Draft Environmental Impact Statement

Wasatch Front Regional Council
DRAFT ENVIRONMENTAL IMPACT STATEMENT

July 1997

Prepared by:

Wasatch Front Regional Council
Parsons Transportation Group
UNIVERSITY-DOWNTOWN-AIRPORT TRANSPORTATION CORRIDOR
SALT LAKE CITY, UTAH

MAJOR INVESTMENT STUDY/DRAFT ENVIRONMENTAL IMPACT STATEMENT

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION
and the
UTAH TRANSIT AUTHORITY

SUBMITTED PURSUANT TO:

JOHN M. JONES
ACTING GENERAL MANAGER
UTAH TRANSIT AUTHORITY

LOUIS F. MRAZ, JR
REGIONAL ADMINISTRATOR
FEDERAL TRANSIT ADMINISTRATION

These signatures authorize the release of this document for public availability.
Major Investment Study
Draft Environmental Impact Statement
(MIS/DEIS)

Responsible Agencies

Lead Federal Agency: U.S. Department of Transportation
Federal Transit Administration

Lead Local Agency: Wasatch Front Regional Council

Title of Proposed Action

East-West Corridor Light Rail Transit Project

For Additional Information Concerning this Document Contact:

Mr. Doug Hattery
Transportation Engineer
Wasatch Front Regional Council
420 West 1500 South, Suite 200
Bountiful, UT 84010
(801) 299-5709

Mr. Ralph E. Jackson
Vice President/Office Manager
Parsons Transportation Group
406 W. South Jordan Parkway
South Jordan, UT 84095
(801) 553-1944

Mr. Don Cover
Director of Program Operations
Federal Transit Administration
U.S. Department of Transportation
216 Sixteenth Street Mall, Suite 650
Denver, CO 80202
(303) 844-3242
ABSTRACT

Based upon coordination with public and government agencies, combined with evaluation of technical considerations, Wasatch Front Regional Council has identified a light rail transit (LRT) system as the preferred alternative to serve the University-Downtown-Airport Transportation Corridor of Salt Lake City, Utah. The 10.9 mile East-West Corridor will be constructed from the University of Utah Health Sciences Center, through the Central Business District (CBD) to Salt Lake City International Airport. It will interface with the existing north-south LRT line at 400 South and Main Street, and at South Temple and 400 West. The East-West LRT project will fulfill the following objectives: improve transit reliability between major destinations within the corridor; reduce traffic congestion; improve air quality; interface with the existing and planned regional transit system; assure minimal impacts on the natural and manmade environment; support development of a multi-modal transportation system that is convenient, accessible, and flexible enough to increase capacity; and connect with service extended to new areas in the future.

This document describes the environmental impacts associated with the construction and operation of the East-West Corridor LRT, as well as the impacts of a TSM and a No-Build alternative. The purpose of analyzing a No-Build alternative is to provide a baseline for comparison of alternatives, as well as to determine the effect of taking no action. The No-Build alternative includes all existing transportation improvements as well as all planned and committed transportation projects listed in the State Transportation Improvement Plan. The environmental, transportation and financial impacts of three alternatives are evaluated and compared against a wide range of considerations including: land use, visual and aesthetic impacts, historic and cultural impacts, parks and open spaces, socioeconomic and demographic, public safety and security, environmental justice, wetlands, ecosystems, water and air quality, floodplains, potential contaminant sources noise and vibration, minerals, utilities, mobility, cost effectiveness, and transportation systems.

Because the East-West LRT line would be constructed and operated in a primarily urban corridor, anticipated negative impacts to the natural and manmade environment are expected to be minimal.

The information contained in this DEIS was used to select a Preferred Local Alternative (LPA) for the University-Downtown-Airport Corridor for further evaluation in the Final Environmental Impact Statement (FEIS) evaluation.
LIST OF PREPARERS
The following persons contributed to the preparation of this MIS/DEIS:

Wasatch Front Regional Council

Doug Hattery is a transportation engineer with 15 years of experience in transportation planning. Oversaw the study process and chaired the steering committee.

Scott Festin, M.A., is a transportation planner with two years experience. Responsible for computerized demographic information and ridership modeling.

Parsons Transportation Group

Ralph E. Jackson, Vice President and office manager for the South Jordan office of Parsons Transportation Group, is a transportation engineer with over 33 years of public agency and private sector consulting experience in transportation planning, systems analysis, facility design, rapid transit technology assessment, bus operations planning, and construction management. He served as the project manager on this study, and oversaw all project operations.

Vicki D. Colton, B.S., is a communication specialist with 6 years of planning & environmental facilitation and technical writing experience. Responsible for coordinating the study team, technical writing and editing, and document production.

Sara Colosimo, P.E., is a transportation engineer with 12 years experience in transportation planning, traffic engineering, and highway design. Special expertise in Intelligent Transportation Systems, urban transportation planning, systems integration, traffic/light rail transit signal timing, signing, and traffic control. Served as a project engineer.

J. Steven Brooks, B.S. is an environmental planner with 23 years experience in environmental planning and NEPA compliance. Responsible for document review for NEPA compliance and quality assurance.

Parsons Engineering Science

Judy L. McCarthy is a senior CADD specialist/graphic designer with 13 years experience in environmental, civil, architectural, structural, electrical, and mechanical design projects. Responsible for production of project graphics.

Bruce H. Christensen is a associate engineer with 3 years civil, environmental, and transportation experience. Served as a staff engineer.

Dr. Marlund Hale, Ph.D., P.E., I.N.C.E., is a noise and vibration specialist with 28 years experience in environmental and industrial noise and vibration control engineering. Responsible for supervising the noise and vibration baseline analysis and impact evaluation.
Thanh T. Luc is a senior engineer with extensive experience in analyzing noise impacts on surrounding communities and designing noise abatement measures. Assisted in the noise and vibration baseline analysis and impact evaluation.

Eckhoff, Watson and Preator Engineering

Dr. Robert Seigel, Ph.D., is a senior transportation engineer with 25 years experience in planning, conceptual design, and analysis of municipal systems, including water and transportation. Supervised evaluation of transportation impacts, and conducted one-on-one public involvement meetings.

Alane Boyd is a civil engineer with 12 years experience emphasizing hydrology, hydraulics, water quality and wetlands. Responsible for evaluation of wetlands, ecosystems, water and air quality, floodplains, potential contaminant sources information.

Randy J. Wahlen, is a civil and transportation engineer with 7 years experience in roadway design, parking design, traffic engineering, and transportation planning. Served as staff engineer responsible for baseline transportation analysis and evaluation of transportation impacts.

Lisa A. Kassels is a biologist and environmental scientist with experience emphasizing wetlands, biology, hydrology, and natural resource management. Responsible for preparing wetlands, ecosystems, water and air quality, floodplains, potential contaminant sources information.

Robert M. Wallace is a civil engineer with a broad background in computer applications in engineering. Responsible for GIS information management and graphics.

Wikstrom Economics

Patricia Callahan, MBA is a financial analyst with 14 years of experience in banking, health care, and transportation. Responsible for the socioeconomic and demographic baseline analysis and evaluation of impacts.

Karen Wikstrom, MS, A.I.C.P, is an economic planner with 16 years of experience in urban economics, real estate and finance. Involved in the socioeconomic analysis and the subsequent evaluation of impacts.

Landmark Design

Jan Streifel, A.S.L.A., A.I.C.P., President of Landmark Design, is a landscape architect and planner with 20 years experience. Responsible for the baseline analysis and evaluation of impacts to land use, visual and aesthetics, historic and cultural resources, and parks and open spaces.
Coley/Forrest

Jean Townsend is President of Coley/Forrest and a consulting economist with 25 years experience specializing in public finance, economic development, real estate and financial feasibility analyses. Responsible for financial analysis.

Bearwest Co.

Ralph Becker, M.S., J.D. has spent 19 years as an attorney, and 25 years in planning and policy analysis, and has 12 years of experience in NEPA compliance. Supervised the public involvement process, and NEPA compliance.

D.J. Baxter, J.D., is an attorney with three years of experience in planning and environmental consulting. Served as a public process facilitator.

Emily Charles is a public process facilitator with 18 years experience in public policy, planning, and public involvement. Assisted in implementing public involvement process and NEPA compliance.
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**CHAPTER 7  COMPARATIVE BENEFITS AND COSTS**

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<td>CERCLIS</td>
<td>Comprehensive Environmental Response Compensation and Liability Information System</td>
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<td>cfs</td>
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<td>HC</td>
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<td>HOV</td>
<td>High-Occupancy Vehicle</td>
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<td>ITE</td>
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<td>ITS</td>
<td>Intelligent Transportation Systems</td>
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<td>lbq</td>
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<td>LOS</td>
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<td>Locally Preferred Alternative</td>
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<td>National Fire Protection Association</td>
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EXECUTIVE SUMMARY

According to the National Environmental Policy Act (NEPA) of 1969, any action undertaken by federal agencies that may have significant impacts on the human or natural environment must be preceded by the preparation of an Environmental Impact Statement. Wasatch Front Regional Council (WFRC), as local lead agency for the University-Downtown-Airport Corridor, is responsible for preparing the environmental documentation required by NEPA. This document must be submitted to the Federal Transit Administration (FTA) as the sponsoring federal agency.

The purpose of this MIS/DEIS is to compare the environmental and transportation impacts of a transportation system management (TSM) alternative and a major investment alternative with a no-build alternative, and select a locally preferred alternative (LPA) for the University-Downtown-Airport Corridor. The information in this document provides the technical information for public agencies, affected communities and the public to evaluate and compare the consequences associated with implementing either Alternative A—No-Build, Alternative B—Bus/HOV, or Alternative C—LRT. The alternative that was selected as the LPA for the East-West Corridor, Alternative C—LRT, combines Light Rail Transit (LRT) with TSM and transportation demand management (TDM) improvements. The MIS/DEIS process is also intended to provide a forum for receiving comments on the impacts and proposed mitigation measures for the LPA, hence both the DEIS and Major Investment Study (MIS) processes used to develop the LPA included public involvement.

This Executive Summary highlights the most significant findings of the EIS under the following leadings:

- Purpose and Need
- Alternatives Considered
- Transportation Impacts and Mitigation
- Environmental Consequences

PURPOSE AND NEED

Purpose

Alternative C—LRT will accomplish the following:
- interface with the regional transit system
- improve transit reliability between major destinations within the corridor
- reduce traffic congestion
- improve air quality
- compatibility with other transportation projects already underway or under consideration in the Salt Lake Valley
- compatibility with the Salt lake City Transportation Master Plan
- assure environmental, community and aesthetic compatibility with surrounding area
- support development of a multi-modal transportation system that is:
  - convenient and accessible to people with a wide variety of needs;
  - flexible enough to increase capacity for short periods of intense travel demand; and
  - flexible enough to extend service to new areas of need as they develop.
Executive Summary

Need
Air Quality
The Salt Lake urban area is designated as a nonattainment area for carbon monoxide (CO), ozone, and particulate matter 10 microns or smaller (PM10). This means the Salt Lake area is in danger of losing federal funding for transportation projects because of poor air quality. As there have been no violations for several years, the state has requested that the EPA remove the area from nonattainment status, however, the area needs to reduce growth in travel to continue to meet air quality standards and thus retain federal funding. It is estimated that more than 80 percent of the CO released into the air in the Salt Lake area comes from vehicles.

The LPA for the east-west corridor is not part of the conforming Long Range Transportation Plan of the conforming TIP at this time. WFRC is in the process of updating the Long Range Plan for the Salt Lake area, which will consider this project. This project will need to be included in a conforming Long Range Plan before a Final EIS and Record of Decision can be completed.

Area Growth and Growth in Travel
Projected population rates for the Salt Lake area indicate a 32 percent increase in population between the years 1995 and 2015. Residential, commercial and industrial growth is increasing regionally as well as within the corridor. In comparison to 1995 activity, projections indicate that by 2015, residential growth in the region will increase 46 percent, commercial activity will increase 33 percent, and industrial employment will increase 21 percent. During the same time, within the study corridor, residential growth is projected to increase roughly 11 percent, commercial growth 21 percent and nonagriculture/nonconstruction employment 20 percent.

Travel in the Salt Lake area is projected to grow significantly over the next 20 years. Total trips will grow by 57 percent by 2015, and VMTs will increase by 62 percent. Total travel to or from the corridor is expected to grow by 28 percent. The increase of growth in total trips and VMTs is greater than the area wide increase in residential, commercial and industrial growth. This is due in part to the following factors: dispersed, single-family development is the most common land use pattern in the area; in recent years, daily auto trips have increased from an average of about two and a half to more than four per household; an increase in car ownership, from 1.89 in 1993 to 2.01 in 2015; and an increasing drive alone rate. Between 1980 and 1990 the drive-alone rate for work trips increased from 67 percent to 76 percent. Congestion is projected to grow faster than either VMT or population. It is anticipated that peak-period delays will result in more than $1.65 million in lost hours on the freeways and arterial roadways as peak-period speeds drop to about 15 miles per hour. Congestion on north-south streets providing access to the corridor will increase by approximately 40 percent by 2015, and within the corridor traffic and parking impacts on neighborhoods is a community concern.

2002 Winter Olympic Games
In February of 2002, Salt Lake City will host the Winter Olympic Games. Major Olympic facilities and much of the area's lodging are located in the corridor, as well as SLCIA, where athletes, coaches, Olympic staff and spectators will likely arrive and depart. In total, it is expected that approximately 70 thousand people will attend the Games in one capacity or another, not to mention the anticipated trips generated by the increased commercial and service activity. For three weeks, Salt Lake will experience an abnormally high travel demand due the associated increase in trips.
ALTERNATIVES CONSIDERED

Screening and Selection Processes of the Major Investment Study

In March of 1996, WFRC began screening and selection of alternatives for the University-Downtown-Airport Corridor. The purpose of the process was to identify those transportation improvements which would be the most effective in improving mobility in the corridor and reducing congestion, while ensuring that environmental and social factors are considered as well. The wide ranges of alternatives were screened based primarily on costs, mobility improvements, operating efficiencies, support of land use policies, and environmental impacts. These criteria were developed with the input of agencies, affected jurisdictions, and the public through a scoping meeting and a Citizens Advisory Committee (CAC). The study looked at conceptual alternatives (different technologies and strategies), alignment options for the eastern and western portions of the corridor, as well as downtown alignment options.

Initially, a wide range of possible technologies and strategies were narrowed to two groups of conceptual alternatives, and a No-Build alternative. One group includes bus, high occupancy vehicle lanes (HOV), TSM and TDM, the other includes LRT, TSM and TDM. These groups of conceptual alternatives form the core of the DEIS alternatives.

The conceptual design details for each of the groups were added with the screening of alternative alignments. The eastern and western alignments screening process looked at three LRT alignment options in both the east and west portions of the corridor, and one bus/HOV alignment on the both east and west sides. The east and west options were screened based on travel time, capital, operations and maintenance costs, mobility improvements, access, neighborhood impacts, and redevelopment potential. Once alignments for LRT and bus/HOV were selected for each end of the corridor alignments to connect the east and west ends were considered as well. The downtown alignment options were screened based on the following criteria: intersection level of service; parking and access preservation, population and employment within walking distance of stations; ease of transfer, environmental impacts, compatibility with land use plans, and compatibility with bus and north-south LRT operations.

Alternatives Considered in Draft Environmental Impact Statement

The three alternatives evaluated in the DEIS are: Alternative A—No-Build, under which no action would be taken; Alternative B—Bus/HOV, which includes bus and high occupancy vehicle lane improvement combined with TSM and TDM strategies; and Alternative C—LRT, which includes light rail transit combined with TSM and TDM strategies. Alternatives were evaluated based on transportation impacts, environmental impacts and benefits, and costs. Alternative C was selected as the locally preferred alternative because, as the locally preferred alternative for the East-West Corridor, LRT/TSM/TDM will do more than either alternative A or B to (1) benefit the environment, (2) promote land use policies and plans, (3) be cost effective in the long view, (4) provide the greatest mobility, and (5) assure the greatest operating efficiencies. (See Table ES-1.)
## Summary of Impacts for DEIS Alternatives

<table>
<thead>
<tr>
<th>MOBILITY</th>
<th>OPERATING EFFICIENCIES</th>
<th>ENVIRONMENTAL AND COMMUNITY</th>
<th>COSTS</th>
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<tr>
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<tr>
<td>TRAVEL TIMING</td>
<td>RIDERSHIP</td>
<td>LOS</td>
<td>REDUCTION IN VMIS</td>
</tr>
</tbody>
</table>

### ALTERNATIVE A
- NO-BUILD
  - N/A
  - N/A

### ALTERNATIVE B
- BUS/HOV
  - POOR
  - POOR
  - GOOD
  - BAD
  - BAD
  - BAD
  - BAD
  - BAD

### ALTERNATIVE C
- LIGHT RAIL TRANSIT
  - POOR
  - POOR
  - GOOD
  - BAD
  - BAD
  - BAD
  - BAD
  - BAD

| Table ES - 1 |
TRANSPORTATION IMPACTS AND MITIGATION

Impacts on Intersection Level of Service

Under existing peak hour conditions, there is a wide variance in level of service (LOS) at existing key intersections. Many operate at LOS C or better with average delay ranging from 3.0 to 21.4 seconds. Some operate at LOS D with average delay of 30.0 seconds or higher. The LOS at five of the existing intersections analyzed was found to be so deficient that the average delay could not be calculated using standard analysis procedures.

The LOS at some of these intersections remains the same under the conditions analyzed for Alternative A—No-Build in the year 2015, but the average delay increases. Many intersections will demonstrate a lower LOS with even higher average delay. Only one intersection, however, experiences a LOS bad enough that the average delay cannot be calculated. Much of this is due to the change in traffic volumes resulting from reconfiguration of the interchanges as part of the I-15 reconstruction.

The future LOS at the same intersections essentially demonstrated no change when analyzed under Alternative B—Bus/HOV. This is primarily because there was no significant change in forecast traffic volumes with this alternative.

Change in LOS at intersections was mixed for Alternative C—LRT. Traffic volumes decreased slightly due to the diversion of some traffic to transit. Offsetting this gain, however, was the impact on traffic operations of implementing the LRT itself, most importantly the increase in difficulty for left turn movements along the LRT alignment. Intersections affected by LRT will need to be modified during preliminary engineering so that adequate capacity is provided and an acceptable LOS is achieved. Based on the traffic operations analysis done in preparing this MIS/DEIS, it appears that the necessary changes can be accomplished within the existing street right-of-way, minimizing any potential environmental impact resulting from these modifications.

Special Generators

One of the unique characteristics of the East-West Corridor is the high number of locations where special events take place on a regular basis throughout the year that are of such a nature that they attract large numbers of person trips. These are also not employment-related activities that would normally be accounted for in the standard transportation modeling process used to forecast the number of potential persons trips by the year 2015. For the purposes of this analysis, these facilities and events were identified as special generators because they are likely to attract a large number of person trips not accounted for in the conventional transit ridership forecasts. A list of 17 special generators located within the East-West Corridor was identified in this analysis. Based on recent attendance figures for these special generators, they attract a total of 8.6 million visitors per year. Since each visit constitutes two person trips, one for arrival and one for departure, this results in a total of 17.2 million person trips per year.

An assessment was made of the likely percentage of these person trips that would possibly choose to travel to and from these events by transit rather than by automobile if improved transit service were available in the future. Alternative B—Bus/HOV would provide a higher level of bus service throughout the corridor by providing a bus every five minutes along the HOV lanes extending the
Executive Summary

A separate analysis was undertaken to estimate the number of transit trips that need to be added to reflect this additional potential transit ridership. In order to provide a conservative estimate of potential ridership, the lower estimate of additional ridership from special generators was used. The estimated annual transit ridership for each alternative is summarized in Table ES-3.

<table>
<thead>
<tr>
<th>TABLE ES-3</th>
<th>ESTIMATED ANNUAL TRANSIT RIDERSHIP (MILLIONS)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Alt A</td>
</tr>
<tr>
<td>Corridor and Region</td>
<td>35.3</td>
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<tr>
<td>Special Generator</td>
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</tr>
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<td></td>
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</table>

**Freight Railroad Operation and Bicycle Impacts**

Freight railroad operation will be impacted at only two locations. The first location is where the LRT will cross over or under the mainline tracks at North Temple. Construction will need to be carried out in such a way that it does not impact ongoing train operations. The second location of potential railroad impact would be at the intermodal transportation center being considered near the intersection of 200 South and 600 West. The details of this impact depend on the final alignment of freight rail, commuter rail and LRT. The nature and extent of this impact will need to be addressed and resolved in the process of preliminary engineering.

UTA currently has a program that allows bicycles to be transported aboard buses. A similar policy is anticipated for UTA operations of LRT. Transit centers, bus stops and LRT stations will therefore be designed with appropriate facilities to accommodate the storage and transportation of bicycles.

**Construction Related Impacts**

The most obvious construction related impact will be the construction of LRT tracks and stations in the center of the street along 400/500 South, 400 West and North Temple. Conceptual plans indicate that most LRT construction will be within existing street right-of-way. Construction of transit centers and park-ride lots would be on acquired right-of-way adjacent to the LRT line or HOV lanes. Appropriate environmental control procedures will be specified in final plans to require proper construction methods that minimize or eliminate potential impacts on such factors as water quality, air quality, noise and traffic control.

**ENVIRONMENTAL CONSEQUENCES AND MITIGATION**

**Visual and Aesthetic Impacts**

The catenary wires and infrastructure would be a visual element in the roadway, however as people become used to them they would blend into existing streetscape, particularly as there will be an existing LRT system in the CBD. LRT infrastructure will fit well into the visual environment at the University Main Campus and Health Sciences Center and at the Airport.

There could be a positive impact on visual quality in the Gateway area. LRT would support
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<th>Alt A</th>
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<th>Alt C</th>
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There could be a positive impact on visual quality in the Gateway area. LRT would support
Executive Summary

Revitalization in Gateway which would encourage street and streetscape improvements, and create opportunities to integrate LRT with a new and much improved image of the Gateway area that includes new sidewalks, lighting, street furnishings and landscape improvements. A new design for streets in the area is an opportunity to improve visual quality and include LRT in the aesthetic solutions.

The cost of catenary systems and station design to fit SLC’s aesthetic standards on the north-south line was included in the capital cost estimate for Alternative C—LRT.

**Land Use: Secondary or Redevelopment Impacts and Support of Existing Uses**

LRT would have a positive effect on existing land uses and would encourage future land uses that are complementary to public transit. Existing Salt Lake City community and neighborhood plans are positively affected by LRT for the following reasons.

The potential for secondary development in the Gateway area and to the south and west of the CBD is a positive implication of LRT development. Transit is a critical element to positive change in the Gateway area—it lends a permanence to the area that can have a direct and positive influence in the scale and success of development projects. The momentum is already moving toward change in the Gateway area, and good public transportation can only accelerate and encourage the kind of development that is oriented toward the pedestrian-friendly urban neighborhood development that is desired for the area.

There would also be a positive impact at the Airport, as the presence of LRT would support the planned development of hotels and other services at a station on the periphery of the Airport, and reduce the need for additional parking facilities, and provide employee transportation.

The presence of LRT would also support existing land use. There is a large amount of commercial and office use along North Temple and 4000 South that could benefit from LRT access, and the pedestrian-friendly atmosphere associated with LRT. LRT would best serve to reduce traffic and parking impacts to neighborhoods by improving access to the University.

**Impacts to Parks and Open Space**

Except for short term construction-related impacts, there are no anticipated negative impacts to parks and open spaces. LRT may, in fact, improve access to several parks within the corridor. Further, urban design of stations in the Gateway Area could incorporate City Creek in the proposed continuance of City Creek Park throughout the Gateway District.

**Impacts to Historic and Cultural Resources**

There are no negative impacts to historic and cultural resources anticipated, as no houses or buildings would be torn down to accommodate Alternative C—LRT. There could be a slight positive impact in the Gateway area and the CBD due to potential adaptive reuse of historic buildings, as access to LRT would complement adaptive reuse of historic buildings.

**Socioeconomic Impacts**

Significant residential population within a few blocks of the LRT alignment assures local access, while reducing commercial infringement on residential neighborhoods. Also, traffic and parking in residential neighborhoods would likely be reduced, thereby protecting quality of life for residents.
Executive Summary

Alternative C—LRT is the only alternative that addresses needs of future growth. Although bus would offer a slight positive impact by supporting existing commercial development, LRT offers the same support to existing uses, while lending much greater support for secondary commercial development throughout the corridor than Alternative B—Bus/HOV. The presence of LRT offers opportunities for new or expanded employment to complement the existing commercial base. LRT would relieve parking pressures and ease congestion in the CBD, and have a significant impact on planned redevelopment in the Gateway Area, as mentioned in the Land Use section above. It would both protect the current market share as well as potentially increase the commercial base and resulting economic output of the corridor.

Ecosystems

It is anticipated that Alternative C—LRT would have some slight impact on wildlife due to removal of habitat, road kills, electrocution, and barriers to movement and visibility. The potential for electrocution could be mitigated with raptor-proof technology to discourage birds from perching or resting on the overhead wires. Short term impacts due to construction would likely include a temporary increase in the impacts mentioned above, (except electrocution). No significant long term impacts to existing stream channels, fisheries are anticipated. Although, due to bridge widening, some short term impacts to water quality and vegetation can be anticipated during construction. Indirect impacts due to construction include invasion of disturbed soils by noxious weeds, and degradation of soil quality through chemicals spills, erosion, or contaminated runoff from paved areas. It should be noted that road kills, noise production and visual barriers to predators would likely increase with Alternative A—No-Build, and the unmitigated increase in traffic associated with Alternative A—No-build. Hence the impact of alternative C—LRT is not as great as it would seem. By mitigating the anticipated increase in traffic and congestion, LRT will likely balance the cost associated with transportation of all modes to the habitat of wildlife in the corridor.

Impacts to Wetlands

Alternative C—LRT will likely impact several wetland areas located within 100 meters of the alignment due to filling for LRT lines and a station located on the periphery of the Airport. These impacts are expected to be minor (one to five acres). Short term impacts due to construction activities could be mitigated by implementing Best Management Practices to prevent sedimentation into adjacent wetlands. A wetland delineation will need to be conducted and addressed in the FEIS. Prior to construction, a 404 Permit will need to be obtained from the U.S. Army Corps of Engineers.

Water Resources/Water Quality

In order to widen bridges in the vicinity of canals, drains, and the Jordan River, it may need necessary to obtain an UPDES permit and a Stream Alteration Permit for widening of bridges in addition to a 404 Permit for wetlands impacts. Although there could be minor impacts due to the potential for urban runoff and non-point source pollution, these impacts are nonquantifiable and could be mitigated by use of Best Management Practices during the construction phases. The implementation of a public transportation system may reduce the amount of cars traveling within the corridor, having a positive impact on water quality because oils and greases associated with motor vehicle travel would be reduced.

Floodplains

Although some sections of the alignment fall within the 100 and 500 year floodplains, it would likely cause no significant impact.
Executive Summary

Potential Contaminant Sources

There are no identified significant differences between alternatives at this time. Further study should be conducted once design details have been decided and the location of infrastructures is determined, and possible roadways are identified for widening.

Mineral Resources

Due to the primarily urban character of the study area there would likely be no significant impacts to minerals. The alignment of Alternative C—LRT would not interfere with extraction of any known mineral deposits in the corridor.

Utilities

Alternative C—LRT would likely require the relocation of utility lines running beneath and parallel to the alignment, as well as lines crossing the right-of-way, which are located closer than approximately three feet from the surface. The cost for relocating the following utilities has been included in the estimate for Alternative C:

- Electric
- Telephone
- Gas
- Sanitary Sewer
- Storm Sewer
- Water

Environmental Justice Considerations

Although both minorities and low income persons live within the study corridor, none of the subareas in the corridor have a majority of minority or low income residents. Impacts and benefits would be distributed evenly throughout the corridor. Since a disproportionate burden or impact cannot be shown in any subarea or against low income or minority residents or minority business owners along the corridor, no negative environmental justice impact can be demonstrated. A full discussion of the public involvement process, whereby residents and business owners had opportunity for input in the decision-making process, can be found in Chapter 2.

Noise and Vibration

The residences located along the alignment and the commercial establishments along 400 South east of 200 East have been identified as being affected by project construction noise and future operational noise and vibration. Construction noise impacts would be significant, but temporary. The main operational noise and vibration impact to these receptors would be from vehicular traffic along the alignment.

Various noise and vibration abatement measures, such as traffic management, design changes, additional right-of-way, landscaping, and noise barriers are discussed. Some are more practical or suitable than others. Short-term construction noise impacts are expected. Several possible construction mitigation measures are given which can be applied when construction activities are within 500 feet of sensitive receptors. Construction equipment noise control measures and construction scheduling measures are also discussed. In addition, temporary, heavy wooden noise barriers are recommended to be used and relocated, as needed. Good public relations with the community also are necessary to minimize the reactions to unavoidable noise. It is recommended...
that communities be notified in advance of the construction scheduling and duration and of the importance of the East-West Corridor project. With regard to mitigating operational vibration impacts, the use of welded track and egg-type, soft, resilient, direct fixation fasteners would reduce vibration impacts to less than significant levels.

**Ar Quality**

Alternative C—LRT will result in a small increase in overall transit ridership in the region, and a corresponding reduction in vehicle miles of travel will result, it is likely to conform with State air quality plans if added to the Long Range Transportation Plan and conforming TIP. There will be no significant decrease in the level of service (LOS) for intersections due to Alternative C—LRT, however, a number of intersections will operate at LOS D or E in the future. It is likely that any possible hot spot impact could be mitigated by minor improvements at corridor intersections. More detailed analysis and consideration of potential hot spots will need to be part of the FEIS.

**FINANCIAL ANALYSIS AND EVALUATION**

For the last 27 years, transit finance has been provided through the Utah Transit Authority (UTA), which was incorporated in March, 1970 under the Utah Public Transit District Act of 1969. The UTA services Salt Lake, Davis, Weber, Utah and Tooele Counties. As an interim measure, between 1970 and about 1975, the regional transit system was subsidized through use of State liquor revenues. This source of subsidy was replaced by a 0.25 percent sales tax approved by voters in Salt Lake and Weber Counties in 1974 and a 0.25 percent sales tax approved by voters in Davis County in 1975.

The primary sources of transportation finance at the State level are funded through a statewide motor fuel tax, currently $0.195 per gallon, motor vehicle registration fees and licenses. Very few State transportation revenues are applied to transit projects. One fourth of State transportation revenues are allocated to local governments based on a formula which includes population, street miles, land area, and the county road allocation is called “B Roads”; the city allocation is called “C Roads.” All funds are to be used for road projects; thirty percent of these funds must be for construction projects or maintenance projects that cost over $40,000.

**Funding Assumptions**

It is anticipated that a major portion of the project capital cost will be funded by grants from the Federal Transit Administration. The percentage breakdown in funding between local and federal funds will be determined as part of the preliminary engineering/FEIS process. Local matching funds will be provided in the form of capital funds, right-of-way and private sector participation.

Consistent with the UTA’s recent cash flow analyses, this study assumes that the Authority has committed its resources available to capital projects to existing capital needs plus funding the North-South LRT until the year 2003. After 2003, the UTA’s capital reserve begins to rebuild as its financial commitment to the North-South LRT lessens. If the FTA were to allow deferral of payment of the local share until the year 2004, then the UTA may be able to participate in financing a share of the capital component of Alternative B or Alternative C.
Projected Expenditures - Capital

Conceptual engineering of the alternatives resulted in the following estimates of capital cost:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Capital Cost</th>
<th>Annual Capital Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - No-Build</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>B - Bus/HOV/TDM/TSM</td>
<td>$37.8</td>
<td>$5.2</td>
</tr>
<tr>
<td>C - LRT/TDM/TSM</td>
<td>$374.0</td>
<td>$30.0</td>
</tr>
</tbody>
</table>

By definition, there is no cost associated with Alternative A—No-Build. The capital cost for Alternative B includes purchase of additional buses along with implementation of the bus/HOV lanes and construction of transit centers and park-ride facilities.

Projected Expenditures - Operation and Maintenance

Estimates of annual operation and maintenance costs were made for each alternative at two levels: one for expanded transit service in the corridor and the second for operation and maintenance of the total regional transit system. O&M costs by level for each alternative were estimated as follows:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Expanded Corridor Service</th>
<th>Regional Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - No-Build</td>
<td>$0.0</td>
<td>$57.8</td>
</tr>
<tr>
<td>B - Bus/HOV/TDM/TSM</td>
<td>$1.9</td>
<td>$59.7</td>
</tr>
<tr>
<td>C - LRT/TDM/TSM</td>
<td>$6.6</td>
<td>$64.4</td>
</tr>
</tbody>
</table>

There is no expanded corridor, and hence, no increase in O&M costs for Alternative A. The annual cost for regional operations under Alternative A is basically for continued operation of the existing bus system, combined with O&M costs for the north-south LRT. O&M costs for Alternative B include all the O&M costs for Alternative A plus operation of a high frequency bus service along the corridor from the University through the CBD to the Airport. O&M costs for Alternative C are based on the following components:

- operation of the north-south LRT
- operation of the east-west LRT
- regional bus operations with a reduction in O&M cost for bus service replaced by the East-West LRT
It is important to note that there is a significant difference in the corridor O&M cost due to the difference between the cost of bus and LRT operations. The difference in regional system operation is not as great because of the large portion of O&M cost associated with the regional bus system that is included in all three alternatives.

Operating Revenues
Annual operating revenue was estimated by multiplying the forecast of annual ridership times an average fare per boarding passenger. Annual ridership for each alternative was adjusted to account for the addition of special-generator patrons. It was estimated in Chapter 4 that special generators would attract as many as 1.65 million patrons who would travel to events by bus. That generates a total of 3.3 million annual riders traveling to and from events under Alternative B—Bus/HOV. The special generator trips for Alternative C—LRT were increased by 20 percent to compensate for the fact that bus is a less attractive mode of transportation than LRT.

This resulted in the following estimates of annual fare box revenue:

<table>
<thead>
<tr>
<th>TABLE ES-6</th>
<th>ANNUAL RIDERSHIP (MILLIONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Normal Transit</td>
</tr>
<tr>
<td>Alternative A</td>
<td>35.3</td>
</tr>
<tr>
<td>Alternative B</td>
<td>36.8</td>
</tr>
<tr>
<td>Alternative C</td>
<td>36.9</td>
</tr>
</tbody>
</table>

Capital and Operating Revenue Shortfalls
A cash flow summary for each of the alternatives is presented in the following table. The annual revenue requirement for any given future year is estimated by adding the estimated annual O&M cost to the annualized capital cost and subtracting the annual fare box revenue. The estimated annual revenue requirement for each alternative is contained in the row labeled "Annualized Net Cost" in the following table. As indicated, the estimated future fare box revenue covers only about 29 or 32 percent of the annual O&M costs. This means that fare box revenues cover only part of the annual O&M cost and none of the annualized capital cost. The annualized net cost constitutes the cash flow shortfall for each alternative is summarized in Table ES-7.
TABLE ES-7
ANNUAL CASH-FLOW SHORTFALL
($ MILLIONS)

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Alternative A - No-Build</th>
<th>Alternative B - Bus/ HOV/TDM/TSM</th>
<th>Alternative C LRT/TDM/TSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual O&amp;M</td>
<td>57.8</td>
<td>59.7</td>
<td>64.4</td>
</tr>
<tr>
<td>Annual Revenue</td>
<td>16.9</td>
<td>19.2</td>
<td>19.6</td>
</tr>
<tr>
<td>Annual Shortfall</td>
<td>40.9</td>
<td>40.5</td>
<td>44.8</td>
</tr>
<tr>
<td>O&amp;M</td>
<td>0.0</td>
<td>5.2</td>
<td>30.0</td>
</tr>
</tbody>
</table>

COST EFFECTIVENESS

Added Annual Cost Per Added Passenger

The annual cost for each alternative was calculated by adding annual O&M costs to annualized capital costs and subtracting annual revenue for each alternative. Annual revenue was adjusted to account for special-generator passengers. The ratio was calculated by dividing added annual passengers into added annual cost. The results are summarized in Table ES-8.

TABLE ES-8
NET ANNUAL COST VERSUS ADDED ANNUAL RIDERS

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Alternative A</th>
<th>Alternative B</th>
<th>Alternative C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Cost</td>
<td>$40.9</td>
<td>$45.7</td>
<td>$74.8</td>
</tr>
<tr>
<td>Added Cost</td>
<td>$0.0</td>
<td>$4.8</td>
<td>$33.9</td>
</tr>
<tr>
<td>Annual Riders</td>
<td>35.3</td>
<td>40.0</td>
<td>40.8</td>
</tr>
<tr>
<td>Added Riders</td>
<td>0.0</td>
<td>4.7</td>
<td>5.5</td>
</tr>
<tr>
<td>Added Cost per Added Rider (not millions)</td>
<td>$0.0</td>
<td>$1.02</td>
<td>$6.16</td>
</tr>
</tbody>
</table>

The added cost per added rider is higher with Alternative C because of greater capital and O&M costs associated with the additional riders.
STRATEGY AND RATIONALE

Alternative C—LRT/TDM/TSM is recommended as the locally preferred alternative for the reasons outlined in this report. The strategy and rationale for the LPA are briefly highlighted as follows.

Alternative C is recommended as the Locally Preferred Alternative because LRT:

- Is consistent with recommendations of the Long Range Transit Analysis;
- Offers a logical extension and a complement to the North-South line;
- Has higher capacity to accommodate increasing transit passenger volumes resulting from the following:
  - increasing population and employment in Downtown area;
  - extension of LRT into other corridors;
  - implementation of Commuter Rail service;
  - growth in travel demand at special generators (such as, Airport, Convention center, Temple Square, LDS Assembly Building, University);
- Has short-term higher capital cost compared to bus, but those are offset by lower O&M cost per passenger for LRT in the long run; particularly if commuter rail is initiated and additional LRT corridors are implemented;
- Has higher passenger capacity per unit:
  - 125 passengers, compared with 55 per bus
  - 500 passengers per train, 4-train unit;
- Reduces number of vehicles on downtown streets (compare two-car LRT with ten busses);
- Emits none of the air pollution that busses do;
- Is more attractive to potential transit passengers;
- Offers better intermodal service/penetration for Airport/University;
- Can provide significantly higher capacity for Special Event service:
  - with minimal increase in operating costs
  - with lower impact on event traffic congestion;
- Supports SLC Master Plan and assists in directing land use and development.

These benefits of LRT will offer optimal service for the University-Downtown-Airport Transportation Corridor when combined with TSM and TDM actions.
CHAPTER 1
PURPOSE AND NEED

1.1 INTRODUCTION

The Salt Lake Area will reach a population of over 1.2 million by the year 2015. Including the Provo and Oden areas, the population of the Utah Wasatch Front Region will exceed 2 million by 2015. The Wasatch Front Regional Council (WFRC), the Utah Transit Authority (UTA), the Utah Department of Transportation (UDOT) and The City of Salt Lake, in cooperation with other agencies and entities, are proposing transportation improvements along an east-west corridor extending from the University of Utah, through the Salt Lake City central business district (CBD), to the Salt Lake City International Airport (SLCIA), connecting the three largest generators of traffic in the Salt Lake region. In its Long Range Transportation Plan, WFRC identifies this corridor as one for potential major transit investments: a vitally important anchor corridor that will help form the foundation of a regional transportation network. Improvements in the corridor have broad implications for upgrading the entire regional transportation system, because so many daily trips travel to or through this corridor. A detailed description of average daily traffic along the corridor is provided in Chapter 4 Transportation Impacts.

Interest in transportation improvements along the corridor has developed from several sources. As mentioned above, studies predict a significant population and employment increase (50 percent) by 2015. Detailed discussions of the existing population and employment and the anticipated growth rate are presented in Chapters 3 and 5, respectively. Interstate 15, part of the regional north-south highway system, is expanding as well. Through the Salt Lake area, I-15 is currently being reconstructed to upgrade the viaducts and to add a high occupancy vehicle lane, a single occupancy vehicle lane and an auxiliary lane in each direction. Poor air quality in the Salt Lake area has led the EPA to designate various parts of the area as non-attainment areas for concentrations of carbon monoxide, ozone and fine particulate matter (PM10). As part of the air quality mitigation measures for the additional capacity added to I-15 during its reconstruction, the UTA is constructing a light rail transit line from Sandy to Downtown Salt Lake City. This line will carry not only Downtown-bound passengers, but also passengers traveling to the Airport and University. The north-south light rail line will be the backbone of a regional transit system, as I-15 is the backbone of the regional highway system.

The east-west corridor serves as a distributor corridor to both north-south transit and highway systems. The three entities that generate the most automobile traffic in the corridor—the University of Utah, the CBD and the SLCIA have created a pressing need to implement transportation improvements in the corridor to link these entities to the regional transportation system. Neighborhoods located between these generators which are affected by the regional traffic filtering through the residential areas to reach these large destinations, could benefit from transportation improvements in the corridor. These transportation improvements would accommodate regional as well as local traffic.
Chapter 1 Purpose and Need

As a final consideration, Salt Lake City will be hosting the Winter Olympic Games in 2002. During the games, traffic at the Airport will intensify significantly and many of those arriving at the Airport will need transportation to the Downtown and University areas.

1.2 MISSION AND GOALS OF THE EAST-WEST MIS/DEIS

1.2.1 Mission Statement

The mission of this study is to select the best ways to meet future travel demands within the transportation corridor extending from the University of Utah, through Salt Lake City’s CBD and the SLClA to the International Center, all located in Salt Lake County, Utah. To this purpose, WFRC, UTA, UDOT and Salt Lake City, in cooperation with other agencies and entities, have prepared a Major Investment Study (MIS) and a Draft Environmental Impact Statement (DEIS).

The East-West MIS/DEIS identifies the need for future major transportation investments in the East-West corridor and develops recommendations and environmental documentation to meet those needs through examination of a reasonable range of alternatives. The MIS process develops alternative approaches to transportation improvements in the corridor on the basis of feasibility and cost-effectiveness and provides a range of alternatives with environmental analysis and documentation. This study also selects a preferred alternative, identifies funding sources and determines the feasibility of the preferred alternative. The study examines the alternative of taking no action, as well as action alternatives which include investments in highway and transit improvements. The DEIS process, required by the National Environmental Policy Act (NEPA) of 1969, was used to evaluate the environmental impacts of the alternatives as they were developed. The DEIS documents the range of alternatives initially considered in the MIS and describes the rationale for the selection of the Locally Preferred Alternative (LPA). Site-specific environmental impacts for the LPA, design options and mitigation strategies have been documented for public and agency review and comment.

During the 45-day review period, the public will have an opportunity to comment on and provide input to the LPA’s design options and mitigation commitments. After circulation and consideration of written and oral comments, design options will be refined through preliminary engineering of the LPA and specific mitigation strategies will be developed. These mitigation strategies will be documented in the FEIS and the Record of Decision (ROD).

1.2.2 Goals of the Study

Specifically, the study seeks to identify improvements that would be feasible and cost-effective. The initial goal is to choose an alternative which:

- Interfaces with the regional transit system;
- Improves transit reliability between major destinations within the corridor;
- Reduces traffic congestion;
- Improves air quality;
Chapter 1 • Purpose and Need

- Is compatible with other transportation projects already underway or under consideration in the Salt Lake region;
- Is compatible with the Salt Lake City Transportation Master Plan;
- Assures environmental, community and aesthetic compatibility with surrounding areas; and
- Supports development of a multi-modal transportation system that is:
  - Convenient and accessible to people with a wide variety of needs;
  - Flexible enough to increase capacity for short periods of intense travel demand; and
  - Flexible enough to extend service to new areas of need as they develop.

1.3 DESCRIPTION OF THE STUDY CORRIDOR

1.3.1 Boundaries and Physical Features

Due to the constraints of the mountains on the east and the lake on the west, development along the Wasatch Front has necessarily spread to the north and south. The east-west corridor transects a wide swatch of this longer north-south corridor as can be seen in the regional map in Figure 1-1. The details of the study corridor boundaries are found in the corridor map in Figure 1-2. Generally, the study corridor extends west from the University of Utah campus on the eastern edge of Salt Lake City, through the CBD and SLCIA to the International Center on the far west.

The physical features of the east-west corridor are varied. As the mountains and foothills on the east edge slope to the lake shore on the west, the corridor is traversed by several creeks and waterways and is constrained by wetlands and a variety of other physical features. A full description of the affected environment is presented in Chapter 3. A detailed evaluation of the environmental effects of the DEIS alternatives can be found in Chapter 5.

1.4 PLANNING CONTEXT

1.4.1 Future Growth By Location: Major Traffic Generators

Within the east-west corridor, there are a wide range of land uses, as well as variations in socio-economic characteristics of population and employment, which have grown significantly in the last few years. WFRC forecasts show population in the Salt Lake urban area will grow from 906,935 in 1990 to 1.2 million by 2015. Employment is forecasted to rise to 638,720 by 2015 from 474,096. Within the east-west corridor itself, population is expected to grow from roughly 50,000 in 1990 to 60,000 in 2015. Non-agriculture, non-construction employment in the corridor is expected to increase from 130,000 in 1990 to over 167,000 in 2015.

As mentioned in the introduction, three of the largest traffic generators in the Salt Lake Valley lie within the corridor. At the eastern edge, the University of Utah generates an average 180,000 vehicle
Great Salt Lake

Wasatch Front Transportation Improvements

- TRAX - Light Rail Line w/ Stations
- Future LRT Extensions
- Potential Commuter Rail
- Intermodal Centers
- I-15 Reconstruction

Figure 1-1

July 9, 1997

DIGISCOADD1212ELEV/UTAMAP2.COR
University-Downtown-Airport Transportation Corridor
Major Investment Study-Draft Environmental Impact Study

Figure 1-2 Corridor Map
trips per day and by 2015, will likely generate some 206,000 trips per day. Most of these trips originate outside the immediate proximity of the University area and, therefore, contribute to travel demand and congestion on a variety of routes. Traffic generated by the University includes travelers associated with campus academic programs, and employees and patients at University Hospital and Primary Children’s Medical Center. Additional traffic is also generated in that area by the 4,200 employees at firms in Research Park and by members of the public traveling to the University to attend sporting events, concerts and other special events held on the campus.

The University Corridor Transit Study, commissioned by WFRC in 1993, cites employment growth at the University and Research Park, as well as growing enrollment at the University, as reasons to study expanded transportation alternatives. Adequate parking will continue to be a concern, especially as new construction continues, making available land scarce. Also, community groups want to discourage campus-bound traffic on such streets as 1500 East, South Temple and 200 South. The University plans to channel more of this traffic to major approaches—Foothill Drive, 1300 East, 500 South—by making parking most accessible from these routes. To address the issue of internal circulation, the University is planning to develop an internal distribution system that would connect to a transportation system in the corridor.

In the center of the corridor, the CBD is the largest generator of traffic in the Salt Lake Valley, producing an average 460,000 vehicle trips per day. This number is expected to jump to 501,000 by the year 2015. Travelers approach the CBD from all directions, but the primary approaches of automobile traffic are from the south and north. Secondary, but significant, use is generated by those who live in residential areas east and west of town and commute to and through the Downtown area by a combination of east-west and north-south routes. The CBD and adjacent areas include a wide variety of traffic generators, including large employers, most of whose traffic is generated during weekday rush-hour periods. Other traffic generators include special event facilities, shopping and entertainment centers, which tend to generate more traffic during the evenings and on weekends. Internal circulation is also an issue in the CBD. A passenger-rail station is already located along the western edge of the CBD and is close to the site that may house an intermodal transportation facility at some future time.

The west end of the corridor contains the SLCIA which generates an average of 107,000 vehicle trips per day and is predicted to generate 242,000 trips per day by 2015. Because SLCIA’s primary access is from Interstate 80 (which extends east-west), much of the traffic generated by the Airport approaches from the east. North Temple Street also provides a significant local access route to the Airport area. The growth in air traffic through SLCIA, which is expected to double in the next 20 years, will place increased demand on existing transportation facilities. It is anticipated that automobile traffic into the Airport will increase substantially.

In addition to the primary traffic generators in the corridor, each section of the corridor contains facilities that generate large volumes of traffic on a less regular basis. Special events facilities such as the Delta Center located Downtown, and Rice Stadium and the Huntsman Center located on the University campus, all sponsor periodic events that draw large crowds. These events often generate high traffic volumes in the evenings and on weekends. The Airport also generates additional traffic volume beyond its normal flow, primarily during holiday and summer travel periods. These factors create the need for a corridor transportation system that can quickly and efficiently provide additional capacity for short periods of time.
14.2 Future Growth By Type: Residential, Commercial, Industrial

The discussion above examines growth by location. The growth within the corridor can also be viewed in terms of the type of growth that is expected to occur (See Figure 1-3). Residential growth between 1995–2015 is expected to be relatively slow, with a projected increase of about 4.8 percent over that 20-year period. This measure is based on the number of additional dwelling units that are likely to be built. The rate of commercial growth, based in part on increasing amounts of office space, will be somewhat higher, measuring 14.9 percent over the coming 20 years. Finally, industrial growth, estimated at 37.8 percent by 2015, will see the largest increase in the corridor.

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Figure 1-3: Growth by Type

14.3 Past Studies

Transportation improvements along the east-west corridor (or affecting it) have been identified in several recent studies:

In its Long Range Transportation Plan for the Salt Lake Area, the WFRC has identified the east-west corridor as a potential corridor for major transportation investments. Locations along this corridor boast the highest employment densities in the Salt Lake metropolitan area. This document recommends a high level of investment in transportation improvements along the east-west corridor as part of a region-wide plan to reduce congestion and maintain air quality. As the region grows in the future, travel in the corridor will increase. While the Long Range Plan does identify this as a corridor for future major transit investments, physical and other constraints will limit major roadway improvements during the next 20 years. Traffic capacities will improve only slightly, if at all, while demands will continue to escalate.

Integration with the Long Range Transportation Plan and STIP is a critical aspect of the east-west MIS/DEIS. WFRC’s 20-year Long Range Transportation Plan identifies the corridor for substantial investments in transit improvements. Once the study is complete, the Long Range Transportation Plan may be amended to include specific recommendations if funding sources can be identified and the LPA is an action alternative. In order to secure the funding commitments
necessary for a project to be included in the Statewide Transportation Improvements Plan (STIF), UDOT’s primary short-term funding and planning process, it must also be included in the Long Range Transportation Plan.

The Long Range Transit Plan for the Salt Lake and Ogden areas is aimed at developing recommendations for future bus service, identifying corridors for future major transit investment and recommending ways to meet inter-city transit needs. Completed in 1996, the analysis recommends a high level of investment in transit in the Salt Lake Area. The analysis found that transit investment would be the most effective in terms of mobility improvements and cost effectiveness, and the most consistent with the long-term goal of implementing transportation improvements over a 20-year planning horizon. The analysis identifies the University-CBD-Airport corridor as the most likely area for possible major investment, as the CBD and the University are, respectively, the first and second largest activity centers in Salt Lake County when ranked by combined total trips and trip density. The Airport is the fifth largest activity center.

The I-15/State Street Corridor Study and Final Environmental Impact Statement evaluated highway and transit alternatives in the corridor from Downtown Salt Lake City to Sandy. A light rail transit system along the Union Pacific right-of-way from 10000 South to Downtown was identified as the preferred transit alternative. Highway improvements include widening I-15 to accommodate one additional traffic lane, an HOV lane and an auxiliary lane in each direction. All interchanges between 10600 South and 500 North will be reconstructed. An Environmental Impact Statement was prepared and final design and construction is underway.

The Salt Lake City Transportation Master Plan outlines the City’s goals for all modes of transportation and recommends corridors for future improvements. The city council adopted policies which emphasize transit over highway as the best way to upgrade the transportation system.

The Salt Lake City International Airport Master Plan defines the future of physical development at the Airport, including transportation. The Airport Master Plan is based on an entirely new configuration of terminal facilities at the Airport. A new central terminal building is being planned with a north-south underground people mover that will connect the east-west concourses and the terminal building. Traffic related to passenger arrivals and departures will be on separate levels. Pedestrian bridges will provide connections to a new transportation center and parking structure south of the Airport access roadway. Provision is being made in plans for the roadway access system and transportation center to accommodate an LRT line and station. The transit station would be on the concourse level with a direct walking connection to the central terminal and concourses.

The recently completed Salt Lake City Central Business District Transportation Plan analyzed traffic volumes, parking capacities, bus routes and proposed light rail alignments in the Downtown area.

The draft Salt Lake City Intermodal Site Environmental Assessment, prepared by WFRC, UTA and Salt Lake City and published on June 25, 1997, identifies the future location of the Amtrak and Greyhound depot at the southwest corner of 200 South and 600 West in Salt Lake City’s Gateway Area. The study provides an environmental assessment of the site and recommends a Finding of No Significant Impact (FONSI). The facility may also serve future LRT
and commuter rail passengers, depending on the outcome of the Commuter Rail Feasibility Study and subsequent planning processes.

The University of Utah Long Range Development Plan, completed in Spring 1997, outlines the referred transportation alternatives in and around the University, including automobile traffic, parking and transit.

The University of Utah Transit Corridor Study evaluated various transit options and alternative alignments for improving service between Downtown Salt Lake City and the University of Utah. An extension of the proposed I-15/State Street corridor LRT line was one of the feasible alternatives identified for further evaluation.

1.4.1 Current and Future Studies

The Gateway Study is focused on developing alternative secondary development strategies for the land that will be made available in the Gateway area by the removal of certain rail lines as proposed in the Salt Lake City Gateway Area Railroad Consolidation Study, published on February 16, 1996. The Gateway Study will evaluate the environmental impacts of alternatives and make a recommendation for the location of future commuter rail and light rail intermodal facilities. It will also recommend zoning densities. It is not yet clear what lines will be removed, or how much land will be made available. Much depends on the reconstruction of I-15, as the I-15 project will determine the length of the viaducts at 400 South, 500 South and 600 South, all located within the boundaries of the Gateway Area. The Gateway Study is expected to be complete by the end of October 1997.

The Ogden Intermodal Study is evaluating sites for a future intermodal facility in the Ogden Downtown area. As of July 1, 1997, the preferred site location combines land west of Wall Avenue and north of the 24th Street viaduct with lands on the east side of Wall Avenue, linking the two portions of the site. It is anticipated that the Ogden Intermodal Facility will serve as a transit hub for UTA bus service and possibly for a future commuter rail service.

The Commuter Rail Feasibility Study is currently evaluating the feasibility of a commuter rail line from Brigham City to Payson. The line would use existing freight rail right-of-way to distribute AM and PM peak hour commuters from the Ogden, Salt Lake and Provo areas. Although the study is not yet complete, it is clear that the operational success of the Regional Commuter Rail system depends on some part on the accessibility of east-west transportation systems at destination stations.

West Valley City is currently undertaking a Major Investment Study to examine transportation alternatives in the West Valley City (WVC) corridor, as well as the location of an intermodal facility. WVC is the location of the Ice Arena to be used for the 2002 Winter Olympics; it will be necessary to provide a reliable system which ties into the regional transportation system.

The North I-15 Major Investment Study is currently evaluating the need for transportation improvements on I-15 in Davis County. The West Davis Highway MIS is evaluating alternatives for a belt route, also in Davis County. There also is a Major Investment Study evaluating I-80 from Parley’s Canyon to the I-15 Interchange, in Salt Lake County.

There are several future studies proposed in the Salt Lake Region. WFRC is in the process of procuring a consultant to carry out a preliminary transportation feasibility study in the Sandy, Draper
and West Jordan corridors. This study will evaluate the potential for implementing improved transportation service in each of these corridors. If results turn out promising in one or more of the corridors, an MIS would be initiated followed by continued implementation, as appropriate.

1.5 TRANSPORTATION FACILITIES AND SERVICES IN THE CORRIDOR

1.5.1 Roads
The corridor contains a variety of roads offering different levels of service and capacities (See Figure 3-8 in Chapter 3). Three major freeways serve the corridor. Interstate 15 (I-15), which is the highest volume roadway in the state, runs north-south through the Salt Lake valley and delivers large volumes of traffic into the center of the corridor from both directions. It is a major access route to and from the CBD and serves traffic traveling to the University of Utah and SLCIA as well. Traffic is also delivered into the east and west sides of the corridor from the south by Interstate 215 (I-215), a belt route that encircles Salt Lake City on the east, west and south sides. Finally, the corridor contains Interstate 80 (I-80), which is located within the study area on the west side of I-15 and lies outside, but parallel to the study area on the east side of I-15. I-80 is the major east-west corridor through the Salt Lake area and serves as the principal access route to the Airport.

The corridor also contains seven principal arterials. The only ones running east-west are 500 and 600 South, both one-way streets that provide the major access to the CBD from I-15. Running north-south, five principal arterials carry traffic to and through the corridor. Foothill Boulevard, which connects to 400 South/500 South, serves as a principal arterial for traffic from Southeast Salt Lake County. Both 700 East and State Street serve the CBD and University from the south. On the west side, the Bangerter Highway and 5600 West serve the CBD and the Airport from the south.

Other important east-west streets include 400 South and South Temple streets, both minor arterials, which provide access to the University of Utah on the east side of the corridor and North Temple, also a minor arterial, which serves the areas west of the CBD to the Airport. Several north-south streets are important as well, such as Redwood Road, 300 West and West Temple. These are minor arterials that deliver traffic into the CBD from the South, and 1300 East, which is a minor arterial that delivers substantial traffic to the University from the south.

1.5.2 Public Transit
The UTA currently does not operate any bus routes that run continuously from one end of the corridor to the other. However, there are 20 routes that travel within the corridor, 14 of which operate the entire length between the CBD and the University of Utah. On the west side, 11 routes operate in the corridor, with four routes traveling the entire length between the CBD and the Airport. These 31 routes operating within the corridor range in frequency from every 20 minutes throughout the day to one round-trip per day. Flextrans, UTA’s specialized transit for the disabled, also operates in the corridor. However, there is no set routing, as Flextrans service provides individually routed service for its riders.

Over the past 10 years, ridership on routes operating in the corridor has increased. From 1985–1995, ridership on the east side corridor routes increased 11.5 percent, an average increase of just over one percent per year. During the same time period, ridership on west side corridor routes increased 28.3 percent, an average increase of 2.5 percent per year.
Because of congestion, travel times have increased in the corridor as well. From 1985–1995, scheduled travel times between the CBD and the University of Utah have increased 6.6 percent. During the same time period, scheduled travel times between the CBD and SLCIA have increased 2.9 percent.

During 1996 and 1997, major changes in the transit system are planned, many of which will have impacts in the corridor. The realignment of routes is being studied in two phases. The first phase will comprehensively analyze the routing structure on the west side of Salt Lake County. The second phase will do the same on the east side. West side planning indicates a need for increased frequency of service between the CBD and SLCIA. In addition, express service to the International Center is being studied. On the east side, streets served by multiple routes are being analyzed to provide better spacing between buses on each route. Numerous other realignments and frequency调整 scenarios are being analyzed that are intended to improve service within the corridor. Further changes in service are anticipated once the north-south light rail is constructed.

Opportunities for Growth in Transit Ridership

Node-split identifies the relative percentage of person trips using each transportation mode including auto, bus, bike, or walk. Recent surveys of mode split suggest that transit ridership at the University has stabilized. The University of Utah reports that sales of bus passes—which are heavily subsidized by the University and offered at a greatly reduced rate to students and faculty—have leveled off in recent years. Although UTA buses going to the University appear to be full, nearly 70 percent of faculty and students drive an automobile to reach the campus, while about 12 percent ride public transit. The remainder walk or travel by bicycle. Factors contributing to this include the University of Utah being a commuter campus where many of the students follow a triangular travel pattern (home—school—work—home), which makes it difficult to rely on public transit, particularly in the late evening.

In the CBD, however, greater potential exists for increasing transit ridership. Current data gathered by WFRC suggest that the Downtown area (600 South to 600 North, 1-15 to 200 East) generates approximately 385,000 person trips per day. Of these, nearly 15,000 are transit trips, producing transit ridership of approximately 3.8 percent. Predictions indicate, however, that by 2015, transit ridership among trips generated by the CBD will increase to 5.4 percent of total trips.

Similarly, transit ridership to the Airport is expected to increase significantly. Current numbers show that SLCIA generates approximately 84,000 trips per day, 742 of which arrive by public transit, resulting in transit ridership of 0.9 percent. By 2015, however, this ridership is expected to nearly double when total trips will amount to 167,500 per day and 2,880 of those people will ride public transit, a ridership of about 1.7 percent.

1.6 SPECIFIC TRANSPORTATION PROBLEMS IN THE EAST-WEST CORRIDOR

16.1 Growth in Travel

Travel in the Salt Lake area is projected to grow significantly over the next 20 years. Total trips will grow by 57 percent, from 7.25 million trip-ends per day to 11.4 million in 2015. Vehicle miles traveled (VMT) will grow even faster, from current levels of 21 million to 32 million in 2015, or 62
percent. Both of these increases outstrip the projected growth in population and employment in the region. A number of factors contribute to this higher growth rate for travel:

- Land use patterns and dispersed development;
- Increased trip-making;
- Higher levels of car ownership;
- Increased drive-alone rate; and
- Population and employment growth.

These factors contribute to the delays and the lack of mobility Salt Lake area drivers are already experiencing in the corridor. One factor by itself would not necessarily generate much traffic congestion, but when combined, these factors have resulted in dramatic increases in congestion. In a 1993 report, the Texas Transportation Institute listed the Salt Lake City Urban Area—which includes all of Salt Lake City, most of Salt Lake County and south Davis County—as having the second largest percentage increase in congestion in the nation between 1982 and 1990, at 35 percent. The report also noted that despite this increase, Salt Lake City still maintained one of the lowest rates of congestion. Nevertheless, as this trend continues, Salt Lake City will need to prepare for the anticipated increases in congestion.

This trend is reflected in the study corridor. Currently, 15.58 percent of all trips in the Salt Lake area will have one or both ends within the corridor: 2.48 percent at the University of Utah, 6.35 percent in the CBD, 1.47 percent at SLCIA and 5.28 percent in other areas of the corridor. While the percentage of trips beginning or ending in the corridor will decrease to 12.73 percent by 2015, total travel to or from the corridor is expected to grow by 28 percent, from 1,130,000 to 1,452,000.

**Land Use Patterns and Dispersion**

Residential land use patterns in the Salt Lake urban area are dominated by single-family housing. While the acreage in suburban high density (6-15 people/acre) has grown in past decades, it has not yet surpassed the amount of acreage in suburban low density (3-6 people/acre) and exurban rural (1-3 people/acre). Residential development with more than 15 people per acre has not increased appreciably and amounts to about four percent of low density suburban land use. Such relatively low densities can make transit systems less practical, as some transit modes require high concentrations of users in order to serve their intended riders effectively. A second land use pattern that increases auto dependence is the separation of commercial and residential uses. Commercial/industrial use has spread, but is not what one could call interspersed. If it were more interspersed, people would not have to travel as far or as often to get to work or run errands.

**Increased Trip-Making and Vehicle-Miles Traveled**

The third factor contributing to congestion is an increasing trip rate. In 1993, the WFRC conducted a daily travel survey of about 3,000 households located throughout the Ogden, Salt Lake and Provo urban areas. The last time such a survey was conducted in the region was 1962. Across the entire region, daily auto trips per person have increased from an average of about two-and-a-half to more than four. Trips per dwelling unit and per employee have also grown. Daily auto trips per auto have decreased only because of the increasing number of cars per person, which is discussed below.
Vehicle miles traveled (VMT) reflects trip-making activity. The projected increase in weekday VMT from 1990–2015 is about 90 percent, or about twice as much as population growth in the same time period. This will, in part, be determined by the increase in the number of automobiles per household, which is predicted to grow from 1.89 in 1993 to 2.01 in 2015.

The regional trends reflect national trends. Part of the increase in trip making results from more women having driver’s licenses and owning cars. For example, in 1990, 85 percent of women had a driver’s license, whereas only 76 percent had one in 1983. Men’s trip rates have increased also. For both women and men, the largest growth occurred both nationally and regionally in nonhome-based, personal-business trips, such as driving from work to a restaurant for lunch.

Current and forecasted trip rates for major traffic generators within the corridor are particularly important to this study.

**Automobile Ownership**

The fourth factor underlying congestion is growth in auto ownership. Nationally, between 1969 and 1990, the number of autos per household increased from 1.16 to 1.77. According to WFRC travel surveys, auto ownership in the region grew from about 1.2 per household in 1962 to about 1.89 in 1990. This number is expected to grow to 2.01 by 2015. Auto ownership within the corridor, however, is slightly lower at 1.05 and is expected to increase to 1.20 by 2015. As vehicles have become more available, people have been driving more.

**Drive-Alone Rate**

A high and increasing drive-alone rate is the final primary cause of congestion. While the discussion here is on work trips, the drive-alone rate for other trips also has increased. Across the Wasatch Front between 1980 and 1990, the drive-alone rate for work trips grew from about 67 percent to 76 percent.

Although the WFRC Long Range Transportation Plan (LRTP) projects a 15 percent decrease in the drive-alone rate for work trips, the projected decrease will not be sufficient to prevent congestion from getting worse, as congestion in the urban area is projected to grow faster than either VMT or population. Weekday VMT is expected to increase from about 18 million miles to 34 million miles or four percent a year. Financially constrained plans for additional lane miles only include an increase of approximately 0.5 percent a year. Consequently, even though the LRP includes almost $1 billion in highway and transit capacity improvements, peak-period speeds along freeways and arterials will fall an average of about 15 mph. This will result in peak-period delays totaling more than 150,000 hours each weekday. Assuming an average hourly wage of $11.00, this results in more than $1.65 million lost each day, not including associated fuel costs. For the average commuter, this delay equates to roughly 10 to 20 minutes twice a day on the most congested facilities.

In addition to these decreases in mobility, accessibility is also projected to be severely reduced. Average travel time to work under congested conditions in 2015 is predicted to be over 30 minutes, up from 20 minutes in 1990. It is important to note that without the improvements in the LRTP, congestion would be much worse in 2015. For example, peak speeds would fall below 10 mph.

### 1.6.2 Traffic Congestion on North-south Streets Providing Access to the Corridor

Congestion is a problem on many north-south streets that deliver traffic into the corridor. Several highways, principal arterials and minor arterials deliver traffic into the corridor from the south,
including I-15, I-215, 5600 West, the Bangerter Highway, 2700 West, Redwood Road, 3100 West, State Street, 700 East, 1300 East and Foothill Boulevard. All of these access routes face severe congestion problems during peak hours and traffic projections forecast continued growth, as shown on Table 1-1. Overall, traffic on these routes will increase by approximately 40 percent by 2015. Whereas, overall capacity will increase by only 20 percent by 2015, despite planned improvements to these routes.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>5600 West</td>
<td>17,875</td>
<td>67,000</td>
<td>2.75</td>
</tr>
<tr>
<td>Bangerter Highway</td>
<td>38,255</td>
<td>59,000</td>
<td>0.54</td>
</tr>
<tr>
<td>2700 West</td>
<td>19,150</td>
<td>35,000</td>
<td>0.83</td>
</tr>
<tr>
<td>I-215</td>
<td>84,970</td>
<td>130,000</td>
<td>0.53</td>
</tr>
<tr>
<td>Redwood Road</td>
<td>51,080</td>
<td>59,000</td>
<td>0.16</td>
</tr>
<tr>
<td>300 West</td>
<td>27,355</td>
<td>45,000</td>
<td>0.65</td>
</tr>
<tr>
<td>I-15</td>
<td>181,695</td>
<td>221,000</td>
<td>0.22</td>
</tr>
<tr>
<td>State Street</td>
<td>38,510</td>
<td>45,000</td>
<td>0.17</td>
</tr>
<tr>
<td>700 East</td>
<td>50,715</td>
<td>70,000</td>
<td>0.38</td>
</tr>
<tr>
<td>1300 East</td>
<td>44,075</td>
<td>50,000</td>
<td>0.13</td>
</tr>
<tr>
<td>Foothill Boulevard</td>
<td>45,440</td>
<td>55,000</td>
<td>0.21</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>599,120.00</strong></td>
<td><strong>836,000.00</strong></td>
<td><strong>0.40</strong></td>
</tr>
</tbody>
</table>

The only access to the corridor from the north is via two highway routes—I-15 and I-215—and two minor arterials—Beck Street and Redwood Road. At peak hours, large and rapidly increasing numbers of vehicles attempt to squeeze through a narrow corridor where usable land is pinched between the foothills and the Great Salt Lake. On these routes, traffic is expected to increase by 76 percent by 2015, while capacity will increase by only 20 percent in that time. (See Table 1-2).
TABLE 1-2
INCREASE IN ADT's FROM NORTH

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>115 (North of SLC)</td>
<td>111,820</td>
<td>196,000</td>
<td>0.75</td>
</tr>
<tr>
<td>1215 (North of SLC)</td>
<td>41,500</td>
<td>80,000</td>
<td>0.93</td>
</tr>
<tr>
<td>heek Street</td>
<td>31,275</td>
<td>47,000</td>
<td>0.50</td>
</tr>
<tr>
<td>ledwood Road</td>
<td>16,300</td>
<td>30,000</td>
<td>0.84</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>200,895.00</strong></td>
<td><strong>353,000.00</strong></td>
<td><strong>0.76</strong></td>
</tr>
</tbody>
</table>

These increases in traffic volumes without accompanying increases in capacity will lead to further increases in congestion unless travelers move to different modes or adjust their travel times.

13.3 Traffic and Parking Impacts on Neighborhoods

Another transportation problem in the corridor is that traffic seeking to reach some of the larger traffic generators often filters through residential neighborhoods, either searching for a faster route or for parking when it is unavailable at the destination. This is particularly problematic in the neighborhoods surrounding the University, and occurs to a lesser degree in the CBD.

Several approaches to the University offer no clear, high-volume vehicular route. The routes that are available, such as 1300 East (approaching from the south) and 400/500 South (approaching from the west), are wholly inadequate to handle all of the traffic bound for the University from the south and west, and therefore, are severely congested during peak hours. On 1300 East, the street narrows from two lanes down to one at 2100 South, causing large bottlenecks of northbound traffic in the morning. These bottlenecks and the resultant congestion encourage traffic to select alternate routes, such as 1100 East, which increases the level of traffic in residential areas adjacent to 1300 East. Another problem on 1300 East is that there are many homes located on this street and homeowners find it nearly impossible to back out of their driveways onto 1300 East during peak hours.

A similar situation exists approaching the University from the west, there is no clear route from the C3D to the University. Traffic comes into Salt Lake City from the north (e.g. Davis County) and then turns east toward the University. South Temple Street, which initially appears to be the most sensible route, has frequent traffic signals that slow traffic to a crawl during peak hours. Farther south, 400 South is a wide commercial street that could accommodate larger traffic volumes with some improvements. Currently, however, this road becomes congested because of high demand during peak hours and traffic signaling patterns. Because these two main streets are less than desirable at peak hours, traffic coming from Davis County tends to spread out onto a variety of residential streets, including 100 South, 200 South, 300 South and 2nd Avenue, causing congestion and high traffic volumes in otherwise quiet residential neighborhoods.
1.6.4 Lack/Location of Adequate Parking

The availability of adequate, close-in parking is a problem at all three of the major trip generators in the corridor—University of Utah, the CBD and SLCIA. Lack of adequate parking at the University results in parking overflow into adjacent neighborhoods. During the first week of classes and at a variety of special events, vehicles quickly exhaust the capacity of the University’s parking lots and begin parking in the surrounding residential area. This problem has been addressed in the immediate vicinity of the campus through “resident only” parking zones, but this solution has simply forced vehicles to park one or two streets farther away, where on-street parking is not restricted. Land requirements for parking areas and structures on campus reduce the amount of land available for other campus facilities. In its current master planning activities, the University is aggressively pursuing options and strategies to reduce the requirement for parking at all areas of the campus. The University is also exploring ways to increase transit use and reduce the number of people who arrive in single occupancy vehicles.

Because the number of parking spaces in the CBD is decreasing, the overflow from the CBD occasionally causes parking problems for surrounding neighborhoods. The limited number of CBD parking spaces often leads to congestion on city streets, as vehicles circulate in search of parking spaces. Any overflow from Downtown events is usually accommodated on city streets, which are generally mixed-use in the areas surrounding the CBD and gradually become more residential farther from the CBD. Construction of new buildings in the CBD is eliminating the supply of surface parking Downtown. Thus, while demand for parking is increasing, the supply of parking is diminishing. The CBD currently contains approximately 1,100 on-street metered parking stalls and another 25,000 stalls in its 69 public parking lots. Many of the large parking garages maintain occupation rates of 100 percent; the average usage rate is 81 percent. Salt Lake City’s Downtown Alliance, an association of Downtown businesses and merchants, is looking for alternatives to solve the short- and long-term deficiency in parking supply. Existing facilities are frequently at capacity and customers have to circulate around the area to find a parking location. Circulation of traffic causes more congestion and creates more pollution.

Parking demand at SLCIA is growing daily. Over the past several years, the passenger mix at SLCIA has changed significantly. In the past, about 60 percent of enplaning passengers were transferring passengers from another flight. Only 40 percent of the enplanements represented local travelers accessing the Airport. Today, that relationship is essentially reversed, with 60 percent of the enplanements having local origins and 40 percent transferring from another flight. Employment at the Airport is also increasing. Almost all of these employees arrive at the Airport by auto and need parking. In developing the Airport Master Plan, SLCIA explored strategies to increase parking supply and, at the same time, reduce the high level of dependency on automobile travel to the Airport.

1.6.5 Internal Circulation Within Large Traffic Generators

Internal circulation is a major need and deficiency at the University, the CBD and SLCIA. In addition, the east-west corridor itself has a significant collection/distribution function for trips entering the corridor from other areas of the region.

The existing circulation system at the University utilizes several shuttle routes that travel clockwise and counterclockwise around the periphery of the campus. Cross-campus circulation is limited to walking and circuitous auto travel. There is also a need for better circulation between the three University areas—Main Campus, Health Sciences and Research Park. Long walking distances and regular interaction between these areas call for further improvements in the University’s internal
circulation system. In its master planning activity, the University is attempting to define a more effective system.

In the Downtown area, studies are currently underway at UTA to develop an appropriate circulation system to compliment the planned north-south LRT system. This local circulation system becomes even more important with possible implementation of a major transit system in the east-west corridor. The CBD anticipates a significant increase in local circulation demand with increasing activity at Temple Square, the new Salt Palace Convention Center and at expanding retail/office establishments. Amtrak passengers, as well as future commuter rail passengers, will also need a good Downtown circulation system.

Internal transportation at the Airport is needed to carry employees to and from large employment centers, such as Delta’s reservation center and hangars. The details of this circulation system will be developed as part of the current master planning activity and feasibility study. An effective land-side circulation system has the potential for significantly reducing the number of vehicles that would need to be accommodated on the existing and expanded circulation roadways serving the terminals. Traffic congestion would be reduced and air quality would improved if such a circulation system were implemented as the Airport continues to expand.

1.6.6 Air Quality

The Salt Lake urban area is designated by the EPA as a non-attainment area for several air pollutants. Since there have been no violations for several years, the State is requesting that the area be removed from non-attainment status. Nevertheless, the Salt Lake area needs to reduce growth in travel to continue to meet air quality standards. Decreased air quality is attributable in large part to three pollutants: carbon monoxide (CO), ozone and particulate matter, 10 microns or smaller (PM10).

One of the primary pollutants is CO, which poses health hazards for people with heart, circulatory, or respiratory problems. It is estimated that more than 80 percent of the CO released into Salt Lake City’s air comes from vehicular sources. Therefore, most of the CO problems occur at congested, signalized intersections, during winter periods of low winds and cold, stagnant air. In recent years there have been no violations of the CO standard in Salt Lake City, although the city is still classified as a non-attainment area for that pollutant. Currently, the Utah Division of Air Quality is drafting an application to the EPA for Salt Lake City to be returned to attainment status.

Ozone has also been a problem in the study area, particularly in the summer. Ozone forms when nitrogen oxides (NOx) and hydrocarbons (also called volatile organic compounds, or VOCs) combine with sunlight. Ozone poses health risks by reducing lung function and resistance to colds. It also causes eye irritation, speeds aging of lung tissue and damages plants, rubber and fabrics. It is estimated that 46 percent of Salt Lake County’s NOx and 36 percent of its VOCs come from vehicles. Although both Salt Lake and Davis counties are non-attainment areas for concentrations of ozone, strong air pollution control programs have helped to prevent any violations from occurring in the last four years. On this basis, the State Division of Air Quality has submitted a request to EPA to redesignate Salt Lake and Davis Counties as attainment areas.

Also affecting air quality in the corridor are small particulates, known as PM10 (particulate matter, 10 microns or smaller). Source estimates in 1988 attributed seven percent of Salt Lake County’s PM10s to gasoline cars, eight percent to diesel vehicles and six percent to road dust. More recent estimates suggest that vehicles account for about 30 percent of PM10 concentrations. PM10s impair
visibility and are harmful to people with chronic respiratory or heart diseases, influenza or asthma. Reducing vehicle contributions to PM10 levels may prove difficult because while other emissions tend to decrease as overall vehicle speed increases, PM10s, which include road dust, increase with vehicle speeds over 45 miles per hour.

1.6.7 Needs Anticipated for the 2002 Winter Olympic Games

Salt Lake City will host the Winter Olympic Games in February 2002. For a three-week period, the entire Salt Lake City metropolitan area will experience an abnormally high traffic demand. Because of the locations for many of the activities and accommodations, most of this additional traffic will be focused in the corridor. For example, nearly 22,000 athletes, coaches and trainers will arrive at the Airport, where most will need to pass through customs and all will be certified by the International Olympic Committee. Then they will be transported to the Olympic Village located at the University of Utah. Throughout the games, participants will travel from the Olympic Village to awards ceremonies, which will be held in Downtown Salt Lake City and event venues, which will be held as far away as Snow Basin, West Valley and Park City/Deer Valley.

Additionally, thousands of spectators and media personnel will also arrive at the Airport and will need transportation to their accommodations, which are most likely to be Downtown and to various events and ceremonies. The largest events are likely to be the opening and closing ceremonies, which are expected to draw some 50,000 spectators to the Olympic Stadium, located on the University campus. Other large-draw events will include Alpine Skiing (in Ogden and Park City), Nordic-combined and Cross-country skiing (near Mountain Dell Reservoir) and Ice Hockey and Figure Skating (in Downtown Salt Lake City). While not all of these events will occur within the corridor, a vast majority of the trips will originate and terminate inside the corridor, where most athletes, spectators and media personnel will be staying. In addition to the traffic generated by Olympic events, the corridor’s transportation system will need to accommodate regular daily traffic during this time. This traffic currently causes heavy congestion at peak periods and is projected to continue growing through 2002.

1.7 TRANSPORTATION GOALS AND OBJECTIVES FOR THE CORRIDOR

The MIS Steering Committee, comprised of WFRC, UTA, UDOT, FAA, FTA, FHWA, SLCIA and Salt Lake City, has reviewed and approved the following transportation goals and objectives for the corridor. These goals and issues have been supplemented with public comments gathered in the scoping process.

1.7.1 Provide a Transportation System That Is Efficient, Safe and Economical

Any combination of transportation elements must serve these basic goals. In order to do so, the transportation system must minimize congestion and accidents and reduce travel time and pedestrian conflicts. Accomplishing these objectives will require providing adequate roadway capacity to accommodate demand, combined with efforts to reduce demand for that capacity. This alone will increase traffic flow, reducing accidents and travel time. This goal will also need to take into account expense and effectiveness of the system in getting people from one place to another and the increased traffic levels already being experienced in some residential areas, as well as the major highways and arterials.
17.2 Provide a Transportation System with Minimal Impact on Environmental, Sociological and Aesthetic Values

A primary concern associated with this goal is that the project identify a way to transport people quickly and efficiently without sacrificing air or water quality and without noise disturbance. This goal also looks toward preserving the views and vistas for which Salt Lake City is known and minimizing business and residential dislocations, community disruption or division and property damage. Thus, any mode chosen for a particular route must be sensitive to the features that might border—now or in the future—the alignment of that route, such as type of land use (residential, commercial, or industrial) and impacts the mode may have on neighboring water sources, wetlands, or wildlife.

17.3 Provide a Balanced and Well-Coordinated Transportation System

A successful transportation system consists of many elements, but in order to be effective, these elements must be well-managed and carefully coordinated to complement one another. Therefore, it is essential to coordinate the development of all elements of both the highway system and other public and private transportation services, as well as the linkages between them. This must be done in a way that will meet present and future travel needs in the corridor and the region. Another important aspect of a well-balanced system is its convenience for all users, including those with special needs. A system that is not easy to use will not fully serve its intended functions. The system must also provide an equitable distribution of transportation modes, facilities and benefits to permit all geographic, economic and social groups to participate effectively in essential urban activities. Finally, an effective system must balance the need for speed and reduced travel time against the benefits of frequent access points.

17.4 Develop Programs That Will Encourage Changes in Travel Habits

Much of the current strain on the area’s transportation system is caused by travel and behavioral patterns. Therefore, the effective capacity of a highway may be increased not only by adding lanes, but also by shifting some of the peak demand to times of day when that route is less congested. Thus, any successful transportation solution must include programs that will seek to reduce peak demand by spreading it over longer time periods. Changes in travel habits can also reduce demand by shifting it to other modes and simply decreasing it when fewer people travel or travel alone. Tele-commuting and trip consolidation should be encouraged as well.

17.5 Develop a System That Is Flexible in the Short and Long Term

Short-term flexibility is important in a system that needs to accommodate isolated periods of increased demand. The corridor contains a number of facilities that generate intense, short bursts of travel demand when they host special events, such as concerts, sporting events, or large meetings. The Airport also has short periods when it generates more traffic than usual during high travel seasons. Thus, a successful system must be able to adapt to accommodate these brief times of high travel demand and do so at a reasonable cost. The system must also be flexible enough to accommodate changing needs over the longer term. Travel demand will undoubtedly change in the region as new residential areas are developed and new employers appear. The system must have the capability to extend into new areas over the long term to serve the needs generated by these new developments.
CHAPTER 2
ALTERNATIVES CONSIDERED

2.1 SCREENING AND SELECTION PROCESSES

2.1.1 Introduction
The MS/DEIS process is designed to narrow a wide range of transportation technologies, strategies and modes to a locally preferred alternative (LPA) that effectively and adequately addresses specific corridor transportation problems while ensuring that environmental and other factors are considered. Current federal guidelines for conducting an MS/DEIS process require that a set of at least the following three alternatives be defined and evaluated in order to define and select the LPA.

- No Action Alternative
- Transportation Systems Management (TSM) Alternative
- Major Investment Alternative (one or more)

The first task of the MIS/DEIS for the University-Downtown-Airport Corridor was to carry out a carefully structured process in order to first define a wide range of conceptual alternatives. This wide range of alternatives was then screened to select a final set of three alternatives for more detailed analysis and evaluation. Documented in this chapter are the actions that were taken, the steps that were followed and the results obtained which provided a basis for selecting three alternatives for more detailed evaluation. These resulting three alternatives are described in Section 2.5 - Description of DEIS Alternatives. The analysis and evaluation of these three alternatives is documented in Chapters 4, 5 and 6 of this report. Chapter 7 discusses the comparative benefits and costs of the three alternatives and presents a recommended LPA for implementation in the University-Downtown-Airport Corridor.

2.1.2 Public and Agency Involvement
The screening and selection process included input from a wide range of interested parties: elected officials; the affected public agencies; the steering committee; and the study team. Throughout the process, public input was gathered through many channels and considered in the decisions at hand.

Scoping
A formal Scoping Meeting was held May 9, 1996. The purpose of that meeting was to solicit input from individuals, neighborhoods, organizations and agencies regarding concerns and issues that should be recognized and addressed in the course of conducting the MIS/DEIS. The meeting was purposely held prior to definition of conceptual alternatives so that issues and concerns obtained from those attending the meeting could be used to formulate alternatives and establish appropriate evaluation criteria.
Public comments obtained at the Scoping Meeting are presented below.

Environmental Needs
- Get cars off the roads in order to reduce congestion and air pollution;
- Plan for future growth and land use; coordinate with land use planners;
- Address environmental concerns; noise, vibration, air quality and pollution;

Cost Concerns
- Alternative transportation must be faster and less expensive than individual autos; make cars more expensive or less convenient by raising parking fees or eliminating parking;
- Work with employers to provide incentives to employees to use mass transit; subsidize mass transit; create more programs like the University's $15.00 bus pass;

Neighborhoods Concerns
- Consider how transit will affect neighborhoods; neighborhood traffic effects; neighborhoods are destinations not routes—need to control speeds through neighborhoods; and
- Preservation of historic districts and aesthetic values;
- System must accommodate pedestrian traffic, especially near schools;

Congestion
- What is the need in this corridor?
- Airport congestion; parking and drop-off areas full;
- University should limit main campus growth and focus on satellite campuses;

Transportation Alternatives
- Look at various modes of travel and alternative fuels for mass transit. What about an underground or elevated system?
- Need to move goods and employment to people, not people to goods and employment;
- Quality of life—trains are a safer, smoother and cleaner ride; more dependable and user-friendly for visitors than buses;
- Transit needs to be safe, attractive and convenient;
- Disabled people must have access; could be difficult keeping on schedule while still accommodating disabled passengers;
- Need for marketing and education about alternative transportation;
- More night and weekend transit service; more express service—fewer stops; better access—more local service; more stops;
- Accommodate bicycles; more bicycle lanes; exclusive bicycle lanes; convenient bike carriers/racks on transit; make it safer for cyclists; find out why more people do not ride bikes or use mass transit; try free bicycle program like Portland's;
- Must be interactive with existing transportation systems; have a flexible capacity;
Considered Alternatives

- Use heavy rail for high-traffic routes (Ogden to Salt Lake City) and use lighter modes for spurs;
- Must consider future generations' needs;
- Need to be able to carry luggage and other items on transit;
- More Park-and-Ride lots;
- Traffic signals need to be better synchronized throughout the valley.

These comments and concerns helped to determine critical issues early in the process, ensuring that all public concerns were known and answered in the study process.

Citizens Advisory Committees
Citizens Advisory Committees were formed in each of the east and west portions of the corridor. These committees met during each evaluation phase throughout the study process. The meetings were facilitated to provide current information to community members and to gather and record community input regarding preferred technologies, strategies and alignment options. After the detailed alternatives were determined, the Citizens Advisory Committees met again to provide a final opportunity to comment on the alternatives, prior to the Agency Review process.

Downtown Stakeholders
Further community input was gathered from Downtown stakeholders. Individual meetings were arranged to include interested parties who were unable to attend the group meetings of the Downtown Alliance. The Downtown Alliance, an organization of Downtown businesses and property owners, was kept informed through a series of presentations, providing information about the possible technologies and alignment options. Members' comments and concerns were recorded for consideration in the study process. Information on goals and objectives was also obtained from the Salt Lake City Futures Committee (See appendix A).

Media
A World Wide Web site was established and updated regularly to allow the public access to current project information. Visitors to the web site were invited to leave their comments about the project. A project hotline was also established offering the latest information about the study process and any upcoming events. Callers were able to leave a formal comment of up to three minutes in length, or a number where they could be reached if they required further information. Information was provided to reporters from local newspapers at meetings and through individual interviews.
Community Meetings
The study team attended many regularly scheduled community meetings to inform the interested public of the study’s progress and solicit community input. These included:

- Salt Lake City Council
- Salt Lake City Planning Commission
- Downtown Alliance Presentation
- Downtown Alliance Transportation Fair
- El Centro Civico Independence Day Celebration
- UDOT Transportation Fair
- Salt Lake City Transportation Open House
- West High School Community Council
- Greek Orthodox Church
- Salt Lake Board of Adjustments
- Salt Lake City Futures Commission
- Community Council Meetings

Open House/Public Meeting
Prior to determining alignment options and detailed alternatives, an informal open house and public meeting was held. Two weeks before the open house, all persons who had expressed an interest in the project were mailed a newsletter informing them of the progress of the project. The newsletter notified the public of the open house/public meeting and invited everyone interested to attend and voice their opinions. Newsletters were also sent to a random sampling of the residences in the study area to ensure full public participation. The open house/public meeting was held on September 26, 1996. At the meeting, the study team presented the public with the information gathered up to that point in the study. Facilitators led the public in group discussions of the proposed alignments and technologies. Public comments were gathered and used in screening the wide range of conceptual alternatives and alignment options down to detailed alternatives.

Steering Committee
The study process was also overseen by a Steering Committee comprised of representatives of the Wasatch Front Regional Council, Salt Lake City, Salt Lake City Redevelopment Agency, Salt Lake City Airport Authority, Utah Transit Authority, Utah Department of Transportation, University of Utah, Federal Transit Administration, Federal Aviation Administration, and the Federal Highway Administration. Through regular review meetings, the steering committee members commented on the screening and selection of conceptual alternatives, alignment options and the detailed alternatives, and directed the study team in conducting the study.

Study Team
The study team responsible for development and evaluation of alternatives was composed of specialists from firms with expertise in the fields of land use planning, socioeconomic matters, finance, transportation and structural engineering and environmental science. This team compiled the most recent data available from the agencies involved and used it to arrive at a baseline condition for the corridor. A thorough discussion of this baseline can be found in Chapter 3 Affected Environment. Concurrent with developing the baseline analysis, the team developed methodologies for evaluating the alternatives, based on the input of Wasatch Front Regional Council and the
Chapter 2 Alternatives Considered

Steering Committee. Those methods were applied to the detailed alternatives to determine the impacts and benefits of each. Chapters 4, 5, 6 and 7 discuss those findings fully.

Participating Agencies
Agency contact began early in the study process and input was solicited throughout the entire process. All interested federal, state and local agencies were contacted for data and input on a variety of issues ranging from historic and cultural resources to wetlands and water quality. Members of the technical advisory team coordinated and met with agency representatives when necessary to ensure a clear understanding of all issues and concerns.

2.1.3 Criteria for Evaluation
At each step in the process, alternatives were evaluated for financial, transportation and environmental impacts, by weighing them against the five measures listed below. As the alternatives became more refined, the level of analysis also became more rigorous and detailed.

In order to gain support and approval for implementation, an alternative transportation system must be achievable in terms of financial resources for both the initial capital investment and the ongoing operations and maintenance costs. It must also be cost effective in terms of positive and reasonable results in relation to the investment.

Mobility Improvements
Evaluation of mobility improvements in relation to a specific transportation alternative analyzes how well travelers and others are able to travel throughout the study area to participate in their desired activities. The criteria for this measure include savings in travel times, number of users on the highway system and level of ridership on the transit system.

Operating Efficiencies
Measurement of operating efficiencies involves the evaluation of the following criteria: roadway/intersection level of service; vehicle-miles traveled; hours and miles of bus and LRT operation; parking requirements; and intermodal system integration.

Environmental Benefits and Impacts
Environmental benefits and impacts occur on both the natural and the man-made world. Alternatives were weighed against the consequences to air quality, water resources, contaminant sources, wetlands and wildlife, flood plains, threatened and endangered species, minerals and vegetation, as well as social and economic characteristics of the corridor, including environmental justice.
Support of Existing Land Use Policies and Future Patterns

Analysis of current and future land use impacts to ensure sensitivity and support for existing land use in the study area includes consideration of speed, noise and vibration, visual impacts to neighborhoods, attractiveness to visitors, as well as image and aesthetic values.

2.1.4 Alternatives Development Process

In narrowing the alternatives for the corridor, there were three stages of evaluation. The first stage considered a wide range of conceptual alternatives. Some of the conceptual alternatives were eliminated and others were organized into Conceptual Alternative Groups. The next stage was to formulate and evaluate alignment options for each Conceptual Alternative Group. A preferred alignment was identified for each group which, in effect, optimized the performance of that alternative group. Each optimized alternative group was then described as one of the three alternatives for more detailed evaluation in accordance with MIS/DEIS procedural guidelines. This alternatives development process is illustrated in Figure 2-1. The details of each stage are discussed in the following sections.

2.2 SCREENING AND SELECTION OF CONCEPTUAL ALTERNATIVES

2.2.1 Conceptual Alternatives Considered

Conceptual alternative is the term used to describe a broad range of potential transportation improvements. Conceptual alternatives are not specific devices as much as general categories of possible strategies and technologies. The categories initially considered in the East-West MIS/DEIS study process are listed below:

No-Build is a baseline alternative required by the National Environmental Protection Act to ensure evaluation of a reasonable range of alternatives. It must be carried through the entire evaluation process from conceptual to detailed alternative. The No-Build alternative requires evaluation of all transportation systems currently existing, as well as those which are not yet in place but are included in adopted local/regional plans and for which specific funding has been authorized. The purpose is to determine what the impacts will be if no action is taken or no project is built.

Transportation System Management incorporates management of existing infrastructure with improvements such as one-way streets, reversible lanes that accommodate the AM and the PM rush hour by designating added lanes to flow in the direction of demand, traffic signals adjusted to respond to traffic-volume demands, intersection turn-lane expansion and bus pull-outs.

Transportation Demand Management is a group of strategies aimed at reducing peak-hour and overall travel through telecommuting, variable work hours/days, employer-based programs, bicycle and pedestrian enhancements and car/vanpooling programs.
MIS/DEIS ALTERNATIVES DEVELOPMENT PROCESS

Conceptual Alternatives

- No Build
- Transportation System Management (TSM)
- Transportation Demand Management (TDIN)
- Intelligent Transportation Systems (ITS)
- Bus/High Occupancy Vehicle Lanes (BUS/HOV)
- Roadways
- Light Rail Transit (LRT)
- Fixed Guideway Transit (FGT)
- Commuter Rail

Conceptual Alternative Groups

- ALTERNATIVE A
- ALTERNATIVE B
- ALTERNATIVE C

Alignment Options

- No Build
- TSM
- TDM
- BUS/HOV
- LRT

Detailed Alternatives

- Intersections
- Bus Routes
- Bus Stops
- HOV Lanes
- Transit Centers
- Park/Rides
- TDM Strategies

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July 15, 1997
Figure 2-1
Chapter 2 Alternatives Considered

Intelligent Transportation Systems are the use of electronic communication and management of travel information such as integrated signal control, signal-timing adjustments based on changing traffic volumes, driver and transit user information and incident management.

Bus and HOV Improvements combine additional local buses and corridor shuttles with high-occupancy vehicle lanes/exclusive-use bus lanes.

Roadways involves expanding the number of through lanes available on existing roads and at intersections. Limits on widening roadways tend to decrease with distance from the urban core, since right-of-way availability goes up as densities go down.

Light Rail Transit System (LRT) is a transit technology that operates with steel wheels on steel rails and is propelled by rotary electric motors. Power is obtained from overhead wires. It operates in its own right-of-way or in mixed traffic, with station spacing of one mile or more. Because LRT can operate as a single vehicle and can also be coupled in trains up to six units, the capacities can exceed conventional bus systems.

Fixed-Guideway Transit (FGT) is a transit system that operates on its own separate guideway; vehicles cannot mix with motor traffic. Station spacing is variable and requires vertical transportation (elevators) to access the elevated stations. It can be operated either manually or by automatic control. This category includes people-movers and monorail.

Commuter Rail runs on conventional railroad tracks—mostly used for long-distance commuter trips. Stations are spaced at least 2-3 miles apart. Vehicles can cross streets and highways but trains cannot operate in mixed traffic because of high operating speeds.

2.2.2 Screening and Selection of Conceptual Alternatives
Initially, the preceding nine conceptual alternatives were screened by the Steering Committee and the Study Team. Evaluated for cost effectiveness, mobility improvements, operating efficiencies, environmental benefits and impacts and policies in support of current and future land use, the initial nine conceptual alternatives were narrowed to those suitable for the corridor. The process required evaluating each alternative against the preliminary criteria and giving a score (good, fair, poor) for how well each conceptual alternative would perform in relation to each of the criteria. These scores were then tabulated and averaged to provide an aggregate score for all.

2.2.3 Discussion of Eliminated Conceptual Alternatives
Based on input from the scoping meeting, discussion with the Steering Committee and identification of fatal flaws, the following conceptual alternatives were eliminated in this screening process:

Roadways
This alternative would involve major expansion of roadway capacity by increasing the number of through lanes on major streets and highways. Numerous roadway improvement projects, including reconstruction of I-15, are upgrading and expanding the roadway capacity and operating efficiently in the corridor on north-south streets and highways. Traffic capacity and level of service in the corridor west of I-15 is forecast to be adequate for the foreseeable future. The street system in the corridor east of I-15 is the only area where addition of traffic lanes might be considered. As this portion of the corridor is primarily urban in land use, the availability of land for new or expanded roads is very limited. A roadway alternative for the corridor was therefore eliminated because of the

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adverse impact involved in taking right-of-way to expand existing roadways or construct new ones.

**Fixed-Guideway Transit (FGT)**

Fixed-guideway transit systems, such as people-movers or monorail, were eliminated because of the high cost of constructing elevated guideways and stations. Due to the short length of the study corridor, possible reductions in travel time were not significant enough to justify the high capital cost expenditure. Concerns about impacts to the visual and aesthetic characteristics of the corridor became factors in the exclusion of FGT. Underground systems (subways) were discarded because they are even more costly than FGT, due to the expense incurred in moving utilities and excavating the underground right-of-way required.

**Commuter Rail**

Commuter Rail was eliminated due to the lack of available right-of-way in the corridor. Commuter trains run on the same kind of tracks as freight rail, reaching speeds up to 90 miles per hour, thus are unable to mix with auto or pedestrian traffic. This technology clearly would not fit into the study corridor's urban and residential environments, since it is designed to run long distances between stops, rather than stopping frequently. Hence, one factor in the elimination of Commuter Rail was the inability to provide frequent stops in the corridor to accommodate riders wishing to access or transfer on the transit system.

### 22.4 Conceptual Alternative Groups

The remaining conceptual alternatives were not eliminated. They were combined into two groups of technologies and strategies, plus a No-Build Alternative. This grouping was made because, although each of the remaining individual conceptual alternatives had merit, no single alternative offered a solution to the multiple transportation problems associated with the study corridor. However, when combined together, they would provide the most comprehensive transportation service possible along the corridor. These conceptual alternative groups are described below.

**Conceptual Alternative Group A—No-Build**

As mentioned above, Alternative A—No-Build is a baseline alternative required by the National Environmental Protection Act to ensure evaluation of a reasonable range of alternatives. It must be carried through the entire evaluation process from conceptual to detailed alternative. The No-Build alternative includes all transportation systems currently existing, as well as those which are not yet in place but have been committed to and are currently underway. Two such projects, unconstructed but committed, were assumed for the purpose of this study. It was assumed I-15 will be reconstructed and the North-South LRT line will be built and put into operation. In addition, traffic signals in the corridor would be synchronized by the ITS program currently in the initial stages of implementation.

In addition, the no-build alternative includes the planned railroad consolidation project in the Gateway district, which anticipates the relocation of the railroad yards currently existing between 400 West and 500 West, to west of 600 West. Construction of an Intermodal Hub at 600 West and 200 South is planned to accommodate the relocated Amtrak Station, as well as the relocated Greyhound Bus Station. There is some uncertainty about the completion date of the railroad consolidation project and Intermodal Hub, but they were still considered part of the no-build alternative because the probability of completion is high and the funding is already committed.
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Conceptual Alternative Group B—Bus/HOV Combined with TSM and TDM
This group of conceptual technologies and strategies focuses on expanded bus service in the corridor, combined with High-Occupancy Vehicle lanes (HOV), Intelligent Transportation Systems (ITS) technologies and Transportation System Management (TSM) and Transportation System Demand Management (TDM) strategies. Bus service would be expanded to offer express buses throughout the corridor, including increased service to Salt Lake City International Airport and the University of Utah, as well as increased frequencies on existing routes during the peak AM and PM travel hours. High-Occupancy Vehicle lanes would be created on existing roadways with signs and pavement markings, exclusively for the use of buses and vehicles carrying two or more passengers during the peak hours. TSM strategies, such as increasing the number of turn lanes, would be used at congested intersections to increase the level of service and allow cars to travel through the intersection more efficiently. Large employers and other activity centers currently generating a significant amount of traffic would be encouraged to use TDM strategies to reduce the number of trips made by their employees and customers. TDM strategies could include, but not be limited to, subsidizing the use of transit through pass programs, reducing/limiting the availability of parking or increasing the cost, encouraging employees to work flexible (non-peak) hours and to telecommute from their homes.

Conceptual Alternative Group C—LRT combined with TSM and TDM
This group of conceptual technologies and strategies focuses on the implementation of a light rail transit line in the corridor between the University of Utah, Downtown Salt Lake City and Salt Lake City International Airport. It also includes Transportation System Management (TSM) and Transportation System Demand Management (TDM) strategies. TSM strategies, such as increasing the number of turn lanes, would be used at congested intersections to increase the level of service and allow cars to travel through the intersection more efficiently. Major employers and other activity centers currently generating a large amount of traffic would be encouraged to use TDM strategies to reduce the number of trips made by their employees and customers. TDM strategies would include but not be limited to subsidizing the use of transit through discount pass programs, reducing/limiting the availability of parking or increasing the cost and encouraging employees to work flexible (non-peak) hours and to telecommute from their homes.

2.3  SCREENING OF EASTERN AND WESTERN CORRIDOR ALIGNMENT OPTIONS
In order to choose an appropriate alignment for each selected group of conceptual alternatives, it was necessary to define and evaluate a number of bus and LRT alignments. To simplify the evaluation of alignments, the corridor was divided into three subareas: the Eastern Corridor; the Western Corridor; and Downtown. One alignment option for the Eastern Corridor and two alignments for the Western Corridor were evaluated for Group B—Bus/HOV. Three Group C—LRT alignment options were evaluated for both the Eastern and Western Corridors (See Figure 2-2). Several Downtown alignment options were selected for evaluation of potential impacts due to implementation of LRT. Those will be discussed fully in Section 2.4, Screening of the Downtown Alignment Options for LRT.
East/West Corridor Alignment Options

Figure 2-2
2.3.1 East-West Bus/HOV Alignment Options Evaluated

**East Corridor Bus Alignment Option**

Plans for reconstruction of I-15 include construction of a bus/HOV lane in each direction in the center of the freeway. A new interchange with I-15 will be constructed at 400 South to provide direct freeway access and egress for these bus/HOV lanes. A key consideration in defining the bus/HOV alignment for the East Corridor was the relationship of the bus/HOV lane to this 400 South interchange with I-15. Streets from 300 South to South Temple would not have good access to the I-15/400 South interchange and also are not appropriate streets due to operational constraints and potential impact on residential areas. The one-way pair of 500 South and 600 South would likewise not have good access to the bus/HOV lanes at 400 South. The bus/HOV alignment for the Eastern Corridor was therefore located on 400 South as follows:

**Option B-2** The traffic lane next to the parking lane in each direction from Foothill Blvd. along 400/500 South to 400 West would be specially marked and signalized to operate as a bus/HOV lane during peak hours. It would connect with the HOV lanes on I-15 from the South and general purpose traffic from the north. Traffic could also transition to I-15/1-80 at 500 and 600 South.

**West Corridor Bus Alignment Options**

**Option B-1** One traffic lane in each direction to and from the Airport along the I-80/Airport access road to 2400 West to North Temple and 400 West would be marked and signalized to operate as a bus/HOV lane during peak hours.

**Option B-3** One lane of the freeway to and from the Airport along I-80 to 500/600 South would be designated for bus/HOV operation during peak hours.

Option B-3 was eliminated as there is not enough congestion in the corridor within the next 20 years to create a demand. It should be considered in the future if congestion increases. East and West Corridor Bus/HOV alignment options B-1 and B-2 were retained and incorporated into the final detailed alternatives for environmental impact evaluation (See Figure 2-2). A detailed comparison of the bus/HOV and LRT alternatives follows in Chapters 4, 5 and 6 of this document.

2.3.2 E/W LRT Alignment Options Evaluated

**Proposed West Corridor LRT Alignment Options**

**C-1** Starting at the planned transportation center at Salt Lake City International Airport, the alignment would traverse Airport property to a station at the location of a possible future hotel at the Airport. The alignment would extend along the north side of the Airport/I-80 access road to just west of 2400 West and then parallel to 2400 West to North Temple. It would continue in the middle of the street along North Temple to Redwood Road. It would continue in the middle of the street on Redwood Road to 600 North to 900 West to 300 North to 400 West. A new overpass over the railroad tracks would be required on 300 North.

**C-2** Same alignment as for C-1 to North Temple and Redwood Road. The alignment would continue east in the middle of North Temple to 400 West. Either the existing North Temple overpass would have to be reconstructed, or a new overpass would need to be constructed for LRT.
Chapter 2 Alternatives Considered

C-3 Same alignment as for C-2 to North Temple at either 600 West or to 900 West where it would extend south in the middle of the street to 200 South and then to 400 West. (See Figure 2-2)

Proposed East Corridor LRT Alignment Options

D-1 The east end would begin at the University of Utah Health Sciences Center. It would be located in the middle of the street via Medical Drive, Wasatch Blvd and South Campus Drive. It would continue along the west side of the Rice Stadium parking lot to 500 South. The alignment would turn west and run in the middle of the street along 500 South and 400 South to 200 East.

D-2 Same alignment as D-1 from University of Utah Health Sciences Center to 400 South and 1000 East. At that point the alignment would be located in the middle of the street running north on 1000 East and west on 300 South to 200 East.

D-3 Same alignment as for D-1 from University of Utah Health Sciences Center to 500 South and 1300 East. The alignment would then extend north in the middle of 1300 East and then west in the middle of South Temple to Main Street where it would share tracks with the North/South LRT line to 400 West.

2.3.3 Screening of East-West LRT Alignment Options

The evaluation process for the east-west alignments involved the gathering of pertinent information about the affected environment and anticipated impacts of each proposed alignment option. This information was compiled into an environmental assessment memorandum (See Appendix B). The information contained in the environmental assessment comprised the majority of the information presented to the public at the September 26 public meeting/open house. Public comment was taken at that meeting, as well as by written and telephone comments. The public preferences stated in the comments were considered a vital part of the decision-making process.

All east-west alignment options were evaluated against the following measures: cost effectiveness; mobility improvements; operating efficiencies; environmental benefits and impacts; and support of existing land use policies and future patterns.

In the screening of the Western and Eastern Corridor alignment options, information on operations and maintenance costs, capital costs, travel times, traffic impacts, environmental impacts and land use was compiled by the study team into a comparison chart. This chart, showing the advantages and disadvantages of each alignment option, was submitted to the Steering Committee for review, along with the public comments to date. The committee selected preferred E/W alignment options based on the information summarized in the following chart (See Table 2-1.)
### Table 2-1 University-Downtown-Airport MIS/DEIS Alignment Option Comparison Chart

<table>
<thead>
<tr>
<th>Alignment Option</th>
<th>Travel Time (minutes)</th>
<th>Capital Costs (millions$)</th>
<th>O&amp;M Costs (millions$)</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - No-Build</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>• no major investment required</td>
<td>• does not comply with Master Plan; does not support future land use in redevelopment of the Gateway District • continued congestion/air quality impacts</td>
</tr>
<tr>
<td>B-1 &amp; 2-Bus/HOV Combined E/W Options</td>
<td>40</td>
<td>30</td>
<td>4.1</td>
<td>• improvement in traffic congestion • higher level of bus service • bus stop flexibility • interfaces with I-15 HOV lanes • moderate level of capital investment</td>
<td>• encourages continued auto dependance • less supportive of redevelopment potential along North Temple and in the Gateway area.</td>
</tr>
<tr>
<td>LRT General (combined E/W options C-2 and D-1 w. Downtown Option A)</td>
<td>36</td>
<td>310</td>
<td>3.6</td>
<td>• flexible capacity • better passenger acceptance than bus • more dependable in inclement weather</td>
<td>• highest level of capital investment</td>
</tr>
<tr>
<td>LRT C-1 600 North</td>
<td>22</td>
<td>218</td>
<td>4.6</td>
<td>• residential access</td>
<td>• does not access Fairpark or commercial and state offices densities in western corridor • lowest level of ridership due to slow travel time • station located in 500 year floodplain • possible adverse impacts to residential areas at station locations • serves only low density residential</td>
</tr>
<tr>
<td>LRT C-2 North Temple</td>
<td>17</td>
<td>174</td>
<td>3.6</td>
<td>• high commercial/employment access: Fairpark, North Temple businesses, and State Offices • complies with the Economic Revitalization Plan by providing stimulus to secondary development along North Temple • viaduct reconstruction over RR tracks on North Temple offers opportunity to create pedestrian and bicycle access between east and west; recreate connection between separated halves of the city • best travel time through corridor</td>
<td>• left turn impact on North Temple • less residential access • safety an issue; high crime area</td>
</tr>
<tr>
<td>LRT C-3 200 South/600 West or 900 West</td>
<td>17</td>
<td>181</td>
<td>3.6</td>
<td>• access to Intermodal Center • supports redevelopment in the Gateway area • most potential for improved view in corridor • would help connect the east and west sides of the city • access to Fairpark, North Temple businesses, and state offices</td>
<td>• viaduct required • visual impact to rear view of the Union Pacific Depot • Intermodal Center is in the 500 year floodplain • safety an issue; high crime area</td>
</tr>
<tr>
<td>LRT D-1 400 South</td>
<td>19</td>
<td>132</td>
<td>2.7</td>
<td>• access to commercial densities along 400 South, including Trolley Square • interfaces with n/s bus routes • increased opportunity for secondary development • supports preservation of historic/park resources (Rio Grande Depot, Pioneer Park) • also serves residential densities one block north on 300 South • moderate grade</td>
<td>• congestion on 400 South could divert traffic into neighborhoods • possible conflicts with HOV traffic exiting I-15, and turning left into CBD • on-street parking impacts</td>
</tr>
<tr>
<td>LRT D-2 300 South</td>
<td>17</td>
<td>126</td>
<td>2.7</td>
<td>• interfaces with n/s bus routes • could protect neighborhoods from auto traffic diverting off 400 South to avoid congestion • serves highest residential density in the city plus employment</td>
<td>• commercial encroachment into neighborhoods • less access to businesses on 400 South • noise and vibration could impact residential due to narrow streets</td>
</tr>
</tbody>
</table>
| LRT D-3 South Temple | 17                    | 145                        | 2.7                   | • restores historic trolley • serves moderate to high level of residential and employment density | • impacts to the historic districts/views • small roadway capacity v. cost to replace sandstone curbs in historic district • weak interface with north/south bus routes • streets are very narrow, could impact residential areas with the noise and vibration of turning the LRT vehicle
### 3.3.4 Selection of Preferred E/W LRT Alignment Options

**E/W LRT Alignment Options Selected**

**C-2** North Temple to 600 West was selected as the preferred western corridor LRT alignment for a variety of reasons. It serves the highest commercial and employment densities in the Western corridor. It offers the most direct route and therefore the fastest travel time for people passing through the corridor between Downtown and the Airport. It has the least impact on residential neighborhoods. It is the most compatible with the planned economic revitalization of North Temple. However, it could not be decided whether to use 400 West or 600 West to connect to the Downtown option. Hence, both streets were retained for incorporation into the Downtown alignment option set for further evaluation.

**D-1** The 400/500 South alignment was selected primarily because it is the most compatible with adjacent land uses and development. This alignment provides a direct connection to the I-15/400 South interchange where the freeway HOV lanes will have access/egress onto 400 South. Access to adjacent properties would essentially be unchanged with this alignment because the existing median in 400/500 South already precludes left turns except at intersections. The 400/500 South alignment is support by neighborhoods because it is a street already functioning as a major transportation corridor.

**West Corridor LRT Alignment Options Eliminated**

**C-1** 600 North was eliminated on the basis of cost effectiveness, mobility improvements, operating efficiencies and support of existing land use. The loss of capacity on the narrow streets to LRT right-of-way could cause significant congestion, particularly at river and canal crossings. The 600 North alignment would have lower potential LRT ridership because it has a relatively low population density, as well as low commercial access. The deviation from North Temple to 600 North and back again represents out of direction travel for the heaviest flow of travel demand between the Airport and Downtown. Further, the length of the alignment increases both capital costs and operating costs and travel times.

**C-3** 200 South to 900 West was eliminated on the basis of cost effectiveness and operating efficiencies. The cost of constructing viaducts to accommodate LRT over existing railroad tracks is high; this alignment would require two major viaducts, as opposed to only one viaduct on either 600 West or North Temple. The 200 South to 600 West was retained as a Downtown option.

The Garfield Railroad spur was also briefly considered but discarded due to conflict with existing industrial rail use and the cost of acquiring the right-of-way, as well as the dismal, back-door view of industrial areas from this alignment.

**East Corridor LRT Alignment Options Eliminated**

**D-2** 300 South was eliminated on the basis of land use and traffic impacts. Concerns about LRT impacts on neighborhoods were voiced at the September 26 public meeting/open house. As the Salt Lake City Master Plan delineates between commercial and residential use at 200 East, it is clear Salt Lake City has made a commitment to protect the area along 300 South east of 200 East from further commercial encroachment. This is further emphasized by the Master Plan's limit of permitted uses in that area. 300 South east of 200 East will be
reconsidered as an alternative if an acceptable level of service cannot be achieved on 400 South with LRT.

D-3 South Temple was eliminated on the basis of cost effectiveness, mobility improvements and operating efficiencies. Because of the staggered intersections where the Avenues District meets South Temple and the lettered streets (B Street, E Street, I Street, etc.) meet the numbered north/south streets (500 East, 700 East, 900 East, etc.) there would be a greatly increased travel time over alignments on 400 South or 300 South. Also, the street is too narrow to accommodate a LRT right-of-way without losing a lane of capacity in each direction, thereby causing significant traffic impacts. Finally, the South Temple alignment runs through a historic district. Hence, the cost of increasing the capacity by widening the roadway would be prohibitive, as the historic sandstone curbs along South Temple would have to be replaced with new sandstone curbs, rather than relatively inexpensive concrete.

A loop system using South Temple to the University and 800 South to return to Downtown was proposed but eliminated on the basis of cost effectiveness and mobility improvements. Because of the length of the proposed track, the additional capital and operating costs and the loss in travel time savings, this alignment would be ineffective both in terms of cost and mobility improvements. A loop system would require riders wishing to travel a short distance in the opposite direction of operation to ride the entire alignment before coming back around to their destination. This configuration would discourage riders at a much greater cost than any other alignment option, therefore, it was not given a full evaluation, but discarded before the screening of alignment options.

2.4 SCREENING OF THE Downtown ALIGNMENT OPTIONS FOR LRT

2.4.1 Downtown LRT Alignment Options Evaluated
The Downtown alignment options describe different ways to connect the University and Airport LRT spurs between the intersections of 400 South/200 East and North Temple/600 West. The following options were evaluated as possibilities by members of the public, steering committee, citizens advisory councils and the study team (See Figure 2-3):

Option A 400 South to Main to 200 South to 600 West to North Temple.

Option B 400 South to 200 East to 300 South to Rio Grande to 200 South to 600 West to North Temple.

Option C 400 South to 200 East to 300 South to Main to 200 South to 600 West to North Temple.

Option D 400 South to 200 East to 300 South to 400 West to North Temple.

Option E 400 South to 200 East to 300 South to Rio Grande to North Temple.

Option F 400 South to Main to South Temple to 400 West to North Temple.

Option G 400 South to 400 West to North Temple.
Option H

One-way pair configuration originating at the intersection of 200 East/300 South to South Temple and 400 West. The eastbound line would use 300 South from 400 West to 200 East. The west-bound line would use 200 East to 200 South to 400 West.

All of the above alignments were assumed to be located in the center of the street except Options G and H. For both of these options, the alignment could be either in the center or along one side of the street.

2.4.2 Screening of Downtown Alignment Options

In screening the Downtown alignment options, a deeper level of detail was required than had been previously performed on the East and West Corridor alignment options, due to the additional conflicts of Downtown traffic and congestion, the north/south LRT line operations, and critical parking and access issues.

Fatal Flaw Screening

An initial screening was conducted to eliminate any of the Downtown alignment options that were considered to have a fatal flaw that would make further evaluation inappropriate. The following three Downtown alignment options were eliminated based on the fatal flaws identified.

Option B

This alignment requires six intersection turning movements to traverse the Downtown. It also uses Rio Grande which has a narrower right-of-way where it would be difficult to construct LRT and maintain adequate local access.

Option C

This alignment also requires six intersection turning movements to traverse the Downtown. Furthermore, it traverses 300 West near access to the new American Stores building as well as Main Street with a common station with the North/South LRT. The number of turns, including the one at the Main Street/300 South intersection, was grounds for eliminating this alignment option from further consideration.

Option E

This alignment would traverse the narrow right-of-way on Rio Grande as discussed with Option B. It also depends on the relocation of railroad tracks north of 200 South before the alignment could be constructed. The railroad overpass for LRT would also be lengthy and expensive due to the required curvature of the structure. Therefore, this alignment option was eliminated from further consideration. This option could be reconsidered during preliminary engineering depending on commitments to relocate the railroad tracks and design alternatives for reconstruction of the North Temple railroad overpass.

The remaining five Downtown alignment options were subjected to a detailed analysis and evaluation as described in the following sections.
Intersection Level of Service
The levels of service at intersections in Downtown are of critical interest to commercial and residential populations. Therefore, the Downtown option selected must allow for an acceptable level of service (level of service D or better) at the intersections affected by LRT operations. In evaluating the probable impacts to traffic flow in Downtown, both existing and future traffic volumes and land use patterns were analyzed. Option D and Option H were found to have significant traffic flow conflicts on 300 South between State Street and Main Street where the new American Stores parking structure accesses 300 South. Traffic entering and exiting the parking structure would not be able to cross the LRT line on 300 South and would be diverted into the intersection at 300 South and Main. Traffic on Main Street is already affected by the N/S LRT line. Option F, which would share the Main Street N/S LRT line, would impact traffic on Main Street even further, resulting in an unacceptable level of service at intersections from 400 South to South Temple. Traffic operations analysis to accommodate the North/South LRT line on Main Street has demonstrated that frequency of LRT trains has an impact on the ability to handle left turns at the intersections. Adding a second LRT line would increase the frequency of LRT trains and further limit capacity for left turns.

Preservation of Priority On-Street Parking
In evaluating the parking impacts of the Downtown options it was necessary to not only quantify the number of parking spaces affected but to assign some priority to them according to the individual impacts. There are some businesses which have no other parking than the spaces on the street which would be lost if LRT were implemented. The evaluation found that there were more priority parking impacts found with Options A, D and H, which use 200 South and 300 South, than with Options G or F. With Option F, no new impacts would occur along Main Street or South Temple as the N/S LRT alignment would be used through Downtown. Option G, using 400 South, would cause less impacts to parking as there are few businesses in the Downtown section of 400 South dependent primarily upon on-street parking (See Figure 2-4).

Number of Parking Spaces Impacted
East/West LRT

![Number of Parking Spaces Impacted Graph](Figure 2-4)
**Preservation of Priority Auto Access to Adjacent Property**

In evaluating driveway access (some alleys) to adjacent property, it was again necessary to identify priority access points. Some businesses have only one access to their properties and would be more severely affected than others by the loss of an access point. The evaluation found that there were more priority access impacts found with Options A, D and H, which use 200 South and 300 South, than with Options F or G. With Option F, no new impacts would occur along South Temple as the N/S LRT alignment will use the same streets through Downtown. Option G, using 400 South, would cause fewer impacts to access because most of the properties adjacent to 400 South either have other access points or are in the process of being redeveloped. Access to new development could be planned to mitigate impacts to access by developing alternate access points to 400 South (See Figure 2-5).

![Number of Access Points Impacted East / West LRT](image)

**Figure 2-5**

**Population and Employment Within Walking Distance of Stations**

For the purpose of analysis, an acceptable walking distance for access to transit was fixed at 1300 feet, roughly one-fourth of a mile. Based on experience in cities where rail transit is available, this is the distance which one might reasonably expect a transit rider to walk to access LRT. In evaluating the differences between options, it was necessary to examine two aspects of walk access: direct walk access to the E/W line; and direct walk access from the N/S line after transferring from the E/W line. When combined, a measure is obtained for the total number of passengers entering the Downtown on the E/W line who have direct walk access to and from an LRT station. The results of the analysis are described in the following graph (See Figure 2-6).
The preceding graph shows Option F (South Temple), has the greatest level of walk access, with the smallest level of transfer access from the N/S line. Option G (400 South), shows the lowest level of walk access, but the highest level of transfer access. It can be seen that the level of walk access decreases as the alignment is moved further south, while the level of access via transfer from the N/S line increases. Option H, the one-way pair configuration, has a moderate level of both transfer access and walk access as it is directly in the center of the area, as do Options A and D. Overall access, both walk and transfer is the greatest with Option A (200 South). Option H, the one-way pair using 200 South and 300 South, offers the second greatest overall level of access. Option G (400 South), is third in overall access, Option D (300 South) is fourth. Although Option F has the greatest level of walk access, it has the lowest level of access via transfer, hence the lowest overall level of access.

**Visual and Aesthetic Characteristics**

Option A, which would require the construction of a viaduct over the railroad tracks at 600 West, could impair the view of the rear of the Union Pacific Depot. Other than this, there would be no adverse impacts to views and vistas in the Gateway area with any Downtown option. The opportunity to improve visual quality in the Gateway area occurs with all alignment options except for Option F, which uses the N/S alignment along South Temple and would not affect existing conditions Downtown. Option G, using 400 South, would not affect any identified view corridor or vistas. The Salt Lake City publication "The Urban Design Element" identifies 300 South views west to the Rio Grande Depot as an important view corridor, as well as the entire South Temple corridor, which has been identified as important and requires protection. However, options using these streets would not adversely affect views if integrated in ways that are sensitive to the urban and historic characteristics of the Downtown area.
Figure 2-9

Alternative B - BUS/HOV Alignment
E/W MIS/DEIS
Historical and Cultural Resources
Although there are several historic districts and individual buildings in the Downtown area, no adverse impacts anticipated with any of the options. A positive impact could occur with any alignment option by providing a stimulus for adaptive reuse of historic structures, which would be a benefit.

Parks and Open Spaces
There would be no adverse impacts to parks and open spaces with any of the alignment options Downtown. LRT in the center of the roadway would not require any additional right-of-way from park lands. All options, except Option F, offer a possible urban design opportunity to incorporate the proposed continuance of City Creek Park as it winds its way through the Gateway area. Options D, G and H are adjacent to Pioneer Park and would therefore provide excellent transit access to this recreational facility. These alignments would not have any adverse long-term impact, although short-term impacts related to construction could occur.

Wetlands
There are no identified wetlands in the Downtown area. There would be no adverse impacts with any of the Downtown alignment options.

Ecosystems—fisheries, wildlife, threatened and endangered species
There would be no adverse impacts with any of the Downtown alignment options.

Water resources and water quality
There would be no adverse impacts to water resources or water quality with any of the Downtown options. Landscaping design around stations incorporating City Creek when it is returned to the surface could have beneficial impact. Transit would also reduce the number of cars in the Downtown area, which could have a positive impact on water quality by reducing the amount of oils and greases deposited by traffic and washed into the storm-drain system.

Floodplains
No Downtown alignment options are within the 100-year floodplain, however the Intermodal center and parts of Option A are within the 500-year floodplain.

Potential contaminant sources and utilities were not a deciding factor in the evaluation of Downtown alignment options as the potential impacts would be similar with any of the options.

Compatibility with bus operations
At the present time, the main bus route into Downtown from the west is 200 South, Main routes from the east are 400 South and to a lesser degree, 200 South. Revised bus routing now being implemented to complement the N/S LRT line will focus more bus service on 200 South. Option A could conflict with this increased bus operation on 200 South, west of Main Street. Option G could conflict with bus operations on 400 South west of Main Street. New HOV access to I-15 at 400 South is likely to increase the volume of bus/HOV traffic on this portion of 400 South. Construction and operation of LRT on this section of 400 South will need to be carefully executed so as preserve an acceptable level of service at affected intersections.
Compatibility with N/S LRT line
UTA prefers not to allow the E/W LRT line to share the N/S LRT line, as it could conflict with LRT operations in the event of future expansion of service on either line. Option F, which uses the N/S LRT alignment from the intersection of 400 South/Main to the intersection of South Temple/400 West, would have the largest impact on operations. Option A also conflicts with operations as it uses the N/S alignment from the intersection of 400 South/Main to the intersection of 200 South/Main.

Master Plan Compatibility
The main focus of planning in Salt Lake City at this time is the planned railroad reconsolidation and redevelopment of the Gateway area. The Gateway area has a tremendous potential for land use change and secondary development which would stimulate the kind of density and development necessary to support high volumes of LRT ridership. Any option using either 400 West or 200 South would serve the Gateway area equally well; however, Option F, which uses South Temple to 400 West would not serve the redevelopment of the Gateway area as well as the other proposed options. Although it serves the highest existing land use densities, it also uses the existing N/S LRT line and so offers no new opportunities for development. Land use in the core of the CBD is well established as high density and not likely to expand eastward. The city prefers to encourage high-density uses to spread toward the south and west of the existing core to the Gateway area. In this respect, Options using 300 South, 200 South and South Temple would be less supportive than Option G which uses 400 South. Option G would provide LRT access further south than any other option. It would therefore encourage the spread of the CBD toward the south and could eventually expand the “boundary” of Salt Lake City’s CBD to the south.

Option A, using 200 South to 600 West, serves the proposed Intermodal hub site at the intersection of 200 South/600 West. 200 South also offers the greatest potential for visual improvement. However, Option A does not serve the existing densities as well as options using 400 West. Options G, D and H, which use 400 West, serve existing densities at the Delta Center, Triad Center, West High and west Downtown Salt Lake City, as well as support redevelopment in the Gateway area. Further, construction of the North Temple overpass to accommodate LRT offers an opportunity to increase pedestrian and bicycle access between the east and west, whereas a viaduct on 600 West would not offer the same opportunity.

Capital Costs
Capital costs for each Downtown alignment were estimated by tabulating the cost of individual components such as structures, bridges, tracks, stations and right-of-way. This cost information provided a basis for the following comparison capital cost for each alignment option:

<table>
<thead>
<tr>
<th>Option</th>
<th>Total Capital Cost</th>
<th>Cost per mile ($ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$366,627,000</td>
<td>$38.59</td>
</tr>
<tr>
<td>D</td>
<td>$378,202,000</td>
<td>$37.42</td>
</tr>
<tr>
<td>F</td>
<td>$368,488,000</td>
<td>$38.72</td>
</tr>
<tr>
<td>G</td>
<td>$373,971,000</td>
<td>$37.00</td>
</tr>
<tr>
<td>H</td>
<td>$406,342,000</td>
<td>$34.98</td>
</tr>
</tbody>
</table>
Chapter 2  Alternatives Considered

Operations and Maintenance Costs
Operations and maintenance costs were calculated to include various costs, such as: operator and maintenance personnel's wages and benefits; administration and scheduling labor; power to propel the vehicles; inspection, maintenance and repair of vehicles; supplies for repair; maintenance of road and track; maintenance of communication systems, fare collection equipment and power facilities. A table showing the cost-component breakdown can be found in Appendix G. The following table demonstrates how the various alignments compare in terms of the operations and maintenance costs.

<table>
<thead>
<tr>
<th>Option</th>
<th>Total O/M Costs</th>
<th>Cost per unlinked passenger</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$7,500,000</td>
<td>$1.57</td>
</tr>
<tr>
<td>D</td>
<td>$7,500,000</td>
<td>$1.57</td>
</tr>
<tr>
<td>F</td>
<td>$7,600,000</td>
<td>$1.58</td>
</tr>
<tr>
<td>G</td>
<td>$7,500,000</td>
<td>$1.57</td>
</tr>
<tr>
<td>H</td>
<td>$7,600,000</td>
<td>$1.59</td>
</tr>
</tbody>
</table>

Ridership
According to the WFRC transportation planning computer analysis, there is no real difference in ridership between Downtown options. Several computer simulations were programmed to model the characteristics of transit, such as how far one walks to transfer from the N/S to the E/W LRT. These characteristics, among other factors, anticipate the level of ridership, or number of people who will use the transit system. The level of ridership varies by only about one thousand riders per day, between options, thus, ridership was not a determining factor in the decision for a preferred Downtown alignment option.

2.4.3 Selection of Preferred Downtown Alignment Option for LRT
Downtown Connectors Eliminated
Table 2-2 presents the evaluation criteria used to screen the Downtown options and a rating of how each option measured against those criteria. This information was presented to the steering committee in January of 1997 and a consensus was reached for Option G as the preferred Downtown alignment at that meeting (See Table 2-2).

Option A 200 South to 600 West to North Temple—Although this was a strong candidate for selection it was eliminated on the basis of operating efficiencies, mobility improvements and land use. In sharing the N/S alignment on Main Street between 400 South and 200 South, the E/W LRT line would conflict with future North/South LRT line operations in the event of expansion. Also, it does not compliment the existing system well, since it would not interface with the N/S line end at 400 West and South Temple as would Options D, F, or H, which use 400 West to North Temple. Although it would support planned redevelopment of the Gateway District and planned expansion to the southwest and serve the proposed intermodal center, it would not provide the boundary definition of the CBD that city planners and decision makers prefer in the 400 South alignment. This option also requires a viaduct to serve the LRT as it crosses over the railroad tracks on 600 West. This viaduct would have a negative impact on the view of the rear of the Union Pacific Depot and of whatever development occurs in this area once the railroad reconsolidation takes place.
# Table 2-2: Downtown Alignment Option Comparison Chart

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Option A 200 South</th>
<th>Option D 300 South</th>
<th>Option F South Temple</th>
<th>Option G 400 South</th>
<th>Option H One-Way Pair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intersection Level of Service</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Preserves Priority On-Street Parking</td>
<td>●</td>
<td>○</td>
<td></td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Preserves Priority Auto Access To Adjacent Property</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Population and Employment Within Walking Distance of Station</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Impact on Environment</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Compatible with Bus Operations</td>
<td>●</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Compatible with North/South LRT Line</td>
<td>●</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Convenience of LRT Transfer</td>
<td>○</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Master Plan Compatibility</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>Overall Score</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>●</td>
</tr>
</tbody>
</table>

○ Positive Effect  ● Negative Effect  ● Neutral Effect
Option D

400 South to 200 East to 300 South to 400 West to North Temple—Although this option was eliminated on the basis of mobility improvements and support of future land use, it was retained as a second choice in the event there are unmitigable impacts found to be associated with the preferred alternative. This option supports the existing densities in the west Downtown along 400 West and serves the Gateway redevelopment; however, it does not define the boundary of the CBD far enough south to serve the projected growth and redevelopment in accordance with the Salt Lake City Master Plan and the preferences of the Salt Lake City Redevelopment Agency.

Option F

400 South to Main to South Temple to 400 West to North Temple—This option was eliminated on the basis of operating efficiencies, land use and mobility improvements. Although it is the least expensive in capital costs, LRT vehicles from the east-west line would conflict with an increased volume of North-South LRT vehicles in the event other corridors are added to the N/S LRT line. Also, Option F would not support planned redevelopment of the Gateway District and planned expansion of the Salt Lake City CBD to the southwest, in accordance with the Salt Lake City Master Plan and the preferences of the Salt Lake City Redevelopment Agency. Nor would it serve any new population in terms of access. By concentrating service in the existing core, it would discourage development and ridership further south.

Option H

One-way pair configuration originating at 200 East/300 South to South Temple/400 West. (The eastbound line would use 300 South from 400 West to 200 East. The westbound line would use 200 East to 200 South to 400 West.) This option was eliminated on the basis of cost effectiveness, mobility improvements and operating efficiencies. Because this alignment option requires capacity from two streets rather than one (as in all the other options) it decreases capacity of auto traffic on both 200 South and 300 South, thereby causing unnecessary congestion at intersections. It also has a relatively high capital cost and could possibly be too confusing to potential transferring passengers to attract a reasonable level of ridership.

Downtown Alignment Option Selected

Option G

400 South to 400 West to North Temple. This alignment option was retained as the preferred option on the basis of mobility improvements, operating efficiencies and land use policy support. This alignment option offers the good service to both existing densities along 400 West and the future densities anticipated to come with the redevelopment of the Gateway area. It also serves to define the future boundary of the CBD as far south as feasible and captures the new riders under served by the alignments further north. 400 South offers good access to the new Courts complex and the City/County building, as well as offering an opportunity to interface with the intermodal center, possibly by incorporating the historic Rio Grande building and urban design elements to create a mall atmosphere between the intermodal center and 400 West. As it would be necessary to reconstruct the overpass on North Temple to accommodate LRT, there is an opportunity to incorporate pedestrian and bicycle enhancements into the design of the new viaduct to facilitate connections between the east and west portions of the corridor.
2.4.4 Alternative Alignments and Extensions

An important aspect of the next phase of preliminary engineering will be to refine the bus/HOV and LRT alignments recommended in this report. In particular, the following four alternative alignments and extensions should be evaluated.

**International Center Extension**

As part of the screening process, an assessment was made of the feasibility and/or desirability of extending transit services to the International Center west of Salt Lake City International Airport. The primary issue is whether the high-frequency bus or LRT line should terminate at the Airport or at the International Center. In formulating the final definition of alternatives, it was recommended the improved transit initially terminate at the Airport for the following reasons:

- There is higher potential for transit ridership related to employment at the Airport compared with the International Center. There are currently 9,000 persons employed in the vicinity of the International Center compared to 12,000 at the Airport. Employment at the Airport is also geographically more concentrated resulting in greater accessibility to transit service.

- The Airport presently generates more than 80,000 trips per day. This number is expected to double in the future. Even if only a relatively small portion of these trips are attracted to improved corridor transit service, there will be significantly higher ridership from the Airport station than could be generated from stations at the International Center.

- Extension of LRT to the International Center would involve construction of approximately three miles of double track line in addition to three or four stations. This represents an investment on the order of about $100 million in order to provide LRT service to that area. Given the levels of employment anticipated in the near future, the level of potential transit ridership is not likely to justify the cost involved.

- In the short term, the International Center will probably be best served by good bus shuttle service to the Airport where it would connect with transportation systems serving the corridor, valley and region. This shuttle service could be designed to provide circulation into and within the International Center in such a manner that walk distances to a bus stop would be, on average, considerably shorter than the walking distance to several LRT stations located along a single corridor.

- Conceptual engineering for an alignment of LRT accessing the Airport has taken into account the possibility of a future connection to the International Center. Starting at the planned hotel station, tracks would cross either over or under the Airport access roadways and then extend west to the International Center. When potential ridership warrants, LRT trains could provide shuttle service from the Airport transportation center through the hotel station to the International Center. Passengers would connect with the rest of the regional LRT system by transferring at one of these stations.

**University Research Park Extension or Alternative Alignment**

As part of the screening process, consideration was also given to the possibility of extending the bus or LRT system to Research Park located southeast of the University of Utah campus. Many citizens and community leaders expressed a high level of interest in this extension. Transit access to the
Chapte' 2 Alternatives Considered

Research Park area could be provided in one of two options. Each scenario is briefly described below along with a discussion of pros and cons of each.

Option 1

Two separate branches could be created for either the corridor bus or LRT system with one going to the Health Sciences Center at the University of Utah and the second extending to the Research Park. Transit operating schedules would be structured so that vehicle/train destinations would alternate between the two branches. Depending on where the end station is located for the Research Park Branch, it would be approximately 0.2 miles shorter in length compared to the branch to the Health Sciences Center. It would probably have the same number of transit stations. This would therefore cost perhaps $500,000 to $800,000 less than the Health Sciences branch.

Pros/Cons

Neither branch would have the same frequency of transit service as that operated on the combined line west of the University of Utah. This would diminish the level of service to each branch and possibly reduce overall potential corridor ridership. It would, however, have the benefit of providing at least some transit access to both branches. The Research Park branch could possibly provide opportunity for a park/ride facility near the intersection of Wakara Way and Foothills Boulevard. Preliminary investigation, however, did not reveal a suitable and available site for such a park/ride facility. If such a station could be constructed, it would potentially intercept trips from the south on Foothills Boulevard and divert them from auto to transit, thus reducing auto traffic in the 400/500 South corridor. This branch would provide corridor transit service within approximately 1/4 mile of the This Is The Place State Park. Walking distance to Hogle Zoo would be in excess of one mile, which is not likely to encourage significant riders to the zoo.

Option 2

The corridor bus or LRT system would not penetrate the University of Utah campus and would extend to the Research Park instead.

Pros/Cons

The Research Park line would have the same frequency of service as the remainder of the corridor. This would maximize ridership potential from the Research Park and from the Foothills Corridor. However, it would eliminate corridor transit from most of the University of Utah campus, including the Huntsman Center and the Health Sciences Center. Likewise, it would reduce or eliminate corridor transit service to planned Olympic facilities on or adjacent to the University of Utah campus. Transit service on this branch only would provide more frequent service to travelers from the Foothills Boulevard corridor, thus increasing the potential to intercept these trips and divert them to transit. As with Option 1, this branch would provide corridor transit service within approximately 1/4 mile of the This Is The Place State Park. Walking distance to Hogle Zoo would be in excess of one mile, which is not likely to encourage significant riders to the zoo.

The University of Utah currently attracts 50,000 persons per day. The Research Park has a current employment of 4,900 employees working in 62 businesses. It is not likely that the Research Park,
combined with intercepted auto trips at a park-and-ride center, would attract nearly as many transit riders as the University of Utah Campus. Further analysis and engineering should be done during preliminary engineering and preparation of the FEIS in order to evaluate whether either of these Options represent a more desirable alternative for corridor transit service compared to the alignment that would penetrate the University of Utah campus to the Health Sciences Center. More detailed engineering will produce refined cost estimates along with potential operating and maintenance costs. Subarea ridership analysis will be required in order to assess which option has the highest overall potential for attracting corridor transit ridership.

**Rio Grande Alternative Alignment**

An LRT alignment along Rio Grande extending north from 400 South was considered and eliminated in the process of screening Downtown alignments options. Some interest remains in this alignment alternative, particularly if an intermodal transportation center is developed along the west side of 600 West south of 200 South. With an intermodal center at that location, it would be possible to use the Rio Grande alignment with an LRT station at the Rio Grande Depot. An improved walk connection could be constructed between the Rio Grande Depot and the planned intermodal center. In order to implement this Rio Grande alignment, it will be necessary to remove or relocate the existing tracks north of 200 South along the extension of Rio Grande. This alignment should be considered during preliminary engineering if implementation of the intermodal center materializes.

**300 South Alignment Alternative between Main and 400 West**

Some concern remains regarding the feasibility of constructing LRT in the center of 400 South between Main and 400 West while, at the same time, providing adequate capacity for traffic connecting with the new I-15 interchange at 400 South. Conceptual engineering carried out as part of this study indicated that the LRT alignment could be constructed in this section of 400 South and still maintain adequate street capacity. It will require detailed refinement of the street geometry and probably widening of the street within the existing right-of-way. These details will need to be addressed and resolved during preliminary engineering. If adequate traffic cannot be maintained, condition should be given to using 300 South as an alternative for this section of the alignment. Disadvantages to the 300 South alternative between Main and 400 West include the addition of two more right-angle turns for LRT vehicles and overlap of the alignment along Main Street between 400 South and 300 South.

**2.5 DESCRIPTION OF THE DEIS ALTERNATIVES**

As explained in Section 2.1.4, initial conceptual alternatives were organized into three basic alternative groups. Alternative alignments were then defined and evaluated for each group. A preferred alignment was identified for both Conceptual Alternative Group B—Bus/HOV and Group C—LRT. By definition, no alignment was defined or evaluated for Alternative Group A—No-Build. The preferred alignment for Groups B and C represent the optimum configuration of the transportation system for each respective alternative group. Having optimized each conceptual alternative group, the next step is to compare the performance of each group and select a locally preferred alternative (LPA). The following sections present a detailed definition of each alternative recommended for consideration in the remaining steps of the MIS/DEIS process.
2.5.1 Alternative A—No-Build

Alternative A is the "no-build" alternative required by NEPA. The No-Build Alternative is defined as "no-build" because it represents the condition and status of the transportation system in the east-west corridor if no major investment is made to improve or change what is already planned and committed. Relative to existing conditions in the corridor, Alternative A—No-Build clearly has major improvements that are already funded and in some stage of implementation. Major elements of the east-west corridor transportation system do not presently exist, but are included in the Alternative A—No-Build. They include the following:

Reconstruct I-15 from 600 North to 10800 South

UDOT is in the process of undertaking a design/build project that will lead to the complete reconstruction of I-15 between the endpoints noted above. The project has an estimated cost of $1.5 billion. Design and construction is scheduled to begin in April, 1997. The following provisions for access are of particular interest to the east-west corridor:

- The existing freeway connections to I-15 at 500 South and 600 South are likely to be reconstructed with connections to local streets further west at 500 West or 400 West.
- General purpose lanes from the south on I-15 will exit to 900 South and 600 South. The return connections to the south are at 500 South and 900 South.
- Separate HOV lanes to and from the south will be constructed in I-15 starting at 400 South. HOV traffic will be able to access I-15 at the newly constructed 400 South interchange. It was assumed that these HOV lanes would extend east from I-15 to at least 400 West.
- The primary interchange from the north for general purpose traffic on I-15 will be at 600 North. This traffic will have intersection connections to 300 West and 400 West.
- General purpose traffic to and from the north on I-15 will also have an interchange at 400 South.
- I-80 traffic to and from the west will have access to Downtown via 500 South (outbound) and 600 South (inbound).

North/South Light Rail Transit (LRT)

The UTA commenced construction early in 1997 on a 15-mile LRT line that extends from South Temple at 400 West through Downtown to 10000 South in Sandy. The line enters the east-west corridor via 200 West to 700 South. It then transitions along 700 South to Main Street where it travels north to South Temple. It then turns west to 400 West. The line will be double track for two-way operation and situated in the center of the street along which the alignment is located.

UTA Bus Routes Coordinated with the North/South LRT

UTA is in the process of modifying local and express bus routes so that they are consistent with eventual operation of the north/south LRT. This includes a Downtown shuttle route using buses passing through Downtown from the Avenues on the east side to the Rose Park area on the west side. Local bus routes running north/south on major streets east of Downtown will enter and exit the Downtown area via 200 South rather than the previous access along 400 South.
Intelligent Transportation System (ITS)
In coordination with local jurisdictions throughout the Salt Lake Valley, UDOT is in the process of developing a management and communication system to integrate the operations of the area’s freeway system and traffic signals at major intersections. A command center will be constructed to provide a central location for management and control of this area-wide coordinated traffic-signal system. Other ITS elements will be implemented as part of the I-15 reconstruction and north/south LRT projects.

Downtown Railroad Consolidation
Studies are presently under way to consolidate railroad operations on the west side of Downtown Salt Lake City. A major benefit of this effort will be to eliminate many of the railroad tracks that presently run in or cross existing streets. This creates the opportunity for redevelopment of the Gateway area and also makes it possible to shorten the viaducts serving Downtown when they are rebuilt as part of the I-15 reconstruction project.

Gateway Redevelopment
Salt Lake City is currently in the process of defining possibilities and options for the redevelopment of the Gateway area on the west side of Downtown. As part of Alternative A—No-Build, it was assumed that these improvements would be defined and initiated.

Salt Lake City International Airport (SLCIA) Master Plan
A new master plan is being developed for SLCIA. This plan includes the construction of a single Airport terminal with east-west concourses north of the terminal connected by an air-side people-mover system. The transportation alternatives for the east-west corridor would eventually interface with the Airport through the single new terminal facility.

Existing Arterial Street Cross Sections
The existing arterial street cross sections represent the no-build condition of Alternative A. The cross sections are described below to establish a baseline for comparison with the revised cross section for Alternatives B and C.

The current cross section along 400 South within the study area consists of four to six lanes depending on east-west location. Currently, parking is allowed on 400 South in the eastern portion of the study area. North Temple consists of four to six lanes depending on east-west location with parking being restricted within the study area. The existing lane configuration of the proposed corridor is summarized in Table 2-3. Typical cross sections of 400 South and North Temple are included in Figure 2-7 and Figure 2-8.

All of the above improvements were included and/or recognized as part of Alternative A—No-Build. Combined with existing elements of the east-west corridor transportation system, they constitute the baseline condition in relation to the other DEIS alternatives. All of the improvements identified in Alternative A—No-Build, were incorporated and assumed in the baseline computer analysis network models. These improvements collectively represent the baseline condition against which the performance of the other DEIS alternatives are to be compared and evaluated.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 2-7  Existing Typical Cross Section-400 South
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 2-8 Existing Typical Cross Section-North Temple
### Table 2-3
MIS/DEIS
University-Downtown-Airport
Existing Alignment Lane Configuration

<table>
<thead>
<tr>
<th>Street Name</th>
<th>From</th>
<th>To</th>
<th>Number of Through Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Temple</td>
<td>1-80</td>
<td>900 West</td>
<td>4</td>
</tr>
<tr>
<td>North Temple</td>
<td>900 West</td>
<td>300 West</td>
<td>6</td>
</tr>
<tr>
<td>400 South</td>
<td>200 East</td>
<td>University Street</td>
<td>6</td>
</tr>
<tr>
<td>South Campus Drive</td>
<td>University Street</td>
<td>Wasatch Drive</td>
<td>4</td>
</tr>
<tr>
<td>Wasatch Drive</td>
<td>South Campus Drive</td>
<td>South Medical Drive</td>
<td>6</td>
</tr>
<tr>
<td>South Medical Drive</td>
<td>Wasatch Drive</td>
<td>Terminus</td>
<td>4</td>
</tr>
</tbody>
</table>

### 2.5.2 Alternative B—Bus/HOV/TDM/TSM
This alternative focuses primarily on providing improved east-west transportation service in the corridor using local and express bus routes. In addition to expanding and improving bus routes, this alternative would include actions related to travel demand management (TDM) and traffic system management (TSM).

**Increased Frequency of Bus Service**
In addition to consolidating local bus operations to utilize the bus/HOV lanes, additional buses would be operated to provide a higher level of bus transit service throughout the corridor. For purposes of comparing alternatives, it was assumed that a special bus route would be operated from the University of Utah through Downtown to the Airport with a bus every five minutes. This represents a major increase in bus service available today. Presently, there is not a bus route that extends the full length of the corridor. Furthermore, the existing bus routes typically operate with buses every 15 minutes to one hour rather than the five-minute headway assumed for this alternative.

**Bus/HOV Lanes**
Under this alternative, a separate bus/HOV lane would be created in the lane nearest the curb for each direction of traffic flow on designated streets. The lane would be specially marked as a "diamond" lane for use by buses and HOV's during peak hours. In addition to special pavement marking, there would be overhead signs with flashing lights and special signalization at intersections to facilitate the efficient flow of vehicles traveling in these lanes. The lanes would be available to buses, commercial vans and cars carrying two or more passengers.

For the east end of the corridor, the lanes would start at Foothill Boulevard to the south of the University of Utah. They would continue along 500 South to 1100 East where they would transition with the main roadway to 400 South. The lanes would continue along 400 South to 400 West where they would connect with the HOV lanes being constructed as part of the I-15 reconstruction project (See Figure 2-9).

As part of Alternative B—Bus/HOV/TDM/TSM, the bus/HOV traffic would follow several alternative routes to continue north, west or south.
Bus/HOV traffic could travel north on 400 West to North Temple. If the North Temple railroad overpass is reconstructed after the railroad tracks are relocated, it would be shortened to provide for a direct connection to 400 West. At this point, the bus/HOV traffic would connect with general traffic on North Temple. If the existing North Temple overpass remains, bus/HOV traffic would need to transition to 300 West in order to connect with North Temple. Because bus/HOV traffic will be able to travel at higher speed along I-80 between Downtown and the Airport, special bus/HOV lanes were not recommended for North Temple.

Bus/HOV traffic travelling to and from the north on I-15 would connect with the freeway at the new 400 South interchange.

Bus/HOV traffic travelling to and from the south on I-15 would transition on north/south streets and connect with 500 South (outbound) and 600 South (inbound).

Bus/HOV traffic travelling to and from the west on I-80 to the Airport and International Center would also use the 500 South and 600 South connections.

Transit Centers and Park-and-Ride Lots
In conjunction with the buses and HOV lanes included with this alternative, transit centers and park-and-ride lots would be constructed at key points of transit interface. Transit centers and park-and-ride lots would be constructed at the following locations:

- **Rice Stadium—University of Utah**
  Special bus lanes would be constructed to access bus loading/unloading facilities surrounding Rice Stadium at the University of Utah. Bus bays would be provided for passengers to transfer between buses or load/unload for activities at the University. Arrangements would be negotiated with the University to utilize parking in the vicinity of the stadium when not needed for University activities.

- **Utah State Fairpark**
  Bus bays would be constructed on both sides of North Temple at the State Fairpark. Bus bays would be provided for passengers to transfer between buses or load/unload for activities at the State Fairpark. Arrangements would be negotiated with the State Fairpark to utilize available parking when not needed for State Fair activities.

- **A transit center with parking would be constructed on the west side of 2400 West between Old North Temple and the North Temple to Airport connection roadway. Three hundred and fifty parking spaces would be provided at this location.**

- **Provisions would be made at the Airport transportation center to accommodate buses and vans. The transportation center would be constructed south of the Airport access roadways with pedestrian overpasses that connect directly to the single Airport terminal. Arrangements would be made for buses to stop at a station south of the Airport circulation roadway at a new hotel, if one is constructed.**

Travel Demand Management (TDM)
Chapter 2 Alternatives Considered

TDM Strategies would be used to encourage potential transit patrons to shift from auto travel to mass transit. The following are some strategies for use in trip-reduction programs in the University-Downtown-Airport Corridor:

- Vanpooling with private vans—UTA’s Rideshare program will assist van owners and commuters to contact each other and form private vanpools.
- Parking management strategies—employer incentives or disincentives that encourage employees to adopt alternatives to driving alone. Raising parking rates and limiting the available parking discourages solo commuting particularly when combined with reserve preferred parking spaces for car/van pools.
- Bicycle commuting can be encouraged by providing secure, well-lit bicycle parking facilities, including showers.
- Telecommuting with the aid of computers, modems, telephones and telefaxes can improve employee productivity and save on hidden costs such as hiring and training staff by increasing employee retention. It also saves office space. Three forms of telecommuting to consider include working from home, from a satellite office, or from a neighborhood work center.
- Carpooling—UTA’s Rideshare program offers free assistance in connecting commuting drivers and riders.
- Employer-sponsored “guaranteed ride home” programs provide emergency transportation to employees who normally ride mass transit.
- UTA’s Rideshare program leases vans to employers and organizes riders, routes and drivers and helps determine rider fees.
- Ride the bus.
- Alternative work hours other than the standard eight-to-five schedule allow commuters to travel at non-peak hours, thereby reducing congestion and VMTs.

Transportation System Management (TSM)

TSM would be used to reduce congestion at three intersections:
- 1300 East and 500 South
- 700 East and 400 South
- North Temple and Redwood Redwood Road

One of the basic methods of decreasing the number of vehicles on a given corridor without reducing the number of trips is to encourage people to share trips. This can be accomplished in a number of ways. One of the most familiar is busing. Other methods include car and van pools. By providing lanes exclusively for vehicles with more than one occupant, more individuals can be encouraged to share rides to gain access to these lanes which, as a rule, are less encumbered than their single occupancy counterparts.
Arterial Street Cross Sections
This alternative provides High-Occupancy Vehicle (HOV) lanes to facilitate East-West travel. The existing roadway would be striped to reconfigure lanes. The HOV lanes are currently designated as the first travel lane in from the curb. The proposed typical cross section for 400 South and North Temple are shown in Figure 2-10 and Figure 2-11 respectively.

Coordination with Bicycles and Pedestrians
The primary transit improvement for this component is a corridor bus service that would provide passengers with a bus every five minutes in each direction most of the day. Access to the system would be a bus stop every few blocks and park-and-ride lots where people can park their cars or be dropped off. Those within a reasonable walking distance of a bus stop or transit center will walk and board buses. Bus shelters and other passenger amenities will be available to accommodate passengers waiting for the next bus.

Passengers who are not within walk access of a bus stop transit center may choose to ride a bike to access the system. Bicycle racks or storage containers will be provided at major bus stops and transit centers. If passengers plan to use their bicycle at the destination end of their trip, they will be able to mount a bike on the front of the bus similar to current UTA practice. During non-peak hours, passengers can board the bus with their bicycles and store them in the back of the bus. This makes it possible for more than two bikers to travel on the same bus during off-peak hours. Bus stops will be located at major cross points or intersections of regional bicycle routes and pedestrian trails.

2.5.3 Alternative C—LRT/TDM/TSM
This alternative would use LRT as the primary mode of travel for transit within the east-west corridor. In addition to construction and operation of LRT, this alternative would include actions related to travel demand management (TDM) and transportation system management (TSM).
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 2-10   HOV Cross Section-400 South
Note: Dimensions are approximate.
Not to scale. Lane widths, parkstrip, sidewalk, etc. varies throughout the corridor. Section shown is approximately 600 West.

Typical Block Site Plan

University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 2-11  HOV Cross Section-North Temple
In this alternative, a two-directional LRT line would be constructed to provide high capacity and dependable transit service between the Health Sciences Center at the University of Utah and the Salt Lake City International Airport (SLCIA). The alignment to and from the University of Utah Health Sciences Center would start at a new complex planned by the University to accommodate an enclosed LRT Station as well as clinics and commercial facilities. From there it would proceed, via Medical Drive and Wasatch Blvd. and South Campus Drive, to the Rice Stadium parking lot. This lot would provide opportunity for an intermodal interface hub with buses, as well as a park-and-ride area for people attending special events Downtown. From Rice Stadium, the LRT alignment proceeds down 500 South continuing along 500 South/400 South to 400 West. The alignment uses 400 West to North Temple where a new overpass for LRT would be constructed parallel to and just south of the existing North Temple overpass. The alignment would continue west and proceed along North Temple to approximately 2400 West turning south to interface with a park-and-ride station location. From 2400 West it would travel adjacent to the Airport/I-80 access road to a stop on the periphery of the Airport at the site of a planned hotel and commercial development. From there, it would proceed into the main terminal of the Airport to a station specially designed and constructed to accommodate safety requirements for a transit terminus in an Airport facility (See Figure 2-12).

LRT would operate in the center of the existing roadways, with one possible exception. If there are unacceptable impacts to the flow of left turns off of 400 South from the HOV and general purpose lane exiting from I-15, the south side of the street alignment would be considered between Main Street and 400 West.

**Alternative Operational LRT Configurations**

The track configuration for the LRT alignment creates a “T” scenario where the east-west line extends the length of the corridor and simply crosses the north/south LRT line at one or two locations. The two lines would essentially operate independently with passengers transferring from one line to the other.

Alternative LRT alignments I and J were developed to test the feasibility and/or desirability of modified operating scenarios that would minimize or eliminate the need to transfer between the north/south and east-west LRT lines. The two alignment options were defined as follows:

**LRT Operational Option I - “Y” Configuration**

Under the “Y” configuration of Operational Option I, two separate LRT lines would both originate and terminate at the south end of the north/south LRT line. LRT vehicles on one line would start at 10000 South in Sandy and travel to South Temple at 400 West, which is the end of the line for the planned north/south line. At that point, the trains would continue along North Temple to the Salt Lake International Airport, thus eliminating the need for passengers to transfer in order to travel to the Airport. The second LRT line would start at 10000 South in Sandy and travel to Main Street and 400 South. At that point, the trains would turn east along 400 South and 500 South, eventually reaching the Health Sciences Center at the University. This second line would eliminate the need for passengers to transfer in order to reach the University from the north/south line. The north/south corridor from 10000 South to 400 South would have double the frequency of service, since both lines would be operating on the same tracks between those two points. The most important disadvantage to this operational scenario is that passengers traveling from the east to the west side of the east-west corridor would have to make a transfer to complete their trip.
LRT Operational Option J—Three-Line Configuration
This operational option is similar to Option J, except that a third LRT line would operate directly between the University and the Airport. One line would operate from Sandy to the Airport. A second line would operate from Sandy to the Health Sciences Center at the University. The third line would operate between the Health Sciences Center and the Airport. It was assumed that the third east-west line would operate along 400 South to 400 West. It would travel along 400 West to North Temple and then to the Airport. This three-line LRT-line configuration would eliminate the need to transfer from one line to another for passengers traveling from one corridor to another. Under this operating scenario, all of the lines would have twice the frequency of service due to the overlap of two lines in each corridor.

Corridor LRT Stations
LRT stations would be constructed at key locations along the corridor. Station spacing was developed to balance two conflicting objectives. First, a higher number of stations increases access to LRT from local neighborhoods. Second, each station decreases the average operating speed of the LRT line due to time needed for deceleration, station dwell and acceleration. Recommended LRT station locations are summarized below.

Western Corridor Stations
- Salt Lake Airport Terminal
- Airport Hotel (if constructed)
- 2400 West / North Temple
- Redwood Road and North Temple
- Utah State Fairpark
- 900 West

Eastern Corridor Stations
- University Health Sciences Center
- Huntsman Center
- 1500 East South Campus Drive
- Rice Stadium
- 1100 East
- 700 East
- 200 East

Downtown Stations
- 400 South between Main Street and West Temple
- 400 South between 200 West and 300 West
- 400 West between 200 South and 300 South
- 400 West between North Temple and South Temple

TSM Strategies would be used to reduce congestion at three intersections:
- 1300 East and 500 South
- 700 East and 400 South
- North Temple and Redwood Road
TDM Strategies would be used to encourage potential transit patrons to shift from auto travel to mass transit. The following are some strategies for use in trip reduction programs in the University-Downtown-Airport Corridor:

- UTA's Rideshare program will assist van owners and commuters to contact each other and form private vanpools.
- Parking management strategies include employer incentives or disincentives that encourage employees to adopt alternatives to driving alone. Raising parking rates and limiting the available parking discourages solo commuting, particularly when combined with reserve preferred parking spaces for car/vanpools.
- Bicycle commuting can be encouraged by providing secure, well-lit bicycle parking facilities, including showers.
- Telecommuting with the aid of computers, modems, telephones and telefaxes can improve employee productivity and save on hidden costs such as hiring and training staff by increasing employee retention. It also saves office space. Three forms of telecommuting to consider include working from home, from a satellite office, or from a neighborhood work center.
- Carpooling—UTA's Rideshare program offers free assistance in connecting commuting drivers and riders.
- Employer-sponsored "guaranteed ride home" programs provide emergency transportation to employees who normally ride mass transit.
- UTA's Rideshare program leases vans to employers and organizes riders, routes and drivers and helps determine rider fees.
- Ride the bus.

Alternative work hours other than the standard eight-to-five schedule, allowing commuters to travel at non-peak hours, thereby reducing congestion and VMTs.

Arterial Street Cross Sections
For most of the corridor, the LRT would be designed to be located in the center of the street. The proposed cross section of the light rail corridor changes in the vicinity of the Airport from a center mall to a right of way along north side of the I-80 Airport access roadway. The light rail corridor is typically 28 feet across between stations and widens out to 39 feet at each station. The typical cross section of this alternative is therefore significantly different at a station as opposed to between stations. A typical cross section for 400 South and North Temple are shown in Figure 2-13 and Figure 2-14 respectively. An overhead view of a typical station cross section is provided along with the typical track alignment between stations on each cross section map.

The width of street right-of-way required at a station will require significant adjustments in existing street geometrics. It may even require widening of the street within the existing right-of-way. Once LRT is constructed, it will be more difficult for left turning movements to be negotiated by traffic.
Chapter 2 Alternatives Considered

running parallel to the LRT lines. The left turning lanes will be located in the "shadow" of the light rail station. A protected left turn phase will be required to facilitate this maneuver which may result in a lower LOS for the affected intersections which do not already have a protected phase.

Coordination with bicycles and pedestrians under this alternative, transit passengers will be boarding both buses and LRT vehicles. LRT transit stations will be located approximately one-half mile apart. This spacing is required in order to maintain acceptable travel times and control system cost for stations. There will therefore be fewer potential passengers that are within a reasonable walking distance of and LRT station. The front door on each LRT vehicle will be designed to accept passengers from a "high block" which has a ramp that can provide access to physically impaired persons. This high block can also be used by elderly, young children and strollers. Shelters and other passenger amenities will be available to accommodate passengers waiting for the next LRT train.

Passengers who are not within walk access of an LRT station may choose to ride a bike to access the system. Bicycle racks and storage containers will be provided at major LRT stations and at park/ride lots. If passengers plan to use their bicycles at the destination end of their trip, they will be able to use the high block at the front door of each train to take their bicycles with them on the LRT. It may be necessary to limit the number of bicycles allowed to board during peak periods of travel. LRT stations and bus stops will be located at major cross points or intersections of regional bicycle routes and pedestrian trails.

In the case of LRT, special attention will be given to location and design of transit stations where passengers will be transferring to the North/South LRT line. Stations will be located to minimize the walking distance between stops on the two LRT lines. Shelters and other passenger amenities will be available to protect passengers from adverse weather. Pedestrian cross walks with traffic signal control will be provided at all stations located in the center of a street.
Figure 2-12
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 2-13  LRT Cross Section-400 South
Note: Dimensions are approximate. Not to scale. Lane widths, parkstrip, sidewalk, etc. varies throughout the corridor. Section shown is for approximately 600 West. Typical section shown is between stations. The roadway may need to be widened at station locations.

Typical Block Site Plan

University–Downtown–Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 2-14  LRT Cross Section–North Temple
Each of the alternatives could have a variety of direct and indirect impacts on the man-made and natural environment of the corridor. This chapter contains information about the setting of the project and describes existing environmental conditions that could be affected by the Locally Preferred Alternative (LPA). The purpose is to provide a baseline condition from which the location and magnitude of the anticipated impacts can be measured. It also serves as a basis for the discussion of transportation impacts in Chapter 4 and environmental consequences in Chapter 5.

To facilitate closer analysis, the study area has been divided into the following geographic subsections:

- **Airport** - I-215 to 7200 South and from the Airport’s north boundary to 800 South;
- **West Central** - from I-15 to I-215 and from 600 North to 800 South;
- **Downtown** - 200 East to I-15, North Temple to 800 South;
- **East Central** - from 1300 East to 200 East and South Temple to 800 South; and
- **University** - bordered by the foothills to the north and east, Sunnyside to the south and 1300 East on the west.

### 3.1 VISUAL SETTING AND URBAN CHARACTER

#### 3.1.1 Methodology

In addition to site reconnaissance visits, the document entitled "The Urban Design Element," prepared by Salt Lake City, is the primary source of information regarding views, vistas, urban form and development character in Salt Lake City. It defines urban design policy with a goal toward preserving city image and maintaining city livability. While it does not provide definitive answers to all questions, it is a guide to creating an atmosphere in which urban design issues are brought to the public and considered by policy and decision-makers.

In very general terms, Salt Lake City's urban form is characterized by a central core where the tallest buildings and the strongest focus of commercial activity occur. Surrounding this core are lower scale buildings and structures which support uses and activity in the central core. Farther from the core, the scale and height of buildings decrease and the grid of streets widen into a less formal, less perpendicular web of rural roads and the patchwork of farms and pastures. Topographic features like the Wasatch Mountains and the Great Salt Lake also play a major role in defining a setting in which Salt Lake City's urban form unfolds. The Views and Vistas Map in Figure 3-1 shows view corridors in the study area.
3.1.2 Airport

Views and Vistas: From the Airport gateway to Salt Lake City, views along the highway toward Downtown and the Wasatch Mountain backdrop are broad and spectacular. It is possible to experience a sense of the city from this perspective and to understand its place in the landscape. Major monuments like the State Capitol Building, Temple Square and the corporate and government skyline of Salt Lake City are easily identified. The monuments are attractive and provide orientation for travelers. Even at night, the importance of Downtown is understood from this viewpoint. The view corridors and vistas which are dominant and important to the character of the area lead to the Wasatch Mountains in the east, and to the Oquirrh Mountains and Great Salt Lake Desert to the west.

Visual Setting and Urban Form: The character of the area to the south and west of the International Center and SLCIA is rather open and rural. Incongruous elements include several massive power lines traversing the area to and from a substation to the south of I-80; and debris piles located along the edges of the roadway. Wing Pointe Golf Course is a green oasis alongside I-80; but the majority of the landscape is dominated by the wide highway right-of-way which is sparsely landscaped, views of the Airport and scattered buildings which serve as Airport support uses and a series of highway structures as one proceeds toward the east. Visual continuity comes primarily from the highway corridor and the mass of interchanges, ramps and structures, also from the broad views to the east and the mountains.

3.1.3 West Central

Views and Vistas: Distant views along North Temple to the east are dominated by the Wasatch foothills; to the west, they terminate in highway structures. Close-up views along North Temple are dominated by hodge-podge development along the corridor and very little streetscape that is visually inviting. A mixture of commercial, office and institutional uses occur along the street.

From the elevated I-80 corridor, views are focused on the distance looking over the development on either side where only the treetops and roofs are occasionally visible. Except for Utah Power and Light’s stacks and an occasional billboard, views from the highway tend to be toward Downtown and the mountain backdrop due to the visual obstruction of heavy trees on either side. From here the broader views to the mountains and Downtown Salt Lake City in the east are more dominant. Views to the west are less interesting and appear more cluttered.

Visual Setting and Urban Form: Visually, this area changes dramatically from industrial and manufacturing, to residential. Sometimes the immediate views are pleasant and attractive because of landscaping and architectural design, such as at Utah State Fairpark or the State Government office complexes. In other places, structures and landscapes are deteriorated and rundown or cluttered. This deterioration is noticeable in the appearance of some businesses along North Temple, at trucking yards and near outdoor storage areas.

The character of the residential neighborhoods is also varied. In some areas, homes are well kept and maintained; in others they are dilapidated and visually unappealing. The abundance of trees in the older residential neighborhoods helps to create a sense of unity. The lack of trees along the North Temple commercial corridor and in the newer residential developments contribute to their harsh and disjointed appearance.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-1 Views and Vistas Map
3.1.4 Downtown

Views and Vistas: Downtown is either the origin or the terminus for several view corridors identified in the Urban Design Element. These are:

- State Street to the State Capitol Building and the surrounding foothills
- Exchange Place terminating at the Post Office Building
- Main Street to the Daughters of Utah Pioneers Museum
- 200 South east to the University of Utah Park building
- 300 South Street terminating at the Denver and Rio Grande Railroad Depot
- South Temple from the Union Pacific Depot to Federal Heights and the foothills
- First Avenue terminating at Temple Square

In addition to these very specific view corridors and vistas, the surrounding landscape is also identified as important. Views north toward Ensign Peak, west to the Oquirrh Mountains including Great Salt Lake and east along the Wasatch foothills, all establish the sense of place in which Salt Lake City has grown.

Visual Setting and Urban Form: One of the most important gateways to Salt Lake City occurs from I-80/I-15 via the 600 South off-ramp. Unfortunately, billboards, railroad yards, dilapidated structures and industrial buildings dominate views and interrupt more important views to the Downtown skyline and the Wasatch Mountain backdrop. Recent plans in the Gateway District of Salt Lake City are encouraging change in the area which has the potential to dramatically and positively affect visual quality and views at this gateway.

Once into Downtown, tall buildings dominate views and focus attention to the CBD. This core area is typically urban in quality with broad sidewalks and buildings forming the edges of rights-of-way. Main Street includes mature trees which provide shade and reduce the scale of the buildings making the sidewalks very pedestrian-friendly. Toward the edges of the core, building height decreases, the scale of the streetscape broadens and trees are less frequent and/or less mature.

Toward the eastern edge of Downtown, retail commercial uses give way to office uses and eventually transition into urban residential areas. To the north, mixed use residential neighborhoods are attractive and appealing. To the south, business and commercial uses continue. This is the area where the new Courts Complex is under construction and new hotel facilities are planned and underway. The western CBD, Gateway District and this southern end of Downtown are changing character through development and redevelopment efforts.
3.1.5 East Central

**Views and Vistas:** Many of the important view corridors listed above in Downtown and identified in The Urban Design Element are also found in the East Central area. These include: South Temple; 200 South; and 300 South. Close-up views from the street are more focused on the residential and mixed-use activity in the area. Along 400 South, close-up views along the street are generally focused on the more commercial uses. Looking east along 400 South, views follow the alignment up to the hill where the roadway transitions to 500 South and heads to the University. Views of the Wasatch Mountains terminate the eastern view. Looking west along 400 South, views are toward the ramps accessing I-15 and the Oquirrh Range.

**Visual Setting and Urban Form:** The character of this area of the City is residential and mixed use. It has an appealing visual quality. Most of the area is developed, so the established character and visual setting will remain. The scale of buildings is compatible with a strong pedestrian streetscape even though streets are wide. Mature trees throughout the area contribute to the pleasant visual quality and continuity of the neighborhood and the "people-friendly" character of the area.

3.1.6 University

**Views and Vistas:** From many locations on the campus, views to the Great Salt Lake and the Great Basin Desert are impressive and broad. This is also true of views from This Is The Place State Park and the hillside trails above Red Butte Garden and Arboretum. With Downtown Salt Lake City and the urban forest as a foreground, views and vistas are orienting, memorable and attractive. From the campus, views to the mountains on the east are foreground and dominant.

**Visual Setting and Urban Form:** Except for the single-family residential development in Federal Heights, which is attractive and inviting, the dominant urban form is campus-like. University of Utah, Fort Douglas, Research Park and the State Park are all open in character and heavily landscaped. Green lawns and streetscapes tie the buildings and development together. Mature trees in most of the areas provide continuity and visual strength.

3.2 LAND USE

3.2.1 Methodology

Land use information was obtained primarily from Salt Lake City Zoning Maps and visual reconnaissance. Salt Lake City recently completed a revision to its zoning ordinance map which reflects existing land use patterns. Because the mapping was completed recently and is based on existing development patterns, it is a reasonably accurate depiction of current land uses in developed areas of the City. In undeveloped and under-developed areas of the City, the zoning map shows an anticipated condition based on neighborhood planning documents, community desires and anticipated development interests. It is in these areas where the greatest potential for change can be expected and where zoning maps do not accurately depict the existing situation. For example, the area to the west and south of the SLCIA and International Center is zoned for manufacturing; however, most of the land is currently undeveloped. In this area, if future development interests change, there is the potential for a major development center. The Gateway District just west of the CBD may also change land uses dramatically in the near future as new plans are completed and
major infrastructure elements change. Again, a major development center is likely to emerge. Plans to reconstruct the I-15 corridor within the study area will push more traffic onto local streets during the construction phases of that project. Parallel streets and cross streets are being improved to increase their capacity in hopes of reducing commuter delay during the I-15 reconstruction. When the I-15 project is complete, the extra capacity may remain. This could have a definite influence on land use and employment densities in the area, as additional capacity encourages more trips to the area. The CBD is also the location of most of the area’s accommodations and shopping attractions. The close proximity of the Airport encourages travelers to seek hotel accommodations in the Downtown area.

These conditions and others are described in the following paragraphs and are indicated on the Existing Land Use Map in Figure 3-2, which depicts areas of concentration. For example, all single-family and duplex zones or other zones which are relatively low in residential density are combined. Multi-family zones are either low, medium, or high density. Some commercial zones are combined if they have similar characteristics. Downtown zones are shown separately. Business and research park uses are combined, as are the two institutional and the two manufacturing zones. Open space, public lands and Airport are the remaining designations. Combining these zones can help to illustrate concentrations of development and reveals fairly strong development patterns in the developed portions of the City.

3.2.2 Airport

The westernmost portion of the corridor includes the SLCIA and surrounding Airport and industrial/business-related uses; the Salt Lake International Center, a business and industrial park; and the Wingpointe Golf Course. Much of the area west of the International Center and south of Interstate 80 is undeveloped. Development south of the SLCIA is also planned as manufacturing and includes some existing commercial and Airport-related business activity.

The Airport is a hub of travel and business activity for the City. In addition to the many Airport-related businesses within the secure boundary of the Airport, there are numerous Airport-related businesses located adjacent to airport property that are strongly tied to Airport activity or support activity. The Airport has a major influence on development patterns in the area because of various Airport Protection Zones, which restrict heights and certain kinds of land uses, such as residential. It is likely that land uses that are currently developing in the area will continue to grow and eventually consume the remaining developable land in the area.

Secondary Development / Redevelopment Potential: Much of the area west and south of the International Center is zoned for manufacturing and/or business park uses. However, this is one area of the City where land use and development patterns are not firmly established and can potentially change. Lands to the north of the International Center are zoned agricultural and open space which reflects current uses for grazing, wildlife habitat and wetlands. While not directly in the corridor, this area is important from a transportation and transit perspective because it has often been identified as a potential residential mixed-use and planned community.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-2   Land Use Map
3.2.3 West Central

The West Central area is a mixture of development patterns including strip commercial along North Temple, two isolated residential neighborhoods in the northern and southern portions of the study area, several business parks with a concentration of State Government offices, heavy industrial uses between North Temple and I-80 and the Utah State Fairpark. Existing land use patterns are fairly well established and compartmentalized. They are distinct and separated from each other by major roadways, highways or the Jordan River. These barriers isolate uses which might otherwise interact more conveniently. As it is, neighborhood commercial uses are difficult to access from residential neighborhoods.

Secondary Development / Redevelopment Potential: There is very little vacant land in this area with the exception of the parking areas associated with the Fairpark and small parcels directly south of the Fairpark. At some future date, the Fairpark may convert to some other use, offering opportunity to redevelop. The condition of the properties varies greatly. There is some potential that secondary development may be encouraged and redevelopment of existing deteriorating areas may occur.

3.2.4 Downtown

Downtown includes major commercial, shopping, hotel/motel, corporate office and government uses, as well as arts and entertainment facilities. It is a major activity and development center in the corridor and includes the State Capitol and offices, World Headquarters of the Church of Jesus Christ of Latter-day Saints, Abravanel Hall and Salt Lake City Arts Center, Salt Palace Convention Center, Delta Center (Utah Jazz Basketball), Temple Square, Capitol Theater, Salt Lake City and County Building, Salt Lake City Courts Complex and Library and many other important civic facilities. It is a central gathering place for sporting and arts events, conventions and conferences, and special events such as the Salt Lake City Arts Festival, Days of Forty-Seven Rodeo, parades and others.

Secondary Development / Redevelopment Potential: While there are many potential opportunities for secondary development and redevelopment in the Downtown area, the largest and most important is the Gateway District. The Gateway District is the area between approximately North Temple Street and 900 South Street and from 300 West to the I-15 Corridor. It has been the subject of much planning and development attention throughout the past two years beginning with the Visionary Gateway Plan which focused on the potential for high density, mixed-use urban development and identified the necessity of removing and shortening I-15 viaducts and consolidating the railroad tracks. The Rail Consolidation Study carried the visionary plan further by documenting the feasibility of removing and relocating most of the trackage which now obstructs development and circulation in the area. A Gateway District Master Plan is anticipated in late 1997 which will define circulation systems, land use development patterns and urban design components of the District.

Salt Lake City is looking to the Gateway District for redevelopment focusing on high-density urban housing, mixed-use commercial, major attractions, markets and festivals, urban open space, and perhaps Olympic facilities. An Olympic Plaza to accommodate crowds and ceremonies associated with the 2002 Winter Olympics is possible. The rebuilding of I-15, shortening of viaducts accessing the CBD, relocation of the railroad tracks, light rail access from the north/south corridor, accessibility by several different transportation modes and the 2002 Olympics all combine to make the development and redevelopment potential of the Gateway District imminent.
3.2.5 East Central

East Central is predominantly residential and residential mixed-use. This has been the development pattern in the area and is the desired pattern for the future. While there has been some encroachment of office structures throughout the area, they are being discouraged in favor of mixed-use development which incorporates residential uses and neighborhood support retail and commercial services. North of South Temple Street in the Avenues and Capitol Hills districts, residential development is primarily single-family and duplex. South of South Temple Street, residential development includes more multi-family and higher-density housing.

Residential development includes some of the oldest in the City. Consequently, there are several residential historic districts in the area. The City has aggressively protected this housing stock and has attempted to halt demolition of residential structures and the increase of commercial office structures. Maintaining and preserving residential neighborhoods has been one of the City's strong policy goals for several years. The current zoning supports those goals and establishes the area as a high density urban neighborhood.

Though scattered throughout the area, retail commercial uses are concentrated on 400 South Street. Recent planning decisions have reinforced this pattern by creating large-scale retail shopping which serves neighborhood and regional needs.

Secondary Development / Redevelopment Potential: There is less potential for secondary development and redevelopment in this area. It is fairly stable and not likely to change in dramatic ways. There is always the potential for changes in use and intensification of use, but it is likely to occur on a smaller scale and to follow the established patterns.

3.2.6 University

The eastern end of the corridor includes the University of Utah and University Medical Complex. They are both major activity generators with educational, health care, cultural and recreational attractions. Development on the University of Utah Campus including the Medical Center is anticipated to increase, adding more medical facilities and educational buildings. Land use patterns are fairly well established in the area and likely to persist into the future.

This area also includes the University's Research Park, This Is The Place State Park, Red Butte Garden and Arboretum, the Federal Heights residential neighborhood (primarily single-family) and the Stephen A. Douglas Armed Forces Reserve Center.

Secondary Development/Redevelopment Potential: Fort Douglas has the potential of changing use as the University of Utah has acquired half of the base and the other half may also change uses as the Army Base is eventually dismantled. Some restrictions will apply to redevelopment of the base because of its historic status.

3.3 PARKS AND OPEN SPACE

3.3.1 Methodology

Parks and open space information was obtained from the Salt Lake City Parks and Open Space Plan and the Salt Lake City Zoning Ordinance and Map. Salt Lake City's open space system includes
numerous natural amenities such as the Jordan River, Great Salt Lake wetlands, canyon streams and mountain ranges, as well as a wide variety of developed parks, recreation facilities and open space. The goal of the Parks and Open Space Plan is to connect the elements of the system throughout the City. Within the study area, there are several existing parks and recreation facilities, existing trails and designated open spaces. These elements are shown on the Existing Parks and Open Space Map (See Figure 3-3).

3.3.2 Airport
Designated open space in this section of the corridor includes the Wing Pointe Golf Course, a public facility operated by Salt Lake City Parks and Recreation. It is located immediately south of the SLCIA and adjacent to I-80. It forms part of the entry landscape into the SLCIA. Most of the area north of the International Center is designated as agricultural use or open space because of existing grazing uses and wetland habitat.

The Open Space Plan identifies a Transvalley Corridor, which follows the railroad right-of-way just west of the International Center property. This is a major east-west open space corridor running from the mouth of Emigration Canyon to Bailey’s Lake. It is intended to serve pedestrian and bicycle needs. Additionally, 7200 West, which is the western boundary of the corridor, is shown as an expanded right-of-way to be installed when the road system is extended to the north. It is to include large areas of open space, paths and trails that will blend into adjacent wetland areas.

3.3.3 West Central
The Jordan River Parkway is the dominant open space in this portion of the study area. It runs north south through the center of the West Central area. The Jordan River Parkway was designated several years ago and has gradually become incorporated into planning efforts by neighboring jurisdictions. In Salt Lake City, it is an important north south connection. At the Jordan River and approximately 600 North Street, the parkway expands into Riverside Park, a municipal park approximately 20 acres in size, operated by Salt Lake City Parks and Recreation, which was established in 1912.

The Jordan River Parkway passes under North Temple Street just to the west of the Utah State Fairpark. The Fairpark, owned and operated by the State of Utah, is the site of the annual Utah State Fair and is a favorite site for special concerts, gatherings, conventions, trade shows and other events. Further south, the Parkway passes under I-80 and winds its way through residential neighborhoods in areas where trail improvements have begun to be implemented.

A small portion of the Westpoint Corridor follows a route adjacent to the eastern edge of I-215 and as proposed would meander through residential neighborhoods just west of I-215, where it crosses North Temple Street at the Fairpark. It is intended to provide a buffer and amenity between residential uses and commercial uses. Once across North Temple, it meanders through White Park, an undeveloped site adjacent to the Jordan River intended to serve as a transition between the Westpoint Corridor and the City Creek/Gateway Redevelopment Area.

Sherwood Park is a municipal park managed by Salt Lake City Parks and Recreation. It is located at 400 South and 1400 West Streets. It is named for Bishop Robert Sherwood who is believed to have dedicated land for this public use and surveyed the city in 1847, along with Orson Pratt.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-3   Parks and Open Spaces Map
Three elementary schools are within the West Central area: Franklin Elementary School, located at 400 South Street just east of the Jordan River; Jackson Elementary, located at 200 North and 800 West Streets; and Backman Elementary, located at 700 North Street and just east of the Jordan River.

### 3.3.4 Downtown

Five important existing urban open space and park elements are included in Downtown: Pioneer Park; City Creek Park; Memory Grove Park; the Gallivan Center; and Washington Square. Pioneer Park, located between 300 and 400 West and between 300 and 400 South Streets dates to the earliest days of Salt Lake City when the various camps of pioneers were consolidated within the walls of "Old Fort." In 1879, it became the property of Salt Lake City and was dedicated as "Pioneer Square" in 1898. It has had a rich and varied history and was recently improved with Redevelopment Agency funds.

Memory Grove sits at the mouth of City Creek Canyon. It, too, is part of the pioneer history of Salt Lake City. Pioneers camped at the mouth of the canyon and began diverting water for their domestic use. City Creek is still a source of culinary water for the City and was put underground in 1909 to protect the water supply and to protect residents from accidental drowning. The area above the buried creek also became park land.

City Creek winds its way through a relatively natural canyon environment toward Memory Grove Park, which was first designated a park in 1902. Later, in 1924, it was set aside as a memorial to those who died in World War I. Since then a number of other monuments have been added to the area commemorating Utah men and women who lost their lives defending their country.

City Creek Park is Salt Lake City's newest park. It returned City Creek to the surface after 85 years of being buried underground. City Creek Park culminates directly across from the LDS Church headquarters at State Street and North Temple Street. At the same time City Creek Park was being developed, the LDS Church completed a complementary park on the south side of North Temple Street to commemorate Mormon history and the settlement of the Salt Lake Valley. Both of these new parks were dedicated in October 1995 and represent the beginning of a long master-planned goal of returning City Creek to the surface through the west Downtown area of Salt Lake City.

Plans call for the City Creek to wind its way west adjacent to North Temple Street and eventually meander to the southwest toward the Gateway District. This area of the city is described in Section 1.1 Land Use and is planned to become an urban mixed-use neighborhood which incorporates the green stream corridor as a major part of the urban fabric of the area. Plans have discussed ponds and stream corridors, open spaces and trails, parks and plazas which celebrate the creek and its passage to the Jordan River and Great Salt Lake. The Gateway District and City Creek are connected to the Westpoint Corridor along a railroad right-of-way and 100 South to the Jordan River and White Park.

Downtown includes one school, West High, which is located on 300 West between 200 and 300 North Streets.

Washington Square is the setting for the historic Salt Lake City and County Building which was restored and rededicated in 1989. The building and the seven acre park which surrounds it were extensively renovated, updated and improved. It is an important green space at the southern end of
the Central Business District and is the frequent site of community gatherings and festivals such as 
the Living Traditions Festival which celebrates the cultural diversity of the City.

Gallivan Center, in Salt Lake City's urban core, is rapidly becoming an important gathering place. 
It is a large urban plaza that is programmed with activity throughout the entire year. New 
development will soon complete the plaza and add to the number of people who have ready access 
to it. The American Stores Corporate Headquarters and its seven story parking structure are nearing 
completion. The new Plaza Drive and its associated retail component and continuation of the plaza 
will be under construction in 1998. A major hotel developer will soon be selected to complete 
development on the block. At its completion, Gallivan Center Plaza will be a unique urban 
experience for Salt Lake City residents and visitors.

3.3.5 East Central
The western edge of East Central touches on the Memory Grove/City Creek parks, which are 
described in Section 3.3.4, Downtown. In addition to these, East Central includes Eleventh Avenue 
Park, Lindsay Gardens and the City Cemetery.

Eleventh Avenue Park is relatively new to the Salt Lake City park system. It is located along 11th 
Avenue in the northeast neighborhood of the Avenues. Lindsay Gardens at "M" Street and 9th 
Avenue was originally the home and business of pioneer Mark Lindsay who later sold the property 
to the City. It is recognized by the Daughters of Utah Pioneers as Mr. Lindsay's homestead, and 
later as one of the first playgrounds in Utah. It is now a municipal park serving the northeast 
Avenues neighborhood. City Cemetery is one of the oldest in the City.

Rowland Hall St. Marks Elementary School is a private school located on First Avenue in the lower 
Avenues neighborhood. Public schools include Ensign Elementary on 12th Avenue in the Upper 
Avenues neighborhood, Wasatch Elementary at South Temple and "R" Street and Bryant Middle 
School at 40 South 800 East Street.

Faultline Park is a small open space in the center of the residential neighborhood. It is part of a 
system of earthquake faults along Wasatch Mountains foothills which has remained undeveloped 
and is now preserved as an open space.

3.3.6 University
The Bonneville Shoreline Trail is a major open space feature of this area. It follows the pre-historic 
shoreline of Lake Bonneville along the foothills at approximately 5,150' elevation, which provides 
controlled access to the foothills and Wasatch-Cache National Forest lands for pedestrians and 
bicycles. It follows the foothills behind the University of Utah Medical Center, Fort Douglas, 
University Research Park and This Is The Place State Park. It intersects Red Butte Canyon at Red 
Butte Garden and Arboretum, connects to trails leading past This Is The Place State Park and into 
Emigration Canyon and meanders between the Research Park and State Park to intersect with the 
foothills section of the Transvalley Corridor at Sunnyside Avenue. (The entire University campus 
is part of Red Butte Arboretum.)

Red Butte Creek Corridor begins at the mouth of Red Butte Canyon and Red Butte Garden and 
Arboretum and follows the creek to the west through Research Park, between University of Utah 
Student Housing and the Veterans Administration Hospital to Sunnyside Park. At Sunnyside Park,
the foothills section of the Transvalley Corridor proceeds down Sunnyside Avenue past Mt. Olivet Cemetery (another of the oldest in the City) and then down 800 South Street.

Sunnyside Park is a large open play area owned and managed by Salt Lake City. Additional adjacent acreage is also owned by the City and has been developed as the Steiner Aquatic Center, a public swimming pool complex with indoor and outdoor pools.

Reservoir Park at 1300 East and South Temple Street is a small urban park (approximately five acres) located adjacent to the city’s water storage reservoir. In 1931, the Art Barn, home of the Salt Lake City Arts Council, was constructed in the southeast corner of the park.

This Is The Place State Park was recently rededicated with the construction of a new visitor’s center. It is the site of a Historic Pioneer Village and the This Is The Place Monument and is a popular tourist attraction. Pioneer Village is a living museum of pioneer structures and demonstrations of craft-making and day-to-day pioneer activities and life.

3.4  HISTORIC AND CULTURAL RESOURCES

3.4.1 Methodology

Historic and cultural resources were investigated using existing information available from the Utah Division of State History, the State Historic Preservation Officer and the Salt Lake City Historic Preservation Officer. Neighborhood planning documents were also reviewed for neighborhoods located in the corridor study area.

The five geographic segments have distinct and identifiable urban characteristics. Each area is described briefly, followed by a summary of the important historic or cultural resources. A complete list of historical sites has been included in Appendix C. To the extent that all project alternatives except the No-Build would occur within the existing street right-of-ways and previous street construction would likely have ruined any archeological remnants, there are no anticipated impacts on archeological resources in the east-west corridor.

Chapter 5 identifies whether any alternative has the potential to affect properties that are listed or eligible for the National Register of Historic Places. Figure 3-4, the Historic Districts Map, shows the location of both national register sites and Salt Lake City register sites.

3.4.2 Significance of National Register of Historic Places Designation

Designation on the National Register of Historic Places means the property has a place on an official federal list of properties that are significant in American history, architecture, archeology and engineering. A listing on the National Register does not interfere with private property rights to alter, manage, or dispose of the listed property. The owner is not required to restore or maintain the property, or to keep it open to the public; however, there are in some cases local ordinances which affect modifications to structures. In the case of Salt Lake City, any property on the National Register must be reviewed by the Preservation Planner if exterior alterations are proposed.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-4   Historic Districts Map
To be eligible for National Register designation, a property must be at least 50 years old and have retained most of its original appearance and character. If properties on the National Register are affected by the LPA, the State Historic Preservation Officer must be consulted to determine possible effects.

Applicable codes include Section 106 of the National Historic Preservation Act of 1966 requiring Federal agencies to take into account activities affecting historic properties and Section 9-8-404 of the Utah Code Annotated, which requires State agencies to take into account its activities affecting historic properties.

3.4.3 Significance of Salt Lake City Register Designation

Designation on the Salt Lake City Register generally follows the same requirements of the National Register. Again, use or disposition of the property is not affected except that exterior must be reviewed by the preservation planner who will make a determination regarding review by the Historic Landmark Commission. The Preservation Officer and Historic Landmark Commission also review any action proposed within a historic district. Applicable sections of the Salt Lake City zoning ordinance include: Part II, Section 3-5 establishing the Historic Landmark Commission and Part III, Section 17-1 describing procedures affecting historic preservation overlay districts. If properties listed on the Salt Lake City Register are affected by any proposed action, such as alteration, relocation, or demolition; a Certificate of Appropriateness must be submitted and approved by the Historic Landmark Commission.

3.4.4 Airport Area

The SLICIA and Salt Lake International Center contain no historic districts or historic sites identified on either the National Register or the Salt Lake City Register.

3.4.5 West Central Area

The Northwest area was the setting for one of the earliest settlements in the Salt Lake Valley. Farming was the way of life for most settlers. In the West Central area there is no historic district, however, there are some historic sites that are on National and Salt Lake City registers. These include the Utah State Fairgrounds, the Albert E. Fisher mansion, the 29th Ward Assembly Hall and the Chapman Branch Library. Salt Lake City also identifies 13 architecturally and historically significant sites in this area. These 13 include St. Patrick’s Church and Rectory, Fisher Brewery Office and Bottling Works; and the Strang Duplex, among other noteworthy sites.

3.4.6 Downtown Area

The Downtown portion of the study area contains two historic districts: Capitol Hill Historic District and Exchange Place Historic District. It also includes the primary shopping and cultural center of the city with its many historic retail and office structures. It includes Historic Temple Square and other worldwide headquarters facilities for the Church of Jesus Christ of Latter-day Saints (Mormon), the Joseph Smith Memorial Building (formerly the Hotel Utah), the Eagle Gate, Lion House and Beehive House, Abravanel Hall (home of the Utah Symphony, the Capitol Theater, Salt Lake Arts Center), Salt Palace Convention Center and many other historic structures and cultural facilities. There are a total of 77 significant sites listed on the National Register and 47 sites identified by the Salt Lake City Register of Cultural Resources in the Downtown area.
Capitol Hill Historic District includes the residential areas to the west and south of the State Capitol Building and contains many important and historic residential structures. It also includes portions of Memory Grove Park and City Creek Park. There are eight National Register sites and 15 Salt Lake City Register sites within this district. One of the more notable is Ottinger Hall at 233 Canyon Road. The hall was constructed by members of Veteran Volunteer Firemen’s Association as a social hall in 1900. It now serves as a meeting place for the Avenues Community Council and other groups.

Exchange Place Historic District was Salt Lake City's major non-Mormon commercial district and sported Utah's first skyscrapers. There are two National Register sites: the Salt Lake Stock & Mining Building and the Judge Building.

Other Historic Structures are present within the Downtown area but are not contained within the boundaries of one of the historic districts. National Register sites include: the ZCMI Cast Iron Front; the Denver-Rio Grande Station; and the Orpheum (Capitol) Theater. The theater’s structure was renovated in 1975. It is the home of Ballet West, the Repertory Dance Theater, the Ririe-Woodbury Dance Company, the Theater League of Utah and the Utah Opera Company. These are only a few of the historic sites in the Downtown area.

3.4.7 East Central Area

There are four historic districts in the East Central area. They are the University Neighborhood Historic District, the South Temple Historic District, the Avenues Historic District and the Central City Historic District. These four historic districts are included on the National Register of Historic Places and include several individual structures which are also listed on the National Register.

University Neighborhood Historic District is between approximately 50 South and 500 South, between Virginia Street and 1100 East. It consists of low- to medium-scale structures that are primarily residential. It also contains an abundance of large, mature street trees and historic residential structures. The area contains some neighborhood business activity between 200 South to 300 South and between University Street and the alley. There are nine National Register sites and Salt Lake City Register sites altogether including the Cluff Apartments and Fire Station No. 8.

South Temple Historic District includes the South Temple Street frontage between approximately 300 East and Virginia Street. It is a symbol of the wealth of Salt Lake City during the turn of the century and remains a premier boulevard in the City. Salt Lake City’s most influential residents lived on South Temple Street and many of their historic homes still exist, including the Kearns Mansion which is occupied by the Governor of the State of Utah and many other beautiful homes and cultural institutions. There are 7 National Register sites including: the Cathedral of Madeleine, a Romanesque cathedral of gray sandstone built in 1889 by Lawrence Scanlon, the first Catholic Bishop of Salt Lake City; and the Thomas Kearns Mansion & Carriage House.

There are 18 Salt Lake City Register sites, including: the First Presbyterian Church, a red sandstone Gothic-revival structure built in 1902 containing several unique stained-glass windows; and the Enos A. Wall mansion, built in 1880 for mining magnate Enos Wall. It now houses the LDS Business College.
**Avenues Historic District** is located north of South Temple Street between Virginia Street and Canyon Road. It contains one of the oldest and most important residential areas in Salt Lake and is characterized by the smaller-scale street grid and block system. Houses were built at the turn of the century, primarily for businessmen. Three of these homes are listed on the National Register, 15 on the Salt Lake City Register. Included are the William F. Beer Estate, built in 1899 by prominent Utah architect Richard K. A. Kletting and the Barton house, one of the oldest remaining homes in the Avenues, built in 1865 for William Bell Barton.

**Central City District** was established for settlement of the Mormon pioneers with a gridiron pattern of wide streets and large 10-acre blocks. The settlement was based on Joseph Smith’s "Flat of the City of Zion," and lots were provided as homesteads for farmers. This part of the City remains primarily residential in character and includes seven homes listed on the National Register and seven listed on the Salt Lake City Register. Some of the more notable homes are the William Francis Armstrong house, the O.J. Salisbury house and the Armista Apartments.

**Other Historic Structures** are located in the East Central area but are not contained within the boundaries of one of the historic districts. Including those listed in the above districts and those which follow, there are a total of 55 significant sites listed on the National Register and 76 sites identified by the Salt Lake City Register of Cultural Resources.

### 3.4.8 University Area

The vicinity of the University of Utah includes several important historic and cultural resources. The University of Utah is the State’s oldest and largest public institution of higher education. The campus contains several important historic buildings which are listed on the National Register. These include all of the buildings fronting on President’s Circle, such as Gardner Hall, the Park Building, the Utah Museum of Natural History and Kingsbury Hall. In addition to being an important educational and medical facility, the University is a center of cultural life in Utah. It offers museums, performing arts theaters and other cultural and sporting facilities. The University of Utah campus and Red Butte Garden and Arboretum at the mouth of Red Butte Canyon make up the State Arboretum of Utah.

This area of the corridor study includes "This Is the Place State Park" which is on the National Register. The park houses Old Deseret Village, which is an important cultural resource in Utah. The village depicts a living history of pioneer life and surrounds a monument celebrating the centennial anniversary of Salt Lake City’s settlement by Mormon pioneers. A new visitors center was recently completed and rededicated with a grand opening celebration.

Historic Fort Douglas is almost completely surrounded by University of Utah property. It includes several buildings from the 1860s, a military museum and a layout of historic residential structures which surround a parade ground. Many of the buildings are constructed of native sandstone. Buildings on the Fort Douglas Officers Circle are designated on the National Register and the Salt Lake City Register.
3.5 DEMOGRAPHIC AND ECONOMIC ACTIVITY

3.5.1 Area of Influence

The following section describes current demographic and economic conditions for the Area of Influence in aggregate, as well as in the five distinctive subareas defined on Page 3-1. These subareas represent the primary development concentrations within the area of influence. Whenever possible, the information is presented at the level that most closely aligns with the boundaries of each subarea. In some instances when necessary, census tract data or zip code data that includes some or all of the subarea is used. WFRC data used in projections is current as of February 1996 and reflects proposals and plans known at that time.

According to the 1990 WFRC Land Use Surveillance Data, the Area of Influence contained 50,277 persons, roughly 31 percent of Salt Lake City’s population and six percent of Salt Lake County’s population, with a median age of 29 years. The majority of the population exists within the West Central and East Central areas, which make up 74 percent of the corridor’s population.

During the 1970s, Salt Lake City’s population decreased 7.3 percent and during the following decade, it decreased another two percent. Thus far in the 1990s, Salt Lake City’s population has grown faster than 1990 forecasts would indicate. Actual population estimates collected between 1990 and 1994 show the City’s population increased a total of roughly seven percent over those four years rather than the projected 2.6 percent. The July 1, 1994, total of 171,849 residents already exceeds the 1995 projected total of 165,995 by approximately 3.5 percent. During the early 1990s, Salt Lake County’s population also increased slightly faster than predicted. Since the study corridor resides within Salt Lake City and since the projected growth rate in the corridor exceeds that of Salt Lake City, it is probable that some of the greater-than-expected population growth occurred in the corridor as well.

The median age for the corridor differs only plus or minus one year from Salt Lake City or Salt Lake County, though the range is from age 23 in the University area to age 37 in the Downtown area. The West Central and Airport areas have about the same number of children as a percentage of the population as Salt Lake City and Salt Lake County. Downtown and the East Central area have the least number of children. The ages of persons living in the corridor are more concentrated between the ages of 18 and 65 than the City or County. While Salt Lake City has a higher proportion of elderly than is found in the corridor, the corridor has more elderly people than the Salt Lake County metropolitan area.

The corridor is more ethnically diverse than either Salt Lake City or Salt Lake County. There are roughly two-and-one-half times as many African-Americans and American Indians and twice as many individuals of Hispanic origin as a percentage of the population in the study corridor as in Salt Lake County. The corridor is slightly more diverse than Salt Lake City.

There is a lower education level among corridor residents than typically found in the county. With almost twice the proportion of the population having less than a ninth grade education, a higher percentage of individuals have not graduated from high school. The majority of these individuals live in the West Central or in the Downtown areas. Overall, the education attainment of individuals in the corridor closely mirrors that of Salt Lake City.
Chapter 3  Affected Environment

Growth in the corridor is projected to out-pace that of Salt Lake City almost three-to-one during the next few decades in terms of increased numbers of dwelling units. Most of the increase will be in the city’s northwest area near the Airport. Even so, the number of dwelling units in Salt Lake County is expected to grow at a significantly higher rate over the same time period.

The corridor contains some of the poorest areas in the city, with the Downtown area having the lowest median income in the study area, Salt Lake City and Salt Lake County. The Downtown area has the highest retail employment density in the study corridor, 46 percent. However, it is interesting to note that the East Central area also has a high employment, approximately 5,000 employees or 34 percent of the total.

Retail sales in the corridor are greatest in the Downtown area with almost $550 million reported in 1995. In comparison, the only other area of significant retail sales in the study corridor is the East Central area with over $300 million in 1995.

3.5.2 Airport

Though large geographically, the Airport area consists of predominantly vacant land and, while it currently has the lowest population density within the corridor. This area has the least amount of ethnic diversity in the corridor and in comparison to Salt Lake City and Salt Lake County. The most current WFRC projections available indicate this area will experience the most new residential development in the corridor in the next two decades. However, recent findings show developmental constraints in this subarea, so the residential growth and subsequent population increases originally projected will, in fact, not occur. Residential development that might occur in the northwest area of Salt Lake City will take place just outside the actual study corridor.

The Airport area is a suburban neighborhood with almost 90 percent of its housing as single units and 65 percent owner occupied. Household size (i.e. the number of persons per household) in the Airport area is larger than in any area in the corridor besides the University.

3.5.3 West Central

Although not totally reflected in forecasts, given current development plans the West Central area could have significant potential for change over the next few decades. The population is projected to increase over eight percent by the year 2020.

Education levels are very low in the area with a larger proportion of residents with less than a ninth-grade education in the study area residing in the West Central area; over twice that of Salt Lake City and more than three times that of Salt Lake County. This area also has the lowest concentration of college graduates.

The West Central area is the most ethnically diverse in the study area with almost two and one half times the concentration of individuals of Hispanic origin than found on average in the corridor and five times that of Salt Lake County.

The West Central area has several older industrial areas slated for redevelopment as western expansion of the urban neighborhood. This revitalization will support larger than projected employment growth in the next few decades.
3.5.4 Downtown
The Downtown area has about 7,000 residents and, while the Wasatch Front Regional Council does not expect the numbers to increase significantly through the year 2020, there are a number of programmed residential projects in the Downtown area that could indicate an increase in population over the near future. The Downtown area has a population with the highest median age of 37 and with the highest percentage of residents over the age of 65. Downtown also contains some of the state's lowest-income residents and has the lowest median income level found either in the corridor or as compared to Salt Lake City and Salt Lake County.

The Downtown area is the financial and business center of the inter-mountain west. It supports the largest concentration of employment in the state of Utah. New office buildings and hotels are being constructed. Existing buildings are being remodeled to accommodate the need for additional office and hotel space.

Downtown is also a major retail center, primarily supported by two large shopping malls. Roughly 40 percent of Salt Lake City’s total retail business occurs within the study corridor. Although there has been a shift of retail activity to suburban locations over the past two decades, retail activity in Salt Lake City still accounts for 27 percent of the total County retail business.

3.5.5 East Central
The East Central area has experienced declining population with commercial encroachment over the past several decades. This area is mixed-use with residential, commercial and office uses all in place. This area is the home to some of the older residential areas in the corridor and the city. Neighborhoods are becoming stronger with renewed investment in renovation and infill. This particular area is often buffeted by activities in the adjoining subareas—specifically, the CBD and the University of Utah.

The East Central area currently has the largest number of dwelling units in any one neighborhood in the corridor, but growth is declining as the area is saturated and more commercial entities displace prior residential dwellings. In recent years, the City has made a commitment to reduce commercial infringement on the neighborhoods east of 200 East by way of zoning amendments.

The East Central area contains an active commercial base generating over $300 million in retail sales in 1995. This accounts for about 30 percent of retail sales in the study corridor and totals about 58 percent as much volume of retail sales as generated in the CBD.

3.5.6 University
The University area has the youngest, most highly educated population not only in the corridor but in all of Salt Lake City and Salt Lake County. Twice as many people per capita have bachelor's degrees and almost four times as many have graduate or professional degrees as any other part of Salt Lake County.

The University of Utah is a major employment center with approximately 13,000 employees and servicing 27,000 students. This area draws employees, students, Medical Center patients, as well as visitors from the entire region. The University is surrounded by a stable, attractive neighborhood, whose inhabitants have the highest median income and least number of inhabitants over 65 years of
age in the corridor.

The University is the home to many special events in the region, including year-round sporting events at both Rice Stadium and the Huntsman Center, music concerts at Huntsman Center and Red Butte Garden and professional meetings and conventions.

The University of Utah Health Sciences Center employs almost 4,000 people and routinely draws patients and visitors from at least a five-state region. The Medical Center handles approximately 350,000 outpatient visits each year for a daily average of 1,500 (given 240 working days/year.)

Research Park, with 240 acres available for lease, is located in the southeast region of the University area. Over 168 acres are currently leased and accommodate 62 businesses with an average of 68 employees per business. The two largest employers in Research Park are Evans and Sutherland and the Association of Regional and University Pathologists (ARUP) which employ about 750 people each. The 220-room University Park Hotel is located adjacent to Research Park. With current employment exceeding 4,000, Research Park expects to grow to over 7,000 employees in the next 10 years.

Demographic and Economic Activity Tables
Total population in the study corridor was projected to increase about one-half percent between 1990 and 1995 and is expected to increase at an average annual rate of .64 percent between 1990 and the year 2020 for a total increase in population of about 21 percent. Salt Lake City is projected to grow at a slower pace, on average—roughly 1.3 times slower than the corridor. On the other hand, Salt Lake County’s population growth will be almost three times greater than that in the corridor. This information is reflected in Tables 3-1 and 3-2.

<table>
<thead>
<tr>
<th>TABLE 3-1</th>
<th>EAST-WEST CORRIDOR</th>
<th>POPULATION 1990-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>702</td>
<td>1,251</td>
</tr>
<tr>
<td>West Central</td>
<td>13,537</td>
<td>13,882</td>
</tr>
<tr>
<td>Downtown</td>
<td>6,783</td>
<td>6,983</td>
</tr>
<tr>
<td>East Central</td>
<td>23,884</td>
<td>23,852</td>
</tr>
<tr>
<td>University</td>
<td>5,371</td>
<td>5,690</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>50,277</td>
<td>51,657</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>160,852</td>
<td>165,995</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>731,762</td>
<td>810,438</td>
</tr>
</tbody>
</table>

Note: Information based on traffic zones within the study area.

As illustrated in the table below, all areas within the corridor except East Central are anticipating some increase in population between 1990 and 2020.
CHAPTER 3  AFFECTED ENVIRONMENT

TABLE 3-2
EAST-WEST CORRIDOR
ANNUAL POPULATION GROWTH RATE 1990-2020

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>12.25%</td>
<td>12.00%</td>
<td>17.02%</td>
<td>5.83%</td>
<td>-4.10%</td>
<td>3.77%</td>
<td>8.42%</td>
</tr>
<tr>
<td>West Central</td>
<td>0.50%</td>
<td>0.76%</td>
<td>0.13%</td>
<td>0.51%</td>
<td>-0.43%</td>
<td>0.13%</td>
<td>0.22%</td>
</tr>
<tr>
<td>Downtown</td>
<td>0.58%</td>
<td>0.56%</td>
<td>0.23%</td>
<td>0.32%</td>
<td>-0.13%</td>
<td>0.00%</td>
<td>0.19%</td>
</tr>
<tr>
<td>East Central</td>
<td>-0.03%</td>
<td>0.02%</td>
<td>-0.67%</td>
<td>-0.43%</td>
<td>-0.99%</td>
<td>-0.62%</td>
<td>-0.54%</td>
</tr>
<tr>
<td>University</td>
<td>1.16%</td>
<td>2.11%</td>
<td>1.19%</td>
<td>1.48%</td>
<td>1.64%</td>
<td>1.31%</td>
<td>1.55%</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>0.54%</td>
<td>0.89%</td>
<td>0.87%</td>
<td>0.73%</td>
<td>0.20%</td>
<td>0.52%</td>
<td>0.64%</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>0.63%</td>
<td>0.82%</td>
<td>0.38%</td>
<td>0.61%</td>
<td>0.15%</td>
<td>0.44%</td>
<td>0.48%</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>2.06%</td>
<td>1.50%</td>
<td>1.80%</td>
<td>2.01%</td>
<td>2.25%</td>
<td>1.63%</td>
<td>1.82%</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic & Planning; Wasatch Front Regional Council

Note: Information based on traffic zones within study area.

Thus far the 1990s, Salt Lake City's population has grown significantly faster than predicted and by mid-1994, already exceeded 1995 projections. Salt Lake County is also growing faster than projected, but only by about one-half percent. Given the earlier prediction, the study corridor population should grow faster than Salt Lake City's population as a whole. It can be assumed the corridor population is also larger than earlier projections.

TABLE 3-3
EAST-WEST CORRIDOR
POPULATION ESTIMATES
1990-1994

<table>
<thead>
<tr>
<th></th>
<th>SALT LAKE CITY</th>
<th>SALT LAKE COUNTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>APRIL 1, 1990</td>
<td>159,928</td>
<td>725,956</td>
</tr>
<tr>
<td>JULY 1, 1990</td>
<td>160,405</td>
<td>729,048</td>
</tr>
<tr>
<td>3 MONTH CHANGE</td>
<td>0.3%</td>
<td>0.4%</td>
</tr>
<tr>
<td>JULY 1, 1991</td>
<td>163,344</td>
<td>745,047</td>
</tr>
<tr>
<td>1990-1991 CHANGE</td>
<td>1.8%</td>
<td>2.2%</td>
</tr>
<tr>
<td>JULY 1, 1992</td>
<td>166,760</td>
<td>763,001</td>
</tr>
<tr>
<td>1991-1992 CHANGE</td>
<td>2.1%</td>
<td>2.4%</td>
</tr>
<tr>
<td>JULY 1, 1993</td>
<td>169,540</td>
<td>780,600</td>
</tr>
<tr>
<td>1992-1993 CHANGE</td>
<td>1.7%</td>
<td>2.3%</td>
</tr>
<tr>
<td>JULY 1, 1994</td>
<td>171,849</td>
<td>795,340</td>
</tr>
<tr>
<td>1993-1994 CHANGE</td>
<td>1.4%</td>
<td>1.9%</td>
</tr>
<tr>
<td>1990-1994 CHANGE</td>
<td>7.1%</td>
<td>9.1%</td>
</tr>
</tbody>
</table>

Although more older people live in the Downtown area, the young population in the University keeps the overall corridor median age very close to that in Salt Lake City and Salt Lake County. The Downtown and East Central areas have fewer than half as many children per population as the County, while the Airport and West Central areas have almost as many children per capita as the County. The corridor age distribution closely mirrors Salt Lake City.

<table>
<thead>
<tr>
<th>TABLE 3-4</th>
<th>EAST-WEST CORRIDOR</th>
<th>MEDIAN AGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRPORT</td>
<td>WEST CENTRAL</td>
<td>DOWN TOWN</td>
</tr>
<tr>
<td>33</td>
<td>29</td>
<td>37</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Governor’s Office of Planning and Budget; 1990 Census Bureau.
Note: Information is compiled by proportion of census tract associated with the study area.

<table>
<thead>
<tr>
<th>TABLE 3-5</th>
<th>EAST-WEST CORRIDOR</th>
<th>AGE DISTRIBUTION (% POPULATION)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 18 YEARS</td>
<td>18-65 YEARS OLD</td>
</tr>
<tr>
<td>AIRPORT</td>
<td>32.8%</td>
<td>54.4%</td>
</tr>
<tr>
<td>WEST CENTRAL</td>
<td>32.7%</td>
<td>57.6%</td>
</tr>
<tr>
<td>DOWNTOWN</td>
<td>17.0%</td>
<td>54.8%</td>
</tr>
<tr>
<td>EAST CENTRAL</td>
<td>15.7%</td>
<td>70.1%</td>
</tr>
<tr>
<td>UNIVERSITY</td>
<td>27.7%</td>
<td>64.6%</td>
</tr>
<tr>
<td>TOTAL CORRIDOR</td>
<td>23.4%</td>
<td>64.2%</td>
</tr>
<tr>
<td>SALT LAKE CITY</td>
<td>26.3%</td>
<td>59.2%</td>
</tr>
<tr>
<td>SALT LAKE COUNTY</td>
<td>34.7%</td>
<td>56.9%</td>
</tr>
</tbody>
</table>

Note: Information derived from sum of all census tracts in study area.

Salt Lake City experienced a precipitous drop in the 1980s in its number of young adults under age 25. Concurrently, although the City’s overall population actually decreased by two percent, the middle-aged population grew roughly 70 percent. In contrast, Salt Lake County’s population increased 35 percent in the 1970s and added 17 percent in the 1980s, with growth in every age group other than in very young children and in the same young-33 adult group that saw a decrease in Salt Lake City.
### TABLE 3-6
EAST-WEST CORRIDOR
POPULATION BY AGE
SALT LAKE CITY 1970-1990

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>15,473</td>
<td>8.8%</td>
<td>14,472</td>
<td>8.9%</td>
<td>-6.5%</td>
<td>13,342</td>
<td>8.3%</td>
<td>-7.8%</td>
<td>-13.8%</td>
</tr>
<tr>
<td>5 TO 9</td>
<td>13,432</td>
<td>7.6%</td>
<td>9,915</td>
<td>6.1%</td>
<td>-26.2%</td>
<td>11,113</td>
<td>6.9%</td>
<td>12.1%</td>
<td>-17.3%</td>
</tr>
<tr>
<td>10 TO 14</td>
<td>14,173</td>
<td>8.1%</td>
<td>8,885</td>
<td>5.4%</td>
<td>-37.3%</td>
<td>10,391</td>
<td>6.5%</td>
<td>16.9%</td>
<td>-26.7%</td>
</tr>
<tr>
<td>15 TO 19</td>
<td>16,664</td>
<td>9.5%</td>
<td>12,508</td>
<td>7.7%</td>
<td>-24.9%</td>
<td>10,066</td>
<td>6.3%</td>
<td>-19.5%</td>
<td>-39.5%</td>
</tr>
<tr>
<td>20 TO 24</td>
<td>20,962</td>
<td>11.9%</td>
<td>21,166</td>
<td>13.0%</td>
<td>1.0%</td>
<td>14,892</td>
<td>9.3%</td>
<td>-29.6%</td>
<td>-29.0%</td>
</tr>
<tr>
<td>25 TO 34</td>
<td>21,378</td>
<td>12.2%</td>
<td>31,328</td>
<td>19.2%</td>
<td>45.5%</td>
<td>31,590</td>
<td>19.8%</td>
<td>0.8%</td>
<td>47.8%</td>
</tr>
<tr>
<td>35 TO 44</td>
<td>14,270</td>
<td>8.1%</td>
<td>13,182</td>
<td>8.1%</td>
<td>-7.6%</td>
<td>22,274</td>
<td>13.9%</td>
<td>69.0%</td>
<td>56.1%</td>
</tr>
<tr>
<td>45 TO 54</td>
<td>18,182</td>
<td>10.3%</td>
<td>12,379</td>
<td>7.6%</td>
<td>-31.9%</td>
<td>12,029</td>
<td>7.5%</td>
<td>-2.6%</td>
<td>-33.8%</td>
</tr>
<tr>
<td>55 TO 64</td>
<td>17,973</td>
<td>10.2%</td>
<td>15,173</td>
<td>9.3%</td>
<td>-15.6%</td>
<td>11,034</td>
<td>6.9%</td>
<td>-27.3%</td>
<td>-38.5%</td>
</tr>
<tr>
<td>65 TO 74</td>
<td>14,033</td>
<td>8.0%</td>
<td>13,577</td>
<td>8.3%</td>
<td>-3.2%</td>
<td>11,961</td>
<td>7.5%</td>
<td>-11.9%</td>
<td>-14.8%</td>
</tr>
<tr>
<td>OVER 75</td>
<td>9,345</td>
<td>5.3%</td>
<td>10,448</td>
<td>6.4%</td>
<td>11.8%</td>
<td>11,244</td>
<td>7.0%</td>
<td>7.6%</td>
<td>20.3%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>175,885</td>
<td>100%</td>
<td>163,033</td>
<td>100%</td>
<td>-1.9%</td>
<td>159,936</td>
<td>100%</td>
<td>-6.1%</td>
<td>-9.1%</td>
</tr>
</tbody>
</table>


### TABLE 3-7
EAST-WEST CORRIDOR—POPULATION BY AGE
SALT LAKE COUNTY 1970-1990

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>48,727</td>
<td>10.6%</td>
<td>76,584</td>
<td>12.4%</td>
<td>57.2%</td>
<td>69,826</td>
<td>9.6%</td>
<td>-8.8%</td>
<td>43.3%</td>
</tr>
<tr>
<td>5 TO 9</td>
<td>51,035</td>
<td>11.1%</td>
<td>59,701</td>
<td>9.6%</td>
<td>17.0%</td>
<td>74,640</td>
<td>10.3%</td>
<td>25.0%</td>
<td>46.3%</td>
</tr>
<tr>
<td>10 TO 14</td>
<td>52,099</td>
<td>11.4%</td>
<td>51,869</td>
<td>8.4%</td>
<td>0.4%</td>
<td>72,714</td>
<td>10.0%</td>
<td>-40.1%</td>
<td>39.6%</td>
</tr>
<tr>
<td>15 TO 19</td>
<td>46,081</td>
<td>10.1%</td>
<td>53,933</td>
<td>8.7%</td>
<td>17.0%</td>
<td>57,124</td>
<td>7.9%</td>
<td>5.5%</td>
<td>24.0%</td>
</tr>
<tr>
<td>20 TO 24</td>
<td>39,751</td>
<td>8.7%</td>
<td>62,365</td>
<td>10.1%</td>
<td>55.9%</td>
<td>52,979</td>
<td>7.3%</td>
<td>-15.1%</td>
<td>33.3%</td>
</tr>
<tr>
<td>25 TO 34</td>
<td>60,604</td>
<td>13.2%</td>
<td>112,833</td>
<td>18.2%</td>
<td>86.2%</td>
<td>127,003</td>
<td>17.5%</td>
<td>12.6%</td>
<td>109.6%</td>
</tr>
<tr>
<td>35 TO 44</td>
<td>46,862</td>
<td>10.2%</td>
<td>64,069</td>
<td>10.3%</td>
<td>36.7%</td>
<td>104,660</td>
<td>14.4%</td>
<td>63.4%</td>
<td>123.3%</td>
</tr>
<tr>
<td>45 TO 54</td>
<td>44,618</td>
<td>9.7%</td>
<td>48,451</td>
<td>7.8%</td>
<td>8.6%</td>
<td>61,671</td>
<td>8.5%</td>
<td>27.3%</td>
<td>38.2%</td>
</tr>
<tr>
<td>55 TO 64</td>
<td>33,283</td>
<td>7.3%</td>
<td>42,709</td>
<td>6.9%</td>
<td>28.3%</td>
<td>44,260</td>
<td>6.1%</td>
<td>3.6%</td>
<td>33.0%</td>
</tr>
</tbody>
</table>
Chapter 3  Affected Environment

### TABLE 3-7
**EAST-WEST CORRIDOR—POPULATION BY AGE**

<table>
<thead>
<tr>
<th>Age</th>
<th>Airport County 1970-1990</th>
<th>West-Central</th>
<th>Down-Town</th>
<th>East-Central</th>
<th>University</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 TO 74</td>
<td>21,516</td>
<td>28,456</td>
<td>36,112</td>
<td>32.3%</td>
<td>4.6%</td>
<td>28.9%</td>
</tr>
<tr>
<td>OVER 75</td>
<td>13,492</td>
<td>18,076</td>
<td>24,967</td>
<td>34.0%</td>
<td>3.9%</td>
<td>38.1%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>458,067</td>
<td>619,066</td>
<td>725,956</td>
<td>35.1%</td>
<td>5.0%</td>
<td>17.3%</td>
</tr>
</tbody>
</table>


The corridor is approximately 84 percent Caucasian, two percent African-American and two percent American Indian. An estimated 5.5 percent of the population along the corridor is of Hispanic origin. The West Central area has the highest percentage of African-Americans and individuals of Hispanic origin—almost two-and-one-half times that of the corridor.

### TABLE 3-8
**EAST-WEST CORRIDOR—RACE AS % POPULATION**

<table>
<thead>
<tr>
<th>Area</th>
<th>White</th>
<th>Black</th>
<th>Native American</th>
<th>Hispanic Origin</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>95.91%</td>
<td>0.66%</td>
<td>0.65%</td>
<td>1.87%</td>
<td>0.91%</td>
</tr>
<tr>
<td>West Central</td>
<td>73.68%</td>
<td>3.77%</td>
<td>2.56%</td>
<td>13.26%</td>
<td>6.73%</td>
</tr>
<tr>
<td>Downtown</td>
<td>85.95%</td>
<td>1.88%</td>
<td>2.75%</td>
<td>4.20%</td>
<td>5.21%</td>
</tr>
<tr>
<td>East Central</td>
<td>90.10%</td>
<td>1.41%</td>
<td>1.59%</td>
<td>2.34%</td>
<td>4.56%</td>
</tr>
<tr>
<td>University</td>
<td>80.97%</td>
<td>1.32%</td>
<td>1.03%</td>
<td>1.14%</td>
<td>15.54%</td>
</tr>
<tr>
<td>Total</td>
<td>83.95%</td>
<td>2.12%</td>
<td>1.93%</td>
<td>5.50%</td>
<td>6.50%</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>87.00%</td>
<td>1.72%</td>
<td>1.57%</td>
<td>4.95%</td>
<td>4.76%</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>93.00%</td>
<td>0.78%</td>
<td>0.83%</td>
<td>2.62%</td>
<td>2.77%</td>
</tr>
</tbody>
</table>


Note: Information is compiled by proportion of census tract associated with the study area.

Due to the high percentage of low income people living in the area, the corridor median income of $18,750 is 23 percent lower than Salt Lake City and 60 percent lower than in Salt Lake County. The University-area median income is almost three times higher than the median income in the Downtown area, the poorest section. The University-area median income is 100 percent higher than that in Salt Lake City and 54 percent higher than the median income for Salt Lake County.

### TABLE 3-9
**EAST-WEST CORRIDOR MEDIAN INCOME**

<table>
<thead>
<tr>
<th>Area</th>
<th>West Central</th>
<th>Down-Town</th>
<th>East Central</th>
<th>University</th>
<th>Total Corridor</th>
<th>Salt Lake City</th>
<th>Salt Lake County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>$24,000</td>
<td>$20,000</td>
<td>$16,000</td>
<td>$17,000</td>
<td>$46,250</td>
<td>$18,750</td>
<td>$23,000</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning Consultants; Governor’s Office of Planning and Budget

Note: Income information reflects the proportion of census tract in the study area.
Downtown has the highest proportion of low income people, although the East Central area has the highest actual number of low income people in the corridor.

<p>| TABLE 3-10 | EAST-WEST CORRIDOR INCOME DISTRIBUTION (% POPULATION) |
|-----------------------------------------------|</p>
<table>
<thead>
<tr>
<th>Less than $6,500</th>
<th>$6,500-$9,999</th>
<th>$10,000-$19,999</th>
<th>$20,000-$37,499</th>
<th>$37,500 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower 15%</td>
<td>15%-25%</td>
<td>25%-50%</td>
<td>50%-75%</td>
<td>75%-100%</td>
</tr>
<tr>
<td>Airport</td>
<td>5.23%</td>
<td>5.28%</td>
<td>19.59%</td>
<td>29.20%</td>
</tr>
<tr>
<td>West Central</td>
<td>14.03%</td>
<td>10.54%</td>
<td>27.38%</td>
<td>26.27%</td>
</tr>
<tr>
<td>Downtown</td>
<td>18.18%</td>
<td>13.60%</td>
<td>26.40%</td>
<td>21.30%</td>
</tr>
<tr>
<td>East Central</td>
<td>16.30%</td>
<td>12.44%</td>
<td>26.45%</td>
<td>22.54%</td>
</tr>
<tr>
<td>University</td>
<td>11.23%</td>
<td>6.14%</td>
<td>22.77%</td>
<td>17.64%</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>11.23%</td>
<td>9.02%</td>
<td>23.94%</td>
<td>25.57%</td>
</tr>
<tr>
<td>Salt Lake Cnty</td>
<td>6.58%</td>
<td>5.43%</td>
<td>18.22%</td>
<td>28.45%</td>
</tr>
</tbody>
</table>

Source: Governor's Office of Planning and Budget; 1990 Census Bureau.

Note: Information is derived from the sum of all census tracts within the study area.

The least-educated individuals reside in the West Central area, while the most-educated live in University area. (See Table 3-11.)

<p>| TABLE 3-11 | EAST-WEST CORRIDOR EDUCATION LEVEL (% POPULATION) |
|-----------------------------------------------|</p>
<table>
<thead>
<tr>
<th>Less than 9th grade</th>
<th>9th-12th grade no diploma</th>
<th>High school graduate</th>
<th>Some college/no degree</th>
<th>Associate degree</th>
<th>Bachelor's degree</th>
<th>Graduate/professional degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>3.22%</td>
<td>23.35%</td>
<td>39.62%</td>
<td>17.24%</td>
<td>9.87%</td>
<td>2.56%</td>
</tr>
<tr>
<td>West Central</td>
<td>9.87%</td>
<td>??</td>
<td>29.59%</td>
<td>21.21%</td>
<td>7.21%</td>
<td>6.90%</td>
</tr>
<tr>
<td>Downtown</td>
<td>9.11%</td>
<td>14.88%</td>
<td>23.51%</td>
<td>23.89%</td>
<td>5.09%</td>
<td>15.66%</td>
</tr>
<tr>
<td>East Central</td>
<td>3.53%</td>
<td>9.33%</td>
<td>16.69%</td>
<td>25.09%</td>
<td>7.07%</td>
<td>22.50%</td>
</tr>
<tr>
<td>University</td>
<td>0.66%</td>
<td>1.91%</td>
<td>9.53%</td>
<td>21.57%</td>
<td>4.92%</td>
<td>32.43%</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>5.67%</td>
<td>12.96%</td>
<td>20.49%</td>
<td>23.37%</td>
<td>6.62%</td>
<td>18.29%</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>4.70%</td>
<td>12.27%</td>
<td>21.90%</td>
<td>24.35%</td>
<td>6.38%</td>
<td>18.71%</td>
</tr>
<tr>
<td>Salt Lake Cnty</td>
<td>3.04%</td>
<td>11.64%</td>
<td>26.47%</td>
<td>27.49%</td>
<td>7.52%</td>
<td>16.25%</td>
</tr>
</tbody>
</table>

Source: Governor's Office of Planning & Budget; 1990 Census Bureau.
Downtown and the East Central areas are classically urban with a majority of multi-unit dwellings and rental units and with almost half of its population living alone. The Airport area is classically suburban with mostly single-unit housing and few single-person households.
## TABLE 3-14
### EAST-WEST CORRIDOR
#### HOUSING UNITS

<table>
<thead>
<tr>
<th></th>
<th>Airport</th>
<th>WEST CENTRAL</th>
<th>DOWNTOWN</th>
<th>EAST CENTRAL</th>
<th>UNIV</th>
<th>SLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE UNIT</td>
<td>89%</td>
<td>53%</td>
<td>17%</td>
<td>22%</td>
<td>56%</td>
<td>51%</td>
</tr>
<tr>
<td>MULTI-UNIT</td>
<td>11%</td>
<td>47%</td>
<td>83%</td>
<td>78%</td>
<td>44%</td>
<td>49%</td>
</tr>
<tr>
<td>MEAN # ROOMS</td>
<td>4.8</td>
<td>5</td>
<td>4.1</td>
<td>4.7</td>
<td>7.6</td>
<td>5.5</td>
</tr>
<tr>
<td>OWNER OCCUPIED</td>
<td>65%</td>
<td>49%</td>
<td>23%</td>
<td>25%</td>
<td>54%</td>
<td>49%</td>
</tr>
<tr>
<td>RENTER OCCUPIED</td>
<td>35%</td>
<td>51%</td>
<td>77%</td>
<td>75%</td>
<td>46%</td>
<td>51%</td>
</tr>
<tr>
<td>1 PERSON HOUSEHOLDS</td>
<td>19%</td>
<td>25%</td>
<td>47%</td>
<td>46%</td>
<td>7%</td>
<td>32%</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Governor's Office of Planning and Budget.
Note: Information taken from census block data within corridor.

## TABLE 3-15
### EAST-WEST CORRIDOR
#### POPULATION PER DWELLING UNIT

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>3.9</td>
<td>2.7</td>
<td>3.2</td>
<td>4.3</td>
<td>3.4</td>
<td>3.1</td>
<td>3.6</td>
</tr>
<tr>
<td>West Central</td>
<td>2.3</td>
<td>2.5</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Downtown</td>
<td>1.6</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>East Central</td>
<td>1.5</td>
<td>1.7</td>
<td>1.7</td>
<td>1.6</td>
<td>1.6</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>University</td>
<td>3.4</td>
<td>3.4</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>1.9</td>
<td>2</td>
<td>2</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
<td>2.3</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Wasatch Front Regional Council.
Note: Information based on traffic zones within study area.

The corridor’s employment center is Downtown; however, significant employment activity is based in the East Central area as well. The University (including Research Park) is also the second largest employment center in the corridor. The greatest growth in employment opportunity is in the Airport/International Center area and in the West Central area and may actually exceed projections if current plans for development of the Gateway are realized.
### TABLE 3-16
EAST-WEST CORRIDOR
NON-AG NON-CONST. EMPLOYMENT DENSITY PER ACRE
1990-2020

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>1.06</td>
<td>1.71</td>
<td>1.89</td>
<td>2.08</td>
<td>2.31</td>
<td>2.49</td>
<td>2.67</td>
</tr>
<tr>
<td>West Central</td>
<td>2.70</td>
<td>3.20</td>
<td>3.50</td>
<td>3.70</td>
<td>4.10</td>
<td>4.40</td>
<td>4.60</td>
</tr>
<tr>
<td>Downtown</td>
<td>29.00</td>
<td>29.85</td>
<td>30.81</td>
<td>31.64</td>
<td>32.59</td>
<td>33.55</td>
<td>34.55</td>
</tr>
<tr>
<td>University</td>
<td>8.48</td>
<td>9.40</td>
<td>9.78</td>
<td>10.11</td>
<td>10.48</td>
<td>10.84</td>
<td>11.18</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>6.24</td>
<td>6.70</td>
<td>7.03</td>
<td>7.34</td>
<td>7.70</td>
<td>8.02</td>
<td>8.34</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Wasatch Front Regional Council.

### Table 3-17
EAST-WEST CORRIDOR
NON-AGRICULTURE NON-CONSTRUCTION EMPLOYMENT
1990-2020

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>19,828</td>
<td>22,716</td>
<td>25,037</td>
<td>27,621</td>
<td>30,570</td>
<td>32,972</td>
<td>35,380</td>
</tr>
<tr>
<td>West Central</td>
<td>6,716</td>
<td>7,911</td>
<td>8,574</td>
<td>9,266</td>
<td>10,067</td>
<td>10,776</td>
<td>11,415</td>
</tr>
<tr>
<td>Downtown</td>
<td>47,866</td>
<td>46,582</td>
<td>48,076</td>
<td>49,375</td>
<td>50,857</td>
<td>52,355</td>
<td>53,908</td>
</tr>
<tr>
<td>East Central</td>
<td>33,151</td>
<td>37,596</td>
<td>39,876</td>
<td>39,937</td>
<td>41,135</td>
<td>42,394</td>
<td>43,572</td>
</tr>
<tr>
<td>University</td>
<td>22,338</td>
<td>24,766</td>
<td>25,752</td>
<td>26,630</td>
<td>27,611</td>
<td>28,554</td>
<td>29,467</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>129,899</td>
<td>139,572</td>
<td>146,314</td>
<td>152,828</td>
<td>160,239</td>
<td>167,060</td>
<td>173,731</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>189,081</td>
<td>206,734</td>
<td>221,133</td>
<td>234,442</td>
<td>250,398</td>
<td>265,303</td>
<td>279,639</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>369,278</td>
<td>438,798</td>
<td>484,242</td>
<td>530,617</td>
<td>582,882</td>
<td>635,477</td>
<td>684,786</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Wasatch Front Regional Council.
Table 3-18
EAST-WEST CORRIDOR
GROWTH RATE FOR NON-AGRICULTURE & NON-CONSTRUCTION EMPLOYMENT
1990-2020

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>10.08%</td>
<td>1.96%</td>
<td>1.98%</td>
<td>2.05%</td>
<td>1.52%</td>
<td>1.42%</td>
<td>1.79%</td>
</tr>
<tr>
<td>West Central</td>
<td>3.46%</td>
<td>1.81%</td>
<td>1.12%</td>
<td>2.07%</td>
<td>1.42%</td>
<td>0.89%</td>
<td>1.46%</td>
</tr>
<tr>
<td>Downtown</td>
<td>0.58%</td>
<td>0.63%</td>
<td>0.53%</td>
<td>0.59%</td>
<td>0.58%</td>
<td>0.59%</td>
<td>0.59%</td>
</tr>
<tr>
<td>East Central</td>
<td>2.62%</td>
<td>0.67%</td>
<td>0.54%</td>
<td>0.59%</td>
<td>0.60%</td>
<td>0.55%</td>
<td>0.59%</td>
</tr>
<tr>
<td>University</td>
<td>2.10%</td>
<td>0.78%</td>
<td>0.67%</td>
<td>0.73%</td>
<td>0.68%</td>
<td>0.62%</td>
<td>0.70%</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>1.45%</td>
<td>0.95%</td>
<td>0.87%</td>
<td>0.95%</td>
<td>0.84%</td>
<td>0.79%</td>
<td>0.88%</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>1.80%</td>
<td>1.36%</td>
<td>1.18%</td>
<td>1.33%</td>
<td>1.16%</td>
<td>1.06%</td>
<td>1.22%</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>3.51%</td>
<td>1.99%</td>
<td>1.85%</td>
<td>1.90%</td>
<td>1.74%</td>
<td>1.51%</td>
<td>1.80%</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Wasatch Front Regional Council.

Most of the retail employment is centered in the Downtown and East Central areas. These areas continue to grow and will probably always be the retail hub in the corridor. University numbers are somewhat low, but with the mix of taxable and tax-exempt entities in this area, more precise data is unavailable.

Table 3-19
EAST-WEST CORRIDOR
RETAIL EMPLOYMENT
1995-2020

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>1,765</td>
<td>1,881</td>
<td>2,030</td>
<td>2,200</td>
<td>2,294</td>
<td>2,385</td>
</tr>
<tr>
<td>West Central</td>
<td>1,134</td>
<td>1,238</td>
<td>1,343</td>
<td>1,449</td>
<td>1,550</td>
<td>1,642</td>
</tr>
<tr>
<td>Downtown</td>
<td>6,846</td>
<td>7,359</td>
<td>7,983</td>
<td>8,702</td>
<td>8,965</td>
<td>9,206</td>
</tr>
<tr>
<td>East Central</td>
<td>4,942</td>
<td>5,253</td>
<td>5,597</td>
<td>5,969</td>
<td>6,186</td>
<td>6,382</td>
</tr>
<tr>
<td>University</td>
<td>47</td>
<td>69</td>
<td>88</td>
<td>103</td>
<td>144</td>
<td>184</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>14,733</td>
<td>15,800</td>
<td>17,041</td>
<td>18,423</td>
<td>19,139</td>
<td>19,799</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>26,399</td>
<td>30,580</td>
<td>28,383</td>
<td>32,937</td>
<td>34,544</td>
<td>36,032</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>77,096</td>
<td>93,456</td>
<td>84,917</td>
<td>102,446</td>
<td>111,235</td>
<td>119,317</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Wasatch Front Regional Council.
Table 3-20
EAST WEST CORRIDOR
RETAIL EMPLOYMENT GROWTH RATE
1995-2020

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>1.29%</td>
<td>1.53%</td>
<td>1.62%</td>
<td>0.83%</td>
<td>0.78%</td>
<td>1.21%</td>
</tr>
<tr>
<td>West Central</td>
<td>1.77%</td>
<td>1.64%</td>
<td>1.53%</td>
<td>1.36%</td>
<td>1.16%</td>
<td>1.49%</td>
</tr>
<tr>
<td>Downtown</td>
<td>1.46%</td>
<td>1.64%</td>
<td>1.74%</td>
<td>0.60%</td>
<td>0.53%</td>
<td>1.19%</td>
</tr>
<tr>
<td>East Central</td>
<td>1.22%</td>
<td>1.28%</td>
<td>1.30%</td>
<td>0.72%</td>
<td>0.63%</td>
<td>1.03%</td>
</tr>
<tr>
<td>University</td>
<td>8.20%</td>
<td>4.95%</td>
<td>3.18%</td>
<td>6.91%</td>
<td>5.05%</td>
<td>3.64%</td>
</tr>
<tr>
<td>Total</td>
<td>1.52%</td>
<td>1.62%</td>
<td>1.65%</td>
<td>0.95%</td>
<td>0.84%</td>
<td>1.32%</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>1.46%</td>
<td>1.50%</td>
<td>1.50%</td>
<td>.96%</td>
<td>.85%</td>
<td>1.25%</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>1.95%</td>
<td>1.93%</td>
<td>1.85%</td>
<td>1.66%</td>
<td>1.41%</td>
<td>1.76%</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Wasatch Front Regional Council.

Table 3-21
EAST-WEST CORRIDOR—RETAIL AS % OF TOTAL EMPLOYMENT
1995-2020

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>8.60%</td>
<td>8.28%</td>
<td>8.11%</td>
<td>7.97%</td>
<td>7.50%</td>
<td>7.23%</td>
<td>8.00%</td>
</tr>
<tr>
<td>West Central</td>
<td>16.89%</td>
<td>15.65%</td>
<td>15.66%</td>
<td>15.64%</td>
<td>15.40%</td>
<td>15.24%</td>
<td>15.75%</td>
</tr>
<tr>
<td>Downtown</td>
<td>14.30%</td>
<td>15.80%</td>
<td>16.61%</td>
<td>17.62%</td>
<td>17.63%</td>
<td>17.58%</td>
<td>16.59%</td>
</tr>
<tr>
<td>East Central</td>
<td>14.91%</td>
<td>13.97%</td>
<td>14.40%</td>
<td>14.95%</td>
<td>15.04%</td>
<td>15.05%</td>
<td>14.72%</td>
</tr>
<tr>
<td>University</td>
<td>0.21%</td>
<td>0.28%</td>
<td>0.34%</td>
<td>0.39%</td>
<td>0.52%</td>
<td>0.64%</td>
<td>0.40%</td>
</tr>
<tr>
<td>Total Corridor</td>
<td>11.34%</td>
<td>11.32%</td>
<td>11.65%</td>
<td>12.05%</td>
<td>11.94%</td>
<td>11.85%</td>
<td>11.69%</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>13.96%</td>
<td>13.73%</td>
<td>13.83%</td>
<td>14.05%</td>
<td>13.80%</td>
<td>13.58%</td>
<td>13.82%</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>20.88%</td>
<td>19.35%</td>
<td>19.30%</td>
<td>19.31%</td>
<td>19.08%</td>
<td>18.78%</td>
<td>19.45%</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Wasatch Front Regional Council.

Roughly 60 percent of Salt Lake City’s retail sales occur within the study corridor. Over 80 percent of those sales are generated in the Downtown and East Central areas. The University area does actually generate a small amount of retail revenues at the bookstore and the Medical Center, but given the unique zip codes in that area and their overall tax-exempt status, our data could not reflect actual dollars there. Retail activity within the corridor accounts for only about 17 percent of retail sales in Salt Lake County.
### Table 3-22
EAST-WEST CORRIDOR—RETAIL SALES ($000s)
1995

<table>
<thead>
<tr>
<th>Subarea</th>
<th>1995</th>
<th>% OF SL CITY</th>
<th>% OF SALT LAKE COUNTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRPORT</td>
<td>$75,559</td>
<td>4.4%</td>
<td>1.2%</td>
</tr>
<tr>
<td>WEST CENTRAL</td>
<td>$106,236</td>
<td>6.2%</td>
<td>1.7%</td>
</tr>
<tr>
<td>DOWNTOWN</td>
<td>$545,964</td>
<td>31.7%</td>
<td>8.7%</td>
</tr>
<tr>
<td>EAST CENTRAL</td>
<td>$318,310</td>
<td>18.5%</td>
<td>5.1%</td>
</tr>
<tr>
<td>UNIVERSITY</td>
<td>$0</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>TOTAL CORRIDOR</td>
<td>$1,046,069</td>
<td>60.8%</td>
<td>16.7%</td>
</tr>
<tr>
<td>SALT LAKE CITY</td>
<td>$1,720,853</td>
<td>100.0%</td>
<td>27.5%</td>
</tr>
<tr>
<td>SALT LAKE COUNTY</td>
<td>$6,269,455</td>
<td>364.3%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Note: Sales information includes data for entire zip codes within corridor.

### 3.5.7 Public Safety and Security
Table 3-23, below, identifies the community police stations within or near the corridor. Coverage is well distributed throughout the corridor. These neighborhood offices do not replace mobile or emergency police coverage; rather, they provide regional centers for residents and business-owners to address safety and security concerns.

### Table 3-23
EAST-WEST CORRIDOR—NEIGHBORHOOD POLICE OFFICES

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Location</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRPORT*</td>
<td>776 NORTH TERMINAL DRIVE SALT LAKE CITY INTERNATIONAL Airport</td>
<td>575-2401</td>
</tr>
<tr>
<td>WEST CENTRAL</td>
<td>647 WEST NORTH TEMPLE RANCHO LANES</td>
<td>596-2321</td>
</tr>
<tr>
<td>WEST CENTRAL</td>
<td>855 WEST CALIFORNIA AVENUE GLENDALE RECREATIONAL CTR</td>
<td>596-5008</td>
</tr>
<tr>
<td>WEST CENTRAL</td>
<td>1174 WEST 600 NORTH SMITH’S FOOD KING</td>
<td>974-2423</td>
</tr>
<tr>
<td>WEST CENTRAL</td>
<td>1464 WEST 500 SOUTH #B POPLAR GROVE</td>
<td>533-2600</td>
</tr>
<tr>
<td>DOWNTOWN</td>
<td>460 WEST 200 SOUTH RIO GRANDE</td>
<td>596-5008</td>
</tr>
<tr>
<td>DOWNTOWN</td>
<td>233 NORTH CANYON ROAD OTTINGER HALL</td>
<td>596-1730</td>
</tr>
</tbody>
</table>
Table 3-23
EAST-WEST CORRIDOR—NEIGHBORHOOD POLICE OFFICES

<table>
<thead>
<tr>
<th>CORRIDOR SUBAREA</th>
<th>LOCATION</th>
<th>PHONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAST CENTRAL</td>
<td>876 EAST 800 SOUTH</td>
<td>532-6850</td>
</tr>
<tr>
<td></td>
<td>SMITH’S FOOD KING</td>
<td></td>
</tr>
<tr>
<td>EAST CENTRAL</td>
<td>402 6TH AVENUE</td>
<td>359-0311</td>
</tr>
<tr>
<td></td>
<td>SMITH’S FOOD KING</td>
<td></td>
</tr>
<tr>
<td>UNIVERSITY*</td>
<td>SOUTH CAMPUS DRIVE</td>
<td>581-7944</td>
</tr>
<tr>
<td></td>
<td>BLDG. 301</td>
<td></td>
</tr>
<tr>
<td>UNIVERSITY/RESEARCH PARK</td>
<td>1400 SOUTH FOOTHILL DRIVE #258</td>
<td>582-6831</td>
</tr>
<tr>
<td></td>
<td>FOOTHILL VILLAGE</td>
<td></td>
</tr>
</tbody>
</table>

Note: *Salt Lake City International Airport & University of Utah operate their own police departments, separate from Salt Lake City Police Department.

Source: Wikstrom Economic and Planning; Salt Lake City Police Department.

Table 3-24 identifies the fire stations in or near the study corridor. All of the transportation options appear to have adequate coverage to meet fire emergencies.

Table 3-24
EAST-WEST CORRIDOR—FIRE STATIONS

<table>
<thead>
<tr>
<th>CORRIDOR SUBAREA</th>
<th>STATION</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIRPORT</td>
<td>STATION #9</td>
<td>5822 AMELIA EARHART DRIVE</td>
</tr>
<tr>
<td>AIRPORT</td>
<td>STATION #11</td>
<td>SLC INTERNATIONAL Airport</td>
</tr>
<tr>
<td>AIRPORT</td>
<td>STATION #12</td>
<td>4030 WEST 1085 NORTH</td>
</tr>
<tr>
<td>WEST CENTRAL</td>
<td>STATION #6</td>
<td>948 WEST 800 SOUTH</td>
</tr>
<tr>
<td>WEST CENTRAL</td>
<td>STATION #7</td>
<td>273 NORTH 1000 WEST</td>
</tr>
<tr>
<td>DOWNTOWN</td>
<td>STATION #2</td>
<td>254 WEST 300 NORTH</td>
</tr>
<tr>
<td>EAST CENTRAL</td>
<td>STATION #1</td>
<td>211 SOUTH 500 EAST</td>
</tr>
<tr>
<td>EAST CENTRAL</td>
<td>STATION #4</td>
<td>830 EAST 11TH AVENUE</td>
</tr>
<tr>
<td>EAST CENTRAL</td>
<td>STATION #5</td>
<td>1023 EAST 900 SOUTH</td>
</tr>
<tr>
<td>UNIVERSITY</td>
<td>STATION #10</td>
<td>785 ARAPEEN DRIVE</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Salt Lake City Fire Department.

3.6 AFFECTED ECOSYSTEMS: WETLANDS, VEGETATION, WILDLIFE, AND THREATENED OR ENDANGERED SPECIES

This section describes potentially affected wetlands, vegetation, wildlife and endangered/threatened species in the east-west MIS study corridor. Because the study corridor encompasses urban,
industrial and agricultural areas in addition to salt marshes, uplands and foothills, a wide variety of species may be affected.

3.6.1 Wetlands

Wetlands are defined as "Waters of the United States" and are protected by Section 404 of the Clean Water Act. Wetlands may not be altered without a permit from the U.S. Army Corps of Engineers (COE). Although the COE prefers avoidance of wetlands if at all possible, they do allow permits when application demonstrates mitigation of impacts to a wetland either directly or indirectly. Wetlands are identified based on soils, hydrology and hydrophytic vegetation.

The primary source of wetland data was derived from the National Wetland Inventory Maps (NWI) created by the U.S. Fish and Wildlife Service (USFWS). Figure 3-5 displays wetlands within the corridor and the water regime: permanently, temporarily, seasonally or intermittently flooded and saturated. Many wetlands located in the west areas are temporarily flooded, while sites that are intermittently exposed and seasonally flooded are scattered in the northwestern area. Few wetlands are located in the eastern part of the corridor (See Figure 3-5).

Soils in the corridor are unsurveyed; however, the soils in the western part of the corridor are primarily of the Decker-Lasil-Terminal and the Chipman-Magna-Ironton associations. These poorly drained soils occur on lake plains and flood plains. Poor drainage may indicate the presence of wetlands on these soils. Groundwater is high within the study area with a range from 1.1 feet to 13.8 feet deep. This high water table may indicate the presence of emergent wetlands in the study region. Emergent wetlands are inundated with from 1 to 18 inches of water, year round.

3.6.2 Vegetation

Most of the east-west MIS study corridor is urban. Landscaping, golf courses and parks provide a diverse range of introduced plant life. The west area of the corridor is a salt bush and greasewood community. Tule marshes are in the northwest and are dominated by bulrushes, cattail and sedges. Great Basin sagebrush communities make up the middle and east areas and have few native forbs (herb-like plants). Mountain mahogany-oak scrub inhabit the Wasatch foothills.

3.6.3 Wildlife

The Utah Division of Wildlife and the USFWS have jurisdiction over wildlife of all species. Although the study corridor is primarily an urban setting, plants and animals will most likely occur in the foothill region on the east and the Great Salt Lake to the northwest, because these areas are not fully developed and create ideal environments for wildlife. The north and northwest parts of the study corridor are comprised of mud flats and marsh lands and serve as resting area for migratory birds and nesting area for waterfowl. The Wasatch foothill region serves as a winter habitat for many animals that migrate to cooler, higher mountain elevations during summer months.

Prominent avian species within the Great Salt Lake marshlands included loons, grebes, ducks, geese, herons, ibis, plovers, sandpipers, phalaropes, gulls and terns. Raptors frequent uplands and marshland habitat. Peregrine falcon sightings occur regularly in the Downtown area near Main Street and South Temple.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-5 National Wetland Inventory Map
Mammals of the Great Salt Lake area include a variety of species of shrews, bats, rabbits, squirrels, gophers, mice, rats, beaver, porcupines, coyotes, foxes, weasels, black bears, badgers, skunks, ringtails, bobcats/cougar, elk and mule deer. Similar to the avian species, the availability of natural habitat for food and shelter shapes the population size. In the Great Salt Lake area fish species include: trout, carp, chubs, suckers, bass and sunfish. Within the study boundary, fish habitat was identified for the mountain whitefish, the Utah sucker and the redside shiner in the Jordan River.

Amphibians and reptiles play an important role in wetland ecosystems. They often are the predators within an ecosystem and can prevent population explosions of their prey. Reptile species in the Great Salt Lake area include: turtles, lizards and snakes. Amphibians include a variety of salamanders, toads and frogs.

3.6.4 Threatened and Endangered Species

Endangered and threatened species are located within the study corridor. The Utah Division of Wildlife and the USFWS have jurisdiction over threatened and endangered species. The USFWS stated that the following endangered/threatened species occur in Salt Lake County: bald eagle (Haliaeetus leucocephalus), peregrine falcon (Falco peregrinus) and Ute ladies' tresses (Spiranthes diluvialis). Additionally, the spotted frog (Rana pretiosa) is a candidate species for the listing under the Endangered Species Act and the USFWS requested that the transportation corridor avoid this species.

The Utah Natural Heritage Program also noted that the Wasatch jamesia (Jamesia americana var. macrocalyx) and the flammulated owl (Otus flammeolus) are both designated as "sensitive" by Region four of the United States Department of Agriculture (USDA) Forest Service. Additionally, the bald eagle uses the study corridor for both nesting and winter habitat.

3.6.5 Water Resources & Floodplains

This section describes the water resources and floodplain conditions in the affected area. A summary of the existing water resource/floodplain information is provided below. In addition, a map showing the location of water resource and floodplain information is also provided in Figure 3-6. The water courses and water bodies that may be affected by the project are listed below:

City Drain: The City Drain runs from approximately 2400 West North Temple north toward the sewage canal. This drain accepts stormwater runoff that does not enter the Jordan River. Salt Lake City has jurisdiction over this drain and any changes must be approved by the City.

Surplus Canal: The Surplus Canal carries excess water from the Jordan River to the south of the SLCIA and then north to the Great Salt Lake. The banks of the Surplus Canal create a levee that completely contain the 500-year floodplain. North Temple Street crosses the Surplus Canal at approximately 3500 West. The floodplain, as shown on the Water Resource and Floodplain map in Figure 3-6, is administered by the Engineering Department of Salt Lake City through a local flood ordinance and any changes to this bridge structure must not increase the 100-year flood event more than one vertical foot. In addition, if alterations are to be made to the stream or bank, a stream-alteration permit must be submitted to the Utah Division of Water Rights.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-6 Water Resources and Floodplains Map
Brighton Canal: The Brighton Canal is an irrigation canal that is also used to control stormwater runoff. The Brighton Canal crosses North Temple Street at 2200 West. The Brighton Canal is operated by the North Point Consolidated Canals Company. Any changes that may impact this canal must be approved by this company.

Jordan River: The Jordan River flows from south to north and crosses North Temple Street at approximately 1200 West. Most of the flow in the Jordan River is diverted into the Surplus Canal to the south of the project boundary. The 100-year floodplain for the Jordan River, as shown in Figure 3-6, is contained by channel banks. However, the 500-year floodplain extends as far south as North Temple Street on the west side of the river. On the south side of I-80, the 100 year and 500-year floodplains extend as far south as 13th South and from 3rd West to 12th West. The floodplain is administered by Engineering Department of Salt Lake City through a local flood ordinance and any changes to bridge structures along the Jordan River must not increase the 100-year flood event more than one vertical foot. In addition, if alterations are to be made to the stream or bank, a stream-alteration permit must be submitted to the Utah Division of Water Rights.

Red Butte Creek: The Red Butte Creek runs from the northeast side of the project area, through the University of Utah campus and eventually into Liberty Park. The average flow for this creek is 4.23 cfs, with a maximum flow of 105 cfs on May 28, 1993. A dam, approximately 1.5 miles upstream from the University campus, forms Red Butte Reservoir. As the creek enters the valley, the channel alternates between above-ground and below-ground sections. The conduits are sized to contain a 500-year flood. In the open channel sections of the stream of the 500-year floodplain, the floodplain is approximately 50 feet on either side of the creek centerline.

Typically shallow groundwater is found throughout the project area. The following description of the groundwater situation in the Salt Lake Valley comes from the USGS Open File Report 92-640.

The Salt Lake Valley groundwater situation consists of a deep unconfined aquifer near the mountains, a confined (artesian) aquifer and shallow unconfined aquifer overlying the confined aquifer and locally unconfined or perched aquifers. Less permeable layers of silt and clay overlie the confined aquifer, but the thickness, continuity and permeability of these confining layers vary with location. Groundwater in the deep unconfined and confined aquifers is used for public supply in many parts of the valley.

The shallow unconfined aquifer is relatively close to activities and processes occurring at the land surface. This makes the shallow unconfined aquifer more susceptible to many types of contamination, such as contamination from trace metals, organic compounds and increased concentrations of dissolved solids as a result of evaporation. The extent of the layers separating shallow, unconfined aquifer from the deep, confined aquifer and their effectiveness as a barrier to contaminant movement are not well known.

Changes that may affect the shallow, unconfined aquifer must be approved through the Utah Division of Drinking Water. All activities in this project should prevent contamination from reaching the shallow, unconfined aquifer.

3.6.6 Potential Contaminant Sources

This section presents summary information concerning the existing contaminant (hazardous waste)
Chapter 3  Affected Environment

sites on or potentially effecting the University of Utah-Downtown-Airport Transportation Corridor project area. Any site currently under regulatory control is considered a potential “contaminant source.” Existing regulatory databases, documentation and files on known and suspected contaminant sites were reviewed from various regulatory agency information sources. The map in Figure 3-7 illustrates the potential contaminant source locations within the study area. The sources identified within the corridor may have caused surface or subsurface degradation of conditions. In the event of a property transaction(s), the new owner may incur liability for characterization, mitigation, or remediation of problem areas in the alignment corridor even though the problem originated from outside the alignment. Under an enforcement order issued by a regulatory agency, the party responsible for the release of hazardous material is obligated to clean up the release. If the responsible party is unable to fulfill this obligation then the current property owner may be burdened with the responsibility. Construction through potential contaminant sources may add health and safety concerns and effect construction budget expenditures. Five types of contaminant sources are displayed in the legend of the Potential Contaminant Source Map in Figure 3-7: Underground Storage Tanks, Title three Sites; Toxic Release Inventory 1990; Leaking Underground Storage Tanks; RCRA Sites; and CERCLA Sites. These are derived from the following information sources:

The State of Utah Division of Environmental Response and Remediation (DERR) maintains three databases: (1) The Underground Storage Tank (UST) Facilities database identifies registered tanks (March, 1996); (2) the Leaking Underground Storage Tank (LUST) sites database identifies facilities with a potential leaking underground storage tank (February 1996). Inclusion of a site on this list does not confirm that a release has occurred. Sites where releases have occurred may be undergoing investigation or remediation. (3) The Comprehensive Environmental Response, Compensation and Liability Inventory System (CERCLIS) database lists documented hazardous waste sites where a release or potential threatened release has been investigated (January 1996). Hazardous waste sites are tracked from the initial discovery to listing on the National Priorities List.

The State of Utah Division of Solid and Hazardous Waste maintains a database of Resource Conservation and Recovery Act (RCRA) facilities (April 1996). The RCRA list identifies hazardous materials from the point of generation to the point of disposal. This database (RCRIS) system tracks events and activities related to facilities which generate, transport, treat, store, or dispose of hazardous waste.

The Toxic Release Inventory is a database generated from Title III of the Superfund Amendments and Reauthorization Act (SARA) (March 1996). SARA requires businesses that handle, store, or manufacture certain hazardous materials to plan for emergency response and to report chemical inventory, on-going releases of “toxic chemicals,” leaks and spills. The reports and plans provide federal, state and local emergency planning and response agencies with information concerning the quantity of chemicals that various facilities use, routinely release and spill.

3.7 TRANSPORTATION

The following section describes the existing roadway functional classifications and volume-to-capacity ratios (v/c) on the streets and highways within the corridor. The Existing Transit Conditions section describes the UTA’S existing mass transit systems within the study area. Existing bus routes are presented along with their frequencies and ridership information. The Bicycle Facilities section describes existing and proposed bicycle routes within the study area. The Freight-Railroad Operations section presents existing railroad operations and locations of railroad
Legend
- Project Boundary
- Airport
- Roads
- Streams
- CERCLA Sites
- RCRA Sites
- TRI Sites
- Title 3 Sites
- LUST Sites
- UST Sites

University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-7 Potential Contaminant Sources Map

Parsons Transportation Group
Eckhoff, Watson and Preator Engineering
spurs; the Passenger Rail section presents existing Amtrak schedules.

### 3.7.1 Existing Roadways and Their Functional Classifications

In transportation planning, roadway facilities are grouped according to their functional classification. At one extreme are high speed, high-volume facilities carrying through-traffic, with no access to abutting properties or local-only traffic. At the other, are local rural roads or streets that carry low volumes, sometimes at low speeds and with a primary function of land service. Road classifications were obtained from UDOT's Functional Classification map. The following highway facilities are classified as arterial or higher (See Figure 3-8).

<table>
<thead>
<tr>
<th>Interstate</th>
<th>Maximum Number of Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-15</td>
<td>8</td>
</tr>
<tr>
<td>I-215</td>
<td>8</td>
</tr>
<tr>
<td>I-80</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Principal Arterial</th>
<th>Maximum Number of Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Street</td>
<td>6</td>
</tr>
<tr>
<td>700 East</td>
<td>6</td>
</tr>
<tr>
<td>500 South</td>
<td>6</td>
</tr>
<tr>
<td>Foothill Blvd.</td>
<td>8</td>
</tr>
<tr>
<td>Redwood Road</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minor Arterial</th>
<th>Maximum Number of Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 West</td>
<td>6</td>
</tr>
</tbody>
</table>

### East-West Corridor Streets Studied

Several roadways with volumes sufficient to significantly impact east-west travel were selected to represent overall conditions in the corridor. They are shown below with their respective functional classifications (see Figure 3-8):

- North Temple
- 400 South
- I-80 via I-15 from the (CBD)
- Bangerter Highway
- Redwood Road
- Interstate-15
- 300 West
- 500 South
- 600 South
- State Street
- 700 East
- 1300 East

### Roadway Traffic Volumes

Current traffic volumes were obtained from *Traffic on Utah Highways 1993*, produced by UDOT. Table 3-25 depicts 1993 traffic volumes for the east-west Corridor. Figures 3-9 and 3-10 show, respectively, 1993 and 2015 screenline counts for corridor roadways.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-8 Functional Roadway Classifications
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-9  1993 AADT - Screenline Counts
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-10 2015 - Screenline Counts
Traffic signal information was obtained from Salt Lake City, Salt Lake County and UDOT. Traffic signals within the study area are predominantly owned and maintained by Salt Lake City, Salt Lake County and UDOT. As part of the I-15 Reconstruction project, by the year 2000 an Advance Traffic Management System will be implemented in the valley which will coordinate traffic signals throughout the region to promote traffic progression.

### Loadway Volume to Capacity

Analysis of the selected intersections identified the congested (less than LOS D) intersections along the east-west corridor. The operation of the selected intersections should be representative of other intersections within the general area. The corridors of interest as mentioned above are primarily owned and maintained by UDOT. There is some concern regarding the possibility of coordination between the two entities and the desired direction of progression. Historically, emphasis has been placed on north/south travel through the valley due to its north/south geography and it is likely that this will remain the favored direction of progression. Therefore, it was assumed in this analysis that the signals along the east-west corridors of interest are not synchronized.

Existing intersection geometries were obtained from either Salt Lake City or a field survey of each intersection. Existing traffic volumes were analyzed at key intersections. The methodology utilized provided volume to capacity ratios for the representative intersections. The capacity of each through-lane for an intersection was assumed to be 900 vehicles per hour (vph). This value seems typical for signalized intersections in the area, but may vary according to signal timing. The volume-to-capacity ratio (v/c ratio) is the measured volume on a particular traffic lane divided by the capacity (in this case 900 vph). For example, a lane used to full capacity would have a v/c ratio of 1.0. This provides a basis to evaluate each alternative and determine what is occurring and what will be likely to happen when changes are made.
A summary of the results of the v/c analysis for each intersection is provided in Table 3-26. The traffic volumes utilized in the analysis were obtained from *Traffic on Utah Highways, 1993*. The PM peak hour traffic volumes were assumed to be 10 percent of the daily volumes given from *Traffic on Utah Highways, 1993*. The directional distribution for each roadway in the intersections was taken to be 50 percent in each direction. Only through-lanes were considered in this analysis. Any turning lanes were ignored for the purposes of this study.

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Signal Status</th>
<th>v/c Ratio</th>
<th>North</th>
<th>South</th>
<th>East</th>
<th>West</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 South/200 West</td>
<td>Signalized</td>
<td>0.25</td>
<td>0.33</td>
<td>0.86</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>300 South/State Street</td>
<td>Signalized</td>
<td>0.54</td>
<td>0.54</td>
<td>0.48</td>
<td>0.48</td>
<td></td>
</tr>
<tr>
<td>400 South/300 West</td>
<td>Signalized</td>
<td>0.51</td>
<td>0.51</td>
<td>0.35</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>400 South/700 East</td>
<td>Signalized</td>
<td>0.78</td>
<td>0.78</td>
<td>0.59</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>400 South/Redwood Road</td>
<td>Signalized</td>
<td>0.61</td>
<td>0.61</td>
<td>0.32</td>
<td>0.32</td>
<td></td>
</tr>
<tr>
<td>500 South/1300 East</td>
<td>Signalized</td>
<td>0.48</td>
<td>0.48</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>500 South/700 East</td>
<td>Signalized</td>
<td>0.58</td>
<td>0.58</td>
<td>0.39</td>
<td>0.39</td>
<td></td>
</tr>
<tr>
<td>500 South/300 West</td>
<td>Signalized</td>
<td>0.4</td>
<td>0.4</td>
<td>N/A</td>
<td>0.62</td>
<td></td>
</tr>
<tr>
<td>500 South/State Street</td>
<td>Signalized</td>
<td>0.62</td>
<td>0.62</td>
<td>0.4</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>600 South/State Street</td>
<td>Signalized</td>
<td>0.54</td>
<td>0.54</td>
<td>N/A</td>
<td>0.47</td>
<td></td>
</tr>
<tr>
<td>1580 East/500 South</td>
<td>Signalized</td>
<td>0.41</td>
<td>0.41</td>
<td>1.15</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>North Temple/300 West</td>
<td>Signalized</td>
<td>0.39</td>
<td>0.39</td>
<td>0.53</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>North Temple/Main Street</td>
<td>Signalized</td>
<td>0.37</td>
<td>0.37</td>
<td>0.79</td>
<td>0.79</td>
<td></td>
</tr>
<tr>
<td>North Temple/State Street</td>
<td>Signalized</td>
<td>0.41</td>
<td>0.41</td>
<td>1.38</td>
<td>0.69</td>
<td></td>
</tr>
<tr>
<td>North Temple/Redwood Road</td>
<td>Signalized</td>
<td>0.29</td>
<td>0.29</td>
<td>0.86</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>South Temple/700 East</td>
<td>Signalized</td>
<td>N/A</td>
<td>N/A</td>
<td>0.77</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>South Temple/State Street</td>
<td>Signalized</td>
<td>0.82</td>
<td>0.54</td>
<td>0.44</td>
<td>0.66</td>
<td></td>
</tr>
</tbody>
</table>

### 3.7.2 Existing Transit Conditions

Existing transit information was obtained from WFRC's Long Range Transit Analysis. The analysis show that in 1994, 19.2 million passengers rode approximately 353 UTA buses for a total of 11.9 million passenger-miles. UTA operates local and express bus service, six days a week on most local routes. In Salt Lake County the majority of local routes operate every 20 to 30 minutes on weekdays. Express and limited routes provide between 1 and 11 daily round trips. Figure 3-11, Existing Bus Routes shows bus routes and roadways in the study corridor, while Table 3-27 shows a summary of the existing bus routes in the project area, with weekday and Saturday frequencies.

Local service bus routes make stops at regular intervals along their routes, with the spacing of stops of between one-quarter mile to every tow to three blocks. Limited service routes operate mostly during peak travel hours and make less frequent stops than local routes, with typical spacing between stops of between one-quarter and one-half mile. Express bus routes operate mostly in peak hours and travel non-stop to Downtown Salt Lake City or other key destinations after making passenger
pick-ups in outlying collection areas. Currently UTA is filling new express buses to capacity as soon as they are added to the system.

Planned major investments in roadway and transit capacity in the Salt Lake Valley will offer an opportunity for improved transit service in the southern portion of the UTA service area, including travelers from Provo to Salt Lake City, as well for travel within Salt Lake County. UTA is currently constructing a light rail line to be located along the Union Pacific Railroad right-of-way from 10000 South in Sandy to Downtown Salt Lake City. Also, the reconstruction of I-15 will include new bus/HOV lanes into Downtown Salt Lake City. Express bus routes coming from the southern portion of the region can be routed to connect with the light rail line in Sandy or the use the Bus/HOV lanes on I-15. Bus routes and schedules will be modified to coordinate with the light rail line. UTA is currently preparing plans for specific bus route and schedule changes to be implemented when the light rail line opens in 2000.

Table 3-27 lists the existing bus routes within the study area. These routes are shown graphically in Figure 3-11.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-11 Area Bus Route Map
### TABLE 3-27

**EAST-WEST CORRIDOR**

**SUMMARY OF EXISTING BUS ROUTES IN PROJECT AREA**

<table>
<thead>
<tr>
<th>Route</th>
<th>Name</th>
<th>Weekday Frequency (In Minutes)</th>
<th>Sat Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9th Avenue</td>
<td>30</td>
<td>80</td>
</tr>
<tr>
<td>2</td>
<td>6th Avenue</td>
<td>30</td>
<td>80</td>
</tr>
<tr>
<td>3</td>
<td>3rd Avenue</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>Ft. Douglas</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Parley's Way</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>Highland Park</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>8</td>
<td>11th East</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>9</td>
<td>9th East</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>11</td>
<td>13th East</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>12</td>
<td>Murray</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>13</td>
<td>Canyon Rim</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>14</td>
<td>East Millcreek</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>15</td>
<td>South 9th West</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>17</td>
<td>Poplar Grove</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>18</td>
<td>No. Redwood Road</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>19</td>
<td>Fairgrounds</td>
<td>30</td>
<td>80</td>
</tr>
<tr>
<td>20</td>
<td>North 6th West</td>
<td>30</td>
<td>80</td>
</tr>
<tr>
<td>21</td>
<td>State Capitol</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>26</td>
<td>No. Temple 2200 W.</td>
<td>7 trips per day</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Ft. Union</td>
<td>8 trips per day</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Sandy-Unionsys</td>
<td>2 trips per day</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Wasatch Blvd</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>34</td>
<td>West Kearns</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>37</td>
<td>Magna</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>40</td>
<td>West Jordan</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>43</td>
<td>Bluffdale</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>48</td>
<td>West Jordan Express</td>
<td>8 trips per day</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>Airport - Int'l Center</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>51</td>
<td>Tooele/Grantsville Express</td>
<td>8 trips per day</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>University of Utah</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>53</td>
<td>Tooele via Airport</td>
<td>7 trips per day</td>
<td></td>
</tr>
<tr>
<td>54</td>
<td>Olympus cove</td>
<td>6 trips per day</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>SLC-Weber State Univ.</td>
<td>22 trips per day</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Woods Cross</td>
<td>6 trips per day</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Bountiful via State Cap.</td>
<td>6 trips per day</td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>North Salt Lake</td>
<td>6 trips per day</td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>West Bountiful</td>
<td>6 trips per day</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>SLC-Ogden Commuter</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>71</td>
<td>Centerville</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>72</td>
<td>Golden Spike Express</td>
<td>24 trips per day</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>SLC-Og Hwy 899 Express</td>
<td>2 trips per day</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>Tooele AD Shuttle</td>
<td>2 trips per day</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>U of U-Sandy Express</td>
<td>3 trips per day</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>900 West Shuttle</td>
<td>27 trips per day</td>
<td></td>
</tr>
<tr>
<td>89</td>
<td>W. Valley- U of U Express</td>
<td>3 trips per day</td>
<td></td>
</tr>
<tr>
<td>34x</td>
<td>West Kearns Express</td>
<td>4 trips per day</td>
<td></td>
</tr>
<tr>
<td>37x</td>
<td>Magna Express</td>
<td>6 trips per day</td>
<td></td>
</tr>
</tbody>
</table>
3.3 Bicycle Facilities
A map of existing bike routes in Salt Lake City is shown in Figure 3-12. These routes are utilized by some local area residents for commute and recreational use. This section only considers Salt Lake City designated bike routes. Salt Lake City currently separates bike routes into three classes.

Class 1 - Bike Paths are independent right-of-ways completely separated from any street or highway. They may be paved or unpaved, could have steep grades and often share right-of-way with pedestrians.

Class 2 - Bike Lanes are striped and signed on-street lane for unidirectional bike travel.

Class 3 - Bike Routes have on-street signing designating bicycle travel in lanes shared with motorized vehicles.

3.4 Freight Railroad Operations
Railroads dominated intercity passenger and freight transportation from the late 1800s to the early 1920s. Transportation by rail began to grow again during World War II, but since then it has steadily declined due to the increased use of automobiles and trucks. Although national railroad use is declining, it reportedly still transports the highest share of freight on a ton-per-mile basis. The percent of passenger travel by train is much less impressive than that of freight. In 1986, passengers who traveled by rail comprised less than one percent.

Passenger Railroad Operations
Although passenger travel by rail is scant, railroads still affect public transportation greatly. The rights-of-way for railroads invariably traverse those of the highways. AASHTO standards for interstate highways require that "railroad grade crossings shall be eliminated for all through traffic lanes". These facts increase the importance of considering all railroad inventories in the corridor. AMTRAK presently operates one eastbound and one westbound train per day through Salt Lake City. This would change significantly, of course if commuter rail were to be operated in the future.

3.1 Mineral Resources
3.1.1 General Description
Mineral resources present within or near the corridor include good quality sand, gravel and building stone, which have been mined at various times in the past. Potential common clay resources and natural gas are also present. The corridor is located within the Jordan River Valley, commonly known as the Salt Lake Valley. The Salt Lake Valley is a structural basin bounded on the east by the Wasatch Range. The Wasatch Fault Zone is present at the western base of the.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-12 Project Area Bike Routes
Chapter 3  Affected Environment

Wasatch Range. The Oquirrh Mountains bound the valley on the west. The basin is filled with lake and stream deposits and alluvium. A portion of the Great Salt Lake, a remnant of ancient Lake Bonneville, is present in the northern part of the Salt Lake Valley. The rock types in the Wasatch Range and Oquirrh Mountains near the corridor consist primarily of limestone, shale and sandstone. The eastern end of the corridor terminates at the University of Utah, located on ancient lake Bonneville shorelines at the western edge of the Wasatch Range front. The western edge of the corridor terminates at 7200 West, on the Great Salt Lake and ancient Lake Bonneville lake plain.

Salt Lake Valley topography has been shaped by ancient Lake Bonneville, by stream activity and by alluvium eroded from the adjacent mountains. At the maximum high stand, Lake Bonneville attained a depth of more than 1,000 feet in the area of the present Great Salt Lake (Hinze, 1973). Shorelines of the lake are a conspicuous feature along the mountain range and valley margins in the Salt Lake Valley and prominent in the University of Utah area. Below the shorelines, flat-lying former Lake Bonneville sediments form a gently undulating plain in the center of Salt Lake Valley. The structural basin is filled extensively with unconsolidated clay, silt, sand and gravel alluvium that locally attains vertical depths in excess of 2,000 feet (Hely et al., 1971). Sand and gravel is mined, primarily along the margins of the valley. Evaporation ponds, used for mineral extraction from Great Salt Lake water, are located west of the corridor.

The Jordan River flows northward in the center of the valley from Utah Lake to the Great Salt Lake and has deposited fine-grained floodplain (overbank) deposits. From the confluence of Big Cottonwood Creek in Salt Lake City to the Great Salt Lake, the Jordan River formed a huge fan-shaped floodplain and delta complex (Davis, 1983). West of State Street in Salt Lake City, the corridor is primarily located on the recent (Quaternary) Jordan River floodplain and delta complex.

Local areas within the corridor have perched water table zones. In some low-lying areas near the center of the valley, the alluvium is saturated by shallow groundwater at or near the ground surface. At the surface, the nearly flat lake and floodplain topography was conducive to the formation of swamps and marshes in the area. In the swampy and marshy areas, dark, highly organic, sediments accumulated. The saturated alluvium and highly organic sediments generally are a poor sub-base for man-made structures.

3.82  Sand, Gravel and Quarry Aggregates
Sand and gravel deposits are extensive, primarily along the Lake Bonneville shorelines and are present at the eastern edge of the corridor. Permitted rock aggregate (sand and gravel) mines, reported by the Utah Department of Natural Resources, Division of Oil, Gas and Mining (September 1995), are located in the area of the corridor. These rock aggregate mines are located in Townshiptone North, Rangeone West, Sections 14, 24 and 25.

The Utah Department of Natural Resources, Utah Geological Survey (September 1996) reports the following resources are present in the area of the corridor.
Chapter 3  Affected Environment

Township One North, Range One East, Sections 31-34
All sections contain good quality Lake Bonneville sand and gravel, most of which is inaccessible due to urbanization. Section 33 contains a small limestone prospect (in Limakiln Gulch), a remnant of an early attempt at lime production.

Township One South, Range One East, Sections 2-4, 10-11
All sections contain good quality Lake Bonneville sand and gravel, most of which is inaccessible due to urbanization. Section three contains a building-stone quarry and resource. Sandstone was quarried for early construction projects at Fort Douglas and possibly for use in building foundations in Salt Lake City houses. Section 11 contains a small limestone prospect.

Township One North, Range One West, Sections 19-36
Sections 23-26 and 36 contain good quality Lake Bonneville sand and gravel although most of it is inaccessible due to urbanization.

3.8.3 Other Resources

Township One North, Range One West, Sections 19-22 and 27-35
Section 19-22 and 27-35 may contain common clay resources. Sections 21 and 30 produced small amounts of natural gas in the past.

Township One North, Range Two West, Sections 1-6, 19-36
All of these sections have potential for common clay deposits. Sections five and six contain salt ponds (evaporation ponds). Sections 27 and 29 produced small quantities of natural gas in the past.

3.9 NOISE AND VIBRATION

This section defines the noise and vibration descriptors that will be used throughout the impact assessment and describes the existing noise and vibration environments in the vicinity of the proposed project. Appendix F contains noise data sheets for this analysis.

3.9.1 Community Noise Characteristics

The areas near the proposed Bus/HOV alignments, the proposed rail stations and rail corridors routinely experience noise to varying degrees from sources such as traffic, trains, industry and aircraft over-flights. The combination of noise from all of these sources is referred to as community noise and is most commonly measured in A-weighted decibels (dBA). Community noise levels typically range from about 40 to 60 dBA. Levels as low as 30 dBA are possible during nighttime hours in an area void of traffic and industry and levels as loud as 90 dBA could result during a close truck pass-by or low aircraft over-flight. Figure 3-13 shows typical noise levels.
FIGURE 3-13
TYPICAL SOUND LEVELS FROM INDOOR AND OUTDOOR NOISE SOURCES

<table>
<thead>
<tr>
<th>COMMON OUTDOOR NOISE LEVELS</th>
<th>NOISE LEVEL (dBA)</th>
<th>COMMON INDOOR NOISE LEVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet Flyover at 1000 ft.</td>
<td>110</td>
<td>Rock Band</td>
</tr>
<tr>
<td>Gas Lawn Mower at 3 ft.</td>
<td>100</td>
<td>Inside Subway Train (New York)</td>
</tr>
<tr>
<td>Diesel Truck at 50 ft.</td>
<td>90</td>
<td>Food Blender at 3 ft.</td>
</tr>
<tr>
<td>Noise Urban Daytime</td>
<td>80</td>
<td>Garbage Disposal at 3 ft.</td>
</tr>
<tr>
<td>Gas Lawn Mower at 1000 ft.</td>
<td>70</td>
<td>Shouting at 3 ft.</td>
</tr>
<tr>
<td>Commercial Area</td>
<td>60</td>
<td>Vacuum Cleaner at 10 ft.</td>
</tr>
<tr>
<td>Heavy Traffic at 300 ft.</td>
<td>50</td>
<td>Normal Speech at 3 ft.</td>
</tr>
<tr>
<td>Quiet Urban Daytime</td>
<td>40</td>
<td>Large Business Office</td>
</tr>
<tr>
<td>Quiet Urban Nighttime</td>
<td>30</td>
<td>Dishwasher Next Room</td>
</tr>
<tr>
<td>Quiet Suburban Nighttime</td>
<td>20</td>
<td>Small Theatre, Large Conference Room (Background)</td>
</tr>
<tr>
<td>Quiet Rural Nighttime</td>
<td>10</td>
<td>Library</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>Bedroom at Night</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Concert Hall (Background)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Broadcast and Recording Studio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Threshold of Hearing</td>
</tr>
</tbody>
</table>

Source: Parsons Engineering Science, Inc.
Single-number descriptors have been developed to facilitate analysis of the continuously fluctuating community noise environment. Two descriptors commonly used in planning documents are \( L_{eq} \) and \( L_{dn} \). The \( L_{eq} \) is a level with the same energy content as the fluctuating noise level over a given time period. The \( L_{dn} \) is a 24-hour average calculated from hourly \( L_{eq} \) values, with 10 dB added to nighttime levels to account for heightened noise-sensitivity at night.

### 3.9.2 Existing Sources of Noise

Community noise along the proposed east-west corridor is determined primarily by aircraft, railroad freight trains, freeway traffic and local street traffic, depending on the particular location. Arriving and departing aircraft from SLCIA are in continuous operation. Noise from Airport operations currently impact the nearby community to the east of the Airport. Rail lines south of the western portion of the east-west corridor run nearly parallel to the proposed route. In the western portion of the Downtown area, rail traffic also runs north and south. Noise from railroad operations is primarily from the locomotive engines and warning horns and can be heard at a large distance.

Heavy road traffic exists on the east-west routes of North Temple along the west side of the corridor, 500 and 600 South in the business district and 400 South along the east side. Additional heavy road traffic exists on north-south routes of 400 West, 300 West and West Temple. Refer to the Transportation Section for more information on area roadways. Various industrial sites and aircraft over-flights also contribute to the ambient noise level in several areas.

### 3.9.3 Noise-Sensitive Receptors

Of the various land uses that surround the project, residential areas are the most noise-sensitive.

The following are brief descriptions of land uses along the project alignment:

- On both sides of North Temple Street, there are some scattered apartment buildings, mobile homes and motels; a few single-family residences are also located along the route. Most single-family residences are located on cross streets perpendicular to North Temple. An existing railroad runs parallel and to the south side of North Temple.

- Along 400 West, commercial and industrial land uses are predominate. The route would pass Pioneer Park on the northeast quadrant of 400 West and 400 South. It would also pass the Union Pacific Rail Road Station which is located on the southwest quadrant of 400 West and North Temple.

- On 400 South, most of the land uses are commercial establishments. There are some residential land uses located toward the eastern end of 400 South near the transition to 500 South. Several hotels are situated along this street within the project area. Also, there is a park in front of the City/County Building at 451 South State Street.
Noise Measurement Sites

Figure 3-14
3.9.4 Ambient Noise Level Measurements

A site visit was conducted in February 1997, to identify representative sensitive receptor locations and conduct noise measurements to evaluate existing background noise levels in the vicinity of the project area.

Four sets of Larson-Davis Model 870 Precision Integrating Sound Level Meters (LD870) and two Larson-Davis Model CA250 Acoustic Calibrators (CA250) were used to conduct noise measurements. The LD870s are ANSI Type 0 instruments. All instruments were calibrated and operated according to the manufacturer's specifications. In addition, all noise measuring equipment is inspected and calibrated annually by the instrument manufacturer.

The entire corridor was toured prior to these measurements to determine the location of all noise-sensitive receptors. The measurement locations represent receptors both adjacent to and within one block of the corridor.

Noise measurements were conducted at 13 locations along the project alignment. Continuous 24-hour noise monitoring was conducted at one site and short-term monitoring was conducted at each of the 12 remaining sites. The results of the 24-hour noise measurements were used to establish the worst-case traffic noise impact hours. All short-term noise measurements were conducted during peak hours or as close to peak hours as possible. All measurements were conducted at residential locations, except for two sets of short-term measurements, which were conducted at a park.

Figure 3-14 shows the location of all ambient noise level measurements taken during the survey.

Table 3-28 presents a list of all the measurement locations and the highest measured background noise levels. Detailed measured noise data are presented in the appendix.

The measured values of peak-hour $L_{eq}$ in the project area varied between 58 and 71 dBA. These levels are typical for the subject areas adjacent to a major traffic route. Figure 3-13 is included in this report for reference purposes and may be used to compare the measured sound levels to typical sound levels encountered in selected indoor and outdoor environments.

---

1 A decibel (dB) is a logarithmic unit used to quantify sound pressure levels. A-weighting of a sound pressure level refers to the application of sound frequency weightings that correspond to the variation in sensitivity of the human ear to different acoustic frequencies.
TABLE 3-28

HIGHEST MEASURED AVERAGE HOURLY NOISE LEVELS

<table>
<thead>
<tr>
<th>Site No.</th>
<th>Description</th>
<th>Date</th>
<th>Time</th>
<th>L_{eq} dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sky Harbor Apartments</td>
<td>02/11/97</td>
<td>06:52 - 07:08</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>1876 W. North Temple</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mobile homes, 13300 West St.</td>
<td>02/11/97</td>
<td>07:18 - 07:45</td>
<td>67</td>
</tr>
<tr>
<td>3</td>
<td>Residence, 60 10th West St.</td>
<td>02/11/97</td>
<td>07:20 - 07:40</td>
<td>65</td>
</tr>
<tr>
<td>4</td>
<td>Residence</td>
<td>02/11/97</td>
<td>07:55 - 08:18</td>
<td>69</td>
</tr>
<tr>
<td>5</td>
<td>Residence, 67 6000 West St.</td>
<td>02/11/97</td>
<td>07:58 - 08:15</td>
<td>66</td>
</tr>
<tr>
<td>6</td>
<td>Pioneer Park, NE corner of 4th South and 4th West</td>
<td>02/11/97</td>
<td>08:34 - 08:51</td>
<td>63</td>
</tr>
<tr>
<td>7</td>
<td>Courtyard - Marriott</td>
<td>02/12/97</td>
<td>08:59 - 09:15</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>130 W. 4th South St.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Park in front of City Hall, 4th South</td>
<td>02/10/97</td>
<td>16:15 - 16:35</td>
<td>63</td>
</tr>
<tr>
<td>9</td>
<td>Residence</td>
<td>02/11/97</td>
<td>07:34 - 07:49</td>
<td>71</td>
</tr>
<tr>
<td>10</td>
<td>Residence</td>
<td>02/11/97</td>
<td>07:31 - 07:55</td>
<td>70</td>
</tr>
<tr>
<td>11</td>
<td>Residence</td>
<td>02/11/97</td>
<td>12:00 - 13:00</td>
<td>71</td>
</tr>
<tr>
<td>12</td>
<td>Residence, Univ. St. - between 400 &amp; 500</td>
<td>02/11/97</td>
<td>07:59 - 08:14</td>
<td>60</td>
</tr>
<tr>
<td>13</td>
<td>Univ. of Utah Student Apts. - West Village -</td>
<td>02/11/97</td>
<td>08:30 - 08:45</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>Building C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* = 24-hour measurements

Source: Parsons Engineering Science, Inc.

3.9.5 Vibration

Vibration is technically termed an oscillatory movement and is expressed in decibels (dB). (Vibration levels are in ddecibels (dB) for vibrational velocity, relative to one micro inch per second.) Figure 3-15 shows the vibration level at 50 feet from some common sources and lists examples of comparative levels. Typical background vibration levels in a residential area are 50 dB or lower, which is below the human perception limit of about 65 dB.

The major source of vibration in the east-west corridor is the existing freight rail trains, particularly the locomotives. Vibration from light rail vehicles are expected to be substantially less than freight train and locomotive vibration. Vibration from bus and automobile traffic is expected to be generally imperceptible.
<table>
<thead>
<tr>
<th>Noise Source</th>
<th>Noise Level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplified Rock'N Roll Band</td>
<td>120</td>
</tr>
<tr>
<td>Commercial Jet takeoff at 200 feet</td>
<td>100</td>
</tr>
<tr>
<td>Busy urban street</td>
<td>80</td>
</tr>
<tr>
<td>Freeway traffic at 50 feet</td>
<td>60</td>
</tr>
<tr>
<td>Normal conversation at 6 feet</td>
<td>40</td>
</tr>
<tr>
<td>Typical office (Interior)</td>
<td>20</td>
</tr>
<tr>
<td>Typical residential (Interior)</td>
<td></td>
</tr>
<tr>
<td>Typical whisper at 6 feet</td>
<td></td>
</tr>
<tr>
<td>Human breathing</td>
<td></td>
</tr>
</tbody>
</table>
3.10 UTILITIES

Existing utilities were identified so that areas of potential conflict for the alternatives under consideration could be identified. All of the utilities listed below share right-of-way with the existing roadways. Any alternative selected which requires relocation of utilities will need to consider the cost of relocation, should it be necessary. The following maps of area utilities can be found at the end of this chapter.

- Electric Figure 3-16
- Telephone Figure 3-17
- Natural Gas Figure 3-18
- Sanitary Sewer Figure 3-19
- Storm Sewer Figure 3-20
- Water Figure 3-21

3.11 AIR QUALITY

The EPA has established National Ambient Air Quality Standards (NAAQS) to protect the public from air pollution. The criteria pollutants included in the NAAQS are carbon monoxide (CO), ozone (O3), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate matter less than 10 microns (PM10), and lead (Pb). Table 3-29 shows the NAAQS for the criteria pollutants and the percent of each pollutant contributed by mobile sources in the Wasatch Front Region. The Table also includes volatile organic compounds (VOC), or hydrocarbons (HC), and nitrogen oxides (NOX), both of which are precursors to ozone.
### Table 3-29
National Ambient Air Quality Standards

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Standard</th>
<th>Allowed</th>
<th>On-Road Mobile Contribution - Typical 1995 Wasatch Front</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ppm</td>
<td>ug/m3</td>
<td>period</td>
</tr>
<tr>
<td>03</td>
<td>0.12</td>
<td>235</td>
<td>1-hr</td>
</tr>
<tr>
<td>VOC (03 precursor)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nox (03 precursor)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>9</td>
<td>10,000</td>
<td>8-hr</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>40,000</td>
<td>1-hr</td>
</tr>
<tr>
<td>PM10</td>
<td>--</td>
<td>50</td>
<td>annual avg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24-hr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>--</td>
<td>150</td>
<td>1-yr</td>
</tr>
<tr>
<td>NO2</td>
<td>0.05</td>
<td>100</td>
<td>annual avg.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SO2</td>
<td>0.03</td>
<td>80</td>
<td>annual avg.</td>
</tr>
<tr>
<td></td>
<td>0.14</td>
<td>365</td>
<td>24-hr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1300)</td>
<td>3-hr</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td>--</td>
<td>1.5</td>
<td>3-mo</td>
</tr>
</tbody>
</table>

**Attainment Status**

Based on the monitoring data, EPA and DAQ have designated non-attainment areas for several pollutants in the region. These non-attainment areas are areas where the NAAQS are exceeded for a particular pollutant. DAQ has prepared State Implementation Plans (SIPs) for each of these areas to identify strategies for reducing pollutant levels to meet the standards.

Salt Lake County is a non-attainment area for ozone. Ozone levels within Salt Lake County exceeded the NAAQS on one day each at two separate monitors during 1995 and on one additional day at one monitor in 1996. These exceedances did not result in a violation of the standards. Before 1995, the standards had not been exceeded since 1990. In light of this record, the DAQ submitted a redesignation request to EPA to designate Salt Lake County as an attainment area for ozone. EPA tentatively approved this request and published this finding in the Federal Register on July 17, 1997.

Salt Lake County is also classified as non-attainment for PM10. No exceedances of the PM10 standards have occurred since February 1996. At that time, two exceedances occurred at one station, but no violations of the standards resulted. The last violation of the PM10 standard occurred in...
1993. Salt Lake County is currently attaining the PM10 standards.

Salt Lake City is designated as a non-attainment area for carbon monoxide. Again, no exceedances of the standard have occurred since December 1994. The CO standards have not been violated for the last 10 years. DAQ has submitted a request to redesignate Salt lake City to attainment for CO.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-17 Utilities-Telephone
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-18 Utilities-Gas
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-19 Utilities-Sanitary Sewer
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-20 Utilities-Storm Sewer
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 3-21 Utilities-Water
This chapter compares Alternative B—Bus/HiHOV and Alternative C—LRT with the baseline Alternative A—No-Build. Measures of comparison include traffic operations, transit trips to special generators, level of service and transit ridership. Each of these topics is discussed in a separate section below.

### 4.1 TRAFFIC OPERATIONS LEVEL OF SERVICE

Level of service (LOS) is a qualitative measure of the operating conditions within a traffic system which represents how those conditions are perceived by drivers and passengers. The LOSs are ranked from A to F with A representing the most desirable conditions and F representing the least. An explanation for each LOS is provided in Table 4-1. This qualitative measure will be utilized to provide a basis of comparison between the different alternatives discussed in this section. This method of comparison coupled with others provided later should offer the information required to make informed decisions concerning the future of East-West transit within the study area.

#### Table 4-1

<table>
<thead>
<tr>
<th>Service Level</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Free flow-Users unaffected by others in traffic stream.</td>
</tr>
<tr>
<td>B</td>
<td>Stable flow-Slight decline in freedom to maneuver from LOS A.</td>
</tr>
<tr>
<td>C</td>
<td>Stable flow-Operation of users becomes significantly affected by interaction of others in traffic system.</td>
</tr>
<tr>
<td>D</td>
<td>Stable flow-High density speeds and freedom to maneuver is extremely difficult.</td>
</tr>
<tr>
<td>E</td>
<td>Operating conditions are at or near capacity. All speeds are low, freedom to maneuver is extremely difficult.</td>
</tr>
<tr>
<td>F</td>
<td>Point at which arrival flow exceeds discharge flow and causes a queue to form.</td>
</tr>
</tbody>
</table>


#### 4.1.1 Existing Counts

1993 counts of the selected intersections were obtained from UDOT. Counts which were unavailable from UDOT were obtained from the Sear-Brown Group. The counts collected by Sear-Brown were performed in 1996. The analyzed intersections are provided in the list below. (*UDOT counts are marked with an '*'*)
Chapter 4 Transportation Impacts

4.1.2 Existing Intersection Analysis

Using the standard Highway Capacity Manual (HCM) software, 12 intersections in the study area were evaluated for existing traffic operations LOS during the PM peak hour. The intersections analyzed and results obtained are summarized in Table 4-2. With 12 intersections included in the analysis and 12 turning movements at each intersection, there are a total of 144 (12 x 12) movements that were analyzed. The industry standard is to consider traffic operations at LOS level D or better as acceptable during peak hour conditions. As illustrated in Table 4-2, there were only 13 turning movements out of 144 that operate today with traffic flow worse than LOS D. All of these deficiencies occurred for left turn lanes at intersections. TSM improvements should be considered at these intersections in order to reduce or eliminate this deficiency.

Under existing peak hour conditions, there is a wide variance level of service (LOS) at existing key intersections. Many operate at LOS C or better with average delay ranging from 3.0 to 21.4 seconds. Some operate at LOS D with average delay of 30.0 or higher. The LOS at five of the intersections analyzed was found to be so deficient that the average delay could not be calculated using standard analysis procedures.

4.1.3 Future 2015 Street Traffic Volumes

Future street traffic volumes for the year 2015 were obtained from computer model runs made by WFRC. WFRC provided 2015 projected trips for the no-build, bus/HOV and LRT alternatives. They modeled trips using MINUTP for the study area to predict changes in traffic volumes caused by implementation of each alternative. Information on existing turning movements was used to generate a forecast of 2015 turning movements at the 12 intersections analyzed for existing LOS. There are two important components to the 2015 intersection turning movements utilized in the analysis:

- The volumes are based on 2015 ADT volumes generated by the WFRC computer model runs; and

- The volumes reflect significant roadway network modifications, most importantly along 400 South. When I-15 is reconstructed, 400 South will have an interchange with I-15. This new interchange will handle general purpose traffic to and from the north on I-15. It will also handle bus/HOV traffic from the south on I-15.
### Table 4-2

**EXISTING PM PEAK HOUR LEVELS OF SERVICE**

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Northbound</th>
<th>Southbound</th>
<th>Eastbound</th>
<th>Westbound</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left</td>
<td>Thru</td>
<td>Right</td>
<td>Left</td>
<td>Thru</td>
</tr>
<tr>
<td>North Temple/Redwood Rd</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>D</td>
<td>C</td>
</tr>
<tr>
<td>400 South/400 West</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>400 South/300 West</td>
<td>C</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>400 South/200 West</td>
<td>C</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>400 South/West Temple</td>
<td>*</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>400 South/Main Street</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>400 South/State Street</td>
<td>D</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>400 South/200 East</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>400 South/400 East</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>400 South/700 East</td>
<td>E</td>
<td>C</td>
<td>C</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>400 South/900 East</td>
<td>*</td>
<td>B</td>
<td>B</td>
<td>F</td>
<td>B</td>
</tr>
<tr>
<td>500 South/1300 East</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

Source: EWP

*Indicates the V/C is greater than one. Delay calculation is meaningless.

### 4.1.4 2015 No-Build Projections/Intersection Analysis

Under the No-Build Alternative, the WFRC modeling projected 32,000 ADT on 400 South between 300 West and West Temple. It also indicates a 20 percent increase in traffic on North Temple at Redwood Road. Therefore on North Temple and 400 South, it was assumed that background traffic would increase at an annual rate of one percent.

Increases in traffic along 400 South will be related to the background growth and the I-15 related interchange modifications at 400 South. The 400 South I-15 access will serve as an off-ramp for vehicles exiting the I-15 from the north and HOV vehicles coming from the south.

UDOT 2015 traffic projections for the 400 South interchange were used to determine the future traffic split between traffic from the north and HOV traffic from the south.

Determining the turning proportions along 400 South was supplemented by a count of existing turning movements along 600 South. Although 600 South is a one-way off-ramp, it is located two blocks from the new 400 South interchange soon to be built as part of the reconstruction of I-15. Therefore it was assumed that the same left turning proportions by street will exist.
It has been estimated that the following directional percentages may occur for vehicles exiting I-15 from the north onto 400 South. This assumes that most of the traffic exiting I-15 from the north destined to the CBD would utilize an improved 600 North interchange.

<table>
<thead>
<tr>
<th>Southbound Vehicles (from the north) Exiting at 400 South</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn to north (toward CBD)</td>
<td>30%</td>
</tr>
<tr>
<td>Continue east (toward University)</td>
<td>60%</td>
</tr>
<tr>
<td>Turn to south</td>
<td>10%</td>
</tr>
</tbody>
</table>

For the HOV vehicles exiting I-15 from the south, the following directional percentages are estimated to occur.

<table>
<thead>
<tr>
<th>Northbound HOV Vehicles Exiting at 400 South</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn to north (toward CBD)</td>
<td>50%</td>
</tr>
<tr>
<td>Continue east (toward U of U)</td>
<td>40%</td>
</tr>
<tr>
<td>Turn to south</td>
<td>10%</td>
</tr>
</tbody>
</table>

These assumptions were consistent with the one-hour cursory traffic counts made on 600 South. The counts were made at 200 West, West Temple, Main Street and State Street for the eastbound approaches on Wednesday, February 5, 1997.

The counts also serve as a way of determining the vehicle usage by street. This identifies the number of left turning vehicles at each counted intersection. The current counts provide a street usage split for the existing one-way 600 South. Some engineering judgment is required in applying these percentages to a two-way 400 South. This is because left turns are easier to make on a one-way street and therefore the left turn capacity at each intersection is much higher than would occur on a two-way street. As traffic increases on a two-way 400 South and left turns become more difficult, the left turning vehicles will begin to spread out more evenly among the intersections. The spread between the intersections is based on the delay being experienced at each intersection and is related to the capacity of the left turn movement. It was assumed that of the left turns generated by the 400 South interchange, they would be distributed among 300 West, 200 West, West Temple, Main Street and State Street with approximately 20 percent assigned to each intersection. Having established the proportions, the future turning movements are projected future approach traffic volumes.

It is necessary to project the 400 South interchange traffic related to traffic from the north and HOV traffic separately due to the differences in directional split. Percentage distributions are applied to the HOV vehicles from the south and vehicles from the north. By assigning the traffic to intersections, the operating level of service of each intersection is estimated.
The assumptions used in determining the future No-Build traffic during the PM peak at each intersection is the following.

- The PM traffic represents 10 percent of the daily traffic based on the EWP counts and the 1995 ADT value for the 600 South off-ramp.
- Background traffic along 400 South will increase by an annual rate of one percent.
- Based on UDOT projections of 400 South interchange usage in 2015, approximately 65 percent is related to traffic from the north and 35 percent is related to HOV traffic from the south.
- It is assumed that 75 percent of I-15 traffic is related to the east and the remaining 25 percent is related to the west.
- In order to approximate the WFRC ADT level for 400 South, the future traffic is the sum of current traffic, increased by one percent per year, to a projected 2015 level and 60 percent of the freeway vehicles produced by the 400 South interchange.

Based on these assumptions, turning movement projections were made for 2015 traffic. The traffic volumes obtained were analyzed using the Highway Capacity Software to predict the level of service at each of the intersections of interest. The results of this analysis are presented in Table 4-2. These levels of service will be utilized as a baseline of comparison for the other alternatives to be evaluated later. Note that some LOS are better under the No-Build with more traffic than under the existing condition. This is because the existing signal timing was used for the existing LOS analysis, but modified timing, based on optimal signal settings, were used for the No-Build alternative.

Results of the traffic operations analysis for the 12 intersections analyzed are summarized in Table 4-3. Of the 144 turning movements analyzed, 15 turning movements showed traffic operations worse than LOS level D. This compares to 13 turning movements with deficient turning movements under existing conditions. Five of the turning movements were deficient in both the existing conditions and in the No-Build alternative. Unless intersection signalization or geometry is modified in Alternative B or Alternative C, these intersections and turning movements would operate at an unacceptable LOS by the year 2015. By definition, no investment would be made under the No-Build alternative to improve these intersections.
### NO BUILD ALTERNATIVE PM PEAK HOUR LEVELS OF SERVICE

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Northbound</th>
<th>Southbound</th>
<th>Eastbound</th>
<th>Westbound</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left Thru Right</td>
<td>Left Thru Right</td>
<td>Left Thru Right</td>
<td>Left Thru Right</td>
<td>LOS</td>
</tr>
<tr>
<td>North Temple/Redwood Rd</td>
<td>E F E D D C D D D F C C</td>
<td>E</td>
<td>41.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/400 West</td>
<td>A A A A A B B B C C C</td>
<td>A</td>
<td>3.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/300 West</td>
<td>D C C B B C D D B C C B</td>
<td>C</td>
<td>19.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/200 West</td>
<td>D C C D D C C C B B B C</td>
<td>C</td>
<td>21.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/West Temple</td>
<td>E E C D D C E C C C E B</td>
<td>D</td>
<td>37.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/Main Street</td>
<td>C D D D D D C B B B D D</td>
<td>B</td>
<td>26.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/State Street</td>
<td>D D D C D C C B D D B C</td>
<td>C</td>
<td>24.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/200 East</td>
<td>D D D C C C B D D B C</td>
<td>C</td>
<td>26.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/400 East</td>
<td>C D D C C C D B C C B C</td>
<td>C</td>
<td>21.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/700 East</td>
<td>* D C E * B B C C * * C *</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/900 East</td>
<td>D E D C D C D C C E B</td>
<td>B</td>
<td>34.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/1300 East</td>
<td>D D D D C C D C C D C D</td>
<td>D</td>
<td>28.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: EWP

*Indicates the V/C is greater than one. Delay calculation is meaningless.

The LOS at some of these intersections remains the same under the conditions analyzed for Alternative A—No-Build in the year 2015, but the average delay increases. Many experience a lower LOS with even higher average delay. Only one intersection, however, experiences an LOS bad enough that the average delay cannot be calculated. Much of this is due to the change in traffic volumes resulting from reconfiguration of the interchanges as part of the I-15 reconstruction.

#### 4.1.5 Alternative B—HOV/TSM/TDM

With this alternative, special HOV lanes would be installed along 400 South. These lanes would be designed to give a travel time advantage to buses and HOVs during peak hours of traffic flow. Because the HOV lane of I-15 and the UDOT estimates were included in the No-Build alternative, further trip reductions would be considered double counting. The HOV and No-Build alternatives are therefore the same in terms of turning movement volumes. Subtle difference would exist, including smaller queue lengths and reduced anticipated travel times for the HOV lanes. However, based on the rough estimates of 2015 traffic, an accurate account of the benefits is not possible.

The only differences to the HOV over Alternative A—No-Build alternative is the recommended TSM improvements for the bus/HOV alternative. These improvements include providing double
left turn lanes for all approaches of the following intersections.

- 1300 East / 500 South
- 700 East / 400 South
- North Temple / Redwood Road

The benefit of dual left lanes is a smaller required green time for the left movement and, therefore, more time for the through movements. The disadvantage of dual left turn lanes is that they require that left turns only be allowed during a protected phase. Permitted left turns would not be allowed even when opposing through traffic provided gaps for a left movement.

Using 2015 traffic volumes, the same 12 intersections were analyzed for traffic operations LOS. The results of this analysis are summarized in Table 4-4. Even with the addition of double left turn lanes, 11 of the 144 turning movements at these intersections would still operate at a level of congestion worse than LOS D. Additional signal and geometry improvements would be required to increase capacity in order to achieve LOS D at these intersections. The cost of improving these intersections to obtain an acceptable LOS is included in the capital cost estimate for Alternative B—HOV/TSM/TDM.

### Table 4-4

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Northbound</th>
<th>Southbound</th>
<th>Eastbound</th>
<th>Westbound</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Left</td>
<td>Thru</td>
<td>Right</td>
<td>Left</td>
<td>Thru</td>
</tr>
<tr>
<td>North Temple/Redwood Rd</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 South/400 West</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/300 West</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/200 West</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/West Temple</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/Main Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/State Street</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/200 East</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/100 East</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 South/100 East</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 South/300 East</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: EWP

*Indicates the V/C is greater than one. Delay calculation is meaningless.
4.1.6 Alternative C—LRT/TSM/TDM

2015 WFRC LRT Projections/Intersection Analysis

The actual number of person trips expected with Alternative A—No-Build, is kept constant but the number of vehicle trips is reduced due to the number of people who will utilize the LRT option.

According to WFRC, LRT can be estimated to reduce trips in the corridor by approximately five percent. This five percent reduction was applied to all east-west related movements in order to estimate the impact LRT will have on intersection operation. These volumes are analyzed in the following section. A LOS is projected for each intersection based on the projected traffic volumes. These LOS can be compared to those predicted in the baseline (No-Build) alternative discussed earlier to quantify changes to how the infrastructure is functioning under this option. It was assumed that left turns would be made over the tracks and that left turn queues would occur over the tracks. Coordination of the left turn movements and train schedule would reduce the conflicts of queued left turn vehicles and the LRT.

Under this alternative, LRT would be installed in the middle of 400 South and 400 West. All on-street parking would be removed. The typical cross section would include three moving lanes in each direction with LRT in the center of the street. The primary difficulty with locating LRT in the center of the street is the impact on dedicated left turn lanes at the intersections. Three basic alternatives are available to solve this problem:

1. Do not allow left turns and eliminate the conflict.
2. Install pavement marking, signing and special traffic signals to allow traffic to enter the LRT lane and execute left turns. This solution has been implemented in several other cities where LRT is in operation, but bus/LRT collisions occur on a frequent basis. Further analysis would be required during preliminary and final design to develop a solution that minimizes the conflict and accident potential.
3. Widen the roadway at intersections to create a separate and protected left turn lane. This solution can be constructed within the existing ROW, but the curb lines would need to be up to 116 feet apart compared to the existing 100 feet. All of the widening would still be within the existing 130-foot ROW. Park strip, sidewalk and possibly some trees would need to be eliminated or relocated to construct this alternative.

Intersection traffic operations were analyzed for 2015 traffic assuming that LRT would be constructed. The results of this analysis are summarized in Table 4-5. This traffic operations analysis was done for the second design alternative discussed above. General traffic was allowed to utilize the LRT lane to make left turns. Again, the optimal timing for signal settings was used for the analysis. All intersections were assumed to have a 120-second cycle length as it is anticipated that this will be a coordinated corridor in the future. The coordination is made much easier by a uniform cycle length for all intersections in the coordination. As indicated in Table 4-5, a total of 29 turning movements out of 144 would operate worse than LOS D under this arrangement. Where appropriate, it was assumed that additional through and turning movement lanes would be created on intersection approaches for north-south streets crossing 400 South.
If the decision is made to implement LRT along 400 South, the traffic operations issues described above would need to be addressed and resolved with more detailed analysis and engineering information. The cost of these intersection improvements would clearly be greater than for those required to implement Alternative B—Bus/HOV/TSM/TDM. The cost of required intersection improvements in conjunction with the construction of LRT are included in the estimated capital cost for Alternative C—LRT/TSM/TDM.

### 4.2 SPECIAL GENERATORS IN THE CORRIDOR

WFRC's Travel Demand Model projects daily traffic and transit volumes based on anticipated delay and congestion. The model focuses more on peak-hour traffic and includes predominantly commuter and daily repeatable activities. In the case of the East-West Corridor, there are a number of activity centers/special generators that are difficult to accurately quantify by using the travel demand model.
These include the following:

- 2002 Winter Olympics
- LDS Church Downtown Campus
- Utah State Fairpark
- Salt Lake City International Airport
- Delta Center
- Fine Arts Museum/Museum of Natural History at the University of Utah
- Salt Lake Arts Center
- Salt Palace Convention Center
- Hansen Planetarium
- Pioneer Trails State Park

All of the above special generators are considered to be within a reasonable walking distance of the most likely east-west corridor transit alternatives. There are additional special generators that could easily be accessed by the east-west corridor by existing or potential future transit service.

To completely understand the east-west corridor and the potential for transit ridership, these special generators need to be taken into consideration. Increased transit ridership as a result of special generators is likely to occur whenever the level of transit service to those facilities is increased. Since both Alternative B—Bus/HOV, and Alternative C—LRT, will provide a higher level of transit service in the corridor, it is likely that either alternative will succeed in motivating participants and spectators attending events at special generators to use transit as their mode of access/egress. As will be discussed later, experience in other cities where LRT is operating has shown that LRT tends to be more attractive than bus services for many of these users. LRT is therefore likely to attract a higher number of transit trips to special generators.

The following sections describe the methodology that was used to estimate the potential increase in annual ridership for special generators. The potential annual ridership from special generators is added to the potential annual ridership of normal daily travelers that was estimated (on an average weekday basis) from the WFRC Travel Demand Model. The following sections discuss the potential for additional transit ridership in the east-west corridor from the two groups of special generators listed above.

### 4.2.1 Special Generators within the East-West Corridor

The following special generators were reviewed as to their east-west corridor transit ridership potential. These generators were considered to be within reasonable walking distance of the most likely east-west corridor alternatives.

#### 2002 Winter Olympics

Salt Lake City will soon join the prestigious list of cities to host the Olympic games. Along with this honor comes many challenges, not the least of which is moving people to and from the event venues. This section draws on the report "2002 Winter Olympics Addendum." This section will discuss venues, lodging areas and traffic volumes expected to be produced by the Olympic games within the study area.
Chapter 4 Transportation Impacts

Venues
The venues located within the study area are listed in Table 4-6 along with the scheduled events and predicted capacity. These venue locations are subject to change.

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Location</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceremonies</td>
<td>Olympic Stadium</td>
<td>50,000</td>
</tr>
<tr>
<td>Ice Hockey</td>
<td>Delta Center</td>
<td>15,000</td>
</tr>
<tr>
<td>Figure Skating</td>
<td>Delta Center</td>
<td>15,000</td>
</tr>
</tbody>
</table>

Table 4-6
MIS/DEIS UNIVERSITY-DOWNTOWN-AIRPORT OLYMPIC EVENT VENUES AND CAPACITIES

Lodging
The capacity of the CBD is growing rapidly in anticipation of the Olympic games, as well as increased convention and tourist interest. The majority of the hotel accommodations are located within the study area along with other generators not considered as lodging in the traditional sense. The Utah State Fairpark is expected to house the Media Village, a central gathering place for the various news media entities covering the Olympics. The Media Center will be located in Salt Lake's central business district and is to be the central broadcasting location of event coverage. The Olympic athletes are to be housed at the University of Utah in the planned Olympic Village.

The lodging capacity of areas expected to provide housing for Olympic events is summarized in Table 4-7 and their locations are shown graphically in Figure 4-1.
### Table 4-7
**EAST-WEST MIS/DEIS**
**LODGING CAPACITY OF EACH ZONE**

<table>
<thead>
<tr>
<th>Code</th>
<th>Location</th>
<th>Capacity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z1</td>
<td>Zone 1</td>
<td>30,200</td>
<td>28.85</td>
</tr>
<tr>
<td>Z2</td>
<td>Zone 2</td>
<td>1,830</td>
<td>1.75</td>
</tr>
<tr>
<td>Z3</td>
<td>Zone 3</td>
<td>4,420</td>
<td>4.22</td>
</tr>
<tr>
<td>Z4</td>
<td>Zone 4</td>
<td>1,070</td>
<td>1.02</td>
</tr>
<tr>
<td>Z5</td>
<td>Zone 5</td>
<td>760</td>
<td>0.73</td>
</tr>
<tr>
<td>Z6</td>
<td>Zone 6</td>
<td>760</td>
<td>0.73</td>
</tr>
<tr>
<td>Z7</td>
<td>Little Cottonwood Canyon</td>
<td>12,900</td>
<td>12.32</td>
</tr>
<tr>
<td>Z8</td>
<td>Big Cottonwood Canyon</td>
<td>1,380</td>
<td>1.32</td>
</tr>
<tr>
<td>Z9</td>
<td>Park City</td>
<td>16,320</td>
<td>15.59</td>
</tr>
<tr>
<td>Z10</td>
<td>Provo</td>
<td>9,150</td>
<td>8.74</td>
</tr>
<tr>
<td>Z11</td>
<td>Ogden</td>
<td>10,980</td>
<td>10.49</td>
</tr>
<tr>
<td>P</td>
<td>Alpine Valley</td>
<td>700</td>
<td>0.67</td>
</tr>
<tr>
<td>A</td>
<td>Olympic Village (U of U)</td>
<td>4,000</td>
<td>3.82</td>
</tr>
<tr>
<td>Q</td>
<td>Nordic Village</td>
<td>700</td>
<td>0.67</td>
</tr>
<tr>
<td>KK</td>
<td>Media Village (Fairgrounds)</td>
<td>4,500</td>
<td>4.30</td>
</tr>
<tr>
<td>C</td>
<td>Media Center</td>
<td>5,000</td>
<td>4.78</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>104,670</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

*Source: 1985 Winter Games Feasibility Study, EWP*

Zones one, two and three in the above table are within transit access of the east-west corridor. These three zones represent just under 35 percent of the housing supply for the Winter Olympics. An accessible and efficient transit system would therefore make a major contribution to providing transportation for competitors, officials, spectators and media during the Olympics.

**Predicted Traffic Volumes**

The peak traffic day predicted for the Olympic games is February 11, 2002. Presented in this section is an estimate of person trips related to Olympic activity. The estimate does not include an allocation to alternative transportation modes. It has been suggested that the ticket price for each event include the price of a transit ticket to the venue. Either an expanded bus system or an LRT line would be able to accommodate a greater number of passengers than the current bus system. If the spectators, athletes and media personnel are encouraged to use the transit system, the number of vehicular trips within the study area can be reduced dramatically.

The predicted peak day traffic volumes for major corridors are shown in Figure 4-2. These numbers represent the peak traffic day for the Olympic games and do not include the baseline traffic which would normally be on the roads. Traffic volumes for selected corridors are shown in Table 4-8 below.
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 4-1  Winter Olympics Lodging Zones
University-Downtown-Airport Transportation Corridor
Major Investment Study/Draft Environmental Impact Study
Figure 4-2  Winter Olympics Peak Day Traffic
Table 4-8
MIS/DEIS
AIRPORT-DOWNTOWN-UNIVERSITY
PREDICTED ONE-WAY PEAK PERSON TRIPS FOR SPECIFIC ROAD SEGMENTS

<table>
<thead>
<tr>
<th>Road Segment</th>
<th>Date</th>
<th>One Way Peak Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-15 Northbound between I-80 to 600 South</td>
<td>February 11</td>
<td>17,093</td>
</tr>
<tr>
<td></td>
<td>February 16</td>
<td>13,726</td>
</tr>
<tr>
<td>Northbound I-215 to Eastbound I-80 Ramp</td>
<td>February 11</td>
<td>9,725</td>
</tr>
<tr>
<td></td>
<td>February 16</td>
<td>8,600</td>
</tr>
</tbody>
</table>

Although these particular traffic volumes are not located within the east-west corridor, they do give an indication of the amount of additional traffic that is anticipated during the period of Olympic activity. The SLCIA will obviously have a high concentration of Olympic-related traffic. An improved transit system in the east-west corridor would provide an alternative to vehicular traffic and therefore reduce traffic volumes.

The Church of Jesus Christ of Latter-day Saints (LDS) Downtown Church Campus
The LDS Downtown Church Campus is comprised of approximately 15 existing facilities and one new major planned facility. These facilities comprise the headquarters of the LDS Church, with functions ranging from administrative to religious to tourist related. The buildings in the church campus include:

- Joseph Smith Memorial Building
- Salt Lake Temple
- Temple Square
- Planned LDS Assembly Building
- Relief Society Building
- Brigham Young’s House
- Family History Library
- Museum of Church History and Art
- Church Office Building
- Church Administration Building
- Beehive Clothing
- Lion House

The heart of the campus is located between West Temple and State Street, from North Temple to South Temple. The Church owns additional properties to the north and west of these areas, where additional growth could be envisioned in the future. While most of these facilities have some special generator functions, the person trips related to full time employees have already been accounted for in the WFRC Travel Demand Model. The facilities that are felt to have the largest potential as special generators of non-employment person trips are reviewed in the following subsections.

Joseph Smith Memorial Building
The Joseph Smith Memorial Building was created from the renovated Hotel Utah Building several years ago. The building’s main external function is related to genealogical research. There are numerous computer terminals that now allow both local residents and tourists to search the computer files for initial genealogical information. The building also includes two
restaurants, a chapel for local church services, banquet rooms, office space for future church employees and volunteers, and a 500 seat "IMAX"-type theater that previews a church history film (currently "Legacy") every hour.

Because of the activities involved, the facility generates a large number of local and out-of-town visitors each year. The following 1995 annual visitor estimates were made by contacting Brent Shingleton the building manager.

<table>
<thead>
<tr>
<th>Facility</th>
<th>Annual Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family History Area</td>
<td>428,900</td>
</tr>
<tr>
<td>Banquet Facilities</td>
<td>157,700</td>
</tr>
<tr>
<td>Roof and Garden</td>
<td>228,000</td>
</tr>
<tr>
<td>General Conference</td>
<td>20,300</td>
</tr>
<tr>
<td>Meetings, Chapel, Relief Society</td>
<td>131,800</td>
</tr>
<tr>
<td>First Night</td>
<td>5,000</td>
</tr>
<tr>
<td>Suites</td>
<td>13,310</td>
</tr>
<tr>
<td>Ambassador Room</td>
<td>2,700</td>
</tr>
<tr>
<td>Legacy Theater</td>
<td>816,900</td>
</tr>
<tr>
<td>Volunteer Workers</td>
<td>900</td>
</tr>
</tbody>
</table>

**Total Annual Visits**  **1,805,600**

**Salt Lake Temple**

The Salt Lake Temple is a facility that is used only for religious ceremonies. These ceremonies draw participants from a Temple District that is located mostly in the northern half of Salt Lake County, as well as many visitors from around the world. Weddings are among the ceremonies performed in the temple. The number of weddings varies by time of day and time of year. It is also possible for up to six weddings to be underway at the same time. These weddings, therefore, frequently attract a large number of people, especially in the summer months. The temple's staff is mostly volunteer with many being older retired people with special commuting needs. No information was available on the annual number of visitors to the Salt Lake Temple.

**Temple Square**

Temple Square shares a block with the Salt Lake Temple and is a well-known attraction for out-of-town tourists. There are two visitor centers where Church missionaries conduct tours and provide an overview of the LDS Church. Temple Square also includes the historic Tabernacle, where the Mormon Tabernacle Choir performs on a weekly basis. Temple Square is a congested destination during the Christmas Season when the Tabernacle hosts a number of Christmas Concerts and thousands travel to the area to see the Christmas lights. No information was available on the annual number of visitors to Temple Square.

**Planned LDS Assembly Building**

Twice a year, members of the LDS Church gather for "General Conference" at Temple Square to listen to leaders of the Church. There are five sessions held at each conference, three on Saturday and two on Sunday. "Conference" is currently held in the Tabernacle, which has a capacity for just over 6,000 people. Participants wait in line for hours to be able to attend this event. The LDS Church recently announced that it plans to build a new Assembly Building that will seat up to 26,000 people directly north of Temple Square. Also
included in the project is a 1,000-seat theater for cultural activities. The Assembly Building will be used for General Conference as well as for area conferences with much smaller gatherings (probably 12,000 to 15,000 people). These area conferences are likely to be held on most Sundays of the year, except when General Conference is being held. There are also plans for pageants and other large cultural events to be held in the Assembly Building. Similar pageants held in New York State and southern Utah, typically draw thousands of visitors per night for several weeks. All of these uses draw both local and out-of-town visitors. Bus and/or LRT transit can be a major mode of access for these events if convenient and attractive service is provided. The following is an estimate of potential visitors to the Assembly Hall:

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Estimated Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-Annual Conference Visitors</td>
<td>300,000</td>
</tr>
<tr>
<td>Area Conference Visitors (estimated at 40)</td>
<td>400,000</td>
</tr>
<tr>
<td>Participants/Spectators - Miscellaneous Events</td>
<td>200,000</td>
</tr>
<tr>
<td>Pageant Visitors (based on 10 performances)</td>
<td>300,000</td>
</tr>
<tr>
<td><strong>Total Annual Visitors</strong></td>
<td><strong>1,200,000</strong></td>
</tr>
</tbody>
</table>

**Family History Library/Museum of Church History and Art**

These two separate buildings are located on the west side of West Temple Street between North and South Temple streets. The Family History Library is one of the most renowned genealogical libraries in the world and has both local and out-of-town visitors. The Museum of Church History and Art would also serve as a destination for many people from the local area and around the world. Annual visitor totals for the facilities are shown below:

<table>
<thead>
<tr>
<th>Facility</th>
<th>Total Annual Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family History Library</td>
<td>771,500</td>
</tr>
<tr>
<td>Museum of Church History and Art</td>
<td>323,800</td>
</tr>
<tr>
<td><strong>Total Annual Visits</strong></td>
<td><strong>1,095,300</strong></td>
</tr>
</tbody>
</table>

**Other Church Campus Facilities**

The Relief Society Building, the Beehive House and the Church Office Building also receive tourists and visitors, but it is felt that many of these will have visited another facility and should, therefore, not be counted again. The Lion House is a restaurant facility and is accounted for in the WFRC Travel Demand Model.

**Utah State Fairpark**

This major center of activity hosts numerous activities of different sizes throughout the year. The largest crowds are attracted to the Utah State Fair that is held for several weeks in September. The estimated attendance to the Utah State Fair is 330,000. Estimates for concerts and other events throughout the year were unavailable.

**Fine Arts Museum/Museum of Natural History**

The Fine Arts Museum and the Museum of Natural History both are located at the University of Utah. The combined total annual visitors to these facilities is over 152,000. With several transit stations proposed for the University and with the school’s current campus shuttle system, these facilities could see special transit generation that is not reflected in the WFRC Travel Demand Model.
Delta Center
The Delta Center is located at South Temple Street and 400 West, the terminus of the planned north/south light rail line. This 20,000-seat arena is currently home to the National Basketball Association’s Utah Jazz. The Delta Center will be one of the major facilities for the 2002 Winter Olympics as it will host figure skating and other events. The arena also holds concerts, circuses, ice shows and other various events. The annual visitor estimates for the Delta Center are as follow:

<table>
<thead>
<tr>
<th>Event</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utah Jazz Attendance</td>
<td>917,400</td>
</tr>
<tr>
<td>Other Event Attendance</td>
<td>556,800</td>
</tr>
<tr>
<td><strong>Delta Center</strong></td>
<td><strong>1,474,200</strong></td>
</tr>
<tr>
<td><strong>Total Annual Attendance</strong></td>
<td></td>
</tr>
</tbody>
</table>

(Based on 1995 attendance records from the Salt Lake Convention and Visitors Bureau.)

Salt Lake Arts Center
The Salt Lake Arts Center is a contemporary art center located at 20 South West Temple near Crossroads Mall. The center has two levels and usually hosts one event per floor. Approximately 89,000 persons visit the Salt Lake Arts Center each year.

Abravanel Hall
This symphony hall is the home of the Utah Symphony and various other concert events. Many high school graduation ceremonies and dances have also been held here in the past. Located on the southwest corner of South Temple and West Temple Streets, on the same block as the Salt Palace Convention Center, this facility hosted a total of 201 events in 1995. The annual number of patrons frequenting these events in 1995 was 322,200.

Salt Palace Convention Center
The Salt Palace Convention Center was recently remodeled and upgraded to a major destination facility. Convention bookings in the facility have been quite successful, to the point where visitor hotel rooms have been extremely hard to reserve during the larger ones. Some visitors have had to lodge 50 miles away to the north or south. This has started a drive to develop more hotel rooms in the Valley and while some major facilities are being planned for the Downtown area, many rooms will be built outside the Downtown area. Some of these will be within the east-west corridor along the planned north/south light rail line. With these visitors will come the additional demands for transit. Estimated annual visitors to the Salt Palace Convention Center is based on two sources. The Salt Palace is rented through the visitors bureau and through private contract. According to the visitors bureau, there were 225,182 visitors related to visitor bureau conventions. There were 3 private contract conventions in 1996. Unfortunately, no visitor number records are available for the private conventions. It was, therefore, conservatively assumed that the visitors bureau comprised 70 percent of the annual visitors to the Salt Palace. Therefore the total estimated visitors was approximated at 321,700.

Rice Stadium
Rice Stadium is home of the University of Utah football team. The stadium hosts about five home games per year and one or two high school football games per year. The stadium is presently being expanded to accommodate 46,000 persons. The present stadium holds 32,500 people and it s
estimated that 150,000 football fans visit the stadium each year. This number, however, may be less with inclement weather. (Estimates provided by Dave Copier of the University of Utah)

**Jon M. Huntsman Center**

The Huntsman Center is the host site of the University of Utah basketball and gymnastics events. A breakdown of the projected annual attendance for the center beginning July 1, 1996 is as follows:

<table>
<thead>
<tr>
<th>Event</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concerts</td>
<td>50,000</td>
</tr>
<tr>
<td>High School Basketball</td>
<td>40,000</td>
</tr>
<tr>
<td>Graduations</td>
<td>24,000</td>
</tr>
<tr>
<td>Men's Basketball</td>
<td>208,000</td>
</tr>
<tr>
<td>Women's Basketball</td>
<td>16,000</td>
</tr>
<tr>
<td>Women's Gymnastics</td>
<td>48,000</td>
</tr>
<tr>
<td>NCAA Basketball</td>
<td>30,000</td>
</tr>
<tr>
<td>Basketball Camps</td>
<td>14,000</td>
</tr>
</tbody>
</table>

**Huntsman Center Total Annual Attendance 430,000**

**Capitol Theater**

The historic Capitol Theater is located between Main Street and State Street on 200 South. It is the housing for various fine theatrical presentations performed by Ballet West, the Repertory Dance Theater, the Ririe-Woodbury Dance Company, the Theater League of Utah and the Utah Opera Company. Capitol Theater hosted a total of 241 performances in 1995, welcoming 364,700 patrons. From January 1996 to November 1996, 254 events were held with a total of 417,000 patrons in attendance.

**Pioneer Memorial Theater**

The Pioneer Memorial Theater is located on the University of Utah campus and is a replica of the historic Salt Lake Theater which was one of the first structures in the Salt Lake Valley. It was also the only building in the area designed explicitly for theater. The Pioneer Memorial Theater seats 1,000 patrons and is the home of the Pioneer Theater Company. Annual productions at the theater range from classical to contemporary plays and musicals. The season runs from mid September to the end of May with seven different productions per year. The performances run six nights a week with an occasional matinee on Saturday. The theater hosts approximately 140 annual performances with slightly over 100,000 people attending each year.

**Kingsbury Hall**

Kingsbury Hall is located on the University of Utah campus and hosts many various performances, such as Broadway shows, dramas, musicals, dance concerts, lectures and magic shows. The Hall was closed due to renovation for two years, but has been open for the past six months. According to the number of audience members and performers during the past six months, an annual number of 231,500 people are expected to attend.

**Triad Center**

The Triad Center is a major Downtown office complex covering more than two blocks. The annual Utah Arts Festival is held at the Center in June and attracts people from all over the state. The arts festival lasts four days and drew approximately 86,000 people in 1996. Also hosted here are "A Taste of Salt Lake" and "Hoop It Up". "A Taste of Salt Lake" is a weekend event in which various
restaurants prepare food for taste-testing. "Hoop It Up" is a weekend three-person basketball tournament where approximately 4,400 players compete. The following annual attendances have been estimated from information provided by the Triad Center:

<table>
<thead>
<tr>
<th>Event</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts Festival</td>
<td>86,000</td>
</tr>
<tr>
<td>A Taste of Salt Lake</td>
<td>3,000</td>
</tr>
<tr>
<td>Hoop It Up</td>
<td>10,000</td>
</tr>
<tr>
<td><strong>Triad Center Special Events</strong></td>
<td><strong>99,000</strong></td>
</tr>
</tbody>
</table>

**John W. Gallivan Utah Center**

This outdoor center hosts a large variety of events year-round. The Center is located between State Street and Main Street on 200 South and consists of an outdoor amphitheater and ice skating rink. The annual Salt Lake City Classic Run begins here and draws about 5,000 runners. “Pasta on the Plaza” is also held at the center the night before the race and draws up to 3,000 people if the weather is good. In addition to these events, there were approximately 193,000 visitors from scheduled events during 1996.

<table>
<thead>
<tr>
<th>Event</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt Lake City Classic Run</td>
<td>5,000</td>
</tr>
<tr>
<td>Pasta on the Plaza</td>
<td>3,000</td>
</tr>
<tr>
<td>Misc. Events</td>
<td>193,000</td>
</tr>
<tr>
<td><strong>Gallivan Center Special Events</strong></td>
<td><strong>201,000</strong></td>
</tr>
</tbody>
</table>

**Hansen Planetarium**

The Hansen Planetarium is located between South Temple and 200 South on State Street. It houses the Space Science Library, a museum and an exhibit hall. The planetarium generates various laser shows and currently hosts over 200,000 visits per year.

**4.2.2 University of Utah and Salt Lake City International Airport**

In the course of completing the ridership analysis, it was recognized that the WFRC passenger forecast model underestimates potential ridership to the Salt Lake International Airport and the University of Utah. The Airport and the University of Utah generate 21.5 million and 16.4 million annual person trips, respectively. A portion of these trips need to be added to ridership estimates in order to more accurately reflect potential transit passengers for each alternative.

**4.2.3 Summary of Special Generator Trip Generation**

The estimated number of annual visits and number who are likely to arrive by transit are summarized in Table 4-9. It is estimated that 8.6 million people will attend activities at these special generators on an annual basis. The airport generates 21.5 million trips annually while the University of Utah attracts 16.4 trips on an annual basis.

The paper "Quantifying Special Generator Ridership in Transit Analyses", prepared by David L. Kurth, Bill Van Meter, Smith Myung and Mark C. Schaefer, was reviewed to predict the number of visitors to these generators who would utilize public transportation. A ridership percentage of 20 percent appears to represent the types of generators presented in this report.
<table>
<thead>
<tr>
<th>Special Generator</th>
<th>Annual Visits</th>
<th>Annual Person Trips</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percent</td>
<td>Riders</td>
<td>Percent</td>
<td>Riders</td>
</tr>
<tr>
<td>Joseph Smith Memorial Building</td>
<td>1,805,600</td>
<td>20%</td>
<td>361,120</td>
<td>5%</td>
</tr>
<tr>
<td>Planned LDS Assembly Hall</td>
<td>1,200,000</td>
<td>20%</td>
<td>240,000</td>
<td>5%</td>
</tr>
<tr>
<td>Family History/Museum of Church History-Art</td>
<td>1,065,300</td>
<td>20%</td>
<td>219,060</td>
<td>5%</td>
</tr>
<tr>
<td>Utah State Fair Park</td>
<td>330,000</td>
<td>20%</td>
<td>66,000</td>
<td>5%</td>
</tr>
<tr>
<td>Delta Center</td>
<td>1,474,200</td>
<td>20%</td>
<td>294,840</td>
<td>5%</td>
</tr>
<tr>
<td>Salt Lake Arts Center</td>
<td>89,000</td>
<td>20%</td>
<td>17,800</td>
<td>5%</td>
</tr>
<tr>
<td>Abravanel Hall</td>
<td>322,200</td>
<td>20%</td>
<td>64,440</td>
<td>5%</td>
</tr>
<tr>
<td>Salt Palace Convention Center</td>
<td>321,700</td>
<td>20%</td>
<td>64,340</td>
<td>5%</td>
</tr>
<tr>
<td>Capitol Theatre</td>
<td>417,000</td>
<td>20%</td>
<td>83,400</td>
<td>5%</td>
</tr>
<tr>
<td>Triad Center</td>
<td>99,000</td>
<td>20%</td>
<td>19,800</td>
<td>5%</td>
</tr>
<tr>
<td>John W. Gallivan Utah Center</td>
<td>201,000</td>
<td>20%</td>
<td>40,200</td>
<td>5%</td>
</tr>
<tr>
<td>Hansen Planetarium</td>
<td>200,000</td>
<td>20%</td>
<td>40,000</td>
<td>5%</td>
</tr>
<tr>
<td>Fine Arts Museum/Museum of Natural History</td>
<td>152,000</td>
<td>20%</td>
<td>30,400</td>
<td>5%</td>
</tr>
<tr>
<td>Pioneer Memorial Theatre</td>
<td>100,000</td>
<td>20%</td>
<td>20,000</td>
<td>5%</td>
</tr>
<tr>
<td>Kingsbury Hall</td>
<td>231,500</td>
<td>20%</td>
<td>46,300</td>
<td>5%</td>
</tr>
<tr>
<td>Rice Stadium</td>
<td>150,000</td>
<td>20%</td>
<td>30,000</td>
<td>5%</td>
</tr>
<tr>
<td>Jon M. Huntsman Center</td>
<td>430,000</td>
<td>20%</td>
<td>86,000</td>
<td>5%</td>
</tr>
</tbody>
</table>

Subtotal of Special Generators: 85,618,500

Salt Lake International Airport: 21,150,000

University of Utah: 166,400,000

Subtotal: 377,900,000

TOTAL: 463,518,500
Chapter 4 Transportation Impacts

Additional transit ridership from special generators, the Airport and the University of Utah were estimated at both a “high” and “low” level. For special generators, the high was estimated at 20 percent and the low at 5 percent. The airport high was estimated at 5 percent and the low at 1 percent. These person trips must be multiplied times two to estimate potential transit riders. For the University of Utah, the high was estimated at 10 percent and the low at 6 percent. The results indicate a high estimate of 4.4 million additional transit riders annually and a low estimate of 1.6 million annually. (See Table 4-9)

4.3 Ridership Comparison

Estimates of future 2015 transit ridership for each alternative were produced by WFRC using the standard MINUTP computer analysis package. Because LRT has not previously been operated along the Wasatch Front, the WFRC modeling system could not be calibrated with any history or empirical data on potential LRT ridership. Experience in other cities where computer analysis has been carried out prior to implementation of LRT has typically demonstrated that the modeling process has a bias that does not adequately account for the relative attractiveness of LRT to potential passengers. The LRT riderships estimated by the WFRC models are therefore conservative on the low side in terms of future potential transit ridership for the LRT alternative.

Total ridership for each alternative was estimated by combining ridership estimates from the conventional transit analysis to those that should be added for special generators, including the Airport and the University of Utah. (See Table 4-9) The “low” estimate of person trips was used in order to provide a conservative ridership estimate. The result of this analysis is summarized in Table 4-10.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Conventional Transit</th>
<th>Special Generators</th>
<th>Total Ridership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative A</td>
<td>35.3</td>
<td>0</td>
<td>35.3</td>
</tr>
<tr>
<td>Alternative B</td>
<td>36.8</td>
<td>3.3</td>
<td>40.0</td>
</tr>
<tr>
<td>Alternative C</td>
<td>36.9</td>
<td>3.9</td>
<td>40.8</td>
</tr>
</tbody>
</table>

TABLE 4-10
ESTIMATED ANNUAL TRANSIT RIDERSHIP (MILLIONS)
CHAPTER 5

ENVIRONMENTAL CONSEQUENCES

This chapter discusses the environmental consequences of Alternative A—No-Build, Alternative B—Bus/HOV/TDM/TSM, and Alternative C—LRT/TDM/TSM. Wherever possible, the study area has been separated into sub-areas to facilitate closer analysis.

5.1 VISUAL AND AESTHETICS

Throughout the corridor, the overhead catenary wires associated with Alternative C—LRT would be a visible element in the immediate roadway. The cost of catenary systems and stations which meet Salt Lake City’s urban design requirements for UTA’s North/South LRT line have been included in the cost estimate for Alternative C. The final design could limit the number of poles and amount of wire to minimize visible elements. It is likely that the wires and poles would become less obvious within a short time, blending with the surrounding overhead utility wires and general streetscape as it weatheres and people become accustomed to the change. Poles and wires needed for LRT would be a visible element in the center of the street, but with all of the existing development it should soon become an expected part of the streetscape. The wires, poles, and tracks would be new in the environment only until people become used to them.

5.1.1 Airport

Alternative A—No-Build

The No-Build Alternative is anticipated to have no adverse consequences to visual quality and/or aesthetics.

Alternatives B and C

Neither the HOV/Bus nor the LRT alternatives would have a negative impact on views and vistas, the visual setting, or urban form in the Airport area. The important views are broad and general, from the Wasatch Mountains to the east and Great Salt Lake and the desert to the west. The presence of buses or LRT in the foreground would not have an adverse impact on these long and broad views throughout the valley.

Salt Lake International Airport is a principal gateway to the City and creates a first impression for many visitors. The Airport itself is attractive and convenient access to public transportation to Downtown Salt Lake City would be a desirable asset to visitors and travelers. Undeveloped land in this area would ultimately be developed, especially with the introduction of any new public transportation systems which better serve the area. The potential for change to the visual environment and impacts to the gateway impression should be carefully considered. LRT would support the Gateway redevelopment and therefore indirectly improve the character of the Gateway area.
5.1.2 West Central

Alternative A—No-Build

The No-Build Alternative would have no adverse consequences to visual quality and/or aesthetics because there would be no alterations to the existing environment. However, the existing clutter in the area would likely continue without the benefit of redevelopment potential to improve visual quality.

Alternatives B and C

There are no specific view corridors or vistas in the area which have been identified by the City, nor are there any identified gateways. None of the major views to the Wasatch Mountains, the Great Salt Lake, and the desert would be adversely affected by the presence of LRT, buses, or HOV lanes on existing roadways. Views from the affected streets occur in either mixed-use (including residential) areas, or the commercial strip along North Temple. The redevelopment potential which may occur because of transit development may be an opportunity for redevelopment and improvement of visual quality in some areas along the route.

5.1.3 Downtown

Alternative A—No-Build

The No-Build Alternative would have no adverse consequences to visual quality and/or aesthetics. Some of the improvements associated with the No-Build Alternative, such as removal of the viaducts and railroads, would actually create positive visual change in the area. With this activity and the potential for redevelopment, the area could undoubtedly improve the entrance to the City and Gateway District, in general.

Alternative B—Bus/HOV

The 400 South alignments would not affect any identified view corridor or vistas. The quality of the visual environment along 400 South is generally good. 400 South Street is a heavily traveled roadway, and the presence of bus/HOV lanes would not adversely impact visual quality.

Alternative C—LRT

From the western edge of this area and along 400 West where all alternatives converge and begin the transition to an eastern alignment, views and vistas and visual quality in general in the area would not be adversely affected by transit improvements. There could be some indirect and positive impacts on visual quality due to the presence of transit in this area.

5.1.4 East Central

Alternative A—No Build

The No-Build Alternative would have no adverse consequences to visual quality and/or aesthetics in the East Central area.

Alternatives B and C

The 400 South alignments would not affect any identified view corridor or vistas. The quality of the visual environment along 400 South is generally good. 400 South Street is a
largely commercial and heavily traveled roadway and the presence of bus/HOV lanes or transit improvements would not adversely impact visual quality.

**Alternative C—LRT**

An additional station is proposed after 400 South transitions into 500 South at 1100 East Street. Here, the existing land uses are single family and small commercial with multi-family housing nearby. A station at this location could serve the neighborhood and may cause some pressure to rezone and develop more neighborhood commercial uses.

**5.1.5 University**

**Alternative A—No-Build**

The No-Build Alternative would have no adverse consequences to visual quality or aesthetics.

**Alternatives B and C**

There are no specifically identified important view corridors or vistas which would be affected by the alternatives. The most important views identified are those looking east toward the Wasatch Mountain backdrop and to the west across the valley toward Great Salt Lake and the desert and the Oquirrh Mountains to the southwest. Neither of these broader views would be adversely affected by transit improvements.

Transit improvements fit well into the visual environment at the University main campus and the Health Sciences Center. Existing visual quality is well established and not likely to be adversely affected by transit improvements.

**5.2 LAND USE**

This section addresses land use, secondary development (new development potential arising from the project) and community impacts resulting from the alternatives.

**5.2.1 Airport**

**Alternative A—No-Build**

With the No-Build Alternative, current growth trends and land development patterns would likely continue. This would mean a continuation of manufacturing and Airport-related land uses in the area. With this continuing pattern it is unlikely that residential neighborhoods would develop in the area. Any potential for secondary development opportunities on the undeveloped land which increases density or encourages a higher use for the land is unlikely to occur with the No-Build Alternative.

**Alternatives B and C**

Alignments in the Airport area do not change between these two western alternatives and would not adversely affect existing land uses. Location of the corridor adjacent to or within the highway right-of-way reduces any potential impact to adjacent business or other land uses. The Airport would receive improved access to public transportation for both patrons and employees, thus relieving demand for parking facilities.
Existing Airport and Airport-related land uses would benefit from proximity to a planned transportation corridor, although consideration needs to be given to the height restrictions around the Runway Protection Zone. With proximity of transit or a major transportation corridor, secondary development potential would likely increase and pressures for development would then occur. Increased access to public transit may increase the attractiveness of the area to high-density residential development. In areas to the far west this may be appropriate; however, in areas south of the Airport residential uses should be discouraged and consideration given to Airport height restrictions and protection zones.

A LRT station located south of the new Airport terminal and integrated into the design of the new parking garage would be beneficial from the perspective of serving the Airport and, if properly designed, should be a stimulus to Airport-related activity. The Airport is currently considering another station located on the southern periphery of the Airport boundary. This station would serve a proposed hotel, as well as a park and ride lot. Alternative C—LRT/TDM/TSM would likely facilitate the development of hotels, additional employment opportunities and other services and activities.

A station at approximately 2400 West includes a parking lot, bus bays and drop-off zones which are compatible with the other Airport-related parking facilities in the area and complements to those activities which now provide shuttle service to the Airport. The station would also serve employees in nearby office buildings and hotels. Individuals coming from the west who do not wish to park in Downtown Salt Lake City may also use the park-and-ride lot and take transit into town. The station and Park and Ride Lot would need to be located outside of the Runway Protection Zone.

5.2.2 West Central

Alternative A—No-Build

With Alternative A—No-Build, current growth trends and land-development patterns would likely continue. This would mean a continuation of mixed-use development including manufacturing, Airport-related business, office park, strip commercial, and residential land uses in the area. Any potential for secondary development opportunities on the undeveloped land which increases density or encourages a higher use for the land is unlikely to occur with the No—Build Alternative. There would continue to be a lack of connection between the north and south residential neighborhoods and a continuation of the compartmentalization that has occurred because of existing barriers. Salt Lake City has been separated by Interstate 15 and the railyards into east and west halves. The west half has again been divided by North Temple, Interstate 80, and Interstate 215. Part of the Gateway Study, anticipated to be completed in October of 1997, is to assess the best way to reconnect the east and west halves of Salt Lake City through redevelopment of the Gateway area, approximately 700 acres of and industrial use land. Although located in the Downtown subarea, the Gateway Area and its proposed redevelopment would be integral to the quality of life in the West Central Area as well.

Alternative B—Bus/HOV

This alternative provides for HOV lanes to accommodate vehicles with multiple passengers and UTA buses. It would not change the configuration of North Temple Street, nor does it
adversely affect uses along the street. Existing uses are compatible with this alternative. With the increased traffic access associated with improved public transit and HOV improvements, there may be some pressure to increase density and development in the area.

**Alternative C—LRT**

This alternative follows the same alignment as Alternative B; however, rather than HOV and bus improvements, LRT is proposed. LRT would be located in the center of the street, so it does not adversely affect uses along the street. Existing uses are compatible with this alternative for the most part; however, consideration must be given to the location of the stations and the need for people to safely cross the wide and very busy North Temple Street.

LRT offers an opportunity to create a more pedestrian-friendly atmosphere on North Temple Street due to the "zipper effect" created by the LRT line in the center of the street. Station platforms and crosswalks create a safety-area in the middle of the road where pedestrians are protected from auto traffic while crossing, which tends to make the street seem less wide to pedestrians and hence pulls the two sides of the street together similar to a zipper pulling together two sides of a garment. This improvement in the pedestrian access between north and south neighborhoods would be a positive impact, pulling the neighborhoods separated by North Temple closer together and helping to alleviate some of the compartmentalization that has occurred in the West Central due to the barriers imposed by I-15, I-80, and I-215, as well as North Temple, one of several major arterials in the area.

This alignment provides excellent access to the Utah State Fairpark, a nearby park-and-ride site, State office buildings located along North Temple and other mixed use commercial and neighborhood services in the area. The vacant land across from the Utah State Fairpark is proposed as a park-and-ride lot, but there is ample room for additional development as well. The North Temple and 900 West station is located at a commercial center with grocers, motels, several restaurants, and other neighborhood services. Both of these stations are appropriately located with compatible land uses.

**5.2.3 Downtown**

**Alternative A—No-Build**

With this alternative the full redevelopment potential of the west Downtown area cannot be realized. It is anticipated that development patterns and land uses would change dramatically because of other improvements in the area and increased accessibility resulting from the removal of I-15 viaducts.

**Alternative B—Bus/HOV**

Alternative B—Bus/HOV does not change the configuration of North Temple Street, nor does it adversely affect uses along the street. Existing uses are compatible with this alternative. With the increased traffic associated with improved public transit and HOV improvements, there may be some pressure to increase density and development in the area. HOV and bus access along 400 South through this area would improve access to existing retail commercial and business uses and access to public facilities such as the City County Building, Library, Court House and others. Land uses are not likely to change, nor would they be adversely affected by this alternative. Activity at the location of the interface with the north/south LRT would become a major transfer point where people would gather.
Alternative C—LRT
The effects of Alternative C—LRT along North Temple are similar to those just to the west in the West Central area until the line reaches approximately 600 West where the North Temple viaduct begins. From this location to 400 West there is little development potential related to LRT access because of the grade separation. However, there is the potential to create a more pedestrian and bicycle access between east and west Salt Lake when reconstructing the viaduct to accommodate LRT. The existing structure is poorly lit and the existing pedestrian access is not easily visible from the road. As North Temple touches down at 400 West, a station location would serve nearby office uses and possibly increase interest in development at this intersection. Development and redevelopment pressures could have a positive affect on the reuse of the Union Pacific Depot and afford excellent access to uses, activities, and attractions which may take place there.

While redevelopment would still occur because of other these improvements in the area, access to LRT would greatly improve accessibility to the CBD shopping areas, many government services and public facilities, major employers and a large concentration of cultural and sporting venues.

This alternative has essentially the same impact on land use and transportation interface as Alternative B, except that transit stops would present opportunities for concentrations of people and opportunities for secondary development. 400 South Street includes a large amount of commercial and office uses which would benefit from LRT access. A station at approximately 250 West 400 South Street is adjacent to new rental apartments and hotel development on Block 49. A station location here also serves the La France Apartments and other residential uses on nearby Pierpont Avenue. A station location between West Temple and Main Street is adjacent to a redeveloping block in an area which includes the Little America Hotel and its expansion to the east.

5.2.4 East Central
Alternative A—No-Build
With the No-Build Alternative, current land use patterns would continue and remain unchanged. Most of this area is an established mixed-use residential neighborhood with very little undeveloped land or incentive for redevelopment.

Alternative B—Bus/HOV
Bus/HOV improvements would not have an effect on existing land uses. Increased transit access would benefit the residential and business uses in the corridor; which when redevelopment opportunities do arise, may encourage increased densities and thus increase ridership as well. However, whether the alternative involves HOV/Bus improvements or LRT improvements, land uses would not likely change.

Alternative C—LRT
This alternative follows the same alignment as Alternative B, but provides LRT rather than HOV access to the area. The existing land use probably would not change, except that increased opportunities for secondary development are provided with the transit stops
associated with LRT. A station located at 700 East and 400 South is an intersection of an east-west commercial corridor and several commercial uses along 700 East, including Trolley Square one block to the south. LRT here is very compatible with adjacent land uses.

5.2.5 University

Alternative A—No-Build

The No-Build Alternative does not solve any of the access problems to the primary land uses in the area—University of Utah, University Medical Campus and VA Hospital, and the possibility of major changes in land use is very unlikely. The University Research Park and Fort Douglas areas would continue to grow and develop, creating more demand for convenient and accessible transit. Existing streets and transportation systems would continue to be congested and inadequate and parking both on campus and in adjacent neighborhoods would continue to be major problems in the area.

Alternative B—Bus/HOV

Bus/HOV routes on Foothill Drive and Wasatch Boulevard provide improved access to University Research Park, VA Hospital, Fort Douglas, and other University destinations. Land use patterns are set and are not likely to change; however, there is still undeveloped land at University Research Park which would benefit from transit accessibility.

Alternative C—LRT

Land uses would not change; but development at the University and Medical Center and increased staff and employment would continue. Staff, students and patients who do not mind walking to and from the station would find LRT access an alternative to the inconvenience of parking and congestion, particularly if service frequencies were high enough to alleviate long periods of waiting. In addition to the employment and student transportation benefits, the University is a major cultural and sports center in the City. Patrons of these facilities and activities could use LRT and greatly reduce impacts to the nearby neighborhoods at these peak times. The land uses in these areas would generate increased density which is supportive and compatible with LRT.

A station adjacent to Rice Stadium on University Street would serve the University neighborhood. Residential structures immediately west of the parking lot may be affected by buses and LRT accessing the parking lot and station area; however, the use itself is very similar to the current use of the area. Stations located on the interior of the campus and at the University Medical Center would serve the facility well and provide additional access for employees, students, and patients. These stations should fit in well with the urban environment of the campus.

5.3 PARKS AND OPEN SPACE

5.3.11 Airport

Alternative A—No-Build

There would be no impact on park land.
Alternatives B and C  
There would be no long-term impact on park land. There may be short-term impacts related to construction of the LRT.

5.3.2 West Central  
Alternative A—No-Build  
There would be no impact on park land.

Alternatives B and C  
The LRT and bus/HOV alternatives occur in the existing street right-of-way. There would be no need for acquisition of land and no impact on existing park lands. Access to parks may improve. Short-term impacts related to construction may occur.

5.3.3 Downtown  
Alternative A - No-Build  
There would be no impact on park land.

Alternatives B and C  
There would be no impacts associated with LRT or bus/HOV to parks in the Downtown area.

Although 400 West Street forms one boundary of Pioneer Park, LRT is in the center of the roadway and does not impact the park. Short-term impacts related to construction may occur. Alternative C may interface with the proposed continuance of City Creek Park as it winds its way through the Gateway District. Carefully designed, they could complement each other and provide unique pedestrian access along 400 West to Pioneer Park.

5.3.4 East Central  
Alternative A—No-Build  
There would be no impact on park land.

Alternatives B and C  
There would be no direct impact on park land.

5.3.5 University  
Alternative A—No-Build  
There would be no impact on park land.

Alternatives B and C  
There would be no direct impact on park land. LRT and HOV alternatives occur in the middle of the street, so there would be no need to acquire park land. Alternatives along Wasatch Boulevard may interface with proposed trail systems; however, there would be no adverse impact to the system. The potential for intermodal connection between trail and transit is positive. Short-term impacts related to construction may occur.
5.4 HISTORICAL AND CULTURAL RESOURCES

5.4.1 Airport
There are no anticipated impacts to historical or cultural resources in this area.

5.4.2 West Central
Alternative A—No-Build
There are no anticipated impacts to historical or cultural resources in this area.

Alternatives B and C
Although these alternatives pass by Utah State Fairgrounds, the park would not be negatively affected by LRT or bus/HOV.

5.4.3 Downtown
Alternative A—No-Build
There are no anticipated impacts to historical or cultural resources in this area.

Alternatives B and C
400 West Street forms the western edge of Pioneer Park and the historic Rio Grande Depot and Union Pacific Depot are nearby. There are opportunities for intermodal connections near the depots which would benefit the area and provide opportunities for the preservation of historic structures which could be refurbished. Opportunities for renovation and reuse of historic and older structures in the area would greatly contribute to the unique character of the area and benefit the neighborhood.

The area between 300 and 400 West streets is identified as a Warehouse Historic District. Many of the structures are in need of repair and renovation. The presence of LRT in the area could provide added stimulus for adaptive reuse of historic structures in the area, which would be a benefit.

These HOV/Bus and LRT alternatives pass through a portion of the Exchange Place Historic District; however, the presence of transit would not adversely impact the area and may complement office uses in the historic structures. Electric trolleys were once a part of Downtown Salt Lake City. The new system would be quieter and more compatible with urban development.

5.4.4 East Central
Alternative A—No-Build
There are no anticipated impacts to historical or cultural resources in this area.

Alternatives B and C
These alternatives follow 400 South Street where they pass the historic City and County Building and Washington Square. Farther to the east they pass through the Central City Historic District and the University Historic District. Both of these historic districts are primarily residential in character. Tenth Ward Square at 400 South and 800 East is listed on
both the National and City Registers. 400 South Street is a heavily traveled road with existing traffic conditions. The presence of bus/HOV or LRT on this route would not change conditions in the area in any important ways and would not be likely to affect historic resources in the area.

This alternative also passes by two historic properties. One site is listed on both the National and City Registers and one is listed on the City Register.

5.4.5 University

Alternative A—No-Build

There are no anticipated impacts to historical or cultural resources in this area.

Alternatives B and C

Alternative C—LRT passes through the University en route to the Medical Center. As it does so, it passes historic Fort Douglas. The route does not enter Fort Douglas.

Alternative B—Bus/HOV does not involve historic structures or districts.

5.5 SOCIO-ECONOMIC IMPACTS

5.5.1 Airport

Alternative A—No-Build

Projections for the area were not based on major transportation improvements; therefore, the impact of the No-Build alternative to neighborhood and businesses should roughly approximate baseline projections for 2020 discussed in Chapter 3. In addition, the No-Build alternative would not incur construction-related impacts to build or acquire the needed products to complete a light rail transit system, nor the benefits associated with LRT such as Federal funding and increased regional earnings and employment.

This alternative would not respond to the increasing traffic pressures from Downtown to the west in Salt Lake City. Though the population is small at present, the estimated annual growth rate of 8.4 percent between 1990 and 2020 far exceeds the growth rate of any other area within the corridor, the city, or the county. The alternative also excludes addressing public transportation needs that could service the ever-increasing number of commuters living in nearby Tooele County but who work in Salt Lake City.

The No-Build Alternative would not serve the growing needs of passengers and employees at the Salt Lake City International Airport, particularly in light of projections that passenger traffic through the Airport is expected to double within the next twenty years.

Alternative B—Bus/HOV

This alternative supports traffic flow through the most dense commercial areas of the corridor, relying on continued bus use, voluntary behavioral shifts and some technological changes. This alternative is most supportive of continued development and economic activity in the three main “hubs”: the University of Utah; the Airport; and the CBD.
This alternative brings more people into the corridor without increasing congestion, thereby increasing convenience in getting to and traveling within the corridor. Car pools, buses and express buses would be used to get people to a specific destination and so should support increased employment and passenger densities within the area. Since this alternative concentrates on moving people through the area, in addition to providing access to local destinations, it is supportive of continued development and economic activity at the Airport and the International Center.

The HOV and Bus alternative is also attractive for residents of Tooele County who commute into Salt Lake City daily. Tooele is a fast growing city with a population that has increased from 13,500 to 18,000 since 1990. Over the next decade, Tooele’s population is expected to double to roughly 36,000 and would increasingly contribute to the growing congestion problem.

**Alternative C—LRT**

The LRT alternative would diffuse the increasing traffic congestion through the most dense commercial areas of the corridor from both south and east of the CBD. It would provide relief for parking shortages for Airport and surrounding area traffic. It would provide an attractive transportation alternative for Airport employees and travelers. A park-and-ride at 2400 West serves traffic coming from west on I-80, including Tooele, traveling to the CBD and University of Utah.

This alternative brings more people into the corridor without increasing congestion, thereby increasing convenience in getting to and traveling within the corridor. LRT would be used to get people to numerous destinations and so should support increased employment and passenger densities within the area.

**5.5.2 West Central**

**Alternative A—No-Build**

With Alternative A—No-Build, the West Central area would continue to have the same level of transit service as currently exists. Circulation in the West Central area is difficult due to the barriers imposed by I-15, I-80, and I-215. The No-Build alternative would greatly hinder development of new and existing commercial entities along North Temple Street because access would continue to be difficult. Because travelers bypass North Temple Street when taking the east-west I-80 freeway, the West Central area loses its potential to capture a significant share of the travel market. In turn, other commercial entities cannot maximize their potential and some new businesses find the area unappealing economically. In addition, without enhanced public transportation across existing barriers, hoped for revitalization and development plans in the Gateway area would not be promoted.

**Alternative B—Bus/HOV**

Since this alternative involves increased bus service that can be reduced or eliminated easily, it would not likely encourage new commercial activity in this area, either along the North Temple Corridor, or in the newly designated Gateway Development area. It would also do little to eliminate the barriers that exist between the CBD and the West Central neighborhoods.
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Alternative C—LRT

LRT could effectively penetrate the physical and psychological barriers that are currently in place between the CBD and West Central neighborhoods and commercial entities. While the North Temple Street corridor has developed as “strip” commercial that is very automobile-oriented, this alignment has potential for further commercial development; new businesses, as well as expansion of existing businesses. A North Temple Corridor Economic Revitalization Plan has been recently developed to jumpstart this process. LRT along this alignment would likely enhance development efforts by providing enhanced access to basic retail services, “Power Center” shopping centers, midrange priced restaurants, entertainment centers, theaters and other commercial entities planned for this corridor. LRT along North Temple Street from the Airport to 600 West would support the three main markets that provide economic activity: the daytime workforce of roughly 10,000 people; the surrounding neighborhoods; and the special generators of recreation, entertainment, tourists, and “small conference” business events that can and do occur with the enhancement of the Jordan River Parkway and the State Fairpark.

In order to assure that those riding the LRT would use local commercial services, public investment in pedestrian-oriented infrastructure such as well landscaped parking strips and inviting walkways should also occur. To the extent that infill development and expansion were to occur, there would be opportunities for new or expanded employment to complement the already roughly 10,000 people employed along or near the North Temple corridor.

5.5.3 Downtown

Alternative A—No-Build

The No-Build alternative would very likely result in added congestion Downtown as employment and visitor numbers grow and availability of parking shrinks. As a result, the area’s attractiveness as a commercial and employment center may be reduced.

Alternative B—Bus/HOV

The enhanced mass transit into the CBD should relieve parking pressures and ease, or at least not increase, congestion. Since excessive traffic and a perceived lack of parking currently discourages some CBD customers, ridership of the North-South LRT with a transfer to east-west bound buses would help protect the commercial base now in place. Otherwise, as traffic congestion increases, the long-term viability of the commercial core of the CBD may be threatened.

Alternative C—LRT

Enhanced mass transit via LRT for east and west bound commuters who travel to the CBD should again relieve parking pressures and ease congestion. Since excessive traffic and a perceived lack of parking currently discourages some CBD customers, ridership of the North-South LRT with a transfer to east-west bound LRT would help protect the commercial base now in place. LRT would make the CBD more competitive with outlying areas for new business development and could increase employment and commercial activity beyond baseline projections.

The 400 West alignment from North Temple to 400 South lends great support the Gateway Project, the plan through which Salt Lake City plans to completely revitalize the western...
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Downtown area. This is a perfect opportunity to implement transit-oriented development, where a mix of development projects and activities can be designed to facilitate access and increase ridership to transit stations. The economic benefit to individuals, businesses, and the city could be significant due to the symbiotic relationship between transit and development.

The symbiotic relationship between the Gateway Area and the proposed LRT line can be summarized as follows. Due to the cost of the capital improvements associated with constructing a LRT line and support facilities, Alternative C would mean a major investment in the Gateway Area which would not come with Alternative B. Alternative B—Bus/HOV would not require the same level of investment, but would also not provide as much support to the redevelopment of the Gateway Area. It can be seen from LRT lines in other cities that the development surrounding LRT is more upscale than that which surrounds bus facilities. The Gateway Area needs to be attractive to investors to be successful. Alternative C—LRT, due to the high level of investment required for the capital improvements associated with LRT, indicate to potential investors that the area is appropriate for a major investment of their own monies. Thus, if transit is present in an area, there is more incentive for redevelopment, just as, if there is redevelopment there is more incentive for transit.

5.5.4  East Central
Alternative A—No-Build
The No-Build alternative does not address the growing traffic congestion in the East Central area, or the destabilizing impact of the increased through-traffic on neighborhoods in the eastern part of Salt Lake’s central city. The East Central area also has a growing elderly population who, in order to protect their independence and mobility, would likely become increasingly dependent on public transportation. The No-Build alternative may fall short of meeting their needs.

Alternative B—Bus/HOV
The 400 South alignment of HOV and bus lanes would peripherally serve the residential population in the area, although the higher concentrations of potential transit users are located to the north. To the extent that the bus/HOV alternative provides this population with increased mobility to local shopping centers or to work, because it is designed to move people through the area, it is unclear how much convenience would be afforded to the immediate population. The main improvements would be slated for major commercial streets. As a result, the potential negative impacts of traffic increasing through the residential neighborhoods are not as likely to occur.

Alternative C—LRT
This alternative would serve the primary retail corridor in the East Central area that runs along 400 South between State Street and roughly 1100 East. A LRT alignment would provide access for the over 4,300 people who work in this area. However, this is not an area of high employment density, but rather dispersed businesses along a strip. Because of the relatively low employment density, it is not likely that mass transit would be a major factor in enhanced employment opportunity along 400 South. Also, because the 400 South businesses are not generally pedestrian-oriented, it is likely that the impact to local businesses’ sales due to increased exposure and access provided by LRT would be fairly
mineral. The system would, however, provide both customers and employees alike an economical alternative to driving that could result in less future congestion in the area which may, in fact, be supportive of the existing business base. Most of the land in this area has already been developed, so any future development activities would be reinvestment in existing business or redevelopment of existing sites.

There is a fairly sparse population along 400 South, so this alignment would not directly serve a higher density residential population. There is, however, a significant population located one to two blocks to the north that would be able to access the LRT line quite easily.

It has been suggested that this alternative would increase traffic in surrounding neighborhoods because of conflicts between trains and cars along the route. This is not anticipated to occur. As 400 South will continue to have the same number of traffic lanes, thus minimal displacement is likely to occur.

5.5.5 University

Alternative A—No-Build

The University/Research Park activity hub serves tens of thousands of people daily and suffers from access and parking limitations. The No-Build alternative would do nothing to relieve the growing congestion in this area, nor would it address the peripheral negative impact of University-bound drivers who drive through residential neighborhoods to reach their destination.

Alternative B—Bus/HOV

Since the University/Research Park activity hub serves more than 45,000 students, employees, patients and visitors on a typical day plus thousands more during special events, the HOV and Bus alternative is a viable one. This alternative brings more people into the corridor without increasing congestion, thereby increasing convenience in getting to and traveling within the corridor. Carpools and express buses would be used to get people to a specific destination and so should support the goal of those whose destination is the University/VA Hospital/Fort Douglas/Research Park complex.

The enhanced mass transit to the University would probably not have a significant impact on the lower campus' employment or economic development activities. However, ease of access to the University Health Sciences Center could both protect current market share as well as potentially increase the consumer base and resulting economic output.

The bus/HOV alternative, which enhances access to Research Park, could accelerate the build-out of the remaining 72 acres currently undeveloped. More rapid development could increase the employment in Research Park from the current 4,000 employees to the projected 7,000 employees faster than would otherwise occur. New economic activity would likewise be accelerated.

Again, because the main improvements would be slated for major commercial streets, the potential negative impacts of traffic increasing through the nearby residential neighborhoods are not as likely to occur.
Alternative C—LRT

The LRT would provide improved access for the 13,000 employees and 27,000 students of the University of Utah as well as the employees of and visitors to Research Park, the VA Hospital and Fort Douglas, particularly as it would interface with the north-south LRT line, providing access to much of the valley. This alternative brings more people to the northeast section of the city without increasing congestion, thereby increasing convenience in getting to and traveling around the University and surrounding areas.

The enhanced mass transit to the University would probably not have a significant impact on the lower campus' employment or economic development activities. However, ease of access to the University Health Sciences Center could both protect current market share as well as potentially increase the consumer base and resulting economic yield.

The LRT alternative, which enhances access to Research Park via shuttle, could accelerate the build-out of the remaining 72 acres currently undeveloped. More rapid development could increase the employment in Research Park from the current 4,000 employees to the projected 7,000 employees faster than would otherwise occur. New economic activity would also be accelerated.

5.6 ECOSYSTEMS

This section describes potential environmental impacts to wildlife, vegetation, fisheries, and threatened and endangered species by the alternatives. The Utah Division of Wildlife Resources regulates impacts to wildlife populations. The U.S. Fish and Wildlife Service must determine if any of the alternatives would have any impact to plants and animals listed under the Endangered Species Act or their respective critical habitats.

5.6.1 Alternative A—No-Build

No long-term impacts to vegetation, fisheries, and threatened and endangered species would occur under the No-Build Alternative. However, under the current transportation system, it is possible that road kills will likely increase over time in correlation with the increase in road use by automobiles. Increased traffic would subsequently heighten noise production, which may disturb wildlife utilizing adjacent habitats. This traffic may also act as a visual barrier between perching avian predators and terrestrial prey, thus decreasing the efficiency of predation and protection.

5.6.2 Alternative B—Bus/HOV

Western Corridor

With buses and HOV lanes as a transportation alternative, North Temple would not be expanded, so no long-term impacts to plants and animals are anticipated. Short-term impacts with construction may impact wildlife through road kills and barriers to movement. Short-term impacts to vegetation could include removal of plants along roadways during construction. Other indirect impacts may include noise production and sight barriers to wildlife.
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Eastern Corridor
In the urban area of the eastern corridor, the road would not be expanded with the bus and HOV Alternative. Additionally, no known wildlife breeding sites, or unique or significant habitats occur along this alignment. No known impacts would occur to wildlife, fisheries, plants, or threatened and endangered species. Short term impacts to vegetation could include removal of plants along roadways. Other indirect impacts may include noise production and sight barriers.

5.6.3 Alternative C—LRT
Western Corridor
Anticipated affects of Alternative C—LRT to wildlife may include removal of habitat, road kills, electrocution, and barriers to movement. Impacts to vegetation through construction activities would also be considered an impact to wildlife habitat. For example, the removal of the typical planted upland grasses and impacts on existing wetlands, would impact potential breeding and cover habitat for wildlife.

During the construction period, increased traffic from vehicles and installation of barriers along the length of the corridor would likely cause an increase in the number of road kills. The barrier may also impede wildlife movement and/or migration of small to medium sized mammals across the corridor. Construction traffic may also act as a visual barrier to perching avian predators and terrestrial prey, thereby decreasing the efficiency of both predation and protection. Road kills may also increase during construction traffic. Increased traffic could increase noise production, which may disturb wildlife utilizing adjacent habitats. However, increased noise levels would likely not exceed existing wildlife tolerance levels. It is important to note that species particularly sensitive to disturbance, such as the interior-forest species of goshawk, elk, lynx, and wolverine do not occur in the project area.

No significant alterations to existing stream channels, hydrologic patterns, or fisheries would occur. Bridges may be widened over the Surplus Canal, the North Point Consolidated Canal, and one branch of the City Drain for the North Temple Light Rail Alternative. This would occur with an approximate 30 foot road widening to accommodate the light rail line. There may be short-term negative impacts to water quality by sedimentation or storm water runoff during construction. However, no significant fisheries were identified in the Surplus Canal, the North Point Consolidated Canal, and the City Drain.

Impacts to vegetation could be caused by associated construction activities (i.e. use of staging areas, vehicle parking, material storage) that would occur along the alignment. Damage may be more significant in areas in which road widening and bridge expansion would occur to accommodate the light rail system. Indirect impacts could include the invasion of disturbed soils by noxious weeds and degradation of soil quality through chemicals, erosion, or contaminated runoff from paved areas.
Eastern Corridor

In the urban area of the Eastern Corridor, no known wildlife breeding sites or significant habitats occur. No known long-term impacts should affect wildlife, fisheries, plants, or threatened and endangered species. Other indirect impacts may include noise production and sight barriers.

Direct impacts to vegetation could be caused by associated construction activities (i.e. use of staging areas, vehicle parking, material storage) that would occur along the alignment. Damage may be more significant in areas in which road widening would occur to accommodate the light rail system. Indirect impacts would include the invasion of disturbed soils by noxious weeds and degradation of soil quality through chemicals, erosion, or contaminated runoff from paved areas. Additionally, the Utah Division of Wildlife Resources requested that construction in the foothill area avoid any plant stand of Blue Bunch Wheat Grass (*Agropyron spicatum*). The Division doubted whether any stands existed but wants to protect any existing populations.

5.7 MINERAL RESOURCES

5.7.1 Alternative A—No-Build

No adverse impacts are anticipated since no action would be taken.

5.7.2 Alternative B—Bus/HOV

Mineral resources locally present within or near the Eastern Corridor (Foothill Blvd. to 500 South theen west to 400 West) include potential good quality sand, gravel, and building stone, which have been mined in the area at various times in the past. The mineral and other resources within the Western Corridor (Airport to Downtown-400 West) include potential common clay resources and natural gas. In general, these potential resources are inaccessible due to urbanization, or are not economically viable. Therefore, there would be no impacts to mineral resources with Alternative B—Bus/HOV.

5.7.3 Alternative C—LRT

Mineral resources locally present within or near the Eastern Corridor (University of Utah Health Sciences Center down Medical Drive to Wasatch Drive to South Campus Drive, through the Rice Stadium Parking lot onto 500 South, along 500 South down the hill to 400 South to 400 West) include potential good quality sand, gravel, and building stone, which have been mined in the area at various times in the past. The mineral and other resources within the Western Corridor include potential common clay resources and natural gas. In general, these potential resources are inaccessible due to urbanization or are not economically viable. Therefore, there would be no impacts to mineral resources with Alternative C—LRT.

5.8 UTILITIES

Existing utilities found in the project right of way (ROW) were obtained from utility drawings provided by Automated Geographic Reference Center (AGRC) and local utility agencies such as Salt Lake City Public Utilities Department, Mountain Fuel, and Utah Power.
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and Light. This information served as the basis for the impact assessment.

The impacts of the No-Build Alternative, High-Occupancy Vehicle Alternative and Light Rail Transit Network Alternative are presented below.

5.8.1 Alternative A—No-Build
Implementation of the No-Build Alternative would require no utility relocation beyond baseline conditions and, therefore, would have no additional impact.

5.8.2 Alternative B—Bus/HOV
Implementation of the High Occupancy Vehicle Alternative might require minimal utility relocation caused by construction of bus pullouts. Utility impacts cannot be estimated until the locations of each bus pullout area are determined.

5.8.3 Alternative C—LRT
Potential Utilities to be relocated for the LRT Alternative are listed below. In these instances it would be necessary to relocate the utilities located closer than approximately three feet from the surface which cross the LRT Alternative ROW. If these lines are located under the potential ROW for Alternative C—LRT, the maintenance and upgrade of these lines would be difficult if not impossible. Longitudinal or parallel lines would be affected more than traverse or crossing lines, depending on location within the ROW. Traverse or crossing lines are of slightly less concern as these would not have their entire length covered by the light rail ROW. Utility agencies state that all utilities should be located a minimum of three feet below the surface but would vary in depth according to utility location. Access points to crossing lines may also need modifications. This would not be determined until preliminary design is available. Detailed maps of the utility locations can be found in Appendix E as well as tables listing all specific utility lines that would require relocation.

- Electric
- Telephone
- Gas
- Sanitary Sewer
- Storm Sewer
- Water Lines

5.9 NOISE AND VIBRATION

This section compares the noise impacts of Alternative A—No-Build, Alternative B—Bus/HOV and Alternative C—LRT. A noise impact assessment was conducted to quantify the extent of expected impacts and to identify feasible mitigation options where necessary. The analysis was conducted in accordance with the procedures contained in the Federal-Aid Highway Program Manual (FHWA 1982) and the Guidance Manual for Transit Noise Impact Assessment (USDOT 1990).

5.9.1 Alternative A—No-Build
The No-Build infrastructure would be very similar to that of the present. Traffic volumes
in the study area are expected to increase at a rate of 3 percent per year for this alternative, with total build-out occurring by the year 2015. Under Alternative A—No-Build, the most substantial project in the study area is the I-15 reconstruction project. Other projects include transit route modifications and scheduled STIP projects. One committed improvement is the North-South LRT alignment project which is to be operational by the year 2001. The noise impacts associated with Alternative C—LRT are expected to be similar to those for the North/South LRT project, as both projects are bound by mainly commercial and industrial land use. Moreover, the I-15 and STIP projects’ impacts and the North-South LRT construction and operational impacts would occur regardless of any east-west transportation improvements.

5.9.2 Alternative B—Bus/HOV

The East-West corridor project is slated to be operational by the year 2001. Total build-out would occur by the year 2015. The main sources of noise from the operation of the bus/HOV project would be buses and automobiles. Receptors along the bus/HOV alignment and near stations would experience noise from bus and automobile traffic. The major sources of construction noise would be the use of diesel-powered construction equipment along the alignment and at station locations.

Currently, the major source of vibration in industrial portions of the bus/HOV alignment is the diesel-electric locomotives used to haul freight. Diesel-powered construction equipment would produce much lower vibration than the freight locomotives.

For the purposes of this MIS/DEIS, a generally significant noise or vibration impact is defined as:

- An exceedance of the Federal Highway Administration Noise Abatement Criteria (NAC) (described below).

- An increase in existing noise levels at a sensitive receptor site by greater than five decibels (dB).

Description of Impact Assessment

The degree of noise impact resulting from this alternative depends on the noise levels produced, the location of sensitive receptors, and existing or ambient levels. The following sections briefly describe these components, as well as applicable noise criteria. Ambient noise levels are discussed in Chapter 3 of this MIS/DEIS.

Noise levels were predicted from bus and HOV vehicles, Park-and-Ride sites, bus stations and automobile and bus traffic accessing the stations. Noise from bus and HOV vehicles and stations was predicted in terms of both the Ldn and the hourly Leq noise level metrics. Noise from traffic was predicted for the existing, No-Build, Bus/HOV and LRT alternative conditions at sensitive receptor sites and locations along the corridors using the Federal Highway Administration’s noise prediction model.

Vibration levels were predicted for both bus and HOV vehicles from measurements of similar kinds of operations and were adjusted using project-specific operating parameters and local geographical conditions.
Chapter 5  Environmental Consequences

Sensitive Receptors
Approximately 13 locations were chosen as representative of noise and vibration-sensitive receptors along the bus/HOV alignment. Nearby residences, motels, hotels, public buildings and parks have been included in the assessment. (See Figure 3-14, Noise Measurement Sites.)

Applicable Noise Standards
Noise control regulations exist on the federal, state, and local levels. On the federal level, no regulations stipulate absolute noise levels that must be met by a project of this type. The FHWA has, however, drafted noise standards for vehicular traffic that, when met, are designed to result in an acceptable community noise environment. The FHWA noise abatement criteria (NAC) are presented in Table 5-1. Background noise levels combined with predicted project noise levels determines the degree of impact at a given receptor location. During the ambient noise measurement survey, the lowest measured Leq along the proposed alignment was 58 dBA at U of U student housing. From Table 5-1, this ambient level would correspond to an impact condition at this receptor site, when the project Leq noise level is greater than 66 dB A. The “change in noise level” criteria from Table 5-2 would be used when the ambient noise is much lower than the NAC criteria. Since the ambient is 58 dBA, the project Leq noise level must not exceed 61 dBA in order for the combined noise level to not exceed 63 dBA, which is five dB above the ambient level. Therefore, a significant impact would occur when the combined predicted traffic, bus, and HOV Leq noise level at this quietest receptor is 61 dBA or greater.

The impact from increased traffic noise levels was assessed as follows. Freight rail and roadway traffic noise currently exists in the alignment and would be likely to increase with an increase of ADT's in the corridor. The use of the criteria in Table 5-1 requires the accurate measurement of present noise levels and prediction of future noise levels. Another method of impact prediction, which requires only predicting the change in these noise levels, also was used for this assessment. The criteria shown in Table 5-2 were used to judge the impact of noise level increases when ambient levels exceed FHWA NAC. Noise mitigation options are discussed for increases of greater than five dBA.

Locally, Salt Lake City has enacted community noise regulations. Vehicles operating within a public right-of-way, however, are exempt.
## TABLE 5-1
**FHWA CRITERIA FOR NOISE ABATEMENT**

<table>
<thead>
<tr>
<th>Activity Category</th>
<th>Noise Abatement Criteria (dBA) $L_{eq}$</th>
<th>Description of Activity Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>57 (Exterior)</td>
<td>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 serve its intended purpose.</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>67 (Exterior)</td>
<td>Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>72 (Exterior)</td>
<td>Developed lands, properties or activities not included in Categories A or B above.</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>--</td>
<td>Undeveloped lands.</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>52 (Interior)</td>
<td>Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.</td>
</tr>
</tbody>
</table>


## TABLE 5-2
**GUIDELINES FOR THE SIGNIFICANCE OF NOISE IMPACTS**

<table>
<thead>
<tr>
<th>Noise Impact</th>
<th>Increase in Noise Level ($L_{eq}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Significant</td>
<td>3 dBA or less</td>
</tr>
<tr>
<td>Possibly Significant</td>
<td>Not greater than 5 dBA</td>
</tr>
<tr>
<td>Generally Significant</td>
<td>6 dBA or more</td>
</tr>
</tbody>
</table>

**Applicable Vibration Standards**

USDOT has developed acceptable limits for vibration and vibration-induced noise. These limits are designed to minimize annoyance caused when buildings are set into motion, minimize the disruption of vibration-sensitive manufacturing and research processes and prevent damage to structures. These criteria, shown in Table 5-3, were used to assess vibration impacts.
Bus/HOV Alternative Results

Construction
Noise at construction sites is non-steady and intermittent. When construction activity occurs along a right-of-way, as in the case of roadway construction, long-term noise exposure descriptors are difficult to quantify. The U.S. Army Corps of Engineers Construction Engineering Research Laboratory (CERL) has developed a model to predict construction noise impacts. However, this model cannot be used for this project at this time because some of the necessary input data for the model, such as type of equipment, effective usage factor, number of each equipment type and construction schedule are not yet available.

Roadway construction is accomplished in several different phases. These phases and their estimated noise levels at the right-of-way (ROW) can be characterized by the following (FHWA, 1977):

<table>
<thead>
<tr>
<th>Phase</th>
<th>Leq (h), dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing and grubbing</td>
<td>83</td>
</tr>
<tr>
<td>Earthwork</td>
<td>85</td>
</tr>
<tr>
<td>Foundation</td>
<td>82</td>
</tr>
<tr>
<td>Superstructure</td>
<td>83</td>
</tr>
<tr>
<td>Base Preparation</td>
<td>85</td>
</tr>
<tr>
<td>Paving</td>
<td>86</td>
</tr>
</tbody>
</table>

Operations
In general, noise impacts from the proposed project are expected to be limited. The immediate area west of the Union Pacific Station is an active passenger and freight rail alignment, with approximately 90 freight trains passing through each day. As a result, ambient noise levels are relatively high, which significantly reduces the impact of noise from the bus and HOV vehicles in that area. In addition, much of the bus/HOV alignment is near industrial and commercial facilities, which have higher ambient noise levels.

Noise impacts from bus and automobile traffic at station locations also are expected to be less than significant because the stations are located in relatively commercial and industrial areas.

Table 5-4 shows the predicted bus and HOV alternative noise for representative locations along the alignment at the right-of-way (ROW).
### TABLE 5-3
GROUND-BORNE VIBRATION AND NOISE IMPACT CRITERIA

<table>
<thead>
<tr>
<th>Land use Category</th>
<th>Ground-Borne Vibration Impact Levels</th>
<th>Ground-Borne Noise Impact Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequent&lt;sup&gt;a&lt;/sup&gt; Events</td>
<td>Infrequent&lt;sup&gt;b&lt;/sup&gt; Events</td>
</tr>
<tr>
<td><strong>Category 1:</strong> Buildings where low ambient noise and/or vibration is essential for interior operations.</td>
<td>65 dB</td>
<td>65 dB</td>
</tr>
<tr>
<td><strong>Category 2:</strong> residences and buildings where people normally sleep.</td>
<td>72 dB</td>
<td>80 dB</td>
</tr>
<tr>
<td><strong>Category 3:</strong> institutional land uses with primary daytime use.</td>
<td>75 dB</td>
<td>83 dB</td>
</tr>
<tr>
<td><strong>Vibration Damage Criteria</strong></td>
<td>Buildings = 100 dB</td>
<td>Historic Buildings = 95 dB</td>
</tr>
</tbody>
</table>

Notes:
- a More than 70 vibration events per day.
- b Fewer than 70 vibration events per day.
- c Vibration level is in dB, based on velocity, relative to one microinch/second.

### TABLE 5-4
PREDICTED BUS/HOV AND TRAFFIC NOISE LEVELS (DBA)

<table>
<thead>
<tr>
<th>Roadway</th>
<th>From</th>
<th>To</th>
<th>Year 1997 Existing Level</th>
<th>Year 2015 No-Build Level</th>
<th>Year 2015 Bus/HOV Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Temple</td>
<td>“Airport”</td>
<td>Redwood</td>
<td>67</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td>North Temple</td>
<td>Redwood</td>
<td>900 West</td>
<td>65-69</td>
<td>70</td>
<td>69</td>
</tr>
<tr>
<td>North Temple</td>
<td>900 West</td>
<td>400 West</td>
<td>65-69</td>
<td>70</td>
<td>69</td>
</tr>
<tr>
<td>400 West</td>
<td>North Temple</td>
<td>400 West</td>
<td>63</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>400 South</td>
<td>400 West</td>
<td>200 East</td>
<td>63-67</td>
<td>68</td>
<td>71</td>
</tr>
<tr>
<td>400 South</td>
<td>200 East</td>
<td>10000 East</td>
<td>70-71</td>
<td>72</td>
<td>74</td>
</tr>
<tr>
<td>500 South</td>
<td>1000 East</td>
<td>University</td>
<td>n/a</td>
<td>72</td>
<td>74</td>
</tr>
<tr>
<td>So. Campus</td>
<td>University</td>
<td>Wasatch</td>
<td>n/a</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Wasatch</td>
<td>So. Campus</td>
<td>So. 1 Medical</td>
<td>58</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>So. Medical</td>
<td>Wasatch</td>
<td>“terminus”</td>
<td>n/a</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

P A R S O N S T R A N S P O R T A T I O N G R O U P

5-23
Alternative B—Bus/HOV exceeds NAC category two criteria (67 dBA) at all residences along the alignment and it also exceeds category three criteria (72 dBA) at commercial locations along 400 South east of 200 East. However, Alternative B—Bus/HOV does not exceed “ambient plus five dB” criteria.

5.14.3 Alternative C—LRT

Under Alternative C—LRT, the East-West LRT line would be operational by the year 2001. Total build-out would occur by the year 2015. The main sources of noise from the operation of this proposed project would be LRT vehicles along with roadway traffic with projected five percent trip reductions in vehicular traffic along the East-West corridor. Receptors along the light rail alignment would experience noise from wheel-track interaction and electric drive motors. Receptors near stations would experience noise from bus and automobile traffic and LRT warning devices. The major sources of construction noise would be the use of diesel-powered construction equipment along the LRT alignment and at station locations.

Currently, the major source of vibration on the west side of the corridor is diesel-electric locomotives used to haul freight. Operation of LRT vehicles and operation of diesel-powered construction equipment would produce much lower vibration levels than freight locomotives do in areas near railways.

For the purposes of this MIS/DEIS, a generally significant noise or vibration impact is defined as:

- An exceedance of the Federal Transit Administration impact criteria (described below);

- An increase in existing noise levels at a receptor site by greater than five decibels (dB).

Description of Impact Assessment

The degree of noise impact resulting from this project depends on the noise levels produced, the location of sensitive receptors, and existing or ambient levels. The following sections briefly describe these components, as well as applicable noise criteria. Ambient noise levels are discussed in Chapter 3 of this MIS/DEIS.

Noise levels were predicted from LRT vehicles, Park-and-Ride and LRT stations and automobile and bus traffic accessing the stations. Noise from LRT vehicles and stations was predicted in terms of the hourly Leq noise level metric. FTA Guidance Manual reference levels were adjusted using project-specific operational information to predict noise levels at receptor locations. Predictions of noise from stations were based on the 20 year total build-out conditions. Noise from traffic was predicted for the present, No-Build and LRT alternative conditions at representative locations along the corridor using the Federal Highway Administration's noise prediction model. Vibration levels were predicted from both LRT vehicles and freight rail trains. FTA Guidance Manual reference levels were adjusted using project-specific operating parameters and local geographical conditions.
Chapter 5  Environmental Consequences

Sensitive Receptors
Approximately 13 locations were chosen as representative of noise and vibration-sensitive receptors along the East-West LRT Alignment and near LRT stations. Nearby residences, motels, hotels, public buildings, and parks have been included in the assessment. (See Figure 3-14, Noise Measurement Sites.)

Applicable Noise Standards
Noise control regulations exist on the federal, state, and local levels. On the federal level, no regulations stipulate absolute noise levels that must be met by a project of this type. The FTA has, however, drafted noise standards for LRT systems that, when met, are designed to result in an acceptable community noise environment. The FTA criteria are presented in Table 5-5. Background noise levels and predicted project noise levels together determine the degree of impact at a given receptor location. During the ambient noise measurement survey, the lowest measured Leq along the alignment was 58 dBA at U of U student housing. From Table 5-5, this ambient level corresponds to an impact condition when the project Leq noise level reaches 61 dBA or more, resulting in a combined noise level of 63 dBA or greater, which would be five dBA or more above the ambient level. Therefore, an impact would occur when the predicted combination of LRT and traffic noise at this quietest receptor site is an Leq of 61 dBA or greater.

The impact from projected light rail and vehicular traffic noise was assessed as follows. Freight rail and roadway traffic noise currently exists in the alignment and would only be altered as a result of the LRT project. The use of the FHWA NAC criteria in Table 5-1 requires accurate measurement of present traffic noise and prediction of future traffic noise levels. Another method of impact prediction, which requires predicting the change in these noise levels, also has been used for this assessment. The criteria shown in Table 5-5 were used to judge the impact of noise level increases. Noise mitigation options are required for combined noise increases of greater than five dBA (FTA Guidance Manual).

Locally, Salt Lake City has enacted community noise regulations. Vehicles operating within a public right-of-way, however, are exempt.

| TABLE 5-5 |
| FTA GUIDELINES FOR THE SIGNIFICANCE OF NOISE IMPACTS |

<table>
<thead>
<tr>
<th>Noise Impact</th>
<th>Increase in Noise Level (L_eq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Significant</td>
<td>3 dBA or less</td>
</tr>
<tr>
<td>Possibly Significant</td>
<td>Not greater than 5 dBA</td>
</tr>
<tr>
<td>Generally Significant</td>
<td>6 dBA or more</td>
</tr>
</tbody>
</table>

Applicable Vibration Standards. FTA has developed acceptable limits for vibration and vibration-induced noise. These limits are designed to minimize annoyance caused when
buildings are set into motion, minimize the disruption of vibration-sensitive manufacturing and research processes and prevent damage to structures. These criteria, shown in Table 5-3, were used to assess vibration impacts.

**LRT Alternative Results**

**Construction**

Noise at construction sites is non-steady and intermittent. When construction activity occurs along a right-of-way, as in the case of roadway and LRT track and station construction, long-term noise exposure descriptors are difficult to quantify. The U.S. Army Corps of Engineers Construction Engineering Research Laboratory (CERL) has developed a model to predict construction noise impacts. However, this model cannot be used for this project at this time because some of the necessary input data for the model, such as type of equipment, effective usage factor, number of each equipment type and construction schedule are not yet available.

Roadway and LRT track and station construction is accomplished in several different phases. These phases and their estimated noise levels at the right-of-way (ROW) can be characterized by the following (FHWA, 1977):

<table>
<thead>
<tr>
<th>Phase</th>
<th>$L_{eq}$ (h), dBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing and grubbing</td>
<td>83</td>
</tr>
<tr>
<td>Earthwork</td>
<td>85</td>
</tr>
<tr>
<td>Foundation</td>
<td>83</td>
</tr>
<tr>
<td>Superstructure</td>
<td>83</td>
</tr>
<tr>
<td>Base Preparation</td>
<td>85</td>
</tr>
<tr>
<td>Paving</td>
<td>86</td>
</tr>
</tbody>
</table>

**Operations**

In general, noise impacts from the proposed project are expected to be limited. A portion of the East-West LRT alignment has active freight rail operations, with approximately 90 scheduled freight trains passing through each day. As a result, ambient noise levels in that portion of the alignment are relatively high, which reduces the impact of noise from the relatively quiet LRT vehicles in that area. Furthermore, much of the LRT alignment is lined by industrial and commercial facilities.

Noise impacts from bus and automobile traffic along the corridor and at LRT station locations also are expected to be less than significant because the stations are located in relatively commercial and industrial areas.
Table 5-6 shows the predicted LRT hourly $L_{eq}$ noise level and the predicted reduced vehicular traffic noise levels for representative locations along the alignment at the right-of-way (ROW).

**TABLE 5-6**

**PREDICTED LRT AND TRAFFIC NOISE LEVELS ($L_{eq}$, DBA)**

<table>
<thead>
<tr>
<th>Roadway</th>
<th>From</th>
<th>To</th>
<th>Year 1997 Existing Level</th>
<th>Year 2015 LRT Level*</th>
<th>Year 2015 Traffic Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Temple</td>
<td>“Airport”</td>
<td>Redwood</td>
<td>67</td>
<td>60-62</td>
<td>68</td>
</tr>
<tr>
<td>North Temple</td>
<td>Redwood</td>
<td>900 West</td>
<td>65-69</td>
<td>60-62</td>
<td>70</td>
</tr>
<tr>
<td>North Temple</td>
<td>900 West</td>
<td>400 West</td>
<td>65-69</td>
<td>60-62</td>
<td>70</td>
</tr>
<tr>
<td>400 West</td>
<td>North Temple</td>
<td>400 South</td>
<td>63</td>
<td>60-62</td>
<td>--</td>
</tr>
<tr>
<td>400 South</td>
<td>400 West</td>
<td>200 East</td>
<td>63-67</td>
<td>60-62</td>
<td>69</td>
</tr>
<tr>
<td>400 South</td>
<td>200 East</td>
<td>1000 East</td>
<td>70-71</td>
<td>60-62</td>
<td>73</td>
</tr>
<tr>
<td>500 South</td>
<td>1000 East</td>
<td>University</td>
<td>n/a</td>
<td>60-62</td>
<td>73</td>
</tr>
<tr>
<td>So. Campus</td>
<td>University</td>
<td>Wasatch</td>
<td>n/a</td>
<td>60-62</td>
<td>--</td>
</tr>
<tr>
<td>Wasatch</td>
<td>So. Campus</td>
<td>“So. Medical”</td>
<td>58</td>
<td>60-62</td>
<td>--</td>
</tr>
<tr>
<td>So. Medical</td>
<td>Wasatch</td>
<td>“terminus”</td>
<td>n/a</td>
<td>60-62</td>
<td>--</td>
</tr>
</tbody>
</table>

*50 feet $L_{eq}(h)$, based on worst-case 4-car train at 35 mph and 10 minute headways.

Table 5-7 shows the predicted LRT and traffic noise levels near each location for the existing conditions, year 2015 No-Build and year 2015 LRT alternatives.
TABLE 5-7
PREDICTED LRT AND TRAFFIC NOISE LEVELS (LEQ, DBA)

<table>
<thead>
<tr>
<th>Roadway</th>
<th>From</th>
<th>To</th>
<th>Year 1997 Existing Level</th>
<th>Year 2015 No-Build Level</th>
<th>Year 2015 LRT/Traffic Noise Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Temple</td>
<td>&quot;Airport&quot;</td>
<td>Redwood</td>
<td>67</td>
<td>68</td>
<td>69</td>
</tr>
<tr>
<td>North Temple</td>
<td>Redwood</td>
<td>900 West</td>
<td>65-69</td>
<td>70</td>
<td>71</td>
</tr>
<tr>
<td>North Temple</td>
<td>900 West</td>
<td>400 West</td>
<td>65-69</td>
<td>70</td>
<td>71</td>
</tr>
<tr>
<td>400 West</td>
<td>North Temple</td>
<td>400 South</td>
<td>63</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>400 South</td>
<td>400 West</td>
<td>200 East</td>
<td>63-67</td>
<td>68</td>
<td>70</td>
</tr>
<tr>
<td>400 South</td>
<td>200 East</td>
<td>1000 East</td>
<td>70-71</td>
<td>72</td>
<td>73</td>
</tr>
<tr>
<td>500 South</td>
<td>1000 East</td>
<td>University</td>
<td>n/a</td>
<td>72</td>
<td>73</td>
</tr>
<tr>
<td>So. Campus</td>
<td>University</td>
<td>Wasatch</td>
<td>n/a</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Wasatch</td>
<td>So. Campus</td>
<td>So. Medical</td>
<td>58</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>So. Medical</td>
<td>Wasatch</td>
<td>&quot;terminus&quot;</td>
<td>n/a</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

It is clear that the noise associated with Alternative C—LRT does not exceed "ambient plus five dB" criteria. However, it does exceed NAC category two criteria (67 dBA) at all residences along the alignment and it also exceeds NAC category three criteria (72 dBA) at commercial locations along 400 South east of 200 East.

**Operational Vibrations**

Included in the vibration assessment were sensitive receptors within approximately one block of the alignment and those used in the noise impact assessment. No vibration-sensitive industrial or research processes were identified adjacent to the alignment. Vibration and vibration-induced noise from light rail vehicles were predicted for representative locations. (See Table 5-8)

Predicted LRT vibration levels range from 65 dB at 100 feet to 85 dB at 25 feet. The results of the vibration analysis are given in Table 5-8 and show that commercial, institutional and industrial properties along the alignment would experience LRT project vibrations which exceed the 75 dB criterion level shown in Table 5-3 (Category 3, frequent events) when within 50 feet from the nearest track. Predicted LRT vibration would exceed the residential impact criteria of 72 dB (Category 2, frequent events) at residential locations within 70 feet of the nearest track.
TABLE 5-8
LRT VIBRATION LEVELS (DB)

<table>
<thead>
<tr>
<th>Roadway</th>
<th>From</th>
<th>To</th>
<th>Year 2015 LRT Vibration Level @ ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Temple</td>
<td>&quot;Airport&quot;</td>
<td>Redwood</td>
<td>48</td>
</tr>
<tr>
<td>North Temple</td>
<td>Redwood</td>
<td>900 West</td>
<td>48</td>
</tr>
<tr>
<td>North Temple</td>
<td>900 West</td>
<td>400 West</td>
<td>58</td>
</tr>
<tr>
<td>400 West</td>
<td>North Temple</td>
<td>400 South</td>
<td>48</td>
</tr>
<tr>
<td>400 South</td>
<td>400 West</td>
<td>200 East</td>
<td>58</td>
</tr>
<tr>
<td>400 South</td>
<td>200 East</td>
<td>1000 East</td>
<td>58</td>
</tr>
<tr>
<td>500 South</td>
<td>1000 East</td>
<td>University</td>
<td>58</td>
</tr>
<tr>
<td>So. Campus</td>
<td>University</td>
<td>Wasatch</td>
<td>48</td>
</tr>
<tr>
<td>Wassatch</td>
<td>So. Campus</td>
<td>So. Medical</td>
<td>58</td>
</tr>
<tr>
<td>So. Medical</td>
<td>Wassatch</td>
<td>&quot;terminus&quot;</td>
<td>48</td>
</tr>
</tbody>
</table>

Mitigation Measures

Alternative A—No-Build

No noise mitigation measures are recommended for this alternative because there would be no new construction.

Alternative B—Bus/HOV and Alternative C—LRT

The receptors identified in the previous discussions as being affected by operational noise from the project alternatives are the residences located all along the alignment and commercial receptors along 400 South east of 200 East. The main noise impact to these receptors would be from vehicular traffic along the alignment. Various noise abatement measures such as traffic management, design changes, purchasing additional right-of-way, landscaping and construction of noise barriers can be used for reducing noise levels at affected receptors. Effective mitigation measures could include the purchase of additional right-of-way to establish a noise buffer zones along the residential areas (which would be costly); constructing 8-foot high sound walls along the residential areas (blocks view and is compromised by driveway openings); or provide architectural noise reducing treatments for interior noise reduction of affected residential and commercial receptors. Because of the locations of existing developments, the purchase of additional right-of-way for use as a buffer zone would present a hardship to residents. Building treatment measures would include installing acoustical windows and doors and/or adding insulation to the walls. To
evaluate the extent of these treatment measures and their effectiveness, a detailed acoustical study would be necessary.

Landscaping with dense shrubs and trees can only provide some very limited noise attenuation, but it would have a positive psychological effect because it would screen the residents' view of the traffic. However, landscaping cannot be considered a reliable solution for noise attenuation and there usually is not enough space for effective landscaping; therefore, it was not considered in this study.

With regard to vibration impacts, the use of welded track and egg-type, soft, resilient, direct fixation fasteners would reduce vibration impacts to less than significant levels.

**Mitigation Measures**

Short-term construction noise impacts are expected. Several possible construction mitigation measures are listed in this section which can be applied when construction activities are within 500 feet of sensitive receptors. It is important to use newer equipment that is quieter and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration insulators. Consider the use of spread footings or cast-in-place piles, in lieu of driven piles.

The duration and time of day that construction activities take place can be adjusted to minimize the noise impact on exposed individuals. Salt Lake City construction time limits should be applied. Activities can be scheduled so that quiet periods are provided. Choose haul routes carefully for material and dump trucks to minimize noise impacts. Temporary, heavy wooden barriers should be used and relocated, as needed, whenever possible.

Good public relations with the community are necessary to minimize the reactions to unavoidable noise. The communities should be notified in advance of the scheduling and importance of the East-West corridor construction project.

**5.10 WETLANDS**

This section evaluates potential impacts of the proposed alignments of 400 South and North Temple Street for use by buses, high-occupancy vehicles lanes (HOV) and light rail on wetlands. Any impacts to wetlands, including short term, would require a 404 Nationwide Permit under the Clean Water Act. The U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service and the State of Utah Department of Natural Resources would require involvement if impacts are anticipated.

Nationwide Permits would often require mitigation, restoration, or creation of wetlands in an area able to support wetland ecology for affected wetlands. Mitigation, on-site or off-site, can involve removal of waste materials, grading of soil to enhance wetland hydrology, planting or seeding with wetland plants, or a combination of these activities. The Utah Division of Wildlife Resources requested that mitigation for wetland impacts be done adjacent to the Farmington Bay Waterfowl Management Area because the Department of
Natural Resources already has a manager for the area. The mitigation should be a low-maintenance type done in coordination with the Utah Department of Transportation, the U.S. Army Corps of Engineers, and the Department of Natural Resources.

5.10.1 Alternative A—No-Build
Under the No-Build Alternative, no action would be taken beyond the existing and committed transportation system. No wetlands should be affected other than current impacts from existing infrastructure.

5.10.2 Alternative B—Bus/HOV
Western Corridor
Several wetland areas are located within 100 meters of the North Temple Alignment. However, since the road is not going to be expanded, no long-term impacts are anticipated. Short-term impacts due to construction activities should be mitigated by implementing Best Management Practices to prevent sedimentation into the nearby wetlands.

Eastern Corridor
The 400 South Alignment for the Alternative B—Bus/HOV begins at Main Street and runs east along 400 South. East of 900 East the lane transitions uphill to 500 South. The route continues east on 500 South to Wasatch Boulevard.

East of University along 500 South, the bus/HOV alignment lies within 50 meters of one palustrine, aquatic bed, intermittently exposed wetland. However, since the road is not being expanded, no long-term impacts are expected. Short-term impacts due to construction activities could be mitigated by implementing Best Management Practices to prevent sedimentation in adjacent wetlands.

5.10.3 Alternative C—LRT
Western Corridor
The western LRT alignment has several wetland areas located within 100 meters of the alignment. Wetlands could be affected because of potential filling for light rail lines and station sites. However, these impacts are expected to be minor (one to five acres). Wetland delineations would have to be conducted in these regions and a 404 Permit from the U.S. Army Corps of Engineers would have to be obtained prior to construction. Short-term impacts to wetlands due to construction activities could be mitigated by implementing Best Management Practices to prevent sedimentation into adjacent wetlands.

Eastern Corridor
No wetlands were identified within 100 meters of the eastern corridor LRT alignment. Therefore, no wetland impacts are anticipated.

55.11 WATER RESOURCES AND WATER QUALITY
This section describes the impacts the alternatives would have on water resources and quality. The alignments both during construction and subsequent operation should be managed in such a way as to ensure ongoing compliance with R317, Utah Administrative Code, Standards of the Quality for Waters of the State, which contains minimum water quality standards for the potentially affected public waters.

The following water quality permits will need to be investigated by Utah Department of Transportation for pertinence based on the final alternative chosen:

- Utah Division of Water Resources Section 401 Stream Alteration Permit and Federal Section 404 Wetland Permit from the Clean Water Act. Any planned crossing or modification to a stream, river, creek bank or wetland requires a permit from the State of Utah. This could be necessary if any roadways or bridges are expanded.

- Utah Pollutant Discharge Elimination System (UPDES) permits from the Utah Division of Water Quality for storm water discharges associated with construction activities. Construction project disturbing more than five acres are required to obtain this permit.

- Utah Division of Water Quality Construction Permit. Construction of storm drainage discharging more than five cfs are required to obtain this permit.

- Utah Division of Water Quality Groundwater Discharge Permit. Discharges to the subsurfaces are required to be permitted.

- Salt Lake City UPDES Storm water Discharges associated with municipal storm water sewer systems. Salt Lake City has this permit and requires approval of site drainage improvements.

Construction required for the buses, LRT, and their stations may increase the amount of impervious area and the potential for urban runoff and non-point source pollution. Best Management Practices should be used during the construction phases to mitigate impacts. For example, installation of on-site detention basins can capture storm water runoff and reduce the volume of pollutant released to the drainage.

The implementation of a public transportation system may reduce the amount of cars traveling within the corridor. This may have a positive impact upon the water quality because oils and greases associated with motor vehicle travel would be reduced.

5.11.1 Alternative A—No-Build

Under the No-Build Alternative, no action would be taken beyond the existing and committed transportation system. The No-Build Alternative would continue to affect water quality through the runoff of contaminants from existing streets and parking lots. However, the difference in the volume of contaminants reaching receiving drainage from these sources are non-quantifiable. When comparing the No-Build the other alternatives, all that can be determined is that there would be more pollutants distributed from vehicles under Alternative
A—No-Build than from Alternatives B or C, as both these alternatives would reduce VMTs to some extent.

5.11.2 Alternative B—No-Build

Western Corridor
Alternative B—Bus/HOV crosses the Jordan River, the City Drain, the Brighton Canal, the Surplus Canal and the North Point Consolidated Canal. Under the present assumptions Alternative B—bus-HOV would not require any roads or bridges to be expanded. No long-term impacts to waterways should occur.

Eastern Corridor
Alternative B—Bus/HOV runs just north of Red Butte Creek, but does not cross any known streams or canals. Under the present assumptions, this alternative would not require any roads or bridges to be expanded. No long-term impacts to waterways should occur.

5.11.3 Alternative C—LRT

Western Corridor
Alternative C—LRT’s alignment crosses the North Point Consolidated Canal, the Surplus Canal, the City Drain, the Brighton Canal, and the Jordon River. The alternative would not require any roads or bridges to be expanded east of the transition from I-80 to North Temple. However, west of the transition of I-80 to North Temple, the road and bridges might have to be expanded by an approximate 30 foot wide corridor to accommodate the LRT. The roads affected include: the Airport access road, frontage roads, and the north side of I-80. Additionally, the crossings of the Surplus Canal, the City Drain and the North Point Consolidated Canal would be affected by this possible road expansion.

Although no long-term negative impacts to waterways are anticipated, it may be necessary to obtain an UPDES permit and a Stream Alteration Permit. If wetland impacts are anticipated, a 404 Permit would need to be obtained through the U.S. Army Corps of Engineers. Additionally, during the LRT construction phase, the construction staging areas may negatively affect some of the waterways through additional runoff. In this case, a permit should be obtained and Best Management Practices should be implemented to prevent erosion and stream siltation.

Eastern Corridor
The Light Rail Fourth South Alignment does not cross any known streams or canals. Under the present assumptions, no roads or bridges would have to be expanded under this route. No long-term impacts should occur from implementation of LRT.

5.12 FLOODPLAINS

Floodplains are mapped by the Federal Emergency Management Agency. Any modification of a floodplain or construction within a floodplain is governed by Salt Lake County Code 19.74 "Floodplain Hazard Regulations." These regulations call for special approval of work
within the floodplain and outlines building methods, materials, minimum floor elevations, flood-proofing and structural requirements. The applicant must also ensure that the flood-carrying capacity of the watercourse is not diminished.

Any alterations to existing streams must submit and obtain a Stream Alteration Permit from the Division of Water Rights, Utah State Department of Natural Resources. This permit provides coverage under a statewide general permit from the U.S. Army Corps of Engineers to fulfill requirements of Section 404 of the Clean Water Act. This permit must detail the proposed changes and then go through a 21 day public review period.

5.12.1 Alternative A—No-Build
Under the No-Build Alternative, floodplains would not be affected.

5.12.2 Alternative B—Bus/HOV
Western Corridor
Alternative B—Bus/HOV crosses the Jordan River, the City Drain, the Brighton Canal, the City Drain, the Surplus Canal, and the North Point Consolidated Canal. The Surplus Canal is in the 100-year floodplain. Under the present assumptions, it would not require any roads or bridges to be expanded. Therefore, implementation of this alignment would have no impact on floodplains or flooding.

Eastern Corridor
Alternative B—Bus/HOV runs just north of Red Butte Creek but does not cross any known streams or canals. Under present assumptions, this transportation option would not require any roads or bridges to be expanded. No long term impacts to floodplains should occur. Implementation of Best Management Practices should be followed.

5.12.3 Alternative C—LRT
Western Corridor
The alignment of Alternative C—LRT crosses the North Point Consolidated Canal, the Surplus Canal, the City Drain, the Brighton Canal and the Jordan River. The alternative would not require any roads or bridges to be expanded east of the transition from I-80 to North Temple. However, west of the transition of I-80 to North Temple, the road and bridges may have to be expanded by an approximate 30 foot wide corridor to accommodate LRT. The roads affected include: the Airport access road, frontage roads and the north side of I-80. Additionally, the crossings of the Surplus Canal, the City Drain and the North Point Consolidated Canal would be affected by this possible road expansion.

Because the Surplus Canal is in the 100-year floodplain, Salt Lake City and Salt Lake County ordinances and regulations for building within a floodplain would need to be followed. Additionally, a Stream Alteration Permit must be obtained from the Utah Division of Water Rights. All construction activities should follow Best Management Practices. No long term impacts to floodplains are anticipated.

Eastern Corridor
Implementation of LRT would have no impacts on floodplains or flooding.

5.13 POTENTIAL CONTAMINANT SOURCES

Due to the large number of potentially contaminated sites along the bus/HOV and LRT alignments currently being considered, and the prohibitive amount of time required to review files and interview regulatory Site Managers for specific information, there are no identified significant differences between alternatives at this time. Further study should be conducted in deeper detail in the FEIS.

In the event of a property transaction(s), the new owner may incur liability for characterization, mitigation, or remediation of contaminated areas in the alignment corridor even though the contamination originated from outside the alignment. Under an enforcement order issued by a regulatory agency, the party responsible for the release of hazardous material is obligated to clean up the release. If the responsible party is unable to fulfill this obligation, then the current property owner may be burdened with the responsibility for clean up. Construction through potential contaminant sources may add health and safety concerns and affect construction budgets expenditures.

At this time there are no significant environmental differences between the bus/HOV alternative and the Light Rail alternative. Once a preferred alternative has been selected, a more detailed analysis should be conducted, including the review of regulatory agency files, interviewing regulatory Site Managers, and reviewing proposed design information (increasing road width and infrastructure location) in an effort to determine more site specific environmental impacts. (See Section 3.6.6 Potential Contaminant Sources for definitions of LUST, RCRA, CERCLA, etc.)

5.13.1 Alternative A—No-Build
Contaminant sources would not impact this alternative as this is a No-Build option.

5.13.2 Alternative B—Bus/HOV

Western Corridor
Twenty-six documented LUST sites and seven documented RCRA sites are located within 100 meters of the proposed alignment.

Four documented CERCLA sites are located within 100 meters of the proposed alignment: Jackobson Drums at 1925 West North Temple, Barber Company Tar Products at 1100 West North Temple, Utah Power & Light/American Barrel at 600 West South Temple, and Diamond Airport Parking at 50 South Redwood Road.

Eastern Corridor
Five documented LUST sites are located within 100 meters of the proposed alignment. No RCRA or CERCLA sites were documented within 100 meters.
5.13.3 Alternative C—LRT

Western Corridor

This alternative has twenty-six documented LUST sites and seven documented RCRA sites located within 100 meters of the proposed alignment.

Four documented CERCLA Sites are located within 100 meters of the proposed alignment: Jackobson Drums at 1925 West North Temple, Barber Company Tar Products at 1100 West North Temple, Utah Power & Light/American Barrel at 600 West South Temple and Diamond Airport Parking at 50 South Redwood Road.

Eastern Corridor

Seven documented LUST sites and one documented RCRA site are located within 100 meters of the proposed alignment. No CERCLA sites are documented within 100 meters of the proposed alignment.

5.14 ENVIRONMENTAL JUSTICE CONSIDERATIONS

This section addresses the issue of environmental justice through the evaluation of environmental consequences of alternatives as they apply to minority and/or low income communities in the study corridor. The purpose of this review is to ensure that low-income households, minority households and minority business enterprises do not suffer a disproportionate share of adverse environmental impacts resulting from federal actions such as federally funded transportation projects. Under consideration are concerns regarding exclusion of persons or populations from participation in the decision-making process, denying persons or populations the benefits of the project, or discriminating against persons or populations in making project decisions.

Opportunities for involvement by disadvantaged groups in addressed in Section 2.1.2, Public and Agency Involvement of Chapter 2. A special effort has been made to include low income and minority populations through various methods. For a detailed summary of the public involvement process, please see Appendix A.

No area within the study corridor has a preponderance of minorities or low income households; therefore, we cannot demonstrate a disproportionate adverse impact on minority households or businesses, or low income households with this project.

5.14.1 Incidence of Minority and Low Income Households in the Corridor

Minority Population

Table 5-9 documents the proportion and composition of the minority population in the study corridor. In all of the subareas, the majority of the population is nonminority. The largest minority population resides in the West Central area.
TABLE 5-9

EAST-WEST CORRIDOR INCIDENCE OF MINORITY POPULATION

<table>
<thead>
<tr>
<th>Corridor Subarea</th>
<th>Minority Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>4.1%</td>
</tr>
<tr>
<td>West Central</td>
<td>26.3%</td>
</tr>
<tr>
<td>Downtown</td>
<td>14.1%</td>
</tr>
<tr>
<td>East Central</td>
<td>9.9%</td>
</tr>
<tr>
<td>University</td>
<td>19.0%</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; 1990 Census Bureau
Note: Information is compiled by proportion of census tract associated with the study area.

Low-Income Population

Table 5-10 summarizes the incidence of low-income households in each subarea in the study corridor. This data indicates that none of the subareas are dominated by low-income households. The Downtown and East Central areas contain the highest incidence of low-income households, between 16 and 18 percent.
TABLE 5-10
EAST WEST CORRIDOR INCIDENCE OF LOW-INCOME HOUSEHOLDS

<table>
<thead>
<tr>
<th>Corridor Subarea</th>
<th>Low-Income Households (lowest 15%)</th>
<th>Top 25% Household Incomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>5.23%</td>
<td>40.7%</td>
</tr>
<tr>
<td>West Central</td>
<td>14.03%</td>
<td>21.8%</td>
</tr>
<tr>
<td>Downtown</td>
<td>18.18%</td>
<td>20.5%</td>
</tr>
<tr>
<td>East Central</td>
<td>16.30%</td>
<td>22.27%</td>
</tr>
<tr>
<td>University</td>
<td>11.23%</td>
<td>42.21%</td>
</tr>
</tbody>
</table>

Source: Wikstrom Economic and Planning; Governor's Office of Planning & Budget; 1990 Census Bureau.
Note: Households in the bottom 15 percent range of regional household incomes are considered low income. Top 25 percent of households earn at least $37,500 per year.

5.14.2 Minority Businesses in the Corridor
Table 5-11 shows approximately 27 minority-owned businesses were located in the study corridor in 1995, located predominately in the Downtown and East Central areas. None of the transportation alternatives are anticipated to adversely affect these minority-owned businesses.

TABLE 5-11
EAST-WEST CORRIDOR MINORITY OWNED BUSINESSES

<table>
<thead>
<tr>
<th>Corridor Subarea</th>
<th># Minority-Owned Businesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>0</td>
</tr>
<tr>
<td>West Central</td>
<td>2</td>
</tr>
<tr>
<td>Downtown</td>
<td>9</td>
</tr>
<tr>
<td>East Central</td>
<td>15</td>
</tr>
<tr>
<td>University</td>
<td>1</td>
</tr>
</tbody>
</table>

1995 Directory of Women and Minority-Owned Businesses (listings in this directory are voluntary and should not be construed as a complete listing of all such businesses.

5.14.3 Anticipated Environmental Impacts
There are no anticipated negative impacts to the natural or man-made environment that would disproportionately affect minority or disadvantaged populations, or minority-owned businesses within the corridor. However, there could be some positive impacts associated with Alternative C—LRT. The West Central area, which has the largest minority population, is isolated from Downtown and compartmentalized by the existing transportation systems.
(highways and railyards) and the industrial uses which have sprung up around them. LRT would support the redevelopment of the Gateway area, thereby creating a bridge between the east and west sides of Salt Lake City by providing improved pedestrian and transit access between the CBD and the neighborhoods on the west side. Currently, the area between the west neighborhoods and the CBD is an imposing barrier due to the railyards, highways and industrial land uses in the area. It would improve access to commercial in CBD and access to University of Utah. Currently, UTA has no through transit service between the east and west sides of the corridor. Additionally, it would bring jobs and economic benefits to the community, which would not be provided by the No-Build or Bus/HOV Alternatives.

5.14.4 Relocation Plan
A Relocation Plan has not been developed because there are no plans to relocate any residences or businesses for this project.

5.15 AIR QUALITY

5.15.1 Regional Conformity
The Clean Air Act Amendments of 1990 and the Intermodal Surface Transportation Efficiency Act of 1991 require that regionally significant transportation projects be included in Long Range Transportation Plans and Transportation Improvement Programs that conform with State Air Quality Plans. Conformity to the SIP is defined as:

- Conforming to an implementation plan’s purpose of eliminating and reducing the severity of existing violations of the NAAQS and achieving attainment of the standards.

- Not causing or contributing to new NAAQS violations, not increasing the frequency or severity of any violation of any standard.

- Not delaying timely attainment of any NAAQS or emissions reduction milestones.

The Salt Lake Area Long Range Plan adopted by the Wasatch Front Regional Council in October 1995 was found to conform with state air quality plans. The FHWA and FTA concurred in this finding on October 18, 1995. The 1997-2001 TIP was approved by the Regional Council in August 1996 and also found to conform with air quality plans. The FHWA and FTA also concurred in this finding on October 1, 1996.

The two build alternatives being considered in the corridor are not part of the conforming Long Range Transportation Plan or the conforming TIP at this time. The Regional Council is in the process of updating the Long Range Plan for the Salt Lake Area. This update will consider the addition of a major transit improvement in the corridor. This project will need
to be included in a conforming Long Range Plan before a Final EIS and Record of Decision can be completed.

Since neither alternative is in a conforming Plan, a separate analysis was completed to show the potential impacts on conformity. As discussed in Chapter 4, both build alternatives will result in a small increase in overall transit ridership in the region and a corresponding reduction in vehicle miles of travel. Table 5-12 shows the estimated emissions reductions for each of the alternatives in comparison to the no-build alternative. Based on this analysis, it is likely that either alternative will conform with state air quality plans if added to the Plan.

**TABLE 5-12**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>VOC (g/day)</th>
<th>NOx (g/day)</th>
<th>CO (g/day)</th>
<th>PM10 (g/day)</th>
<th>Total Emissions (g/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSM</td>
<td>12,900</td>
<td>16,100</td>
<td>118,300</td>
<td>17,300</td>
<td>164,600</td>
</tr>
<tr>
<td>Light Rail</td>
<td>15,300</td>
<td>20,000</td>
<td>131,600</td>
<td>21,300</td>
<td>188,200</td>
</tr>
</tbody>
</table>

**5.15.2 Project Level Impacts**

While a number of intersections in the corridor will operate at Level of Service D or E in the future, the build alternatives will not operate at a significantly lower level of service than the no-build alternative. Overall traffic volumes will be lower in the corridor with the build alternatives. However, the reduced capacity for general traffic with the bus/HOV Alternative and the possible increase in delay for general traffic because of the possible reduction in green time available at intersections in the corridor with the light rail alternative could result in slightly lower levels of service for these alternatives. It is likely that any possible hot spot impact could be mitigated by minor improvements at corridor intersections. More detailed analysis and consideration to potential hot spots will need to be part of the Final EIS process.

**5.15.3 Intersection Air Quality Impacts**

One aspect of the air quality analysis for a project of this type is to examine the potential impact of traffic volumes and level of service on air quality at major intersections. Standard computer analysis programs are used to make this evaluation. The analysis is typically performed at the worst intersections in terms of forecast traffic volumes and level of service. This detailed intersection air quality analysis is normally done as part of the effort in preparing the FEIS when more precise engineering information is available. In preparation for that activity, three intersections were identified which are forecast to have the highest volumes of traffic with Alternative C—LRT. An additional three intersections were identified which are forecast to have the highest level of delay for the same alternative. These intersections were selected based on delay calculations contained in Table 4-5.
six intersections that should be analyzed for potential air quality impacts are listed in the following table:

**TABLE 5-13**  
AIR QUALITY ANALYSIS

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Criteria Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 South/700 East</td>
<td>Volume Rank 1</td>
</tr>
<tr>
<td>400 South/900 East</td>
<td>Volume Rank 2</td>
</tr>
<tr>
<td>400 South/1300 East</td>
<td>Volume Rank 3</td>
</tr>
<tr>
<td>400 South/Main Street</td>
<td>Delay Rank 1</td>
</tr>
<tr>
<td>400 South/State Street</td>
<td>Delay Rank 2</td>
</tr>
<tr>
<td>400 South/300 West</td>
<td>Delay Rank 3</td>
</tr>
</tbody>
</table>
(Cost is an important consideration in the evaluation of transportation alternatives. Critical decisions that affect eventual selection of a locally preferred alternative are based on the annual net cost of each alternative. The annual net cost is estimated based on three basic financial elements: annual capital costs, annual operating and maintenance (O&M) costs and annual fare box revenue. The analysis of these financial elements for each of the DEIS alternatives is presented in the following sections. The results of this analysis are summarized in Table 6-1.

### 6.11.1 Capital Costs

Estimation of capital costs was carried out in three steps: development of cost estimation methods; actual estimation of capital costs; and a comparison of capital costs between alternatives. Each of these steps for estimating and evaluating capital costs is presented for alternatives B and C. No estimate of capital cost was made for Alternative A because, by definition, Alternative A is the “No Action/No New Major Investment” alternative. Funding for projects that will be constructed under the no-build scenario are already committed and do not represent or require new major investment dollars.

**Cost Estimation Methods**

*Alternative A—No-Build.* By definition of this alternative, estimation of capital costs was not required.

*Alternative B—Bus/HOV/TDM/TSM.* Capital cost for this alternative was estimated based on cost for the following elements. All units and unit costs are included in Table 6-2.

- **New buses to expand the fleet**
  This element includes costs to buy additional buses which will be added to the existing total bus system. The fleet was increased by 18 buses to serve the peak period with the Bus/HOV option.

- **Marking and signing HOV lanes**
  This element includes costs associated with new paint and labor for marking and signing as well as for construction and installation of signs and signal control devices.

- **TSM intersection improvements**
  This element includes costs associated with traffic signal adjustments necessary to accommodate traffic volume demands, as well as intersection turn-lane expansion costs. For purposes of estimating capital costs, it was assumed that 15 intersections would be modified.

- **TDM program**
  This element includes costs associated with employer-based programs, bicycle and pedestrian enhancements and car/vanpooling programs.
### TABLE 6-1
ANNUAL CASH FLOW PROJECTIONS FOR E/W TRANSIT SCENARIOS (1996 DOLLARS)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing System ($ thousands)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Bus System O&amp;M</td>
<td>50,400</td>
<td>50,400</td>
<td>50,400</td>
</tr>
<tr>
<td>N/S LRT O&amp;M</td>
<td>7,400</td>
<td>7,400</td>
<td>7,400</td>
</tr>
<tr>
<td>Subtotal</td>
<td>57,800</td>
<td>57,800</td>
<td>57,800</td>
</tr>
<tr>
<td><strong>E/W Corridor ($ thousands)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus/HOV O&amp;M*</td>
<td>-</td>
<td>1,900</td>
<td>(950)</td>
</tr>
<tr>
<td>LRT O&amp;M</td>
<td>-</td>
<td>-</td>
<td>7,500</td>
</tr>
<tr>
<td>Subtotal</td>
<td>-</td>
<td>1,900</td>
<td>6,550</td>
</tr>
<tr>
<td><strong>Grand Total O&amp;M ($ thousands)</strong></td>
<td>57,800</td>
<td>59,700</td>
<td>64,350</td>
</tr>
<tr>
<td>Passengers (Daily)</td>
<td>124,700</td>
<td>129,900</td>
<td>130,500</td>
</tr>
<tr>
<td>Annual Passengers**</td>
<td>35,290,100</td>
<td>36,751,700</td>
<td>36,931,500</td>
</tr>
<tr>
<td>Annual Special Generators</td>
<td>-</td>
<td>3,259,850</td>
<td>3,911,820</td>
</tr>
<tr>
<td><strong>Total Passengers</strong></td>
<td>35,290,100</td>
<td>40,021,550</td>
<td>40,843,320</td>
</tr>
<tr>
<td>Annual Revenue ($ thousands)***</td>
<td>16,900</td>
<td>19,200</td>
<td>19,600</td>
</tr>
<tr>
<td>Net O&amp;M Cost ($ thousands)</td>
<td>40,900</td>
<td>40,500</td>
<td>44,800</td>
</tr>
<tr>
<td>Net O&amp;M Cost Per Passenger ($)</td>
<td>1.16</td>
<td>1.10</td>
<td>1.10</td>
</tr>
<tr>
<td>Operating Ratio</td>
<td>29%</td>
<td>32%</td>
<td>30%</td>
</tr>
<tr>
<td>Capital Cost ($ thousands)</td>
<td>-</td>
<td>37,800</td>
<td>374,000</td>
</tr>
<tr>
<td>Annual Capital Cost ($ thousands)</td>
<td>0</td>
<td>5,200</td>
<td>30,600</td>
</tr>
<tr>
<td>Annual Capital Cost + O&amp;M ($ thousands)</td>
<td>57,800</td>
<td>64,900</td>
<td>94,400</td>
</tr>
<tr>
<td>[Annual Capital Cost + O&amp;M] Per Passenger ($)</td>
<td>1.64</td>
<td>1.62</td>
<td>2.31</td>
</tr>
<tr>
<td>Annual Net Cost ($ thousands)</td>
<td>40,900</td>
<td>45,700</td>
<td>74,800</td>
</tr>
<tr>
<td>Annual Net Cost Per Passenger ($)</td>
<td>1.16</td>
<td>1.14</td>
<td>1.83</td>
</tr>
</tbody>
</table>

* Savings in Bus O&M for LRT  
** Annualization factor of 283 days  
*** Average Fare $.46
### TABLE 6-2
E/W CORRIDOR BUS/HOV CAPITAL COST ESTIMATE

<table>
<thead>
<tr>
<th>Item</th>
<th>Units x Unit Cost</th>
<th>Item Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Buses to expand fleet</td>
<td>18 @ $250,000 per bus</td>
<td>$4,500,000</td>
</tr>
<tr>
<td>Markingg and signing HOV lanes</td>
<td></td>
<td>$1,000,000</td>
</tr>
<tr>
<td>TSiM intersection improvements</td>
<td>15 @ $100,000 per intersection</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>TDIM program</td>
<td></td>
<td>$500,000</td>
</tr>
<tr>
<td>Transit Centers</td>
<td>4 @ $2,000,000 per transit center</td>
<td>$8,000,000</td>
</tr>
<tr>
<td>Park-and-rides</td>
<td>4 @ $1,300,000 per park-and-ride</td>
<td>$5,200,000</td>
</tr>
<tr>
<td>Maintenance Facilities</td>
<td></td>
<td>$-</td>
</tr>
<tr>
<td>Right-of-Way</td>
<td>2,000,000 sf @ $2.70 per square foot</td>
<td>$5,400,000</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td>$26,100,000</td>
</tr>
<tr>
<td>Contingency (30%)</td>
<td></td>
<td>$7,830,000</td>
</tr>
<tr>
<td>Engineering Design (5%)</td>
<td></td>
<td>$1,305,000</td>
</tr>
<tr>
<td>Construction Management (10%)</td>
<td></td>
<td>$2,610,000</td>
</tr>
<tr>
<td>Grand total</td>
<td></td>
<td>$37,800,000</td>
</tr>
<tr>
<td>Annualization of Grand Total</td>
<td>6% interest over 20 years</td>
<td>$3,200,000</td>
</tr>
</tbody>
</table>
Transit Centers
This element consists of transit centers at the Airport and University of Utah, as well as at two other locations. It was assumed that each center would include up to 300 parking spaces along with bus loading bays and passenger waiting facilities. Based on construction of similar centers in other cities, the centers are assumed to cost $2,000,000 each.

Park-and-Ride Facilities
The cost for this element is based upon area and paving costs. The average Park-and-Ride lot is assumed to hold 500 cars.

Maintenance Facilities
No additional maintenance facilities are assumed necessary for implementation of this option.

Right-of-Way
Right-of-way was calculated at $2.70 per square foot based on the average cost of land between the Airport, Downtown and the University. This average cost was applied to the area of the Park-and-Ride lots, assuming 350 square feet per car, plus 15 percent for buses. Additionally, a uniform width of 30 feet was assumed to run the full length of the corridor, to allow for the tracks.

Contingency
Due to the extreme variability of the costs associated with this project at this early stage, a uniform 30 percent contingency was assumed for all capital costs.

Pre-Engineering and Design
This includes the engineering costs associated with the FEIS, preliminary design, design and preparation of specifications and bid packages. A total fee of 15 percent of the capital costs was assumed, including the contingency.

Construction Management
This cost includes engineering, construction management and permitting.

Annualized Capital Cost
The annualized capital cost was calculated by amortizing the total capital cost over 20 years at an interest rate of six percent.

Alternative C—LRT/TDM/TSM. Capital cost for this alternative was estimated based on the following cost elements. All units and unit costs are included in Table 6-3.

Civil Construction
This element includes costs associated for structures, bridges, LRT tracks and road replacement as part of construction. Units and unit costs assumed for the capital cost estimation were based on the 35 Percent Design Progress Submittal Report for the North/South LRT (February 1996) and the Denver RTD Southwest LRT Preliminary Cost Estimate Summary (January 1996).
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Systems
This element includes the electrical and communication systems. The costs of systems is based on a unit cost derived from the North/South LRT 35 Percent Submittal Report and the Denver RTD Southwest LRT Preliminary Cost Estimate.

Stations
This element includes the costs of the end-of-line stations and normal or intermediate stations. Unit costs for the stations are based on the average station costs in North/South LRT report. For the normal or intermediate stations, the rate was equated as shown in Table 6-3, however, the end-of-the line stations at the University and the Airport are expected to be much larger. The increased rate is further reflected in Table 6-3.

Park-and-Rides
The cost estimates for the park-and-ride facilities were based upon the area and paving costs. The average park-and-ride lot was assumed to hold 500 cars.

Vehicles
It was assumed that an additional 16 vehicles would be needed for the east-west LRT system. The current costs for the vehicles being used on the North/South LRT were obtained for this estimate.

Maintenance Facilities
Costs for the maintenance facilities for the North/South LRT and the Denver RTD Southwest LRT were compared. This maintenance complex would supplemental to the main North/South LRT facility. It would provide storage capacity for the additional vehicles along with equipment and facilities required for daily vehicle maintenance, washing and repair.

Right-of-Way
Right-of-way was calculated at $2.70 per square foot, based on the average cost of land between the Airport, Downtown and University. This average cost was applied to the area of the park-and-ride lots, assuming 350 square feet per car, plus 15 percent for buses. Additionally, a uniform width of 30 feet was assumed to run the full length of the lot, to allow for the tracks.

Amenities
Amenities include benches and other facilities associated with rider comfort. This cost was associated to 10 percent of the total unburdened capital costs of the East-West LRT.

Contingency
Due to the extreme variability of the costs associated with this project at this early stage, a uniform 30 percent contingency was assumed for all capital costs.
### TABLE 6-3
ALT. C - LRT
CAPITAL COST ESTIMATE

<table>
<thead>
<tr>
<th>Cost Components</th>
<th>Unit Cost</th>
<th>Units</th>
<th>Years</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Civil Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structures</td>
<td>$4,200</td>
<td>$/foot</td>
<td>30</td>
<td>4,330</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (ft)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bridges</td>
<td>$4,200,000</td>
<td>each</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Number Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (ft)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Tracks</td>
<td>$235</td>
<td>$/foot</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Number Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
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<td></td>
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</tr>
<tr>
<td>Length (ft)</td>
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<tr>
<td>Costs</td>
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</tr>
<tr>
<td>Double Tracks</td>
<td>$361</td>
<td>$/foot</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Number Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Length (ft)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>$190</td>
<td>$/foot</td>
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</tr>
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<td>Number Costs</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (ft)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systems</td>
<td>$1,000</td>
<td>$/foot</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Number Costs</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length (ft)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End</td>
<td>$1,500,000</td>
<td>each</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Number Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
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<td>0</td>
</tr>
<tr>
<td>Number Costs</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Number Costs</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Park and Ride</td>
<td>$1,300,000</td>
<td>each</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>Number Costs</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicles</td>
<td>$2,100,000</td>
<td>each</td>
<td>25</td>
<td>0</td>
</tr>
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<td>Number Costs</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance Facilities</td>
<td>$8,800,000</td>
<td>each</td>
<td>30</td>
<td>0</td>
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<tr>
<td>Number Costs</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right of Way</td>
<td>$2,70</td>
<td>/sq-ft</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Area (sq-ft)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amenities</td>
<td>10</td>
<td>% of subtotal</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contingency</td>
<td>30</td>
<td>% of subtotal</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Engineering and Design Costs</td>
<td>15</td>
<td>% of subtotal</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cons. Management</td>
<td>15</td>
<td>% of subtotal</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Administration</td>
<td>15</td>
<td>% of subtotal</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Operations</td>
<td>5</td>
<td>% of subtotal</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>5</td>
<td>% of subtotal</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cost per mile</strong></td>
<td></td>
<td></td>
<td></td>
<td>$34,898</td>
</tr>
<tr>
<td><strong>Annualized Capital Costs</strong></td>
<td></td>
<td></td>
<td></td>
<td>$23,618</td>
</tr>
</tbody>
</table>

\[ \text{(\$1000's)} \]
Pre-Engineering and Design
This includes the engineering costs associated with the FEIS, preliminary design, design and preparation of specifications and bid packages. A total fee of 15 percent of the capital costs, including the contingency, was assumed.

Construction Management
This cost includes engineering construction management and permitting.

Project Administration
This cost includes the agency administration costs associated with the construction of the East-West LRT. These costs were based on estimates from the Denver RTD system and completed systems in San Diego.

Pre-Operations
This cost reflects expenditures associated with start-up of the system following construction. A cost of five percent of capital cost with contingency was assumed for the DEIS.

Insurance
The insurance costs were assumed to be equivalent to five percent of the total capital costs.

Annualized Capital Cost
The annualized capital cost was estimated by calculating the amortization costs for various components of the LRT system and then summing to obtain a total annual cost. The number of years used to amortize the various capital items is indicated in Table 6-3. The assumption on number of years used in amortizing capital cost is based on federal guidelines related to the type of element and its expected useful life.

Capital Cost-Estimation Results

Alternative A—No-Build
As there are no capital costs associated with Alternative A—No-Build, no capital cost estimate was prepared.

Alternative B—Bus/HOV/TDM/TSM
Table 6-2 reflects the capital cost estimate including unit cost, number of units, amortization period, total cost and annual cost. The estimated capital cost for Alternative B—Bus/HOV/TDM/TSM is $37.8 million in 1996 dollars. As indicated in Table 6-2, the annual capital cost of these improvements is estimated to be $3.2 million. In addition to capital costs for the Bus/HOV improvements, there are also annual costs for TDM and TSM improvements. Total annual capital cost for Alternative B—Bus/HOV is summarized as follows:
Table 6-3 reflects the capital cost estimate including unit cost, number of units, amortization period, total cost and annual cost. The estimated capital cost for Alternative C—LRT/TDM/TSM is $374 million. The annualized cost of these improvements is $28.6 million. As with Alternative B, there are also annual capital costs associated with TDM and TSM. The annual capital cost for this alternative is comprised of the following elements:

- **LRT**: $28.6 million
- **TDM**: $0.5 million
- **TSM**: $1.5 million

Total annual cost is $30.6 million.

### Comparison of Capital Costs for Alternatives

The procedure followed and results obtained in estimating capital cost for each alternative is documented in the previous section. FTA has specific guidelines for amortizing different elements of transit projects. LRT vehicles, for example, are amortized at a different rate than tracks or stations. Table 6-4 provides a summary of the capital cost (1996$) and annualized capital cost for each alternative.

<table>
<thead>
<tr>
<th>TABLE 6-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAPITAL COST COMPARISON</td>
</tr>
<tr>
<td>(in millions)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Total Cost</td>
</tr>
<tr>
<td>Annual Cost</td>
</tr>
</tbody>
</table>

### 6.1.2 Operation and Maintenance (O&M) Costs

Estimation of O&M costs was accomplished in three steps: development of cost estimation methods; estimation of O&M costs for each alternative; and comparison of O&M costs between alternatives. Each of these steps is presented below.

#### O&M Cost Methodology

**Alternative A—No-Build.** Operations cost for the no-build alternative consists of the existing total bus system cost and N/S LRT O&M cost. A cost of $49 million for 1995 was obtained from UTA for existing total bus system O&M. This cost was inflated by three percent to $50.47 million to reflect 1996 dollars. An O&M estimate of $7.4 Million was obtained from the EIS for the N/S LRT.
Chapter 6 Financial Analysis

Alternative B—Bus/FOV/TDM/TSM. Operations cost for special east-west bus line between the University and the Airport was derived based on methodology outlined in Operating and Maintenance Cost Projections Technical Memorandum (September 1993) prepared for UTA. The methodology consists of multiplying service level variables, including vehicle miles traveled, number of peak vehicles, number of maintenance facilities, platform hours and unlinked passenger trips, by the appropriate unit cost for each of the cost components as follows:

- Administration and scheduling of transportation operations/labor
- Operator wages and fringes
- Fuel and lube
- Tires and tubes
- Vehicle maintenance administration/labor
- Facilities maintenance administration/labor
- Servicing revenue vehicles/labor
- Inspection, maintenance and repair of revenue vehicles—labor
- Inspection, maintenance and repair of servicing of revenue vehicles—materials and supplies
- Inspection, maintenance and servicing of service vehicles
- Maintenance of fare collection and counting equipment
- Maintenance of repair of buildings, grounds and equipment
- Ticketing and fare collection
- Injuries and damages
- General insurance

The O&M cost model for the existing bus system is included in Appendix G. The same model was used to estimate O&M costs for the east-west corridor bus service. Unit cost data were taken from information supplied by UTA. Service level variables were derived based on the following headway assumptions in Table 6-5 below.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>LRTT Headway (min)</th>
<th>Bus/HOV Headway (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:30 AM to 6 AM</td>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>9:30 PM to 12 AM</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>9:30 AM to 4 PM</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>4:30 PM to 9 PM</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

This schedule generates 164 one-way trips per day over a 10.4 mile distance. It necessitates that 16 peak vehicles be in use during the five-minute headway periods. Approximate one-way travel time for bus/HOV along this route is equal to 40 minutes based on similar bus routes from the Airport to Downtown and from the University to Downtown. Deadhead bus travel time and distance were also considered in the calculation of service level variables. The estimated O&M cost for total specialized east-west bus service is summarized in Table 6-6.
Bus operations for Alternative B consist of two components. The first component is the entire regional bus system not including any special bus service in the east-west corridor. Based on information obtained from UTA, the existing bus system had an annual operating cost of $49 million in 1995. Adding a one-year adjustment of three percent, the annual operations cost for the UTA bus system is estimated at $50.47 million.

The second element of the bus system for Alternative B is a special corridor bus service operation at relatively high frequency between the University and the Airport. The calculations used to estimated the cost of operating this bus service are summarized in table 6-5. Total bus operating cost for Alternative B is summarized as follows:

<table>
<thead>
<tr>
<th>UTA System</th>
<th>$50.47 million</th>
</tr>
</thead>
<tbody>
<tr>
<td>East-West Corridor Bus</td>
<td>1.91 million</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$52.38 million</strong></td>
</tr>
</tbody>
</table>

Alternative C—LRT/HOV/TDM/TSM. Operations cost for Alternative C was derived based on methodology outlined in Operating and Maintenance Cost Projections Technical Memorandum (September 1993) prepared for UTA. An updated version of the LRT cost model is contained in Appendix G. The methodology consists of multiplying service level variables, including vehicle miles traveled, number of peak vehicles, number of maintenance facilities, platform hours, directional track miles and unlinked passenger trips, by the appropriate unit cost for each of the cost components listed below:

- Operator wages and fringes
- Administration and scheduling of transportation operations/labor
- Propulsion power
- Inspection, maintenance and repair or revenue vehicles/labor
- Servicing revenue vehicles/labor
- Inspection, maintenance and repair of servicing of revenue vehicles/materials and supplies
- Vehicle maintenance administration/labor
- Facilities maintenance administration/labor
- Maintenance of roadway and track/labor
- Maintenance of vehicle movement and control systems/labor
- Maintenance of communication systems/labor
- Right-of-way & systems maintenance materials and supplies
- O&M of electric power facilities/labor
- O&M of electric power facilities/ materials and supplies
- Maintenance of repair of buildings, grounds and equipment/labor and materials
- Maintenance of fare collection and counting equipment
- Maintenance administration facilities
- Ticketing and fare collection
- Injuries and damages
- System security
- General insurance
## TABLE 6-6
### OPERATION & MAINTENANCE COSTS FOR ALT. B - BUS/ HOV

<table>
<thead>
<tr>
<th>Cost Component</th>
<th>Unit Cost</th>
<th>Units</th>
<th>Alt. B-Bus/ HOV</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 Admin &amp; Scheduling Labor</td>
<td>$3.90</td>
<td>$/plat hour</td>
<td>33,540</td>
</tr>
<tr>
<td>Platform hours</td>
<td></td>
<td></td>
<td>$130,806</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 Oper. Wages &amp; Fringe</td>
<td>$19.23</td>
<td>$/plat hour</td>
<td>33540</td>
</tr>
<tr>
<td>Platform hours</td>
<td></td>
<td></td>
<td>$644,974</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33 Fuel &amp; Labor</td>
<td>$0.17</td>
<td>$/veh mile</td>
<td>583,400</td>
</tr>
<tr>
<td>Vehicle miles</td>
<td></td>
<td></td>
<td>$99,178.00</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 Tubes and Tires</td>
<td>$2,399</td>
<td>$/peak veh</td>
<td>16</td>
</tr>
<tr>
<td>Peak vehicles</td>
<td></td>
<td></td>
<td>$38,389</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53 Vehicle Maint. Admin Labor</td>
<td>$0.13</td>
<td>$/veh mile</td>
<td>583,400</td>
</tr>
<tr>
<td>Vehicle miles</td>
<td></td>
<td></td>
<td>$75,642</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61 Facilities Maint. Admin Labor</td>
<td>$16,290</td>
<td>$/garage</td>
<td>1</td>
</tr>
<tr>
<td>Garage</td>
<td></td>
<td></td>
<td>$16,290</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>77 Servicing Revenue Veh. Labor</td>
<td>$5,276</td>
<td>$/peak veh</td>
<td>16</td>
</tr>
<tr>
<td>Peak vehicles</td>
<td></td>
<td></td>
<td>$84,415</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>81 Vehicle Inspect., Maint., Repair (Labor)</td>
<td>$0.42</td>
<td>$/veh. mile</td>
<td>583,400</td>
</tr>
<tr>
<td>Vehicle miles</td>
<td></td>
<td></td>
<td>$245,028</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>91 Vehicle Inspect., Maint., Repair (Supplies)</td>
<td>$0.16</td>
<td>$/veh. mile</td>
<td>583,400</td>
</tr>
<tr>
<td>Vehicle miles</td>
<td></td>
<td></td>
<td>$93,344</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Insp., Maint., Service of Service Vehicles</td>
<td>$216.46</td>
<td>$/peak veh</td>
<td>16</td>
</tr>
<tr>
<td>Peak vehicles</td>
<td></td>
<td></td>
<td>$3,463</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Maint. of Vehicle Control System</td>
<td>$653</td>
<td>$/peak veh</td>
<td>16</td>
</tr>
<tr>
<td>Peak vehicles</td>
<td></td>
<td></td>
<td>$10,448</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Maint. of Fare Collection Equip.</td>
<td>$112</td>
<td>$/peak veh</td>
<td>16</td>
</tr>
<tr>
<td>Peak vehicles</td>
<td></td>
<td></td>
<td>$1,788</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 Maint of Buildings/Grounds</td>
<td>$142,254</td>
<td>$/garage</td>
<td>1</td>
</tr>
<tr>
<td>Garage</td>
<td></td>
<td></td>
<td>$142,254</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 Ticketing &amp; Fare Collection</td>
<td>$0.01</td>
<td>$/peak veh</td>
<td>4,850,000</td>
</tr>
<tr>
<td>Unlinked passenger trip</td>
<td></td>
<td></td>
<td>$24,735</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 Injuries &amp; Damages</td>
<td>0.001</td>
<td>$/veh mile</td>
<td>583,400</td>
</tr>
<tr>
<td>Vehicle miles</td>
<td></td>
<td></td>
<td>$846</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Component</td>
<td>Unit Cost</td>
<td>Units</td>
<td>Alt. B-Bus/ HOV</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------</td>
<td>---------</td>
<td>----------------</td>
</tr>
<tr>
<td>16 General Insurance Peak vehicles</td>
<td>$100</td>
<td>$/peak veh</td>
<td>16</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td>$1,600</td>
</tr>
<tr>
<td>17 Security System Garage</td>
<td>$56,004</td>
<td>$/garage</td>
<td>1</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td>$56,004</td>
</tr>
<tr>
<td>Subtotal</td>
<td></td>
<td></td>
<td>$1,669,405</td>
</tr>
<tr>
<td>General &amp; Administrative (10.9%)</td>
<td></td>
<td></td>
<td>$181,965</td>
</tr>
<tr>
<td>Total ($1995)</td>
<td></td>
<td></td>
<td>$1,850,000</td>
</tr>
<tr>
<td>Total ($1996, With 3% Inflation)</td>
<td></td>
<td></td>
<td>$1,910,000</td>
</tr>
</tbody>
</table>
The service level variables were derived based on the headway assumptions given above in Table 6-5 and on the following assumptions:

- Estimated LRT corridor travel times
- Vehicles deadhead 0.5 miles to garage from point on track approximately one-half way between SLCIA and University of Utah
- 142 departures (eastbound and westbound) daily, as per headway schedule above in Table 6-5
- 16 vehicles
- 283 day annualization factor
- Unlinked passenger trips data supplied by WFRC
- One LRT garage
- Platform hours = operating hours + deadhead hours
- Each vehicle deadheads to and from garage three times per day

The estimated O&M cost for East-West LRT is summarized in Table 6-7.
### TABLE 6-7
OPERATION & MAINTENANCE COSTS FOR ALT. C - LRT

<table>
<thead>
<tr>
<th>Cost Component</th>
<th>Unit Cost</th>
<th>Units</th>
<th>Alt. C-LRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Operator Wages and Fringes</td>
<td>$37.66</td>
<td>$/plat hour</td>
<td>24,029</td>
</tr>
<tr>
<td>Platform hours Costs</td>
<td></td>
<td></td>
<td>$904,925</td>
</tr>
<tr>
<td>2 Admin and Sched. of Trans. Oper. - Labor</td>
<td>$14.70</td>
<td>$/plat hour</td>
<td>24,029</td>
</tr>
<tr>
<td>Platform hours Costs</td>
<td></td>
<td></td>
<td>$353,223</td>
</tr>
<tr>
<td>3 Propulsion Power</td>
<td>$0.38</td>
<td>$/veh mile</td>
<td>647,885</td>
</tr>
<tr>
<td>Vehicle miles Costs</td>
<td></td>
<td></td>
<td>$245,548.42</td>
</tr>
<tr>
<td>4 Insp. Maint. &amp; Repair of Revenue Veh.</td>
<td>$1.93</td>
<td>$/veh mile</td>
<td>647,885</td>
</tr>
<tr>
<td>Vehicle miles Costs</td>
<td></td>
<td></td>
<td>$1,250,418</td>
</tr>
<tr>
<td>5 Servicing of Revenue Vehicles - Labor</td>
<td>$11,584</td>
<td>$/peak veh</td>
<td></td>
</tr>
<tr>
<td>Peak vehicles Costs</td>
<td></td>
<td></td>
<td>$185,344</td>
</tr>
<tr>
<td>6 I,M&amp;R and Serv. of Rev. Veh - Supplies</td>
<td>$0.40</td>
<td>$/veh mile</td>
<td>647,885</td>
</tr>
<tr>
<td>Vehicle miles Costs</td>
<td></td>
<td></td>
<td>$261,098</td>
</tr>
<tr>
<td>7 Vehicle Maint. Admin - Labor</td>
<td>$0.51</td>
<td>$/veh mile</td>
<td>647,885</td>
</tr>
<tr>
<td>Vehicle miles Costs</td>
<td></td>
<td></td>
<td>$331,717</td>
</tr>
<tr>
<td>8 Maint. of Road and Track - Labor</td>
<td>$91,835</td>
<td>$/dir track mile</td>
<td>20.8</td>
</tr>
<tr>
<td>Dir. track miles Costs</td>
<td></td>
<td></td>
<td>$1,910,168</td>
</tr>
<tr>
<td>9 Maint. of Vehicle Move. Cntl Syst.-Labor</td>
<td>$1,272</td>
<td>$/dir track mile</td>
<td>20.8</td>
</tr>
<tr>
<td>Dir. track miles Costs</td>
<td></td>
<td></td>
<td>$26,458</td>
</tr>
<tr>
<td>10 Maint. of Comm Syst. - Labor</td>
<td>$349</td>
<td>$/peak veh</td>
<td>20.8</td>
</tr>
<tr>
<td>Dir. track miles</td>
<td></td>
<td></td>
<td>$7,259</td>
</tr>
<tr>
<td>11 ROW and Syst. Maint. - Supplies</td>
<td>$17,675</td>
<td>$/dir track mile</td>
<td>20.8</td>
</tr>
<tr>
<td>Dir. track miles Costs</td>
<td></td>
<td></td>
<td>$367,640</td>
</tr>
<tr>
<td>12 O &amp; M of Electric Power Facil. - Labor</td>
<td>$19,507</td>
<td>$/dir track mile</td>
<td>20.8</td>
</tr>
<tr>
<td>Dir. track miles Costs</td>
<td></td>
<td></td>
<td>$405,746</td>
</tr>
<tr>
<td>13 O &amp; M of Electric Power Facil. - Labor</td>
<td>$3,186</td>
<td>$/dir track mile</td>
<td>20.8</td>
</tr>
<tr>
<td>Dir. track miles Costs</td>
<td></td>
<td></td>
<td>$66,269</td>
</tr>
<tr>
<td>14 Maint. &amp; Rep. of Blds&amp;Grds - Mat&amp;Labor</td>
<td>$142,254</td>
<td>$/facility</td>
<td>1</td>
</tr>
<tr>
<td>Facilities Costs</td>
<td></td>
<td></td>
<td>$142,254</td>
</tr>
<tr>
<td>15 Maint of Fare Coll. Equip.</td>
<td>$112</td>
<td>$/peak veh</td>
<td>16</td>
</tr>
<tr>
<td>Peak vehicles Costs</td>
<td></td>
<td></td>
<td>$1,792</td>
</tr>
<tr>
<td>16 Maint Admin. - Facilities</td>
<td>$16,290</td>
<td>$/facility</td>
<td>1</td>
</tr>
<tr>
<td>Facilities Costs</td>
<td></td>
<td></td>
<td>$16,290</td>
</tr>
</tbody>
</table>
## TABLE 6-7

**OPERATION & MAINTENANCE COSTS FOR ALT. C - LRT**

<table>
<thead>
<tr>
<th>Cost Component</th>
<th>Unit Cost</th>
<th>Units</th>
<th>Alt. C-LRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Ticketing &amp; Fare Collection</td>
<td>$0.01</td>
<td>$/unl. passngr.</td>
<td>2,968,912</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$15,090</td>
</tr>
<tr>
<td>Unlinked passengers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 Injuries and Damages</td>
<td>0.0015</td>
<td>$/veh miles</td>
<td>647,885</td>
</tr>
<tr>
<td>Vehicle miles</td>
<td></td>
<td></td>
<td>$939</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 System Security</td>
<td>$56,004</td>
<td>$/facility</td>
<td>1</td>
</tr>
<tr>
<td>Facilities</td>
<td></td>
<td></td>
<td>$56,004</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 General Insurance Premiums</td>
<td>$100</td>
<td>$/peak vehicle</td>
<td>16</td>
</tr>
<tr>
<td>Peak vehicles</td>
<td></td>
<td></td>
<td>$1,600</td>
</tr>
<tr>
<td>Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td></td>
<td><strong>$6,549,782</strong></td>
</tr>
<tr>
<td><strong>General &amp; Administrative (10.9%)</strong></td>
<td></td>
<td></td>
<td><strong>$713,926</strong></td>
</tr>
<tr>
<td><strong>Total ($1995)</strong></td>
<td></td>
<td></td>
<td><strong>$7,260,000</strong></td>
</tr>
<tr>
<td><strong>Total ($1996, With 3% Inflation)</strong></td>
<td></td>
<td></td>
<td><strong>$7,480,000</strong></td>
</tr>
</tbody>
</table>
O&M Cost Estimation Results

Calculation of LRT operating costs in the east-west corridor are summarized in Table 6-7. There would be an estimated savings of $950,000 per year in bus operating cost for bus service replaced by LRT operations. Bus operating costs with Alternative B are estimated as follows:

<table>
<thead>
<tr>
<th>Cost Description</th>
<th>Alternative B Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-Build Cost</td>
<td>50.47 million</td>
</tr>
<tr>
<td>Service replaced by LRT</td>
<td>95 million</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>49.52 million</strong></td>
</tr>
</tbody>
</table>

Total transit-systems operating-costs with Alternative C are estimated as follows:

<table>
<thead>
<tr>
<th>System Type</th>
<th>Alternative C Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E/W LRT</td>
<td>7.50 million</td>
</tr>
<tr>
<td>N/S LRT</td>
<td>7.40 million</td>
</tr>
<tr>
<td>Bus System</td>
<td>49.52 million</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>64.42 million</strong></td>
</tr>
</tbody>
</table>

The estimated O&M costs ($1996) for each alternative are summarized in Table 6-8 below.

<table>
<thead>
<tr>
<th>System Type</th>
<th>Alternative A Cost ($)</th>
<th>Alternative B Cost ($)</th>
<th>Alternative C Cost ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTA Bus</td>
<td>50.4</td>
<td>50.4</td>
<td>49.5</td>
</tr>
<tr>
<td>East-West Corridor Bus</td>
<td>0</td>
<td>1.9</td>
<td>0</td>
</tr>
<tr>
<td>North-South LRT</td>
<td>7.4</td>
<td>7.4</td>
<td>7.4</td>
</tr>
<tr>
<td>East-West LRT</td>
<td>0</td>
<td>0</td>
<td>7.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>57.8</strong></td>
<td><strong>59.7</strong></td>
<td><strong>64.4</strong></td>
</tr>
</tbody>
</table>

A primary objective of making a major investment in transportation services for the east-west corridor is to provide a more effective collection/distribution system to serve the large number of special generators in the corridor. Both the bus service improvements in Alternative B and the LRT service in Alternative C, were configured to accomplish this objective. The amount of service provided by each alternative is comparable. That is, they follow basically the same alignment and provide a similar level of service in terms of operating frequency. There is a significant difference, however, in terms of O&M costs. The annual O&M costs for Alternative B—Bus/HOV/TDM/TSM is $1.9 million compared to $ 7.5 million for Alternative C—LRT/TDM/TSM.
### 6.1.3 Operating Revenues

Estimation of annual operating revenues was accomplished by multiplying estimated annual ridership times the estimated average fare per passenger.

#### Methodology

The current fare price is $0.85. However, with transfers the average fare price per boarding passenger is $0.48 based on information provided by UTA. Annual ridership data for different LRT and/or Bus/HOV scenarios was obtained from WFRC.

#### Results

Alternative A—No-Build. Daily ridership for this alternative is estimated to be 124,700 persons. An annualization factor of 283 was established to represent the fact that UTA provides only 60 percent of normal weekday service on Saturdays and practically no service on Sunday. Multiplying this annualization factor by an average fare of $0.48 yields an annual revenue of $16.9 million.

Alternative B—Bus/HOV/TDM/TSM. Daily ridership for this alternative is estimated at 129,858 persons. This represents an increase of 5,200 daily transit riders in comparison with Alternative A. Annualizing by 283 days yields an estimate of 36.7 million passengers. An estimate of additional person trips from special generators, the Airport and the University of Utah is presented in Table 4-9. Multiplying the low estimate of person trips times two yields 3.3 million additional riders. Multiplying by an average fare of $0.48 yields an annual revenue of $19.2 million. (See Table 4-9)

Alternative C—LRT/TDM/TSM. Daily ridership for this alternative is projected to be 130,500 persons. This represents an increase of 5,800 and 600 daily transit riders over Alternative A and Alternative B, respectively. Annualizing by 283 days yields an estimate of 36.9 million passengers. The additional transit passengers or special generators, the Airport and the University of Utah for Alternative B—Bus/HOV, was increased by 20 percent to reflect the attractiveness of LRT resulting in a total ridership of 40.8 million. Multiplying by an average fare of $0.48 yields an annual revenue of $19.6 million.

#### Comparison

Because both bus and LRT ridership is projected to be similar and because the fare for each is the same, the revenues are similar as well. See Table 6-9 below.

<table>
<thead>
<tr>
<th>TABLE 6-9 ANNUAL REVENUE COMPARISON</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alternative A</strong>—No-Build</td>
</tr>
<tr>
<td>Daily Ridership</td>
</tr>
<tr>
<td>Annual Ridership</td>
</tr>
<tr>
<td>Special Generator Riders</td>
</tr>
<tr>
<td>Total Riders</td>
</tr>
<tr>
<td>Revenue ($1 thousand)</td>
</tr>
</tbody>
</table>

Parsons Transportation Group
6.2 CAPITAL AND OPERATING REVENUE SHORTFALLS

The annual revenue requirement for any given future year is estimated by adding the estimated annual O&M cost to the annualized capital cost and subtracting the annual fare box revenue. The estimated annual revenue requirement for each alternative is contained in the row labeled "Annualized Net Cost" in Table 6-10. As indicated in Table 6-10, the estimated future fare box revenue covers only about 29 to 32 percent of the annual O&M costs. This means that fare box revenues cover only part of the annual O&M cost and none of the annualized capital cost. The annualized net cost, which constitutes the cash flow shortfall for each alternative, is summarized in Table 6-10.

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Alternative A - No-Build</th>
<th>Alternative B - Bus/ HOV/TDM/TSM</th>
<th>Alternative C LRT/TDM/TSM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual O&amp;M</td>
<td>57.8</td>
<td>59.7</td>
<td>64.4</td>
</tr>
<tr>
<td>Annual Revenue</td>
<td>16.9</td>
<td>19.2</td>
<td>19.6</td>
</tr>
<tr>
<td>Annual Shortfall O&amp;M</td>
<td>40.9</td>
<td>40.5</td>
<td>44.8</td>
</tr>
<tr>
<td>Annual Shortfall Capital</td>
<td>0.0</td>
<td>5.2</td>
<td>30.6</td>
</tr>
</tbody>
</table>

6.3 ADDITIONAL REVENUES

6.3.1 Federal Funding

It is anticipated that the appropriate local agencies will pursue Federal funding to cover the capital funds needed for the preferred alternative.

6.3.2 New, Non-Federal Local Funding Sources

This section describes historic or traditional transit finance practices in the Wasatch Front Region and outlines key working assumptions regarding transit finance possibilities related to East-West MIS alternatives. This section also summarizes possible local financial commitments for each alternative.

This section follows the general guidelines provided by the Federal Transit Administration contained in:

*Federal Transit Administration—Section 5309 (Section 3(j)) FTA New Starts Criteria*, Federal Transit Administration, US Department of Transportation, December 16, 1996.
Traditional Transit Finance Practices in Wasatch Front Region

For the last 27 years, transit finance has been provided through the Utah Transit Authority (UTA), which was incorporated in March, 1970 under the Utah Public Transit District Act of 1969. The UTA services Salt Lake, Davis, Weber, Utah and Tooele counties. As an interim measure, between 1977/0 and about 1975, the regional transit system was subsidized through use of State liquor revenues. This source of subsidy was replaced by a 0.25 percent sales tax approved by voters in Salt Lake and Weber counties in 1974 and a 0.25 percent sales tax approved by voters in Davis County in 1975.

The primary sources of transportation finance at the State level are funded through a statewide motor fuel tax, currently $0.245 per gallon, motor vehicle registration fees and licenses. Very few State transportation revenues are applied to transit projects. One fourth of State transportation revenues are allocated to local governments based on a formula which includes population, street miles and land area. The county road allocation is called "B Roads"; the city allocation is called "C Roads." All funds are to be used for road projects; 30 percent of these funds must be for construction projects or maintenance projects that cost over $40,000.

Working Assumptions Regarding East-West Transit Finance and UTA Funding Availability

Consistent with UTA's recent cash flow analyses, this study assumes that the agency has committed its resources available to capital projects to existing capital needs plus funding for the North/South LRT until the year 2003. After 2003, UTA's capital reserve begins to rebuild as its financial commitment to the North/South LRT lessens. If the FTA were to allow deferral of payment of the local share until the year 2004, then the UTA may be able to participate in financing a share of the capital component of Alternative B or Alternative C.

The analysis assumes that the UTA will own and operate the system and be able to finance the necessary local subsidy associated with ongoing operations and maintenance.

Timing

There are two general time frames for development of an East-West MIS alternative. The first, which is titled "expedited," would have the system operational in time for the 2002 Winter Olympics. A number of high-traffic volume Olympic sites are near the Bus/HOV and the LRT alignments, including opening and closing ceremonies (University of Utah), figure skating (Delta
Center), Olympic Village (University of Utah), the media center (Salt Palace) and potentially the awards ceremonies (Union Station). An expanded transportation system that links these sites would improve the flow of traffic and ease congestion. Constructing permanent transportation improvements prior to the Olympics could save a substantial temporary Olympics-only investment in buses, temporary easements for parking and the like.

The second timing strategy, which is titled "standard," would schedule construction of the East-West MIS improvements after construction of the North/South transit line. This timing option would open one financing opportunity and would eliminate several others.

**Local Financial Commitment: Alternative A—No-Build**

Since this alternative requires no additional capital improvements or operations that have not been financed with prior committed funds, there is no need to explore a local financial commitment to Alternative A.

**Local Financial Commitment: Alternative B—Bus/HOV/TDM/TSM**

This alternative has an estimated capital cost of $37.8 million. The components of this cost were presented in Table 6-2.

If these improvements were made on the expedited schedule and were operational in time for the 2002 Olympics, then funding for Olympics-only bus improvements might be applied to this permanent solution. If these improvements were made on the standard schedule, which began after the completion of the North/South LRT Line, then the UTA might have capital resources to participate in funding the local share of needed improvements.

While specific costs have not been estimated, it is anticipated that the Airport Authority, the University of Utah and the State Division of Facilities Construction & Management would be willing to provide land or a lease for land needed for bus transit centers and park-and-ride lots on their respective properties. Recent law requires that the value of this right-of-way be based on fair market value. Although there would not be an actual flow or diversion of revenue, it would be possible for the value of that right-of-way to be counted as a contribution in tabulating local match for federal funding.

**Local Financial Commitment: Alternative C—LRT/TDM/TSM**

This alternative has an estimated capital cost of $374 million, measured in 1996 dollars and on-going operations and maintenance cost of $7.5 million, measured in 1996 dollars. Capital cost components of the LRT system were summarized in Table 6-3.

In an effort to identify and secure local funding commitments, several meetings or conversations have been conducted with prospective local financing partners, including the Salt Lake City International Airport Authority, Salt Lake City, the University of Utah, the State of Utah Public Facilities, UTA, UDOT, the LDS Church, Union Pacific Railroad Company, several ITS providers and a local philanthropist.

The results of these efforts are 19 funding opportunities that have promise. While each idea has been introduced to the prospective funding partner, none of the concepts have been endorsed by the
prospective partner. The dollar value of some sources of funding have been estimated while others have not because the funding opportunity is too conceptual at this point.

For the reviewer's convenience, each local funding concept has been numbered in Table 6-11. The concepts are not in any priority order. If the LRT alternative is selected, each prospective local funding opportunity will be refined and amended, some funding sources will likely be eliminated while other sources will be added as new opportunities unfold. Key financing concepts are summarized briefly below; each prospective source of funding is described in Appendix H.

**The Airport Authority:** The Salt Lake City Airport Authority is a possible prospective funding partner through: a) the provision or lease of land to lay the track and build one or two transit stations and park-and-ride lots; b) the potential investment in LRT in lieu of additional structured parking spaces, and; c) the potential provision of "extra" environmental mitigation credits for wetlands. In accordance with the current airport master plan, a transportation center will be constructed as part of the parking structure on the south side of the airport access roadway. The Airport has extended considerable effort to incorporate an LRT station into the architectural plans for the transportation center. They have also designed an alignment for LRT on airport property that can be constructed without impacting the timing of construction of access roadways and other facilities. Although the "envelope" is provided for the LRT alignment and station, the Airport Authority has no funds programmed for LRT construction. It may be possible, however, to count costs related to construction of the transportation center, excluding specific elements related to LRT specifically, as local math for the project. Any funding beyond that will have to be negotiated with the Airport Authority.

**University of Utah:** The University of Utah is a principal prospective source of funding because of potential opportunities to extend the LRT system to include several on-campus Olympics-related transportation improvements and the provision or lease of land to extend the track and provide three transit stations and park-and-ride locations.

**State of Utah:** The State of Utah Division of Facilities Construction and Management is a prospective local funding participant through the potential provision or lease of land at the State Fairpark for a transit station and park-and-ride lot.

**LDS Church:** The LDS Church is a prospective funding participant if the Church were to invest in transit in lieu of constructing some structured parking for its Assembly Building in Downtown Salt Lake City.

**Maintenance Facility:** It may be possible for the east-west and the North/South LRT lines to share a common maintenance facility, thereby creating a substantial cost savings for the facility which may cost up to $18.8 million.

**Joint Development:** There are several joint development opportunities at proposed LRT stations. Opportunities to work with Union Pacific and the Salt Lake City Redevelopment Agency in the Gateway area is one illustration that has been explored in a preliminary way.
Private Philanthropist: A private philanthropist has expressed interest in making a contribution to Downtown Salt Lake City through landscape and streetscape amenities along some of the proposed transit lines.

Private Vendors: If the LRT were to be operational in time for the 2002 Olympics, there are a variety of opportunities to secure high-technology ITS improvements from private vendors at no or below cost in return for the opportunity to showcase their products to an extraordinary, international market. Preliminary conversations with several vendors suggests this possibility is valid. This financing option would only be viable under the expedited schedule.

UTA Capital Contribution: This analysis assumes that the UTA does not have the resources to finance the capital component of the LRT alternative, as it has committed its available resources to improvements to the existing system and to the North/South LRT until after the year 2003. Under an expedited schedule, if the FTA would allow a delayed application of local resources, then the UTA may be in a position to commit capital resources to the project.

After 2003, the UTA’s capital reserve begins to increase. By 2010, the ending capital reserve is estimated at $28 million. Under a “standard” time schedule, with construction after the North/South line commitments are complete, the UTA may have the capacity to contribute to the capital costs of the system. The UTA’s contribution may be in the form of a cash outlay or pledge of revenues for a bond issue.

UTA Operations & Maintenance Subsidy Contribution: The analysis also assumes that the UTA will be able to finance the operating subsidy required after receipt of fare box revenues, FTA Section Nine Operating Assistance, advertising and other project-specific revenues.

As described in Table 6-11, the potential local funding contributions to help finance the proposed improvements are presented in a variety of ways:

- Some sources of funding are direct provision of cash to finance LRT system components (4, 11, 18, 19);
- Some sources of funding are an in-kind provision of LRT system components at below cost or no cost (1, 5, 9, 10, 12, 14);
- Some sources of funding are logical project enhancements or extensions which would be funded locally (2, 3, 6, 7, 8, 17);
- Some sources of funding are cost savings achieved by dual use of needed LRT components (13).
## TABLE 6-11
PROSPECTIVE SOURCES OF LOCAL FUNDING
(Each Are Described in Appendix H)

<table>
<thead>
<tr>
<th>Source of Local Funding</th>
<th>Direct Provision of Cash</th>
<th>In-Kind Provision</th>
<th>Project Enhancement or Extension</th>
<th>Savings by Dual Use</th>
<th>Estimated Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Airport Land Lease or Dedication of Right-of-Way</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>$610,935</td>
</tr>
<tr>
<td>2. Airport Authority Terminal Multi-Modal Transportation Center</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$17,000,000</td>
</tr>
<tr>
<td>3. Airport Authority: LRT Investment in lieu of Parking</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>4. Airport Authority: Environmental Mitigation Credits</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>5. Univ. Of Utah: Olympic Stadium Transportation Center</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1,600,000</td>
</tr>
<tr>
<td>6. Univ. Of Utah: Olympic Village Land Bridge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3,200,000</td>
</tr>
<tr>
<td>7. Univ. Of Utah Olympic Village Parking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3,000,000</td>
</tr>
<tr>
<td>8. University Land Lease or Dedication of Right-of-Way</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>$662,545</td>
</tr>
<tr>
<td>9. State of Utah: Land Lease or Dedication of Right-of-Way</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$544,500</td>
</tr>
<tr>
<td>10. LDS Church: LRT Investment in lieu of Parking</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>11. Electric Utility Improvements</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>Up to $27,600,060</td>
</tr>
<tr>
<td>12. Savings-Joint Use of Maintenance Facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Up To $18,826,000</td>
</tr>
<tr>
<td>13. Telecommunications / ITS Corporate Partners</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>14. UDOT: Telecommunications / Fiber Optics Shared Right-of-Way</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>15. Landscaping Enhancements in the Downtown Area</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>16. Joint Development Opportunities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>17. Delayed Use of UTA Sales Tax Revenues for Capital</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>18. UTA Operating Subsidy Support</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>$1.5 to $3.0 per year</td>
</tr>
</tbody>
</table>
In addition to these financing concepts, other ideas that have been considered and dismissed for a variety of reasons. These inactive financing ideas include:

- Increasing the statewide motor fuel tax;
- Establishing a local option motor fuel tax;
- Increasing UTA’s sales tax rate or Salt Lake City’s local option sales tax rate;
- Imposing a parking tax or assessment on Downtown property owners;
- Imposing an employee or head tax on employers/employees near transit stations; and
- Imposing a surcharge on Airport, Downtown and/or University parking.
CHAPTER 7
COMPARATIVE BENEFITS AND COSTS

7.1 APPROACH

7.1.1 Qualifying and Quantifying Need
This study has identified both immediate and long-range transportation needs within the east-west corridor extending from the University of Utah, through Downtown and Salt Lake City International Airport to the International Center. Once data was assembled, current conditions of mobility were considered within the study area and projected for the future. Using these conditions and projections, and applying standard transportation industry measures and models, alternatives ranging from conceptual to detailed were considered and evaluated. The initial process of defining and screening conceptual alternatives is documented in Sections 2.1 through 2.4 of this report. The set of three alternatives selected for more detailed analysis and evaluation are described in Section 2.5. The methodology used and results obtained in refining and comparing these alternatives were summarized in the following chapters:

Chapter 4 - Transportation Impacts
Chapter 5 - Environmental Consequences
Chapter 6 - Financial Analysis

Using the information developed and documented in the above chapters, another round of public meetings and briefings was held to present preliminary conclusions and propose a recommendation for the locally preferred alternative (LPA). That process involved evaluation and comment from government officials and agencies; professional engineers; planners; architects; and citizens who would be affected by the alternatives. A series of public meetings was announced and held to invite comment from any citizen with a concern. The issues identified in those meetings included neighborhood impacts, cost concerns, land use and environmental considerations. Along with citizen input, these meetings provided a forum for views from developers; planners; municipal and state entities; and anyone who might have an opinion or concern.

All attempts to measure human behavior with statistical means are limited. This study acknowledges the limitations of such gauges. Any analysis of the costs and benefits of major investments in technologies that are intended to serve people must go beyond the purely scientific calculations and measurements to incorporate the less precisely measurable social attitudes, values, and preferences that influence how and whether people will use the technology. Cities and regions tend to reflect the values of the people who live there—sometimes in subtle ways, sometimes more overtly. The most optimal transportation plan and investment in the East-West Corridor will consider the distinct set of qualitative values that make Salt Lake the city that it is, at the same time that it considers the quantitative engineering and cost-benefit analyses.

7.1.2 Definition of Evaluation Criteria

The quantitative and qualitative analysis discussed in the previous section was carried out based on the following five essential criteria:

- Environmental benefits and impacts
- Support of existing land use policies and future patterns
- Cost effectiveness: financial analysis and evaluation

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- Mobility improvements
- Operating efficiencies

The following sections provide a description of each of these criteria.

**Environmental Benefits and Impacts**
Environmental benefits and impacts occur on both the natural and man-made world. Alternatives were weighed against the consequences to air quality, water resources, contaminant sources, wetlands and wildlife, flood plains, threatened and endangered species, minerals and vegetation, as well as social and economic characteristics of the corridor, including environmental justice.

**Support of Existing Land Use Policies and Future Patterns**
Analysis of current and future land use impacts to ensure sensitivity and support for existing land use in the study area includes consideration of speed, noise and vibration, visual impacts to neighborhoods, attractiveness to visitors, as well as image and aesthetic values.

**Cost Effectiveness: Financial Analysis and Evaluation**
In order to gain support and approval for implementation, an alternative transportation system must be achievable in terms of financial resources for both the initial capital investment and the ongoing operations and maintenance costs. It must also be cost effective in terms of positive and reasonable results in relation to the investment.

**Mobility Improvements**
Evaluation of mobility improvements in relation to a specific transportation alternative analyzes how well passengers and others are able to travel throughout the study area to participate in their desired activities. The criteria for this measure include both savings in travel times and level of ridership.

**Operating Efficiencies**
Measurement of operating efficiencies involves the evaluation of the following criteria: roadway/intersection level of service; vehicle miles traveled; hours and miles of bus and LRT operation; parking requirements; and intermodal system integration.

### 7.2 LAND USE AND ENVIRONMENTAL BENEFITS AND IMPACTS

All three alternatives have implications for land use and the environment. Each offers some potential for positive or negative affects, respectively benefits or impacts. As land use is considered a part of the man-made environment, the two categories of criteria are closely linked. Therefore, the following section summarizes both, concurrently.
7.22.1 Measure of Benefits and Impacts

Measures for environmental impacts and benefits of alternatives included the following:

- Land use
- Visual and aesthetic
- Historic and cultural
- Parks and open spaces
- Socioeconomic
- Environmental justice
- Utilities
- Wetlands
- Ecosystems
- Water resources/quality
- Flood plains
- Potential contaminant sources
- Mineral resources
- Noise and vibration

7.22.2 Comparative Discussion

An evaluation summary table can be found in the Executive Summary. See Table ES-1.

Alternative A—No-Build

Alternative A—No Build, has a potentially negative impact on the land use and socioeconomic characteristics of the study corridor. There would be some continued degradation of water quality and air quality due to emissions and non-point source pollutants associated with continued single occupancy vehicle dependency, but it has not been measured at this time as the air quality analysis will be performed in the FEIS.

The largest negative impact associated with Alternative A—No Build is the lack of support to current land use plans to reconnect the City. The Gateway study now underway is evaluating alternatives for redevelopment of about 700 acres in the western portion of Downtown Salt Lake City. This land, currently occupied by rail yards and warehouses, and is in need of redevelopment. It offers the only real opportunity to develop Downtown Salt Lake City without encroaching on the residential neighborhoods surrounding the CBD. The removal of the railroad tracks, and environmental mitigation of the site is necessary before any new development can take place. Preparation of the Gateway Master Plan, which is currently under way, includes a blight survey and Brownfield Study that will give direction to this redevelopment.

With the construction of Interstate 15, Salt Lake City was divided into two halves, one to the east and one to the west of the highway. The west side was then divided again with the construction of Interstate 80, and then again with Interstate 215. Further barriers to movement between the city’s east and west sides are caused by the rail yards and industrial land uses adjacent to those yards. Movement between the north and south neighborhoods in the western corridor is restricted by both the railroad tracks and North Temple (including the North Temple viaduct). There are real and perceived barriers between the east and west sides; socially, economically and physically, residents are constrained by these barriers. The Railroad Consolidation Study and the redevelopment of the Gateway area are intended, in part, to remedy this compartmentalization of Salt Lake City. Alternative A—No Build, offers no support for high density development anticipated with the Gateway Project and the Railroad Study beyond the existing and committed transportation systems.

Alternative A—No Build is a lost opportunity for a beneficial impact to the revitalization of the Gateway area. This is recognized in the Long Range Transit Analysis of the Wasatch Front, (BRW), December 1996). According to the LRTP, “only the moderate and high investment alternatives have
the potential to affect future land use patterns. Higher densities of residential and commercial activities could be attracted to the major investment corridors in these alternatives, especially around stations and other access points. The higher densities could then make transit a more viable travel option in the future and help contribute to less vehicle miles to travel and pollutant emissions. With regard to air quality and other environmental values, the alternatives with the highest transit ridership will provide the greatest potential benefit.”

Alternative A also does nothing to address the congestion in the corridor. The LRTA indicates an 80 percent increase in VMTs in the Salt Lake planning area by the year 2015, leading to an increase of 23 percent in roadway congestion if no action is taken to accommodate the increase in traffic.

**Alternative B—Bus/HOV**

Alternative B—Bus/HOV would have limited negative impacts to the natural or man-made environment, however, it would have little positive impact, either. Although additional bus service and HOV lanes would improve mobility in the corridor, it would probably not have much affect on new or secondary development in the corridor. There would be little revitalizing effect to anticipated redevelopment in the Gateway area with this alternative, so this alternative too is a lost opportunity to reconnect the east and west sides of the city. This alternative requires no reconstruction of the North Temple viaduct between 400 and 600 West, which, although costly, would offer an opportunity to create bicycle and pedestrian crossings linking separated parts of the city, and mitigating the barriers posed by the rail yards, I-15, and I-80.

The increase in frequency of bus service associated with this alternative would likely increase the transit access to all parts of the corridor. To the extent that increased transit access encourages growth and development, this alternative would have a slight positive impact. Since these kinds of transit improvements are not perceived to be major in cost or permanent in nature, experience has demonstrated that these kinds of bus improvements do not have a significant impact of overall development or change in land use.

**Alternative C—LRT**

Alternative C—LRT would have several environmental impacts, both positive and negative. In terms of the natural environment, constructing a LRT line would impact some wetlands (probably less than five acres, although the delineation cannot be performed until spring or summer). There would also be some long term impacts to wildlife due to loss of habitat, and the barrier imposed by the LRT rails and right-of-way to the movement of small and mammals. The corridor supports threatened and endangered species, so the power source for the LRT should be designed to preclude electrocution of wildlife. There could be some impact on vegetation due to the invasion of disturbed soils by noxious weeds during construction. Due to the wetland impacts, a 404 Nationwide Permit under the Clean Water Act, will need to be obtained. The participation of the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the State of Utah Department of Natural Resources will be required in determining the best way to mitigate, restore or recreate the affected wetlands. The necessary agencies have been contacted and informed of the study progress, and it is anticipated that an amenable solution can be reached, either by using existing wetland mitigation acres currently banked by the Airport for future use, or by creating a low maintenance type site adjacent to the Farmington Bay Waterfowl Management Area. Alternative C—LRT will also have some short-term impact to water quality due to widening of bridges to accommodate the LRT. The
short-term water quality and vegetation impacts can be mitigated by the implementation of best management practices during construction.

In terms of impacts to the man-made environment, Alternative C would have several positive impacts. First, it would positively impact the redevelopment of the Gateway area. Station areas along 400 West would offer an opportunity to integrate urban design elements of the LRT stations with the proposed continuance of City Creek Park, creating the type of urban atmosphere conducive to upscale development. This area, in turn, will be zoned to encourage mixed-use high-density, supporting both residential and commercial facilities, which is the land use condition most supportive of transit. In redeveloping the Gateway area, new land uses will in effect create a bridge between the east and west sides of Salt Lake City. This will substantially increase the viability of this area. What is now a veritable no-man’s land, could be revitalized into a urban commercial and transit center, offering shopping and recreational facilities, as well as office space and high density residential dwellings. A new viaduct on North Temple, between 400 and 600 West would also assist in bridging the gap between east and west Salt Lake City. In addition to accommodating LRT, the bridge could be designed to allow pedestrians and bicyclists to pass more freely across what is now an imposing obstacle. No other alternative offers the same chance for Salt Lake to mitigate the physical and social division caused by the rail yards and highways, in support of future land use plans.

Much of the same opportunity for improved land use is offered on North Temple with LRT. North Temple is wide and prohibitive to pedestrians trying to cross. The center-street configuration of LRT, integrated with a median of grass and trees and other urban design amenities could create a zipper effect on the street, allowing pedestrians a safe haven from cars crossing. LRT’s stimulus to upscale development could benefit the commercial community along North Temple, in support of the North Temple Revitalization Plan.

In addition to the positive stimulus to land use, there is socioeconomic benefit to the community in terms of wages and increased economic activity associated with the construction of the LRT line, and the jobs created thereby. Alternatives A and B would require much less of a federal investment, investment which could provide a stimulus to the local economy would be much less with alternatives A and B.

Although there are some negative environmental impacts associated with Alternative C—LRT, those impacts are relatively minor and can mostly be mitigated. However, the positive impact LRT could have on the redevelopment of the Gateway area probably cannot be recreated through any other means. Without the revitalization and stimulus of a major investment in this community, the full potential for revitalization of the Gateway area will likely not be reached. Loss of that opportunity probably cannot be mitigated.

### 7.3 COST EFFECTIVENESS

To determine cost effectiveness of the various alternatives, the study identified capital costs, operations and maintenance costs, operating revenues, and the cost per added rider.
7.3.1 Capital Costs

Conceptual engineering of the alternatives resulted in the following estimates of capital cost.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Capital Cost ($ millions)</th>
<th>Annual Capital Cost ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - No-Build</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>B - Bus/HOV/TDM/TSM</td>
<td>$37.8</td>
<td>$5.2</td>
</tr>
<tr>
<td>C - LRT/TDM/TSM</td>
<td>$374.0</td>
<td>$30.6</td>
</tr>
</tbody>
</table>

By definition, there is not cost associated with Alternative A - No-Build. The capital cost for Alternative B includes purchase of additional buses along with implementation of the bus/HOV lane and construction of transit centers and park/ride facilities.

7.3.2 Operation and Maintenance Costs

Estimates of annual operation and maintenance costs were made for each alternative at two levels, one for expanded transit service in the corridor and the second for operation and maintenance of the total regional transit system. O&M costs by level for each alternative were estimated as follows:

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Expanded Corridor Service ($ millions)</th>
<th>Regional Operations ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - No-Build</td>
<td>$0.0</td>
<td>$57.8</td>
</tr>
<tr>
<td>B - Bus/HOV/TDM/TSM</td>
<td>$1.9</td>
<td>$59.7</td>
</tr>
<tr>
<td>C - LRT/TDM/TSM</td>
<td>$6.6</td>
<td>$64.4</td>
</tr>
</tbody>
</table>

There is no expanded corridor, and hence, no increase in O&M costs for Alternative A. The annual cost for regional operations under Alternative A is basically for continued operation of the existing bus system, combined with O&M costs for the North-South LRT. O&M costs for Alternative B include all the O&M costs for Alternative A plus operation of a high frequency bus service along the corridor from the University of Utah, through Downtown to the Airport. O&M costs for Alternative C are based on the following components:

- operation of the north-south LRT
- operation of the east-west LRT
comparative benefits: and cost

- regional bus operations with a reduction in O&M cost for bus service replaced by the East-West LRT

It is important to note that there is a significant difference in the corridor O&M cost due to the difference between the cost of bus and LRT operations. The difference in regional system operation is: not so great because of the large portion of O&M cost associated with the regional bus system that is included in all three alternatives.

7.3.3 Operating Revenues

Annual operating revenue was estimated by multiplying the forecast of annual ridership times an average fare per boarding passenger. Annual ridership for each alternative was adjusted to account for the addition of special-generator patrons. It was estimated in Chapter 4 that special generators would attract as many as 21.8 million patrons who would travel to events by LRT. That generates a total of 5.6 million annual riders when accounting for travel to and from events. The special generator trips for Alternative B were reduced by 50 percent to compensate for the fact that bus is a less attractive mode of transportation than LRT.

This resulted in the following estimates of annual fare box revenue:

| TABLE 7-3 |
|---|---|---|---|---|
| | Annual Ridership | | | |
| | (in millions) | Normal Transit | Special Generators | Total | Annual Revenue |
| Alternative A | 35.3 | 0 | 35.3 | $16.9 |
| Alternative B | 36.8 | 3.3 | 40.1 | $19.2 |
| Alternative C | 36.9 | 3.9 | 40.8 | $19.6 |

7.3.4 Added Annual Net Cost Per Added Passenger

The annual net cost for each alternative was calculated by adding annual O&M costs to annualized capital costs and subtracting annual revenue for each alternative. Annual revenue was adjusted to account for special-generator passengers discussed in section 7.3.3. The ratio was calculated by dividing added annual passengers into added annual cost. The results are summarized as follows:
The added cost per added rider is higher with Alternative C because of greater capital and O&M costs associated with the additional riders.

### 7.4 MOBILITY IMPROVEMENTS

Mobility improvements were measured using walk access, intersection level of service (LOS) and integrated transit convenience.

#### 7.4.1 Walk Access

Walk access was measured by estimating the number of transit passengers whose trip origin or destination within the Downtown area was within 1,300 feet (1/4 mile) of a transit stop. This measure was most useful in comparing alternative alignments for each alternative.

**Alternative B:** Walk access to transit with Alternative B is not significantly improved over walk access with Alternative A because they are essentially the same bus system. Alternative B is more attractive because of more frequent service on the corridor bus route.

**Alternative C:** Alternative C has improved walk access at the University of Utah because the LRT penetrates the campus to the Health Sciences Center. Along the corridor, there is essentially no difference between Alternative B and Alternative C in terms of walk access, because the stations are at the same locations.

#### 7.4.2 Intersection Level of Service

Twelve high volume intersections were analyzed using street traffic volumes for the year 2015 obtained from computer model runs made by WFRC. The models showed that the intersection would need to be modified or the signalization improved for both Alternative B and C in order to reach acceptable LOS by the year 2015.

**Alternative A:** The level of service (LOS) for traffic flow at intersections in the year 2015 is decreased from existing LOS due to the approximately 30 percent increase in traffic volumes over
Chapter 7 Comparative Benefits and Cost

existing levels (see Table 4-3).

**Alternative B:** For this alternative, special HOV lanes would be installed to give a travel time advantage to buses and HOVs during peak hours of traffic flow. Even with the addition of double left turn lanes, turning movements at these intersections would still operate at a level of congestion worse than LOS D. Although transit ridership increases for Alternative B, the intersection LOS experiences only a minor benefit because the reduction in traffic flow is minimal. The LOS at major points of potential congestion is improved through TSM modifications to signals and lane configurations. (See Table 4-4)

**Alternative C:** The primary impact resulting from the LRT alignment in the center of the street, as shown in Figure 2-13, is on dedicated left turn lanes at the intersections. Further analysis would be required during preliminary and final design to minimize the conflict and accident potential with left-turning auto traffic. Prior to implementing LRT, the traffic operations issues described above would require further analysis and engineering information. The cost of these intersection improvements would be greater than for those required to implement Alternative B—Bus/HOV. Alternative C—LRT is forecast to have slightly higher transit ridership than Alternative B, but the reduction in daily traffic is offset by the reduction in intersection capacity due to implementation of the ILRT. As discussed in Chapter 2, signals and intersection geometry will need to be modified in order to achieve an acceptable LOS at intersections where LRT is constructed. As with Alternative B, the LOS at major points of potential congestion is improved through TSM modifications to signals and lane configurations.

### 7.4.3 Integrated Transit Convenience

**Alternative B:** The higher level of corridor bus service with Alternative B makes the integrated transit system more attractive to potential riders compared with Alternative A.

**Alternative C:** Experience elsewhere in the world has demonstrated that LRT is more attractive to potential riders than bus. Alternative C is therefore an improvement over Alternative B because the east-west corridor is served with LRT which will be perceived as an extension of the North-South LRT line. Some passengers are more likely to accept a transfer from LRT to LRT than from LRT to bus.

### 7.5 OPERATING EFFICIENCIES

The characteristics of each alternative were entered into standard transportation models, which produced comparisons of ridership.

#### 7.5.1 Measures of Effectiveness

**Ridership**

Factors influencing ridership were modeled out to the year 2015, showing LRT ridership slightly ahead of Bus/HOV. With the East-West LRT to complement the North-South segment of LRT, the study anticipates that this more comprehensive system would increase ridership more than the North-South LRT would alone.

As these alternatives were compared for ridership, it became clear that no single transportation improvement by itself will attract the desired ridership to serve the projected demand for the year.
What does attract measurable new ridership is the combined appeal of LRT in concert with the other enhancements and improvements, including ITS, TSM, TDM, and added bus service. However, even when considered independently, the three alternatives show only moderate differences in ridership. The system-wide ridership for the No-Build Alternative is projected to be 124,700, for the Bus/HOV Alternative 129,900, and for the LRT 130,500.

Another figure that highlights the distinction between the three alternatives is a comparison of projected ridership within the East-West Corridor and the North-South Corridor combined. Considered from this view, corridor ridership of the three alternatives shows the No-Build with some 19,000 riders, Bus/HOV with 32,000, and LRT at just under 35,000.

### 7.6 EVALUATION SUMMARY

#### 7.6.1 Identification and Explanation of Significant Differences

The major differences between the No-Build, the Bus/HOV and the LRT alternatives are really differences of degree. All three choices have costs associated with them, as the study has shown, and all three have benefits. The costs associated with the No-Build decision are those of lost opportunity and inconvenience, not to mention greater costs of solving a problem later that needs solving now. Of course, the benefit is that immediate costs are not incurred.

With the Bus/HOV alternative, certain improvements can be achieved without major infrastructure changes. Increasing the fleet of buses and frequency of service can be done inexpensively enough to make it seem more appealing than going with LRT. But the limits of bus lanes are similar to the limits of automobile lanes. Only so many can be built, and only so many buses can be accommodated on Downtown streets.

While the cost of LRT is significantly greater than Alternatives A or B, experience in other cities has demonstrated that the ongoing costs for LRT are lower in the long run. As ridership increases, as more areas are served, the cost-per-passenger decreases, and the cost-per-passenger-mile declines. The long-range solution is always more expensive initially, but tends to cost less in the long run. Another major difference, as the study has determined, is the influence LRT will have on land-use planning and revitalization. Besides these, the LRT capability to move high volume traffic comfortably and efficiently is unequaled by either Alternative A or B.

#### 7.6.2 Identifying Trade-offs Between Impacts and Benefits

Like most choices about the future, the decision of whether to invest in transit is one that offers tradeoffs. Perhaps one of the most important developments to recommend LRT for the East-West system is the recent push coming from the Governor's office for hastening the implementation of a regional rail or commuter rail to serve as a means of replacing Interstate 15 while it is out of service during the coming years. The regional rail is already part of the Long Range Transit Analysis, but a new sense of urgency accompanies the reconstruction of the freeway. If the commuter Rail Study proves that commuters would alter their driving habits between Provo and Salt Lake City, from the north, the regional rail service could be implemented relatively soon using existing Union Pacific rails. This service would then benefit greatly from having an LRT line that could collect or deliver commuters along the University-Downtown-Airport Corridor.
The major drawback to LRT is the initial capital cost of implementation. Some of the costs of implementing LRT could be offset by coordinating certain expenses with the construction of the north-south link currently underway. Since the intersecting lines could share facilities, such as maintenance facility, storage and other equipment, the investment could become more cost-effective.

Further tradeoffs exist for LRT in the East-West Corridor, including environmental impacts to the wetlands in the West Corridor. These impacts can be mitigated with minimal effort when compared to the benefits that LRT can have on revitalizing and directing the land use in the Gateway District.

7.7 STRATEGY AND RATIONALE

Alternative C—LRT/TDM/TSM is recommended as the locally preferred alternative for the reasons outlined in the previous chapters and summarized throughout this chapter. The strategy and rationale for the LPA are briefly highlighted as follows. Alternative C is recommended as the LPA because LRT:

- Is consistent with recommendations of the Long Range Transit Analysis;
- Offers a logical extension of an complement to the North-South line;
- Has higher capacity to accommodate increasing transit passenger volumes resulting from the following:
  - increasing population and employment in Downtown area;
  - extension of LRT into other corridors;
  - implementation of Commuter Rail service;
  - growth in travel demand at special generators (such as, Airport, Convention Center, Temple Square, LDS Assembly Building, University);
- Has short-term higher capital cost compared to bus, but those are offset by lower O&M cost per passenger for LRT in the long run; particularly if commuter rail is initiated and additional LRT corridors are implemented;
- Has higher passenger capacity per unit:
  - 125 passengers, compared with 55 per bus;
  - 500 passengers per train, 4-train unit;
- Reduces number of vehicles on Downtown streets (compare two-car LRT with 10 buses);
- Emits none of the air pollution that buses do;
- Is more attractive to potential transit passengers;
- Offers better intermodal service/penetration for Airport/University;
Can provide significantly higher capacity for Special Event service:
- with minimal increase in operating costs;
- with lower impact on event traffic congestion;

Supports SLC Master Plan and assists in directing land use and development;

These benefits of LRT will offer optimal service when combined with TSM and TDM actions.

**Inputs from the Citizen Participation Process**

Public involvement in the MIS/DEIS process was considered important from the outset. Valuable perspective and concerns were identified, articulated, and considered in the evaluation process. Citizens, businesses, community councils, agencies, and other entities expressed interest on many levels and about a variety of issues, from aesthetic to technical to environmental, to cost. These concerns are reported in more detail in the public involvement report found in Appendix A.

**Relative Importance of Various Objectives**

**The Long View**

Salt Lake City is one of only a handful of cities in the world founded on a comprehensive master plan. Like Peter the Great’s vision of a complex of canals to unify St. Petersburg, Brigham Young had a grand scheme based on a generous grid of blocks centering on Temple Square. In the middle of the nineteenth century, the pioneer architects envisioned, organized, and built Salt Lake City with the long view in mind. That long view not only allowed for growth, change, and technological development, but anticipated them.

A similar long view persists among its leaders and planners today. The same prudence and foresight that originally designated streets of unusual width, diverted mountain creeks into canals and ditches for irrigating the arid desert floor, and conserved commodities—stockpiling them—in storehouses that became models for welfare systems worldwide, these same values guide contemporary leaders of the city and state.

People will be more inclined to use a system that can get them more places. Adding the east-west link of a light rail system to the north-south link allows each to complement the other. And with spurs into Draper and West Jordan, off the north-south line and a regional rail link from Ogden to Provo, the system begins to become a truly comprehensive urban/suburban service, which could be expected to attract significantly increased ridership.

As the locally preferred alternative for the East-West Corridor, LRT/TSM/TDM will do more than either alternative A or B to (1) benefit the environment, (2) promote land use policies and plans, (3) be cost effective in the long view, (4) provide the greatest mobility and (5) assure the greatest operating efficiencies.

**An Olympic Boost**

The significance of the transportation demands that will accompany the 2002 Winter Games should not be underestimated. As an international event drawing tens of thousands of people, the Olympics will provide Salt Lake a brief glimpse of travel needs in the coming decades, at least in certain corridors. The Games bring not only Salt Lake City, not only Utah, but the United States an
opportunities to welcome the world and to host these international as well as intra-national visitors in one of our most picturesque landscapes. The event provides the state with a chance to implement a transportation system that could be a showpiece of efficiency and convenience.

In short, the Wasatch Front is poised to be the focus of worldwide attention in five years. If the transportation recommendations of this study are implemented, the region would be better prepared to meet the needs of both the Olympics in 2002 and the significant growth in permanent population in the following decades. This will be a crucial period for shaping and developing transit habits. The University-Downtown-Airport corridor, which is the focus of this study, has the potential to greatly enhance the efficiencies and ridership of the north-south line currently being implemented.
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American Stores
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Avenues Community Council
Avenues Community Council
Bearwest
Bed & Breakfast Association of Utah
Bonneville Realty
Clamp VIP
Capitol Hill Community Council
Capitol Hill Community Council
Caribbean Printing
Catalyst Magazine
Central City Community Council
Central City Community Council
Certified Real Estate Services
Coalition for Utah’s Future
Consolidated Realty Management Group
Crossroads Plaza
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Department of Natural Resources
Department of Natural Resources
Dept. of Community and Economic Development
Dept. Of Environmental Quality
Dept. of Public Works
Director of Chicano Affairs
Division of Air Quality
Division of Comprehensive & Emergency Management
Division of Drinking Water
Division of Emergency Response and Remediation
Division of Parks and Recreation
Division of Radiation Control
Division of Solid & Hazardous Waste
Division of State History
Division of Water Quality
Division of Water Rights
Division of Wildlife Resources
Division of Wildlife Resources - Habitat Section
East Central Community Council
Economic Development Corp. Of Utah
Executive Director Downtown Alliance
Facilities Planner University of Utah
Federal Aviation Administration Denver Airports Dist. Office
Federal Emergency Management Agency
Federal Highway Administration

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Holy Trinity Greek Orthodox Church
Homeowners' Association
Indian Walk In Center
Indian Walk In Center
Jordan Meadows Community Council
Land Division, Zions Securities
LDS Hospital
Leucadia National Corporation
Lockheed Martin Services Group
Northwest Merchants Association
Office of Sen. Robert Bennett
PacifiCorp
Parks & Rec Division - Provo/Jordan River Pkwy Authority
People's Freeway Community Council
Peoples Freeway Community Council
Poplar Grove Community Council
Poplar Grove Community Council
Poplar Grove Community Council
Presiding Bishop - LDS Church
Questar Corporation
Rio Grande Community Council
Rose Park Community Council
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SLC Corporation
SLC International Airport (SLCIA)
SLC Police Dept., Community Support Div.
SLC Redevelopment Agency
SLC Redevelopment Agency
SLCIA
SLCPD/CSD
Soil Conservation Service - Utah Office
State Council For Independent Living
State Fairpark Community Council
State Government Offices
State of Utah DFCM
Sugar House Community Council
Sugarhouse Community Council
Sunnyside East Assoc. Council
Sunnyside East Association
Sunset Oaks
The Chronicle
The Delta Center
The Metropolitan Restaurant
Triad Center
US West
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UDOT
UDOT
UDOT - Office of Loss Control
UDOT Environmental Division
UDOT Transit Plans
UDOT, Region 2
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University of Utah Parking Services
US Army Corps of Engrs - Utah Regulatory Unit
US Dept. Of Agriculture - Natural Resources Consv. Srvcs
US Fish & Wildlife Services
US Fish & Wildlife Services - Region 6
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Utah Independent Living Center
Utah Motor Transport Association
Utah State Fairgrounds
Wasatch Front Resource Consv. and Devlp. Council
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West High School Community Council
West High School Community Council
Westpointe Council
WFRC
WFRC
Yalecrest Community Council
Yalecrest Community Council
Zion's Security Property Management

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Day-River Library Branch
Chapman Library Branch
Main Branch Library
Sweet Library Branch

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Wayne Mills
John Wood
John Morelli
Florence Morelli
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