RTC West Valley North-South Critical Facilities Study – Phase 1 Draft Report

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Section 1: Introduction

Project Objective

The purpose of the West Valley North-South Critical Facilities Study was to analyze transportation facilities in the western portion of the Las Vegas Valley and identify facilities needed to serve travel demand both in the horizon year (2030) and beyond if the urban boundary were to expand.

Project Scope

The broad study area designated for this project required a regional approach to demand analysis using the RTC travel model. Two different future land-use scenarios were identified in the project work scope, one using the adopted land-use forecast and model domain, and another with enhanced land use and an expanded model domain reflecting conditions beyond the planning horizon. The purpose of the latter analysis was to ensure that recommended facility improvements would not be overwhelmed by a continuation of the rapid pace of growth experienced in the West Las Vegas Valley during the past decade.

Study Area

This study area included 306,600 acres, is shown by the dashed line in **Figure 2.0 – Study Area and Constraints**. The eastern limit of the study area was originally fixed along Rainbow Boulevard; however, this boundary was moved further eastward to include both Decatur and Jones at the June 18, 2007 project stakeholder's meeting. The resulting study area includes virtually the entire western Las Vegas Valley. In the northwest, the boundary stops at the edge of the Nellis Air Force Base range. In the north, it stops at the boundary of the Desert National Wildlife Refuge. The western boundary extends southward from eastern edge of the Paiute Indian Reservation along the eastern edge of the Red Rock Canyon National Conservation Area to Interstate Highway 15 near Sloan. The area also includes potentially developable land east of I-15 and south of the current Public Land Management Act (PLMA) boundary. Although transportation needs in this area were not analyzed, it was included because, if developed, it would generate significant demand for north-south mobility west of I-15.

Stakeholder Coordination

Coordination with on-going studies and planned projects was an essential aspect of this study. In particular, the intent was to closely follow the progress of corridor studies underway and to incorporate available details accurately into the results of this study. In the South and southwest of the study area, the Rainbow Boulevard-Blue Diamond to Sloan Corridor Study and the Southwest Valley North-South High Speed Connection Study-CC-215 to Blue Diamond were both in progress. Also, the Clark County Environmental Study for the proposed Ivanpah Airport was in progress. Representatives from each of these projects were included on the stakeholder committee for this project to facilitate coordination and the exchange of technical data, and their active participation was invaluable in this study.

Approximately 52 percent (160,600 acres) of the land within the project study area lies outside the current PLMA disposal boundary. This leaves 146,000 acres in the study area also within the current PLMA boundary. Also, significant environmentally-sensitive areas lie within the study area that could affect the location of future transportation facilities. For these reasons, it was very important to involve the U.S. Bureau of Land Management (BLM) in the process. During the project, BLM provided advice to the consultant and stakeholders and important counsel on the concerns and activities of other resource agencies.

The purpose of the West Valley North-South Critical Facilities Study was to analyze transportation facilities in the western portion of the Las Vegas Valley and identify facilities needed to serve travel demand both in the horizon year (2030) and potential beyond 2030 if the urban boundary were to expand.

The City of Las Vegas was another major project stakeholder. The City had raised a number of concerns with RTC that were addressed by the study. In particular, the City of Las Vegas wanted to ensure mobility and connectivity for developing residential areas north of the proposed Sheep Mountain Parkway and was concerned about the connection of that facility to CC-215. Also, City representatives strongly advocated a longer range vision for the transportation system that envisioned growth beyond current boundaries and constraints.

Based on these considerations, the overall scope of this project was a broad, strategic analysis of future mobility needs for the western Las Vegas Valley. As noted above, both the adopted 2030 land use and model domain and an analysis of an expanded land use and model domain were performed. The methodology for these analyses is discussed in detail later in this Report.

Project Tasks

The project work scope included the following specific tasks:

- Review previous work and on-going studies to assure that link evaluation activities are consistent with the recommendations defined within the study process.
- Review output from the RTC-sponsored Southwest Area Charrette to include consensus proposals derived from the cooperative planning process to reduce redundant evaluations, including bus lanes and express lanes from Ivanpah Airport.
- Review existing, proposed and approved land uses in the area.

- Evaluate the existing and available rights-of-way in the corridor.
- Evaluate the effectiveness of the network to handle projected 2030 regional movement, using the Travel Forecast Model for two scenarios: with the adopted land use forecast and model domain and with enhanced land use and an expanded model domain.
- Enhanced land use would include: the proposed Ivanpah airport; associated developments in the I-15 corridor South of Sloan summit; full-build within the existing PLMA boundary in the southwest; anticipated growth within the 2002 PLMA extension in the northwest; anticipated growth on the Las Vegas Paiute Indian Reservation; and increased truck traffic associated with the development and operation of the Yucca Mountain Nuclear Depository.
- Identify opportunities for improving connectivity between segments with the fewest impacts on existing and planned land uses.
- Conduct cost benefit analysis to objectively compare potential alternatives with specific reference to issues of regional movement.
- Define a range of alignment and design options that would meet the need for regional connectivity while protecting vulnerable natural environment and wildlife habitats in the area between I-15 South and the PLMA boundary South of SR-160.
- Advance recommendations to the RTC for adoption consideration.

Issues

For the past decade, at least, the Las Vegas urbanized area has experienced remarkable growth that has exceeded the ability of the transportation network to keep pace. While the residential growth rate has moderated recently in some parts of the Las Vegas Valley, rapid development continues within the study area, particularly South and west of CC-215 and to the North of SR157. Most of the growth in tourism destinations has occurred along the I-15 corridor and Las Vegas Boulevard; however, most of the growth in this area is related to the gaming industry. Tourism-related travel also includes trips made for recreational purposes. The western Las Vegas Valley includes several destinations not directly related to gaming, particularly in the area of Summerlin, where resorts predominate. Also, the Red Rock Canyon National Conservation Area and Mt. Charleston are accessed from this area of the Valley.

The most significant impact on present and future mobility is the expanding urban growth boundary and the construction of high density residential developments near the periphery. On the west, future development will be limited by the Red Rock Canyon National Conservation Area. Similar limitations don't exist to the South and southwest of CC-215. Planned residential growth between CC-215 and Blue Diamond has the potential to overwhelm even the most robust traditional transportation facilities. This study gave particular attention to this impending problem, since there is still time to increase the capacity of North-South facilities in this area.

The developing area in the extreme northwest of the City of Las Vegas suffers from a number of constraints. This area is bisected by the BLM Conservation Transfer Area and a number of other land-uses that restrict North-South mobility. This area has the potential to develop to four times its platted dimensions before reaching geographical constraints. Providing better connectivity from this area to the arterial grid to the South of CC-215 is a very high regional priority.

Meeting recreational travel demand and the general travel needs of residents will be critical for future mobility in the study area. Therefore, the future quality of life for residents and the satisfaction of visitors both depend on understanding and meeting the demands of all travel groups and trip purposes.

The intensity of growth and background traffic congestion that has occurred in Las Vegas often masks the root cause of these conditions. It is not enough to acknowledge that "traffic is bad and getting worse". The authors of this study believe it is important to delve into the root cause of congestion and reduced mobility and to develop a phased approach for solutions.

Table 1.0 – Issues, Problems, Trends describes the issues identified and offers a basic approach to potential solutions. Each issue is discussed in greater technical detail in the following sections of this report.

General Approach

The approach to this study involved the following steps:

- Understand and document current conditions, including transportation issues, problems and trends affecting the study area.
- Utilize the adopted RTC planning variables (demographic forecast) and RTC Travel Model (network and demand forecast) to project future conditions in the planning horizon year (2030).
- Develop a methodology to analyze conditions beyond 2030 to predict long-range development patterns and travel demand.
- Recommend additional, time-phased improvements to transportation facilities to serve year 2030 demand, which will not be superseded by growth and development occurring after 2030.

Technical Approach

The technical approach to this project required extensive use of the RTC TransCAD Travel Model. Two previously-developed TransCAD travel demand model versions were utilized, as follows:

- A model version was obtained from RTC in August 2006 that featured 1219 Traffic Analysis Zones (TAZs). This was the model version upon which the present RTC Long Range Plan is based and served as the Base Model for this project.
- A second model version was obtained from Parsons Brinckerhoff in March 2007 that featured 1757 TAZs. This model was termed the "Extended Model", and it was used almost exclusively for analysis of growth and travel demand occurring in the extreme northwest sub-area of the study area within the City of Las Vegas. This model was also modified to better account for development potential in the southern portion of the study area.

Travel Model Refinements

Although the Extended Model was not directly usable for this study, there were advantages to using the structure of the Extended Model files instead of the Base Model, such as:

- With more zones, there was more flexibility in representing additional populated areas beyond the boundaries of the Base Model. Unused TAZ numbers were also redeployed for use in the South where additional TAZs were required.
- Use of this model version made it unnecessary to build the TAZ and street network structure for the northwest area from scratch.

Demographics from the RTC Base Model for zones 1 through 1219 were transferred to the Extended Model to ensure it reflected the latest

available RTC information. For estimating needs in 2030, the extended zones were available but were not used. For estimating needs resulting from the extended growth boundary after 2030, the extra zones were used as discussed below.

Traffic Analysis Zone Adjustments

The extended model included a refined grid of TAZs in the north, but there were no such TAZs in the south. Several unused zone centroids were relocated to the southern study area to help represent the potential development in that space. These areas and their potential for development were determined through geographic analysis using ArcGIS. A "slope map" was generated for the entire Las Vegas Valley depicting slopes in the following ranges:

- 0-6%
- 6-12%
- 12-24%
- Above 24%

The slope map was a key element in determining where zone centroids should be located, and how much development potential existed in each zone. Slopes up to 12% are considered fully developable, those up to 24% are partially constrained, and any slope above 24% is considered not developable.

Demographics

First, the residential and commercial densities in the Extended Model were compared with the RTC Base model and presented to the project stakeholders. The stakeholders, as a group, weren't comfortable with the future total population and employment shown in the Northern Sub-area in the Extended Model because the densities were higher than reasonable. Since no regional control total exists for demographic projections in Clark County, all of the population and employment shown in these areas was additive to the RTC adopted 2030 demographic projections.

For both 2030 conditions and beyond 2030, demographic data from the RTC Base Model was used to populate TAZ's located within the PLMA boundary, and approximately 50 percent of the total potential population and employment outside the PLMA was added. This additional population and employment was derived through use of the slope map and other resources to identify developable, non-developable and protected land within the study area outside the PLMA boundary.

The resulting analysis indicated that approximately 92,700 acres of unconstrained land lay within the study area that could be developed in the future. These new areas were populated in the model demographics by assuming uniform development densities depending on the slope of the terrain. Areas with slopes less than 12 percent were assigned an average density of 5 dwelling units/gross acre, and slopes between 12-24 percent were assigned 2 dwelling units/gross acre. The use of gross acres in these assumptions allowed space for infrastructure development to support the assumed population and employment.

For the southern portion of the study area, this resulting population and employment was assigned to the large TAZ's discussed earlier to generate external trips that would need to be served by facilities within the study area. The large TAZ size precluded analysis of inter-zonal trips, but provided very useful data for analysis of regional trips using the existing and improved network.

The above steps accounted for approximately 50 percent of the total population possible in the new development areas outside the current PLMA boundary. Thus, the beyond 2030 conditions modeled represent an unspecified future year where development has not yet reached "build-out" conditions.

Other demographics file changes made to both sets of data included the following.

- Population and employment related fields for TAZs in the Northern Sub-area were adjusted as discussed above.
- Population was added to downtown area TAZs to better represent planned condominium developments.
- Population was added to three southern area TAZs to represent increased residential development.

Following development of the Modified Extended Model, runs were completed for both 2030 and post-2030 baseline conditions using the 2030 network. Following this analysis, modifications were made to the network to better accommodate travel demand, and the model was run again. Recommendations included in this report were developed through an iterative process that allowed identification of a future regional transportation network to meet demand projected by the model.

It is important to note that the above process can be useful in making decisions for regional type facilities. Freeways, expressways and principal arterials can be located and sized, and capacity improvements can be estimated for existing facilities and intersections. Conversely, regional modeling results require careful application for use in sub-regional areas.

Data Collection and Related Studies

Data Collection

The following data was collected to support the analysis conducted during this Study:

- **Aerial Photography** – The most recent aerial photography for the entire study area was obtained from Clark County.
- **Clark County's Contour Geodatabase** – A database which contains 20-foot contours for regional use and 5-foot contours in most areas for detailed analysis was obtained. These contours were used in conjunction with a 30 percent slope layer to complete a general analysis of buildable land in the West Valley.
- **RTC's 2030 Base Model and Existing Street Network** – This data was used to determine population and employment densities, along with connectivity issues. It was also used to determine sections of roadway that are incomplete.
- **Census and Demographic Data** – Census and demographic data for both 2005 and 2025 from the travel model were obtained as well as Traffic Analysis Zones.
- **Land use** – Land use and zoning were obtained from the Clark County web site. These layers were used to determine existing and planned conditions in the study area.

Table 1.0 – Issues, Problems, Trends

Issues/Problems/Trends	Approach/Solution
Existing facilities are overloaded due to unconstrained growth on the periphery of the Las Vegas valley.	Utilize RTC Travel Model and demographics to identify true travel demand and roadway capacity needed to serve 2030 demand.
Incomplete or non-existent facilities to support 2030 land uses and travel demand.	Identify new links necessary needed to connect existing facilities and provide system continuity.
New development occurring at much higher densities (12+ units/acre). New standards are needed.	Identify new roadway standards, particularly ROW width, to serve emerging development patterns and densities.
Efficiency of intersections.	Investigate and recommend innovative intersection designs to improve LOS.
Need for better Travel Demand Management strategies (FHWA emphasis).	Investigate and recommend congestion mitigation and TDM strategies for further analysis by RTC.
A lot of buildable land outside the current PLMA boundary needs to be accounted for as possible developable areas. What effect does this have on the interior facilities – existing and proposed?	Utilize the slope map developed by WSA in this project to identify potential growth and densities beyond the current PLMA boundary. Utilize this information to forecast general travel demand beyond the 2030 planning horizon.
Too much reliance on I-15 for N/S mobility.	Investigate alternatives for N-S movement in the western valley that reduce reliance on I-15 for N-S trips.
Possible trend towards exurbs/town centers in less congested areas to avoid inner congestion (ie. Summerlin).	Investigate means to better coordinate future high density growth centers with planned and proposed transportation facilities.
Many key arterials have insufficient ROW for future expansion to the extent needed.	Investigate the full build out for existing arterials on west side. Recommend alternative operating strategies for those that cannot be expanded further because of existing development or ROW constraints.
Roadway development and construction are continuing to address volumes identified in the past.	Prioritize recommendations so that planning can get ahead of the development curve, particularly in ROW preservation and in developing better partnerships with developers.

Section 2: Existing Conditions & Constraints

In the context of this Report, existing conditions includes: existing and trend development, protected land-uses and environmentally-sensitive areas, and geographical constraints which constrained the selection of new or expanded transportation corridors in the study area. This section lists those existing conditions and constraints that affected the analysis presented in the following sections.

Land Uses

The study area (Figure 2.0) includes a diverse mixture of the following land-uses:

- Residential
- Rural
- Industrial
- Commercial
- Office
- Public Facilities
- Major Development Projects
- Open Lands

The very large size of the study area and the differing transportation issues in the developed and developing areas made it necessary to subdivide the study area into geographically distinct sub-areas for analysis. These sub-areas included the following:

- Northern Sub-area-the area North of CC-215 in the northern portion of the study area
- Southern Sub-area-the area South of CC-215 in the southern portion of the study area
- Core Sub-area- the area bounded by CC-215 on the North and South, and the eastern and western boundaries of the study area

Analysis of future mobility needs in these sub-areas did not rigidly adhere to these boundaries and extended into the adjacent sub-area as necessary to show effects and continuous facilities.

Existing and Trend Development

Related Studies and Projects

Approximately 16 related studies were reviewed for their applicability to the objectives of this Study. These included:

- I-15 South Traffic Study
- RTC Southwest Study Area Charrette
- SR-160 Corridor Study
- City of Las Vegas Northwest Open Space Plan
- RTC Southwest Beltway Transit Study
- Clark County Transportation Element
- Mountain Edge Parkway Feasibility Study
- Ivanpah Valley Airport Project Definition and Justification
- RTC Sloan-Ivanpah Regional Fixed Guideway Corridor Study
- RTC Park and Ride Location Plan
- RTC Rancho Drive Corridor Study
- Clark County Slope Development Ordinance
- US 95 Widening
- Bruce Woodbury Beltway
- I-15 South Corridor NEPA
- South County I-15 Corridor Amendment
- South County Land Use and Development Guide
- Sahara Avenue Super Arterial-BRT

The results of each of these prior studies were assessed in terms of their importance to this study. The results of were tabulated in a matrix that ranked the relevance as critical, important, or as significant to the context of this study. This summary matrix is included as **Appendix A** to this report. Maps from the RTC Southwest Study Area Charrette were used to identify potential alignments to the South of Blue Diamond.

Related Corridor Studies

Two on-going corridor studies have a direct affect on North-South mobility in the study area. These are the Rainbow South (Parsons) and Southwest High-Speed Connector (WSA) studies. The Consultant Team working on this North-South Critical Facilities Study also includes technical staff working on the Southwest High-Speed Connector Study. The Rainbow South Project Manager was included in all meetings and correspondence related to this Study. The Rainbow South project team has communicated progress of in the form of meeting minutes and emails. It is important to incorporate the facilities resulting from these two studies into the North-South Critical Facilities 2030 baseline. Understanding the results and recommendations from these studies was also important in properly spacing facilities recommended by this study.

Summerlin Township

Several of the project sponsors, including RTC and Clark County staff met with Tom Warden, Vice President of Community and Government Relations for the Howard Hughes Corporation/General Growth Properties. The purpose of the meeting was to discuss the feasibility of a western alignment that would connect into Summerlin Parkway and other potential tie-ins to the South. Existing and planned development on the foothills west of Hualapai effectively forms a barrier to future roadways, and none of the roadway options developed in this Study that connect to CC-215 were supported by Summerlin.

The constraint imposed by existing and planned development in Summerlin is discussed in the following section.

Clark County Mixed-use Overlay District

Three of the four Clark County Mixed-use Development (MUD) Overlay Zones are located in the study area. The presence of these zones, by themselves, is not an impediment to North-South mobility. Instead, the MUD Overlay Zones present an excellent opportunity to better integrate mixed-use development with improved regional transportation facilities.

The MUD Overlay Zones encourage a diverse mix of land uses and more intense urban form in an effort to increase pedestrian activity and support transit, particularly along designated corridors (such as Interstates 15 and 215 and State Highways 160, 582 and 146). Generally, the MUD Overlay Zone is intended for the resident and employee audience, as opposed to the short-term stay and tourist audience as noted by reference to housing and work opportunities. As stated in the MUD Ordinance, "Mixed-use projects are intended to create and sustain pedestrian oriented neighborhoods where local residents have convenient access to jobs, schools, shops, public facilities, transit, and various services."

MUD Sub-Districts

The MUD Overlay Zone consists of four sub-districts (MUD 1-4) that range in intensity (from urban to suburban). Development standards differ for each sub-district to ensure the height, density and character of the development is appropriate for the type of urban form desired. Following is a summary of the four sub-districts:

- **MUD-1: Most intense urban form:** This is intended to allow a high concentration of mixed-uses that are typical of central business districts where high and mid-rise development already exists. This area is characterized as having a highly developed pedestrian network with access to a combination of transportation modes such as high frequency bus service, light rail, monorail, freeway, or other rapid transit modes.
- **MUD-2: Most intense suburban form:** These areas are intended to be "nodal" with a concentrated mixture of low-rise to high-rise (up to 100 feet, with the possibility of additional height through density bonus incentives). These areas have a highly developed pedestrian network and access to a combination of transportation options such as freeway interchanges, arterial streets, and high frequency transit consisting of fixed guideways and enhanced bus service.
- **MUD-3: Moderately intense suburban form:** MUD-3 areas are intended to be a transition area between high and low intensity uses, with a mixture of low to mid-rise buildings (up to 50 feet with the possibility of additional height through density incentives)**.** These areas are to be established at freeway interchanges, arterial intersections, and along high frequency transit corridors.
- **MUD-4: Least intense suburban form:** MUD-4 areas are intended to transition from higher-intensity mixed-uses to suburban and single family development. These areas are intended to have low-rise development (up to 35 feet with the possibility of additional height through density incentives). MUD-4 areas may be established at the intersection of arterial streets and along transit corridors where more intense development may not be appropriate due to neighboring land uses.

MUD's two, three, and four are found within the study area. West Sahara, which centers on Sahara Avenue, consists of MUD's three and four. SW-215, which centers on the southern curve of CC-215, consists of MUD's two, three, and four. Blue Diamond, which centers on SR 160, consists of MUD's two, three, and four. While this may not be seen as a constraint, it was taken into account during the evaluation/alternatives development process.

Constraints-Protected Land–uses and Environmentally Sensitive Areas

Figure 2.0 – Study Area and Constraints, illustrates an array of land areas and uses where the existing designation was very carefully considered when developing potential roadway alignments. This study attempted to determine which of the following areas must be avoided, however, it was not possible to do so within the scope. Therefore, reasonable assumptions were made as to feasible alignments, and follow-on effort will be required to determine the acceptability of future transportation facilities in these areas. These geographic areas from North to South are:

- Paiute Indian Reservation
- Conservation Transfer Area
- Floyd Lamb Park
- Shooting Range
- Red Rock Canyon National Conservation Area
- ACEC
- Desert Tortoise Protection Area
- Sloan Canyon National Conservation Area
- Tortoise Translocation Area
- Ivanpah Airport Noise Compatibility Area
- White-margined Beardtongue Area

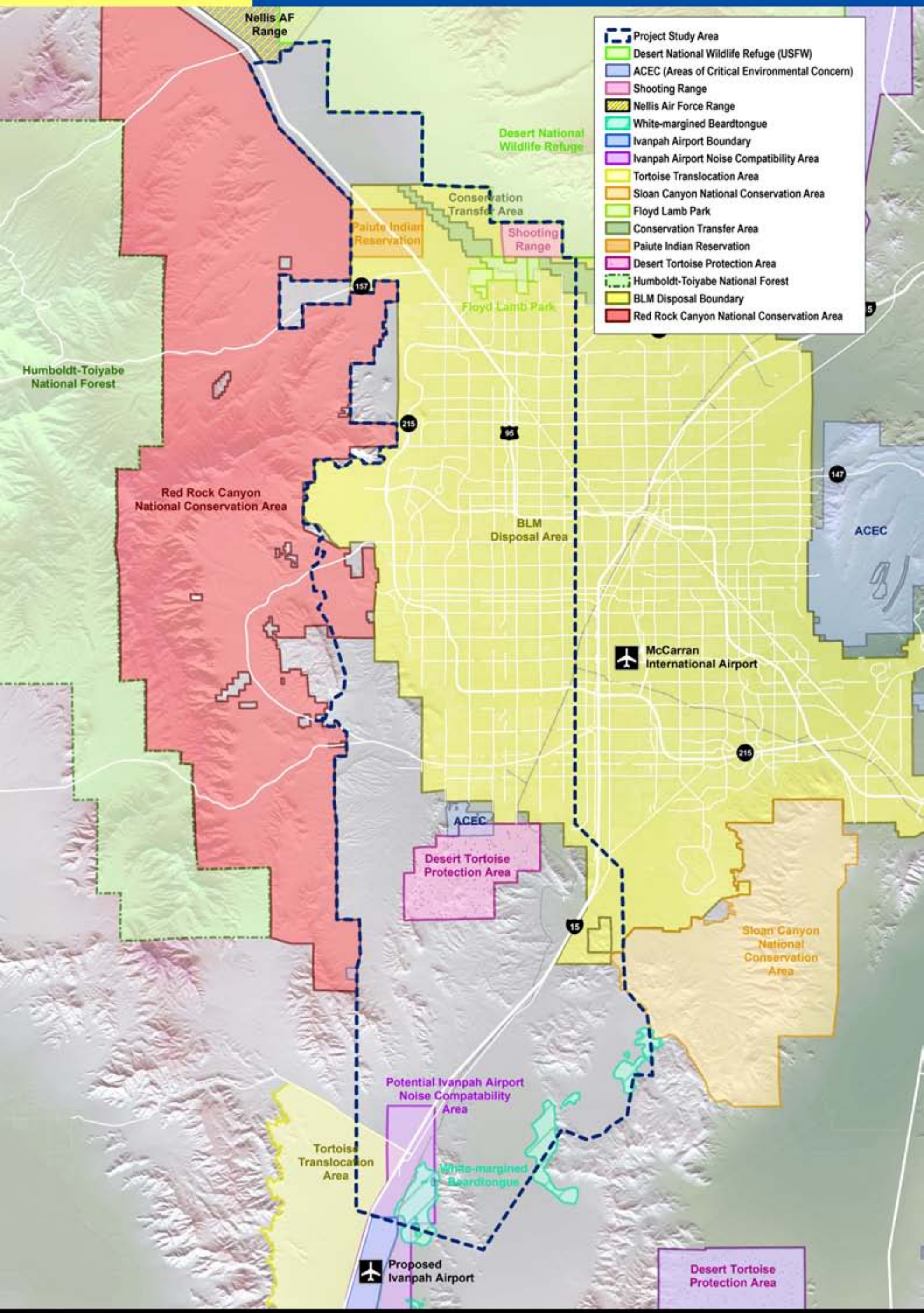
BLM Coordination

Coordination between the Project Team and the BLM occurred separately from the regularly scheduled stakeholder meetings due to schedule conflicts. It was important to coordinate with the BLM because many of the alternatives were shown on federally-owned BLM land. Many of the constraints described previously were identified during this coordination.

Geographic Constraints

Topographic constraints played an important role in determining both alignment options and potential development that might occur outside the current PLMA boundary. **Figure 2.1 – Slope Constraints and Demand Analysis Screen Lines**, graphically depicts slopes from zero to greater than 24 percent. While of the study area to the North of Blue Diamond and east of CC-215 is between zero and six percent, much of the area to the South of Blue Diamond and west of CC-215 have slopes greater than 24 percent. This made alignment options in some cases infeasible or impractical in some areas. **Figure 2.1** also shows screen line locations where future volumes were analyzed, as discussed in the next section.

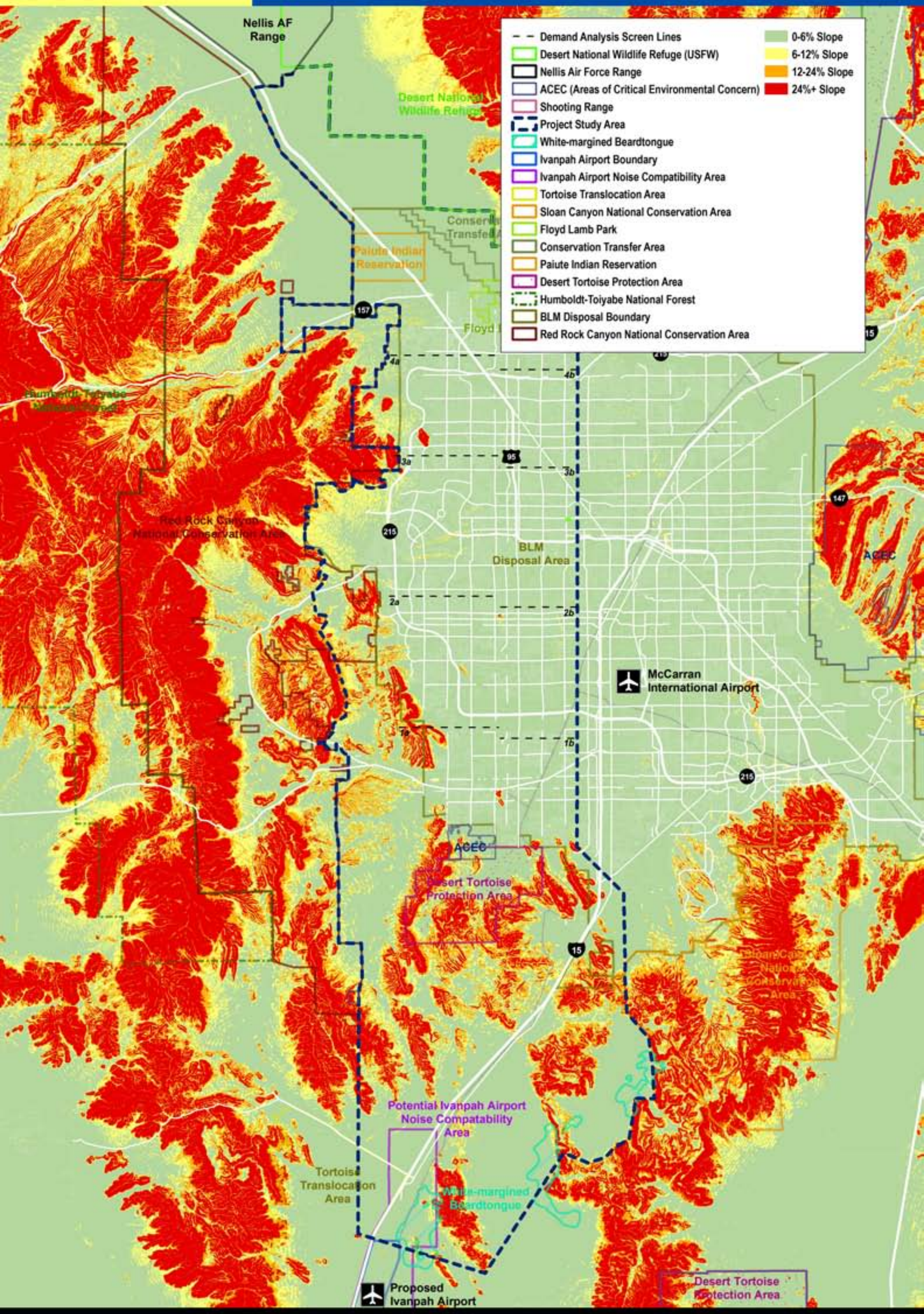
West Valley N-S Critical Facilities Study



WilburSmith ASSOCIATES

Figure 2.0 - Study Area and Constraints
(DRAFT - For Discussion Purposes Only)

West Valley N-S Critical Facilities Study



WilburSmith ASSOCIATES

Figure 2.1 - Slope Constraints and Demand Analysis Screen Lines
(DRAFT - For Discussion Purposes Only)

Section 3: 2030 Mobility Needs

This section addresses study area mobility needs through the year 2030. Analysis was based on the latest available RTC demographic estimates (planning variables) for 2030 that assume the current PLMA boundary will not be expanded. There are several interesting questions that arise in such a large study area even if the PLMA boundary is not expanded. These include:

- How many North-South trips might traverse the entire study area?
- Would facilities designed for long trips be overwhelmed by short trips?
  - If so, are there reasonable ways to accommodate short trips in other ways?
  - If the current PLMA boundary is not expanded by 2030, what additional North-South capacity is needed, and where?
  - Is there sufficient demand to warrant one or more rural highways between Blue Diamond and I-15, as was suggested in the RTC Southwest Study Area Charrette?
  - How would roadways in the northern study area perform as development continues?

Additional questions result if the PLMA boundary it is expanded. These are dealt with in the next section.

Basic Concepts

Intuitively, substantial mobility improvements could be achieved by constructing one or more major North-South facilities to carry regional trips completely through the study area. As a practical matter, even one such continuous facility would be almost impossible to construct in large part because a continuous connection to CC-215 in the Southwest would be too challenging to construct. In the Core Area, existing development and the presence of Summerlin and the Red Rock Canyon National Conservation Area to the west present formidable barriers to such facilities. Any attempt to define a major corridor through the Core Sub-area would face the difficult obstacle of securing adequate right-of-way.

With these facts in mind, the project team focused on CC-215 as the most practical high-capacity North-South facility to serve the critical Core Sub-area. However, this raised the following questions:

- How well will CC-215 serve regional North-South trips in 2030?
- Is CC-215 too far west to service the majority of north-south trips generated by the Core sub-area?
- What alternatives exist to supplement the capacity afforded by CC-215?
- Will rapid development, particularly South of CC-215, foreclose possibilities for more expansive facilities connecting to CC-215?

The population of Clark County is growing at an astounding rate. Potential right of way for long-term road improvements is often developed before the region can identify the need. This limits the possibilities to expand the roadway network and causes future issues when existing roads begin to fail.

CC-215 and Interior Grid

Currently, CC-215 is built with three lanes but could be expanded to five lanes through most of its length. This is important to consider when spacing facilities around the beltway. From Decatur to the Beltway the city is mostly built-out and the road facilities have limited right-of-way to expand. In most cases, expanding roads requires taking substantial property and may not be the best solution. However, there are opportunities for connectivity on some roadways and there are opportunities to upgrade many intersections which will improve overall flow. These options will be discussed later in this report.

A Single High-Speed Corridor

Exploring existing constraints helped determine the feasibility of creating a single, high-speed, access controlled highway beginning at I-15 near Primm, then connecting to CC-215, and transitioning to the North-South leg of the planned Sheep Mountain Parkway to end at US 95. For most of the length, it is possible to develop a high-speed, access controlled highway. The most problematic section is the connection to CC-215.

This Study determined that the existing constraints make it impractical to create a single, high-speed, access controlled highway from I-15 near Primm to CC-215. To the extent there is demand to bypass I-15 on the west side it is necessary to upgrade one existing arterial as much as possible (expressway status) between Blue Diamond and CC-215. However it is also necessary that other existing arterials be significantly enhanced beyond what is presently planned to help distribute the demand and avoid overwhelming any expressway that may be developed.

Alternatives to a Single High-Speed Corridor

It is important to avoid overloading major arterials with short trips in order to preserve their ability to adequately serve medium and even longer distance trips. In the Core Sub-area, CC-215 functions well for medium to long trips because it is located too far west to attract longer trips generated east of Buffalo.

Most auto trips tend to be very short, neighborhood scale trips of three miles or less. If the urban grid is lacking collectors and minor arterials, these trips are forced onto major arterials and even freeways where they consume space designed to handle longer trips. Model analysis of

the existing plan for 2030 is discussed under ***Core Sub-area Analysis***, and confirms that there is an over-dependence on section-line streets such as Decatur, Jones, Rainbow, etc., while there is untapped capacity on in-between streets such as Lindell Road, Torrey Pines, and Tenaya Way. The latter streets are occasionally discontinuous and force neighborhood-scale trips onto the arterials. In order to avoid too many short trips on major arterials, it is important not to ignore this market when developing mobility concepts.

Southern Sub-area Analysis

To determine how many trips would traverse the study area, it was first necessary to make it possible to do that within the model. Modeled paths must respect that potential paths would all likely have a few miles with lower design speeds but not necessarily inadequate capacity.

Southwest Connector Alternatives

There are two general locations for alignments South of Blue Diamond: 1) an eastern pathway that connects to Rainbow near Blue Diamond, and 2) a western pathway that connects to Fort Apache and/or Durango near Blue Diamond. Both alignments were tested individually and together as "rural highways" beginning at I-15 and transitioning to high-capacity, at-grade urban arterial streets North of Blue Diamond. Where high speeds are possible, free-flow speeds were modeled at 65 mph. Unlimited capacity was allowed to determine unconstrained demand. When paths must transition to lower speed existing alignments, they were modeled at average traverse speeds of 40 mph to account for the effect of speed limits and signals. In these sections, capacities were constrained to what appeared practical to design. Capacities were consistent with recommendations emerging from the RTC Southwest Corridor study. The corridor then transitioned to CC-215. At the northern end, it transitioned to the planned North-South leg of Sheep Mountain Parkway.

Modeling Results

If a western-most path existed and there were no extension of Rainbow to I-15, modeling suggests there would be 21,000 vehicles per day diverted from I-15 that reach Blue Diamond. If an eastern path existed and there were no western path, the Rainbow South Study determined that a connection to I-15 near Sloan could expect as much as 80,000 vehicles per day near Blue Diamond. Closer to I-15 volumes would be between 23,000 and 43,000, and about 14,000 to 23,000 trips per day could be diverted from I-15, depending on the option selected, and the remainder generated by land uses along the corridor, trips to/from south, Henderson, etc.

If the Rainbow corridor were completed to Sloan and another more western corridor were connected to I-15 near Primm, the western alignment would likely attract 13,000 vehicles from I-15 and the Rainbow alignment would attract the remaining 8,000.

Table 3.0a: Traffic Diversions from I-15 South

Scenario	Rainbow	Fort Apache
Rainbow corridor	23,000	N/A
Fort Apache corridor	N/A	21,000
Both simultaneously	8,000	13,000

Note 1: Assumes 2030 with no change in PLMA boundary
Note 2: Add volumes to expected background traffic further north

Volumes above 10,000 vehicles per day cannot be safely accommodated on a 2-lane rural highway, as there would be very few safe gaps for passing. Passing lanes for slow-vehicles would be needed up to 15,000 at which point it is better to provide 4-lanes for the full length. Diverted volumes in any of the scenarios would effectively eliminate the need for one lane each direction on I-15 up to the interchange with CC-215. It would also substantially reduce volumes on other key corridors such as Blue Diamond, the east-west leg of CC-215, and US-95.

Most trips diverted from I-15 would ultimately end up spreading out across available North-South arterials North of Blue Diamond. This is a benefit for I-15, but could potentially overload streets between Blue Diamond and CC-215 unless an adequate design for those streets could be identified and preserved quickly.

Approximately 4 percent of diverted trips have destinations north of the CC-215 beltway. There is almost no demand to head toward Reno from vehicles entering the area from California because there are shorter paths in California. Thus, the demand to and from points South on I-15 is from generators within the study area and it gradually diminishes until it reaches the end of the existing 2030 PLMA boundary.

Core Sub-area Analysis

While there is still time to plan and program for adequate facilities in the Northern and Southern Sub-areas, North-South mobility within the Core Sub-area must be accommodated as best as possible within existing realities. This section outlines expected volumes and capacities within the Core Sub-area.

Modeling Results

Table 3.0 shows that volumes diverted from I-15 could be enough to justify creating both alignments, especially when factoring in background traffic for which the combination may overwhelm either the Rainbow or Fort Apache corridors. **Screenline Tables 3.1-3.4** on the following page show expected volumes in 2030 from the RTC travel demand model, assuming the PLMA Boundary is not expanded beyond its present size, but that two new connections to I-15 are created: one that generally makes its way to the Rainbow corridor, and another that makes its way to the Fort Apache-Durango corridor. The table shows expectations for each street at a given latitude (see **Figure 2.1** for screen line locations). Values for yellow-background streets are summed to show eastern screen lines, and green-background streets are western screen lines. Columns show the street name, 2030 lanes in the RTC plan, expected volumes, expected daily capacity if the RTC fiscally constrained plan is implemented, and the expected volume / capacity (V/C) ratio. Any street exceeding V/C 1.0 means there will likely be one or more hours per day when it takes multiple signal cycles for a vehicle to cross an intersection.

The most acute problems expected for 2030 are in the South, where virtually all streets will be operating well above V/C 1.0.

Northern Sub-area Analysis

The situation in the Northern Sub-area is difficult to discern completely, and would require more research than budget allowed in this study. There are a number of section-line arterials and mid-section collector streets that today not continuous or are significantly downgraded at certain points. The RTC model suggests that these conditions may also exist far into the future at many locations. If so, the result will be significant congestion with much of the traffic winding its way north and south by transferring to east-west links to reach parallel facilities with more capacity. This issue exists primarily on streets south of CC-215. Streets to the north of CC-215 are emerging on a more uniform plan.

Table 3.0b: Traffic Diversions from US-95 / I-15

Scenario	
N-S leg of Sheep Mt. Pkwy	13,000

Note 1: Assumes 2030 with no change in PLMA boundary
Note 2: Add volumes to expected background traffic further south

Table 3.4 shows streets where it is not clear whether they will be fully extended north and south of CC-215 (marked by N/A). If they ultimately remain discontinuous or contain significant bottlenecks, traffic will naturally gravitate to longer streets with significant capacity, as well as to US 95 – causing both the freeway and north-south arterials to ultimately

serve more traffic than they can comfortably handle.

Some sections can be expected to fail by 2030 even if the PLMA Boundary does not change, though the situation would not be as extreme as is anticipated in the Southern Sub-area.

Note that it is not necessarily the case that the model reflects build-out conditions in the North, even within the existing PLMA boundary since development patterns in this area are more difficult to predict.

Section 4 elaborates on how these streets may perform if the PLMA Boundary is extended. Section 5 discusses potential capacity enhancement opportunities that appear to be reasonably achievable, though it would require significant additional analysis to both confirm the need and determine the feasibility of the potential.

North-South Leg of Sheep Mountain Parkway
Table 3.0b shows demand levels expected on the North-South leg of Sheep Mountain Parkway, and on Hualapai – the nearest parallel street – that could be expected to occur by 2030 if the PLMA boundary is never extended beyond its present location, Note that if Hualapai were the only street, it is expected to carry about 40,000 vehicles per day, most of which would likely be generated by adjacent development. This can be easily accommodated by a 7-lane arterial, which is what is shown for 2030 in the RTC model. If the Parkway is developed along side, it would likely attract only about 13,000 trips per day, coming mostly from Hualapai which was not overly congested anyway. Thus it is hard to claim this link is critical for any reason other than high-speed continuity to US 95 if the PLMA boundary is never extended. However Section 4 shows how this premise changes considerably if the rest of the study area is ultimately developed.

Table 3.0b: Traffic Diversions from US-95 / I-15

Scenario	Huallapai	N-S Sheep Mt.
Huallapai only	40,000	N/A
N-S leg of Sheep Mt. Pkwy	30,000	13,000

Note 1: Assumes 2030 with no change in PLMA boundary
Note 2: Add volumes to expected background traffic further south

Caveats-Extreme V/C Ratios

Volumes at many locations range from V/C 1.3 to as high as 1.8. This represents incredible latent demand that is not possible to serve with traditional designs as represented in the current fiscally constrained plan. The model forces volumes through because it has no where else to put them. In practice, multiple phenomena would occur to dampen such high ratios. These include avoidance of these areas during congested periods and use of alternative modes, such as transit and carpooling. Vehicles would require multiple cycle lengths to cross an intersection for perhaps several hours, but this delay may encourage many to travel outside those times – something not reflected in the model. Land use patterns would also begin to adjust to the new reality, perhaps altering what was assumed in the model. There would likely be a good market for transit separated from congestion, if such were available.

While these effects may help to lower the V/C ratio over what was modeled, the end result may still be extreme congestion. This is due in part because it is impractical to develop new roadways within the constraints of the existing city. Alternatives to new roads and traditional road widening must be pursued if demand significantly outstrips capacity of existing roadways. Later sections of this study will explore opportunities to enhance overall North-South mobility within the Core Sub-area.

Table 3.1: Baseline Volumes, Capacities at Screenline 1 (CC-215 South)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap
Decatur	7	85,000	60,000	1.4
Jones	7	76,000	60,000	1.3
Rainbow	7	94,000	60,000	1.6
Buffalo	5	44,000	40,000	1.1
Durango	7	73,000	60,000	1.2
Ft Apache	5	69,000	40,000	1.7
1a. East	21	255,000	180,000	1.4
1b. West	17	186,000	140,000	1.3

Table 3.2: Baseline Volumes, Capacities at Screenline 2 (Sahara)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap
Decatur	7	78,000	60,000	1.3
Lindell Rd	3	19,000	11,250	1.7
Jones	5	45,000	40,000	1.1
Torrey Pines	5	36,000	32,000	1.1
Rainbow	7	85,000	60,000	1.4
Tenaya Way	3	13,000	12,000	1.1
Buffalo	5	45,000	40,000	1.1
Cimarron	5	20,000	22,500	0.9
Durango	7	69,000	60,000	1.2
Ft Apache	5	70,000	40,000	1.8
Huallapai	7	51,000	60,000	0.9
Town Center Dr.	7	51,000	60,000	0.9
CC-215	6	198,000	165,000	1.2
2a. East	30	276,000	215,250	1.3
2b. West	42	504,000	447,500	1.1

Table 3.3: Baseline Volumes, Capacities at Screenline 3 (Cheyenne)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap
Decatur	7	60,000	60,000	1.0
Lindell Rd	3	10,000	11,250	0.9
Jones	5	31,000	32,000	1.0
Torrey Pines	5	16,000	24,000	0.7
Rainbow	5	30,000	40,000	0.8
US 95	6	208,000	165,000	1.3
Tenaya Way	3	8,000	12,000	0.7
Buffalo	5	35,000	40,000	0.9
Cimarron	3	8,000	11,250	0.7
Durango	7	46,000	60,000	0.8
Ft Apache	5	20,000	24,000	0.8
Huallapai	5	20,000	24,000	0.8
CC-215	6	130,000	165,000	0.8
3a. East	34	363,000	344,250	1.1
3b. West	31	259,000	324,250	0.8

Table 3.4: Baseline Volumes, Capacities at Screenline 4 (CC-215 North)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap
Decatur	7	42,000	60,000	0.7
Lindell Rd	5	20,000	32,000	0.6
Jones	5	38,000	40,000	1.0
Torrey Pines	3	15,000	12,000	1.3
Rainbow	5	35,000	40,000	0.9
Tenaya Way	3	10,000	12,000	0.8
Buffalo	5	15,000	30,000	0.5
Cimarron	3	8,000	11,250	0.7
Durango	7	36,000	60,000	0.6
US 95	6	132,000	165,000	0.8
Ft Apache	5	25,000	24,000	1.0
Huallapai	7	25,000	60,000	0.4
Sheep Mt., NS	6	30,000	165,000	0.2
4a. East	28	160,000	196,000	0.8
4b. West	39	271,000	515,250	0.5

Section 4: Post 2030 Potential Mobility Needs

Figure 4.0 – Developable Areas, shows that the total land area outside the PLMA boundary, but within the study area, is approximately 140,100 acres. Some 69 percent, or 97,300 acres, of this total land area is suitable for development. If the PLMA boundary changes and these areas were to develop, even at or below densities observed in the last decade, several additional questions would be raised:

- To what extent would development outside the present PLMA boundary increase travel volumes at study area screen lines?
- Could the additional demand overwhelm facilities designed only to accommodate 2030 traffic within the current PLMA boundary?
- Are there corridor preservation opportunities or other measures that could be taken within the current boundary to better accommodate the ultimate demand?

Analysis of Developable Area

Areas that are potentially developable, but outside the current PLMA boundary, were determined by their being owned by the federal government, flat enough for development (below 24% grade), and not protected by a specific environmental designation.

For convenience, the area was divided into eight arbitrary zones, and the amount of potentially developable land was identified. In the Southern Sub-area, areas east of I-15 were included in the study area because, if developed, they would greatly influence overall volumes on any alignments west of I-15 since trips would interact with that area.

If the average gross residential unit density across an entire zone were five dwelling units per acre, a zone with 10,000 acres could accommodate 50,000 units, or over 125,000 people at a nominal 2.5 residents/dwelling unit. Note that five units per gross acre may have one tenth of an acre lots within the average subdivision, given the need to commit land to parks, commercial space, internal roads and other uses.

Thus, with almost 100,000 acres of developable land outside the current PLMA boundary, the study area could accommodate over one million residents at the density described. A population increase of approximately 500,000 residents was assumed in the analysis using the Extended Model to illustrate realistic conditions beyond 2030, but well short of build-out. Note that this potential increase assumes other obstacles to sustainable development can be solved.

Volume/Capacity Analysis Assuming Expanded Development

The questions posed at the beginning of this section were analyzed by expanding the zone system and demographic input files to the RTC travel demand model to cover much of the land that is currently outside the PLMA boundary. Those spaces were filled to about half of their holding capacity to produce a conservative estimate short of full build-out.

The graphic to the right illustrates how volumes across the region may increase if zones 1-8 of **Figure 4.0** are developed as described in the preceding section, as compared with 2030 volumes that assume no additional development, but do assume the extension of Sheep Mountain Parkway in the north, and Fort Apache and Rainbow in the south. **Tables 4.0a and 4.0b** summarize expectations on key facilities both with and without the PLMA boundary extension.

Table 4.0a: Daily Volumes on Southern Extensions

Location	2030 Base	PLMA Extended
Rainbow at I-15	31,000	65,000
Fort Apache at I-15	13,000	113,000

Note 1: Assumes areas beyond PLMA boundary are half developed

Table 4.0b: Daily Volumes on Key Northern Facilities

Location	2030 Base	PLMA Extended
N-S leg of Sheep Mt. Pkwy	13,000	53,000
Hualapai	30,000	40,000
Grand Canyon	20,000	30,000
Durango-El Capitan	45,000	50,000
US-95	122,000	220,000

Note 1: Assumes areas beyond PLMA boundary are half developed
Note 2: All streets measured just north of CC-215

There is also significant volume added to the grid within the Core Sub-area. **Screenline Tables 4.1-4.4** show the same information as before, but also include columns in green that show how the volumes and congestion on any given street may be expected to change given the expanded urban boundary. The challenges to North-South mobility in all areas are formidable - especially if the boundaries are extended. Concepts to address expected and potential needs are the subject of the next section.

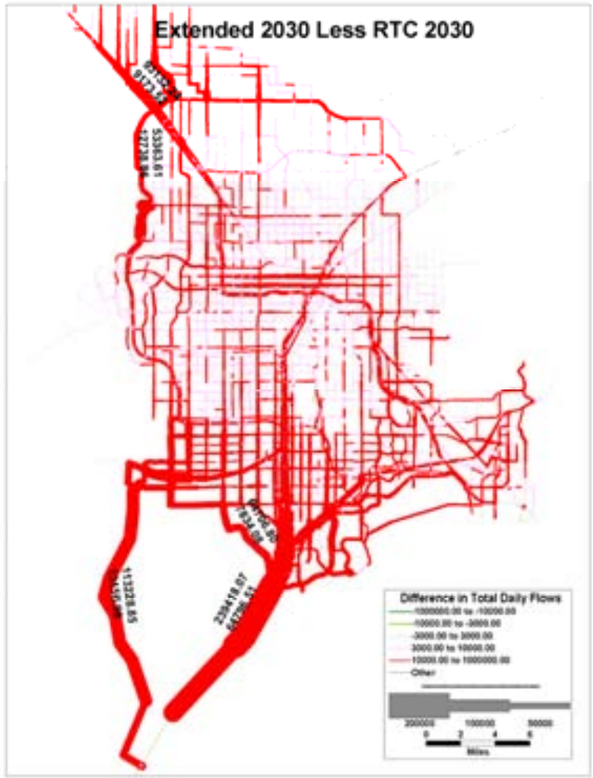


Table 4.1: Volumes, Capacities with Baseline and Extended Boundary at Screen Line 1 (CC-215 South)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap	Volume w/Extended Boundary	Vol/Cap w/Extended Boundary & RTC Cap.
Decatur	7	85,000	60,000	1.4	90,000	1.5
Jones	7	76,000	60,000	1.3	85,000	1.4
Rainbow	7	94,000	60,000	1.6	105,000	1.8
Buffalo	5	44,000	40,000	1.1	70,000	1.8
Durango	7	73,000	60,000	1.2	100,000	1.7
Ft Apache	5	69,000	40,000	1.7	120,000	3.0
1a. East	21	255,000	180,000	1.4	280,000	1.6
1b. West	17	186,000	140,000	1.3	290,000	2.1

Table 4.2: Volumes, Capacities with Baseline and Extended Boundary at Screen Line 2 (Sahara)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap	Volume w/Extended Boundary	Vol/Cap w/Extended Boundary & RTC Cap.
Decatur	7	78,000	60,000	1.3	85,000	1.4
Lindell Rd	3	19,000	11,250	1.7	23,000	2.0
Jones	5	45,000	40,000	1.1	50,000	1.3
Torrey Pines	5	36,000	32,000	1.1	40,000	1.3
Rainbow	7	85,000	60,000	1.4	95,000	1.6
Tenaya Way	3	13,000	12,000	1.1	20,000	1.7
Buffalo	5	45,000	40,000	1.1	55,000	1.4
Cimarron	5	20,000	22,500	0.9	25,000	1.1
Durango	7	69,000	60,000	1.2	75,000	1.3
Ft Apache	5	70,000	40,000	1.8	75,000	1.9
Hualapai	7	51,000	60,000	0.9	60,000	1.0
Town Center Dr.	7	51,000	60,000	0.9	60,000	1.0
CC-215	6	198,000	165,000	1.2	240,000	1.5
2a. East	30	276,000	215,250	1.3	313,000	1.5
2b. West	42	504,000	447,500	1.1	590,000	1.3

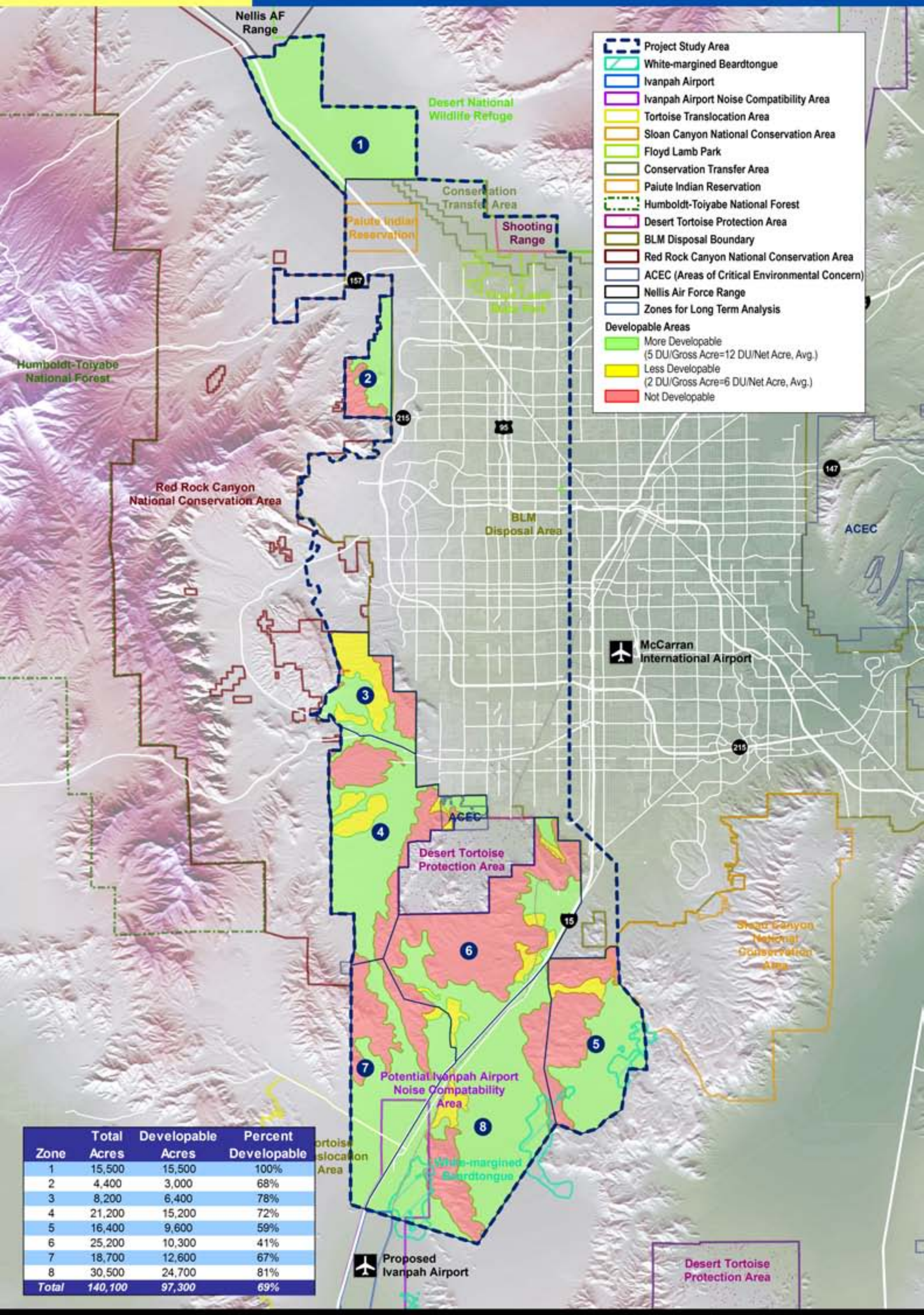
Table 4.3: Volumes, Capacities with Baseline and Extended Boundary at Screen Line 3 (Cheyenne)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap	Volume w/Extended Boundary	Vol/Cap w/Extended Boundary & RTC Cap.
Decatur	7	60,000	60,000	1.0	65,000	1.1
Lindell Rd	3	10,000	11,250	0.9	12,000	1.1
Jones	5	31,000	32,000	1.0	35,000	1.1
Torrey Pines	5	16,000	24,000	0.7	18,000	0.8
Rainbow	5	30,000	40,000	0.8	32,000	0.8
US 95	6	208,000	165,000	1.3	282,000	1.7
Tenaya Way	3	8,000	12,000	0.7	15,000	1.3
Buffalo	5	35,000	40,000	0.9	37,000	0.9
Cimarron	3	8,000	11,250	0.7	10,000	0.9
Durango	7	46,000	60,000	0.8	60,000	1.0
Ft Apache	5	20,000	24,000	0.8	25,000	1.0
Hualapai	5	20,000	24,000	0.8	25,000	1.0
CC-215	6	130,000	165,000	0.8	202,000	1.2
3a. East	34	363,000	344,250	1.1	459,000	1.3
3b. West	31	259,000	324,250	0.8	359,000	1.1

Table 4.4: Volumes, Capacities with Baseline and Extended Boundary at Screen Line 4 (CC-215 North)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap	Volume w/Extended Boundary	Vol/Cap w/Extended Boundary & RTC Cap.
Decatur	7	42,000	60,000	0.7	60,000	1.0
Bradley (Lindell)	3	20,000	16,000	1.3	35,000	2.2
Jones	5	60,000	40,000	1.5	75,000	1.9
Torrey Pines	N/A	-	-	-	-	-
Rainbow	N/A	-	-	-	-	-
Tenaya Way	3	30,000	16,000	1.9	35,000	2.2
Buffalo	5	22,000	30,000	0.7	30,000	1.0
Cimarron	N/A	-	-	-	-	-
Durango-El Capil	7	50,000	60,000	0.8	70,000	1.2
US 95	6	132,000	165,000	0.8	242,000	1.5
Grand Canyon	5	25,000	32,000	0.8	48,000	1.5
Hualapai	7	40,000	60,000	0.7	85,000	1.4
Sheep Mt., NS	N/A	-	-	-	-	-
4a. East	18	152,000	132,000	1.2	205,000	1.6
4b. West	30	269,000	347,000	0.8	475,000	1.4

West Valley N-S Critical Facilities Study



Zone	Total Acres	Developable Acres	Percent Developable
1	15,500	15,500	100%
2	4,400	3,000	68%
3	8,200	6,400	78%
4	21,200	15,200	72%
5	16,400	9,600	59%
6	25,200	10,300	41%
7	18,700	12,600	67%
8	30,500	24,700	81%
Total	*140,100*	*97,300*	*69%*

WilburSmith ASSOCIATES

Figure 4.0 Developable Areas
(DRAFT- For Discussion Purposes Only)

Section 5: Concepts and Recommendations

Previous sections of this report have outlined significant needs for North-South mobility across the study area, as well as the difficult challenges posed by both the natural and built environment in actually providing adequate mobility. This section seeks to provide practical, affordable concepts that RTC may wish to pursue further to improve North-South mobility across the study area. Concepts are organized by Southern, Core, and Northern Sub-areas. First, the concepts themselves are discussed, and then an analysis of the performance of the concepts is provided.

Concepts to Improve Mobility

The recommendations discussed in this section include the following general concepts:

- Increase right-of-way in some locations to increase capacity
- Construct new facilities to improve overall mobility.
- Connect key streets that are currently discontinuous.
- Build one-way couplet systems in areas where significant demand will exist and ROW is limited.
- Improve intersection performance by applying high-capacity intersection techniques.
- Pursue transit options in key corridors

Southern Sub-area Concepts

Modeling results show the Southern Sub-area has significant emerging mobility challenges, created in part because the built and natural environment have both closed off much of the ability to construct higher-order facilities. There are still opportunities to preserve corridors meant to improve the overall grid and to handle the loads that higher order facilities would otherwise have handled. **Figures 5.1 - 5.3** detail various aspects of this sub-area.

Figure 5.1 is the top-level view of the Southern Sub-area. It depicts areas where there are no clear constraints to development other than the fact that the areas are outside of the current PLMA boundary. This helped define where it was possible to fit alignments between I-15 and Blue Diamond, as well as show potential development that may depend on those alignments if ever those areas become part of the PLMA boundary.

Two potential general alignments exist in the western portion of the Southern Sub-area, one of which would pass through both the Desert Tortoise Study Area and an Area of Critical Environmental Concern (ACEC). The situation is similar to alignments under consideration in the Rainbow Boulevard-Blue Diamond to Sloan Corridor Study. Two of the four alternative alignments in the west have obvious environmental challenges. This study recommends that if any alignment is needed, it should be the most western alignment which avoids the most sensitive environmental areas.

Western Alignment Appears Warranted

Without the western alignment, traffic will have only two options for reaching destination on the west side of the valley. Remain on I-15 or divert to the Rainbow corridor and connected facilities. Either option will only exacerbate congestion on these facilities. Recall from **Table 3.0a** that preliminary modeling suggests that the more western alignment would likely attract at least 13,000 vehicles per day. This is sufficient reason to pursue follow-on studies aimed at eventual construction of a four-lane rural highway – especially if it is able to relieve congestion on more eastern corridors such as I-15 and Rainbow.

Right-of-Way on Fort Apache

The Southwest Valley Charette suggested a western freeway beginning at I-15 near Primm, and connecting to CC-215, then on a path west of Hualapai on land currently outside the PLMA Boundary (anticipating that it would eventually be released for development). This study and the Southwest Valley North-South High Speed Connection Study-CC-215 to Blue Diamond (Southwest Connector study) each confirm the difficulty of such a connection west of Hualapai. But this study validates the need for a major highway in the event that areas between I-15 and Blue Diamond are ultimately developed, noting an additional 13,000 vehicles/day as a minimum, and up to 100,000 vehicles/day if land outside the PLMA boundary is developed.

Since the potential for a western option is seriously limited by the Red Rock Canyon Conservation Area, and by existing development at the most likely CC-215 connection options, both this study and the Southwest Connector study recommend using Fort Apache as the primary means to connect both the Pahrump area and I-15 South to CC-215. The Fort Apache corridor is still in the early stages of formation and there is good opportunity to protect the majority of this alignment. However, it may be too late to develop it as a more conventional freeway between CC-215 and Blue Diamond. Protecting adequate right-of-way may allow Fort Apache to handle more significant volumes that could occur if significant development occurs in Pahrump.

To better handle the extra 13,000 and to be prepared for the possibility of even more traffic from potential development South of Blue Diamond and toward Pahrump, this Study recommends that Fort Apache be upgraded as much as possible. The optimum right-of-way between Blue Diamond and Sunset Road would be 300 feet to provide the option for a full freeway extension from the corner of CC-215. However, this may no longer be possible, and a width of 200 feet (restricting access as much as possible) should be considered the minimum acceptable width. There is a drainage right-of-way next to Fort Apache for much of the length that could be used jointly for drainage and transportation, and this space could be counted as part of the 200 feet.

There are existing developments along Fort Apache that have been built to different standard than exist today. This should not deter efforts to expand the right-of-way wherever it is still possible. It may be many years before properties that conflict with the ultimate right-of-way would be needed anyway.

At Sunset Road, the corridor should split into one-way couplets to the east as recommended in the Southwest Corridor Study. Fort Apache should also continue northward on the existing right-of-way to CC-215. Presently, Fort Apache passes over but doesn't connect to CC-215. In fact, this connection cannot be completed easily due to the proximity of interchange ramps for both Tropicana and Flamingo. One solution is to extend the collector-distributor system that currently terminates at Tropicana to Flamingo. This would not be without impacts, but the combination of a couplet system on Sunset for eastbound trips, and a northward continuance of Fort Apache to connect to CC-215, is an attractive way to braid the connection of a 200 foot Fort Apache further to the south, without requiring additional right-of-way where development is most dense near CC-215.

Likely due to funding constraints more than need, the connection of Fort Apache to I-15 South may only be able to be shown in the illustrative portion of the next RTC plan. However, immediate action to protect additional right-of-way on Fort Apache must be taken in order to avoid foreclosing the option to expand it as necessary in the event that the western alignment is ultimately constructed.

Screen Line Analysis of Concepts

Specific concepts are discussed more in detail below, but an analysis of those concepts is provided in **Screenline Tables 5.1-5.4**. The tables show the same information as noted previously, but also show (in the blue columns) results that are potentially achievable with and without expansion of the PLMA boundary, if all of the concepts presented here were implemented.

Concepts that were judged impractical were excluded from this study. A practical project as defined in this study means projects that would be lower cost than other alternatives because they likely would not require an excessive number of properties or grade separation, and for the most part could fit very closely within existing right-of-way.

Connecting to CC-215

Perhaps the most difficult challenge facing North-South mobility in the entire study area is ensuring adequate connections to and across CC-215. The screen line analysis shows that if built as currently planned, V/C ratios at virtually all interchanges will average about 1.35 if the PLMA boundary is never extended southward, and 1.8 if it is extended. Simply put, if plans in this area are not significantly upgraded, the ensuing gridlock and public pressure for relief will force the region to attempt solutions in the midst of built-out conditions. This would mean that any solution will be extremely expensive and less effective than if preservation for adequate capacity is dealt with today while land development has not yet closed off the best options.

Ideally, the region would have preserved sufficient land for a freeway extension southward from the corner of CC-215 near Durango and Sunset. Existing land uses make this impractical, but it is still possible that Fort Apache can serve as a major at-grade expressway. The additional load that a freeway would have handled will ultimately spread across other arterials with connections to CC-215.

The Clark County MUD Transportation Study also confirmed that densities around CC-215 are likely to be far higher than was anticipated when CC-215 was in the approval process. The study noted that while higher densities of mixed uses would improve mode split and lower overall regional VMT, it would also still bring more cars to the site. That study suggested splitting all alignments that connect with CC-215 into one-way couplets beginning just South of Warm Springs and ending just North of Sunset.

Reasons Prior Studies Propose Couplets

The following points support consideration of couplets to resolve issues in this critical area:

1. Couplets can serve between 30-50 percent more vehicles per hour with the same number of lanes as bi-directional facilities.

2. Couplets could provide a total right-of-way between 200-240 feet without requiring any widening of existing streets. Widening existing two-way streets would impact existing properties significantly.

3. Two 100 foot streets with traffic from only one direction are much easier to cross and safer for pedestrians than a single two-way street that is much wider and has traffic conflicts with pedestrians from multiple movements.

4. Couplets are common in downtown pedestrian-oriented settings. The entrance to one-way streets marks the beginning of a unique "Place" that offers landscape and building architects a foundation on which to create Town Centers and a uniquely pedestrian friendly flavor – which is one of the major goals of the Mixed Use Development areas.

The Southwest Connector Study also validated that couplets offer high-efficiency two-phase signals, excellent signal coordination, low cost construction, are context-sensitive, and provide more right-of-way approaching the interchanges than is available in any other way. That study noted if land uses begin to close off these options, the next solutions may be to convert existing arterials into super-arterials involving right of way expansion, expensive grade separations, and freeway flyovers.

Figure 5.3a depicts the couplet configuration as suggested by these studies but also proposes some modifications. Screen line analysis conducted for this study suggests that if Fort Apache is upgraded to handle more traffic, there is no significant need to provide additional capacity on Buffalo allowing Buffalo to remain as planned. However Decatur, which was not included in other studies, will have sufficient volume and its capacity should be upgraded to a couplet system. Thus, every other interchange would be upgraded for higher capacity.

Figure 5.3b depicts another option that is more traditional. This option ensures that Cimaron, Tenaya Way, Torrey Pines, and Lindell Road are all extended across CC-215 and are accessible from each of these by means of a one-way frontage collector-distributor system that runs along side CC-215. Doing this will greatly relieve congestion at Durango, Buffalo, Rainbow, Jones, and Decatur, though likely not as much as the couplet system would. This option may be slightly more expensive, offer slightly less capacity, and be less context-sensitive, but in some instances may be more politically possible.

The two options outlined can be combined with one another. It is recommended that RTC should acquire right-of-way for as many of the couplets systems as possible and also complete each of the above named collectors up to the CC-215 frontage roads. Then bridges spanning CC-215 could be constructed if necessary.

Key South Sub-area Intersections

The Southwest Corridor Study also recommended that significant intersections on Fort Apache, Durango, and Rainbow between Blue Diamond and CC-215 should flare out and be access restricted to a given distance from the intersection. This design makes it easier to upgrade intersections to more efficient designs such as the Continuous Flow Intersection, or even grade-separated arterial interchanges if need and funding allow. This study also finds this an essential element of managing the high volumes that will spread across all corridors in lieu of the freeway extension noted earlier that may now be infeasible.

Core Sub-area Concepts

Improving North-South mobility inside the beltway is extremely challenging because the built environment is almost completely formed. Yet modeling confirms that traffic is still expected to grow significantly even if rights-of-way are not. Thus recommendations in the core study area focus less on large highway projects and more on transit, connectivity spot improvements to help tap this under-utilized capacity, and intersection efficiency projects to help more vehicles fit through with the same number of lanes.

Complete Continuity of Collectors

As noted in the section on existing conditions, because collector roads such as Lindell Road, Torrey Pines, and Tenaya Way are all blocked by existing development at various points, shorter localized trips that would have used them if they existed are forced onto larger streets where they will help create excessive delay for the longer trips that should be on larger streets. Larger streets often need a relief valve for peak times, and in many cases that valve does not exist. However a close review of aerial photography suggests that there are often just a handful of buildings that stand in the way of extending these important streets. There are even locations where the street can be extended without any impacts to existing buildings. **Figure 5.4** notes in orange locations that require no buildings for extension, and in green locations that are more complicated, along with an estimate of the number of buildings likely to be impacted depending on the design.

It is never easy to impact existing buildings, and undoubtedly there will be many who are concerned that the connections will raise volumes on those streets. However if these streets can be completed it will greatly enhance the overall ability of the core study area to handle expected volumes within a reasonable Level of Service.

Enhance Major Arterials with Transit and Intersection Improvements

Additionally, this study identifies several key arterial corridors for emphasizing both transit enhancements and intersection efficiency projects. Specifically, the Continuous Flow Intersection and Parallel Flow Intersection, or CFI and PFI, represent a new breed of at-grade intersection designs that are able to eliminate the need for left-turn arrows, thus increasing capacity by 50% or more.

These designs often require more intersection right-of-way than is available, but usually not much more. Whatever is required is generally a fraction of the space and cost required for more traditional solutions such as adding another through lane for miles, or grade separating. It is unknown at this time whether the identified intersections could be made to accommodate higher efficiency designs. They are identified only because expected volume levels and corridor stature as major arterials suggest these may be good locations to conduct further research into the feasibility, costs, and benefits of higher efficiency designs.

Northern Sub-area Concepts

Screenline Table 5.4 shows the information from earlier tables along with potential capacity that may be possible to achieve. Earlier sections noted the difficulty of assessing the true picture of both demand and capacity on streets both north and south of CC-215 in part because many streets are discontinuous and disjointed. This study recommends that future studies should clarify the intended cross sections and continuity of all section line and mid-section streets roughly from Cheyenne north to the end of the PLMA Boundary in order to do a more complete assessment of the needs and constraints in the area.

Hence, the screenline analysis of existing plans may not fully account for what is planned. The potential enhancements likewise may not be fully achievable if noted extensions and right of way widenings would be politically too difficult to obtain.

With that, it does appear that the RTC plan may not be fully adequate for 2030, and will certainly not be fully adequate if the PLMA boundary is extended. If the boundary does change, streets could be impacted significantly depending on the level of development beyond the current boundary.

The City of Las Vegas has been aggressively pursuing land use and associated roadway plans in the event that some or all of the potentially developable area is ultimately developed. This study in large part supports their plans and finds them by and large adequate for serving potential development near and north of Sheep Mountain Parkway. However this study offers additional details for consideration in those spaces, as well as areas a bit to the south that would be heavily impacted by that development, but which impacts have not been fully considered in other studies to date.

This study area assumes much less development potential in the north than was assumed in the Sheep Mountain Parkway study for several reasons. The Sheep Mountain Parkway study envisioned high densities from I-15 to US-95 between the current edge of development clear to where steep slopes would prevent additional development. This would require development on land that is currently part of the Desert National Wildlife Refuge and a large shooting range. This study area assumes that the Desert National Wildlife Refuge and the shooting range would continue indefinitely, and therefore only a 15,500 acre space (Zone 1 on Figure 4.0) may be potentially developable. As noted earlier, densities in all of zones 1-8 were modeled at about half of their expected full potential to get a minimum expectation of their impact on existing streets.

Even with this modest amount of additional development, **Screenline Table 5.3** shows that the screen line at the north beltway would have V/C ratios between 1.4 and 1.6 if planned capacity and connectivity have been interpreted correctly. The concepts below suggest practical ways that the area may be able to create additional capacity in a cost effective way.

Extensions of Major Arterials

Figure 5.5 shows concepts recommended for further study regarding the Northern Sub-area. Fort Apache, Durango, Buffalo, Jones, and Decatur should all continue north of the beltway if possible. Rainbow need not continue across the Conservation Transfer Area. Durango likewise should be tied into Fort Apache just south of the Conservation Transfer Area to avoid excessive crossings of this sensitive area. Jones and Decatur both run up to the shooting range. These streets should then turn eastward and run as a frontage road along side Sheep Mountain Parkway where they would join with Buffalo. All these major

streets should conform to existing plans shown as dotted white lines.

Meandering Foothills "Grande Boulevard"

Buffalo is a good candidate to transition to a meandering Grande Boulevard that respects natural contours as it makes its way northwestward to connect back to US 95. There are several ways to create such a Boulevard that all achieve good speeds and capacities, but also encourage transit oriented and pedestrian friendly land uses typical of a Grande Boulevard. One design would have say a 200 foot right of way, where much of the space is used for frontage road buffers that would allow parking and pedestrian uses separated from the major thoroughfare. Another is to use Town Center Intersections at specific locations, complimented by Continuous Flow Intersections or some other high-capacity intersection type between TCIs.

Increase Typical Cross Sections

Because average densities are now much higher than in the past, all arterials should be 120 foot minimum standard with possibly two exceptions: The Grande Boulevard concept noted above, and the Fort Apache extension should be a 150 foot minimum standard since it is serving as the continuation of both Durango and Fort Apache. All of these recommendations also depend on developing an adequate supply of intermediate collectors that are continuous for as far as possible (not shown).

This will facilitate the availability of sufficient right-of-way for an improved pedestrian environment as well as for auto, bike, and transit needs.

CC-215 and Sheep Mountain Parkway

Figure 5.5 also shows in red potential one-way collector-distributor roads that could run along side CC-215 as well as the future north-south segment of Sheep Mountain Parkway. There are several factors in the area that make an extensive C-D system worth considering. First the need for a freeway to freeway interchange at the connection of CC-215 to Sheep Mountain Parkway normally requires a 1.5 mile separation between that point and the nearest access ramp. This will leave a significant area without good access to either roadway. A C-D system that collects traffic from multiple streets to a frontage road, which frontage road eventually ties into the freeway, is a good way to provide access that would otherwise be very limited. Also, the semi-rural neighborhoods within a mile of Ann Road and Grand Canyon Drive are all build on a 1-block grid. Traditional interchanges will tend to channel traffic to just one street, where a frontage system that connects to many or all streets can distribute the volumes more evenly. For example, this is a way to connect Grand Canyon Drive to CC-215 without having to build an interchange or even a bridge. Finally, a C-D system can be a relief valve when the freeway is failing from congestion or an incident.

The system shown may be larger than would ultimately prove necessary, and the real value may be contained to the area near the freeway to freeway interchange. This issue was not studied extensively and should be considered a suggestion for consideration rather than a recommendation. It is simply Wilbur Smith Associate's observation nationally that a freeway with one-way frontage roads that connect interchanges, such as is common in Texas and that exist in other sections of CC-215, has many attractive features that cannot be duplicated in any other way.

Phasing of Future Projects

Phasing recommendations are shown in **Figure 5.6.** These are less specific than what occurs in the RTC regional plan, which identifies projects to be built by a certain date. Rather, phasing in this context identifies locations as follows:

- Red – Right-of-way identification and preservation action required as soon as possible (0-4 years), to prevent development from precluding solutions.
- Orange – development less likely to hinder solutions in short term, but projects likely needed by 2025.
- Yellow – no current threat of development within best alignments. Project also more valuable after 2025.
- Grey –Alignments may be duplicative and unnecessary, or they face significant natural or built environmental challenges.

Note, the numerous connectivity issues, intersection improvements, and potential transit improvements identified on **Figure 5.4** should also be considered a high priority for identifying any right-of-way that is necessary for the improvement. This will require further analysis and studies that should begin as soon as possible. Most of the intersections are already fully developed, so it is less critical to do those immediately. However knowledge of the ultimate design of each intersection will aid in working with developers as affected properties redevelop.

Table 5.1: Volumes, Capacities with Baseline, Extended Boundary, and Concept Projects at Screen Line 1 (CC-215 South)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap	Volume w/Extended Boundary	Vol/Cap w/Extended Boundary & RTC Cap.	Potential Lanes	Potential Capacity	Vol/Cap w/2030 Vol & Pot. Cap.	Vol/Cap w/Extended Boundary & Pot.Cap.
Decatur	7	85,000	60,000	1.4	90,000	1.5	10	106,000	0.8	0.8
Jones	7	76,000	60,000	1.3	85,000	1.4	6	60,000	1.3	1.4
Rainbow	7	94,000	60,000	1.6	105,000	1.8	10	106,000	0.9	1.0
Buffalo	5	44,000	40,000	1.1	70,000	1.8	6	60,000	0.7	1.2
Durango	7	73,000	60,000	1.2	100,000	1.7	10	106,000	0.7	0.9
Ft Apache	5	69,000	40,000	1.7	120,000	3.0	10	125,000	0.6	1.0
1a. East	21	255,000	180,000	1.4	280,000	1.6	26	272,000	0.9	1.0
1b. West	17	186,000	140,000	1.3	290,000	2.1	26	291,000	0.6	1.0

Table 5.2: Volumes, Capacities with Baseline, Extended Boundary, and Concept Projects at Screen Line 2 (Sahara)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap	Volume w/Extended Boundary	Vol/Cap w/Extended Boundary & RTC Cap.	Potential Lanes	Potential Capacity	Vol/Cap w/2030 Vol & Pot. Cap.	Vol/Cap w/Extended Boundary & Pot.Cap.
Decatur	7	78,000	60,000	1.3	85,000	1.4	7	90,000	0.9	0.9
Lindell Rd	3	19,000	11,250	1.7	23,000	2.0	3	18,000	1.1	1.3
Jones	5	45,000	40,000	1.1	50,000	1.3	5	40,000	1.1	1.3
Torrey Pines	5	36,000	32,000	1.1	40,000	1.3	5	35,000	1.0	1.1
Rainbow	7	85,000	60,000	1.4	95,000	1.6	7	90,000	0.9	1.1
Tenaya Way	3	13,000	12,000	1.1	20,000	1.7	3	18,000	0.7	1.1
Buffalo	5	45,000	40,000	1.1	55,000	1.4	5	40,000	1.1	1.4
Cimarron	5	20,000	22,500	0.9	25,000	1.1	5	35,000	0.6	0.7
Durango	7	69,000	60,000	1.2	75,000	1.3	7	60,000	1.2	1.3
Ft Apache	5	70,000	40,000	1.8	75,000	1.9	7	90,000	0.8	0.8
Hualapai	7	51,000	60,000	0.9	60,000	1.0	7	60,000	0.9	1.0
Town Center Dr.	7	51,000	60,000	0.9	60,000	1.0	7	60,000	0.9	1.0
CC-215	6	198,000	165,000	1.2	240,000	1.5	10	248,000	0.8	1.0
2a. East	30	276,000	215,250	1.3	313,000	1.5	30	301,000	0.9	1.0
2b. West	42	504,000	447,500	1.1	590,000	1.3	48	593,000	0.8	1.0

Table 5.3: Volumes, Capacities with Baseline, Extended Boundary, and Concept Projects at Screen Line 3 (Cheyenne)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap	Volume w/Extended Boundary	Vol/Cap w/Extended Boundary & RTC Cap.	Potential Lanes	Potential Capacity	Vol/Cap w/2030 Vol & Pot. Cap.	Vol/Cap w/Extended Boundary & Pot.Cap.
Decatur	7	60,000	60,000	1.0	65,000	1.1	7	75,000	0.8	0.9
Lindell Rd	3	10,000	11,250	0.9	12,000	1.1	3	18,000	0.6	0.7
Jones	5	31,000	32,000	1.0	35,000	1.1	5	40,000	0.8	0.9
Torrey Pines	5	16,000	24,000	0.7	18,000	0.8	5	32,000	0.5	0.6
Rainbow	5	30,000	40,000	0.8	32,000	0.8	5	40,000	0.8	0.8
US 95	6	208,000	165,000	1.3	282,000	1.7	10	248,000	0.8	1.1
Tenaya Way	3	8,000	12,000	0.7	15,000	1.3	3	18,000	0.4	0.8
Buffalo	5	35,000	40,000	0.9	37,000	0.9	5	40,000	0.9	0.9
Cimarron	3	8,000	11,250	0.7	10,000	0.9	3	16,000	0.5	0.6
Durango	7	46,000	60,000	0.8	60,000	1.0	7	90,000	0.5	0.7
Ft Apache	5	20,000	24,000	0.8	25,000	1.0	5	24,000	0.8	1.0
Hualapai	5	20,000	24,000	0.8	25,000	1.0	5	24,000	0.8	1.0
CC-215	6	130,000	165,000	0.8	202,000	1.2	10	248,000	0.5	0.8
3a. East	34	363,000	344,250	1.1	459,000	1.3	38	471,000	0.8	1.0
3b. West	31	259,000	324,250	0.8	359,000	1.1	35	442,000	0.6	0.8

Table 5.4: Volumes, Capacities with Baseline, Extended Boundary, and Concept Projects at Screen Line 4 (CC-215 North)

Street	2030 RTC Lanes	2030 Daily Volume	RTC Planned Capacity	2030 Vol/Cap	Volume w/Extended Boundary	Vol/Cap w/Extended Boundary & RTC Cap.	Potential Lanes	Potential Capacity	Vol/Cap w/2030 Vol & Pot. Cap.	Vol/Cap w/Extended Boundary & Pot.Cap.
Decatur	7	42,000	60,000	0.7	60,000	1.0	7	75,000	0.5	0.7
Bradley (Lindell)	3	20,000	16,000	1.3	35,000	2.2	5	32,000	0.6	0.8
Jones	5	60,000	40,000	1.5	75,000	1.9	7	60,000	0.8	0.8
Torrey Pines	N/A	-	-	-	-	-	3	16,000	0.8	0.8
Rainbow	N/A	-	-	-	-	-	5	40,000	0.8	0.8
Tenaya Way	3	30,000	16,000	1.9	35,000	2.2	3	16,000	0.8	0.9
Buffalo	5	22,000	30,000	0.7	30,000	1.0	5	40,000	0.6	0.6
Cimarron	N/A	-	-	-	-	-	3	16,000	0.6	0.9
Durango-El Capit	7	50,000	60,000	0.8	70,000	1.2	7	60,000	0.8	0.8
US 95	6	132,000	165,000	0.8	242,000	1.5	10	248,000	0.5	0.9
Grand Canyon	5	25,000	32,000	0.8	48,000	1.5	5	32,000	0.6	0.9
Hualapai	7	40,000	60,000	0.7	85,000	1.4	7	60,000	0.5	0.7
Sheep Mt., NS	N/A	-	-	-	-	-	4	110,000	0.1	0.5
4a. East	18	152,000	132,000	1.2	205,000	1.6	30	239,000	0.6	0.9
4b. West	30	269,000	347,000	0.8	475,000	1.4	41	566,000	0.5	0.8

West Valley N-S Critical Facilities Study

Zone	Total Acres	Developable Acres	Percent Developable
1	15,500	15,500	100%
2	4,400	3,000	68%
3	8,200	6,400	78%
4	21,200	15,200	72%
5	16,400	9,600	59%
6	25,200	10,300	41%
7	18,700	12,600	67%
8	30,500	24,700	81%
Total	*140,100*	*97,300*	*69%*

215

Wigwam

Pebble

Blue Diamond

Silverado Ranch

N/S improvements to be determined in conjunction with Southwest Corridor Study

ACEC

Issues with resource conservation

Desert Tortoise Protection Area

Alignment to be determined in conjunction with Rainbow Corridor Study

15

Red Rock Canyon National Conservation Area

Both alignments may not be necessary

Potential Connections to I-15

Potential Ivanpah Airport Noise Compatability Area

Tortoise Translocation Area

White-margined Beardtongue

3

4

6

5

7

8

Project Study Area

Intersection Improvements

Improvement Alternatives Considered

Downgrade to Major Collector

ACEC (Area of Critical Environmental Concern)

White-margined Beardtongue

Ivanpah Airport Boundary

Ivanpah Airport Noise Compatibility Area

Tortoise Translocation Area

Sloan Canyon National Conservation Area

Desert Tortoise Protection Area

BLM Disposal Boundary

Red Rock Canyon National Conservation Area

Zones for Long Term Analysis

Developable Areas

More Developable
(5 DU/Gross Acre=12 DU/Net Acre, Avg.)

Less Developable
(2 DU/Gross Acre=6 DU/Net Acre, Avg.)

Not Developable

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Figure 5.1 Potential Southern Connections to I-15 (DRAFT- For Discussion Purposes Only)

West Valley N-S Critical Facilities Study

Zone	Total Acres	Developable Acres	Percent Developable
1	15,500	15,500	100%
2	4,400	3,000	68%
3	8,200	6,400	78%
4	21,200	15,200	72%
5	16,400	9,600	59%
6	25,200	10,300	41%
7	18,700	12,600	67%
8	30,500	24,700	81%
Total	*140,100*	*97,300*	*69%*

Project Study Area
Intersection Improvements
Improvement Alternatives Considered
Downgrade to Major Collector
ACEC (Areas of Critical Environmental Concern)
Clark County MUD District
BLM Disposal Boundary
Red Rock Canyon National Conservation Area
Zones for Long Term Analysis

Developable Areas
More Developable
(5 DU/Gross Acre=12 DU/Net Acre, Avg.)
Less Developable
(2 DU/Gross Acre=6 DU/Net Acre, Avg.)
Not Developable

Notes:

1 - Downgrade Buffalo to a major collector south of Warm Springs.

2 - Alternative intersection treatments need to be studied for intersections south of Warm Springs.

3 - One way couplets on Durango, Rainbow and Decatur help aleviate future heavy traffic volumes north of Warm Springs and south of CC-215.

Sahara
Desert Inn
Flamingo
Tropicana
Russell
Sunset
Warm Springs
Wigwam
Pebble
Blue Diamond
Silverado Ranch
Hualapai
Fort Apache
Durango
Buffalo
Rainbow
Jones
Decatur
215
Potential alignment issues connecting to CC-215
Note 1
Note 2
Note 3
Long Term Beyond 2030
ACEC
3
4
6

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Figure 5.2 West Valley Highway Connections and East West Mobility
(DRAFT- For Discussion Purposes Only)

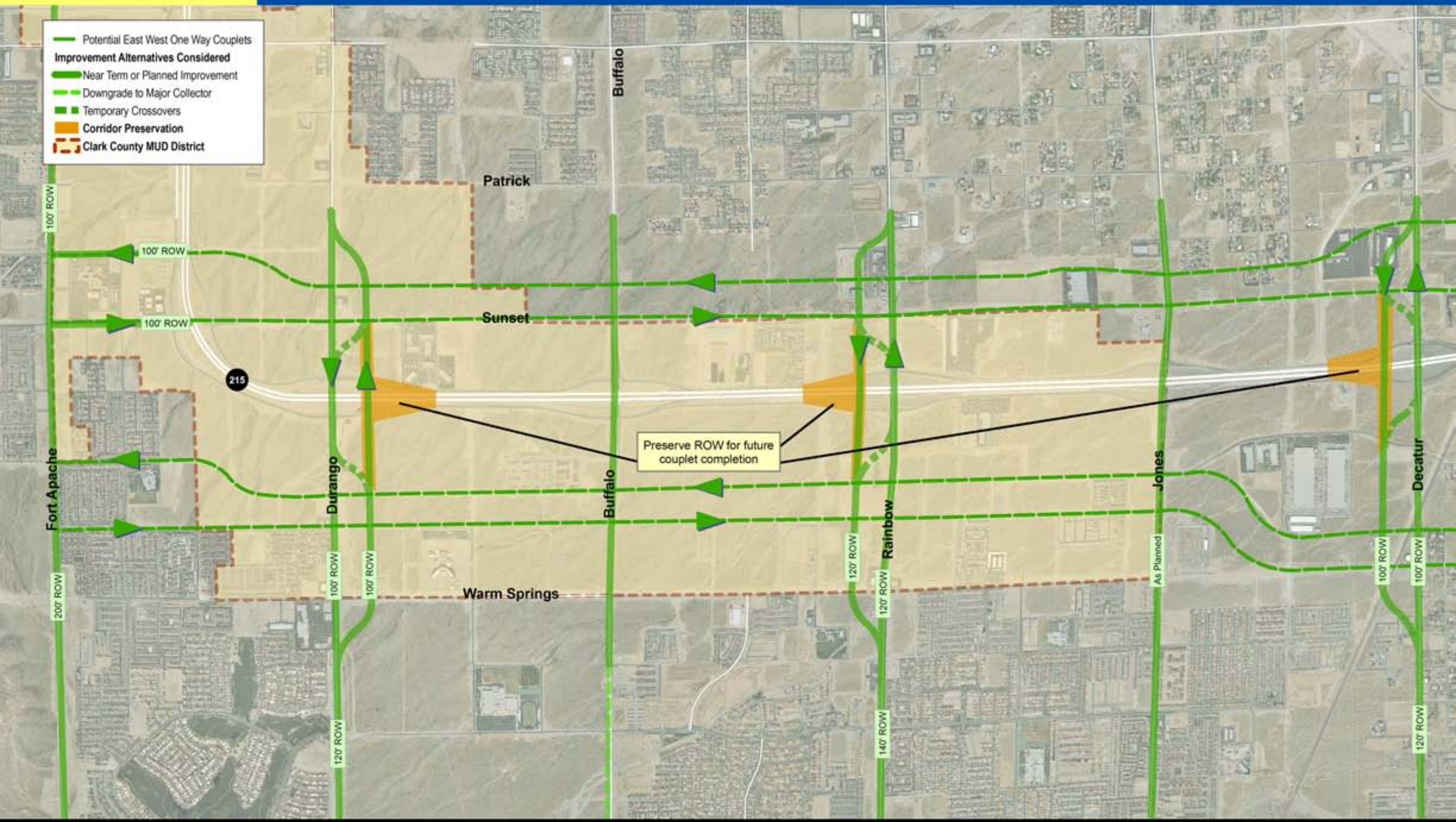

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Figure 5.3a Alternative 1, CC-215 West One Way Couplets
(DRAFT - For Discussion Purposes Only)

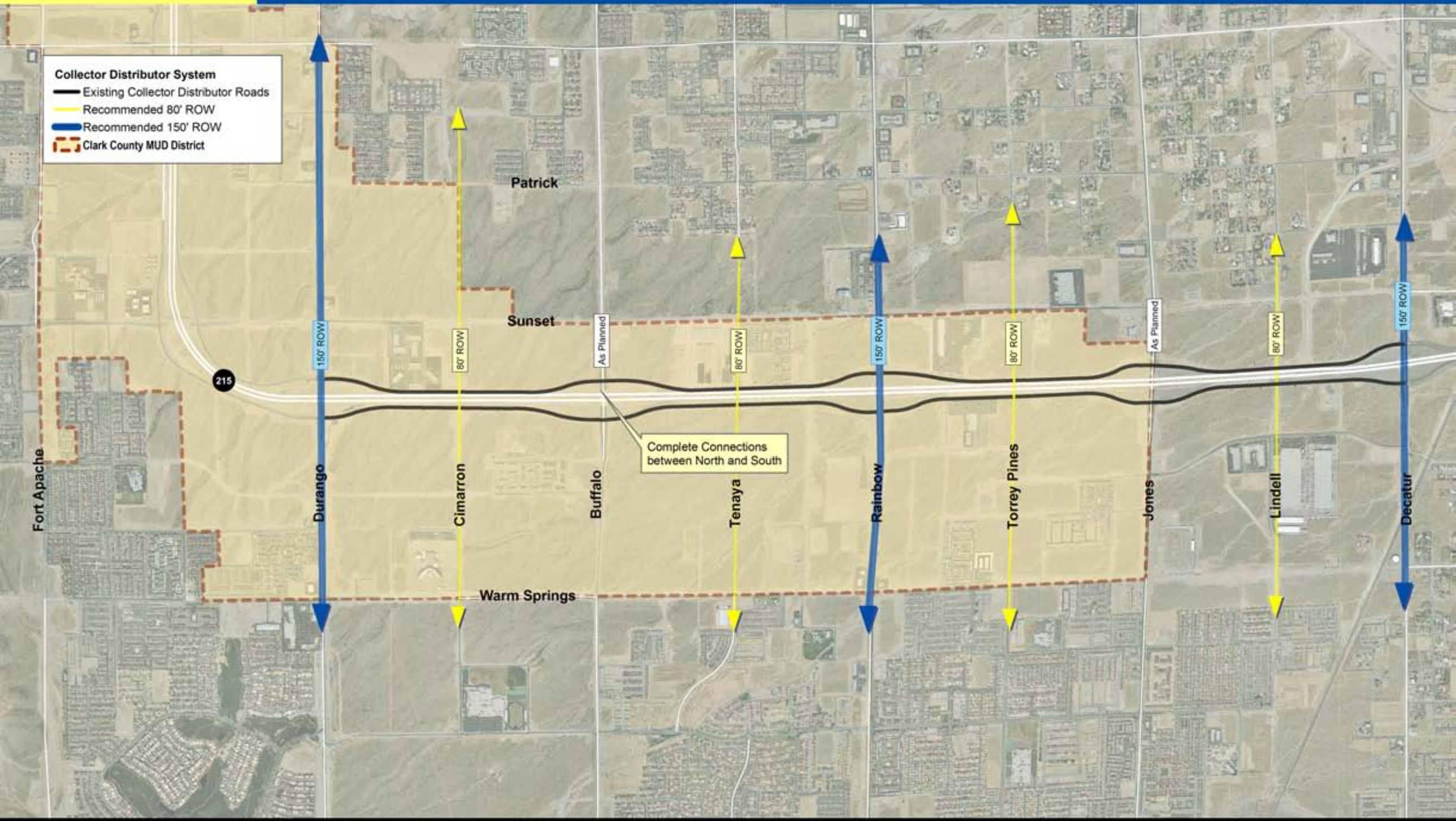

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Figure 5.3b Alternative 2, CC-215 Collector Distributor System
(DRAFT - For Discussion Purposes Only)

West Valley N-S Critical Facilities Study

Paiute Indian Reservation

Shooting Range

Potential connections/ extensions undetermined

157

Grand Teton

Elk Horn

Red Rock Canyon National Conservation Area

4a

215

4b

Ann

2 Acq.

2-4 Acq.

3-5 Acq.

Lone Mountain

5-20 Acq.

95

5-10 Acq.

Alexander

1-3 Acq.

3a

3b

Cheyenne

6-10 Acq.

215

3-10 Acq.

Charleston

6-10 Acq.

3-5 Acq.

Sahara

2a

2b

Desert Inn

Flamingo

1-3 Acq.

Tropicana

1-3 Acq.

Hualapai

Russell

Fort Apache

Durango

Cimaron

Buffalo

Tenaya

Rainbow

Torrey Pines

Jones

Lindell

Decatur

Sunset

215

Warm Springs

1a

1b

Wigwam

Pebble

Cimaron	8-12 Acq.
Tenaya	8-16 Acq.
Rainbow	3-5 Acq.
Torrey Pines	5-20 Acq.
Lindell	14-32 Acq.
Total Acq.	38-97 Acq.

- Completion of North South Major Collectors
- One Way Collector/Distributor Roads and Connectors
- Improvement Alternatives Considered
- Downgrade to Major Collector
- Intersection Improvements

Corridor Issues

- Connection Issues
- Extensions with No Acquisitions Anticipated
- Extensions Requiring Acquisitions **# of Acquisitions**
- Potential BRT Corridors
- Project Study Area
- Zones for Long Term Analysis
- Floyd Lamb Park
- Conservation Transfer Area
- Paiute Indian Reservation
- BLM Disposal Boundary
- Red Rock Canyon National Conservation Area

Developable Areas

- More Developable (5 DU/Gross Acre=12 DU/Net Acre, Avg.)
- Less Developable (2 DU/Gross Acre=6 DU/Net Acre, Avg.)
- Not Developable

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Figure 5.4 North South Arterials Analysis (DRAFT- For Discussion Purposes Only)

West Valley N-S Critical Facilities Study

Zone	Total Acres	Developable Acres	Percent Developable
1	15,500	15,500	100%
2	4,400	3,000	68%
3	8,200	6,400	78%
4	21,200	15,200	72%
5	16,400	9,600	59%
6	25,200	10,300	41%
7	18,700	12,600	67%
8	30,500	24,700	81%
Total	*140,100*	*97,300*	*69%*

- One Way Collector/Distributor Roads and Connectors
- Completion of North South Major Collectors
- Near Term or Planned Improvement
- Connection Issues
- Extensions with No Acquisitions Anticipated
- Extensions Requiring Acquisitions
- Desert National Wildlife Refuge (USFW)
- Nellis Air Force Range
- Shooting Range
- Project Study Area
- Zones for Long Term Analysis
- Floyd Lamb State Park
- Conservation Transfer Area
- Paiute Indian Reservation
- BLM Disposal Boundary
- Red Rock Canyon National Conservation Area

Developable Areas

- More Developable (5 DU/Gross Acre=12 DU/Net Acre, Avg.)
- Less Developable (2 DU/Gross Acre=6 DU/Net Acre, Avg.)
- Not Developable

Nellis AF Range

Desert National Wildlife Refuge

1

Planned Roadway Network

Alignment to be determined in conjunction with Sheep Mountain Parkway Study

Red Rock Canyon National Conservation Area

Paiute Indian Reservation

Shooting Range

Conservation Transfer Area

157

Grand Teton

Promote Frontage road use. Do not force traffic onto freeway.

Elk Horn

4a

215

4b

Ann

2

Lone Mountain

Fort Apache

Durango

Buffalo

95

Rainbow

Jones

Decatur

Alexander

3a

Cheyenne

3b

WilburSmith ASSOCIATES

Figure 5.5 Northern Alignments
(DRAFT- For Discussion Purposes Only)

West Valley N-S Critical Facilities Study

Implementation Priority

- Critical Priority for Corridor Protection
- Near/Nearer-Term Implementation
- Long/Longer-Term Implementation
- Sheep Mountain Parkway Study
- Natural or Built Environment Challenges
- Intersection Improvements
- Demand Analysis Screen Lines
- Completion of North South Major Collectors
- Connection Issues
- Extensions with No Acquisitions Anticipated
- Extensions Requiring Acquisitions
- Project Study Area
- Desert National Wildlife Refuge (USFW)
- Nellis Air Force Range
- ACEC (Areas of Critical Environmental Concern)
- Zones for Long Term Analysis
- Shooting Range
- White-margined Beardtongue
- Ivanpah Airport Boundary
- Ivanpah Airport Noise Compatibility Area
- Tortoise Translocation Area
- Sloan Canyon National Conservation Area
- Floyd Lamb State Park
- Conservation Transfer Area
- Paiute Indian Reservation
- Desert Tortoise Protection Area
- BLM Disposal Boundary
- Red Rock Canyon National Conservation Area

Nellis AF Range

Desert National Wildlife Refuge

Valuable extensions, alignments to be determined

Planned Roadways

Paiute Indian Reservation

Shooting Range

Conservation Transfer Area

Alignment to be determined in conjunction with Sheep Mountain Parkway Study

See Figure 5.4 for Interior N/S Options

ACEC

Red Rock Canyon National Conservation Area

This extension is helpful if any connection to CC-215 can be found.

McCarran International Airport

Humboldt-Toiyabe National Forest

ACEC

Alignment to be determined in conjunction with Rainbow Corridor Study

Desert Tortoise Protection Area

Sloan Canyon National Conservation Area

Potential Connections to I-15

Potential Ivanpah Airport Noise Compatability Area

White-margined Beardtongue

Proposed Ivanpah Airport

Desert Tortoise Protection Area

Zone	Total Acres	Developable Acres	Percent Developable
1	15,500	15,500	100%
2	4,400	3,000	68%
3	8,200	6,400	78%
4	21,200	15,200	72%
5	16,400	9,600	59%
6	25,200	10,300	41%
7	18,700	12,600	67%
8	30,500	24,700	81%
Total	*140,100*	*97,300*	*69%*

WilburSmith ASSOCIATES

Figure 5.6 Phasing and Implementation
(DRAFT- For Discussion Purposes Only)

Section 6: Cost Benefit Analysis

To be completed after the October 1st Meeting.

Section 7: Recommendations for Further Study

This section discusses activities that could be pursued as a direct follow up to this study, as well as more in depth activities and studies that would require more effort to accomplish.

Potential continuation options for this study

Explore Connectivity Details

Look at collector streets across the area that were identified for potential extension and propose logical alignments on which to continue the street. Product would be 1-3 reasonable alignments and associated right-of-way takes shown on aerial photos associated with extending the street on each alignment, along with a cursory evaluation of value of each extension, and the environmental challenges associated with the extension.

Explore Intersection Enhancement Options

This study identified a need to enhance capacity at a number of specific intersections beyond what is possible with conventional intersection designs common in Clark County. This task would produce an Intersection Guidelines report that describes key attributes of the following unconventional at-grade intersections that all show promise of becoming more mainstream:

- Continuous Flow Intersection
- Parallel Flow Intersection
- Town Center Intersection
- Super Street Intersection
- Median U-Turn Intersection
- Quadrant Roadway Intersection

The report should include the following for each design:

- General description,
- Pros and cons,
- Generalized capacity,
- Generalized cost ranges,
- Circumstances that would make design preferable over others

A base line at-grade and grade-separated comparison of the same features for more traditional designs common in Clark County should also be included. Some Vissim animations to highlight functionality and capacity should also be included.

This task could also engage the steering committee in developing a ranking and comparison methodology to determine the important factors that any promising designs would need to satisfy in order to fit into different land use contexts across the study area. The outcome of comparisons and ranking would be intersection designs preferred by the committee at different volume thresholds and land use contexts. These preferences could then inform development decisions around intersections, as well as project development decisions.

For each intersection identified for potential enhancements in this study, the Intersection Guidelines report could also include the steering committee's recommendation for the type of design or designs that should be investigated further at each site, and a consultant opinion of the ease or difficulty of implementing preferred designs at that site. It is anticipated that in some and potentially most circumstances, more traditional solutions to include doing nothing, would end up preferred over anything else.

Establish Framework for Major Corridor Studies

The following corridors are emerging from the study as corridors of critical regional significance that each would benefit from enhanced mobility. This task would not propose to do any additional work on these corridors other than help establish some key elements of a framework for developing more extensive corridor studies or environmental studies.

- Fort Apache: I-15 South to Northern PLMA Boundary
- Rainbow: Blue Diamond to US 95
- Decatur: Southern PLMA Boundary to Northern PLMA Boundary

Key elements such studies could include:

- Establishing ultimate right-of-way footprint in the event that the PLMA boundary is ever extended.
- Top-level review of design needs and constraints to be considered in each corridor.
- Identifying potential conflicts with existing or planned development,
- Peak hour intersection demands,
- Demand diversion opportunities such as transit enhancements and connectivity extensions of parallel streets.
- Evaluation of simulated intersection performance with traditional designs and any alternative concepts identified as potentially desirable by this study's steering committee.

Enhance RTC Model for "What If" Studies

The RTC model in its present state is not well suited to provide an accurate estimate of demands that may occur if such a large study area were extensively developed.

Geographic-based planning data is an excellent compliment to traditional horizon year planning data. The approach is essentially as follows:

1. Create Traffic Analysis Zones in areas that are potentially developable beyond the horizon year
2. Fill them with a hypothetical population and employment to holding capacities that are reasonable to the majority of a panel of experts
3. Create a hypothetical, minimally acceptable network in those areas for access.
4. Test the effects that development significantly beyond the level anticipated at the horizon year could have on existing and planned infrastructure.

This will reveal the extent to which horizon-year plans could be inadequate for potential realities. It also opens discussion for how best to deal with that potential (balance of highways, transit, more efficient land uses, congestion pricing, etc).

One of the inherent weaknesses of horizon year planning is that the horizon year can come much sooner than expected. This is a reality Las Vegas has faced more than any other city in America.

Geographic-based build out planning was much of the motive for this study and was advocated strongly by the City of Las Vegas. We are satisfied that estimates of potential demands if the PLMA boundary is ultimately expanded are reasonable, however the tools available for this specialized type of analysis were lacking. Build-out planning is something the study area could have benefited from greatly if spaces currently within the PLMA boundary had been filled in the models and planned for decades ago. It is not too late to equip the model to handle such “what if” planning questions of how tomorrows boundary expansions could affect today’s emerging areas.

Section 8: Summary of Findings and Recommendations

Key Facts and Findings

- It is possible and desirable to construct two southern connectors to I-15. The purpose is to connect I-15 to CC-215 on both the east and west. The extensions would divert at least 21,000 vehicles per day from I-15 even if the PLMA boundary is never expanded.
- The north-south leg of CC-215 has adequate right of way to serve demand even beyond the horizon year, though it will require one if not two additional lanes by the horizon year.
- Most existing north-south arterials in the Core Sub-area will fail seriously by the horizon year unless funding can be identified for many of the recommendations of this study.
- There are nearly 100,000 developable acres in the study area, but outside the current PLMA boundary. If fully developed at today's densities, it could accommodate over 1 million people.

Southern Sub-area Recommendations

- Extend Rainbow south to I-15.
- Preserve option to extend Fort Apache South to I-15. Connection appears warranted both with Rainbow extension and without extended PLMA boundary.
- Upgrade Fort Apache between Blue Diamond and Sunset Road to 200-feet with good access control.
- As Fort Apache approaches CC-215, consider Sunset couplet system for eastbound, and Tropicana-Flamingo C-D system for northbound.
- Town Center Intersections (intersecting couplets) should be studied as most context sensitive means of handling high volumes in MUD areas.
- Ensure right of way will exist for couplet systems between Warm Springs and Sunset on Durango, Rainbow, and Decatur.
- Ensure Cimaron, Tenaya Way, Torrey Pines, and Lindell Road will exist up to CC-215 frontage roads, so that bridge extensions are possible if ever needed.
- Flare out significant intersections on Fort Apache, Durango, Rainbow, and Decatur between Blue Diamond and Warm Springs and apply noted access restrictions to secure the option to upgrade to Continuous Flow Intersections or higher.

Core Sub-area Recommendations

- Anticipate ultimately widening CC-215 to 5-lanes per direction between Durango and Sheep Mountain Parkway.
- Preserve option for any additional lanes to be HOT lanes, to help ensure high speeds remain possible in spite of any surrounding congestion.
- Midsection-line collector streets (Lindell/Bradley, Torrey Pines, Tenaya, Cimarron), should be made continuous in as many places as possible. This would often mean acquiring several existing properties to make it work.
- Enhance major intersections on Fort Apache/Durango, Rainbow, and Decatur. Consider non-traditional designs such as Continuous Flow Intersections and others.
- Consider significant transit upgrades in the same corridors, perhaps coupled with intersection improvements.

Northern Sub-area Recommendations

- Follow up this study with additional phase to clarify plans and feasible extensions between Cheyenne and Sheep Mountain, and refine recommendations.
- Plan to extend major arterials north of CC-215 similar to what is shown in Figures 5.5-5.6.
- Upgrade the minimum cross-section for minor arterials to 120 feet, and for major arterials to 150 feet in future development areas.
- Consider implementing "Grande Boulevard" along foothills. Identify preferred intersection and corridor styles as appropriate to certain land use types.
- Consider implementing a C-D frontage system where possible along CC-215, Sheep Mountain Parkway, and US 95 as a means of dispersing traffic that otherwise may overwhelm the these facilities or their interchanges.

Generally Applicable Recommendations

- Implement a revolving loan fund dedicated to preservation of critical corridors that can be protected in no other way. Even if the fund is only a few million per year, the return on investment is very high.
- Upgrade the coverage area of the RTC model to handle "what if" questions regarding an expanded PLMA boundary.

Additional Study Recommendations

- Identify potential alignments and key issues surrounding extensions of existing collector streets.
- Research options for upgrading key intersections, considering some of the latest innovative designs such as Continuous Flow Intersections, Town Center Intersections, etc.
- Emphasize the regional significance of Fort Apache, Rainbow, and Decatur by developing complete corridor visions for each.

Appendix A – Related Study Matrix

Study Issue	Most Critical	Important	Part of Study Context
I-15 South Traffic Study			
I-15 corridor had 225,000 residents in 2002, projected 729,000 by 2030 (186% increase)	X		
Existing traffic volumes range from 42,000 vehicles per day using I-15 south of Sloan Road to 223,000 vehicles per day using I-15 north of Tropicana Ave.	X		
Average ADT by 2030 on I-15 projected to be 153,000 on the S. of the corridor (Sloan Road), and 507,000 near Tropicana.		X	
2030, 10-lane freeway cross section between Sloan Road and Blue Diamond will be LOS D.		X	
2030, 14-16-lane cross section simulated and has LOS D or E.		X	
These ADT assume that I-15 is 10 lanes between Sloan and 215, 14 lanes from 215 to I-15/95/US 515 interchange.	X		
Henderson population forecast to increase from 211,000 in 2002 to ~490,000 in 2030	X		
Spring Valley population forecast to increase from 136,000 in 2002 to ~187,000 in 2030	X		
Paradise population forecast to increase from 191,000 in 2002 to ~205,000 in 2030	X		
Enterprise population is forecast to increase from 44,000 in 2002 to ~239,000 in 2030.	X		
Land developers in Enterprise are planning to construct as many as 14 hotel/casinos astride I-15, south of the 215 Beltway.	X		
Ivanpah Valley intl. airport is slated to be operational by 2017, and is expected to accommodate 30.7 million passengers by 2030. I-15 will be the major conveyance for most.		X	
The current population of Clark County is about 1.9 million residents. It is projected to grow to 2.9 million by the year 2030.	X		
Table 3-1. CC Projected Population (2004-2030), Pg. 3-3. Source: Center for Business and Economic Research, UNLV 2003	XXX		
Tables 3-2 and 3, Pg. 3-8 population and employment forecasts for Las Vegas Valley, based on Center for Business and Economic Research forecasts for CC 4/19/04.	XXX		
Tables 4-1 and 2, Pg. 4-9-10 Year 2030 CORSIM Traffic Ops Results and Year 2030 Weaving, Merging/Diverging Traffic Ops Analysis	XXX		
South of the 215 Beltway, lands to the west of I-15 are sparsely developed to Cactus Ave. The "Southern Highlands" master planned community lies to the south of Cactus Ave. Southern Highlands is primarily a residential development, but contains retail, commercial and recreational land uses.	X		
The RTC RTP includes plans to reconstruct the interchange and realign Blue Diamond Road between FY 2007-2010.	X		
The RTP was based on old pop. forecasts which underestimated pop.growth in the Valley.	X		
RTC Southwest Study Area Charette			
Three options; A, B, C all showing a western freeway from Russell Road west to Jean	X		
Option A, High volume arterials on Blue Diamond and Rainbow, with Rainbow extended south though Desert Tortoise Area to connect with I-15 between Sloan and Jean. Transit along Western Freeway south of Blue Diamond and also along I-15.	X		
Option B, High volume arterials on Blue Diamond and Rainbow (Rainbow does not extend south), transit same as option A	X		
OptionC, High volume arterials on Blue Diamond and Rainbow with Rainbow extended south following UPRR to Sloan then southwest to connection with I-15 at same location as Option A	X		
SR-160 Corridor Study - Tech Memo #1 - Current Conditions			
Clark County has designated a Mixed-Use Overlay District, which impacts development along the SR-160 Corridor. A key element to these plans is incorporating transit as a vital piece in the transportation system.	X		
SR-160 is the major limited access road serving Clark County's Enterprise Planning Area, the fastest growing Planning Area in unincorporated Clark County. Along the segment east of Decatur Blvd., SR-160 functions very much like a major arterial road. West of Decatur Blvd., SR-160 resembles a limited access expressway with fewer and more distance signalized intersections. Between 1990 and 2003, the population of Enterprise increased from 5,505 to 62, 796, an 1,040% increase.	X		
Clark County anticipates a near doubling of the population of Enterprise to 110,594 by 2008. Population density in the Enterprise area varies from approximately 0-10 people per acre in some parts to 10-20 persons per acre. There is a robust demand for entry-level, single-family units in medium- to high-density residential subdivisions where large parcels can be developed.	X		
Currently, there is no fixed-route bus service along the SR-160 Corridor.	X		
SR-160 is a regional link connecting the Las Vegas Valley to the communities of Mountains Edge and Pahrump and will also serve an increasing share of locally-oriented trips.	X		
Between Dean Martin Dr. (formerly Industrial Dr.) and S. Decatur Blvd., an eight-lane highway planned by NDOT is being fit into a 150-foot wide corridor, leaving no room for any additional transportation elements. For the entire remainder of the study area west of Decatur Blvd., SR-160 widens to 200 feet, providing capacity for additional lane(s) or other transit features, and even more space becomes available as the highway narrows to six lanes and ultimately to two lanes. NDOT has indicated that there are no existing easements along SR-160 that could provide additional space at this time.		X	
Of the total developable land, approximately 39,384 acres, Clark County reported about 16% is developed. Land uses in the SR-160 Corridor fall in the following categories: single-family residential, multi-family residential, industrial, mineral extraction, other commercial, public facility, and vacant land.	X		
Based on the 2004 Las Vegas Valley Long Range Transit Plan, the population density of the SR-160 Corridor is 381 persons per square mile, which ranks SR-160 among the least dense areas in southwest Las Vegas.	X		
The current land use variables project a population density of 1,782, more than four times the 2003 population density.	X		
Along SR-160, current employment per sq. mile is 235 and is expected to increase to 735 jobs per sq. mile in 2025, with much of the employment density clustered along I-215 west of I-15.	X		
No.-So. arterial networks are not complete with major gaps on Ft. Apache, Durango, and Buffalo. There are no viable east-west arterials that can serve as substitutes to SR-160.	X		
Over a ten year period, traffic volumes have more than doubled along Decatur, Rainbow and Pahrump Valley Road.	X		
The largest increase in traffic is expected on north-south arterials serving the eastern portion of the SR-160 study area, specifically Durango Drive and Hualapai Way.	X		
CAT service along the SR-160 Corridor has not been established largely because this area of southwest Las Vegas had consisted of low-density, rural neighborhoods where the rate of automobile ownership per household is among the highest in Clark County.		X	
West of S. Buffalo Dr., the highway will narrow from six lanes to four, then from four to two, prior to reaching S. Durango Dr. From Durango to Hualapai Way the highway remains in its current undivided two lane configuration.	X		

Study Issue	Most Critical	Important	Part of Study Context
SR-160 Corridor Study - Final Report			
Developments surrounding Blue Diamond will have over 10,000 new dwelling units by 2025.	X		
Currently, two-lane road throughout the study corridor, with extra lanes at several major intersections.			X
2004, NDOT developed a major improvement plan that widens sr-160 through most of the study area and includes: a divided highway with turn lanes and signaling at all major intersections, 8 lanes (4 each) from Las Vegas Blvd. to Rainbow Blvd., 6 lanes from	X		
Highway ROW is 150 feet from I-15 to Decatur, and 200 feet west of Decatur.	X		
In addition to sr-160, the study evaluates two potential e/w corridors and five n/s corridors for transit use.		X	
Pg. 1-4 two growth scenario maps show bus routes, blue: BRT, green: Express, other: Local. Buses would operate on 15-30 minute headways, depending on routes and time of day.		X	
Investigates the feasibility of transit-supportive treatments along sR-160 such as bus-only lanes, signal priority, and "queue-jumping".		X	
P & R locations: Hualapai Way, Durango Rd., Torrey Pines (east end of Mountain's Edge).		X	
Recommendations: Adopt a Blue Diamond Corridor Transit Plan, either per this report or with modifications; incorporate the plan into RTC's overall transit planning, and seek to obtain funding; work with BLM to reserve access to Federally-owned land for P&	X		
City of Las Vegas Northwest Open Space Plan			
Plan created to balance growth and development with conservation of native lands and rural character.			X
Goal, "Improve the quality of life and community character of northwest Las Vegas with a well planned system of interconnected open spaces, greenways, trails, parks and protected landscapes. Achieve optimal, cost effective, sustainable implementation and			X
Purpose, protect non-programmed and programmed open space which in the future can be devoted to 1) the preservation of natural resources; 2) outdoor recreation; 3) preservation of historic and cultural property; 4) protection of scenic landscapes; and 5)			X
Establish a planning goal of protecting 30%of the land in the Northwest Region as future open space.	X		
Protection and stewardship of the federal and state lands that surround the Las Vegas Valley under a system named in the plan as the Las Vegas Vias Verdes.		X	
Recommendations: 1) improvements to Floyd Lamb State Park, 2) a new equestrian park, 3) a new model railroad society park, 4) a new archaeological park.		X	
Lands within the proposed Vias Verdes include: Lake Mead National Recreation Area, Sheep Mountains, Sloan Canyon National Recreation Area, Desert National Wildlife Refuge, Red Rocks Canyon National Conservation Area.	X		
Appendix C: GIS Resource Database; Composite map illustrating publicly and privately held green space resource, Local, regional, state and federal park and public land; Natural resources inventoried for Clark County in the Multiple Species Habitat Conser	XXX		
RTC Southwest Beltway Transit Study			
Purpose. Determine the feasibility of a premium transit service system along the southwest portion of the Bruce Woodbury Beltway corridor between the Airport Connector and Sunset Rd.		X	
West Village includes high-rise condos and other forms of high-density housing, office and retail commercial space, and UNLV research and technology park. 10,000 family units, 2 million square feet of retail and 5 million sq.ft. of office space, and a cas	X		
The regional fixed guideway is a BRT system in a dedicated ROW, traversing the LV Valley from the southeast to the north.			X
Alt. D: 215-Frontage Roads - Currently have two lanes in each direction and will have three could provide the most feasible alt. for a dedicated transit lane, signals spaced only at the arterials, travel time should be shorter than service on Sunset Road,	X		
Options for continuing from the end of the 215 Frontage Roads at Decatur Blvd, to the SSTT: mixed-flow on the Southwest Beltway, mixed-flow on Sunset Road, dedicated transit lane adjacent to the UPRR mainline.	X		
Alt D. is the most feasible and the most likely to qualify for Very Small Starts and other federal RFG-type project funding.	X		
Table 1-1 RTP/Trans. Improvement Program Projects near the Study Area			X
Clark County Transportation Element			
Clark County Unified Development Codes, Title 30 provides for the dedication of a 100-foot ROW on each section line, an 80-ft ROW on each one-quarter section line, and a 120-ft ROW on township and range lines.	X		
New streets are built in accordance with a functional class system that includes 5 types of roads: limited access arterials, arterial roadways, collector, and local streets.		X	

Study Issue	Most Critical	Important	Part of Study Context
Mountain Edge Parkway Feasibility Study			
Ex. Summ. - Purpose of preserving the Mountain Edge Parkway Corridor is to provide multimodal transportation access in the North Las Vegas Valley, enhance opportunities to meet long range mobility needs, and promote integrated transportation and land use		X	
Continued land sales by the BLM pursuant to the Southern Nevada Public Land Management Act of 1998.		X	
Study area generally along US 95 north toward Lee Canyon Road.		X	
Proposed corridor would traverse the North Valley and connect US 95 and I-15. Elements include: general purpose travel lanes, frontage roads, managed lanes, dedicated high-capacity transit, and multi-use trails for bicyclists and peds.		X	
Anticipated that new residential density will increase from over 6 units per acre in 2003 to almost 15 units per acre in 2045.	X		
Study provides a comparison of Las Vegas and 11 other urban areas in terms of population, employment, and transportation infrastructure.		X	
CAT system experienced more growth between 1992 and 2002 than other peer cities.		X	
The north Las Vegas Valley contains sensitive environmental and cultural resources.		X	
2004 Las Vegas Valley Disposal Boundary EIS describes these sensitive resources.		X	
Recreational resources include: Floyd Lamb State Park, Desert National Wildlife Range, Red Rock Canyon National Conservation Area, and CC Sport Shooting Park.		X	
Upper Las Vegas Wash and associated floodplains are located in study corridor.		X	
Sensitive biological resources include: Las Vegas bearpoppy, Las Vegas buckwheat, native cacti and yuccas, and desert tortoise.		X	
Tule Springs historic site and other archeological and paleontological sites are also located within the study area. Many are concentrated in portions of the Upper Las Vegas Wash, which has been designated as a Conservation Transfer Area by BLM.		X	
Eleven alternatives developed and evaluated.		X	
Ch. 1, pg. 2 - Major access points include connections with: CC 215 Beltway, Horse Road, Grand Teton Road, US 95, Fort Apache Road, Durango Blvd., Buffalo Dr., Jones Blvd., Decatur Blvd., North 5th Street, Lamb Blvd., Losee Road, Pecos Road, Revere Road,		X	
Corridor would typically be approx. 550 feet wide and have the capacity to incorporate multiple modes of transportation.	X		
Modes would be integrated with transit supportive land uses/traditional neighborhood design, linear parks, and context-sensitive landscaping.		X	
1.2, pg. 4 - The SNPLMA authorizes the BLM to dispose of approx. 52,000 acres of federal land in the region.	X		
Land disposal does not preclude other existing authorized uses of public lands, such as ROW, leases, and recreation and public purposes.		X	
Land disposal has two major implications for Corridor. 1 - new availability of several thousand acres of undeveloped public land for residential and commercial development is likely to contribute to the region's rapid population growth and resulting traf	X		
1.4, pg. 5 - NV population is growing by 7,700 persons per month with 2/3 occurring in the Las Vegas region.	XXX		
Population projections anticipate the maximum long-term build-out potential of the North Las Vegas Valley.	X		
Table 1.1 Projected Study Area Population Growth: 2005 - 297,162, 2015 - 638,054, 2025 - 1,137,568, 2035 - 1,655,668, 2045 - 2,179,477.	XXX		
According to the City of Las Vegas Master Plan 2020, the city population is expected to increase to between 760,000 and 800,000 by the year 2020. Over 96% of this growth is expected to occur in the west and northwest areas of the city.	X		
2000 Census had nearly 191,000 housing units of all types in 2000, 56% consisted of single-family dwellings.	X		
City of North Las Vegas estimates a population of 514,645 by 2020.	XXX		
Approx. 70% of available land within the City of North Las Vegas is currently undeveloped or underdeveloped.	XXX		
Lone Mountain/Centennial Hills Land Use Plan, 72 square mile area directly adjacent to the western portion of the proposed Parkway. Wide variety of land uses and densities.	X		
Town Center will be located at the juncture of 215 beltway and US-95.	X		
Kyle Canyon Gateway Master Planned Community, 1,600 acres located in the northwest corner of the Lone Mtn./Centennial Hills Land Use Plan area.		X	

Study Issue	Most Critical	Important	Part of Study Context
Mountain Edge Parkway Feasibility Study			
University of Nevada Las Vegas campus in North Las Vegas. 25,000 students and 640 acres. Located north of the 215 beltway and between Lamb Blvd. and Pecos Rd. Intermodal transit hub planned on Pecos Rd.	X		
City of North Las Vegas, North 5th Street Transit Supportive Concept Plan. Relationship between transportation, including walking, biking, transit, driving, and land use. Study area North 5th Street from Owens Avenue to Deer Springs Way, east on Deer Sp		X	
Northwest Clark County Land Use and Development Guide approved in 1996, addresses various rural planning issues in 2,750-square mile area. Primarily zoned Rural Open Land, 1 unit per two-acre minimum lot. General Highway Frontage District commercial zoni	X		
Northeast Clark County Land Use and Development Guide (1994) includes 2,700 square miles abutting the east side of Nellis Air Force Base.		X	
1.4.3, Private development is prohibited in the Red Rock Canyon National Conservation Area and the Spring Mountains National Recreation Area west of LV. The Desert National Wildlife Range, and Nellis Air Force Base Small Arms Range restrict development n	X		
BLM controls ~ 766 square miles (28%) of public lands, exclusive of designated recreation, conservation, and wildlife area in northwest Clark County.		X	
Table 1.2 Median Value of Single-Family Residences			X
2.1 - Purpose, preserve land for future public infrastructure use, provide multimodal transportation access in the North LV Valley, enhance opps. To meet long-range mobility needs, promote integrated transportation and land use decision making.			X
2.2 Need, accommodate growth and development, transportation demand resulting from SNPLMA land sales, address transportation access and mobility needs with multimodal alternatives, plan long-term transportation investments, prevention of urban sprawl.			X
Table 3.1 2002 Population, Employment and Highways Relationships		X	
Table 3.2 Public Transportation Usage, 1992,2002		X	
4.1 At the end of 2003, the average residential housing density in the Mountain Edge Parkway study area was 6.3 units per acre.	X		
Under the high forecast, new residential density would reach 14.9 units per acre by 2045. 45% projected residential; 22% projected commercial; other 33%.	X		
5.1 Floyd Lamb State Park: 2,045-acre located along the south side of the proposed corridor in its western portion and east of US 95. Protected under 6(f)(3).		X	
Desert National Wildlife Range: 1.6-million acre north of the proposed corridor, the Sheep Mtn. Range, managed by the US Fish and Wildlife Service.		X	
Red Rock Canyon National Conservation Area: borders the western limits of the proposed corridor. 196,000-acre managed by BLM. Granting of transportation ROW would require filing an application with BLM (43 CFR 2800).	XXX		
Clark County Shooting Park: located north side of the corridor opposite Floyd Lamb State Park.		X	
5.2 Urban development in the proposed Mtn. Edge Parkway Corridor is likely to occur regardless of whether the facility is built or not. Potential impacts on water quality from the transportation facilities themselves would be minor relative to the effect			X
5.3 Paiute Tribe: northwest of the proposed corridor. Census tract 58.14 showed a population of 44 in 2000.		X	
5.4 Sensitive Biological Resources include: LV bearpoppy, LV buckwheat located outside and south of the corridor. Native cacti and yuccas are protected no removal w/o permission of the Nevada Division of Forestry. Desert tortoise have been observed in t		X	
Figure 5.2: Constraints Map	XXX		
7.1 Population growth in the LV valley has consistently outpaced projections, long-term demands on regional infrastructure have been grossly underestimated.			X
Conditions that may impair the use of traditional travel demand analysis are Las Vegas' unprecedented population growth, tourism visitation, and increasingly high land development densities.		X	
7.1.2 Key assumptions for population change: Persons Per Household, 2.99; vacancy (attached for-sale), 7.5%; vacancy (detached for-sale) 3.0%; vacancy (apartments) 7.0%. Mix of attached (generally higher density) and detached (generally lower density) ho		X	
9. Findings and Conclusions - Reserving adequate ROW for transportation in advance of development will minimize future adverse impacts to neighborhoods. Land can be acquired from BLM at no cost.	X		
One alternative in the City of Las Vegas and three alternatives in the City of North Las Vegas are recommended for further analysis.	X		
Figure 9.1: Recommended Alignments	X		

Study Issue	Most Critical	Important	Part of Study Context
Ivanpah Valley Airport Project Definition and Justification			
Number of commercial service operations has increased dramatically at LAS over the last decade		X	
Department of Defense reserves much of the airspace north of the metro area. Civil use is constrained.			X
Ivanpah site best serves the needs of Clark County at an acceptable cost and with fewer social, community, and environmental impacts.			X
Unconstrained forecast predicts an average growth rate of 2.7% per year from 2005 level of 380,000 air carrier and commuter ops. And 553,000 total ops.		X	
Forecast aircraft ops predict ~42,000 annual aircraft ops at the facility's opening year 2017 and ~172,000 by 2025.		X	
Two runways needed to handle future capacity		X	
Parallel runway system with orientation of ~010/190 degrees, parallel to the mountain ranges east and west and between I-15 and UPRR.		X	
Runway length of 15,000 feet for primary and 12,000 feet for secondary		X	
Dedicated airport lanes within existing ROW along I-15	X		
Three primary access roadways. Primary access via a full interchange on I-15 near the north end.	X		
Second access via an access road along the west side of the UPRR ROW. Connect Jean and Primm and emergency access to terminals	X		
Third access for cargo, general aviation, and support via an access road connecting to an interchange with I-15 on south end.	X		
Land use Table 4-12, pg. 81. Ground Transportation 70 acres or 1% of land	X		
RTC Sloan-Ivanpah Regional Fixed Guideway Corridor Study			
Addresses transportation and mobility needs in the south LV valley and Ivanpah valley and evaluates opps for regional fixed guideway transit.		X	
Purpose is to address needs for Intermodal connectivity and transportation demand generated by rapid population and employment growth.		X	
Demand for multiple types of trips - express to Ivanpah airport, service to resorts and other employment centers, regional trips between residential and commercial centers, long-term connectivity between central LV and Ivanpah		X	
LV Boulevard is recommended as the locally preferred alternative	X		
BRT or LRT are recommended for service in the south LV valley	X		
Existing 200-foot wide ROW on LV Boulevard South be preserved so that there will be adequate space to construct regional fixed guideway facilities. Expansion of conventional bus service along the major streets in the south valley is recommended to provid	X		
BRT service on managed lanes on I-15 is recommended for service to the Ivanpah Airport.	X		
Recommended that RTC proceed with an approach that continues to advance the project while maintaining the option to pursue federal funding		X	
Figure 1.1 RTP/TIP Project in the Study Corridor			X
RTC Park and Ride Location Plan			
1. Other studies - RTC Park-and-Ride Site Location Study (April 2006); Land Use and Parking Analysis Study (April 2006).			X
2. Study targeted TAZs that displayed the following characteristics: abutted by heavily traveled transportation corridors; located along corridors that connect central activity centers to the LV valley and areas outside; contained in or adjacent to existi			X
3. 50%pf the resort/casino parking supply is for employees.	X		
Central p-n-r facilities, involves locating facilities directly adjacent to the Resort Corridor and to provide access to the monorail, the Deuce and shuttles transporting employees.		X	
Inner ring p-n-r involves locating facilities just outside the Resort Corridor edge servicing a wider area of employees and reducing the amount of vehicles driving to the Resort Corridor.		X	
Remote p-n-r involves locating facilities in outlying locations. Land availability makes this concept feasible. Does not address the needs of the greatest number of employees who live near the Strip.		X	
A combination of these alternatives is most likely to provide the range of choices necessary to entice Resort Corridor employees out of their cars and into car pools, van pools or transit.	X		
RTC is eligible to occupy BLM land at no cost under a ROW permit.	X		
RTC Rancho Drive Corridor Study			
Purpose to identify transportation investment options for one of the most congested non-freeway corridors in the LV valley area.		X	
Objectives: relieving congestion on US-95 northwest of the Spaghetti Bowl by providing a travel time competitive route for commuters traveling from the growing NW to the Resort Corridor.		X	
Table 1.2 - 2004 to 2030 Population and Employment Growth included in background info	X		
Traffic congestion greatest corridor need, inconsistent cross-sections, closely spaced signals, and frequent driveway and cross-street access.		X	
Serves both commuter and residential connectivity		X	

Study Issue	Most Critical	Important	Part of Study Context
US-95 Widening-NDOT			
The southern half of the new bridge over Rancho Drive is now open (summer 2006)			X
When the Rancho Drive Interchange project is finished in fall 2007 several improvements will be in place: reconstructed bridge that provides space for a SPUI on Rancho Drive; new connector ramps to and from I-15, eliminating weaving traffic exiting and en			X
Web site for updated information: www.us95.net		X	
Bruce Woodbury Beltway (CC-215)			
Full-freeway facility will consist of a divided highway with grade-separated interchanges and cross streets. Signalized intersections will occur only at interchanges.	X		
Minimum of four lanes - two in each directions will be provided in all locations.		X	
# of lanes for each segment will depend on current and future anticipated traffic volumes	X		
Adequate ROW is provided for up to five lanes each direction	X		
Where feasible, auxiliary lanes will also be constructed to ease the cars merging on and off.	X		
I-15 South Corridor NEPA			
Existing volumes range from 42,000 vehicles per day south of Sloan to 223,000 north of Tropicana.	X		
Improvements include: I-15 improvements including widening and reconstruction; Las Vegas Blvd. South improvements; new interchanges; frontage roads; I-15/215 system interchange improvements; and identification of potential transit corridors.	X		
Construction expected to begin summer 2007	X		
Cross-section maps included as part of background information			X
South County Land Use and Development Guide - I-15 Corridor Amendment			
Ivanpah Airport along I-15 presents a unique opportunity for the implementation of new land use strategies.		X	
Purpose of amendment is to provide practical solutions to facilitate the development of the Ivanpah airport and to mitigate impacts that result from the construction and operation of the airport.		X	
General Policies			
Goal 1: Provide for adequate public and quasi-public infrastructure along I-15, creating opportunities for transportation connectivity, protecting the view shed, enhancing highway beautification and minimizing the impacts of air quality pollutants	X		
Policy 1.5: Development should be screened and buffered according to Title 30 Clark County Unified Development Code, Section 30.64, Site Landscape and Screening Standards.			X
Residential uses are incompatible with the airport and should be excluded.	X		
I-15 varies in width from four lanes to six lanes and has posted speeds of 65 and 75 mph. South of the 215 beltway, access is currently provided at five points; existing ROW is approximately 500' between Ivanpah airport and Blue Diamond; ROW north of Blu		X	
AADT on i-15 at CA/NV state line grew an average of 4.4% per year from 1994 to 2003.		X	
2003 25% of visitors to Las Vegas were from Southern CA.		X	
AADT in 2004 at state line was 38,800 vehicles per day.	X		
Planned Land Use Map included as part of background information.	X		
South County Land Use and Development Guide			
Introduction: South County Planning Area covers about 1,980 square miles in the southern part of Clark County			X
Communities: Cal-Nev-Ari, 65 miles southeast of LV (residential); Goodsprings, 30 miles southwest of LV (residential); Jean, 30 miles south of LV (no permanent residents, hotels, casinos, and correctional facility); Nelson, 40 miles southeast of LV on SR		X	
Slope: five distinct mountain ranges in the planning area: Springs Mountains, located between Sandy Valley and I-15; the McCullough Range, located between I-15 and US 95; the Highland Range, east of the McCullough Range and west of US 95; the Eldorado Mtn		X	
Issues: Truck traffic does not bypass the developed residential areas, dependence on underground aquifers to supply potable water. Limited water resources may affect development, many commercial and public services are currently not available, many histo		X	
Given current development, uncommitted ground water resources can be considered and closely matched to future land use approvals.	X		
Slope and Historic Mining Activity Map included	X		
Archaeological, historical, and wildlife areas map included	X		
Transportation map included	X		
Energy Transmission facilities map included	X		

Insert SW Charrette Maps

Appendix B – Contact List

Name	Title	Agency	Division	Address	Phone	Email	Kickoff	12-Apr	18-Jun	25-Jul
Marcus Majors	Principal Transportation Planner	Clark County	Comprehensive Planning	500 S. Grand Central Parkway Las Vegas, NV 89155-1741	702-455-2526	mmajors@co.clark.nv.us	X	X	X	X
Elizabeth Zylka	Senior Engineer	Clark County	Public Works	500 S. Grand Central Parkway Las Vegas, NV 89155-1741	702-455-6009	zylka@co.clark.nv.us	X	X		X
Rudy Malfabon	Deputy Director, Southern Nevada	NDOT		123 East Washington	702-385-6506	malfabon@dot.state.nv.us			X	
Greg McDermott	Engineering Project Manager	City of Las Vegas	Public Works	731 S. 4th Street Las Vegas, NV 89101	702-229-2143	gmcdermott@lasvegasnevada.gov	X	X		
Randy Fultz	Assistant City Engineer	City of Las Vegas	Public Works	731 S. 4th Street Las Vegas, NV 89101	702-229-2176	rfultz@lasvegasnevada.gov	X	X	X	X
Mike Loghides	Airport Program Administrator	Clark County	Aviation	P.O. Box 11005 Las Vegas, NV 89111-1005	702-261-5750	mikelo@mccarran.com; James.Caviola@c-b.com		X	X	X
Teresa Arnold	Airport Planning Manager	Clark County	Aviation	P.O. Box 11005 Las Vegas, NV 89111-1005	702-261-5706	TeresaA@mccarran.com		X		
Mark R. Chatterton	Assistant Field Manager	BLM		4701 N. Torrey Pines Dr. Las Vegas, NV 89130	702-515-5049	mchatter@nv.blm.gov				X
Philip Banea	Planner	RTC		600 S. Grand Central Parkway Suite 350 Las Vegas, NV 89106	702-676-1651	baneap@rtcsnv.com	X	X	X	X
Martyn James	Assistant Planning Manager	RTC		600 S. Grand Central Parkway Suite 350 Las Vegas, NV 89106	702-676-1715	jamesm@rtcsnv.com	X	X	X	X
Thomas Bordeaux	Senior Transportation Manager	Parsons	Transportation	6795 Edmond St. Ste. 150 Las Vegas, NV 89118	702-789-2035	Thomas.bordeaux@parsons.com	X			X
Bruce Turner	Planning Manager	RTC		600 S. Grand Central Parkway Suite 350 Las Vegas, NV 89106	702-676-1718	turnerb@rtcsnv.com	X		X	
Barry Banks	Project Manager	WSA		257 East 200 So. Suite 825 SLC, UT 84111	801-363-3955	bbanks@wilbursmith.com	X	X	X	X
Mike Brown	Engineering	WSA		257 East 200 So. Suite 825 SLC, UT 84111	801-363-3955	mrbrown@wilbursmith.com	X	X		X
Alana Spendlove	Transportation Planning	WSA		257 East 200 So. Suite 825 SLC, UT 84111	801-363-3955	aspendlove@wilbursmith.com	X	X	X	
Melvin McCallum	Transportation Planner	NDOT	Program Development	3830 Meadows Lane Las Vegas, NV 89107	702-486-0478	mmccallum@dot.state.nv.us	X	X	X	X
Flinn Fagg	Planning Manager	City of Las Vegas	Comp. Planning	731 S. 4th St. Las Vegas, NV 89101	702-229-4848	ffagg@lasvegasnevada.gov		X		
Rod Allison	Assistant Planning Director	Clark County	Comp. Planning	500 So. Grand Central Parkway Las Vegas, NV 89106	702-455-3123	rxa@co.clark.nv.us		X		
JP Woyton	Engineer/Planner	Parsons	Transportation	6795 Edmond St. Ste 150 Las Vegas, NV 89118	702-789-2016	jp.woyton@parsons.com				X
Jim Caviola	Ivanpah Airport PM	Carter & Burgess		6655 Bermuda Rd. Las Vegas, NV 89119	702-938-5598	james/caviola@c-b.com		X	X	X
Ed Miranda	Manager of Engineering Services	NDOT	Engineering	123 E. Washington Ave.	702-671-8856	emiranda@dot.state.nv.us				X