

Lompa Ranch North Specific Plan



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CARSON CITY BOARD OF SUPERVISORS

LOMPA RANCH NORTH SPECIFIC PLAN

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1. Introduction

1.1 Location

The Lompa Ranch North Specific Plan Area encompasses 251.31± acres. The majority of land (203.27±) acres is located on the west side of Interstate 580, north of East Fifth Street, east of Saliman Road, and south of US Highway 50 (East William Street). The remaining 48.04± acres is located on the east side of Interstate 580 along the western side of Airport Road. Figure 1 (below) depicts the Lompa Ranch North in context with the surrounding area.



Figure 1 – Lompa Ranch North Specific Plan Area

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1.2 Purpose

The purpose of this Development Handbook is to provide for the orderly development of the Lompa Ranch North Specific Plan Area (SPA) as envisioned, while assuring that the stated desired level of quality is achieved. Since implementation of public and private improvements will occur in multiple phases, over many years, the standards and guidelines contained herein establish a common framework to guide individual improvement plans. The development of the property is controlled and restricted by these development requirements as well as by all applicable government codes and regulations. This Development Handbook is not intended to limit creativity or prevent variation necessary to respond to unique site conditions, but rather to generate consistency and quality throughout the SPA.

This SPA is for the Lompa Ranch North properties specifically identified with this document. Future development of the remaining Lompa Ranch properties as identified in the 2006 Carson City Master Plan shall be required to receive approval of a new SPA for those areas prior to development.

1.3 Vision

The Lompa Ranch North SPA is intended to provide for a sustainable community that includes a range of land uses that complement not only each other but those that currently exist outside of the SPA boundaries. The vision is to provide for a viable community that promotes a variety of housing types supported by well-balanced commercial, recreational, and educational opportunities.

Complementing the commercial uses and neighborhoods within Lompa Ranch North will be a linear open space preserve along Interstate 580 as well as a network of trails and sidewalks throughout the community, providing non-vehicular connectivity to the various internal and regional components of the area. Throughout Lompa Ranch North, consistent design themes, entries, and landscape treatments will establish a sense of place/community and recall the property's ranching roots.

1.3.1 Land Use Pattern

The land use mix within Lompa Ranch North provides for varying levels of compatible densities and intensities that will result in a synergy that attracts both residents and businesses. This supports walkability within the community to commercial, recreational, employment, and public activities. It also minimizes the consumption of land associated with traditional suburban development by encouraging and creating a more

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compact development pattern that is efficient for infrastructure, public services and maintenance.

1.3.2 Sense of Place and Community

Creating a sense of place is one of the key components in creating a vibrant and balanced community. A sense of place is fostered within Lompa Ranch North by creating human-scale environments in which the individual can feel both comfortable and safe. This includes provisions for open space and walking paths, neighborhood parks, common design themes, and uses that complement each other.



Furthermore, the Lompa Ranch North SPA promotes and provides for connectivity between various neighborhoods and uses that are integrated through the standards included within this handbook.

1.3.3 Diverse Housing Mix



The Lompa Ranch North SPA provides for neighborhood diversity by allowing for a mix of residential densities and product types to support a wide range of resident interests and needs. The



densities included in the SPA will also support and complement planned commercial uses within the Lompa Ranch North plan area. Furthermore, this diversity in densities and housing types serves to break up the monotony of traditional residential development by reinforcing the dynamics of character and identity within each of the neighborhoods.



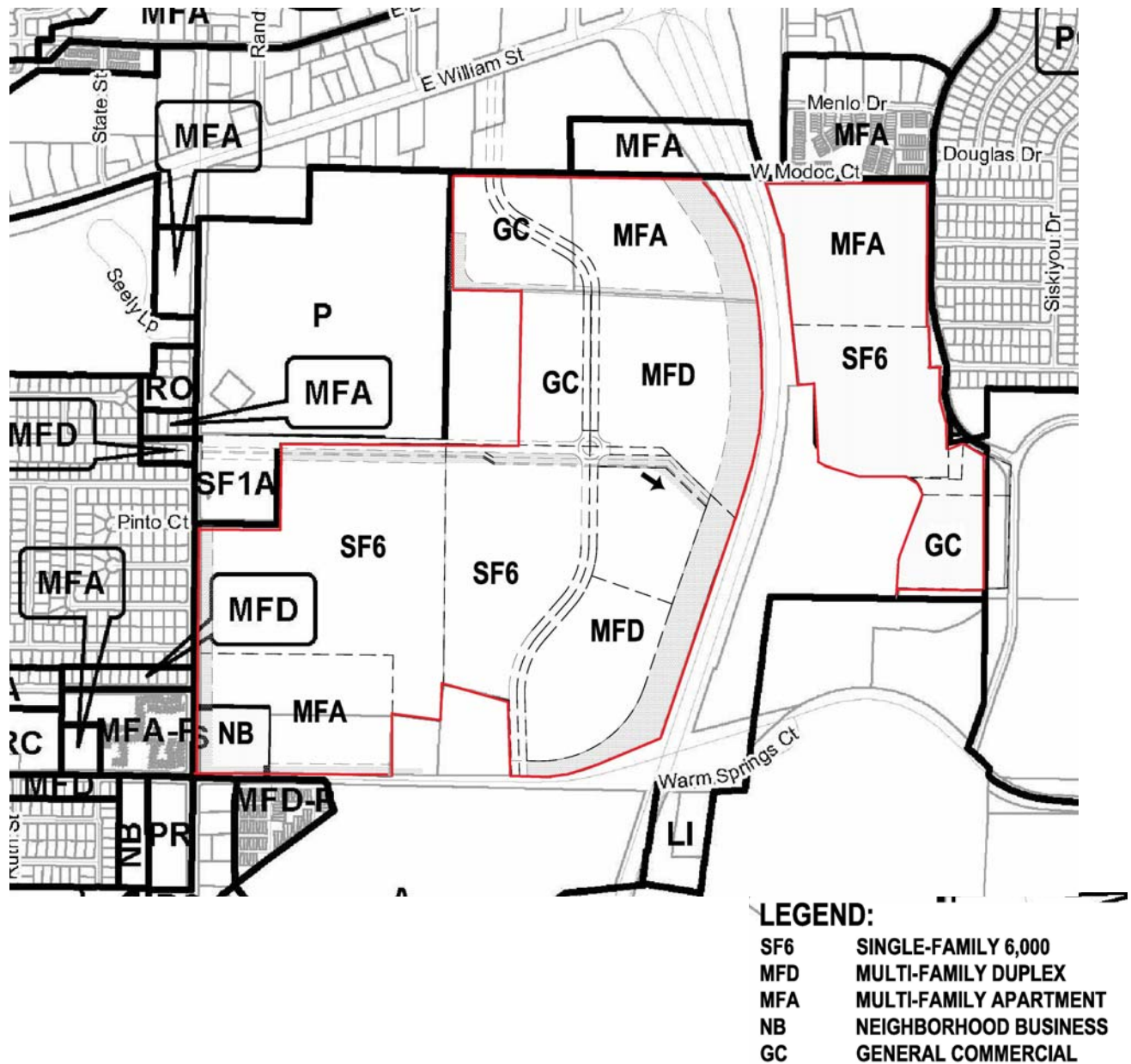
1.3.4 Implementation

This handbook will be used by the Carson City Community Development Department as a guide for reviewing individual projects within the boundaries of the Lompa Ranch North SPA.

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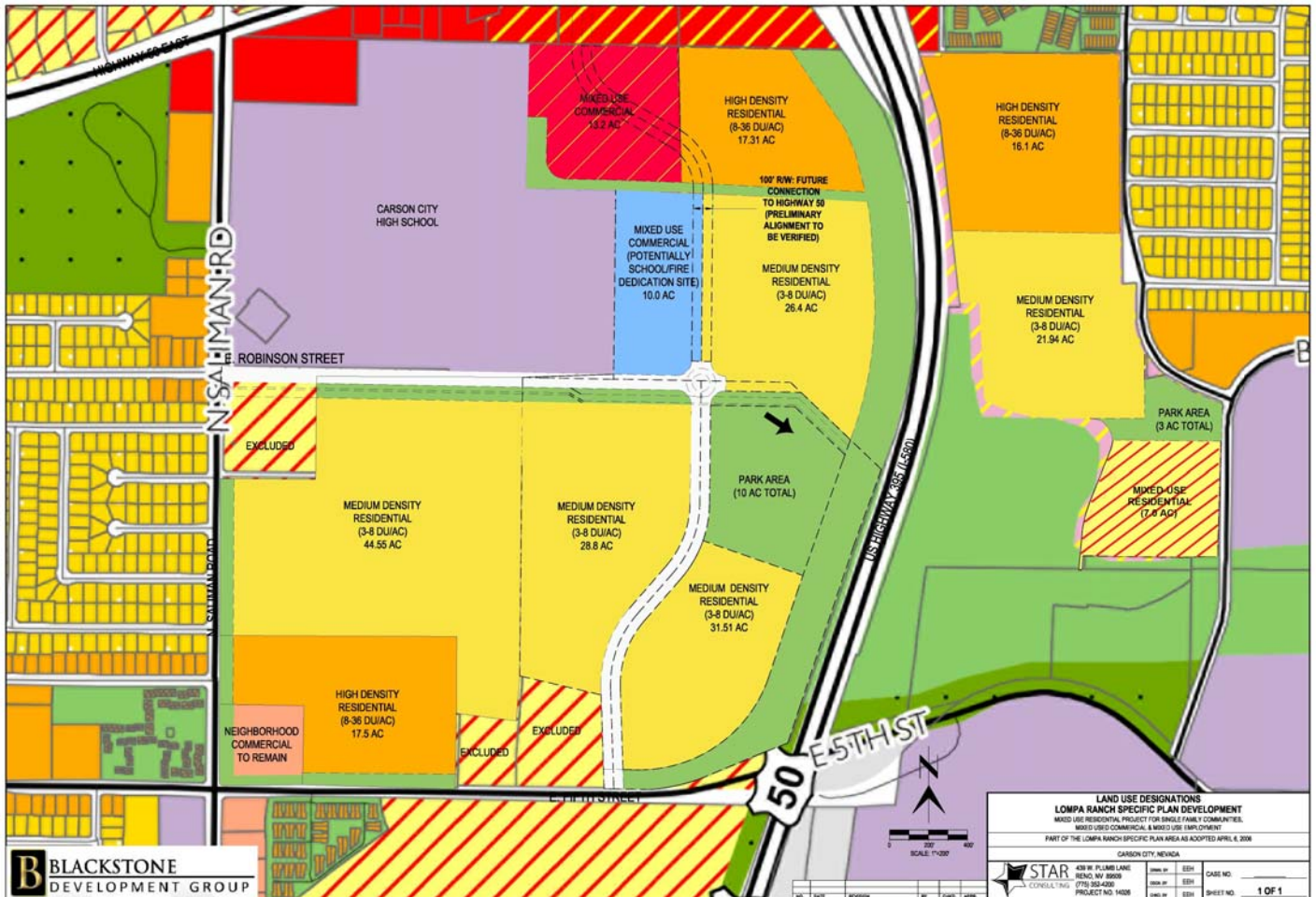
1.4 Allowed Uses

Allowed uses within the Lompa Ranch North SPA shall be determined based on the underlying zoning categories, as included in the Carson City Municipal Code Title 18. The zoning districts included within Lompa Ranch North are depicted below:



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Master Plan land use designations for the Lompa Ranch North SPA are included below:



1.4.1 General Standards

- a) The Lompa Ranch North SPA is envisioned to include a mix of residential uses ranging from 4 units per acre up to 36 units per acre.
- b) Land use is determined based on zoning. Zoning adopted with this Specific Plan shall be reviewed and approved by the Carson City Planning Commission and Board of Supervisors and deemed to be appropriate for the site(s).

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- c) Commercial uses at a varying range of intensities are encouraged within the SPA to serve both new residents of Lompa Ranch North as well as those within the surrounding area. Commercial uses shall be located as to properly relate to adjoining uses.

- d) Uses within Lompa Ranch North shall conform to the underlying zoning district(s) assigned to the individual parcels as outlined in Title 18 of the Carson City Municipal Code

- e) Supplemental review required for specific uses within zoning categories such as Special Use Permits shall remain in effect per the Carson City Municipal Code (refer to allowed uses within individual zoning categories).

- f) This Specific Plan shall not grant any special privileges or waivers in terms of public review or entitlements otherwise required under the Carson City Municipal code in terms of allowed uses or supplemental review.

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2 Standards and Guidelines

The site planning standards and guidelines address general provisions of site development which include building orientation, grading and drainage, parking areas, landscape, lighting, signs, walls and fences, and service areas. Site planning controls the proper placement of buildings and internal roads that service and access the various land uses in the community. It addresses the linkages and land use relationships at a human-scale, in order to create a stimulating and visually pleasant community. The goal is to promote pedestrian activity and safety, create visual compatibility with surrounding neighborhoods and minimize negative impacts on the natural environment. These standards are intended to be used in addition to the standards outlined in the Carson City Municipal Code, Title 18 Appendix - Development Standards. In cases where a conflict exists, the stricter of the standards shall apply. Where these standards are silent, the Carson City Development Standards shall apply.

2.1 Commercial Uses

2.1.1 Commercial Site Planning Standards

- a) Building placement and orientation shall be designed to create visual interest along public streets. Multiple buildings in a single project shall demonstrate a positive functional relationship to one another.
- b) To the extent possible, buildings located within a single project shall be clustered. Plazas and pedestrian areas shall also be an important element in the design of clustered buildings. When clustering is impractical, a visual link should be established between buildings through the use of architectural features, landscaping, etc.
- c) For general commercial uses, a minimum of 15 percent of the building area should be located at or near the front setback line. This minimizes large, continuous areas of parking and encourages active streetscapes.
- d) Buildings shall be oriented so that public access or windows face adjoining streets.
- e) Plazas or common areas within a project shall be located near building entrances or areas of high pedestrian traffic to ensure their use.
- f) To the extent possible, areas between buildings shall be utilized for plazas, outdoor seating, or landscape

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features in order to eliminate “dead zones” of underutilized space.

g) Bicycle racks shall be provided within all commercial centers.

2.1.2 Commercial Grading and Drainage

a) Design of commercial uses shall be sensitive to the natural terrain, and structures should be located to minimize necessary grading and preserve natural site features such as drainageways, wetlands, etc. Grading of commercial sites should blend with the natural topography of the site.

b) Grading within commercial areas shall be designed to complement the architectural and landscape design character of the center and surrounding area. Grading techniques can be used to screen parking and service areas, reduce the perception of height and mass on larger buildings, and provide reasonable transitions between uses.

c) Graded slopes should properly transition to existing natural terrain at project borders.

d) Man-made slopes shall not exceed an average of 3:1 slope and turf areas shall not exceed an average 4:1 slope.

e) Areas disturbed by grading activities shall be revegetated prior to the issuance of a certificate of occupancy. If climatic conditions or other circumstances prevent planting at the time of occupancy, a bond shall be provided for landscaping during the subsequent growing season. Drought tolerant plant species shall be utilized to help minimize erosion.

f) New commercial developments must include a final hydrology report to be reviewed and approved by the Carson City Engineering Department prior to the issuance of a building permit.

g) An erosion control plan shall be included with each grading permit.

Appendix 1 contains the Conceptual Drainage Study and Stormwater Management Report for Lompa Ranch North.

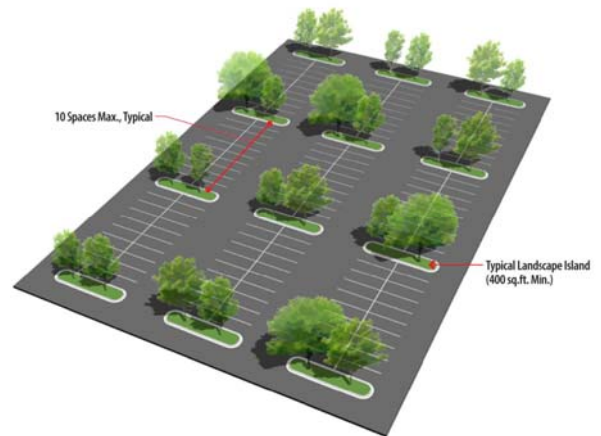
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2.1.3 Commercial Parking Lots

a) A minimum of 10 feet of landscaping shall be provided between parking lots and the public streets.

b) A minimum 400 square foot interior planter shall be provided at the end of parking aisles (refer to example to the right). Planters shall include a minimum of one deciduous tree (min. two inch caliper) – see example to right.

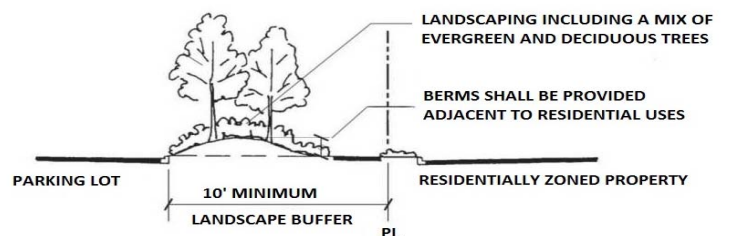
c) Landscape islands (minimum of 400 square feet) shall be provided for every 10 spaces in large parking fields and shall include a minimum of one deciduous tree (two inch caliper minimum). See example to right.



d) Pedestrian connections between parking lots and buildings shall be provided along with connections to sidewalks along adjoining public streets.

e) Parking should be located to the side and rear of a project site where feasible. However, no more than 10 percent of the required parking shall be in the rear service area (typically not used for general public access) of a project site.

f) Parking areas shall be screened from adjoining residential areas through the use of landscaping and berming. This buffer shall be a minimum of 10 feet in width (see example to right).



g) Commercial centers that include tenants that utilize shopping carts shall provide a “cart corral” within 150 feet of 85 percent of their parking stalls.

h) For commercial centers exceeding 5 acres, a maintenance plan shall be required for parking lots that includes regular sweeping and a snow removal/storage plan for winter weather events.

i) For commercial centers adjoining residential areas, parking lot sweeping shall be limited to the hours

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between 8:00 am and 9:00 pm.

j) Parking lot design, including space dimensions, aisle widths, etc. shall comply with the provisions of the Carson City Municipal Code.

k) Outdoor sales or special events may not reduce parking past minimum requirements mandated in the Carson City Municipal Code.

2.1.4 Commercial Landscaping

a) Landscaping, including plant materials and themes shall be consistent throughout the Lompa Ranch North SPA.

b) Landscaping standards contained in the Carson City Development Standards shall apply within Lompa Ranch North.

c) Within commercial centers, areas not utilized for parking, buildings, plazas, or access/circulation shall be landscaped to the back of curb. Unbuilt pad areas shall be excluded from this standard.

d) Drought tolerant plantings shall be used in conjunction with low water demand principles and techniques.

e) All landscaped areas shall be irrigated with permanent automatic irrigation systems. All irrigation systems shall be placed underground.

f) Landscape maintenance within commercial areas shall be the responsibility of individual property owners or completed through a private maintenance association.

g) Landscaping along adjoining rights-of-way shall be a minimum width of 15 feet and provide a mix of trees, shrubs, and living groundcover. Trees shall be provided at a rate of 1 tree per 25 lineal feet of street frontage with a minimum of six shrubs per tree

2.1.5 Commercial Lighting

a) Adequate lighting shall be provided to ensure a safe pedestrian environment.

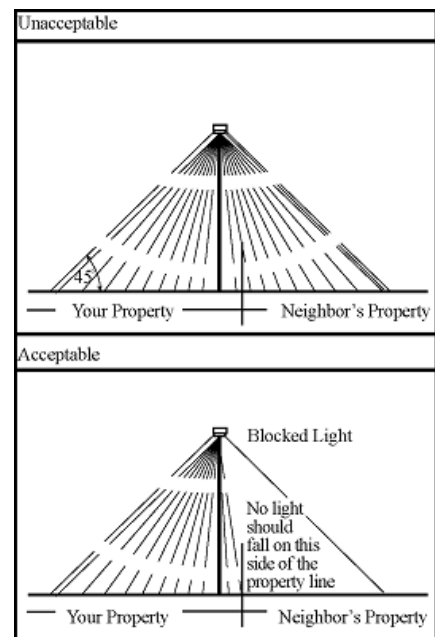
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b) Parking lot lighting within 75 feet of residential areas shall be limited to 12 feet in height and shall incorporate shielded fixtures. Additional height limitations for parking lot lighting within certain distances of residential areas are identified in the Carson City Development Standards.

c) Parking lot lighting shall use shielded/directed fixtures to ensure that spill-over and glare do not occur on adjoining properties. See example to right.

d) The use of bollard lighting is encouraged in pedestrian areas.

e) Exterior lighting shall be used for purposes of illumination and safety only, and shall not be designed for, or used as, an advertising display.



2.1.6 Commercial Signs

Signs and their integration into the project is a critical element in the design of Lompa Ranch North. Careful use of forms, styles, materials, and colors will establish continuity throughout the community. Signs are intended to be utilized only where necessary, and in an understated manner, emphasizing an image of permanence and quality.

a) Signs shall be included on facades or entry canopies of buildings and illuminated or backlit with indirect lighting. All tenant identification signs shall be consistently located and integrated into the architectural design of the building entry. Storefront signs shall be proportional with the building architecture (see example to right).



b) Flashing or animated signs are prohibited.

c) Building signs that project more than 4 inches beyond the wall façade are prohibited, unless incorporated as an architectural element.

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d) Hanging signs may be included under eaves above walkways and shall maintain a minimum of 8 feet of clearance. These signs shall be architecturally compatible with the building they serve (see example to right).



2.1.7 Commercial Fencing

a) Walls and fences shall be utilized to provide a buffer between incompatible uses. It is important, however, that walls are appropriately integrated into each project

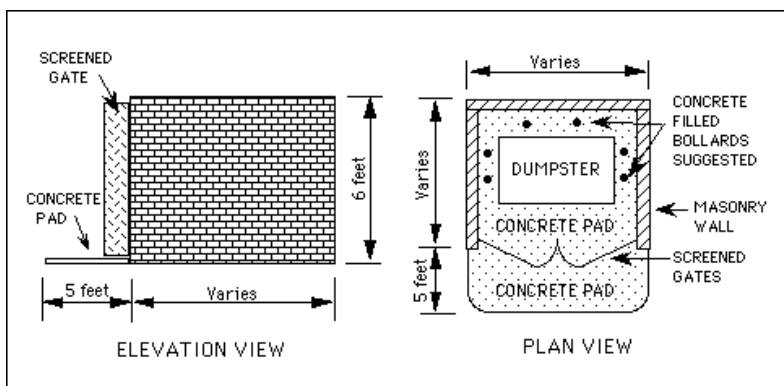
b) Solid fencing (6 foot minimum) shall be installed between commercial uses within Lompa Ranch North and adjoining residential uses. This can include wood or vinyl fencing, concrete block walls, pre-cast wall systems, or similar.

c) Chain link fencing shall be prohibited within commercial centers.

2.1.8 Commercial Trash and Utility Areas

a) Service and maintenance areas shall be screened from adjacent public right-of-ways, pedestrian plazas or adjacent residential uses with landscaped berms, walls or plantings. Storage areas shall be enclosed by a 100% site obscuring fence or wall, permanently installed and maintained at a minimum height of six feet.

b) All trash and garbage bins shall be stored in an enclosure that includes solid screening, to the approval of the Carson City Community Development Department.



c) Trash enclosures shall incorporate building materials, colors, etc. that are complementary to the overall project architecture. Gates shall be constructed of durable building materials that screens at a minimum 80% of the view into the trash enclosure. Wood or chain link gates are not allowed (see example to left).

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d) Trash enclosures must include provisions for concrete pads or appropriately designed asphalt sections in front of the enclosure. The area in front of the trash enclosure shall be a minimum of six (6) feet to reduce pavement damage from disposal trucks.

2.2 Single Family Residential Areas

2.2.1 Neighborhood Diversity

Single family areas within the Lompa Ranch North SPA will include varied densities and housing types in order to create separate and distinct neighborhoods within the project. This can be accomplished through the use of varied housing types, distinct architectural styles and elements, etc.

a) Densities within single family areas will range from 3 to 8 dwelling units per acre.

b) Neighborhood density shall properly relate to adjoining developed areas and provide for transition between neighborhood types. Proper transitions can include feathering of density/lot size, landscape buffers, or walls/fences that serve to identify community boundaries.

c) Individual single family projects within the SPA boundary may create their own sense of identity through the use of entry features that include distinctive signage, entry treatments, landscape improvements, water features, etc.

d) Varied densities are encouraged throughout the SPA boundary to encourage varied product types including single family detached homes, patio homes, duplexes, townhouses, etc. Additionally, new urbanism design principles such as house-forward designs with residential alleyways are permitted within the single family areas.

e) It is the intent of the SPA to provide a number of distinctly different neighborhood types rather than a single "large neighborhood" with a single product type.

f) Variation in architectural styles is encouraged throughout the SPA in order to provide distinct neighborhood identity to new subdivisions within the Lompa Ranch North.

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2.2.2 Single Family Neighborhood Design

Neighborhoods within Lompa Ranch North will promote quality development that is complementary to the existing built environment, while establishing its own sense of identity through uniform and innovative design. A variety of single family detached, as well as single family attached products are anticipated within the SPA boundary.

a) To the extent possible, “forward” architecture shall be used in the design of homes. This is accomplished by placing entries, windows, front porches, and living areas towards the street on most plan variations.

b) With the exception of zero lot line lots, plans should be reversed and plotted so that garages and entries are adjacent to each other. This creates an undulating sense of setback. Occasionally this pattern should be broken so that it will not become overly repetitious or reflected by the massing across the street.



c) The garage shall not be the dominant feature of the building facade facing the street and should be offset through architectural detailing for garage forward elevations.

d) So as not to contribute to a repetitious and monotonous appearance along the street, the use of varying building setbacks from the street right-of-way is encouraged.

e) Neighborhoods shall provide connections into the community trail system.

g) In order to avoid a “walled-in” feel, homes backing to parks, open space, or drainage corridors shall include open rear fencing. This includes the use of split rail or iron fencing. See example to right.

h) Setbacks for single family residential areas shall comply with the underlying zoning district for which the subdivision is located. In order to provide for visual interest within the streetscape, front setbacks may be reduced up to 5 feet in order to achieve a non-monotonous/repetitive streetscape pattern.

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2.2.3 Single Family Grading

- a) The design of residential neighborhoods shall be sensitive to the natural terrain, and structures shall be located in such a manner so as to minimize necessary grading and preserve natural site features and drainage ways. Any grading of the site terrain shall blend with the natural topography of the site.
- c) Graded slopes shall be rounded resulting in smooth, harmonious transitions between the man-made terrain and the natural terrain.
- d) All graded slopes shall be revegetated prior to building occupancy. If climatic conditions or other circumstances prevent planting at the time of occupancy a bond shall be provided for landscaping during the subsequent growing season or other arrangements made for revegetation, subject to the approval of the administrator. Drought tolerant plant species shall be utilized to help minimize erosion.

2.2.4 Single Family Landscaping

- a) Front and street side yard landscaping shall be installed by the builder prior to the occupancy of the individual home. See example to right.
- b) Front yard landscape packages shall provide for a minimum of 1 tree per 50 lineal feet of street frontage as well as a minimum of 12 shrubs. Trees shall be a minimum of 1 inch caliper for deciduous and 6 feet in height for evergreens. Shrubs shall be a minimum of 2 gallon.
- c) Xeriscape options for front yards shall be permitted. Xeriscape packages must include the required trees and shrubs outlined under the previous standard.



- c) Front yard landscaping is required for all homes and will be reviewed and approved with the tentative map establishing installation timing.
- d) Front yard landscape packages shall include an automatic irrigation systems.

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2.2.5 Single Family Lighting

- a) Lighting shall be designed to differentiate land use areas, emphasize community amenities, provide continuity along street corridors and ensure the safety of residents and users.
- b) Exterior lighting shall be shielded from projection offsite and designed to be compatible with the architectural and landscape design of the home.

2.2.6 Single Family Walls and Fencing

- a) Walls may be used where necessary to provide privacy and security for residential neighborhoods when adjacent to arterial or collector roadways, or when adjoining non-residential uses.
- b) Walls within the community shall not become the dominant visual element and walls where needed shall blend into the overall landscape.
- c) Walls within Lompa Ranch North shall not exceed 6 feet in height. Acceptable materials include stone, stone veneer, split face/precision block, slump stone, and stuccoed CMU.
- d) Open fencing shall be used where the rear of individual lots are adjacent to open space. See examples below.
- e) Open fences at rear yards may include landscaping with trees and shrubs to screen views of private yards from adjacent properties, common areas, and/or roadways.
- f) Acceptable open fencing materials include wood or vinyl split-rail or wrought iron. See examples below.



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g) Single family residential lots may include solid privacy fences. Acceptable materials include wood and vinyl. Privacy fencing shall not exceed 6 feet in height.

h) Chain link fencing is prohibited within residential areas.

2.3 Multi-Family Residential Site Planning

2.3.1 Multi-Family Building Orientation

a) Multi-family structures should be grouped in clusters of buildings rather than one large continuous structure in order to minimize the scale of the project.



b) Open space areas and courtyards shall be created within multi-family developments in order to break up building mass and provide recreational opportunities. See example to left. Open space/recreational areas shall be provided per the requirements of the Carson City Municipal Code.

c) To provide privacy between living spaces, there should be distance separations, buffering or changes in the angles of units. See examples below.



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d) All multi-family/attached single family developments shall incorporate pedestrian connections to adjoining residential, recreational and commercial uses as well as to the community trail system (where practical).

e) Multi-family/attached single family projects in excess of 35 units shall provide a secure children's play area. Additionally, such projects shall incorporate a minimum of 5 recreational facilities. These can be any 5 of the following:

- Swimming pool
- Tennis courts
- Horseshoe Pits
- Spa
- Fitness Center/Gym
- Game room
- Community room
- Picnic areas to include tables with barbecues
- Volleyball court
- Basketball court



f) Recreation facilities shall be conveniently and centrally located for the majority of the units (see examples to right).

g) Private open space, such as decks or patios, shall be contiguous to the units with a minimum width of six (6) feet.

h) Setbacks shall conform to the underlying base zoning. Deviations to setbacks within 10% of requirements may be granted by the Carson City Community Development Director or his/her designee.

2.3.2 Multi-Family Grading and Drainage

a) The design of multi-family housing or attached single family housing shall be sensitive to the natural terrain, and structures shall be located in such as manner so as to minimize necessary grading and preserve natural site features and drainage ways. Any grading of the site terrain shall blend with the natural topography of the site.

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- b) Site grading shall be designed to complement the architectural and landscape design character of the community, screening parking and service areas, reducing the perception of height and mass on larger buildings, and providing reasonable transitions between on-site uses.
- c) Graded slopes shall be rounded resulting in smooth, harmonious transitions between the man-made terrain and the natural terrain.
- d) All graded slopes shall be revegetated prior to building occupancy. If climatic conditions or other circumstances prevent planting at the time of occupancy a bond shall be provided for landscaping during the subsequent growing season or other arrangements made for revegetation, subject to the approval of the administrator. Drought tolerant plant species shall be utilized to help minimize erosion.

Appendix 1 contains the Conceptual Drainage Study and Stormwater Management Report for Lompa Ranch North.

2.3.3 Multi-Family Parking

- a) Parking areas shall not be located in excess of 400 feet from individual units within multi-family projects.
- b) Pedestrian links between units (i.e. sidewalks) shall be provided between all units and parking areas.
- c) Garages and covered parking shall be designed as an integral part of the architecture of the development and shall include the same colors, materials, etc. as the primary building(s). Carports should not have roof pitch of less than 3:12.

2.3.4 Multi-Family Landscaping

- a) Minimum landscape requirements shall be established by the Carson City Development Standards based on underlying zoning of the project site.
- b) Drought tolerant and low water demand plantings shall be used to the extent possible. Xeriscaping may be substituted for turf areas and must contain trees and shrubs per the standards of the Carson City Development Standards.
- c) Automatic irrigation systems shall be installed with all multi-family projects. All irrigation systems shall be placed underground.

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d) Large parking lots (in excess of 25 spaces) within multi-family shall provide a minimum 400 square foot landscape island containing at least one tree (two inch caliper) for every 10 spaces of required parking.

e) Landscaping along adjoining rights-of-way shall be a minimum width of 15 feet and provide a mix of trees, shrubs, and living groundcover. Trees shall be provided at a rate of 1 tree per 25 lineal feet of street frontage with a minimum of six shrubs per tree.

2.3.5 Multi-Family Lighting

a) The height of lighting within multi-family projects shall be in scale with the setting and complement the architecture. Light fixtures over 10 feet shall include a cut-off shield to prevent the light source from being directly visible from off-site areas.

b) Light sources shall be kept as low to the ground as possible while ensuring safe and functional levels of illumination. For example, the use of bollard lighting rather than pole lighting is required in pedestrian areas. See examples below.



c) Illumination of landscape features or building facades for aesthetic purposes shall ensure that light does not project beyond the project boundary.

2.3.6 Multi-Family Walls and Fencing

a) Multi-family projects that adjoin common areas, open space, or drainageways shall include open fencing adjacent to such features. Acceptable materials include wood or vinyl split rail or wrought iron and shall not exceed 6 feet in height.

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- b) In areas where open fencing is employed, landscaping shall be used to screen views of private yards from adjacent properties and public streets.
- c) Design of all walls and fences shall be consistent in terms of material, color and detail within each multi-family and attached single family residential project. Chain link fencing is prohibited.
- d) In areas where multi-family development adjoins either single family residential or commercial use, a minimum 6-foot wall shall be provided for separation. Acceptable materials include stone, stone veneer, split face/precision block, slump stone, and stuccoed CMU.

2.3.7 Multi-Family Service and Utility Areas

a) Enclosures shall be provided in order to screen all trash dumpsters and shall architecturally complement the primary building(s). Enclosures shall include solid gates and screen a minimum of 80% of the interior area. See example to right.



b) Trash enclosures shall include durable materials that complement the primary architecture and shall be screened with landscape on three sides and shall comply with the Carson City Development Standards. Chain link fencing is prohibited. See example to right.

c) The use of individual trash cans for multi-family projects in excess of 15 units shall be prohibited.

2.4 ARCHITECTURE STANDARDS AND GUIDELINES

2.4.1 Architectural Theme

It is the intent of the Lompa Ranch North SPA to promote a high quality development that incorporates an architectural style that reflect the historical ranching aspect of the area. Therefore, a ranch and craftsman architectural theme is adopted with the Lompa Ranch North SPA.

Variations on the ranch/craftsman style are encouraged in order to promote creative design, innovative features, and high quality elevations. Variations may include the introduction of a southwestern elements

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such as barrel tile roofs or Victorian elements such as wrap-around porches. These deviations will be complementary to the overall theme and can add visual interest within the community.

2.4.2 Residential Architectural Elements

a) New structures within Lompa Ranch North shall, at a minimum, incorporate a minimum of two of the following elements:

- Gable roofs with deep overhangs.
- Exposed rafters, brackets, columns, etc.
- Decorative doors and windows
- A mixture of 2 (at a minimum) exterior elements including stucco, wood siding or shingles, brick, or stone
- Exterior porches or courtyards

b) Acceptable roofing materials include concrete or clay tile, slate, or architectural grade (30+ year) composition asphalt shingles. Metal roofing may be used as an architectural element in conjunction with the previously listed materials.

c) Flat roofs are prohibited in residential areas.

d) Metal buildings, other than accessory sheds not to exceed 250 square feet, are prohibited.

e) Modular homes are not permitted within the Lompa Ranch North SPA.

f) Building articulation shall include a minimum of 4 separate roof planes incorporated on front/primary elevations. Front/primary elevations shall contain a minimum of 2 wall planes offset by a minimum of 3 feet.

g) Building colors shall utilize an earth tone pallet such as browns, tans, whites, greens, deep reds and oranges, pale yellows, etc. The use of bright or vibrant colors is prohibited with the exception of highlighting architectural elements.

2.4.3 Commercial Architecture

Commercial areas within the Lompa Ranch North SPA are envisioned to complement residential uses in function and form. Smaller retail uses will incorporate the ranch theme while larger commercial centers can

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take a more traditional center approach with the inclusion of the ranch theme elements such as rock, stone, brick, etc.

2.4.4 Commercial and School Building Mass and Form

a) Individual buildings, forms, and components within commercial centers shall be designed as a whole to ensure unity to the overall design of the center.

b) Facades shall include articulation to ensure that the large scale of commercial buildings is softened and appropriate for the area at a human scale. Articulation shall be provided on all sides of any commercial building that is adjacent to a public right-of-way or main commercial parking area.

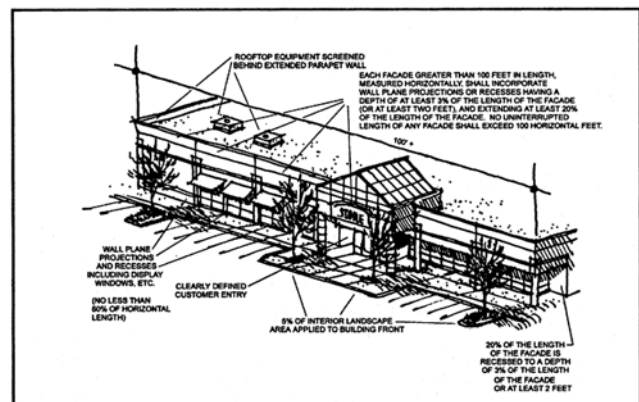
c) Visual interest shall be created in building facades through the incorporation of wall plane projections or recesses that are a minimum of two (2) feet in depth.

d) Wall plane projection or recess may be substituted with a combination of vertical or horizontal elements such as trellises, awnings, shed roofs, or columns. Any such element must have a minimum of 2 feet change in vertical or horizontal projection or recess. The proposed alternative design solution shall meet the intent of this standard.

e) In commercial areas adjoining residential uses, building heights shall relate to the adjacent development to enhance view corridors and ensure compatibility.



f) Multi-tenant commercial spaces shall use color change, texture change, material change, or relief change to avoid large expanses of blank walls and box-like structures (see example to the left).



g) Buildings in excess of 10,000 square feet should vary building and roof forms to give the appearance of smaller forms. See example to right.

h) Commercial centers that include multiple buildings shall incorporate a consistent architectural theme. Pad site buildings with conflicting architectural style are prohibited.

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2.4.5 Commercial Roof Form

a) Rooflines shall include variations to add visual interest and reduce the scale of large buildings. Refer to example below.



b) Roof profile elements visible at ground level shall incorporate horizontal and vertical offsets as depicted in the example above.

c) All rooftop equipment shall be screened from public view at street level and the parking lot.

d) All roof mounted mechanical equipment must be screened from public view at the street level and the parking lot.

2.4.6 Commercial Materials and Colors

a) The colors and materials of new buildings shall be compatible with those of adjoining buildings/uses.

b) Exterior building materials shall be of high quality. These may include, but are not limited to:

- brick
- stained, painted, or weathered wood/cementitious products such as heavy timbers or stock lumber
- stone veneer/cultured stone
- integral color split face block or rough cut wood
- metal such as corrugated, battened or standing panelized systems; performed painted or stained metal shapes
- fabric or metal awnings
- dimensioned asphalt or simulated wood shingles
- tilt-up concrete with wood texture, or other similar treatment

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- c) Accent colors (including vibrant colors) may be used to emphasize special façade elements in order to attract attention at focal points.
- d) Facades shall include the use of earth tone palette colors in broad expanses. The use of high intensity colors, very dark colors or fluorescent colors are discouraged unless they are used to accentuate architectural forms or features.
- e) Building trim and accent may feature a brighter, more intense palette of colors used to direct focus toward important building elements.
- f) The following exterior building materials are not allowed as predominant features on building facades:
 - integral color smooth-faced or painted concrete masonry
 - tilt-up concrete panels without textures or finishes
 - pre-fabricated steel panels
 - unprotected wood
 - dimensional asphalt shingles (architectural grade asphalt shingles may be used on roofs)

2.4.7 Single Family Residential Architecture

Architectural standards for residential areas promote an upscale development concept that reflects a western and ranching heritage while providing for modern amenities and features. Although neighborhoods may include distinctive architectural designs, common elements serve to create a cohesive community that creates a sense of place.

2.4.8 Single Family Building Mass and Form

- a) Home facades shall incorporate the architectural style and materials outlined in section 2.4.1.
- b) A minimum of 3 distinctive floor plans shall be used within each subdivision. Subdivisions with less than 20 lots are exempt from this requirement. Phasing of 20 units or less does not circumvent this standard.
- c) Architectural details and stylings used on the front of the home shall be carried over to all elevations.
- d) A minimum of 3 distinctive front elevations shall be included for each model within subdivisions. Matching elevations shall not be allowed to repeat next to each other.
- e) Varied setbacks, floorplans, and elevation packages shall be used within subdivisions to create a visually interesting streetscape.

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2.4.9 Single Family Roof Form

a) Roof planes are required to vary through the use of architectural features such as dormers, gables, hipped roofs and variations in pitch appropriate to the homes chosen architectural style.

2.4.10 Single Family Materials and Colors

a) As mandated within other provisions of this handbook, single family homes shall incorporate an[~~e~~] earth tone color palette. The use of bright and vibrant colors is prohibited with the exception of enhancing key architectural elements and features.

b) Conflicting architectural styles within a single subdivision shall be prohibited.

c) Building materials and elements shall be consistent with those outlined under previous standards.

2.4.11 Single Family Garages

a) Garages shall include a minimum of 5 feet offset from inhabitable areas. Front elevations should provide focus on living areas and not garages.

b) Home plans shall incorporate one of the garage designs listed below and each subdivision shall incorporate at least two of these techniques to reduce the emphasis of the garage on the street (see examples to left).



- Recessing garage back a minimum of five (5) feet in relationship to the front of the house.



- Incorporation of a side-load garage that eliminates the continuous view of garage doors from the street.

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c) Garage forward plans shall be permitted when offsets (5 feet minimum) exist for the garage in order to provide visual distinction between the garage and residence. See examples below.



2.4.12 Multi-Family Architecture

Multi-family standards are intended to result in a visually pleasing product that does not reflect a “big box” appearance and incorporates elements to break up building masses, provide articulation at a human scale, and complement single family uses within the Lompa Ranch North SPA.

2.4.13 Multi-Family Building Mass and Form

a) Facades of multi-family buildings shall be articulated using at least one of the architectural elements previously listed in the Architectural Theme standards.



b) Buildings shall incorporate facade articulation with no long expanses of flat wall planes, vertically or horizontally, exceeding 50 feet (see example to left).

c) Architectural elements (i.e., exterior materials, fenestration, window trims, cornices, arches, etc) shall be utilized on all sides of the building.

d) Architectural elements such as towers, piers and varied rooflines may be used to break up the horizontal massing and provide visual interest.

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- e) Single family attached products such as townhomes that include garages and/or carport are more than 50 percent of the total width of the unit shall incorporate architectural features such as shutters, garage door window trim and minimum offsets of 2 feet, to reduce the visual impact of garages and carports on the front façade.
- f) Garages and carports not attached to the main residential building shall match the main structure in building design, materials, roof pitch and architectural character.

2.4.14 Multi-Family Roof Form

- a) Roofs planes shall include variation which can be accomplished with the inclusion of elements such as dormers, gables, hipped roofs and variations in pitch. (See example to right).
- b) Roof materials shall include concrete tile, clay tile, slate, or architectural grade (30+ year) composition shingles. Metal roofing is prohibited as a primary material but may be used as an accent feature when combined with the allowed materials.



2.4.15 Multi-Family Materials and Colors

- a) As mandated within other provisions of this handbook, multi-family uses shall incorporate an earth tone color palette. The use of bright and vibrant colors is prohibited with the exception of enhancing key architectural elements and features.
- b) Varied elevations may be used within a single project. However, conflicting architectural styles within a single multi-family development shall be prohibited.
- c) Building materials and elements shall be consistent with those outlined under previous standards.

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3 Public Services and Infrastructure

3.1 Parks, Open Space, and Trails

The Lompa Ranch North SPA envisions a community that is linked together through a system of trails, open space, and parks. The intent of these standards is to implement the provisions of the *Unified Pathways Master Plan*; *Parks and Recreation Master Plan*; and *Open Space Master Plan* adopted by Carson City.

3.1.1 General Standards

- a) A Landscape Maintenance District (LMD) shall be formed by the Master Developer to provide for the maintenance and upkeep of open space and common area landscaping, trails, and park/recreation facilities and amenities. The LMD shall be in place prior to the issuance of the first certificate of occupancy.
- b) A private homeowner's association (HOA) shall provide for the maintenance of all private landscape features and non-public recreation facilities (i.e. private parks within gated communities, etc.).
- c) Design of open space areas shall follow the standards and policies of the Carson City Open Space Plan, adopted by Carson City in June 2000.
- d) Pathways and trails, other than those described in Section 3.1.2 (following) shall conform to the standards and policies of the Unified Pathways Master Plan adopted by Carson City on April 6, 2006 (as revised March 15, 2007).
- e) Any new park facilities within the Lompa Ranch North SPA shall conform to the *Parks and Recreation Master Plan* as adopted by Carson City on April 6, 2006.
- f) Sidewalk connections to the Lompa Ranch North SPA trail/pathway system shall be provided in order to provide convenient and logical access to the trail system, parks/recreation areas, and open space.

3.1.2 Trails and Pathways

- a) Trails, pathways, and sidewalks not specifically called out within this section shall conform to the standards outlined in Section 6 of the Carson City Unified Pathways Master Plan (Pathway Types).

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b) As individual subdivisions and/or projects are submitted for review, the applicant/developer shall be required to demonstrate that trail connectivity between parks, trails, open space, and the high school is being provided. This shall be to the satisfaction of the Community Development and Parks, Recreation and Open Space Departments.

c) The trails and pathway system shall be constructed of concrete with a portion of it constructed using stabilized decomposed granite.

3.1.3 West Side Facilities

The following standards apply to properties within Lompa Ranch North that lie west of Interstate 580:

a) Prior to the issuance of the certificate of occupancy for the 750th residential unit west of Interstate 580, the Master Developer shall construct and dedicate to the City a minimum 10-acre neighborhood park site on the west side of the freeway as shown on the adopted land use map. This shall be coordinated through and agreed upon by the Carson City Parks, Recreation and Open Space Department.

b) For the park area west of the freeway, a meandering path (consistent with Unified Pathways Master Plan Standards) shall be constructed along a north/south route, connection 5th Street to the northern boundary of the SPA area. This pathway may follow a proposed drainage channel(s) where feasible and shall meet the guidelines for an “off-street/multi-use trail.” A multi-use path shall connect to the SPA’s park/recreation facilities in this project.

c) A fitness course may be substituted for park benches along the north/south trail. See examples below:



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- d) An east-west off-street multi-use path shall be constructed on the freeway's west side of the Lompa Ranch North SPA along 5th Street and connected to the east side development. Timing of this trail along with final alignment shall be in conjunction with new development and coordinated through the Parks, Recreation, and Open Space Department.
- e) An east-west multi-use path shall connect with the north/south trail, as depicted in the Unified Pathways Master Plan and described in c) and d) above.
- f) For park area west of the freeway, trails, pathways, and sidewalks shall provide off-street connectivity from 5th Street to Carson High School and Robinson Street.

3.1.4 East Side Facilities

The following standards apply to properties within Lompa Ranch North that lie east of Interstate 580:

- a) The Master Developer shall work with the Carson City Parks, Recreation and Open Space Department and provide for a 3-acre minimum neighborhood park site on the east side of Interstate 580 as depicted on the land use plan. The park site shall be constructed and dedicated to the City prior to the issuance of the certificate of occupancy for the 250th residential unit located on the east side of I-580. This shall be coordinated through and agreed upon by the Carson City Parks, Recreation and Open Space Department.
- b) For park area east of the freeway, the north/south trail being constructed by the City shall, at a minimum, include landscaping and pedestrian amenities. Trees (either evergreen or deciduous) shall be planted at a rate of 1 tree per 50 lineal feet with a minimum of 4 shrubs per tree. Park benches shall be located along the trails at a rate of 1 bench per 500 lineal feet of trail along with mileage parkers at one-mile intervals.
- c) The City property (approximately .13 acres) adjacent to the 3-acre minimum neighborhood park site shall be included in the park's design and constructed with the other park amenities.

3.1.5 Open Space

- a) All identified wetland areas within the Lompa Ranch North SPA shall be preserved as dedicated open space.
- b) Drainage channels shall be incorporated into open space areas and include trails/paths as described in section 3.1.2.
- c) Open space areas shall be maintained through a LMD and/or by a private homeowners association(s).
- d) Landscape medians, parkways, corridors, etc. included within common or open space areas shall be maintained by a private homeowners association(s) and/or through the LMD.

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e) Open space areas that remain private shall not include public access (if privately owned) and shall be maintained by a private homeowners association and not through an LMD.

3.1.6 Parks – General Standards

a) Parks within the Lompa Ranch North SPA shall be maintained through implementation of a Landscape Maintenance District. Any private parks (without general public access) shall be maintained by a private homeowners association(s).

b) Opportunities for joint use of park and open space facilities (i.e. stormwater detention basins) shall be a priority within the Lompa Ranch North SPA. This includes the incorporation of one or more dog park facilities.

c) All park facilities and open space areas shall have access to the overall trails/pathways system and sidewalk network within the SPA area.

d) Smaller public parks are discouraged within the SPA in favor of larger community parks. Private small parks or pocket parks may be permitted within individual subdivisions but shall be maintained by a private HOA, not the LMD.

e) Park facilities within Lompa Ranch North will be coordinated with the Carson City Parks, Recreation, and Open Space Department for review and approval as individual projects within the Lompa Ranch North SPA are brought forward.

f) Park design shall be consistent with Carson City Parks, Recreation, and Open Space Department guidelines and design standards, including water conservation design elements.

g) Playgrounds within public parks shall be designed to be universally accessible per design standards adopted by the Carson City Parks, Recreation and Open Space Department.

h) As part of the overall Lompa Ranch North park plan , provisions for a neighborhood “Splash Pad” and/or water play feature shall be included to the approval of the Carson City Parks, Recreation and Open Space Department.

i) New parks shall be designed to allow for automobile access, including City maintenance vehicles and emergency services.

j) The Master Developer, at its cost, will dedicate land and improvements for two neighborhood parks, detention basin parks and trails/pathways within the Project; as a result, the residential construction tax described in Carson City Municipal Code 15.06 – Residential Construction Tax et. seq. will not be collected by Carson City at the time building permits are issued for residential dwellings in the Project.

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3.2 Sanitary Sewer

- a) All new development within the Lompa Ranch North SPA shall be required to connect to municipal sanitary sewer service.

- b) Prior to submittal for the first construction permit, a complete description of all phasing must be submitted. This phasing description must indicate the geographical boundaries of each phase, a description of the proposed development for each phase, and the estimated sewer demand imposed by each phase. A final sewer report demonstrating capacity to serve the development shall be submitted with each individual project within the SPA boundary. Any existing sewer capacity provided to the development shall be on a “first come, first served” basis. There may be additional future infrastructure or costs associated with serving the development depending on build out time frames.

- c) The site has no known constraints which would impact the ability to be served by a gravity fed extension of the public sewer. Existing sewer manholes in the SPA have vents. Any sewer vents located within or near the boundary of a phase must be evaluated as part of the sewer analysis for that phase to prevent odor issues.

- d) An overall water and sewer technical report for each phase shall be submitted to and approved by Carson City prior to submittal for the first construction permit of each phase, to ensure that each project phase is properly sized and designed. The Lompa Ranch North Water and Sewer Demand Report is included as Appendix 5 of this document. Water and sewer technical reports shall include analysis of downstream/offsite capacities. Technical reports shall cite sources of any rate of demand used.

3.3 Water Service

- a) All new development within the Lompa Ranch North SPA shall be required to connect to municipal water service.

- b) Prior to submittal for the first construction permit, a complete description of all phasing must be submitted. This phasing description must indicate the geographical boundaries of each phase, a description of the proposed development for each phase, and the estimated water demand imposed by each phase. All new development shall be required to pay applicable water connection fees and demonstrate that adequate water supply is available to serve the project and dedicated for use. Any existing water capacity provided to the development shall be on a “first come, first served” basis. There may be additional future infrastructure or costs associated with serving the development depending on building out time frames.

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c) Separate irrigation meters will be employed in accordance with the guidelines present at the time of connection.

d) An overall water and sewer technical report for each phase shall be submitted to and approved by Carson City prior to submittal for the first construction permit for each phase, to ensure that each project phase is properly sized and designed. The Lompa Ranch North Water and Sewer Demands Study is included as Appendix 4 of this document. Water and sewer technical reports shall include analysis of downstream/offsite capacities. Technical reports shall cite sources of any rate of demand used.

3.4 Storm Water Management

The Lompa Ranch area benefits from extensive review and policy implementation that has been performed by Carson City as part of their long-range planning and infrastructure management processes. It is a goal of this Specific Plan to adhere to and complement this planning work. Policy *LR-SPA 3.1 Floodplain and Drainage*, from the Carson City Master Plan is therefore included in this document as a means of establishing long-range storm water management planning for Lompa Ranch North. This policy states:

- *The existing floodplain shall be identified based on FEMA mapping with post-freeway drainage improvements for development of the final SPA. In order to develop the property, drainage improvements will be required to mitigate the 100-year floodplain on the property. This may also require amending the FEMA mapping through a letter map amendment process. Once the new floodplain is determined, designated land use intensities shall be developed outside this floodplain area.*
- *An overall storm water management plan shall be developed with the final SPA to ensure adequate drainage facilities to serve the entire SPA area.*
- *A detailed wetlands delineation shall be provided with the final SPA identifying any areas that meet the Federal 404 definition of wetlands. Following wetland identification, designated land use intensities shall be developed outside the wetlands.*

Per the above policy, a wetlands delineation is currently planned for Spring 2016. The completion deadline for this task is June 30, 2016. No development shall occur within the Lompa Ranch North SPA until the wetlands delineation has been completed.

Additional resources for guiding storm water management (and other utilities) are the Conceptual Drainage Study and Stormwater Management Report for Lompa Ranch North (included in Appendix 1). In particular, this report states the following:

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Based on the floodplain analysis, it is recommended that a LOMR be pursued based on the existing topography. The LOMR would remove much of the Lompa Ranch from the burden of delineated floodway both upstream and downstream of the Highway 395. It would establish discharges which could be used for the design of proposed drainage improvements including the design of channels along 5th Street, Saliman Drive, Robinson Road and north of Carson High School. In addition the model could be used for future site development planning and design and would be considered as the effective model for future modeling efforts, specifically those that would be part of a CLOMR for new development.

The existing *Master Plan Policy LR-SPA 3.1* and the *Conceptual Drainage Study and Stormwater Management Report* therefore form part of the standards for the Lompa Ranch North SPA.

The LOMR must be approved by Carson City and submitted to the Federal Emergency Management Agency (FEMA) prior to submittal for the first construction permit. Prior to any construction permit being issued, the development must have a conditional letter of map revision (CLOMR) approved by Carson City and FEMA. If the property is divided and sold to different owners, each separate development in the floodplain must have a CLOMR approved by FEMA prior to any construction permit being issued. The developer of any parcel in the flood plain, prior to any construction permit being issued, must provide funds to the City to process a Letter of Map Revision (LOMR) after the improvements are complete.

Additional standards include:

- a) The primary channels provided along Robinson Street, Saliman Road, Interstate 580, and 5th Street shall be designed to contain the existing off-site watershed discharges as well as the existing discharges from the SPA area.
- b) Onsite retention and detention facilities are required within the development of multi-family and commercial parcels.
- c) Existing drainage patterns shall be maintained.
- d) A comprehensive drainage impact analysis for the overall Lompa Ranch North SPA shall be reviewed and approved with the first tentative map and/or permit request. The analysis shall provide estimates of project impacts at buildout along with required upgrades, improvements, etc. as well as with triggers for when these improvements are required.
- e) Updates to the master drainage analysis shall be provided for any project proposing multi-family or commercial uses.
- f) Prior to submittal for the first construction permit, a complete description of all phasing must be submitted. This phasing description must indicate the geographical boundaries of each phase, a description of the proposed development for each phase, and the estimated stormwater runoff imposed by each phase.

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g) The development shall implement Low Impact Development (LID) Standards to include the *Truckee Meadows Low Impact Development Standards Handbook*, current edition, or current LID standards adopted by Carson City.

Appendix 1 contains the Conceptual Drainage Study and Stormwater Management Report for Lompa Ranch North.

3.5 Utility Services

a) All utility services within the Lompa Ranch North SPA shall be undergrounded. Overhead power lines shall be prohibited.

b) Plans for electrical, natural gas, telephone, and cable service shall be reviewed and approved by the applicable purveyor (i.e. NV Energy, Southwest Gas, AT&T, etc) prior to the issuance of a building permit.

3.6 Roadways

A traffic impact study has been completed for Lompa Ranch North (included in Appendix 2). This study includes recommended roadway improvements that mitigate the projected impacts. These roadway improvements are included below under their relevant heading.

a) All roadways within the Lompa Ranch North SPA shall comply with the standards and requirements included within the Carson City Municipal Code. This includes the provision of sidewalks where appropriate. All sidewalks in the Lompa Ranch North SPA shall be designed to provide connectivity to multi-use paths, parks, and open space.

b) Prior to submittal for the first construction permit, a complete description of all phasing must be submitted. This phasing description must indicate the geographical boundaries of each phase, a description of the proposed development for each phase, and the estimated traffic impact imposed by each phase.

c) An easement agreement or right of way must be in place prior to approval of any construction permits which are part of a phase which requires roadway improvements which will need additional right-of-way to be completed.

d) Each phase will require a traffic impact study to be completed and submitted for that phase prior to approval of any construction permits in that phase. The traffic study for Phase 1 will require coordination with the School District to mitigate impacts along Robinson Street.

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3.6.1 Saliman Road

a) Consistent with the conclusions/recommendations outlined in the traffic impact analysis (Appendix 2), add northbound dual lefts at E. William/Saliman intersection, and add northbound right turn lane at 5th Street. Include drainage improvements. Channel section to include open space for multi-use path.

3.6.2 Robinson Street

a) Robinson Street shall be improved to collector standards established by the Carson City Municipal Code. Robinson Street should be extended to intersect with a new north-south “spine road” within the project area and as shown in Exhibit 2. Robinson Street can be constructed with one through lane in each direction. Include drainage improvements. Channel section to include open space for multi-use path.

b) Consistent with the conclusions/recommendations outlined in the traffic impact analysis (Appendix 2), add westbound right turn lane at Saliman Road, and widen Robinson Street to accept dual left turn lanes from Saliman Road.

3.6.3 Fifth Street

a) Fifth Street shall include new drainage improvements to address site development conditions to the satisfaction of the Carson City Engineering and Public Works Departments.

b) Consistent with the conclusions/recommendations outlined in the traffic impact analysis (Appendix 2), add an intersection where the new Spine Road will meet 5th Street with an eastbound left turn lane, westbound right turn lane, southbound exclusive left and right turn lanes, and signalization (signalization only if warranted). Widen 5th Street at this intersection to accommodate turn lanes. Also, add a westbound right turn lane at Airport Road. Add a westbound right turn lane at Saliman Road, which may already be warranted without the project.

3.6.4 Airport Road

a) Right-turn lanes will be added along Airport Road based on the recommendations included in the reviewed and approved traffic impact analysis. The Carson City Engineering Department shall determine compliance with this standard.

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b) US 50/Airport – Consistent with the conclusions/recommendations outlined in the traffic impact analysis (Appendix 2), Provide northbound dual left turn lanes.

3.6.5 North/South Collector (Spine Road)

a) A collector roadway (Spine Road) shall be constructed from 5th Street extending north to US Highway 50. This road shall be designed as a limited access collector (per City standard) and include additional space for a multi-use path and landscaping, separated from vehicular traffic. The Spine Road can be constructed with one through lane in each direction. For Phase 1, the spine road may need to extend north of the Robinson Street extension.

b) US 50/Gold Dust Casino – Consistent with the conclusions/recommendations outlined in the traffic impact analysis (Appendix 2), add a northbound right turn lane and widen the south leg to accept a new left turn lane from westbound E. William Street. The south leg will continue to connect with the proposed north-south spine road.

c) Consistent with the conclusions/recommendations outlined in the traffic impact analysis (Appendix 2), a new three- to four-leg intersection at Robinson Street/Spine Road should be constructed to provide a north leg at this intersection. This north leg is proposed to continue to its connection with the south leg of the William Street/Casino intersection. This will require widening the existing south leg of this intersection to a standard two to three lane cross section.

d) The preferred northern intersection of the spine road is at the existing signalized intersection on William Street serving access to the Gold Dust Casino. The south leg of this intersection should be widened to accommodate a potential additional westbound to southbound left turn lane at this intersection. The spine road is anticipated to carry approximately 12,000 vehicles per day at Build Out. This volume approaches the threshold for a four-lane roadway. Further analysis and continuing discussions with the property owners south of William Road will be required.

3.6.6 U.S. 50/E. William Street

a) Consistent with the conclusions/recommendations outlined in the traffic impact analysis (Appendix 2), add westbound dual left turn lanes at the new Spine Road.

3.7 Traffic Impacts

a) A generic traffic impact analysis for the overall Lompa Ranch North SPA has been reviewed and accepted with this Specific Plan. This analysis provides estimates of the project impacts at buildout along with required upgrades, improvements, etc. Additional traffic impact studies will be required for each phase of development prior to approval of any construction permits which are part of that phase.

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b) Updates to the master traffic impact analysis shall be provided for any project generating more than 80 peak hour trips to determine if roadway upgrades/improvements are triggered. Such updates shall also address long-term cumulative impacts from the site as a whole so that appropriate refinements may be made to any mitigation measures.

Appendix 2 contains the Traffic Impact Study for Lompa Ranch North.

3.8 Fire Protection

The Carson City Fire Department currently services the Lompa Ranch North area from Fire Station # 1 located on Stewart Street. As development occurs within the Specific Plan boundary and surrounding area(s), an additional facility and/or equipment may be needed in order to ensure adequate levels of service for new development. As such, the following standards are included within this SPA:

a) As individual projects and subdivisions are submitted, the Carson City Fire Department shall review development plans in context with existing service limitations to ensure adequate levels of service are maintained.

b) The Carson City Fire Department has the ability to condition projects to ensure adequate levels of service are maintained for Lompa Ranch North. Such conditions include requiring fire sprinklers for new homes if response times are below accepted levels, inclusion of fire resistant building materials, requiring upgrades to existing equipment or purchase of new equipment, etc.

c) In order to assist in funding new fire facilities within the area (i.e. fire station), individual builders within Lompa Ranch North shall work with the Carson City Fire Department to participate in a program implemented by Carson City which provides funds (to be paid at time of building permit) that are dedicated to fire improvements. In the absence of a current City-wide impact fee program, fees shall be as follows for Lompa Ranch North: a minimum of \$1,000.00 per dwelling unit in single family or multi-family residential development. Also, a minimum fee of \$1,000.00 per 1,000 square feet of business, industrial, commercial or lodging facilities. The Board of Supervisors reserves the right to use this fee to offset the cost to the City of other facilities that is incurred as a result of the impacts of the proposed development.

d) In lieu of and as an alternative to the fire fee, it may be possible for individual builders within Lompa Ranch North to work with the Carson City Fire Department to determine if other mitigation measures may be available. Such measures could include, but are not limited to, providing improvements such as paving, utility extensions, etc. along with construction of new facilities, etc. These improvements shall be credited

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back to any applicable fire fee. This shall be reviewed on a case by case basis dependent on current Fire Department needs and demands.

e) New development within Lompa Ranch North shall participate in any applicable impact fee program that is enacted by Carson City. This SPA shall not exempt development from any impact fee program adopted post-approval of this SPA.

3.9 Police Protection

The Carson City Sheriff's Department currently operates patrols in the area. The following standards related to police protection are provided for the Lompa Ranch North SPA:

a) All new projects submitted for review by Carson City shall be routed through the Sheriff's Department for review and comment.

b) The Sheriff's Department shall reserve to the right to condition projects in order to implement and or incorporate crime prevention measures, etc.

c) New commercial projects within Lompa Ranch North shall be required to submit a lighting and security plan to the Sheriff's Department for review and approval.

3.10 Schools

The following standards have been developed in conjunction with the Carson City School District:

a) A new elementary school site (minimum of 10 acres) shall be reserved within Lompa Ranch North to meet future enrollments needs.

b) The elementary school site shall be made available prior to the issuance of the 700th residential certificate of occupancy.

c) Generally, the 10-acre elementary school site should be located on the west side of Interstate 580, central to the project site near the current terminus of Robinson Street.

c) All residential development within the Lompa Ranch North SPA shall be required to provide estimated

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student enrollment projections to the Carson City School District for review.

d) The Master Developer of the Lompa Ranch North SPA shall work with the School District to participate in the current (2016) School Facilities Master Plan Update process to ensure that needs identified within the SPA boundary are addressed.

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Chapter 4 – Phasing Plan

4.1 Parks, Open Space, and Trails

4.1.1 Trails and Pathways

The trails within Lompa Ranch North are part of a network of trails and sidewalks throughout the community consistent with the Appendix 2.2, “Unified Pathways Master Plan” as well as the Lompa Ranch SPA. The trails and pathways are depicted in Appendix 2.1, “Lompa Ranch North SPA - Trail Phasing Plan”. The Phasing Plan shall ensure that as each respective project phase is developed, non-vehicular connectivity to existing and proposed internal and regional components of the area are maintained and there is continued walkability within the community to commercial, recreational, employment and public activities.

All multi-use paths will be design and constructed to a 10-foot wide (minimum) AASHTO standard concrete “off-street/paved/shared” multi-use path with an adjacent 3-foot wide decomposed granite path. The multi-use paths will include landscaping with a variety of the trees (either evergreen or deciduous) that will be planted at a rate of 1 tree per 50 lineal feet (tree groupings are acceptable with a minimum of 4 shrubs per tree). Path amenities include but are not limited to park benches/seating area (per 1000 lineal feet of trail along the path), pet waste stations/trash cans, signage depicting direction and trail distance.

The Developer shall enter into a Developer Agreement with Carson City (the “Developer Agreement”). This agreement will include terms and conditions for the funding of the design, construction and dedication of park, recreation and path facilities within the Lompa Ranch North SPA. The agreement will outline Carson City’s process of the Residential Construction Tax (“RCT”) compliant with Carson City Municipal Code (“CCMC”) 15.60. The Developer Agreement must be considered and approved by the Board of Supervisors prior to recording the Final Map.

4.1.1.1 Phased Trails and Pathways Installation and Triggers.

Reference Appendix X, “Trails, Paths and Parks - Triggers” for a matrix of proposed geographical areas and unit count/triggers for planning and construction of trails and paths.

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4.1.1.1.1 Trail and Pathway A, “North/South Trail”.

A path shall be constructed along the spine road, north/south route connecting 5th St to the northern boundary of the Lompa Ranch SPA. The trail shall be consistent with the “off-street/paved/shared” Unified Pathways Master Plan design parameters and connect to the park and recreational facilities of the community. The spine road shall be constructed as full street improvements, to Carson City standards and engineering requirements, including the construction of “on-street bike lanes” and concrete “off-street/shared/paved” multi-use paths. The path along the spine road will be constructed on the road’s east side. If the right-of-way is acquired for Gold Dust Way, the “off-street/shared/paved” multiuse path shall taper down, connect to the existing sidewalk and provide pedestrian connectivity to William St from the spine road.

Trigger. Construction of the North/South Trail shall be concurrent with roadway construction. Pursuant to the aforementioned provision, when the park is constructed, connectivity shall be provided with each development.

4.1.1.1.2 Trail and Pathway B, “5th St Trail”.

A trail consistent with the “off-street/paved/shared” Unified Pathways Master Plan design parameters shall be constructed along 5th St, east of Lompa Ranch Blvd and connected to the existing “off-street/paved/multi-use” trail just west of Interstate 580. Via the proposed 5th St Trail, there shall be connectivity from the 10-acre community park on the west side to the 3- acre east side community park on the east side. The 5th St Trail shall also connect to the North/South Trail. The developer shall obtain encroachment permits from the Nevada Department of Transportation that includes an easement to the City for a public access.

Trigger. Construction of the 5th St Trail shall be in concurrent with improvements along 5th Street, scheduled to occur at the time the spine road is connected to 5th Street.

4.1.1.1.3 Trail and Pathway C, “Robinson Street Trail”.

A trail consistent with the “off-street/paved/shared” Unified Pathways Master Plan design parameters shall be constructed along the Robinson Street Alignment in accordance, west of Lompa Ranch Blvd with connectivity to the park situated on the west side of Interstate 580. Robinson Street shall be constructed as full street improvements, to Carson City standards and engineering requirements, including the construction of “on-street bike lanes” and concrete “off-street/shared/paved” multi-use paths. The path along Robinson Street will be constructed on the road’s south side.

Trigger. Construction of the Robinson St Trail shall be in conjunction with road construction. The Robinson Street Trail as depicted herein shall provide the east-west connectivity west of Interstate 580 in lieu of the trail shown approximately 500 feet north of on the Unified Pathways Master Plan

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4.1.1.2 On-Going Measures to Assess if Phased Development Provides Trails and Pathways Consistent with the Lompa Ranch SPA and Unified Pathways Master Plan.

As the development's phases are implemented, the plans will be submitted for review by Carson City. The applicant shall be required to demonstrate pedestrian connectivity between the neighborhood parks, "off-street/paved/shared" multi-use paths and sidewalks. This shall be done to the satisfaction of the Parks, Recreation and Open Space Department.

All "off-street/paved/shared" multi-use paths and sidewalks will conform to the standards and policies outlined in the Carson City Unified Pathways Master Plan adopted April 6, 2006 (as revised March 15, 2007) and as amended in the future. There will be adequate pedestrian connectivity, throughout the development that provides convenient and logical access to the neighborhood parks and paths and enhances the overall sidewalk network within the development.

4.1.3 Parks

Lompa Ranch SPA provides for future park facilities consistent with Carson City parks and recreation master plan element. Areas designated for proposed parks are shown in Appendix 1.2, "Lompa Ranch North SPA - Development and Infrastructure Phasing Plan" and Appendix 1.3, "Lompa Ranch North SPA - Concept Plan". The Phasing Plan and directives below ensure park and recreations facilities are planned and designed within parameters which are safe, are of a lasting quality, creates an enjoyable environment and provides for ease of maintenance.

4.1.3.1 Phased Park Installation and Triggers.

Prior to the issuance of the building permit for the 750th residential unit on the west side of Interstate 580, a minimum 10-acre community park as shown in Appendix 1.2 and 1.3 shall be constructed, accepted and land dedicated to Carson City. Furthermore, prior to the issuance of the building permit for the 250th residential unit on the east side of Interstate 580, a minimum 3-acre neighborhood park as shown in Appendix 1.2 and 1.3 shall be constructed, accepted and land dedicated to Carson City.

4.1.3.1.1 Design, Construction and Dedication of a Park in Lieu of Collection Residential Construction Tax.

The applicant will enter into a Developer Agreement with Carson City. This agreement will include terms and conditions for the funding of the design, construction, and dedication of park, recreation and path facilities within the Lompa Ranch North Specific Plan area. The agreement will outline the City's process for the collection and distribution of Residential Construction Tax (RCT) compliant with CCMC 15.60. This agreement must be considered and approved by the Board of Supervisors prior to recording the Final Map.

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4.1.3.1.2 10 Acre Park (West).

Reference Appendix 2.3 for a matrix of triggers and unit counts that shall dictate construction of the park between Phase B1 and B2. Planning for the park will commence with the completion of a conceptual site plan no later the issuance of the certificate of occupancy for the 400th residential unit. The planning process and public meetings shall be coordinated through and agreed upon by the Carson City Parks, Recreation and Open Space Department.

The Developer, at its expense, will design the park. The design will incorporate a universally accessible playground, compliant with the Americans with Disability Act, and be consistent with the department's guidelines and development standards, including water conservation design elements. The design process will be coordinated with the Parks, Recreation and Open Space Department and include consideration by the Carson City Parks and Recreation Commission. The Developer will provide safe pedestrian crossing from the 10-acre community park to the "off-street/paved/shared" multi-use trails on the south side of Robinson St. at the time the roundabout is constructed. The "off-street/paved/shared" multi-use trail on the south side of Robinson St and the east side of the spine road shall also provide safe pedestrian crossing to the elementary school site, assuring connectivity throughout the development.

At the expense of the developer, the park will be constructed, accepted, and the land dedicated to the City prior to the issuance of the certificate of occupancy for the 750th residential unit on the west side on Interstate 580. Upon successful completion, final project acceptance of said work will be done to the satisfaction of the City, through its Parks, Recreation and Open Space Department.

4.1.3.1.3 3 Acre Park (East).

Reference Appendix 2.3 for a matrix of triggers and unit counts that shall dictate construction of the park between Phase D1 and D2. Planning for the park will commence with the completion of a conceptual site plan no later the issuance of the certificate of occupancy for the 100th residential unit subject to review, approval and execution of agreed upon terms and conditions memorialized in the Developer Agreement. The planning process and public meetings shall be coordinated through and agreed upon by the Carson City Parks, Recreation and Open Space Department.

The Developer, at its expense, will design the park. The design will incorporate a universally accessible playground, compliant with the Americans with Disability Act, and be consistent with the department's guidelines and development standards, including water conservation design elements. The design process will be coordinated with the Parks, Recreation and Open Space Department and include consideration by the Carson City Parks and Recreation Commission.

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At the expense of the developer, the park will be constructed, accepted, and the land dedicated to the City prior to the issuance of the certificate of occupancy for the 250th residential unit on the east side on Interstate 580. Upon successful completion, final project acceptance of said work will be done to the satisfaction of the City, through its Parks, Recreation and Open Space Department.

Triggers for Shared-Use Trail Along Robinson Street and Spine Road. Reference Appendix 2.3 for a matrix of triggers and unit counts that addresses the timing for the construction of the “off-site/shared/paved” multi-use trail along Robinson St and Lompa Ranch Rd.

4.1.3.2 On-Going Measures to Assess if Phased Development Provides Recreational Facilities Consistent with the Lompa Ranch SPA and Goals of the Parks and Recreation Department.

Proposed park facilities shall be coordinated through, encourage community input and agreed upon as well as approved by the Parks and Recreation Department. Park facilities shall have access to the overall trail and pathway network within the SPA area. Park design shall be consistent with Carson City Parks and Recreation Department guidelines and standards, including water conservation design elements.

4.1.3.2.1 Operation and Maintenance of Park, Recreation and Path Facilities.

A private Home Owner's Association (HOA) or similar instrument will be established for the Lompa Ranch North Specific Plan area to provide for the operations and maintenance of all park, recreation and path facilities. Operation and maintenance standards for these facilities will be established by the City. The operation and maintenance standards will include policies regarding replacement and repair of equipment and facilities. The applicant will draft an Operations and Maintenance agreement for the Board of Supervisor's consideration and approval no later than issuance of the building permit for the 200th residential unit for the east side and 650 for the west side.

4.1.3.2.2 Maintenance of Common Areas.

A private HOA or similar instrument will be formed to provide 100% funding and maintenance for all the following areas in perpetuity: Common landscape and open space areas, buffer areas between the development and neighborhoods, landscaping associated with the development's path system, landscape medians, street corridors, non-public recreation facilities/amenities, detention basins, and drainage channels. The maintenance and funding shall be addressed in the developer agreement to the satisfaction of the Board of Supervisors. Common area maintenance shall include at a minimum, but not limited to the following:

- Debris, Weed and Litter Removal
- Noxious and Invasive Weed Management, Including Fire Prevention
- Care and Replacement of Plant Material
- Plant Material Irrigation and Irrigation System Repair

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Additionally, a recorded covenant or deed restriction will be placed on all properties within the Lompa Ranch SPA to ensure maintenance of these amenities is funded in perpetuity. The restrictions will provide that should HOA ever cease to exist or becomes inactive; an assessment will then be implemented by the City via a Landscape Maintenance District (LMD) per the Carson City Municipal Code at the time of initiation to provide for the maintenance and upkeep of the public improvements.

4.2 Sanitary Sewer

The forecasted wastewater demand pursuant to land uses shown in Appendix 1.3, “Lompa Ranch North SPA - Concept Plan”. A schematic layout for the sanitary sewer system main lines within the proposed collector and arterial roadway network is depicted in Appendix 1.2, “Lompa Ranch North SPA - Development and Infrastructure Phasing Plan” and Appendix 3.1, “Lompa Ranch North SPA - Sanitary Sewer and Water System Phasing Plan”. The Phasing Plan has been provided to ensure that for each respective phase of development, sanitary sewer mains shall be installed, and oversized for capacity to service the community full build-out. Hence, mitigating unnecessary upgrade of installed infrastructure as each respective phase of development is completed. Pursuant to the requirements of the Lompa Ranch SPA, a description and boundary of each phase as well as the estimated wastewater demand for each phase is provided as Appendix 3.2, “Lompa Ranch Phasing Plan – Estimated Wastewater Demand”.

4.2.1 Phased Sewer Service Installation and Triggers.

Public sanitary sewers shall be installed along the full frontage(s) of all sides of the project phase adjacent to the public right-of-way as schematically shown in Appendix 3.1, “Lompa Ranch North - Sanitary Sewer and Water System Phasing Plan”. Sewers shall be sized in accordance with ultimate hydraulic requirements of the project phase and capacity required at full build-out of the Specific Plan Area. The wastewater demand, sanitary sewer pipe sizing installation and analyses is further detailed in the “Sanitary Sewer Feasibility Master Study – Lompa Ranch North SPA”, included as Appendix 3.4.

4.2.1.1 Sanitary Sewer Main Data.

A concept sanitary sewer master plan has been provided as Appendix 3.3, “Sanitary Sewer Phasing Plan Matrix – Triggers, POCs and Rim/Invert Elevation”. The Sewer Feasibility Study established wastewater demands pursuant to proposed land use designations and density.

Appendix 3.1 and 3.3 have incorporated the following data in the plan and matrix:

- Point-of-Connection (“POC”)
- Size of Proposed Sewer Mains
- Invert Elevation, Rim Elevation and Depth of Cover at Proposed POCs
- Sanitary Sewer Main Slopes

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4.2.1.2 Additional Sewer Requirements.

Cast in place manholes will not be allowed, regardless of depth of new sewer mains. Riser depths must meet Carson City Standard Details. To accommodate minimum standards, precast manholes with 8" pipes shall be at least 4'-4" from finish grade to invert.

4.2.1.3 On-Going Measures to Assess if Phased Development Provides Sanitary Sewer Infrastructure Adequate for Full Build-Out of the Community.

Beyond the general schematic, Appendix 3.1 provided in the Phasing Plan, the Master Utility Study shall be updated as required pursuant to further utility analyses for each respective development to assure that the proposed demand and infrastructure shall adequately service the future full build-out, as well as validate the adequacy of downstream facilities.

4.3 WATER

A schematic water main system layout within the proposed collector and arterial roadway network is shown in Appendix 1.2, "Lompa Ranch North SPA - Development and Infrastructure Phasing Plan" and Appendix 1.3, "Lompa Ranch North SPA - Sanitary Sewer and Water System Phasing Plan". The Phasing Plan has been provided to ensure that for each respective phase of development, maximum day, peak hour and maximum day plus fire flow pressures shall be provided to service the proposed phase as well as full buildout of the project. Pursuant to the requirements of the Lompa Ranch SPA, a description and boundary of each phase as well as the estimated water demand for each phase is provided as Appendix 4.3, "Lompa Ranch Phasing Plan Estimated Water Demand". The water demand, conceptual layout, pipe sizing and water network analysis is further detailed in the "Water Feasibility Master Study – Lompa Ranch North SPA", included as Appendix 4.4.

4.3.1 Phased Water Service Installation and Triggers.

Each development shall provide water along full frontage(s) of each respective property pursuant to Appendix 4.1, "Lompa Ranch North SPA – Sanitary Sewer and Water System Phasing Plan", as well as a stub for future connection to service the adjacent property. Water mains shall be sized in accordance with ultimate hydraulic requirements of the project phase and capacity required at full build-out. The domestic water and fire flow demand, water main sizing and analyses are detailed in the Master Utility Study, incorporated herein as a reference for phased utility infrastructure.

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4.3.2 Dual Water Connections (Each Phase) for a Looped System.

The overall utility plan, Appendix 4.1 and Appendix 4.3, “Water Phasing Plan Matrix – Triggers and POCs” designates 2 connection points for each geographical phase. The matrix provides the following:

- Connection Designated as Existing or Proposed Watermain
- Size of Existing and/or Proposed Water Main Connection
- Location of Water Main (i.e. Alignment in Right-of-Way or Easement)
- Designation of 2 Connection Points for Each Phase
- A Revised Alignment and Connection Point to the North (Williams Street)
- Any Previously Proposed Parallel Water Mains are Shown as One Single Water Main and Looping Maintained

4.3.3 Designation of 3 Connection Points to Existing 24” Water Main. Reference Appendix 4.4.

Pursuant to Doc #414955, the concept utility plan and map provided is limited to only 3 taps total to the existing 24” water main traversing the property (east west). One tap from Phase A1 (west of Interstate 580), a second tap on Lompa Ranch Blvd near the intersection of Robinson Road and Lompa Ranch Blvd (west of I-580) and a third tap on Phase D3 (east of Interstate 580).

4.3.4 Services off a Water Main.

No water main shall have more than 15 services without looping. Any single phase on a water main must have looping.

4.3.5 Water Sampling Stations

Water sampling hydrants will be installed in locations determined by Carson City Public Works. Locations will be identified at the time of construction plan review

4.3.6 On-Going Measures to Assess if Phase Development Provides Domestic and Fire Waterline Infrastructure Adequate for Full Build-Out of the Community.

If the property is to be developed in phases, it is necessary to demonstrate that each phase of construction meets the minimum pressure requirements; otherwise additional looping and/or increased pipe sizes may be required. Each development shall require a utility analysis to assure that the proposed demand and infrastructure shall adequately service the project as well as assure that the downstream facilities are adequate to for the study.

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4.4 Storm Water Management

Reference Appendix 5.1, “Lompa Ranch North SPA - Storm Water Management (Open Channels)”. The channels have been incorporated to Appendix 1.2, “Lompa Ranch North SPA - Development and Infrastructure Phasing Plan”. The open channels have been designed to accommodate the existing off-site storm water discharge as well as on-site storm water pursuant to the ultimate developed condition at the full build-out of project. Pursuant to the requirements of the Lompa Ranch SPA, a complete description of all phasing, geographical boundaries of each phase, a description of the proposed development for each phase, and the estimated storm water runoff imposed by each phase is further detailed in Appendix 5.2, “Drainage Study Master Plan – Lompa Ranch North Specific Plan Area (SPA)”, Kimley Horn and Associates, March 1, 2017 (Version 2).

4.4.1 Drainage Improvements Phasing and Triggers.

Proposed open channel drainage facility improvements on Robinson Street or Ash Canyon Channel (ACC), Saliman Road and 5th Street or King’s Canyon Channel (KCC) and Vicee Canyon Channel (VCC) have been designed to accommodate off-site storm water flows from the 100- year storm event. Reference Appendix 5.1. The drainage facilities in Appendix 5.1 will be installed with development of the first phase of the project as presented in Appendix 1.2, “Lompa Ranch North SPA - Development and Infrastructure Phasing Plan”. Channelized flows will create concentrated discharge conditions that will also require transitional drainage facilities to assure existing drainage patterns and flow velocities for downstream tributary properties are not altered by the open channels constructed with the first phase of development. The multi-family and commercial phases of the development will include the design of detention ponds to detain post-development peak flows to pre-development levels for the 100-year storm event.

4.4.1.1 Open Channel Drainage Facilities.

Open channels shall meet the following criteria:

- 4.4.1.1.1** Provide sufficient access for Carson City maintenance equipment along the full length, with access points space out no more than every 660 feet. Robinson St, Lompa Ranch Blvd, East 5th St and North Saliman Rd are not to be considered part of this access.
- 4.4.1.1.2** All flood channels and associated access must be on separate parcels to be dedicated to Carson City. Maintenance of these lands to be funded through a maintenance district or similar instrument, to be established prior to Final Map approval.
- 4.4.1.1.3** Any crossings of open channels shall meet a 100-year flow capacity plus 18-inches of freeboard and must be a clear opening, no multi-barrel pipes.

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- 4.4.1.1.4** The minimum clear space between the top edge of ACC and the 24-inch water main is to be 10-feet.
- 4.4.1.1.5** KCC shall be designed such that the drainage and/or any water rights associated with parcels 010-041-34 and 010-041-035 are not adversely affected.
- 4.4.1.1.6** The KCC, ACC, and VCC channels are to be installed with the first development permit that is issued. There are no drainage channels proposed along the frontage of any development phases. A new Saliman Rd channel is proposed to collect runoff that is not contained with Saliman Rd and convey it down to the KCC. The ACC will also have a transition section at the beginning of the channel to capture flow that has overtopped Saliman Rd.
- 4.4.1.1.7** The irrigation diversion structure on the north side of E 5th St must be shown in the improvement plans and referenced in the technical drainage study for the subdivision.
- 4.4.1.2** The flood conveyance channels necessary for the CLOMR must be built with the first subdivision. A sedimentation basin must be constructed as part of these improvements at the 90-degree turn of the Vicee channel.
- 4.4.1.3 LID and Water Quality Facilities.**

The proposed development will utilize several Low Impact Development (“LID”) practices to reduce the volume of storm water runoff and treat the runoff close to its source. The fill placed on-site will include top soil material that will provide infiltration and storage for storm water to promote infiltration and reduce runoff quantities. The vegetated swales will be designed where runoff leaves the roadway and is conveyed to the flood control channels. For example, a 20-foot wide by 100-foot long vegetated swale will be designed in the Phase A1, the 44.5 acre TM area at the end of the cul-de-sac where on-site drainage discharges from the south portion of the subdivision into the KCC. A similar swale will be designed near the Robinson Rd entrance before discharging into the ACC. Where practical, vegetated buffer strips will filter storm water runoff that flows directly into the flood control channel and swales. LID measures shall meet the Truckee Meadows Low Impact Development Manual design requirements. Multifamily residential and non-residential developments will be required to utilize LID design in managing stormwater.

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4.4.1.4 Analysis to Validate Adequate Downstream Conditions (if Detention is not Required).

This analysis was completed and is included in the Drainage Master Plan. Runoff hydrograph from off-site drainage was estimated using the FLO-2D model previously prepared for the Southeast Carson Flood Study by Kimley-Horn and Associates. This model was used because the effective FEMA model only provides peak flows. Hydrographs for the 100-year storm from King’s Canyon, Ash Canyon, and Vicee Canyon Creeks were input into the SWMM5 model used for the Drainage Master Plan. Due to the large upstream drainage area, the peak flow from the upstream watershed arrives hours after the peak flow leaving the site (See AO1, AO2, and AO3 on Figure 5 in the Drainage Master Plan).

4.4.1.4 Base Flood Elevation and Proposed Structures.

All structures must meet the Flood Protection Ordinance where the lowest floor is 2-feet above the base flood elevation of the FEMA 1% chance flood or the onsite 1% chance flood, whichever is higher.

4.4.1.5 Floodplain Storage Capacity Protection Requirements.

Drainage studies for all development phases shall demonstrate compliance with Floodplain Storage Capacity Protection requirements of CCMC 12.09.080 (9). The roadway network on the south side of the D Phases, reference Appendix 1.2, “Lompa Ranch North SPA - Development and Infrastructure Phasing Plan”, shall be designed to accommodate flood plain as necessary.

4.4.1.6 Funds for Processing the Letter of Map Revision (“LOMR”).

Prior to issuing any development permit in the floodplain, or approving a final map, the developer will provide funds to Carson City for processing the LOMR.

4.4.1.7 Emergency Flow Paths for the 100-Year Peak Storm.

All development phases shall provide emergency flow paths for a 100-year peak storm in accordance with development standards. Figure 13 in Appendix 5.2 shows the proposed 100-year floodplain delineation with flow directions, validating that the 100-year flow path will stay clear, free of draining and will not impact any structures.

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4.4.2 On-Going Measures to Assess if Drainage Facility Improvements are Compliant w/ Carson City Master Drainage Plan and Criteria.

The proposed improvements in Appendix 5.1 shall be designed and constructed pursuant to the comprehensive drainage impact analysis prepared for the project, the Master Drainage Study. Further continued assessment to the Master Drainage Study, concept and technical drainage studies and/or improvement plans will be required to assure first and foremost any phased development will not adversely impact the downstream properties. The primary intent is to promote and protect the health, safety and welfare of the community. Second, adequate drainage systems shall be provided pursuant to full build-out of the property to mitigate unnecessary upgrade of drainage facilities constructed with phased development with future development. And lastly, transitional storm water management facilities for each respective phase of development shall be designed, reviewed and approved to assure that existing storm water flows or drainage patterns of downstream properties are not altered as a result of phased development

4.5 TRAFFIC IMPACTS

Current and forecasted future traffic volumes and distribution patterns have been assessed to determine interim and future build-out requirements for Lompa Ranch. The Phasing Plan will ensure that as development is phased, there is consideration for strategically constructing roadway and traffic improvements to promote public welfare and safety adequate for interim development and mitigate unnecessary upgrade of traffic improvements not planned for full build-out of the community.

4.5.1 Traffic Improvement Phasing and Triggers.

Proposed phasing of full build-out traffic improvements are enumerated and referenced in Appendix 6.1, "Lompa Ranch North SPA - Traffic Phasing Plan". A schedule of 2030 full build-out improvements is provided in Appendix 6.2, "Traffic Impact Study for Lompa Ranch West Build-Out", Traffic Works, March 9, 2017 (Update).

4.5.1.1 Geometric Improvements and Traffic Signal Optimization.

An update to the Master Traffic Study was provided, as required by Carson City, to determine the need for traffic improvements to maintain acceptable and safe traffic operations of the roadway system within and around the vicinity of the Lompa Ranch West project. Reference Appendix 6.2. Each project within the Master Traffic Study shall be responsible for providing safe roadway and pedestrian access to the project and frontage improvements. All roadway improvements shall conform to the latest editions of the Manual on Uniform Traffic Control Devices (MUTCD), the AASHTO publication A Policy on Geometric Design of Highways and Streets and Carson City standards. Geometric improvements and traffic signal optimization recommendations have been provided pursuant to the Master Traffic Study update, dated March 9, 2017. The triggers have been determined from traffic analysis such as sight visibility, queueing, left & right turn storage, delay (Level-Of-Service), signal warrant, school walking route, emergency response time, intersection capacity, and other analysis such as signal timing optimization.

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4.5.2 Gold Dust West Way Connection Alternative.

The developer is actively seeking the Gold Dust West Way connection and believes that the required right of-way for this connection will be obtained. In case this connection or a substitute connection cannot be made, no more than 810 single family residential unit building permits (or permits for the equivalent trip generation) shall be issued in the Specific Plan Area west of Highway 580. Without the Gold Dust West Way connection, the William St/Saliman Rd intersection can accommodate approximately 65% of the total projected traffic, without requiring any improvements. Reference Appendix 6.2.

4.5.3 Interim and Final Improvements Triggers.

Reference Appendix 6.2, "Traffic Impact Study for Lompa Ranch West Buildout", depicting triggers for interim and final improvements:

4.5.3.1 Robinson St and Spine road.

A new roundabout intersection should be installed with Phase B1 or B2 or with the Park construction. (There is no interim improvement needed for this intersection.)

4.5.3.2 5th St and Spine road.

All the improvements at 5th St/Spine road intersection specified in the Traffic Impact Study report (exclusive outbound left and right-turn lanes from Spine road, and exclusive inbound left and right-turn lanes on 5th St) will not be needed until the construction of Phase B2, (but not more than 810 housing units). There are no interim improvements at this location because this connection is not needed until Phase B2. The Side Street STOP Controlled intersection with turn lanes is adequate for all project phases north of 5th St. Other improvements will be considered with the development south of 5th St and would be constructed with that project. The developer must coordinate with the Nevada Department of Transportation regarding construction of the 5th Street / Spine road intersection as appropriate. Sufficient right-of-way must be provided to accommodate a roundabout and a signal at the 5th Street / Spine road intersection. Pursuant to this dedication of land, Carson City will not require any Lompa Ranch North SPA Developer or condition any Phase in the Lompa Ranch North SPA to construct any improvements that are required for the future roundabout or future signal at 5th and Spine Rd. At the developer's expense, the developer must install curb, gutter and sidewalk along the north side of 5th street from Saliman Road to the existing sidewalk at the I-580 overpass concurrently with the development of each phase along 5th Street.

Lompa Ranch Specific Plan Design Standards

4.5.3.3 Saliman Rd and Robinson St.

The applicant shall construct a traffic signal not later than 1) the AM peak hour bidirectional traffic volume on Robinson Street east of Saliman Road reaching 600 total vehicles, or 2) the completion of 460 housing units that contribute trips directly to Robinson Street (Phases A2 and A3 in the southwest corner of the property are not considered contributors to Robinson Street). Either trigger point is independently sufficient to require the traffic signal. The traffic signal shall not be constructed until MUTCD traffic signal warrant criteria are formally met, which is anticipated prior to reaching the triggers stated above.” The precise timing of and potential need for signal installation prior to reaching the triggers above will be determined in the Traffic Study updates with each project

4.5.4 Updated Traffic Study.

An updated traffic study is required prior to each subdivision map to analyze existing conditions and determine the necessary improvements. The studies may cause improvements to take place sooner than the triggers in the Phasing Plan, however, they will not cause improvements to take the place later than these triggers. .

4.5.5 Additional Traffic Improvements Required.

Reference Appendix 6.1 for an exhibit identifying improvements below.

4.5.5.1 Robinson St and Spine Rd shall be improved to Collector Roadway standards with bike lanes;

4.5.5.2 Robinson St and Spine Rd shall be constructed as full street improvements;

4.5.5.3 Airport Rd shall be improved to Collector Roadway Standards, including sidewalks along the west side;

4.5.5.4 Both Robinson St and the Spine road corridors shall include “off site/shared/paved” multi-use paths to be constructed at the time of roadway construction.;

4.5.6 Additional Required Provisions.

4.5.6.1 The Developer shall facilitate meetings with the school district to identify the type of school facility; and

4.5.6.2 Local roads will have minimum AC pavement thickness of 4 inches.

Lompa Ranch Specific Plan Design Standards

4.5.7 On-Going Measures to Assess if Phased Traffic Improvements are Compliant w/ the Master Traffic Plan & Carson City Criteria.

The proposed improvements in Appendix 6.1 shall be further quantified and validated pursuant to the comprehensive traffic analysis to be submitted and reviewed with every phase and per Carson City Development Standards 12.13.1. . Updates to the Master Traffic Study shall be provided to determine if roadway upgrades/improvements are triggered. An update or traffic engineering study shall determine the transportation system improvements needed for the project and shall comply with the Master Traffic Study and Carson City criteria.

4.5.8 Traffic Impact Study Requirements.

Traffic Impact Studies for all phases must demonstrate the following:

- 4.5.8.1** The segment of N Saliman Rd between E William St and E Robinson St shall have a projected level of service of C or better for year 2025. The North South spine road must connect to E William St prior to any development that would cause a level of service worse than C for this segment of road, or prior to the 811 single family residential building permit on the west side of the Specific Plan Area,

- 4.5.8.2** The N Saliman Road / E William Street intersection must be analyze with any A, B or C phases. For this analysis, the following more conservative traffic thresholds apply; 1) the northbound approach to William Street shall be LOS "D" or better in addition to LOS "D" or better for the overall intersection during the school hours and 2) the westbound left-turn movement to Saliman Road shall be LOS "D" or better during school hours. The Spine road must connect to E William St before approval of any phase which would cause one or more of these movements to have a level of serve worse than D. The overall intersection must maintain a level of service of D or better regardless of Spine road connectivity.

APPENDIX 1

**Conceptual Drainage Study and Stormwater
Management Report for Lompa Ranch North**

CONCEPTUAL DRAINAGE STUDY &
STORMWATER MANAGEMENT REPORT
FOR
LOMPA RANCH DEVELOPMENT

In association with a Specific Plan Amendment Application, Master Plan Amendment Application
and Rezoning Application.

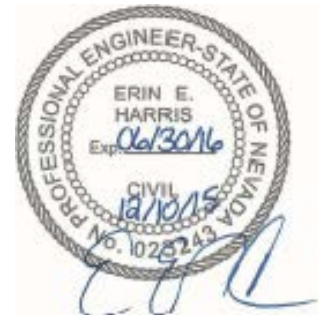
Prepared for:

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Prepared by:

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439 W. Plumb Lane
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December 2015



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EXECUTIVE SUMMARY

The Lompa Ranch Specific Plan area is a large, unique and diverse development located in the heart of Carson City. The Lompa Ranch Specific Plan Area is located south of Highway 50 and north of Fairview Drive. The policies and guidelines contained in the Lompa Ranch Specific Plan are applicable to all properties contained within the Specific Plan boundary and more specifically this Project Area. The drainage and transportation systems extend throughout the development and connect to 5th Street and through to Highway 50 to the north.

Specifically, section LR-SPA 3.1 outlines the following Floodplain and Drainage Policies:

- *The existing floodplain shall be identified based on FEMA mapping with post-freeway drainage improvements for development of the final SPA. In order to develop the property, drainage improvements will be required to mitigate the 100-year floodplain on the property. This may also require amending the FEMA mapping through a letter map amendment process. Once the new floodplain is determined, designated land use intensities shall be developed outside this floodplain area.*
- *An overall storm water management plan shall be developed with the final SPA to ensure adequate drainage facilities to serve the entire SPA area.*
- *A detailed wetlands delineation shall be provided with the final SPA identifying any areas that meet the Federal 404 definition of wetlands. Following wetland identification, designated land use intensities shall be developed outside the wetlands.*

Several regional watercourses exist adjacent to or flow through the specific plan area.

Run south of 5th Street stems from two sources. Runoff that breaks out of the Kings Canyon Creek several miles west of the project area as well as runoff generated by the urbanized watershed south of 5th Street. The combined runoff conveyed east and is ultimately discharged into Tributary H – a constructed watercourse whose headwaters are located south and west of the project Lompa Ranch. As part of the improvements in the area, some of which are associated with the construction of Highway 395, Tributary H is aligned such that runoff is conveyed beneath 5th Street west and released into the Kings Canyon Creek directly west of the Highway 395 Bridge.

This project study area is subjected to runoff from five regulatory watercourses – Vicee Canyon Creek, Ash Canyon Creek, Kings Canyon Creek, Goni Canyon Creek and Tributary H, as well as the local watersheds north of Highway 50, south of 5th Street, and east of Highway 395, all of which contribute runoff to the Kings Creek drainage system. It is the intent of this development to design and construct all necessary drainage improvements (channels, road culverts, etc) to collect and convey these watersheds to their natural downstream location. The flow will have a clear and unobstructed path from the upstream inlet to the project to the downstream outlet. The roads and structures are proposed to be laid out and constructed in a manner that does not block or impede the flow as it

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traverses the site. A 100-year design event will be used for all drainage conveyance systems. Capacity of the downstream system will also be evaluated and improved or mitigated as appropriate with additional drainage improvements.

At this time, the design intent for the Project Area is to construct open, trapezoidal channels to convey the discharge around or through the site. Maintenance of the channels is a top priority for design considerations. The Developer will continue to work with Carson City Storm Water Management to finalize a design section that both allows for the required conveyance capacity and is also reasonable to maintain in both the short and long term. Grass-lined, earthen channels are favored for this application as they are aesthetically pleasing as to be incorporated into the park and open space system, provide conveyance capacity and are easily maintained and inspected. Preliminary channel sections are provided in the body of this analysis showing both rock-lines and earthen configurations. The rock-lined sections are expected to only be necessary where velocities in the channels may cause erosion to a grass-lined channel. In these cases, in addition to culvert outlets or energy dissipaters, rock lining or splash pads will be used.

The construction of this project is expected to be completed in phases. While specific development phase lines are unknown at this time, it is the intent of the Developer to construct the necessary drainage facilities for each phase and to only mass-grade a block or area has development is permitted and ready to proceed. The mass-grading and ground disturbance of large areas is in proposed or anticipated due to the derogatory impact on the natural and built environments of leaving large areas of disturbed land open and disturbed. Land disturbance will be limited to those areas necessary for immediate development.

Based on the floodplain analysis, it is recommended that a LOMR be pursued based on the existing topography. The LOMR would remove much of the Lompa Ranch from the burden of delineated floodway both upstream and downstream of the Highway 395. It would establish discharges which could be used for the design of proposed drainage improvements including the design of channels along 5th Street, Saliman Drive, Robinson Road and north of Carson High School. In addition the model could be used for future site development planning and design and would be considered as the effective model for future modeling efforts, specifically those that would be part of a CLOMR for new development.

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I. INTRODUCTION

A. DESCRIPTION OF PROJECT

The project area is currently undeveloped. The Lompa Ranch area has been planned for development since the Specific Plan stage. The current project area is bound by Fairview Drive to the east, Saliman Road to the west, Highway 50 to the north and 5th Street to the South. For ease of reference, the entire study area is referred to as Lompa Ranch, which specifically encompasses 246 acres. The land is divided such that 200 acres lies west of Highway 395 with the remaining 46 acres is located the east of the highway. A map depicting the project limits is incorporated with this document (Figure 1).

Adequate drainage systems shall be provided in order to preserve and promote the general health, welfare, and economic well-being of the region. Drainage is a regional feature that affects all of Carson City. Drainage plans shall be consistent with and integrated with the Carson City drainage master plan upon adoption. This characteristic of drainage requires coordination and cooperation from both the public and private sectors.

Storm water drainage systems are an integral part of the development process. The planning of drainage facilities shall be included in the development process and in preparation of improvement plans.

Drainage systems require space to accommodate conveyance and storage functions. When the space requirements are considered, the provision for adequate drainage becomes a competing use for space along with other land uses.

Storm drainage planning for all development shall include the allocation of space for drainage facility construction and maintenance, which may entail the dedication of right-of-way and/or easements. The provision of multi-use facilities such as combining with parks, open space, and recreation needs is strongly encouraged.

(Division 14.1- Storm Drainage Policy and Basic Principles)

The purpose of this Conceptual Drainage Report is to quantify and identify the drainage system requirements of this development for space, multi-use opportunities and general integration with the project plan.

B. EXISTING SITE CONDITIONS

Independent studies from various engineering firms have been completed which analyzed the hydrologic and hydraulic impacts of contributing watersheds and associated watercourses in and around the Lompa Ranch area. These studies expand upon the original FEMA Flood Insurance Study for Carson City. Among

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these were hydrologic and hydraulic efforts completed by WRC as part of the feasibility and design of Highway 395, while a more recent study was prepared as part of a physical map revision (HDR 2009). The intent of HDR analysis was to delineate the floodplain through the developed area west of Lompa Ranch and culminated in the removal of Highway 395 from the floodplain. In addition Kimley Horn and Associates compiled a 2-dimensional model using FLO-2D that focused exclusively on the drainage south of 5th Street. The Kimley-Horn model included Tributary H – a watercourse which contributes flow in the Kings Canyon Drainage System at a location upstream of the Highway 395 Bridge. A list of the previous studies follows:

- 1) HDR, *Draft Hydrologic Analyses and Results for Carson City Flood Insurance Study*, June 2010
- 2) HDR; *Draft Hydraulic Analyses and Results for the Carson City Flood Insurance Study*, July 2010
- 3) Kimley-Horn and Associates; *Southwest Carson City Flood Study*, February 2014
- 4) Manhard Consulting, LTD; *SW Carson City Regional Hydrologic Analysis Final Report*, March 2010
- 5) Northwest Hydraulic Consultants; *Summary Findings for Vicee Canyon Channel HEC-RAS Analysis Preliminary FIS/FIRM Review Support Carson City, NV*, September 2001
- 6) WRC Nevada; Inc *Hydrologic Analysis US 395 Bypass Freeway, Carson City Nevada*, April 1997
- 7) WRC Nevada; Inc *US 395 Bypass Section 404(b)(1) Alternatives Development and Evaluation Report*, June 30, 1998
- 8) WRC Nevada; Inc *Carson City Northwest Alternatives Analysis*, April 22, 1999
- 9) WRC Nevada; Inc *Carson City Northwest Drainage Facilities Hydrologic and Hydraulic Report*, November 5, 1999

The study area is subjected to runoff from five regulatory watercourses – Vicee Canyon Creek, Ash Canyon Creek, Kings Canyon Creek, Goni Canyon Creek and Tributary H, as well as the local watersheds north of Highway 50, south of 5th Street, and east of Highway 395, all of which contribute runoff to the Kings Creek drainage system. Of these contributing flow sources, runoff from Vicee Canyon Creek, Ash Canyon Creek, Kings Canyon Creek and Tributary H and the local drainage from Highway 50 coalesce upstream of Highway 395. The combined flow is conveyed underneath Highway 395 where it coalesces with runoff from Goni Canyon Creek and runoff generated by the local watersheds south of 5th Street, and the local watersheds east of Highway 395. The combined flow is conveyed east ultimately discharging into the Carson River.

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C. GENERAL LOCATION MAP

Figure 1 depicts the project area, general location, existing topography and existing aerial photo.

FIGURE 1-1: LOMPA RANCH SPECIFIC PLAN AREA



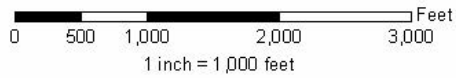
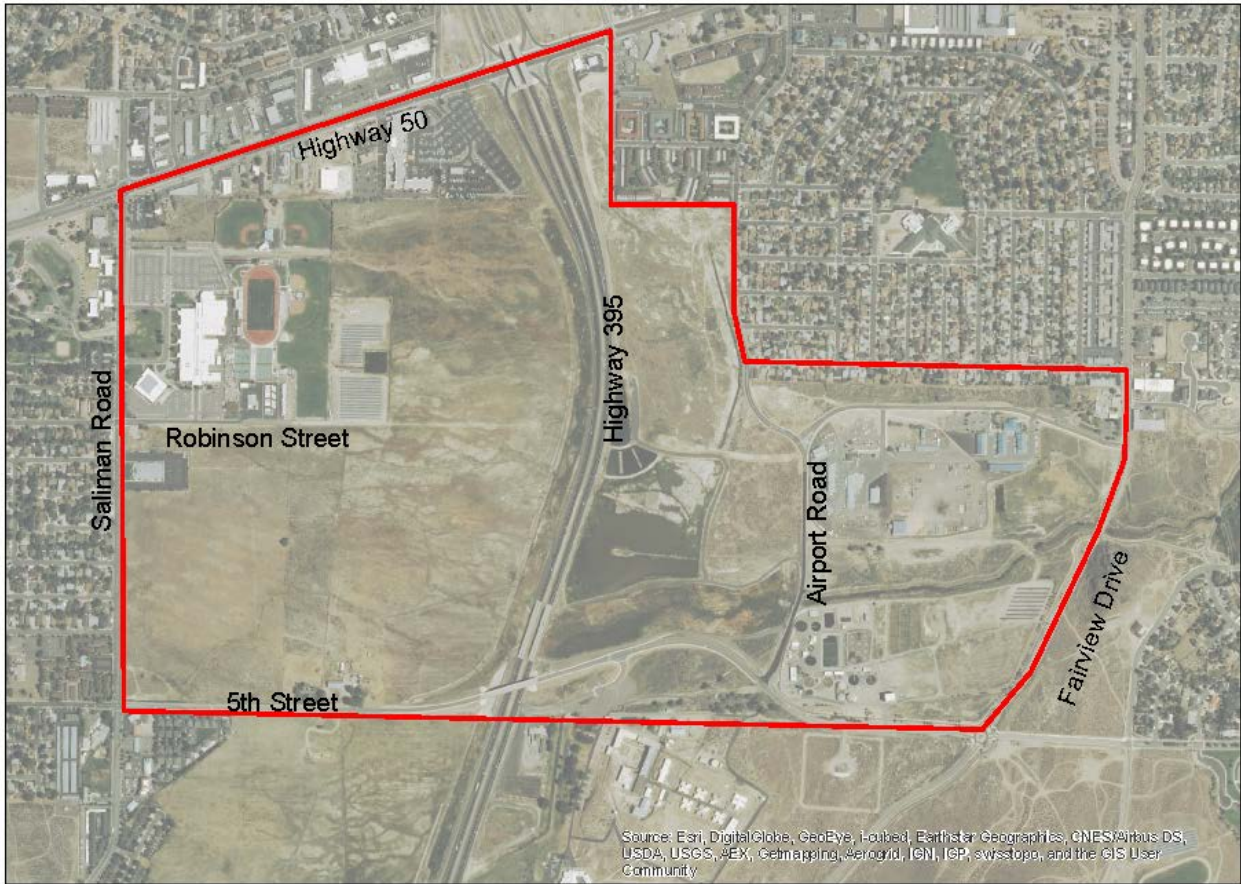
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FIGURE 1-2: PROJECT STUDY AREA



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FIGURE 1-3: EXISTING TOPOGRAPHY



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FIGURE 1-4: EXISTING AERIAL PHOTO



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II. EXISTING AND PROPOSED HYDROLOGY

A. EXISTING AND PROPOSED DRAINAGE BASIN BOUNDARIES

Detention is considered a viable method to reduce storm runoff from developed properties. Temporarily detaining storm runoff can significantly reduce downstream flood hazards as well as pipe and channel requirements. Storage also provides for sediment and debris collection which reduces maintenance requirements for downstream channels and streams.

Local detention storage for land development, which includes subdividing land, shall be required when the development increases flows and downstream conveyance capacities of the drainage system are not capable of handling non-detained flows, and the developer elects to not upgrade the existing storm drainage system. Onsite detention storage shall be sized to detain sufficient runoff to limit flows from a five (5) year storm (Q5) to their predevelopment condition.

The capacity of downstream conveyance systems shall be analyzed in accordance with this division and shall be based on runoff from the development as fully improved. Local detention can also be required when designated in flood or drainage master plans to reduce the peak rate in regional facilities. (Division 14.1.8)

A common detention facility is proposed to be incorporated into the neighborhood park proposed at the east end of Robinson. The area is proposed as a multi-use facility incorporating low depth storage.

The size and modeling of this neighborhood facility will be completed with the Tentative Map. The intent; however, is to detain the water for the Lompa Ranch area, north of 5th in a centralized system. This will allow for maintenance to be centralized and avoid the need for small individual basins throughout the community.

B. DESIGN STORM AND 100-YR DISCHARGES

As stated above numerous modeling efforts were completed for the LOMPA Ranch Area. However a comprehensive study incorporating the results of previous studies and creating a definitive hydrologic model accounting for the finalized improvements was still lacking.

As a part of the floodplain study, the various hydrologic analysis were reviewed and a single hydrologic model (broken into two parts) was created for the purpose of identifying the floodplain and floodway zones within Lompa Ranch east and west of Highway 395. Based on the previous studies, the hydrologic analysis was conducted using the Army Corps of Engineers Software HEC-1 and was based in part on the work

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completed by WRC and the effective model prepared by HDR (August 2010). The new model effectively accounts for the current alignment of the known watercourses. Figure 2 illustrates the contributing watersheds. A table of preliminary discharges is provided on Table 1.

Localized drainage from the blocks will be directed to the channels through the streets. Curb will be used to contain the flow to the public right-of-way. The flow depth is not to exceed 6". In the event the capacity of the street is increased to allow for flow, one lane should be left available for emergency vehicles to pass.

Any development within a mapped floodplain will be required to provide a 1 to 1 volume and 2 feet of freeboard in accordance with the Carson City standards.

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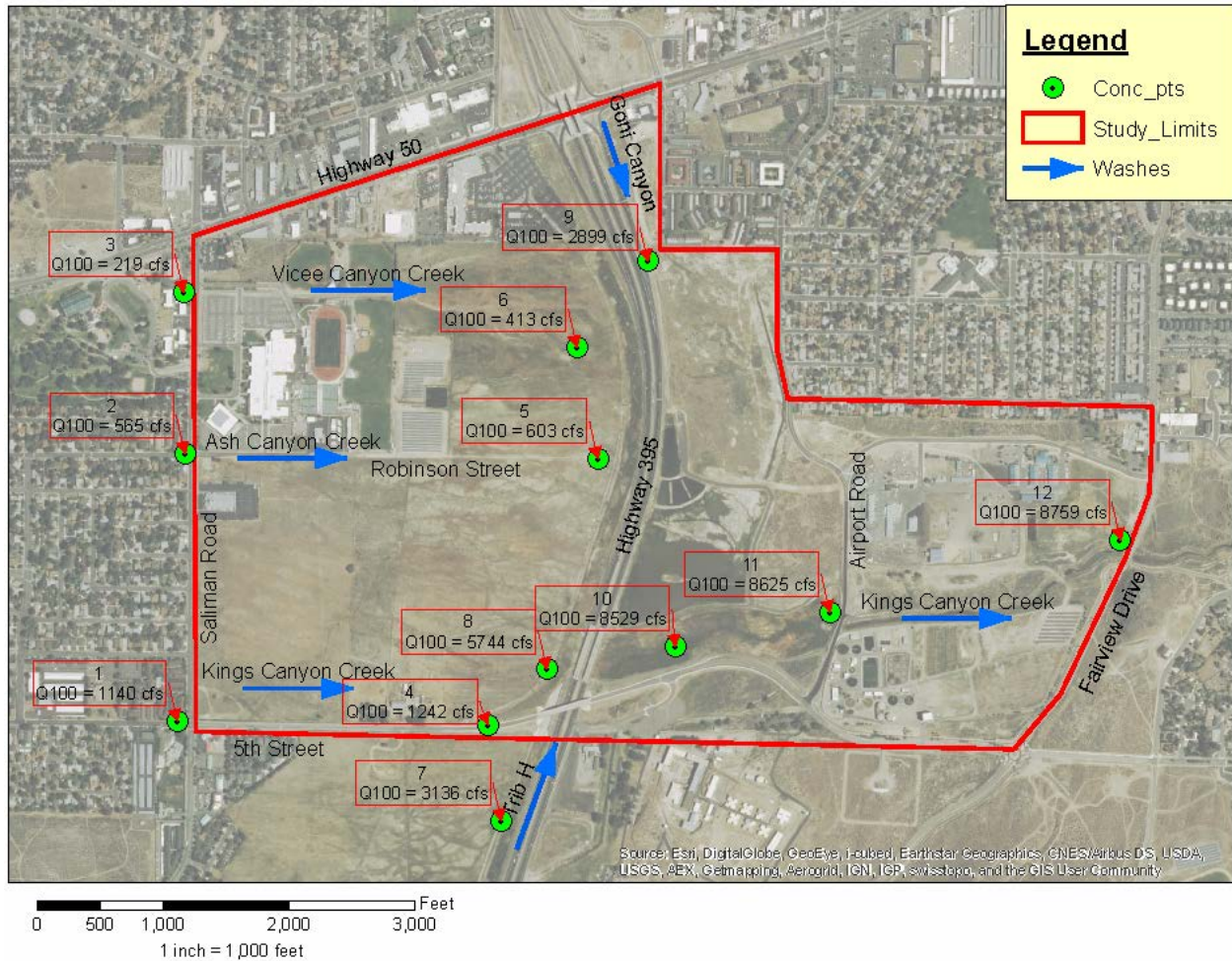
C. EXISTING DRAINAGE PROBLEMS

As the property is currently undeveloped, no existing drainage problems are known.

D. ON-SITE AND DOWNSTREAM DRAINAGE

The study area is subjected to runoff from five regulatory watercourses – Vicee Canyon Creek, Ash Canyon Creek, Kings Canyon Creek, Goni Canyon Creek and Tributary H, as well as the local watersheds north of Highway 50, south of 5th Street, and east of Highway 395, all of which contribute runoff to the Kings Creek drainage system. Of these contributing flow sources, runoff from Vicee Canyon Creek, Ash Canyon Creek, Kings Canyon Creek and Tributary H and the local drainage from Highway 50 coalesce upstream of Highway 395. The combined flow is conveyed underneath Highway 395 where it coalesces with runoff from Goni Canyon Creek and runoff generated by the local watersheds south of 5th Street, and the local watersheds east of Highway 395. The combined flow is conveyed east ultimately discharging into the Carson River. The watercourses and associated 100-yr discharges are illustrated in Figure 2.

FIGURE 2: PRELIMINARY DISCHARGE MAP



E. FLOODPLAIN

Based on the floodplain analysis, it is recommended that a LOMR be pursued based on the existing topography. The LOMR would remove much of the Lompa Ranch from the burden of delineated floodway both upstream and downstream of the Highway 395. It would establish discharges which could be used for the design of proposed drainage improvements including the design of channels along 5th Street, Saliman Drive, Robinson Road and north of Carson High School. In addition the model could be used for future site development planning and design and would be considered as the effective model for future modeling efforts, specifically those that would be part of a CLOMR for new development.

A CLOMR will be required for the proposed drainage infrastructure.

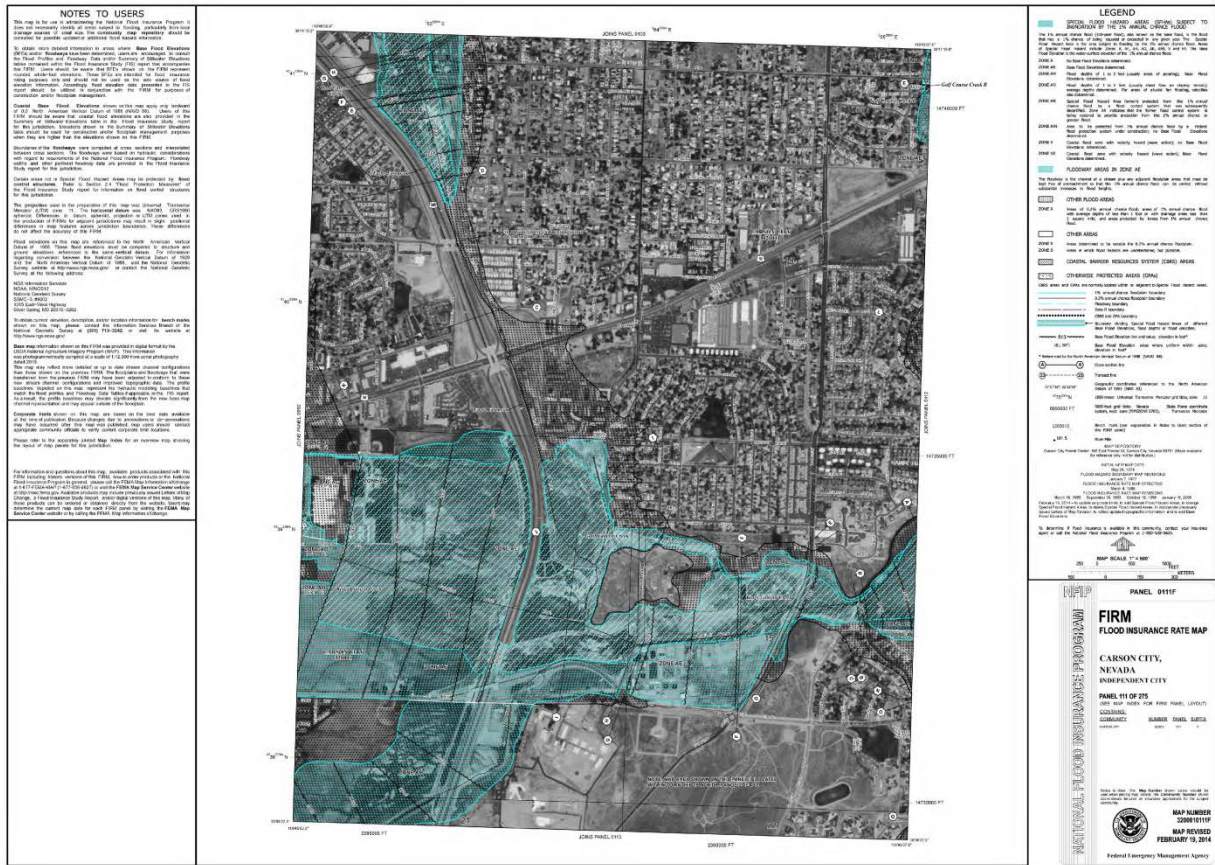
The existing floodway and floodplain is shown in Figure 3.

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FIGURE 3-1: CURRENT EFFECTIVE FIRM



FIRM Flood Insurance Rate Map

Carson City, Nevada

Panel: 111 of 275

Map Number: 3200010111F

Revised: February 19, 2014

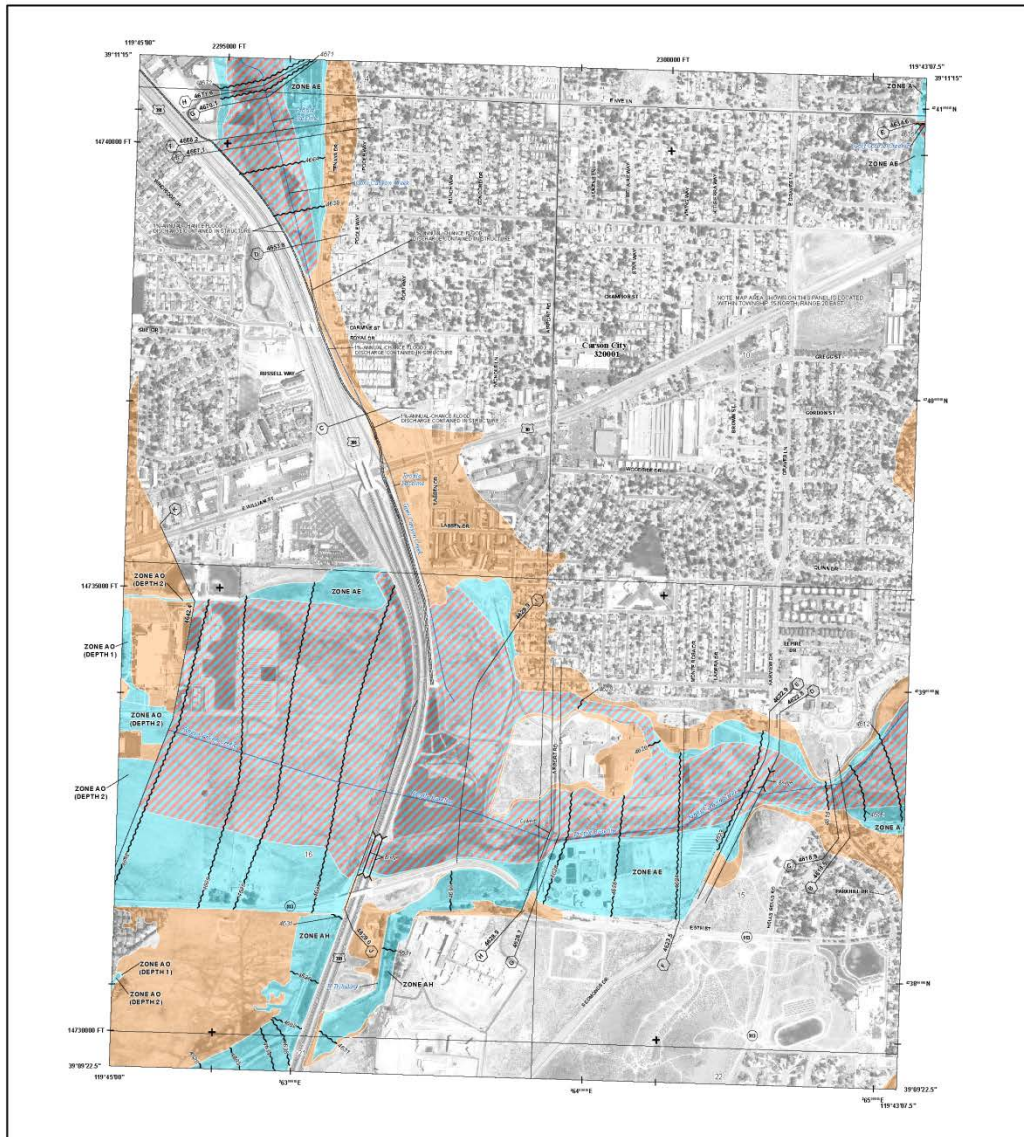
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FIGURE 3-2: PRELIMINARY FIRM (MAY 22, 2015)



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LOCATOR. THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION IS ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://NISC.FEMA.GOV](http://nsc.fema.gov)

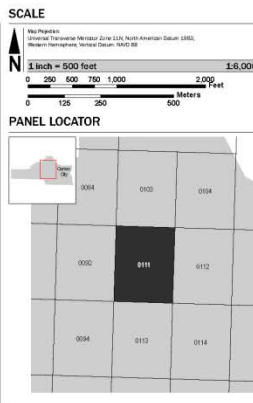
SPECIAL FLOOD HAZARD AREAS	Description
	Without Base Flood Elevation (BFE) Zone X-1, X-2
	With BFE or Depth Zone AE, AH, X, X-1, X-2 Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% Annual Chance Flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	1% Annual Chance Flood Hazard Zone X
	Areas with Reduced Flood Risk due to Levee Sea Walls Zone X
	Areas of Minimal Flood Hazard Zone X
	Areas of Undetermined Flood Hazard Zone X
	Channel, Culvert or Storm Sewer
	Accretion or Proximally Accretion Levee, Dike or Floodwall
	Non accretion Levee, Dike or Floodwall
	Grass Sections with 1% Annual Chance
	Water Surface Elevation (WSE)
	Coastal Flooding
	Coastal Transport Barriers
	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM industry release, please visit the National Flood Insurance Program website at www.fema.gov or the FEMA Map Information Center at 1-877-FEMA-1345 or call the FEMA Map Information Center, 4801 Rockledge Drive, Rockledge, FL 32955. For more information, please contact the FEMA Map Information Center at 1-877-FEMA-1345 or call the FEMA Map Information Center, 4801 Rockledge Drive, Rockledge, FL 32955. For more information, please contact the FEMA Map Information Center at 1-877-FEMA-1345 or call the FEMA Map Information Center, 4801 Rockledge Drive, Rockledge, FL 32955.

Coordinates are given in feet and meters. The panel number is given in the adjacent panel as well as the current FIRM color. These are the correct details from the National Flood Insurance Program (NFIP) Flood Insurance Program at 1-800-358-3447.

Please note that information shown on this FIRM was derived from multiple sources. Please note that the public information was prepared by Carson City, Nevada, and completed in 2011. The information shown on this map was prepared by Carson City, Nevada, and completed in 2011. The information shown on this map was prepared by Carson City, Nevada, and completed in 2011. The information shown on this map was prepared by Carson City, Nevada, and completed in 2011.



FEMA

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

CARSON CITY, NEVADA

INDEPENDENT CITY

FIRM: 111 of 275

Panel Coordinate: CARSON CITY 32096, 4433, 0

PRELIMINARY

May 22, 2015

VERSION NUMBER: 2.3.0

MAP ID: 00025

32096/0433

MAP REVISED

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III. PROPOSED DRAINAGE FACILITIES (ON-SITE AND OFF-SITE)

A. ROUTING

The hydraulic analysis used the Army Corps of Engineers' software package HEC-RAS. The model was based on uniform, steady flow to determine the water surface elevations at specified points along the study reaches. The water surface elevations were then used to delineate the 100-year (0.1%) floodplain. The downstream tie in location for the updated model was the effective floodplain east of Fairview Drive. The upstream tie in location was the floodplain east of Saliman Road as delineated in the recently approved FIS prepared by HDR (Reference 1). A map illustrating the revised floodplain is provided in Figure 3.

In addition to modeling the floodplain throughout the study reach, the revised hydraulic analysis examined the floodway. This analysis determined that the floodway should be removed for the area west of Highway 395. This recommendation was first suggested as part of the study prepared by HDR (Reference 1). In addition, the floodway can be adjusted such that it aligns with the new Highway 395 Bridge and is contained within the constructed channel downstream, thus eliminating Lompa Ranch from the floodway. The proposed floodplain and floodway alignment are presented on Figure 3.

As shown by the map, the analysis did not identify large areas of land that could be readily removed from the floodplain. However, the floodway reduction was significant which should allow for development within the floodplain with minimal effort outside of elevating the development parcels using compacted fill or constructing conveyance channels to capture and direct flow to a logical outlet (i.e. Highway 395 Bridge).

Future development of the property will direct the flow to the major watercourses in the same manner as existing conditions.

B. MITIGATION MEASURES

1. CHANGE IN MANNER OF FLOW

Development shall tend to concentrate existing natural sheet flow into point flows at property lines. These point flows are generally associated with outlets from gutter flow, storm drains, and detention facilities. Downstream properties may experience a longer duration of storm flows, and greater flows in general due to a shortened time of concentration. Discharge of point flows on downstream property can cause increased erosion at the discharge point and further downstream. Therefore, downstream facilities shall be evaluated for runoff capacity during the design and review process. Mitigation of these point flows can be accomplished through energy dissipaters or flow spreaders. Point

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flows shall be discharged to downstream properties at non-erosive velocities and depths of flow. (Division 14.1.3)

2. *DIVERSION OF DRAINAGE*

Development can alter the historic or natural drainage paths. When these alterations result in a local on-site drainage system that discharges back into the natural drainage-way or wash at or near the historic location, then the alterations (inter-basin transfer) are generally acceptable. However, when flows from the local on-site drainage system do not return to the historic drainage-way or wash, then inter-basin transfer may result. These inter-basin transfers are generally not acceptable. Planning and design of drainage systems shall not be based on the premise that storm water can be transferred from one basin to another unless part of an adopted city regional drainage system plan.

The flow of storm runoff shall be maintained within its natural drainage course unless reasonable use is demonstrated otherwise. When storm water is discharged into an existing drainage course, the peak discharge into the water course shall not adversely affect or cause damage to property along the drainage course now or in the future based on existing zoning and the Carson City master plan build-out conditions. Erosional impacts due to concentration of flows and increased flow durations shall be evaluated and mitigated. (Division 14.1.4)

3. *PROPOSED MITIGATION*

The proposed drainage system uses a combination of open channels and culverts for road crossings to direct the flow to an existing channel or existing downstream drainage infrastructure. The manner of discharge into the existing channel will be concentrated and as such, erosion protection such as splash pads should be considered with the Drainage Improvement Plans. The time of concentration and quantity of discharge will not be effected due to the attenuation effect from the detention basin on the peaks. The discharge locations are consistent with the historical discharge locations.

C. CONCEPTUAL DRAINAGE IMPROVEMENT EXHIBIT

The overall drainage concept for the master planned community is to construct several earthen channels at the perimeter and through the proposed development. Generally speaking, these channels are proposed to also incorporate recreational and open space components such as multi-use paths, benches, and supplemental vegetation. Maintenance access roads can also be incorporated into the multi-use path design and access. Culverts and storm drain is expected at road crossings and in the vicinity of commercial zones. The channels and culverts are sized for a design discharge which

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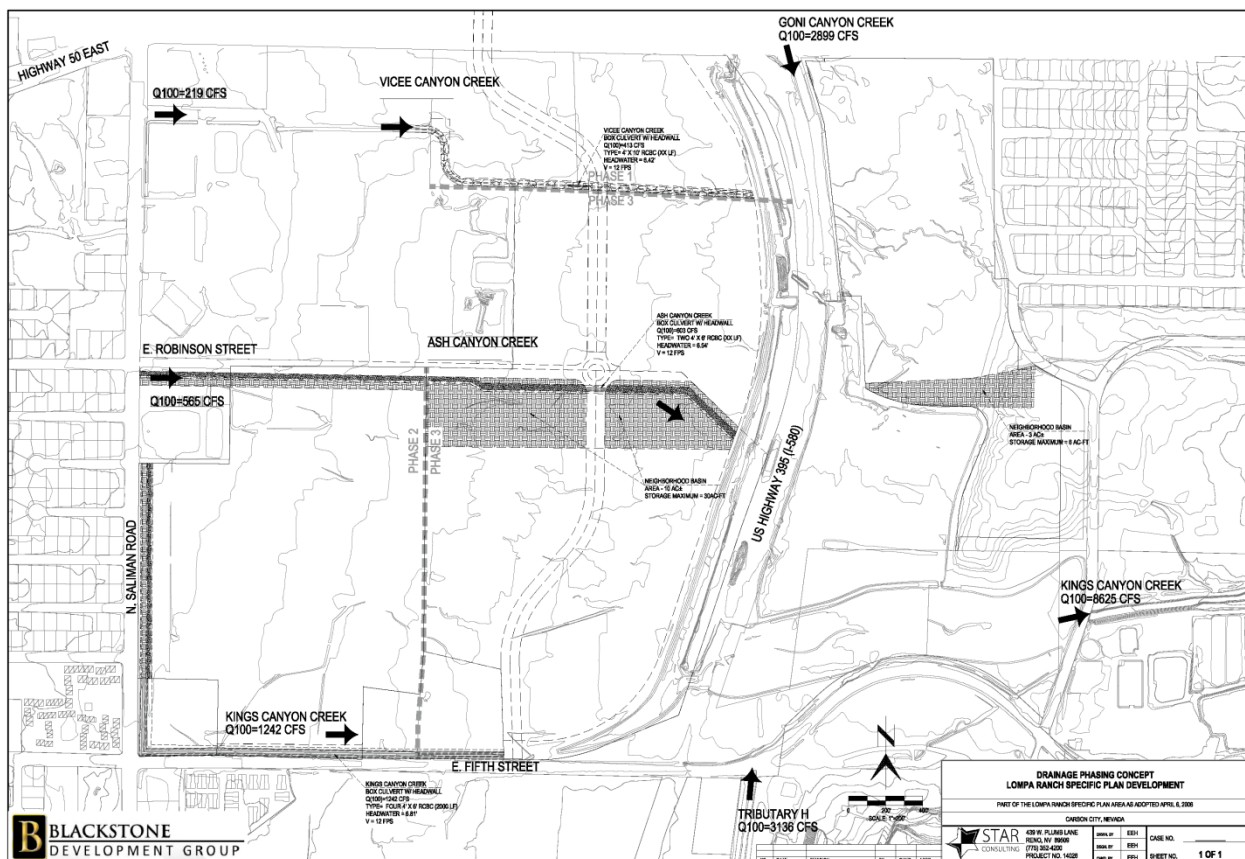
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allows for the clear flow path from the west to the east. The clear flow path for 100-yr discharges will allow for the existing discharges to pass through the site and exit to the east consistent with the manner in which it discharges under existing conditions. The storm water within each development is proposed to be contained within the pavement and curb with a depth not to exceed 6". In the event the road way drainage exceeds 6" in depth, a storm drain system will be added to direct the flow to the constructed channels.

Figure 4 shows the overall drainage concept for the development.

FIGURE 4: CONCEPTUAL DRAINAGE IMPROVEMENTS



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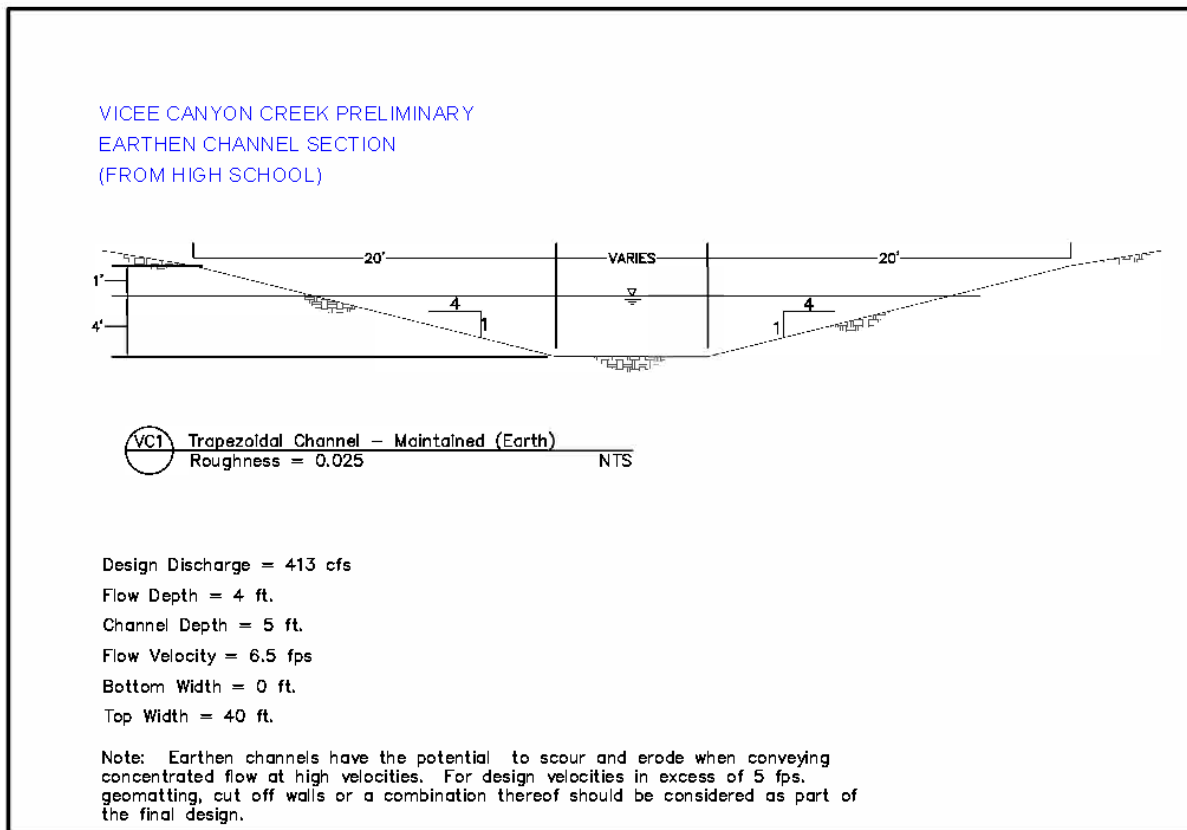
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1. *VICEE CANYON CREEK*

The conceptual cross section for the Vicee Canyon Creek, from the high school to the Highway 395 channel is either an earthen or rock-lined open, trapezoidal channel. Pedestrian and multi-use paths are not proposed along this channel as it is not in a location or direction beneficial to circulation. One road crossing with the north-south spine road is expected. The preliminary design for this road crossing is a concrete box culvert. The flow will not be trapped behind the road crossing but will be allowed to flow under the road in the box culvert. Figure 5 shows the preliminary cross sections for the Vicee Canyon Creek improvements through Lompa Ranch.

FIGURE 5-1: VICEE CANYON CREEK CONCEPTUAL CROSS SECTIONS



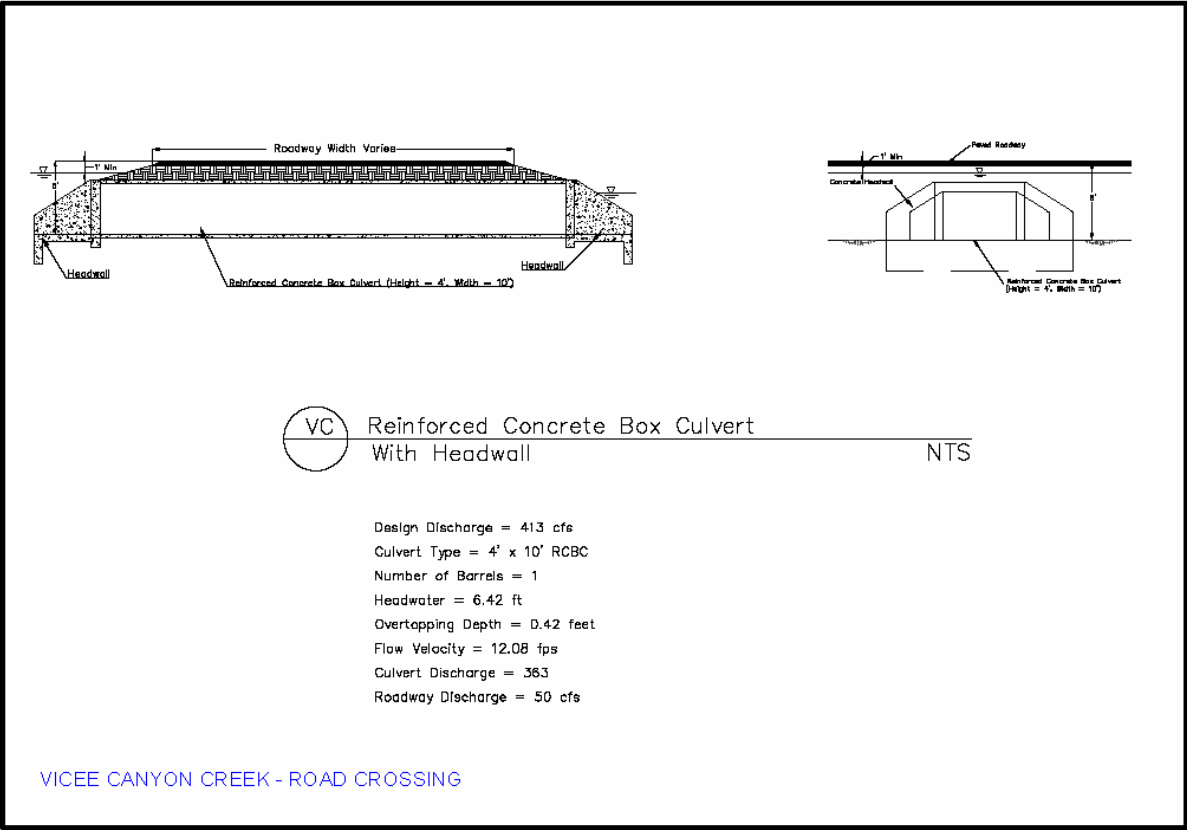
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FIGURE 5-2: VICEE CANYON CREEK CONCEPTUAL CROSS SECTIONS



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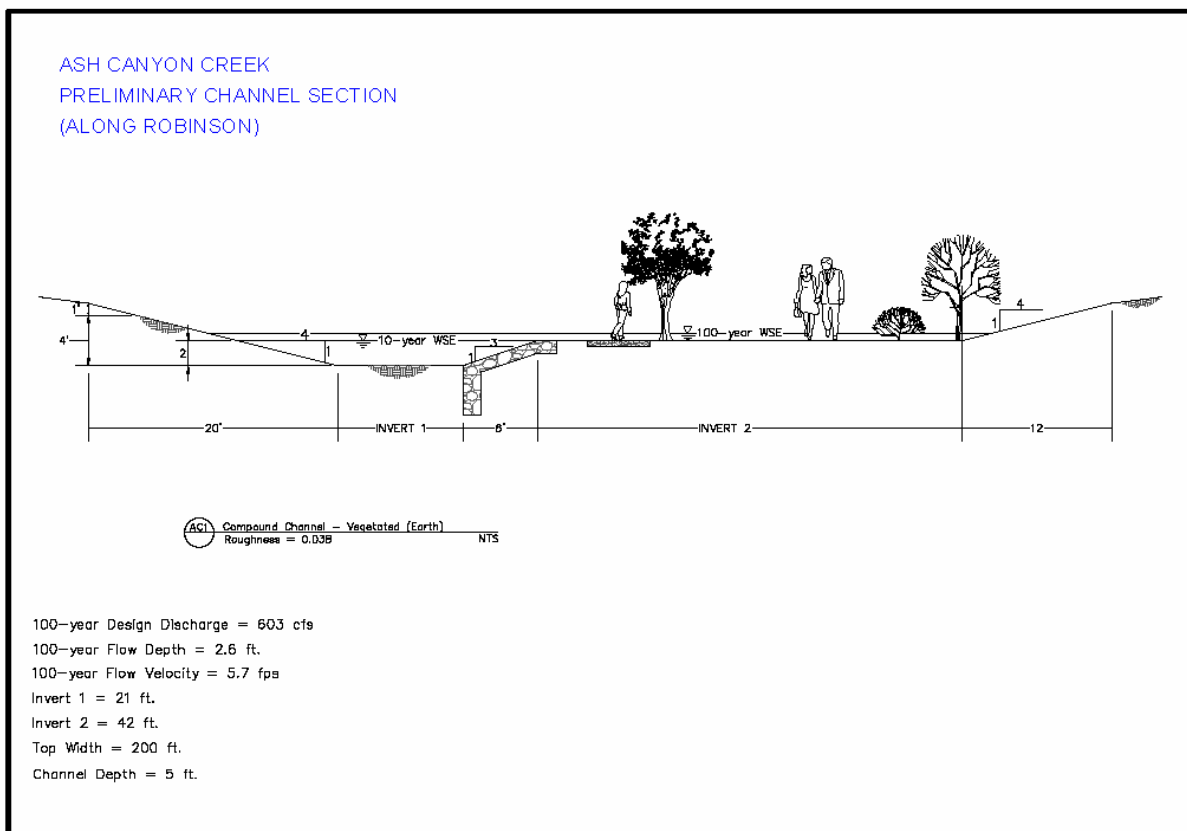
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2. ASH CANYON CREEK

The conceptual cross section for the Ash Canyon Creek, from Saliman Road, along Robison to the Highway 395 channel is either an earthen or rock-lined open, trapezoidal channel. Pedestrian and multi-use paths are a significant component to this design concept. The multi-use path proposed along this channel will provide a critical link between the multi-use path on 5th Street, east of the highway to the high school. One road crossing with the north-south spine road is expected. The preliminary design for this road crossing is a concrete box culvert. The flow will not be trapped behind the road crossing but will be allowed to flow under the road in the box culvert. Figure 6 shows the preliminary cross sections for the Ash Canyon Creek improvements along Robinson and through Lompa Ranch.

FIGURE 6-1: ASH CANYON CREEK CONCEPTUAL CROSS SECTIONS



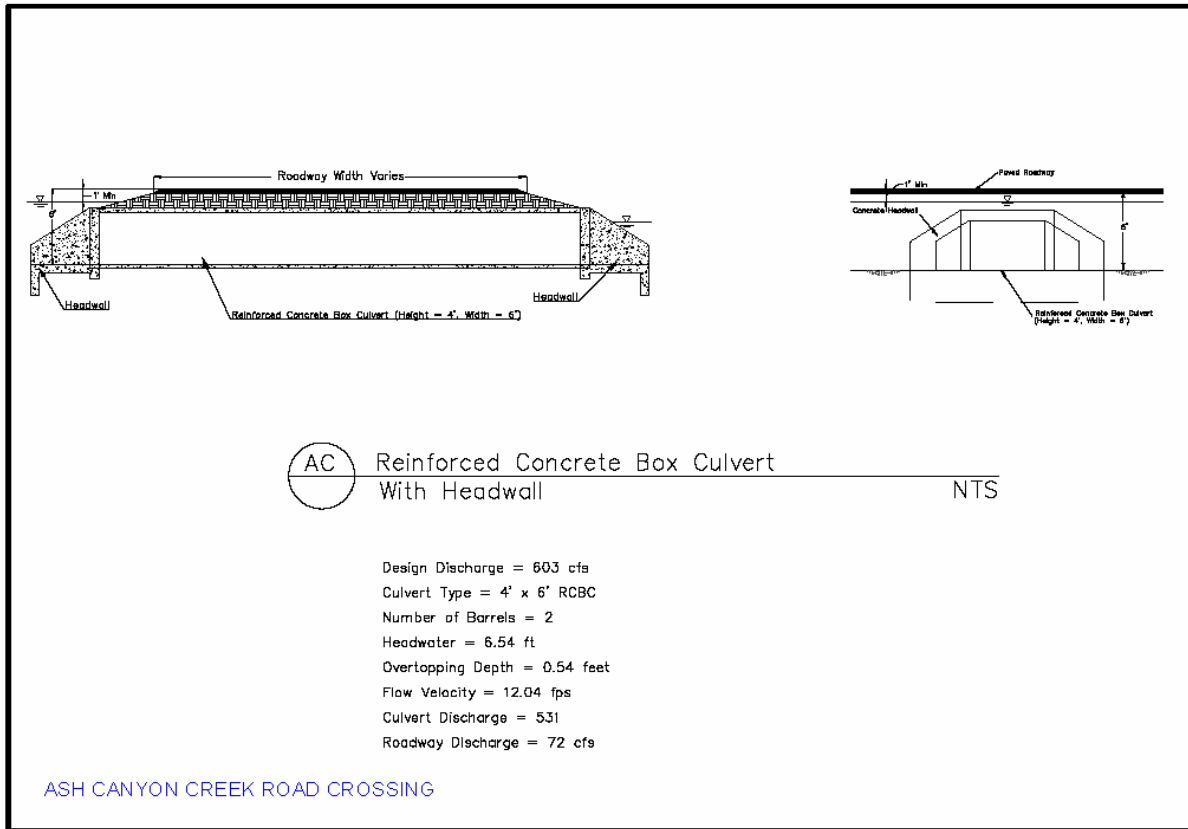
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FIGURE 6-2: ASH CANYON CREEK CONCEPTUAL CROSS SECTIONS



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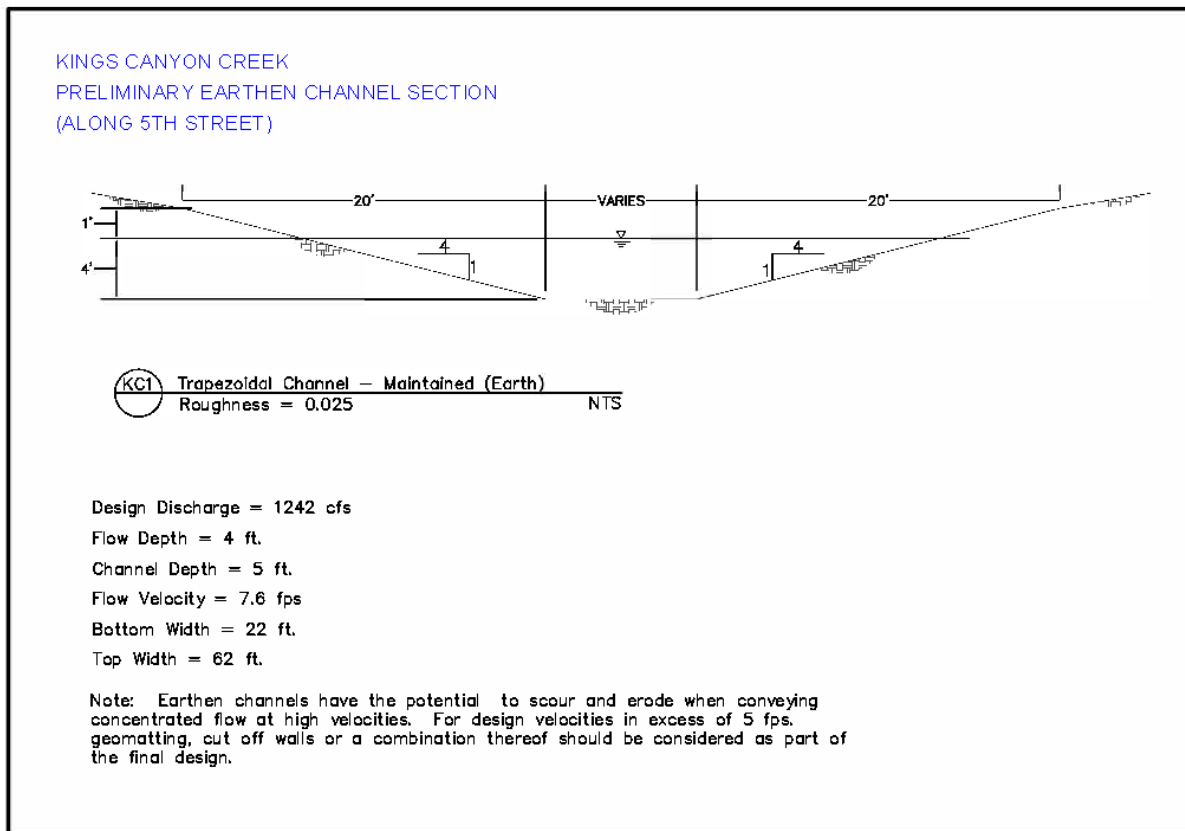
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3. *KINGS CANYON CREEK*

The conceptual cross section for the Kings Canyon Creek, along 5th Street from Robinson to the Highway 395 channel is an open channel or storm drain system. A physical constraint of horizontal clearance within the existing right-of-way will likely be a design constraint in the vicinity of the two non-participating parcels. One road crossing with the north-south spine road is expected. The preliminary design for this road crossing is a concrete box culvert. The flow will not be trapped behind the road crossing but will be allowed to flow under the road in the box culvert. Figure 7 shows the preliminary cross sections for the Kings Canyon Creek improvements through Lompa Ranch.

FIGURE 7-1: KINGS CANYON CREEK CONCEPTUAL CROSS SECTIONS



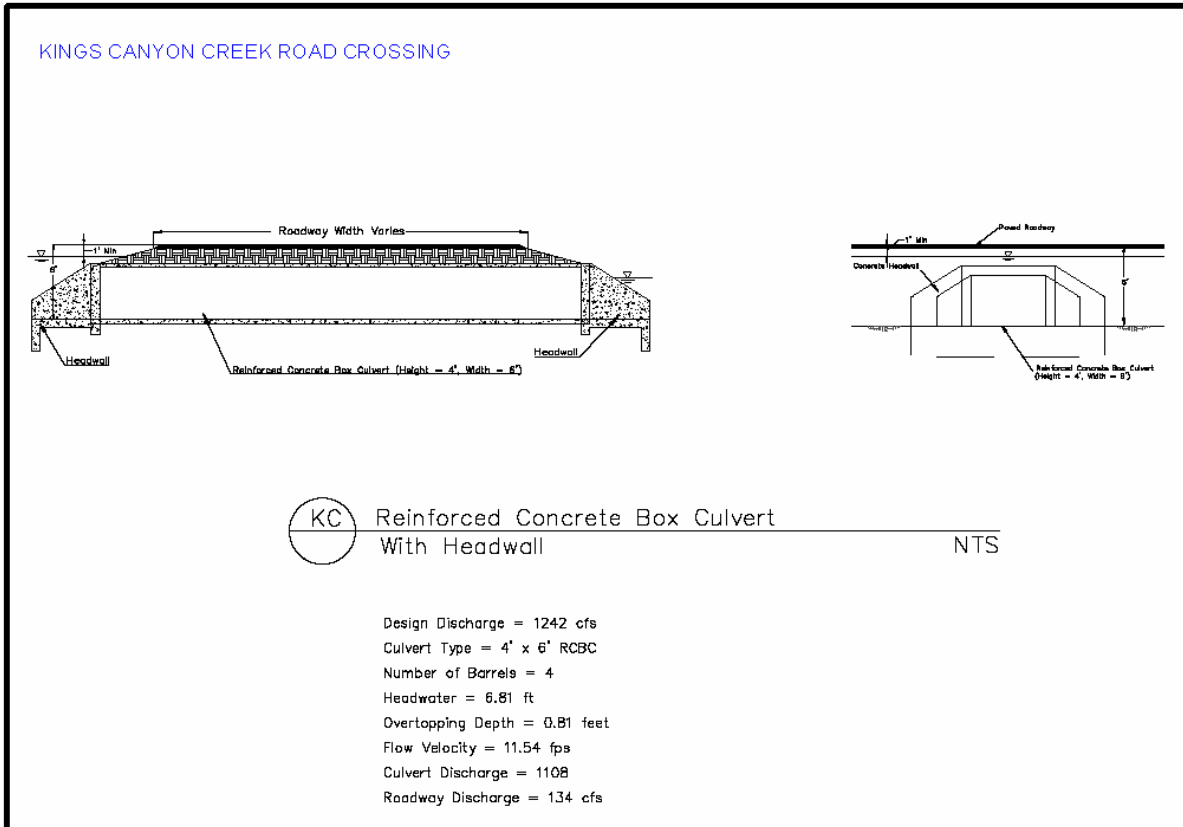
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FIGURE 7-2: KINGS CANYON CREEK CONCEPTUAL CROSS SECTIONS



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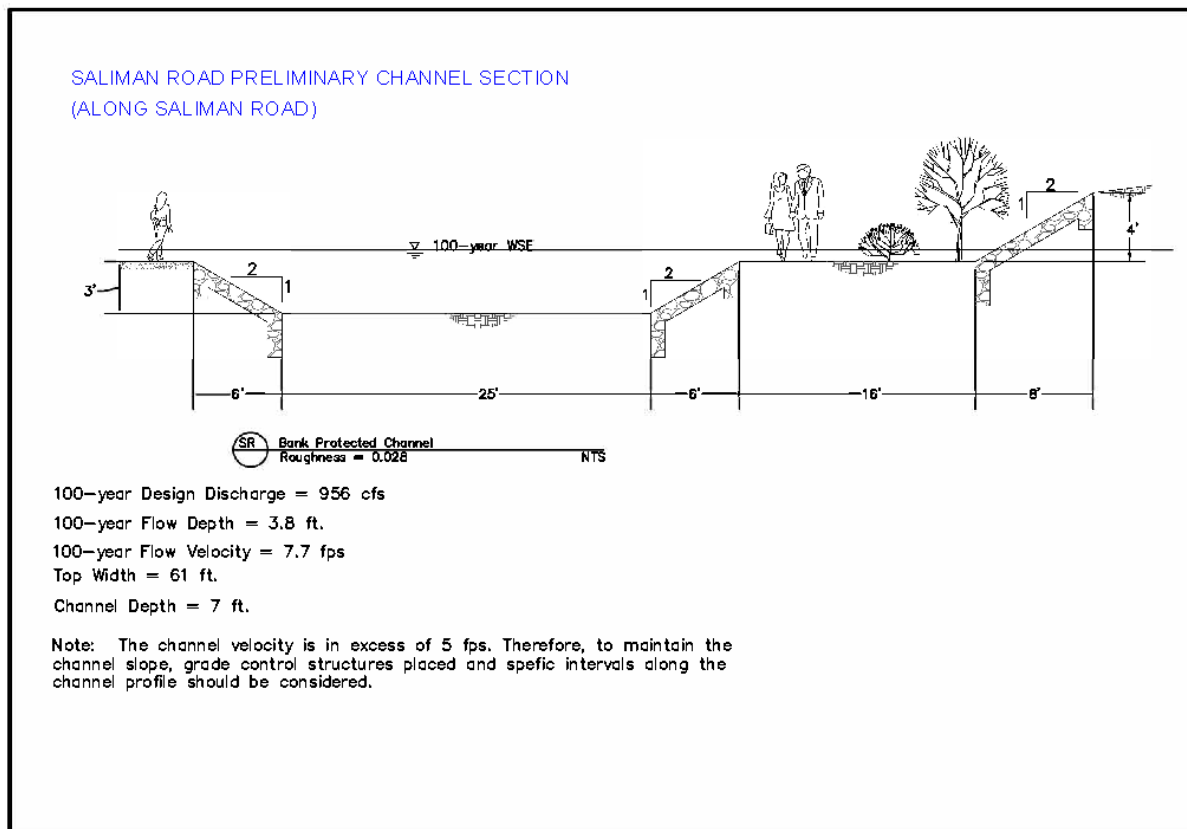
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4. SALIMAN ROAD CHANNEL

The conceptual cross section for the Saliman Road channel, from the high school to 5th Street is either an earthen or rock-lined open, trapezoidal channel. Pedestrian and/or multi-use paths are a significant component to this design concept. The multi-use path proposed along this channel will provide a critical link between the pedestrian circulation on 5th Street to the high school and north to Highway 50. Road crossings are expected. A box culvert or multiple circular or squash pipes may be used depending on the grade of the road and vertical clearance. The flow will not be trapped behind the road crossing but will be allowed to flow under the road in the culvert. Figure 8 shows the preliminary cross sections for the Saliman Road Channel.

FIGURE 8: SALIMAN ROAD CHANNEL CONCEPTUAL CROSS SECTION



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IV. EROSION AND SEDIMENT CONTROL

Storm drainage improvements shall incorporate water quality and erosion controls in accordance with the Nevada "Handbook of Best Management Practices," this division, and accepted engineering practice. Storm drainage leaving a development may not be of a quality that shall adversely affect downstream uses.

A SWPPP is required with the Grading and Drainage Plans for the on-site and off-site channel and drainage infrastructure. A SWPPP is also required with the construction of each block within the development.

The construction of this project is expected to be completed in phases. While specific development phase lines are unknown at this time, it is the intent of the Developer to construct the necessary drainage facilities for each phase and to only mass-grade a block or area has development is permitted and ready to proceed. The mass-grading and ground disturbance of large areas is in proposed or anticipated due to the derogatory impact on the natural and built environments of leaving large areas of disturbed land open and disturbed. Land disturbance will be limited to those areas necessary for immediate development.

Compliance with Division 13, Erosion and Sediment Control will be required for all phases of this development.

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V. CONCLUSIONS

- All design and construction work shall be in compliance with Carson City Title 18 Division 13 Erosion / Sediment Control and 14 Storm Drainage policies and technical criteria.
- Storm drainage improvements shall incorporate water quality and erosion controls in accordance with the Nevada "Handbook of Best Management Practices," this division, and accepted engineering practice. Storm drainage leaving a development may not be of a quality that shall adversely affect downstream uses. (Division 14.1.5)
- Drainage improvements consist of curb and gutter, inlets and storm drains, culverts, bridges, swales, ditches, channels, detention areas, and other drainage facilities required to convey design storm runoff to the point of discharge. Drainage improvements are further defined as on-site (private) facilities that serve a specific development and are privately owned and maintained or off-site (public) facilities. Public and private drainage facilities shall be constructed in accordance with the requirements of this division. (Division 14.1.6)
- Floodplain management shall provide the guidance, conditions, and restrictions for development in floodplain areas while protecting the public's health, safety, welfare, and property from danger and damage. Development within the Federal Emergency Management Agency (FEMA) designated floodplains shall comply with CCMC, and requirements of the National Flood Insurance Program (NFIP). (Division 14.1.7)
- Easements shall be provided where necessary for access and maintenance of the storm drain system.
- Based on the floodplain analysis, it is recommended that a LOMR be pursued for removal of the floodway based on the existing topography. The LOMR would remove much of the Lompa Ranch from the burden of delineated floodway both upstream and downstream of the Highway 395. A CLOMR will then be pursued based on the design recommendations and conveyance infrastructure.
- A Technical Drainage Study in accordance with Division 14.9 shall be completed with or prior to the Drainage and Grading Improvement Plans for the drainage infrastructure.

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APPENDIX 2

Traffic Impact Study for Lompa Ranch North

**TRAFFIC IMPACT STUDY
FOR
LOMPA RANCH DEVELOPMENT**

In association with a Specific Plan Amendment Application, Master Plan Amendment Application
and Rezoning Application.

Prepared for:
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Prepared by:
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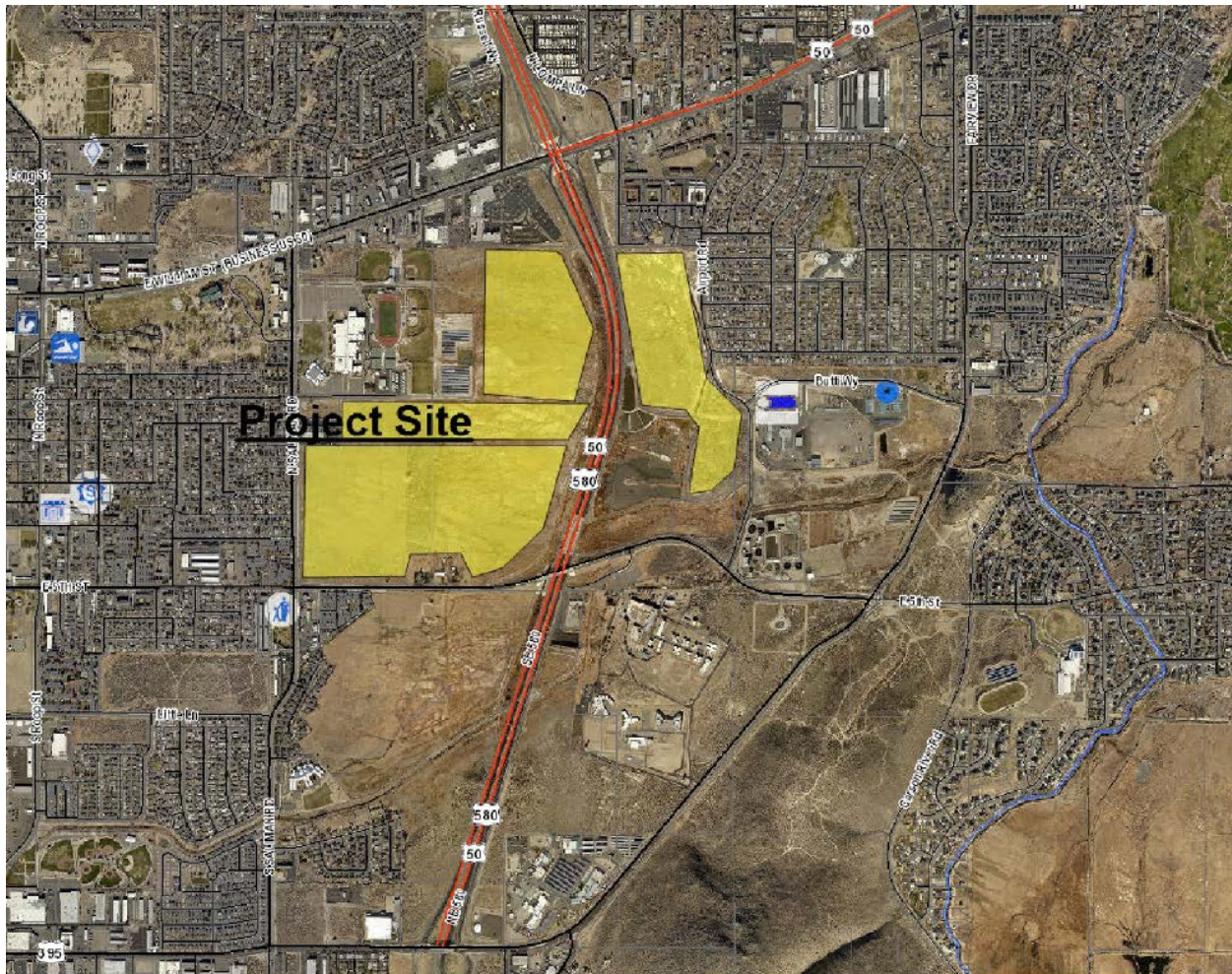
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1. Introduction and Executive Summary

This traffic impact study (TIS) supports a comprehensive plan amendment and rezoning application and identifies the transportation-related impacts of a proposed Lompa Ranch mixed-use development. The project is generally located north of 5th Street, south of William Street/US 50, east of Saliman Road and west of Airport Road in Carson City, Nevada. The project includes proposed commercial and residential land uses. The site location is shown in Exhibit 1.

Exhibit 1 Site Location

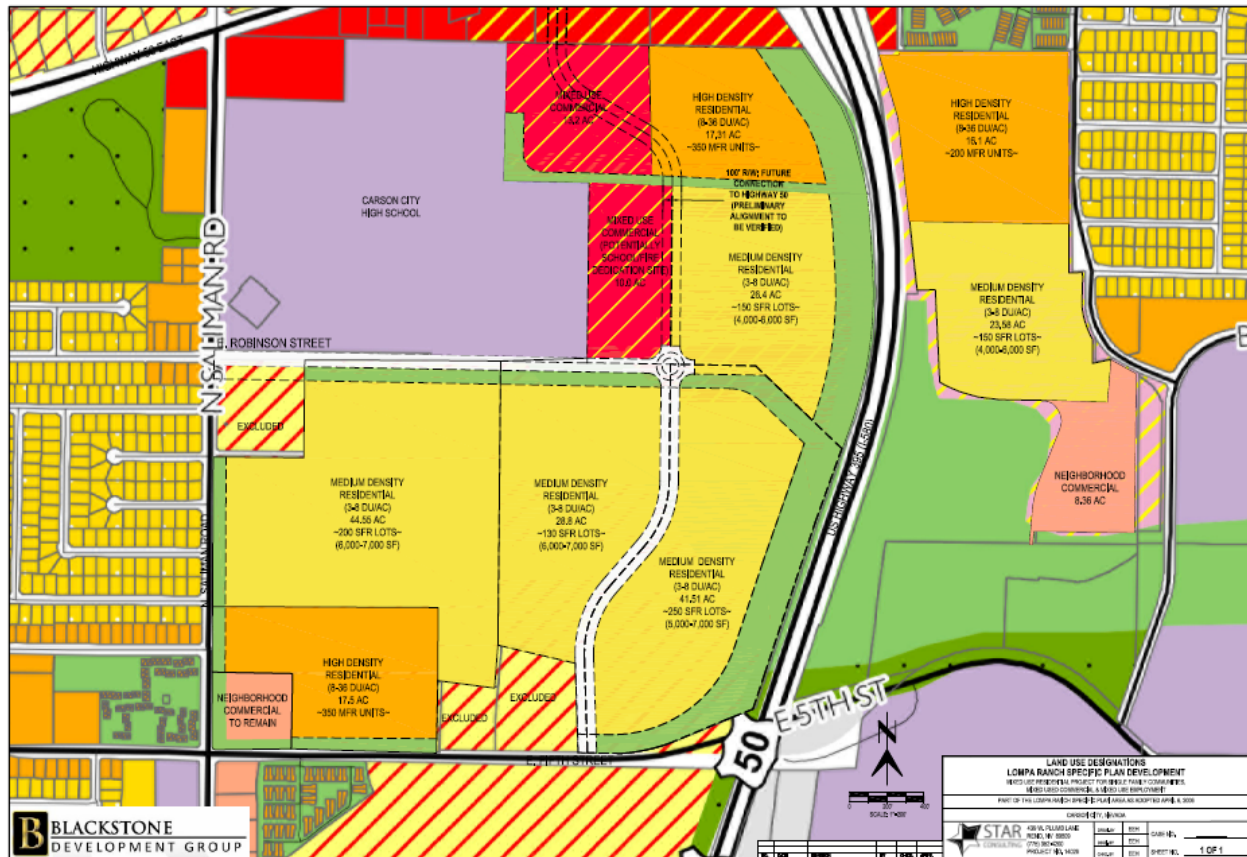


This report provides general guidance and preliminary recommendations for anticipating traffic impacts at the area intersections based on site trip estimates and at the driveway access locations. This traffic report is provided to support a rezoning submittal and should be updated once the specific land uses are developed in better detail.

Development Description

The project is within twelve areas, or parcels comprising a total of approximately 250 acres. A conceptual plan, showing the potential location of the land use types is provided in Exhibit 2. The specific locations of access points have not yet been determined. However, for the purposes of this analysis, we have assumed that there would be driveways on Saliman Road, 5th Street, Robinson Street, and Airport Road.

Exhibit 2 Land Use Concept Plan



A preliminary land use scenario is shown in Exhibit 3. The land use designations plan identifies twelve areas either designated for medium density residential (MDR), high density residential (HDR), mixed use commercial or neighborhood commercial. The proposed residential densities are shown to range from 3 to 8 dwelling units per acre for MDR and for HDR, 8 to 36 dwelling units per acre.

The number of single family and multi-family residential units is estimated to be over 1,780. There are 310,000 square feet of commercial uses, estimated by applying a floor area ratio (FAR) of 0.20 to the acreage of the parcels designated “mixed use commercial” and “neighborhood commercial”.

The current zoning is A (Agricultural). The developer is submitting a rezoning application for a Specific Plan authorizing the proposed land uses. Following Carson City’s approval of the Specific Plan, the project is tentatively expected to be built out by 2035, although it will likely be developed in phases. The project developer has indicated that the area bordered by Robinson Street to the north, the new “spine road” to the east, 5th Street to the south and Saliman Road to the west may be constructed as Phase 1 by the year 2020. The remainder of the project is expected to be built out by 2035.

Exhibit 3 Land Use Scenario

Parcel	Acreage	Land Use	DU/Acre or FAR		Estimated Units (DU or KSF)
			Low Range	High Range	
A	13.2	Mixed Use Commercial	0.20	0.20	115
B	17.31	High Density Residential	8	36	350
C	4.1	Neighborhood Commercial to Remain	0.20	0.20	36
D	44.55	Medium Density Residential	3	8	200
E	17.5	High Density Residential	8	36	350
F	10	Mixed Use Commercial	0.20	0.20	87
G	26.4	Medium Density Residential	3	8	150
H	41.51	Medium Density Residential	3	8	250
I	28.8	Medium Density Residential	3	8	130
J	16.1	High Density Residential	8	36	200
K	21.1	Medium Density Residential	3	8	150
L	8.3	Neighborhood Commercial	0.20	0.20	72
	248.87	Commercial KSF			310
		Residential Units			1,780

For Phase 1, the project is the project generates approximately 7,000 daily one-way trips, with about 460 trips during the AM peak hour and 680 during the PM peak hour.

For the build out phase (year 2035), the project generates approximately 27,600 daily one-way trips, with about 1,400 trips during the AM peak hour and 2,600 during the PM peak hour.

This TIS, along with other documents supporting the project’s rezoning application is subject to approval by Carson City. This study has been prepared in accordance with the Carson City’s Code of Ordinances section on the *Preparation of Traffic Impact Studies*. The project is a large scale development expected to generate over 1,000 trips during the peak hour.

Study Objectives

The specific study objectives are:

- Evaluate existing intersections near the project site including:
 - Saliman Road/William Street (Signalized)
 - Saliman Road/Robinson Street (Unsignalized)
 - Saliman Road/5th Street (Signalized)
 - William Street/Casino Road (Signalized)
 - Airport Road/5th Street
 - Airport Road/US 50
- Evaluate the impact of the project on the streets near the project:
 - Saliman Road

- William Street
 - Robinson Street
 - 5th Street
 - Airport Road
 - US 50
- Evaluate the effects the proposed development will have on pedestrian, bicycle and transit activity in the area.
 - Provide recommendations to mitigate (if necessary) undesirable traffic conditions that the project may create.

Principal Findings

This project is located on both sides of US 395, between Saliman Road and Airport Road and 5th Street and William Street.

Assuming a preliminary land use estimate, at build out the project will generate approximately:

- 1,400 morning peak hour trips,
- 2,600 evening peak hour trips,
- 27,600 weekday trips.

Approximately ¼ of these trips will be generated during Phase 1 of the project.

Based on the projected 2020 Phase 1 total volumes which include background traffic, the project will not require the widening of adjacent roadways. There is currently enough capacity on the study area roads to accommodate the addition of Phase 1 site traffic, as described in this report.

The following recommendations are based on the estimated trip generation from the concept plan provided in Exhibit 2 at Phase 1 and at Build Out. Design and construction should not be commenced based on these recommendations. Rather, they are provided as a basis for anticipating the cost of roadway infrastructure that may be needed to maintain acceptable levels of service on the adjacent roadways and intersections. At the development plan stage, with a better defined site plan, an updated traffic impact study should be conducted.

Phase 1 General Recommendations (Year 2020)

Existing Intersection

- Saliman/Robinson – Add westbound right turn lane. Robinson Street should be extended to intersect with a new north-south “spine road” within the project area and as shown in Exhibit 2. The spine road should extend north from a new intersection with 5th Street. Both Robinson Street and the Spine Road can be constructed with one through lane in each direction. For Phase 1, the spine road does not need to extend north of the Robinson Road extension.

New Intersections

- 5th Street/Spine Road – Construct a new intersection with an eastbound left, westbound right, southbound exclusive left and right lanes and signalization (if warranted). 5th Street will need to be widened at the intersection to accommodate the turn lanes. The location of the spine road should avoid the gradient on the eastbound approach to the US 395 overpass.

Build out General Recommendations (Year 2035)

Existing Intersections

- Saliman/William – Northbound dual lefts.
- Saliman/Robinson – Add northbound right turn lane and provide southbound dual lefts. This will require the widening of the east leg of Robinson Street to accept the two left turn lanes.
- Saliman/5th – Add a northbound right turn lane, and a westbound right turn lane (which may already be warranted without the project).
- William/Gold Dust Casino – Add a northbound right turn lane and, westbound dual lefts. This will require the widening of the south leg to accept a new lane. The south leg will continue to connect with the proposed north-south spine road.
- US 50/US 395 TI – No improvements.
- US 50/Airport – Provide northbound dual left turn lanes.
- Airport/5th – Add a westbound right turn lane.
- A new three- to four-leg intersection at Robinson Street/Spine Road should be constructed to provide a north leg at this intersection. This north leg is proposed to continue to its connection with the south leg of the William Street/Casino intersection. This will require widening the existing south leg of this intersection to a standard two to three lane cross-section.
- The preferred northern intersection of the spine road is at the existing signalized intersection on William Street serving access to the Gold Dust Casino. The south leg of this intersection should be widened to accommodate a potential additional westbound to southbound left turn lane at this intersection. The spine road is anticipated to carry approximately 12,000 vehicles per day at Build Out. This volume approaches the threshold for a four-lane roadway. Further analysis and continuing discussions with the property owners south of William Road will be required.

The traffic impact study indicates where turn lane warrants may be met based on traffic volume triggers. However, at some locations, right-of-way constraints, or other physical constraints may limit the ability to construct these turn lanes.

As indicated above, the recommendations for Phase 1 and Build Out should be anticipated, but not constructed. They should be subject to an updated analysis at the development plan stage when the site plan is more refined.

Traffic signals are not preliminarily warranted at Saliman/Robinson or at the new 5th Street/Spine Road intersection. However, at the development plan stage, another signal warrant analysis should be conducted at these intersections.

A preliminary queuing analysis for the Phase 1 condition indicate that there a few existing turn lanes that should be extended to accommodate 95% queues, as calculated in the capacity analysis. However, this should be reanalyzed at the development plan stage.

Sidewalks and bike lanes exist along several of the project roadways. Sidewalks and bike lanes should be constructed along the spine road and wherever improved connectivity is required.

Adequate sight distance meeting Carson City requirements at the project intersections must be provided.

All signs and pavement markings must conform to the *MUTCD* and Carson City requirements.

2. Proposed Development

Site Location and Site Plan

The project is in Carson City. It is along both sides of US 395, between Saliman Road and Airport Road, and between US 50 and 5th Street. The existing site is generally undeveloped.

Land Use and Intensity

Land uses are conceptual at this time, but may include single family residential units, multi-family residential units and commercial and retail uses. The site is now zoned A (Agricultural) and the developer is submitting a rezoning application for Specific Plan for the entire site. The projected land uses may generate over 27,600 trips per day at build out. The conceptual land uses are listed in Exhibit 3.

Site Access

Access is proposed from the existing roadway network along Saliman Road, 5th Street, William Street and Airport Road. A new north-south internal spine road is proposed to be constructed between 5th Street to US 50, via the existing Gold Dust Casino entrance road and intersecting US 50 at the existing signalized intersection. Robinson Road is also proposed to be extended to the east to intersection with the new spine road.

Access Geometrics

Access geometrics are not defined at this time, although driveway design and driveway spacing and corner clearance will be done based on Carson City standards. The conceptual plan does not identify driveway locations, but when the plan is refined, the number of access locations on the arterials and collectors should be limited to reduce potential conflicts. The location of the access locations should also be opposite existing driveways or at sufficient distances from nearby driveways to reduce crash potential associated with closely spaced access points. For the purposes of this study, we assumed two driveways on Saliman Road, two on Robinson Street, one on 5th Street, two on Airport Road and three on the new spine road (at build out).

Development Phasing and Timing

For the purposes of this analysis, the project is projected to be built out by 2035. This year aligns with the horizon year associated with the current Regional Transportation Plan. However, it is likely that the project will be phased. For the purpose of this analysis, we have assumed that approximately 25% of the total project will be occupied by the year 2020. Carson City Department of Development Services provided travel demand model data for existing (Year 2013), year 2020 and year 2035 conditions.

3. Study Area Conditions

Study Area

The study area includes the intersections of Saliman Road/William Street, Saliman Road/Robinson Avenue, Saliman Road/5th Street, William Street/US 50, William Street/Gold Dust Casino, US 50/Airport Road, 5th Street/Airport Road. These intersections are adjacent to the project site. The analysis also includes a planning level capacity analysis of the segments of Saliman Road, 5th Street, William Street, Airport Road and Robinson Street in the vicinity of the project site. Aerial photos provided by the Carson City GIS map are in Exhibit 4.

Exhibit 4 Intersection Aerial Photos



Saliman-5th Intersection



Saliman-Robinson Intersection



Saliman-William Intersection



William-Gold Dust Casino Intersection



US 395-US 395 Traffic Interchange



US 50-Airport Road



5th Street-Airport Road

Land Use

Existing Land Use

The project site is a working ranch with a residential building north of 5th Street and west of US 395. Most of the remaining project area is vacant.

Carson City High School is located on the northeast corner of the Saliman Road/Robinson Street intersection. High school buses are currently parked along the east side of the high school within the project area. The Gold Dust Casino and commercial and retail shops are north of the project area. There are residential areas east, west, and north of the project area. Another section of Lompa Ranch is south of 5th Street and is not part of this project.

Site Accessibility

Access is proposed from the existing roadway network along Saliman Road, 5th Street, William Street, Robinson Street and Airport Road.

4. Analysis of Existing Conditions

Physical Characteristics

Roadway Characteristics

Exhibit 5 is an inventory of the physical features and recorded volumes of the project area roadways.

Saliman Road is a north/south minor arterial with a posted speed limit of 35 mph. Between William Street and 5th Street, it has a five-lane cross-section with two through lanes in each direction and a two-way left turn lane. In the vicinity of the project, it has bike lanes and sidewalks on each side.

William Street is an urban east/west minor arterial with a posted speed limit of 40 mph. East of Saliman Street, it has a five-lane cross-section with two through lanes in each direction and a two-way left turn lane. As it approaches US 395, prior to the Gold Dust Casino, it transitions to a six-lane road with a raised median, and continues with this cross section to the east side of US 395. In the vicinity of the project, it has bike lanes on each side. On the east side of US 395 it becomes US Highway 50.

Robinson Street is a two-lane local road on both sides of Saliman Road. On the west side, it provides access to a residential area and has a posted speed limit of 25 mph. On the east side of Saliman Road, it is the primary access to Carson High School, and has a posted speed limit of 15 mph. It extends east into the Lompa Ranch area and terminates approximately 2,000 feet from Saliman Road.

US 50 continues from William Street as an urban east/west principal arterial with a posted speed limit of 40 mph. It has a six-lane cross-section with a raised median for about 900 feet from its interchange with US 395. It then transitions to a five-lane cross section with a two-way left turn lane. In the vicinity of the project, it has bike lanes on each side.

Airport Road is a residential collector near US 50 with a speed limit of 25 mph. It has 2 lanes with sidewalks. It serves retail and commercial services near US 50 and continues through a residential neighborhood to Butti Way. South of Butti Way to its intersection with 5th Street, the speed limit is 35 mph. It provides access to Carson City municipal services in the vicinity of Butti Lane.

5th Street is a two-lane east-west collector that runs along the south border of the project area. It has a speed limit of 40 mph and has bike lanes and sidewalks.

Transit Service

Jump Around Carson (JAC) is the public transit system in Carson City. Routes 2A and 2B (North Town, Clockwise and Counterclockwise West/East Carson Area) provide service on Airport Road south of US 50.

Bicycle/Pedestrian Facilities

There are several roads with striped bike lanes in the vicinity of the project, including Saliman Road, William Street, US 50 and 5th Street. Saliman Road, Airport Road, 5th Street and Robinson Street all have sidewalks on all or part of their segments.

Traffic Control Devices

The study area intersections of Saliman Road/William Street, Saliman Road/5th Street, William Street/Casino, William Street/US 50/US 395 are signal controlled. Saliman Road/Robinson Street and 5th Street/Airport Road are stop sign controlled intersections.

Exhibit 5 Roadway Inventory – Existing Conditions

Roadway Segment	Lanes	Recorded ADT	LOS D Threshold	Speed Limit	Bike Route	JAC Bus Route	Sidewalks
Saliman Road: 5th Street to William Street	5	6,100	29,160	35	Yes	No	Yes
William Street: Saliman Road to US 395	5	22,500	35,820	40	Yes	No	No
US 50: US 395 to Airport Road	5	26,500	39,800	40	Yes	No	No
Airport Road: US 50 to Butti Way	2	4,600	14,800	25	No	Yes	Yes
Airport Road: Butti Way to 5th Street	2	2,500	11,840	35	No	No	No
5th Street: Saliman Road to Airport road	2	5,900	17,700	40	Yes	No	Yes
Robinson Street: East of Saliman Road	2	<2,000	11,840	15	No	No	Yes
Robinson Street: West of Saliman Road	2	<2,000	11,840	25	No	No	Yes

ADTs from *State of Nevada Department of Transportation*

Annual Average Daily Traffic Count Stations

LOS D Thresholds from *Florida Department of Transportation Generalized Annual Average Daily Volumes for Florida's Urbanized Areas*

Traffic Volumes

The State of Nevada Department of Transportation publishes annual average daily traffic (ADT) counts on their website. Year 2014 counts for roadway segments in the vicinity of the project area are shown in Exhibit 5, Roadway Inventory. The ADTs on all roads are well below their Level of Service D capacity thresholds. Segment performance has been estimated using the planning methods contained in the Florida Department of Transportation Level of Service Handbook¹. Segment performance is often overshadowed when intersection performance when signals are closely spaced.

Carson City staff provided am and pm peak hour traffic demand model counts for the study area signalized intersections. Peak hour turning movement counts were collected at the intersections of Saliman Road/Robinson Street, William Street/Casino Road and 5th Street/Airport Road the week of November 30th.

Peak hour traffic data are shown in Exhibit 6.

Level of Service

Level of service is a qualitative description of how well a roadway or intersection operates under prevailing traffic conditions based on traffic volumes, capacity and intersection delay. A grading system of A through F, similar to academic grades, is utilized. LOS A is free-flowing traffic, whereas LOS F is forced flow and extreme congestion. LOS D is generally accepted as the standard in urbanized areas although LOS E is sometimes accepted in more congested areas.

Roadway Performance

Exhibit 5, Roadway Inventory, provides a summary of ADT, current roadway capacity, and whether the segments operate under or over the LOS D capacity for the roadway.

¹ Florida Department of Transportation Generalized Annual Average Daily Volumes for Urbanized areas contained in *Quality / Level of Service Handbook, 2012*

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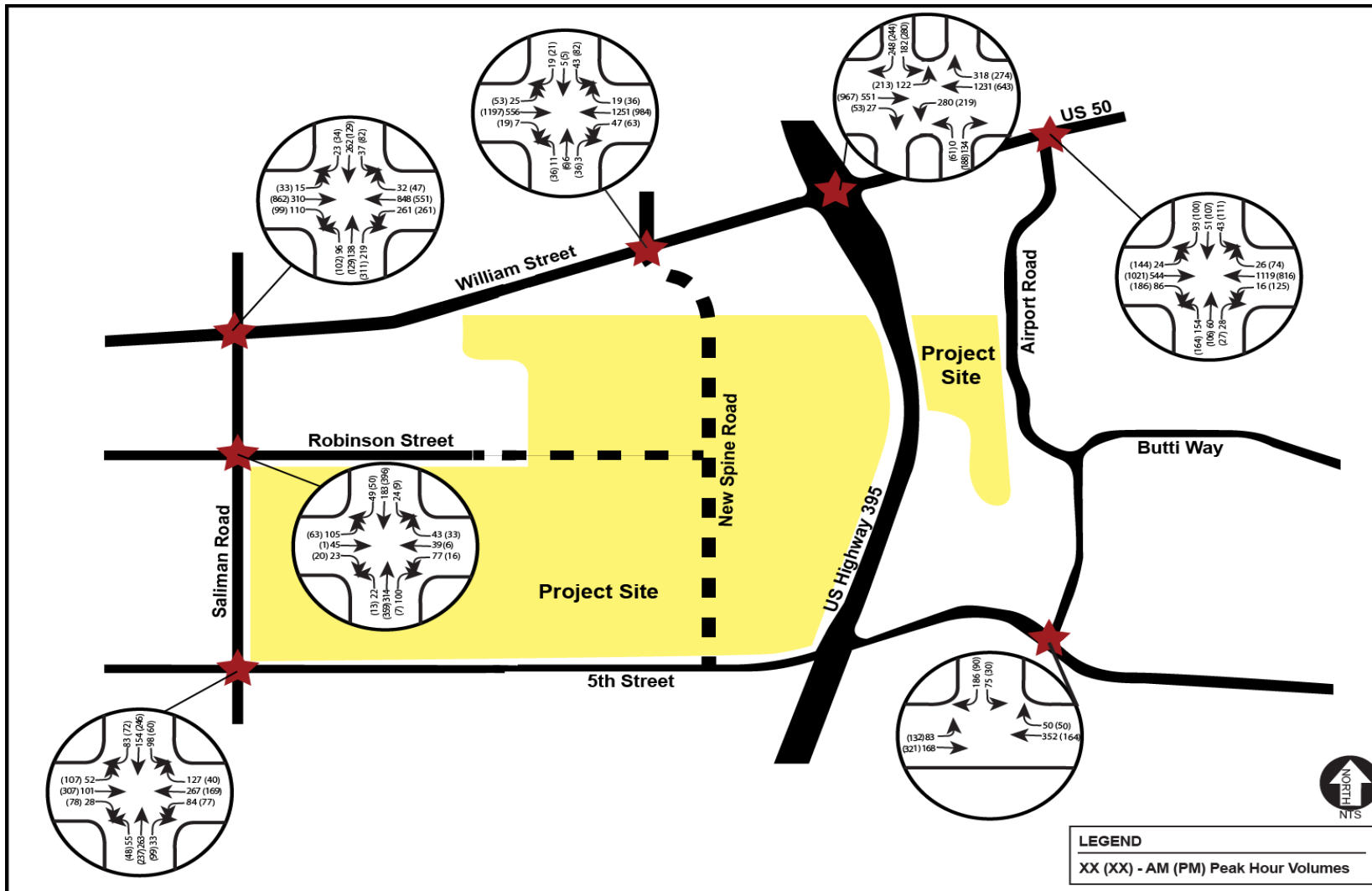
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Exhibit 6 Existing Peak Hour Volumes



Intersection Performance

Under existing conditions, all intersections in the study area operate at LOS D with all lane movements operating at LOS D or better during the morning and afternoon/evening peak hours. The results are shown in Exhibit 7.

Exhibit 7 Intersections Performance (Existing Conditions)

Saliman Road/William Street	Existing 2015			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound William Street				
Left	28.9	C	29.6	C
Through	15.1	B	18.6	B
Right	13.8	B	12.3	B
<i>Approach</i>	15.2	B	18.4	B
Westbound William Street				
Left	28.3	C	38.1	D
Through	14.8	B	11.5	B
Right	10.0	B	9.6	A
<i>Approach</i>	17.8	B	19.5	B
Northbound Saliman Road				
Left	12.8	B	15.8	B
Through	12.5	B	15.4	B
Right	12.1	B	16.1	B
<i>Approach</i>	12.4	B	15.9	B
Southbound Saliman Road				
Left	18.4	B	23.4	C
Through/Right	19.6	B	21.5	C
<i>Approach</i>	19.5	B	22.1	C
Intersection	16.5	B	18.6	B

Saliman Road/Robinson Street	Existing 2015			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound Robinson Street				
Left	21.2	C	14.0	B
Through/Right	16	C	10	B
<i>Approach</i>	19.1	C	13	B
Westbound Robinson Street				
Left	21.9	C	12.4	B
Through/Right	14.4	B	10.4	B
<i>Approach</i>	18.1	C	11	B
Northbound Saliman Road				
Left	7.8	A	8.4	A
Southbound Saliman Road				
Left	8.3	A	8.1	A

Exhibit 7 (cont.) Intersections Performance (Existing Conditions)

Saliman Road/5th Street	Existing 2015			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound 5th Street				
Left	6.3	A	6.6	A
Through/Right	5.9	A	6.3	A
Approach	6.0	A	6.4	A
Westbound 5th Street				
Left	6.3	A	6.5	A
Through/Right	8.3	A	6.6	A
Approach	7.9	A	6.5	A
Northbound Saliman Road				
Left	7.9	A	6.9	A
Through/Right	8	A	7.1	A
Approach	8	A	7.1	A
Southbound Saliman Road				
Left	8.7	A	7.1	A
Through/Right	7.8	A	7.1	A
Approach	8	A	7.1	A
Intersection	7.7	A	6.8	A

William Street/Casino Road	Existing 2015			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound William Street				
Left	17.1	B	15.5	B
Through/Right	14.8	B	17.9	B
Approach	14.9	B	17.8	B
Westbound William Street				
Left	11.1	B	17.6	B
Through/Right	22.1	C	15.6	B
Approach	21.7	C	15.7	B
Northbound Casino Road				
Left	12.3	B	11.7	B
Through/Right	12.2	B	11.3	B
Approach	12.3	B	11.5	B
Southbound Casino Road				
Left	13.0	B	11.6	B
Through/Right	12.3	B	11.2	B
Approach	12.7	B	11.4	B
Intersection	19.3	B	16.6	B

Exhibit 7 (cont.) Intersections Performance (Existing Conditions)

US 50/Airport Road	Existing 2015			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound US 50				
Left	30.6	C	41.6	D
Through	12.5	B	15.9	B
Right	10.6	B	10.7	B
Approach	12.9	B	17.9	B
Westbound US 50				
Left	39.1	D	39	D
Through	23.5	C	19.5	B
Right	11.1	B	13.5	B
Approach	23.5	C	19.6	B
Northbound Airport Road				
Left	15.6	B	20.7	C
Through/Right	19	B	23.7	C
Approach	16.8	B	22	C
Southbound Airport Road				
Left	19.9	B	21.2	C
Through	22.1	C	24.4	C
Right	21.5	C	22.5	C
Approach	21.3	C	22.7	C
Intersection	19.5	B	19.4	B

US 50/US 395	Existing 2015			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound US 50				
Left	17.3	B	21.4	C
Through	7.4	A	9.7	A
Approach	9.6	A	12.6	B
Westbound US 50				
Left	18.7	B	15.3	B
Through	7.3	A	8.6	A
Approach	9.9	A	10.1	B
Northbound US 395				
Left	18.8	B	15.9	B
Approach	18.8	B	15.9	B
Southbound US 395				
Left	0.0	A	13.6	B
Approach	0	A	13.6	B
Intersection	10.6	B	12.0	B

5th Street/Airport Road	Existing 2015			
	AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound 5th Street				
Left	8.5	A	8.0	B
Southbound Airport Road				
Left	19.0	C	18.5	C
Right	13.2	B	9.9	A
Approach	14.9	B	12.1	B

5. Projected Traffic

Site Traffic Forecasting

Trip Generation

The future traffic from the project is estimated using the trip rates contained in the Institute of Traffic Engineers' *Trip Generation Handbook*, 9th Edition. The number of trips generated is the mathematical product of land use intensity (building square footage, number of dwelling units, etc.) and the trip generation rate. The result is the total number of one-way trips (not round trips) expected to be generated by the project. These trips represent the number of vehicles estimated to enter and leave the project.

The densities of the land uses are conceptual at this time, but the trip generation for conservative numbers of homes, apartments and commercial areas was estimated.

We applied average trip rates from the *Trip Generation Handbook* to estimate trip generation for the residential (single family dwelling units for the MDR and apartments for the HDR) and commercial (shopping center) uses. Exhibit 8 shows the trip rates and estimated trip generation. Based on the average trip rates for the project land uses, and an estimate of the residential lots and units by the developer, the project generates approximately 7,000 daily trips, 460 AM peak hour trips and 680 PM peak hour trips in Phase 1. At build out, the project is estimated to generate 27,600 daily one-way trips, 1,400 AM peak hour trips and 2,600 PM peak hour trips.

The *Trip Generation Handbook* also provides guidance on pass-by and diverted trip percentages for several land uses. The *Trip Generation Handbook* includes pm peak hour pass-by rates for the land use, Shopping Center. However due to the conceptual nature of the land uses, we did not consider these reductions.

Trip Distribution and Assignment

Trip distribution and assignment is somewhat premature given the conceptual level of the project. The completion of the southern section of US 395 will also change traffic patterns in the project vicinity. However, an estimated distribution of site trips is illustrated in Exhibit 9. Site trips would be distributed to the adjacent roads and beyond, including US Highway 395.

The number of site trips added to the adjacent and nearby roadway system would be dependent on the densities of the residential and commercial parcels. These would be further refined at the development plan stage.

We assigned the daily site traffic as shown in Exhibits 10 (Phase 1) and Exhibit 11 (Phase 2). The site trips at the project driveways and the off-site intersections are shown in Exhibits 12 and 13 for Phase 1 only. We did not assign peak hour trips at build out because it would be premature to do so at this time. This should be done at the development plan stage.

Exhibit 8 Trip Rates and Trip Generation

Trip Generation Rates

Parcel	Proposed Use	Unit	No.Units	ITE Categ.	Weekday AM		Weekday PM		Avg Weekday	
					In	Out	In	Out	In	Out
A	Shopping Center - North (13.2 Acres at 0.20 FAR)	1000 SF	115	820	0.96 62% 38%	3.71 48% 52%	42.7 50% 50%			
B	Apartments- North (17.31 Acres)	DU	350	220	0.51 20% 80%	0.62 65% 35%	6.65 50% 50%			
C	Shopping Center - South (4.1 Acres at 0.20 FAR)	1000 SF	35.72	820	0.96 62% 38%	3.71 48% 52%	42.7 50% 50%			
D	Residential - Single Family Dwelling (44.55 Acres)	DU	200	210	0.75 25% 75%	1.00 63% 37%	9.52 50% 50%			
E	Apartments- North (17.5 Acres)	DU	350	220	0.51 20% 80%	0.62 65% 35%	6.65 50% 50%			
F	Shopping Center - South (10.0 Acres at 0.20 FAR)	1000 SF	87.12	820	0.96 62% 38%	3.71 48% 52%	42.7 50% 50%			
G	Residential - Single Family Dwelling (26.4 Acres)	DU	150	210	0.75 25% 75%	1.00 63% 37%	9.52 50% 50%			
H	Residential - Single Family Dwelling (41.51 Acres)	DU	250	210	0.75 25% 75%	1.00 63% 37%	9.52 50% 50%			
I	Residential - Single Family Dwelling (28.8 Acres)	DU	130	210	0.75 25% 75%	1.00 63% 37%	9.52 50% 50%			
J	Apartments- South (16.1 Acres)	DU	200	220	0.51 20% 80%	0.62 65% 35%	6.65 50% 50%			
K	Residential - Single Family Dwelling (21.1 Acres)	DU	150	210	0.75 25% 75%	1.00 63% 37%	9.52 50% 50%			
L	Shopping Center - South (8.3 Acres at 0.20 FAR)	1000 SF	72.31	820	0.96 62% 38%	3.71 48% 52%	42.7 50% 50%			

Trip Generation

Parcel	Proposed Use	Unit	No. Units	Weekday AM		Weekday PM		Avg Weekday	
				In	Out	In	Out	In	Out
A	Shopping Center - North (13.2 Acres at 0.20 FAR)	1000 SF	115	110	427	4,910			
B	Apartments- North (17.31 Acres)	DU	350	68 42	205 222	2,455 2,455			
				179	217	2,328			
				36 143	141 76	1,164 1,164			
C	Shopping Center - South (4.1 Acres at 0.20 FAR)	1000 SF	35.72	34	133	1,525			
				21 13	64 69	763 763			
D	Residential - Single Family Dwelling (44.55 Acres)	DU	200	150	200	1,904			
				38 113	126 74	952 952			
E	Apartments- North (17.5 Acres)	DU	350	179	217	2,328			
				36 143	141 76	1,164 1,164			
F	Shopping Center - South (10.0 Acres at 0.20 FAR)	1000 SF	87.12	84	323	3,720			
				52 32	155 168	1,860 1,860			
G	Residential - Single Family Dwelling (26.4 Acres)	DU	150	113	150	1,428			
				28 84	95 56	714 714			
H	Residential - Single Family Dwelling (41.51 Acres)	DU	250	188	250	2,380			
				47 141	158 93	1,190 1,190			
I	Residential - Single Family Dwelling (28.8 Acres)	DU	130	98	130	1,238			
				24 73	82 48	619 619			
J	Apartments- South (16.1 Acres)	DU	200	102	124	1,330			
				20 82	81 43	665 665			
K	Residential - Single Family Dwelling (21.1 Acres)	DU	150	113	150	1,428			
				28 84	95 56	714 714			
L	Shopping Center - South (8.3 Acres at 0.20 FAR)	1000 SF	72.31	69	268	3,088			
				43 26	129 139	1,544 1,544			
Totals - Phase 1 Only				460	680	6,994			
				119 341	413 267	3,497 3,497			
Totals - Build Out				1,417	2,589	27,606			
				441 975	1,469 1,119	13,803 13,803			

Note: Phase 1 trips shown in **Bold Italic**. DU = Dwelling Unit; FAR = Floor Area Ratio

Exhibit 9 Site Traffic Distribution Percentages

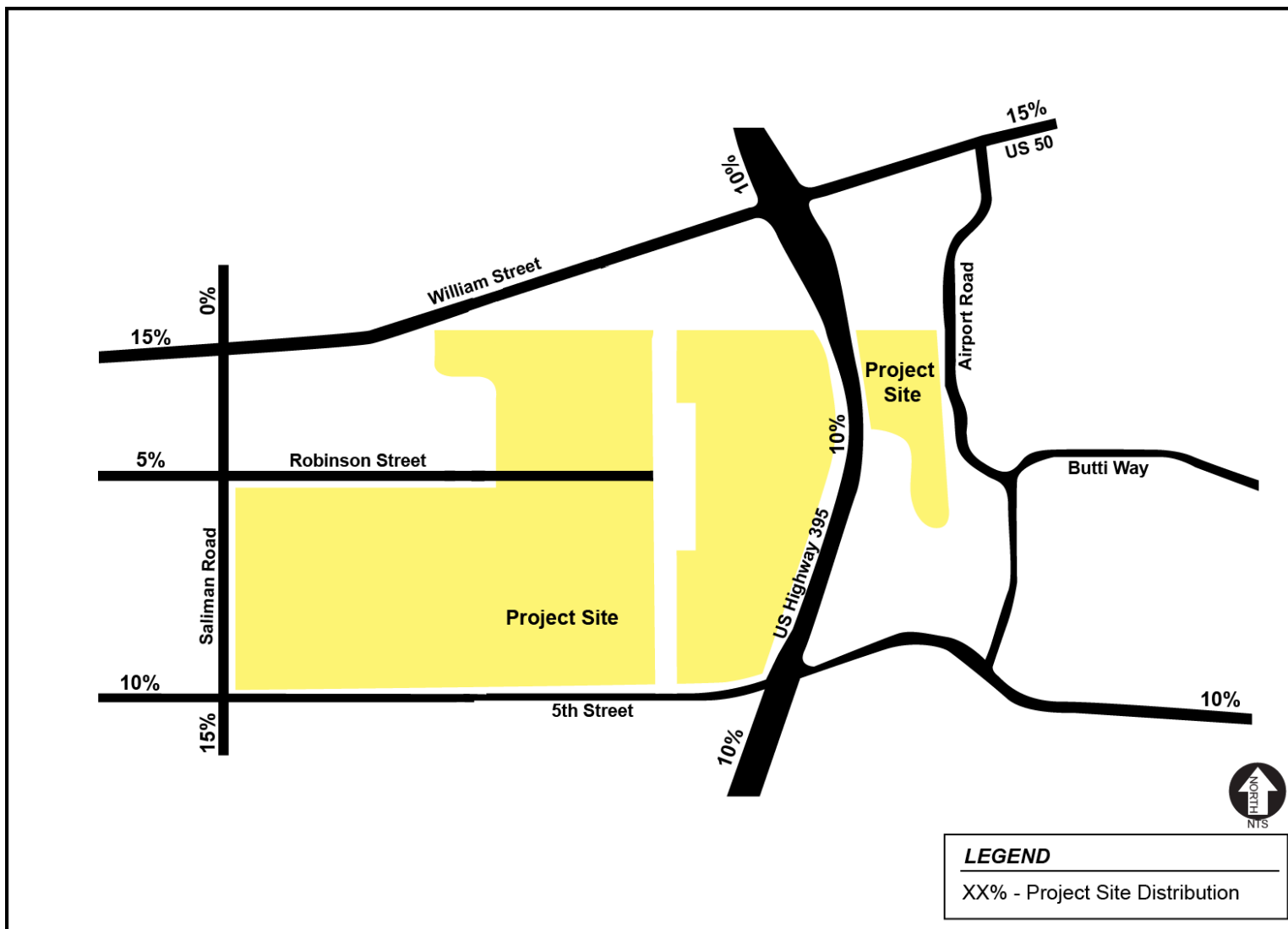


Exhibit 10 Site Traffic Distribution – Phase 1 ADTs

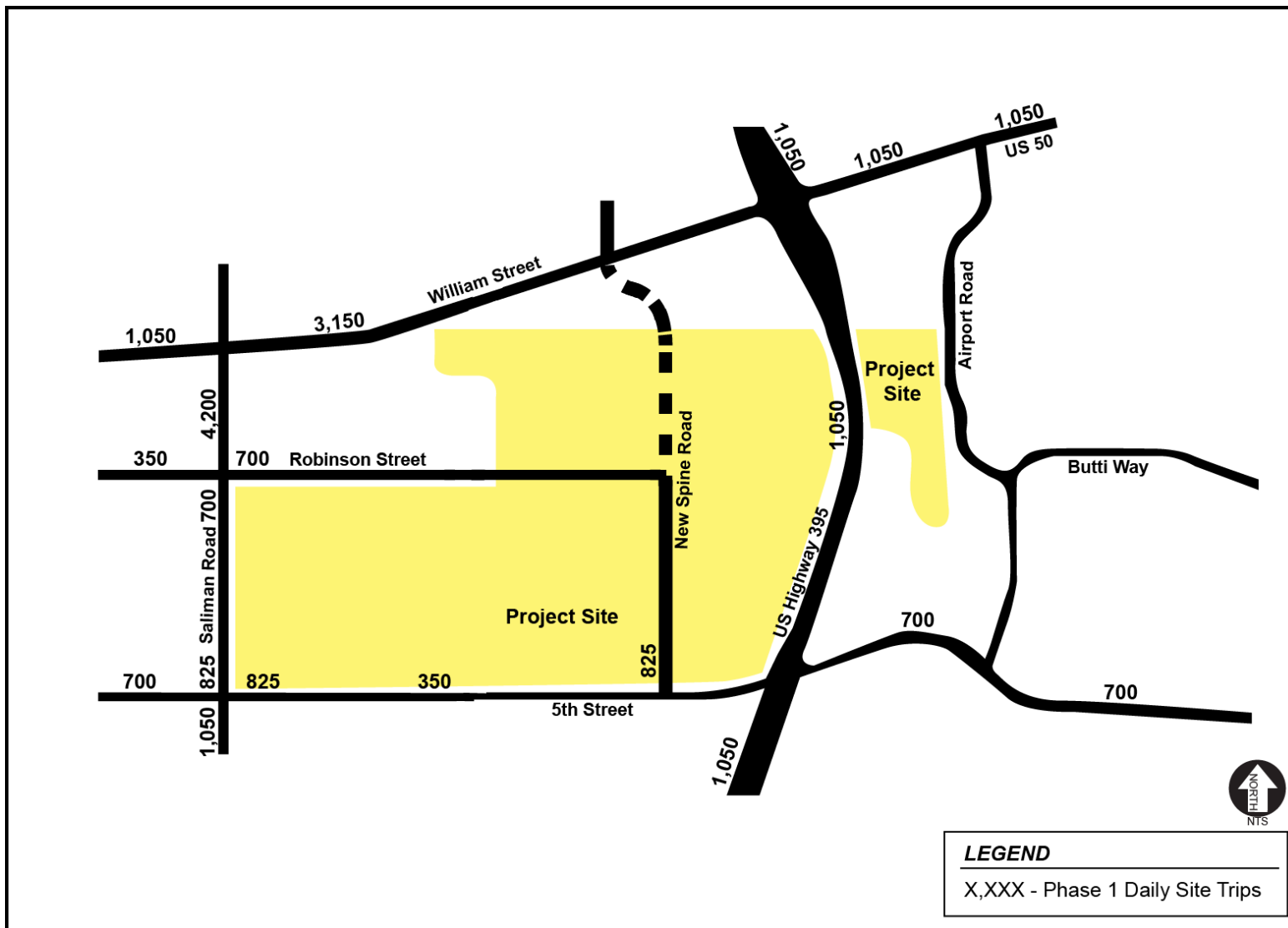


Exhibit 11 Site Traffic Distribution – Build out ADTs

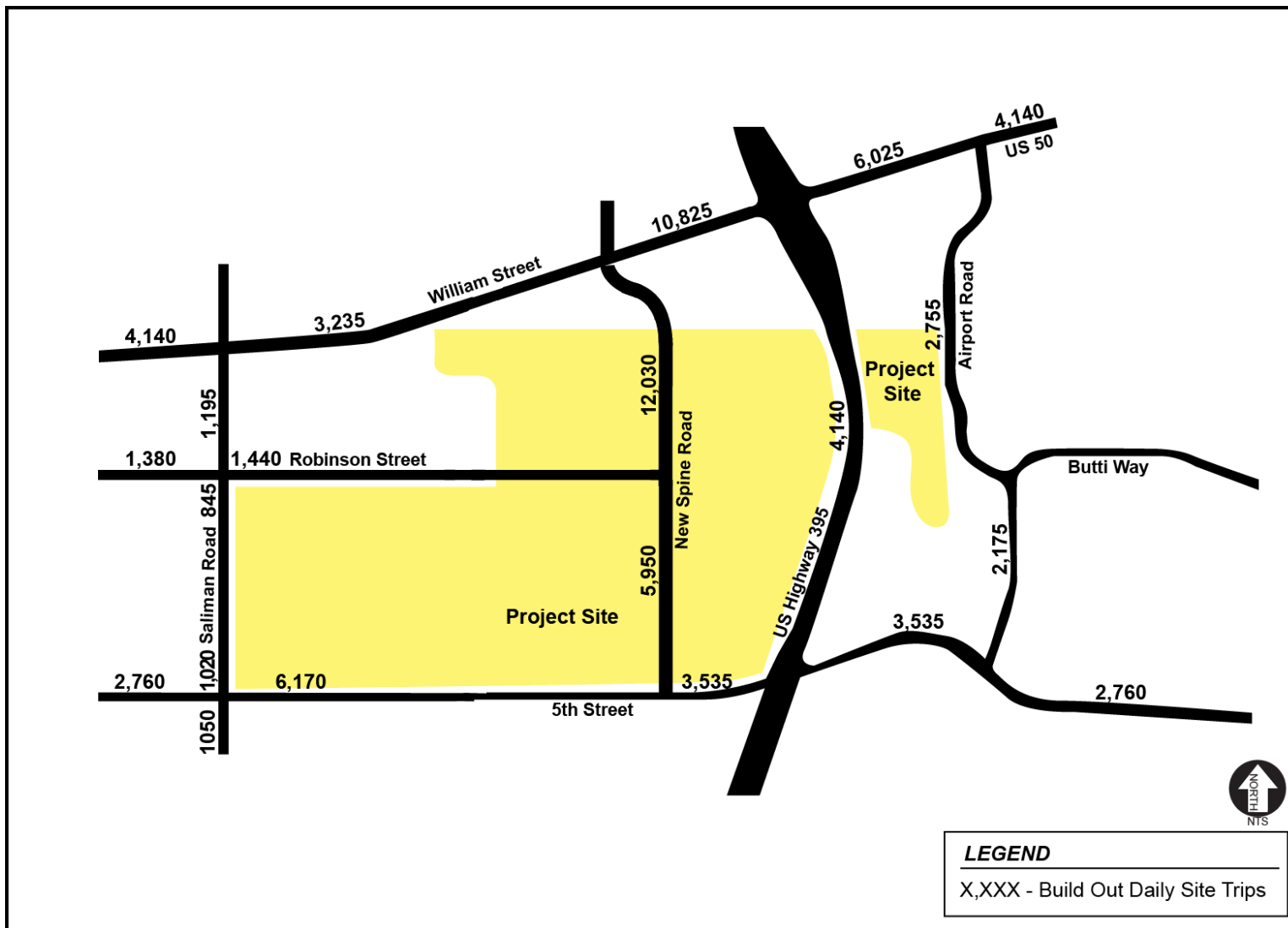


Exhibit 12 Site Trips – Project Intersections (Phase 1)

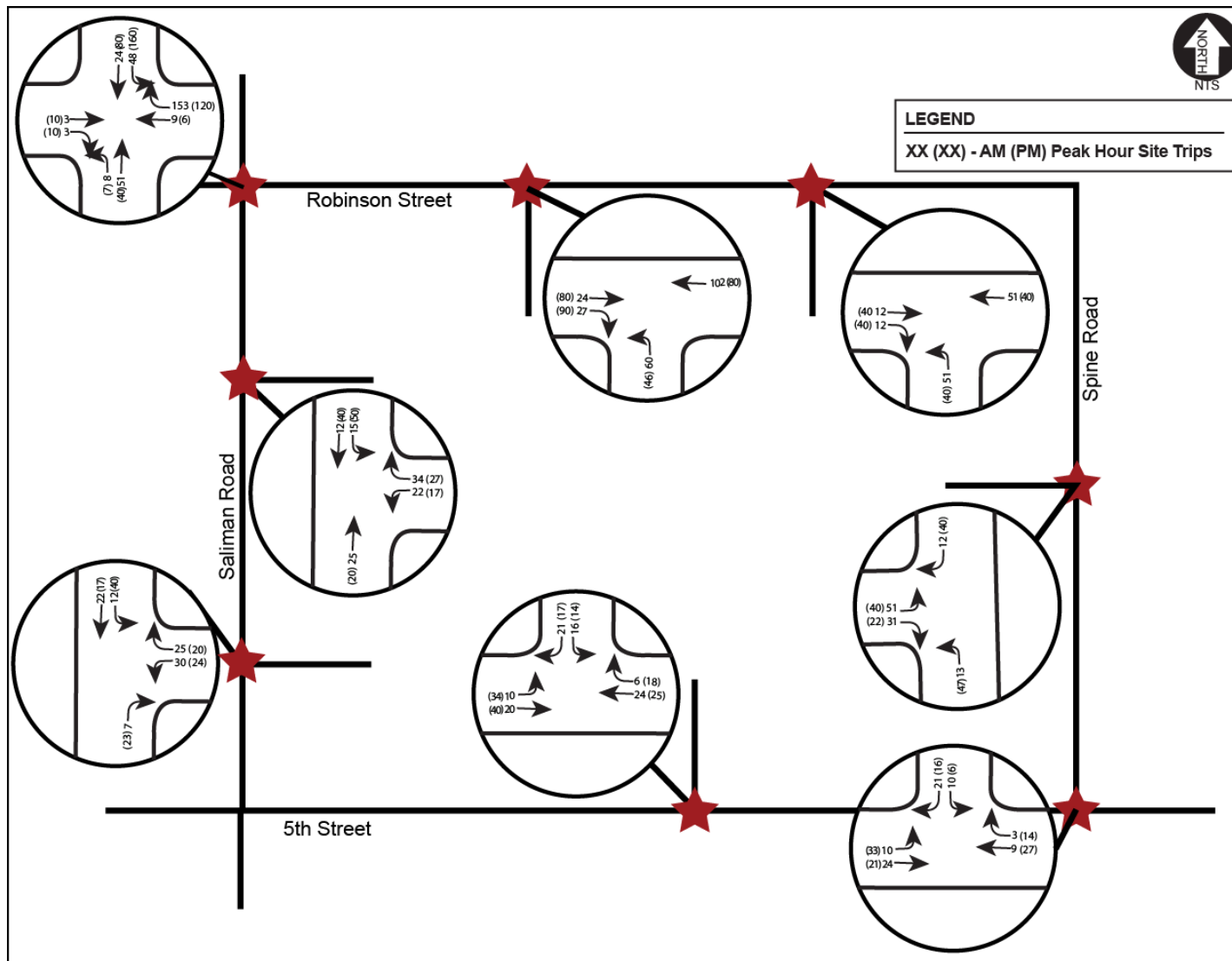
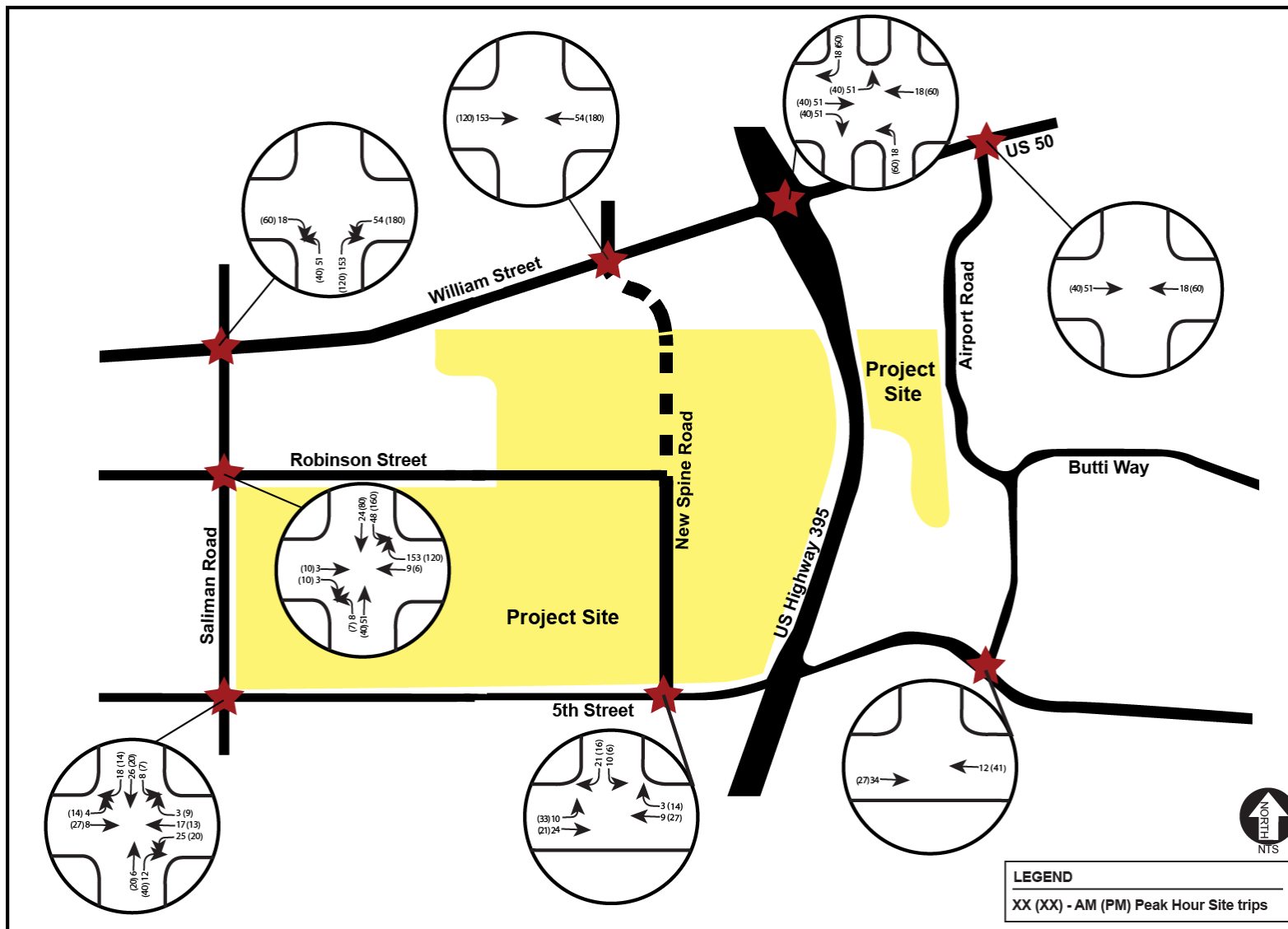


Exhibit 13 Site Trips – Project Off-Site Intersections (Phase 1)



Non-Site Traffic Forecasting

Projections of Non-Site Traffic

The Carson Area Metropolitan Planning Organization's (CAMPO) travel demand model projects traffic volumes on city streets and intersections for the horizon years of 2020 and 2035. This model did not include the number of residential and commercial units proposed for this Lompa Ranch project, although a moderate increase in residential, and non-residential units was included in the year 2020 and year 2035 forecasts.

The demographic data estimates for the CAMPO model include a modest growth of about 45 new single family households and 31 new multi-family residential units in the Lompa Ranch study area by the year 2020². A total of 120 and 83 new single-family and multi-family units are projected in the CAMPO model within the project study area by the year 2035. The CAMPO model includes two-thousand (2,000) new square feet of retail development, and a total of 5,000 new square feet of retail development by the year 2035.

Comparatively for this project, the conservative estimate of residential units, both single family and apartments, is almost 1,800. The projected commercial use in the project area is approximately 310,000 square feet. For the purposes of this report, we have reported the 2020 travel demand model volumes at the project intersections assuming that the modest growth would still occur for these years in the absence of this project. Exhibit 14 shows the future turning movement intersection counts under the no-project condition for the Phase 1 year 2020.

Total Traffic

Site traffic volumes associated with the Lompa Ranch Development were added to the background traffic. Because the proportion of residential and commercial units is small in the CAMPO model within the project area to the proposed number of units for this project, we did not subtract the CAMPO model residential and commercial units from the projected residential and non-residential units.

The resulting total peak hour turning volumes at the project intersections are illustrated in Exhibit 15.

² The area includes the CAMPO RTP transportation analysis zones (TAZ) 67, 138, 139, 140 and 141.

Exhibit 14 2020 Peak Hour Intersection Volumes – Without Project

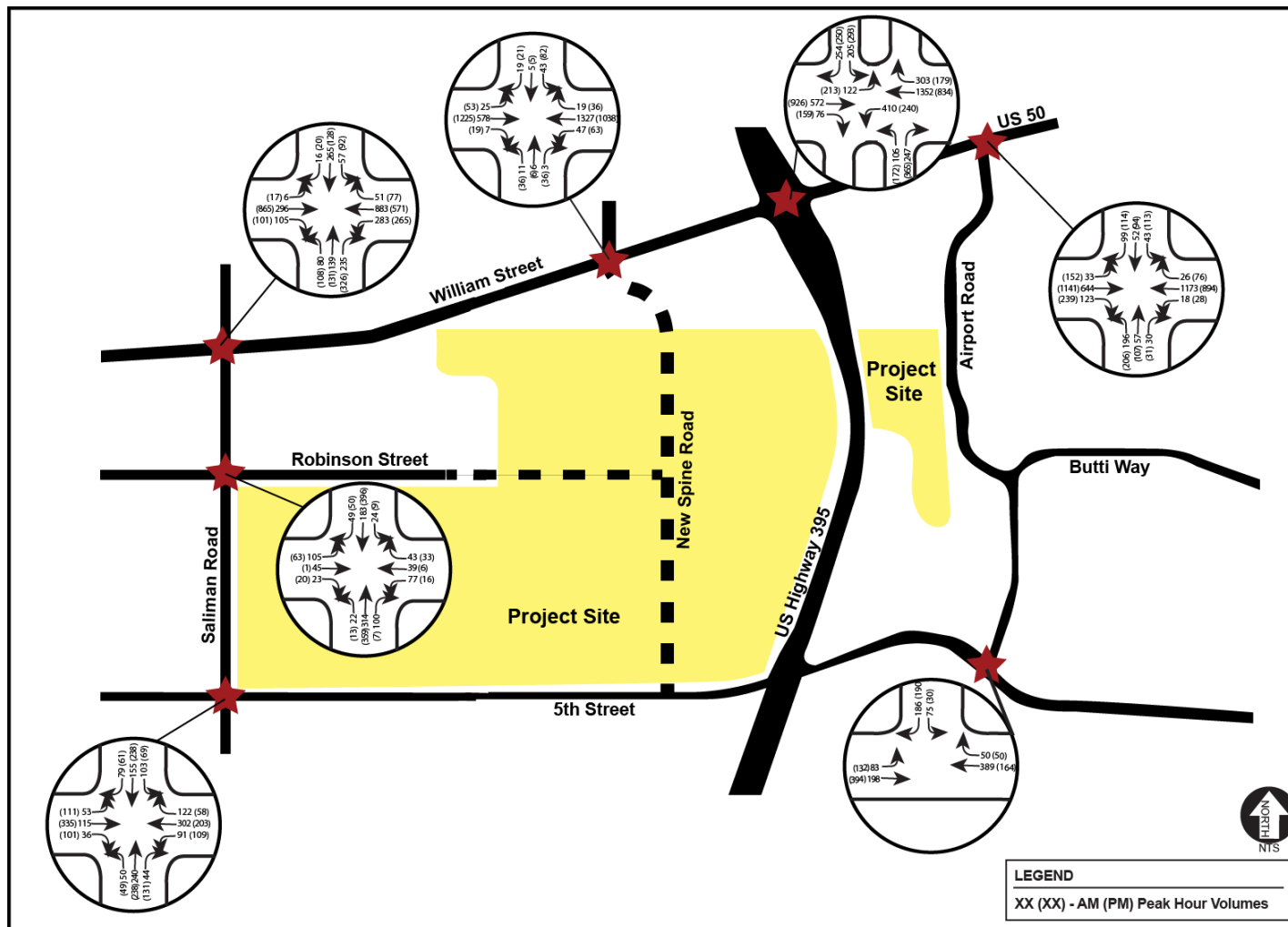
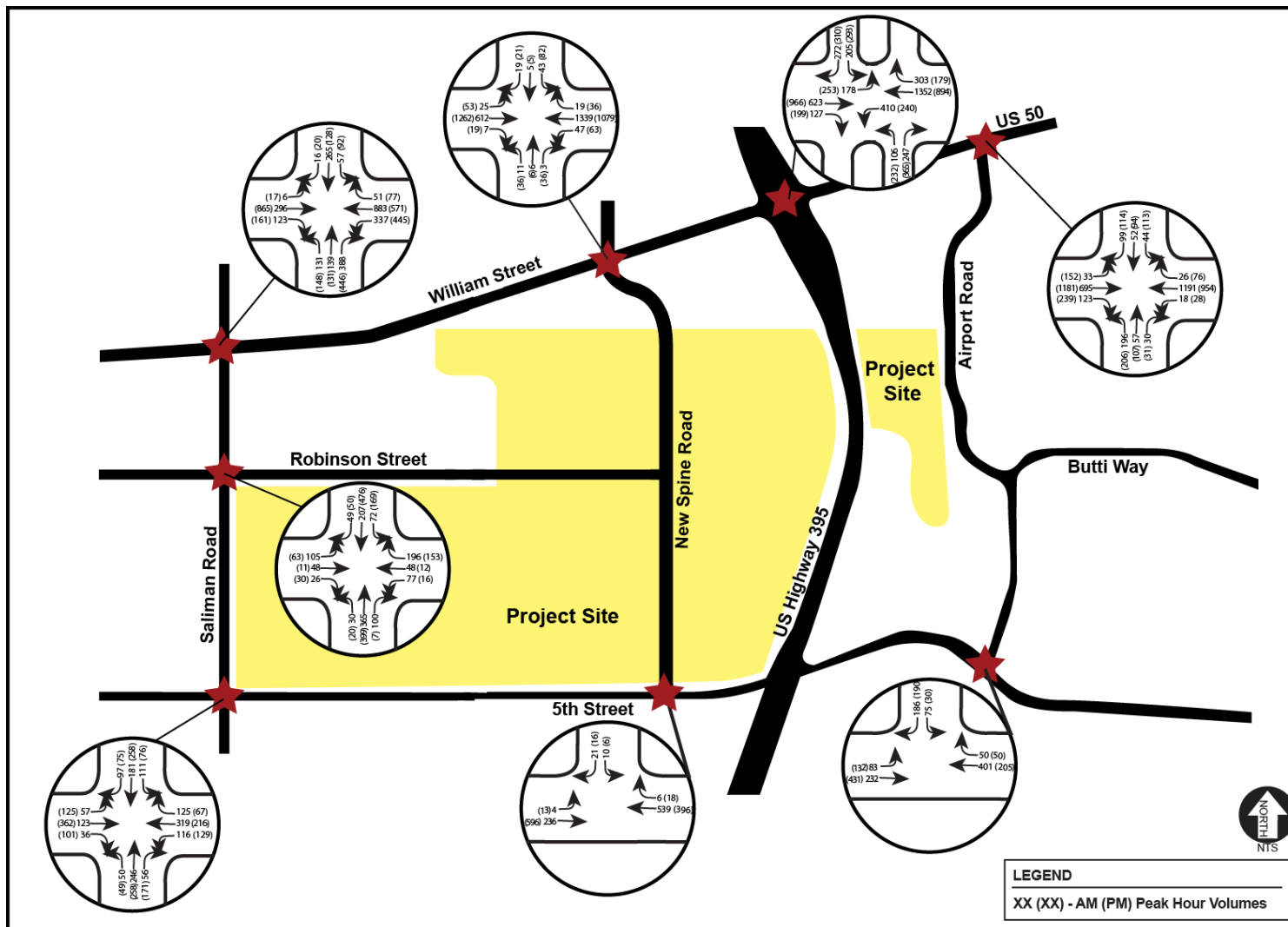


Exhibit 15 2020 With Project Peak Hour Volumes



6. Traffic and Improvement Analysis

Level of Service Analysis

Roadway Performance

Exhibit 16 summarizes the new ADT and daily volume capacity (LOS D) of the roadway segment with and without the project in 2020 and 2035. The year 2020 with project volumes include the addition of Phase 1 site trips. The year 2035 With Project volumes include the site trips at build out. The build out daily site trips were distributed to the adjacent roadways, and assumes that the spine road is fully constructed between William Street and 5th Street. As such, the segment with the highest site trip volume is William Street east of the spine road.

The table show that all roads, with the exception of US 50, will operate at LOS D or better based on the FDOT LOS D thresholds. The west section of US 50 from US 395 to Airport Road is a six lane road that transitions to a four-lane road about halfway to Airport Road. The four-lane section is expected to exceed the LOS D threshold (35,820 vehicles per day) for a four-lane roadway by the year 2020 even without the project.

Exhibit 16 Future Roadway Volumes and Capacity

Roadway Segment	LOS D Threshold	2020 Site Trips	2035 Site Trips	2020 ADT (No Project)	2020 ADT (With Project)	2035 ADT (No Project)	2035 ADT (With Project)
Saliman Road: 5th Street to William Street	29,160	4200	1200	8,000	12,200	9,400	10,600
William Street: Saliman Road to 1000' east of Saliman	35,820	3150	3235	24,400	27,550	26,200	29,435
William Street: 1000' feet east of Saliman Road to US 395	53,910	3150	10825	24,400	27,550	26,200	37,025
US 50: US 395 to 900' east of US 395	53,910	1050	6025	36,300	37,350	39,200	45,225
US 50: 900' east of US 395 to Airport Road	35,820	1050	6025	36,300	37,350	39,200	45,225
Airport Road: US 50 to Butti Way	14,800	0	2725	8,200	8,200	8,400	11,125
Airport Road: Butti Way to 5th Street	11,840	0	2175	2,100	2,100	2,300	4,475
5th Street: Saliman Road to Airport Road	17,700	825	6170	5,500	6,325	6,500	12,670
Robinson Street: East of Saliman Road	11,840	350	1380	100	450	200	1,580
Robinson Street: West of Saliman Road	11,840	700	1440	2,200	2,900	2,600	4,040

ADTs from *State of Nevada Department of Transportation Annual Average Daily Traffic Count Stations*

LOS D Thresholds from *Florida Department of Transportation (FDOT) Generalized Annual Average Daily Volumes for Florida's Urbanized Areas*

Intersection Performance

For the year 2020, we analyzed the project intersections with and without project trips. For the “without project” scenario, we included the available traffic volumes from the CAMPO travel demand model. For the intersections for which there are no modeled volumes, (Saliman Road/Robinson Street, William Street/Gold Dust Casino and 5th Street/Airport Road), we reviewed both existing data at the intersections and the 2020 model volumes at the nearby intersections to estimate the turning movement volumes.

The results for the peak hour intersection analysis are provided in Exhibit 17. Although we assigned site traffic to a number of potential driveway locations on Robinson, Saliman, 5th Street and Airport Road, we did not analyze conditions at the project driveways since the number and location of the driveways are not yet defined.

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As shown in the summary tables all intersections will operate at LOS D or better with the Phase 1 project traffic added through 2020.

Because the year 2035 site traffic projections for the study area intersections would be speculative at best, we did not conduct a similar intersection analysis for this horizon year.

Exhibit 17 Intersections Performance – Year 2020

Saliman Road/William Street	2020 No Project				2020 With Project			
	AM		PM		AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound William Street								
Left	25.8	C	33.3	C	26.5	C	43.8	D
Through	14.3	B	18.3	B	15.5	B	23.4	C
Right	13.1	B	12.3	B	14.3	B	16.1	B
Approach	14.2	B	18	B	15.3	B	22.6	C
Westbound William Street								
Left	32	C	42.2	D	34.7	C	36.8	D
Through	14.6	B	11.0	B	15.3	B	10.5	B
Right	9.7	A	9.2	A	10.1	B	8.8	A
Approach	18.5	B	19.9	B	20.2	C	21.1	C
Northbound Saliman Road								
Left	12.8	B	16.3	1.3	13.7	B	22.7	C
Through	12.6	B	15.8	15.8	12.7	B	20.8	C
Right	12.2	B	16.7	B	12.9	B	24.7	C
Approach	12.4	B	16.4	B	13.0	B	23.6	C
Southbound Saliman Road								
Left	18.2	B	24.3	B	19.2	B	31.1	C
Through/Right	18.7	B	21.8	B	19.8	B	27.9	C
Approach	18.6	B	22.8	B	19.7	B	29.1	C
Intersection	16.6	B	18.7	C	17.6	B	22.8	C

Saliman Road/Robinson Street	2020 No Project				2020 With Project			
	AM		PM		AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound Robinson Street								
Left	14.0	B	14.0	B	33.9	D	35.8	E
Through/Right	12.5	B	10	B	14.4	B	13.5	B
Approach	13.4	B	13	B	25.8	D	26.9	D
Westbound Robinson Street								
Left	13.9	B	12.4	B	16.6	C	19.3	C
Through/Right	11.9	B	10.4	B	14.5	B	12.3	B
Approach	12.9	A	11	B	15	C	12.9	B
Northbound Saliman Road								
Left	7.8	A	8.4	A	7.9	A	8.7	A
Southbound Saliman Road								
Left	8.3	A	8.1	A	8.7	A	8.9	A

Exhibit 17 (cont.) Intersections Performance – Year 2020

Saliman Road/5th Street	2020 No Project				2020 With Project			
	AM		PM		AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound 5th Street								
Left	6.2	A	6.7	A	6.4	A	7	A
Through/Right	5.8	A	6.5	A	5.9	A	6.7	A
Approach	5.9	A	6.5	A	6	A	6.8	A
Westbound 5th Street								
Left	6.2	A	7.1	A	6.5	A	7.7	A
Through/Right	8.6	A	6.9	A	9.1	A	7.2	A
Approach	8.2	A	7	A	8.5	A	7.3	A
Northbound Saliman Road								
Left	8.1	A	7.2	A	8.3	A	7.5	A
Through/Right	8.3	A	7.4	A	8.5	A	7.8	A
Approach	8.3	A	7.4	A	8.4	A	7.8	A
Southbound Saliman Road								
Left	9.1	A	7.6	A	9.4	A	8.1	A
Through/Right	8.1	A	7.3	A	8.3	A	7.7	A
Approach	8.4	A	7.3	A	8.6	A	7.8	A
Intersection	7.9	A	7.0	A	8.2	A	7.4	A

William Street/Casino Road	2020 No Project				2020 With Project			
	AM		PM		AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound William Street								
Left	18.8	B	16.0	B	18.5	B	16	B
Through/Right	13.6	B	18.2	B	13.3	B	16.4	B
Approach	13.9	B	18.1	B	13.5	B	16.4	B
Westbound William Street								
Left	9.6	A	17.9	B	10.1	B	17.9	B
Through/Right	16.3	B	16.0	B	16.3	B	14.9	B
Approach	16.1	B	16.1	B	16.1	B	15.1	B
Northbound Casino Road								
Left	12.5	B	11.7	B	12.6	B	13.5	B
Through/Right	12.4	B	11.3	B	12.5	B	13	B
Approach	12.4	B	11.5	B	12.5	B	13.3	B
Southbound Casino Road								
Left	13.1	B	12.7	B	13.2	B	14.7	B
Through/Right	12.5	B	11.2	B	12.5	B	12.9	B
Approach	12.9	B	12.4	B	13.0	B	14.2	B
Intersection	15.3	B	16.8	B	15.2	B	15.7	B

Exhibit 17 (cont.) Intersections Performance – Year 2020

US 50/Airport Road	2020 No Project				2020 With Project			
	AM		PM		AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound US 50								
Left	32.2	C	42.2	D	32.2	C	42.7	D
Through	13.0	B	16.5	B	13.3	B	16.8	B
Right	10.6	B	10.9	B	10.6	B	10.8	B
Approach	13.4	B	18.1	B	13.6	B	18.4	B
Westbound US 50								
Left	41.7	D	53.3	D	41.7	D	53.5	D
Through	26.6	C	20.5	C	28.2	C	21.4	C
Right	11.1	B	13.6	B	11.1	B	13.5	B
Approach	26.5	C	20.8	C	28.1	C	21.7	C
Northbound Airport Road								
Left	17.8	B	26.8	C	17.8	B	27.5	C
Through/Right	18.6	B	25.7	C	18.6	B	26.1	C
Approach	18.0	B	26.4	C	18.0	B	26.9	C
Southbound Airport Road								
Left	19.9	B	23.3	C	19.9	B	23.6	C
Through	21.4	C	26.1	C	21.4	C	26.4	C
Right	20.8	C	24.4	C	20.8	C	24.7	C
Approach	20.8	C	24.5	C	20.8	C	24.8	C
Intersection	20.9	C	20.5	C	21.6	C	21	C

US 50/US 395	2020 No Project				2020 With Project			
	AM		PM		AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Eastbound US 50								
Left	18.9	B	27.0	C	19.1	B	21.5	C
Through	8.7	A	9.6	A	8.6	A	9.2	A
Approach	11.0	B	12.9	B	10.9	B	11.8	B
Westbound US 50								
Left	18.3	B	17.4	B	18.7	B	18.4	B
Through	7.1	A	7.7	A	7.1	A	8.2	A
Approach	10.3	B	10.1	B	10.3	B	10.7	B
Northbound US 395								
Left	23.3	C	19.3	B	23.6	C	22.7	C
Approach	23.3	C	19.3	B	23.6	C	22.7	C
Southbound US 395								
Left	18.1	B	16.2	B	18.2	B	18.8	B
Approach	18.1	B	16.2	B	18.2	B	18.8	B
Intersection	11.9	B	12.9	B	12	B	13.2	B

Exhibit 17 (cont.) Intersections Performance – Year 2020

5th Street/Airport Road	2020 No Project				2020 With Project			
	AM		PM		AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
	Eastbound 5th Street Left	8.6	A	8.0	A	8.7	B	8.1
Southbound Airport Road Left	21.1	C	20.3	C	22.6	C	22.5	C
Right	13.8	B	9.9	A	14	B	10.2	B
Approach	15.9	C	12.5	B	16.5	C	13.3	B

5th Street/Spine Road	2020 No Project				2020 With Project			
	AM		PM		AM		PM	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
	Eastbound 5th Street Left	N/A		N/A		8.7	A	8.3
Southbound Airport Road Left	N/A		N/A		17.3	C	21.4	C
Right	N/A		N/A		12.4	B	11.0	B
Approach	N/A		N/A		14.0	B	14.0	B

Traffic Safety

Sight Distance

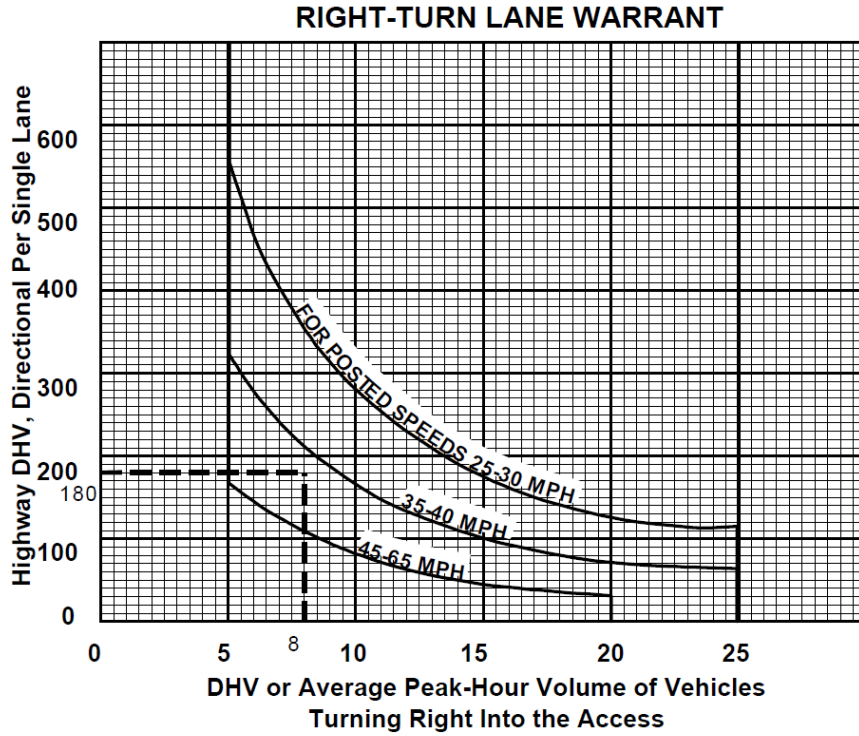
All project driveways and intersections should be designed to allow for acceptable sight distance. Sight distance is typically shown on the development plan and improvement drawings.

Turn Lane Analysis

A turn lane “warrant” is a justification for constructing a turn lane, based on traffic volumes at an intersection. Turn lanes are warranted based on these criteria when the peak hour turn lane volume exceeds a trigger based on the two-way daily volume (ADT, or Average Daily Traffic as indicated in the table) on the roadway. Carson City does not have a turn lane warrant policy or standard.

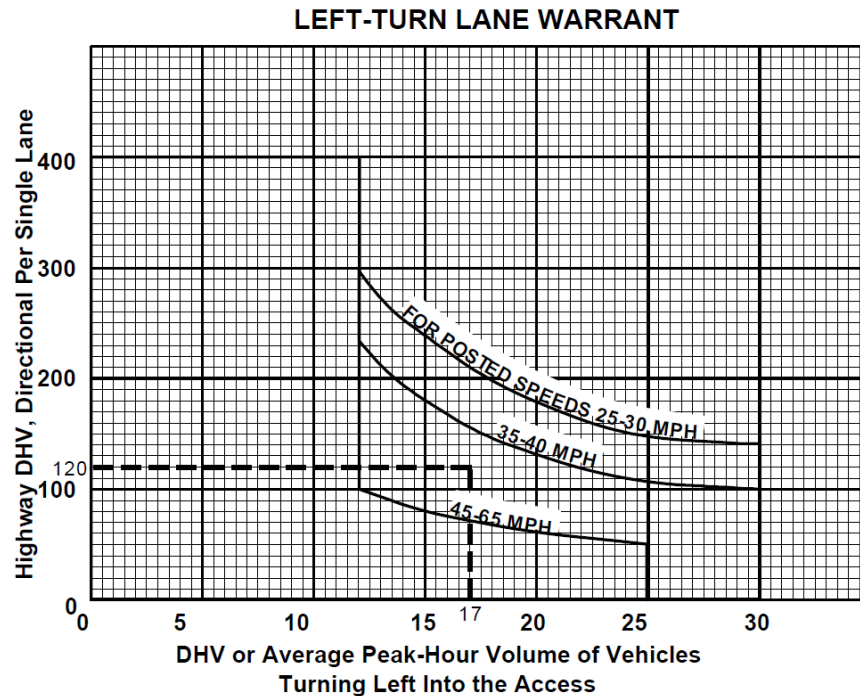
There are many examples of turn lane warrants. The Idaho Department of Transportation Traffic Manual provides examples and guidelines for turn lane warrants. Exhibits 18 and 19 show the warrant graph for right and left turn lane warrants. Exhibit 18 illustrates how a condition where there are eight right turns on a road with 180 vehicles per lane would warrant a right turn lane if the posted speed limit was 45 mph or higher, but would not be warranted if the posted speed limit was 40 mph or lower. Exhibit 19 shows a similar example for a left turn lane warrant.

Exhibit 18 Right Turn Lane Warrant Criteria



Source: Idaho DOT

Exhibit 19 Left Turn Lane Warrant Criteria



Source: Idaho DOT

These examples indicate that a conservative (small) number of turns may warrant the provision of a turn lane. If applied in Carson City, there are several locations where a turn lane would be warranted today, where there is no turn lane, based on existing modeled volumes. For example, the southbound PM peak hour right turn volume at the Saliman/William intersection is 34 vehicles per hour. This exceeds the warrant threshold for a right turn lane by four vehicles per hour. However, the City should carefully consider the application of these or any warrants as there are other factors that may not justify the provision of a turn lane, at a particular time.

Nevertheless, the impact of the project on the City's roadway system should require the provision of turn lanes at certain intersections. Turn lanes should be considered at the following intersections at Phase 1 and at Build Out:

Year 2020 – Phase 1

Existing Intersection

Saliman/Robinson – Westbound Right

New Intersections

5th Street/Spine Road – Eastbound left, Westbound Right, Southbound Exclusive Left and Right Lanes

Robinson Street should be extended to intersect with a new north-south "spine road" within the project area and as shown in Exhibit 2. The spine road should extend north from a new intersection with 5th

Street. Both the Robinson Street extension and the Spine Road can be constructed with one through lane in each direction.

Year 2035 – Build Out

Existing Intersections

Saliman/William – NB Dual Lefts

Saliman/Robinson – WB Right Turn Lane, NB Right Turn Lane, SB Dual Lefts

Saliman/5th – NB Right Turn Lane (a WB right turn lane may already be warranted).

William/Gold Dust Casino – NB Right Turn Lane, WB Dual Lefts (requiring the widening of the south leg to accept a new lane)

US 50/US 395 TI – No improvements

US 50/Airport – NB Dual Lefts

Airport/5th – WB Right Turn Lane

The traffic impact study indicates where turn lane warrants may be met based on traffic volume triggers. However, at some locations, right-of-way constraints, or other physical constraints may limit the ability to construct these turn lanes.

A new three- to four-leg intersection at Robinson Street/Spine Road will be constructed to provide a north leg at this intersection. This north leg is proposed to continue to its connection with the south leg of the William Street/Casino intersection. This will require widening the existing south leg of this intersection to a standard two to three lane cross-section.

Pedestrian, Bicycle, and Transit Considerations

The project must consider the connectivity of existing and future roads and paths. Carson City's *Complete Streets Policy* provides guidance associated with project design and planning for multi-modal roads.

As indicated in the *Complete Streets Policy*,

“Projects should be implemented so as to establish connectivity within the existing street network. Developing connections to existing pedestrian and bicycle facilities where ever possible is encouraged, and will improve the overall safety and accessibility to those that are dependent on those modes. Complete Streets concepts need to be applied to private developments as well in an effort to eliminate “islands” with no connection to the outside network. The private sector must be held to City standards and to the essence of Complete Streets concepts for proposed developments to ensure that the intent of this policy carries through approved site plans and the entire development process.”

While most surrounding streets have sidewalks and/or bike paths, the design of the internal streets, such as the extension of Robinson Street and the proposed north/south spine road should include these facilities and related amenities to encourage non-motor vehicle use within the development. The provision of open space, parks and other recreational areas in Lompa Ranch would also encourage pedestrian and bicycle activity in the area.

Discussions should be held with JAC transit services to determine whether transit in the development should be provided.

Speed Considerations

The City must determine the posted speed for Robinson Street if it is extended to the east, as well as the Spine Road.

Other Considerations

Signal Spacing

The recommended minimum signal spacing is $\frac{1}{4}$ mile. This can be accommodated on Saliman Street if a signal is found to be warranted at Saliman Street/Robinson Street. The location of the spine road connection on 5th Street should also be at least $\frac{1}{4}$ mile from Saliman Road.

Corner and Driveway Clearances

Driveways should be located either across from existing streets or with at least 150 feet of offset. Driveways on collectors and arterials should also be located outside of the functional area of intersection turn lanes (beyond the storage length and taper).

Queuing Analysis

Storage lengths should be extended if existing or projected traffic volumes at intersections queue beyond the calculated 95th percentile queue length, so that queuing vehicles do not back up and encroach into other lanes.

The Synchro software estimates queue lengths for all intersection turning movements. Exhibit 20 shows the existing storage lengths for turn lanes at the project area off-site intersections and indicates whether the calculated 95th percentile queue lengths exceed the physical storage lengths of the turn lanes. The analysis was done for the year 2020 "With Project" conditions. These estimates should not be used for design purposes. A reassessment of the queue lengths should be conducted at the development plan stage.

Exhibit 20 Turn Lane Storage and Queue Lengths

Saliman/William			95% Queue Length	
			2020 With Project	
	Speed Limit	Existing Storage (ft)	AM	PM
Eastbound				
Left	40	210	6	14
Right		125	21	31
Westbound				
Left	40	175	150	198
Right		95	0	7
Northbound				
Left	45	155	69	99
Right		155	48	159
Southbound				
Left	45	160	47	84

Saliman/5th			95% Queue Length	
			2020 With Project	
	Speed Limit	Existing Storage (ft)	AM	PM
Eastbound				
Left	40	135	28	49
Westbound				
Left	40	100	47	55
Northbound				
Left	35	160	25	25
Southbound				
Left	35	160	50	37

US 50/Airport			95% Queue Length	
			2020 With Project	
	Speed Limit	Existing Storage (ft)	AM	PM
Eastbound				
Left	40	100	36	163
Right		100	25	77
Westbound				
Left	40	240	25	37
Right		145	0	5
Northbound				
Left	25	70	43	126
Southbound				
Left	25	190	35	73
Right		150	21	28

William/Casino			95% Queue Length	
			2020 With Project	
	Speed Limit	Existing Storage (ft)	AM	PM
Eastbound				
Left	40	180	13	23
Westbound				
Left	40	120	21	26
Northbound				
Left	n/a	50	13	29
Southbound				
Left	n/a	70	32	54

Traffic Control Needs

A preliminary traffic signal warrant analysis was conducted for the intersections of Saliman Road/Robinson Road and 5th Street/Spine Road. This analysis applies the Oregon DOT Preliminary Traffic Signal Warrant analysis³ procedures. The highest volumes are projected to be during the pm peak hour. We applied a peak hour “K” factor of 0.09 for the peak hour in the calculation of the ADT from the future peak hour volumes to estimate the target ADT for the analysis.

As indicated in Exhibits 21 and 22, signalization may not be warranted at both intersections. However, these analyses should be updated at the development plan stage.

It should be noted that at the Saliman Road/Robinson Road, the existing weekday peak hour may occur between 2 and 3 pm because Carson High School classes end at 2:05. However, site traffic volumes associated with the Lompa Ranch project may change the peak hour at this location. It should be noted that the signal warrant analysis conducted was preliminary, and a full warrant analysis should be conducted as recommended by the Manual of Uniform Traffic Control Devices at the Development Plan stage. This analysis will require traffic data for the eight highest hours of the day at the intersection (which would likely include the school peak hour). There are other warrants, such as Peak Hour Warrant (Warrant #3), Pedestrian Volume Warrant (Warrant #4), and School Crossing Warrant (Warrant #5) that should be considered.

³ This analysis is based on MUTCD signal warrant methods. It is conducted to screen potential intersections for a more rigorous signal warrant study, based on daily traffic volumes.

Exhibit 21 Preliminary Signal Warrant Analysis – Saliman/Robinson

Oregon Department of Transportation Transportation Development Branch Transportation Planning Analysis Unit					
Preliminary Traffic Signal Warrant Analysis ¹					
Major Street: Saliman Road			Minor Street: Robinson Street		
Project: Lompa Ranch			City/County: Carson City		
Year: 2020 -Peak Hour			Alternative: 2020 With Project		
Preliminary Signal Warrant Volumes					
Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	Percent of standard warrants 70	Percent of standard warrants 100	Percent of standard warrants 70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants ²				
Preliminary Signal Warrant Calculation					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	2	10600	13489	N
	Minor	1	2650	311	
Case B	Major	2	15900	13489	N
	Minor	1	1350	311	
Analyst and Date: ME-Eng 11-9-2015			Reviewer and Date:		

¹ Meeting preliminary signal warrants does **not** guarantee that a signal will be installed.

² Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

Exhibit 22 Preliminary Signal Warrant Analysis 5th/Spine Road

Oregon Department of Transportation Transportation Development Branch Transportation Planning Analysis Unit					
Preliminary Traffic Signal Warrant Analysis ¹					
Major Street: 5th Ave			Minor Street: Spine Road		
Project: Lompa Ranch			City/County: Carson City		
Year: 2020 -Peak Hour			Alternative: 2020 With Project		
Preliminary Signal Warrant Volumes					
Number of Approach lanes		ADT on major street approaching from both directions		ADT on minor street, highest approaching volume	
Major Street	Minor Street	Percent of standard warrants 100	Percent of standard warrants 70	Percent of standard warrants 100	Percent of standard warrants 70
Case A: Minimum Vehicular Traffic					
1	1	8850	6200	2650	1850
2 or more	1	10600	7400	2650	1850
2 or more	2 or more	10600	7400	3550	2500
1	2 or more	8850	6200	3550	2500
Case B: Interruption of Continuous Traffic					
1	1	13300	9300	1350	950
2 or more	1	15900	11100	1350	950
2 or more	2 or more	15900	11100	1750	1250
1	2 or more	13300	9300	1750	1250
X	100 percent of standard warrants				
	70 percent of standard warrants ²				
Preliminary Signal Warrant Calculation					
	Street	Number of Lanes	Warrant Volumes	Approach Volumes	Warrant Met
Case A	Major	2	10600	11367	N
	Minor	1	2650	67	
Case B	Major	2	15900	11367	N
	Minor	1	1350	67	
Analyst and Date: ME-Eng 11-9-2015			Reviewer and Date:		

¹ Meeting preliminary signal warrants does **not** guarantee that a signal will be installed.

² Used due to 85th percentile speed in excess of 40 mph or isolated community with population of less than 10,000.

7. Conclusions and Recommendations

1. This project is located on both sides of US 395, between Saliman Road and Airport Road and 5th Street and William Street.
2. Assuming a preliminary land use estimate, at build out the project will generate approximately:
 - 1,400 morning peak hour trips,
 - 2,600 evening peak hour trips,
 - 27,600 weekday trips.

Approximately ¼ of these trips will be generated during Phase 1 of the project.

3. Based on the projected 2020 Phase 1 total volumes which include background traffic, the project will not require the widening of adjacent roadways. There is currently enough capacity on the study area roads to accommodate the addition of Phase 1 site traffic, as described in this report.
4. The following recommendations are based on the estimated trip generation from the concept plan provided in Exhibit 2 at Phase 1 and at Build Out. Design and construction should not be commenced based on these recommendations. Rather, they are provided as a basis for anticipating the cost of roadway infrastructure that may be needed to maintain acceptable levels of service on the adjacent roadways and intersections. At the development plan stage, with a better defined site plan, an updated traffic impact study should be conducted.

Phase 1 General Recommendations (Year 2020)

Existing Intersection

- Saliman/Robinson – Add westbound right turn lane. Robinson Street should be extended to intersect with a new north-south “spine road” within the project area and as shown in Exhibit 2. The spine road should extend north from a new intersection with 5th Street. Both Robinson Street and the Spine Road can be constructed with one through lane in each direction. For Phase 1, the spine road does not need to extend north of the Robinson Road extension.

New Intersections

- 5th Street/Spine Road – Construct a new intersection with an eastbound left, westbound right, southbound exclusive left and right lanes and signalization (if warranted). 5th Street will need to be widened at the intersection to accommodate the turn lanes. The location of the spine road should avoid the gradient on the eastbound approach to the US 395 overpass.

Build out General Recommendations (Year 2035)

Existing Intersections

- Saliman/William – Northbound dual lefts.
- Saliman/Robinson – Add northbound right turn lane and provide southbound dual lefts. This will require the widening of the east leg of Robinson Street to accept the two left turn lanes.
- Saliman/5th – Add a northbound right turn lane, and a westbound right turn lane (which may already be warranted without the project).

- William/Gold Dust Casino – Add a northbound right turn lane and, westbound dual lefts. This will require the widening of the south leg to accept a new lane. The south leg will continue to connect with the proposed north-south spine road.
- US 50/US 395 TI – No improvements.
- US 50/Airport – Provide northbound dual left turn lanes.
- Airport/5th – Add a westbound right turn lane.
- A new three- to four-leg intersection at Robinson Street/Spine Road should be constructed to provide a north leg at this intersection. This north leg is proposed to continue to its connection with the south leg of the William Street/Casino intersection. This will require widening the existing south leg of this intersection to a standard two to three lane cross-section.

The traffic impact study indicates where turn lane warrants may be met based on traffic volume triggers. However, at some locations, right-of-way constraints, or other physical constraints may limit the ability to construct these turn lanes.

5. The preferred northern intersection of the spine road is at the existing signalized intersection on William Street serving access to the Gold Dust Casino. The south leg of this intersection should be widened to accommodate a potential additional westbound to southbound left turn lane at this intersection. The spine road is anticipated to carry approximately 12,000 vehicles per day at Build Out. This volume approaches the threshold for a four-lane roadway. Further analysis and continuing discussions with the property owners south of William Road will be required.
6. Traffic signals are not preliminarily warranted at Saliman/Robinson or at the new 5th Street/Spine Road intersection. However, at the development plan stage, another signal warrant analysis following full MUTCD signal warranting procedures should be conducted at these intersections.
7. A preliminary queuing analysis for the Phase 1 condition indicate that there a few existing turn lanes that should be extended to accommodate 95% queues, as calculated in the capacity analysis. However, this should be reanalyzed at the development plan stage.
8. Sidewalks and bike lanes exist along several of the project roadways. Sidewalks and bike lanes should be constructed along the spine road and wherever improved connectivity is required.
9. Adequate sight distance meeting Carson City requirements at the project intersections must be provided.
10. All signs and pavement markings must conform to the *MUTCD* and Carson City requirements.

APPENDIX

- Traffic Data
- Synchro Analysis Sheets

AM Count			AM 2020 Adjusted			AM 2035 Adjusted		
17	791		17	701		17	715	
	10	632 149		10	466 225		237	468 10
	↘	↖		↘	↖		↘	↖
163	47	↘	163	47	↘	163	47	↘
	↘	↖		↘	↖		↘	↖
111	↖	Node 1210	111	↖	↖	111	↖	↖
	↖	↖		↖	↖		↖	↖
5	↖	↖	5	↖	↖	5	↖	↖
	↖	↖		↖	↖		↖	↖
	6	618 61		6	416 53		6	420 65
	↘	↖		↘	↖		↘	↖
	685			475			491	
Carson St -- William St (US 50 E)			Carson St -- William St (US 50 E)			Carson St -- William St (US 50 E)		
18	203		18	185		18	195	
	12	161 30		18	137 30		31	144 20
	↘	↖		↘	↖		↘	↖
348	11	↘	348	15	↘	348	16	↘
	↘	↖		↘	↖		↘	↖
270	↖	Node 1258	264	↖	↖	281	↖	↖
	↖	↖		↖	↖		↖	↖
67	↖	↖	140	↖	↖	148	↖	↖
	↖	↖		↖	↖		↖	↖
	39	106 145		50	71 134		54	74 135
	↘	↖		↘	↖		↘	↖
	290			255			263	
Stewart St -- William St			Stewart St -- William St			Stewart St -- William St		
19	234		19	238		19	253	
	33	151 50		27	165 46		51	179 23
	↘	↖		↘	↖		↘	↖
452	22	↘	434	17	↘	451	17	↘
	↘	↖		↘	↖		↘	↖
407	↖	Node 1257	386	↖	↖	402	↖	↖
	↖	↖		↖	↖		↖	↖
23	↖	↖	31	↖	↖	32	↖	↖
	↖	↖		↖	↖		↖	↖
	33	165 56		38	168 15		39	179 23
	↘	↖		↘	↖		↘	↖
	254			221			241	
Roop St -- William St			Roop St -- William St			Roop St -- William St		
20	322		20	338		20	352	
	23	262 37		16	265 57		66	269 17
	↘	↖		↘	↖		↘	↖
435	15	↘	407	6	↘	439	6	↘
	↘	↖		↘	↖		↘	↖
310	↖	Node 1256	296	↖	↖	324	↖	↖
	↖	↖		↖	↖		↖	↖
110	↖	↖	105	↖	↖	109	↖	↖
	↖	↖		↖	↖		↖	↖
	96	138 219		80	139 235		83	141 270
	↘	↖		↘	↖		↘	↖
	453			454			494	
Saliman Rd -- William St			Saliman Rd -- William St			Saliman Rd -- William St		

AM Count			AM 2020 Adjusted			AM 2035 Adjusted		
21	18		21	18		21	18	
	8 0 10			8 0 10			10 0 8	
	↘ ↓ ↙			↘ ↓ ↙			↘ ↓ ↙	
578	29 ↘		29 ↘		29 ↘		23 ↘	
547	→ Node 1244	↑ 1170	582	→	↑ 1257	686	655	→
	2 ↘		2 ↘		2 ↘		2 ↘	
	↘ ↑ ↙			↘ ↑ ↙			↘ ↑ ↙	
	0 1 0			0 1 0			0 1 0	
	1			1			1	
Humboldt Ln -- William St			Humboldt Ln -- William St			Humboldt Ln -- William St		
22	430		22	459		22	493	
	248 0 182			254 0 205			217 0 276	
	↘ ↓ ↙			↘ ↓ ↙			↘ ↓ ↙	
578	0 ↘		0 ↘		0 ↘		0 ↘	
551	→ Node 1703	↑ 951	648	572	→	718	637	→
	27 ↘		76 ↘		410 ↘		81 ↘	
	↘ ↑ ↙			↘ ↑ ↙			↘ ↑ ↙	
	0 0 0			0 0 0			0 0 0	
	0			0			0	
US 395 SB Ramps -- US 50 E			US 395 SB Ramps -- US 50 E			US 395 SB Ramps -- US 50 E		
23	141		23	148		23	135	
	84 21 36			89 21 38			44 21 70	
	↘ ↓ ↙			↘ ↓ ↙			↘ ↓ ↙	
743	32 ↘		39 ↘		28 ↘		49 ↘	
630	→ Node 1713	↑ 1320	893	773	→	1031	901	→
	81 ↘		81 ↘		13 ↘		81 ↘	
	↘ ↑ ↙			↘ ↑ ↙			↘ ↑ ↙	
	145 23 9			145 23 9			145 23 9	
	177			177			177	
Lompa Ln -- US 50 E			Lompa Ln -- US 50 E			Lompa Ln -- US 50 E		
24	187		24	195		24	200	
	93 51 43			99 52 44			45 52 103	
	↘ ↓ ↙			↘ ↓ ↙			↘ ↓ ↙	
654	24 ↘		33 ↘		26 ↘		43 ↘	
544	→ Node 1254	↑ 1119	800	644	→	934	761	→
	86 ↘		123 ↘		18 ↘		130 ↘	
	↘ ↑ ↙			↘ ↑ ↙			↘ ↑ ↙	
	154 60 28			196 57 30			205 38 33	
	242			283			276	
Airport Rd -- US 50 E			Airport Rd -- US 50 E			Airport Rd -- US 50 E		

AM Count		AM 2020 Adjusted		AM 2035 Adjusted	
37	214	37	229	37	256
	32 ↘		28 ↘		44 ↘
	159 →		165 →		180 →
	23 ↘		36 ↘		32 ↘
238	38 ↘	223	17 ↘	242	19 ↘
	171 → Node 1317		177 →		194 →
	29 ↘		29 ↘		29 ↘
	↘ ↑ ↘		↘ ↑ ↘		↘ ↑ ↘
	45 ↘		45 ↘		45 ↘
	216 →		231 →		240 →
	35 ↘		34 ↘		37 ↘
	296		310		322
Roop St -- 5th St		Roop St -- 5th St		Roop St -- 5th St	
38	335	38	337	38	376
	83 ↘		79 ↘		119 ↘
	154 →		155 →		167 →
	98 ↘		103 ↘		90 ↘
181	52 ↘	204	53 ↘	227	58 ↘
	101 → Node 1322		115 →		129 →
	28 ↘		36 ↘		40 ↘
	↘ ↑ ↘		↘ ↑ ↘		↘ ↑ ↘
	55 ↘		50 ↘		54 ↘
	263 →		240 →		254 →
	33 ↘		44 ↘		63 ↘
	351		334		371
Saliman Rd -- 5th St		Saliman Rd -- 5th St		Saliman Rd -- 5th St	
39	568	39	600	39	730
	127 ↘		151 ↘		119 ↘
	298 →		302 →		386 →
	143 ↘		147 ↘		225 ↘
232	71 ↘	240	73 ↘	243	90 ↘
	147 → Node 1324		153 →		138 →
	14 ↘		14 ↘		15 ↘
	↘ ↑ ↘		↘ ↑ ↘		↘ ↑ ↘
	24 ↘		25 ↘		28 ↘
	228 →		206 →		235 →
	143 ↘		153 ↘		140 ↘
	395		384		403
Fairview Dr -- 5th St		Fairview Dr -- 5th St		Fairview Dr -- 5th St	
40	381	40	342	40	338
	12 ↘		12 ↘		64 ↘
	308 →		269 →		262 →
	61 ↘		61 ↘		12 ↘
14	10 ↘	14	10 ↘	14	10 ↘
	3 → Node 1305		3 →		3 →
	1 ↘		1 ↘		1 ↘
	↘ ↑ ↘		↘ ↑ ↘		↘ ↑ ↘
	0 ↘		0 ↘		0 ↘
	417 →		321 →		346 →
	38 ↘		29 ↘		30 ↘
	455		350		376
Stewart St -- Little Ln		Stewart St -- Little Ln		Stewart St -- Little Ln	

AM Count			AM 2020 Adjusted			AM 2035 Adjusted		
57	0		57	0		57	0	
	0	0		0	0		0	0
	↘	↓		↘	↓		↘	↓
122	↘		127	↘		145	↘	
613	→	Node 1702	651	→		710	→	
	↘			↘			↘	
0	↘		0	↘		0	↘	
	↘	↑		↘	↑		↘	↑
	0	0	106	0	247	103	0	325
		134			353			428
US 395 NB Ramps -- US 50 E			US 395 NB Ramps -- US 50 E			US 395 NB Ramps -- US 50 E		
58	0		58	0		58	0	
	0	0		0	0		0	0
	↘	↓		↘	↓		↘	↓
2	↘		2	↘		2	↘	
106	→	Node 1686	119	→		150	→	
	↘			↘			↘	
46	↘		49	↘		51	↘	
	↘	↑		↘	↑		↘	↑
	0	0	0	0	0	0	0	0
		0			0			0
US 395 SB On Ramp -- Arrowhead Dr			US 395 SB On Ramp -- Arrowhead Dr			US 395 SB On Ramp -- Arrowhead Dr		
59	98		59	98		59	98	
	91	0		91	0		7	0
	↘	↓		↘	↓		↘	↓
13	↘		13	↘		13	↘	
94	→	Node 1687	107	→		138	→	
	↘			↘			↘	
0	↘		0	↘		0	↘	
	↘	↑		↘	↑		↘	↑
	131	7	143	7	26	145	7	51
		6			176			203
US 395 NB Ramps -- Arrowhead Dr			US 395 NB Ramps -- Arrowhead Dr			US 395 NB Ramps -- Arrowhead Dr		
60	0		60	0		60	0	
	0	0		0	0		0	0
	↘	↓		↘	↓		↘	↓
0	↘		0	↘		272	↘	
397	→	Node 1516	380	→		415	→	
	↘			↘			↘	
847	↘		597	↘		330	↘	
	↘	↑		↘	↑		↘	↑
	0	0	48	0	57	60	0	69
		0			105			129
US 395 NB On Ramps -- Fairview Dr			US 395 NB On Ramps -- Fairview Dr			US 395 NB On Ramps -- Fairview Dr		

PM Count		PM 2020 Adjusted		PM 2035 Adjusted	
17	931	17	722	17	750
	16 ↘		16 ↘		16 ↘
	764 ←		542 ←		558 ←
	151 ↙		164 ↙		176 ↙
204	58 ↘	204	58 ↘	204	58 ↘
	241		279		298
	138 ↑		89		89
	Node 1210		89		89
	8 ↘		27		106
	106		436		493
	9 ↘		9 ↘		9 ↘
	784 ↑		597 ↑		592 ↑
	109 ↘		65 ↘		0 ↘
	902		671		601
Carson St -- William St (US 50 E)		Carson St -- William St (US 50 E)		Carson St -- William St (US 50 E)	
18	235	18	195	18	203
	13 ↘		8 ↘		9 ↘
	176 ←		141 ←		148 ←
	46 ↙		46 ↙		46 ↙
464	18 ↘	355	0 ↘	387	0 ↘
	21		21		21
	412 ↑		260		277
	Node 1258		260		277
	34 ↘		98		141
	141		379		439
	114 ↘		153 ↘		164 ↘
	202 ↑		187 ↑		197 ↑
	270 ↘		233 ↘		243 ↘
	586		573		604
Stewart St -- William St		Stewart St -- William St		Stewart St -- William St	
19	424	19	434	19	446
	43 ↘		28 ↘		29 ↘
	256 ←		264 ←		280 ←
	125 ↙		142 ↙		137 ↙
783	58 ↘	641	30 ↘	677	31 ↘
	78		93		85
	686 ↑		414		443
	Node 1257		414		443
	39 ↘		125		83
	83		632		611
	50 ↘		51 ↘		53 ↘
	231 ↑		250 ↑		266 ↑
	127 ↘		191 ↘		203 ↘
	408		492		522
Roop St -- William St		Roop St -- William St		Roop St -- William St	
20	245	20	240	20	221
	34 ↘		20 ↘		22 ↘
	129 ←		128 ←		139 ←
	82 ↙		92 ↙		60 ↙
994	33 ↘	983	17 ↘	1024	21 ↘
	47		77		91
	862 ↑		571		599
	Node 1256		571		599
	99 ↘		265		261
	261		913		951
	102 ↘		108 ↘		117 ↘
	129 ↑		131 ↑		144 ↑
	311 ↘		326 ↘		372 ↘
	542		565		633
Saliman Rd -- William St		Saliman Rd -- William St		Saliman Rd -- William St	

PM Count		PM 2020 Adjusted		PM 2035 Adjusted	
21	59	21	71	21	114
	27		27		27
	0		0		0
	32		44		87
	↘		↘		↘
	↑		↑		↑
	↙		↙		↙
83	↘	83	↘	83	↘
	↙		↙		↙
38	↙	38	↙	44	↙
1251	1163	1298	1210	1345	1257
	Node 1244		Node 1244		Node 1244
	↑		↑		↑
	890		965		1042
937	5	1012	5	1095	5
	↘		↘		↘
	↙		↙		↙
	↑		↑		↑
	5		5		5
	3		3		3
	5		5		5
	13		13		13
Humboldt Ln -- William St		Humboldt Ln -- William St		Humboldt Ln -- William St	
22	524	22	543	22	583
	244		250		275
	0		0		0
	280		293		308
	↘		↘		↘
	↑		↑		↑
	↙		↙		↙
213	↘	213	↘	213	↘
	↙		↙		↙
0	↙	0	↙	0	↙
1239	967	1298	926	1374	1001
	Node 1703		Node 1703		Node 1703
	↑		↑		↑
	723		787		836
723	59	1027	159	1095	160
	↘		↘		↘
	↙		↙		↙
	↑		↑		↑
	0		0		0
	0		0		0
	0		0		0
	0		0		0
US 395 SB Ramps -- US 50 E		US 395 SB Ramps -- US 50 E		US 395 SB Ramps -- US 50 E	
23	146	23	121	23	130
	57		23		21
	34		34		34
	55		64		75
	↘		↘		↘
	↑		↑		↑
	↙		↙		↙
76	↘	58	↘	56	↘
	↙		↙		↙
59	↙	63	↙	73	↙
1457	1276	1610	1447	1710	1549
	Node 1713		Node 1713		Node 1713
	↑		↑		↑
	1016		1145		1345
1095	105	1228	105	1438	105
	↘		↘		↘
	↙		↙		↙
	↑		↑		↑
	95		95		95
	28		28		28
	16		16		16
	139		139		139
Lompa Ln -- US 50 E		Lompa Ln -- US 50 E		Lompa Ln -- US 50 E	
24	318	24	321	24	319
	100		114		127
	107		94		80
	111		113		112
	↘		↘		↘
	↑		↑		↑
	↙		↙		↙
144	↘	152	↘	156	↘
	↙		↙		↙
74	↙	76	↙	77	↙
1351	1021	1532	1141	1645	1237
	Node 1254		Node 1254		Node 1254
	↑		↑		↑
	816		894		1075
915	186	998	239	1177	252
	↘		↘		↘
	↙		↙		↙
	↑		↑		↑
	164		206		221
	106		107		102
	27		31		37
	297		344		360
Airport Rd -- US 50 E		Airport Rd -- US 50 E		Airport Rd -- US 50 E	

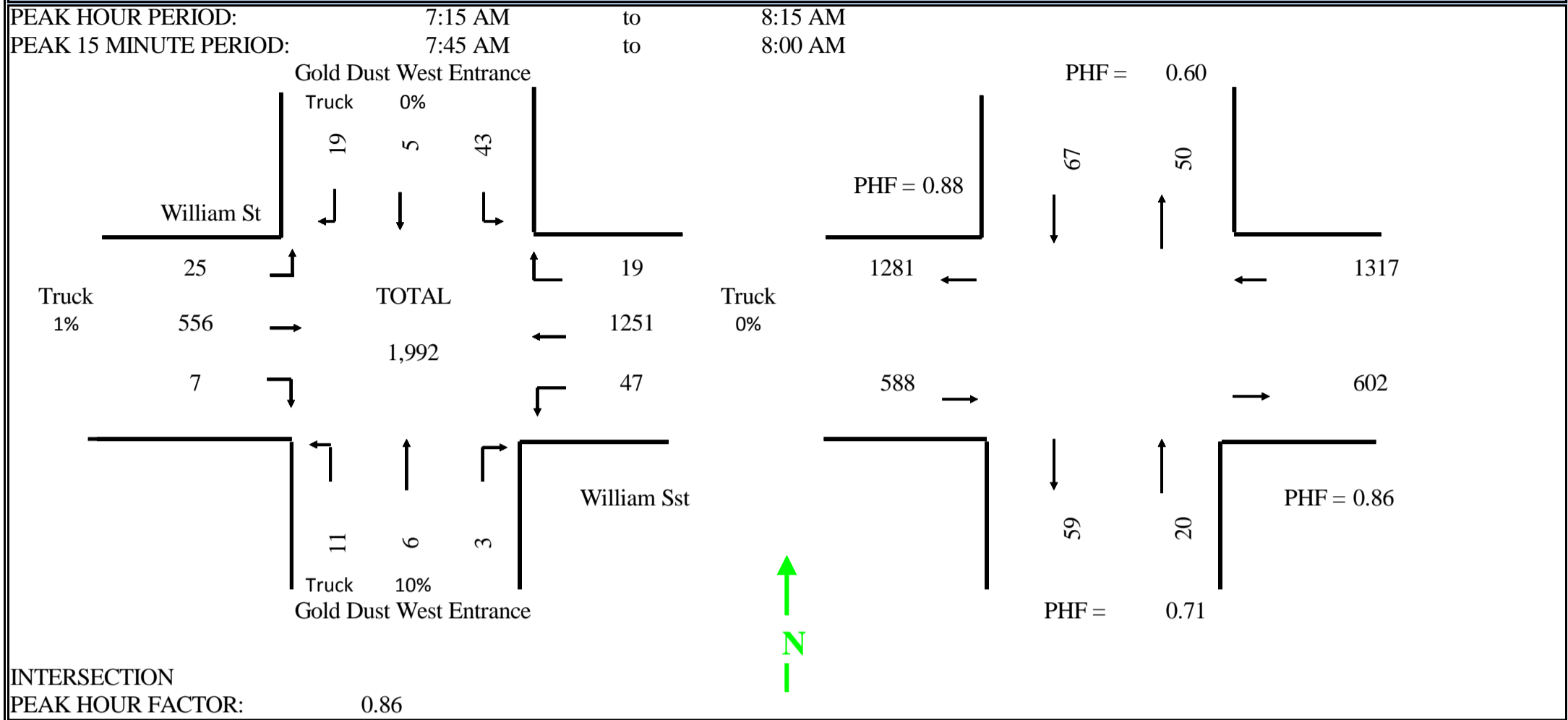
PM Count		PM 2020 Adjusted		PM 2035 Adjusted	
37	420	37	486	37	528
	27 ↘		63 ↘		69 ↘
	↖ 327		↖ 358		↖ 379
	↗ 66		↗ 65		↗ 80
459	36 ↘	528	104 ↘	542	111 ↘
	↖ 356		↖ 357		↖ 364
	Node 1317		↖ 67		↖ 67
	↗ 191		↗ 74		↗ 87
327	67 ↘	307	67 ↘	372	67 ↘
	↖ 38		↖ 38		↖ 38
	↖ 291		↖ 312		↖ 341
	↖ 136		↖ 141		↖ 150
	465		491		529
Roop St -- 5th St		Roop St -- 5th St		Roop St -- 5th St	
38	378	38	368	38	408
	72 ↘		61 ↘		62 ↘
	↖ 246		↖ 238		↖ 248
	↖ 60		↖ 69		↖ 98
492	107 ↘	547	111 ↘	574	127 ↘
	↖ 307		↖ 335		↖ 362
	Node 1322		↖ 101		↖ 85
	↗ 169		↗ 109		↗ 77
286	78 ↘	370	78 ↘	409	78 ↘
	↖ 48		↖ 49		↖ 55
	↖ 237		↖ 238		↖ 255
	↖ 99		↖ 131		↖ 160
	384		418		470
Saliman Rd -- 5th St		Saliman Rd -- 5th St		Saliman Rd -- 5th St	
39	555	39	524	39	630
	120 ↘		153 ↘		221 ↘
	↖ 352		↖ 274		↖ 353
	↖ 83		↖ 97		↖ 56
358	220 ↘	376	250 ↘	406	286 ↘
	↖ 103		↖ 91		↖ 82
	Node 1324		↖ 35		↖ 38
	↗ 63		↗ 95		↗ 61
183	35 ↘	220	35 ↘	135	35 ↘
	↖ 29		↖ 29		↖ 30
	↖ 446		↖ 459		↖ 509
	↖ 106		↖ 130		↖ 106
	581		618		645
Fairview Dr -- 5th St		Fairview Dr -- 5th St		Fairview Dr -- 5th St	
40	570	40	428	40	479
	39 ↘		39 ↘		39 ↘
	↖ 433		↖ 318		↖ 355
	↖ 98		↖ 71		↖ 85
57	19 ↘	57	19 ↘	57	19 ↘
	↖ 30		↖ 30		↖ 30
	Node 1305		↖ 8		↖ 8
	↗ 17		↗ 0		↗ 17
102	8 ↘	70	8 ↘	104	8 ↘
	↖ 2		↖ 2		↖ 2
	↖ 490		↖ 387		↖ 386
	↖ 49		↖ 82		↖ 86
	541		471		474
Stewart St -- Little Ln		Stewart St -- Little Ln		Stewart St -- Little Ln	

PM Count			PM 2020 Adjusted			PM 2035 Adjusted					
57	0		57	0		57	0				
	0	0		0	0		0	0			
	↘	↓		↘	↓		↘	↓			
1237	0	↘		0	↘	1237	26	↘			
1237	→	Node 1702	↑	643	1136	1237	→	Node 1702	↑	961	1430
	0	↘		0	↘		0	↘		0	219
	↘	↑		↘	↑		↘	↑		↘	↑
	61	0		172	0		172	0		172	0
		188			365			406			406
	249			537			578			578	
US 395 NB Ramps -- US 50 E			US 395 NB Ramps -- US 50 E			US 395 NB Ramps -- US 50 E					
58	0		58	0		58	0				
	0	0		0	0		0	0			
	↘	↓		↘	↓		↘	↓			
275	4	↘		4	↘		4	↘			
130	→	Node 1686	↑	199	232	130	→	Node 1686	↑	280	313
	141	↘		158	↘		163	↘		163	↘
	↘	↑		↘	↑		↘	↑		↘	↑
	0	0		0	0		0	0		0	0
	0			0			0			0	
US 395 SB On Ramp -- Arrowhead Dr			US 395 SB On Ramp -- Arrowhead Dr			US 395 SB On Ramp -- Arrowhead Dr					
59	49		59	49		59	49				
	48	0		48	0		48	0			
	↘	↓		↘	↓		↘	↓			
137	44	↘		44	↘		44	↘			
93	→	Node 1687	↑	100	114	93	→	Node 1687	↑	217	231
	0	↘		0	↘		0	↘		0	1
	↘	↑		↘	↑		↘	↑		↘	↑
	73	33		83	33		87	33		87	33
		14			41			55			55
	120			157			175			175	
US 395 NB Ramps -- Arrowhead Dr			US 395 NB Ramps -- Arrowhead Dr			US 395 NB Ramps -- Arrowhead Dr					
60	0		60	0		60	0				
	0	0		0	0		0	0			
	↘	↓		↘	↓		↘	↓			
1329	0	↘		0	↘		324	↘		324	↘
521	→	Node 1516	↑	256	463	521	→	Node 1516	↑	488	750
	808	↘		268	↘		0	↘		0	↘
	↘	↑		↘	↑		↘	↑		↘	↑
	0	0		67	0		79	0		79	0
	0				106			106			106
	0			173			185			185	
US 395 NB On Ramps -- Fairview Dr			US 395 NB On Ramps -- Fairview Dr			US 395 NB On Ramps -- Fairview Dr					



VEHICLE MOVEMENT SUMMARY

INTERSECTION: William St & Gold Dust West Entrance	TIME: 7:00 AM to 9:00 AM
JURISDICTION: Carson City	DATE: 12/1/2015
PROJECT TITLE: Lompa Ranch Counts	PROJECT NO: J170



INTERSECTION PEAK HOUR FACTOR: 0.86

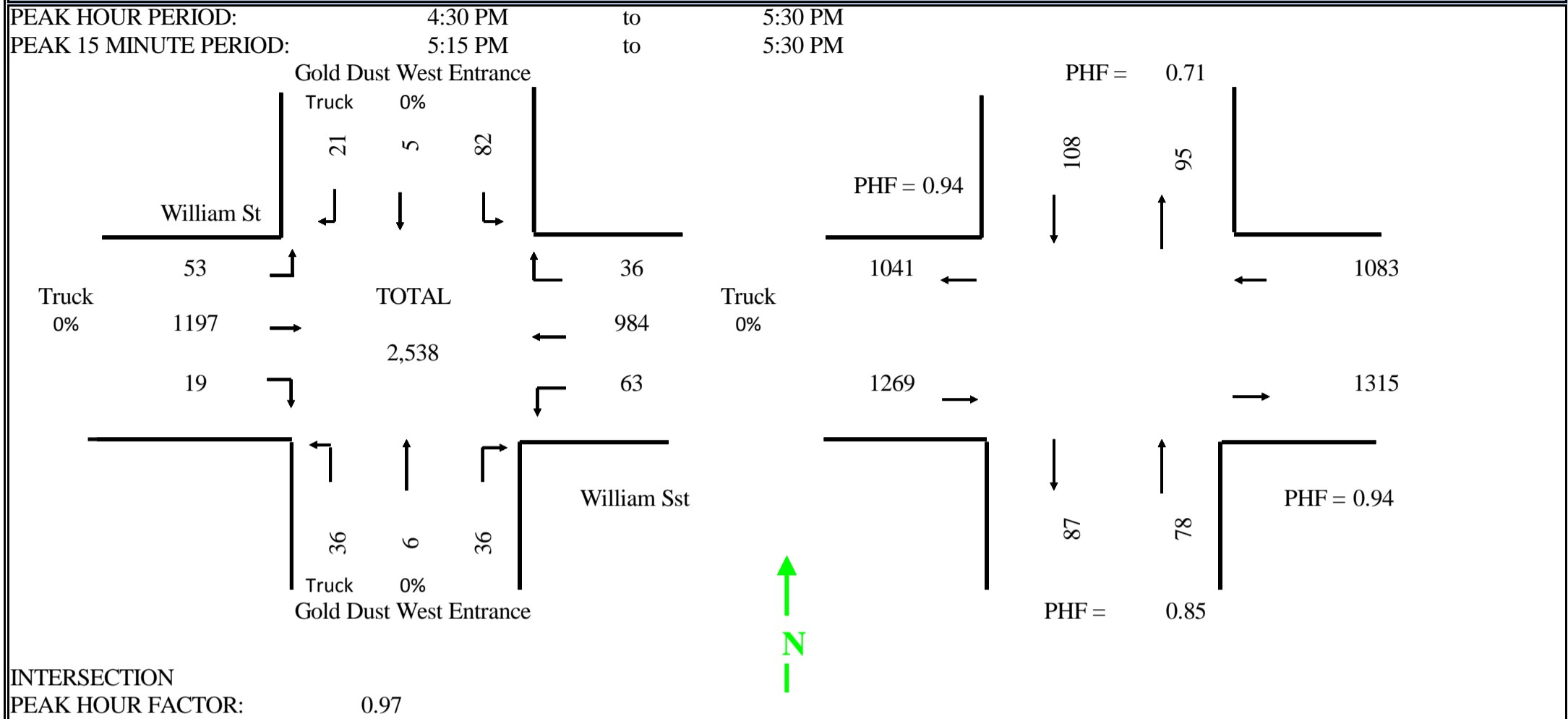
RUNNING COUNTS	William St Eastbound			William Sst Westbound			Gold Dust West Entrance Northbound			Gold Dust West Entrance Southbound			TOTAL
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Period End	A	B	C	D	E	F	G	H	I	J	K	L	
7:15 AM	4	78	0	5	197	1	4	0	5	3	0	2	299
7:30 AM	8	215	2	13	479	3	7	0	5	10	0	7	749
7:45 AM	16	365	4	26	830	9	7	6	6	22	2	10	1303
8:00 AM	21	525	6	41	1191	14	10	6	8	41	4	17	1884
8:15 AM	29	634	7	52	1448	20	15	6	8	46	5	21	2291
8:30 AM	34	750	8	55	1670	32	18	7	9	58	5	24	2670
8:45 AM	39	877	12	63	1841	38	18	7	11	69	5	28	3008
9:00 AM	45	985	21	80	2052	45	23	8	15	75	8	33	3390

PERIOD COUNTS	William St Eastbound			William Sst Westbound			Gold Dust West Entrance Northbound			Gold Dust West Entrance Southbound			TOTAL
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Period End	A	B	C	D	E	F	G	H	I	J	K	L	
7:15 AM	4	78	0	5	197	1	4	0	5	3	0	2	299
7:30 AM	4	137	2	8	282	2	3	0	0	7	0	5	450
7:45 AM	8	150	2	13	351	6	0	6	1	12	2	3	554
8:00 AM	5	160	2	15	361	5	3	0	2	19	2	7	581
8:15 AM	8	109	1	11	257	6	5	0	0	5	1	4	407
8:30 AM	5	116	1	3	222	12	3	1	1	12	0	3	379
8:45 AM	5	127	4	8	171	6	0	0	2	11	0	4	338
9:00 AM	6	108	9	17	211	7	5	1	4	6	3	5	382



VEHICLE MOVEMENT SUMMARY

INTERSECTION: William St & Gold Dust West Entrance	TIME: 4:00 PM to 6:00 PM
JURISDICTION: Carson City	DATE: 12/1/2015
PROJECT TITLE: Lompa Ranch Counts	PROJECT NO: J170



INTERSECTION PEAK HOUR FACTOR: 0.97

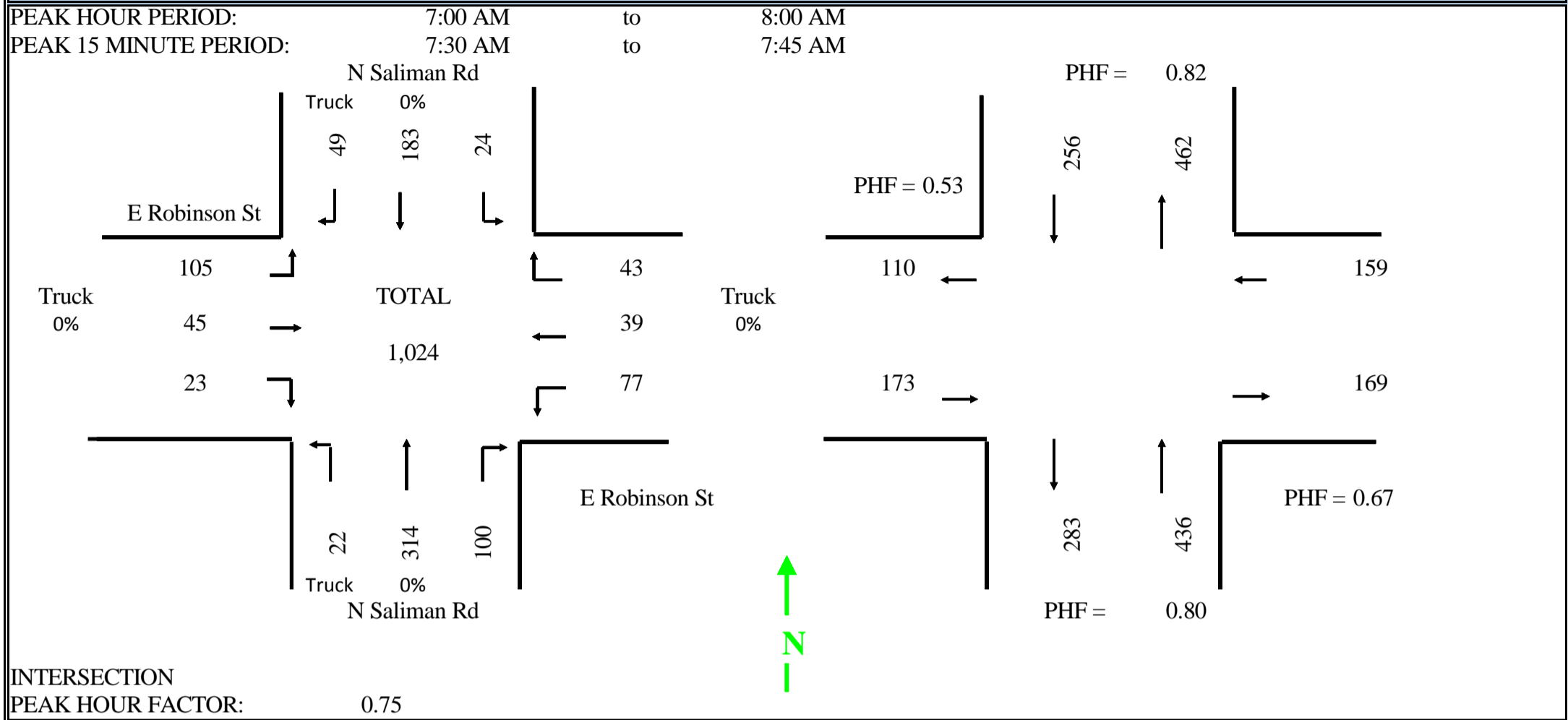
RUNNING COUNTS	William St Eastbound			William Sst Westbound			Gold Dust West Entrance Northbound			Gold Dust West Entrance Southbound			TOTAL
	A	B	C	D	E	F	G	H	I	J	K	L	
4:15 PM	18	277	7	20	263	8	14	2	4	21	1	11	646
4:30 PM	26	527	14	32	490	20	33	2	13	50	4	25	1236
4:45 PM	34	788	22	43	724	28	40	4	24	79	6	32	1824
5:00 PM	53	1081	27	64	982	38	48	6	37	94	6	34	2470
5:15 PM	67	1404	29	79	1224	45	60	7	45	112	7	40	3119
5:30 PM	79	1724	33	95	1474	56	69	8	49	132	9	46	3774
5:45 PM	90	1991	35	107	1710	59	78	8	55	150	10	52	4345
6:00 PM	102	2212	40	119	1875	71	86	11	57	169	11	55	4808

PERIOD COUNTS	William St Eastbound			William Sst Westbound			Gold Dust West Entrance Northbound			Gold Dust West Entrance Southbound			TOTAL
	A	B	C	D	E	F	G	H	I	J	K	L	
4:15 PM	18	277	7	20	263	8	14	2	4	21	1	11	646
4:30 PM	8	250	7	12	227	12	19	0	9	29	3	14	590
4:45 PM	8	261	8	11	234	8	7	2	11	29	2	7	588
5:00 PM	19	293	5	21	258	10	8	2	13	15	0	2	646
5:15 PM	14	323	2	15	242	7	12	1	8	18	1	6	649
5:30 PM	12	320	4	16	250	11	9	1	4	20	2	6	655
5:45 PM	11	267	2	12	236	3	9	0	6	18	1	6	571
6:00 PM	12	221	5	12	165	12	8	3	2	19	1	3	463



VEHICLE MOVEMENT SUMMARY

INTERSECTION: E Robinson & N Saliman Rd	TIME: 7:00 AM to 9:00 AM
JURISDICTION: Carson City	DATE: 12/1/2015
PROJECT TITLE: Lompa Ranch Counts	PROJECT NO: J170



RUNNING COUNTS	E Robinson St Eastbound			E Robinson St Westbound			N Saliman Rd Northbound			N Saliman Rd Southbound			TOTAL
	A	B	C	D	E	F	G	H	I	J	K	L	
7:15 AM	14	14	3	15	9	15	2	57	37	15	33	4	218
7:30 AM	36	25	10	42	19	26	11	150	71	17	75	15	497
7:45 AM	88	45	20	72	36	38	18	250	93	22	118	38	838
8:00 AM	105	45	23	77	39	43	22	314	100	24	183	49	1024
8:15 AM	115	45	23	79	41	43	22	382	105	24	224	56	1159
8:30 AM	124	46	24	85	43	51	23	436	120	31	273	57	1313
8:45 AM	135	46	24	92	46	57	25	500	125	38	276	63	1427
9:00 AM	138	46	25	93	46	62	25	547	125	40	314	66	1527

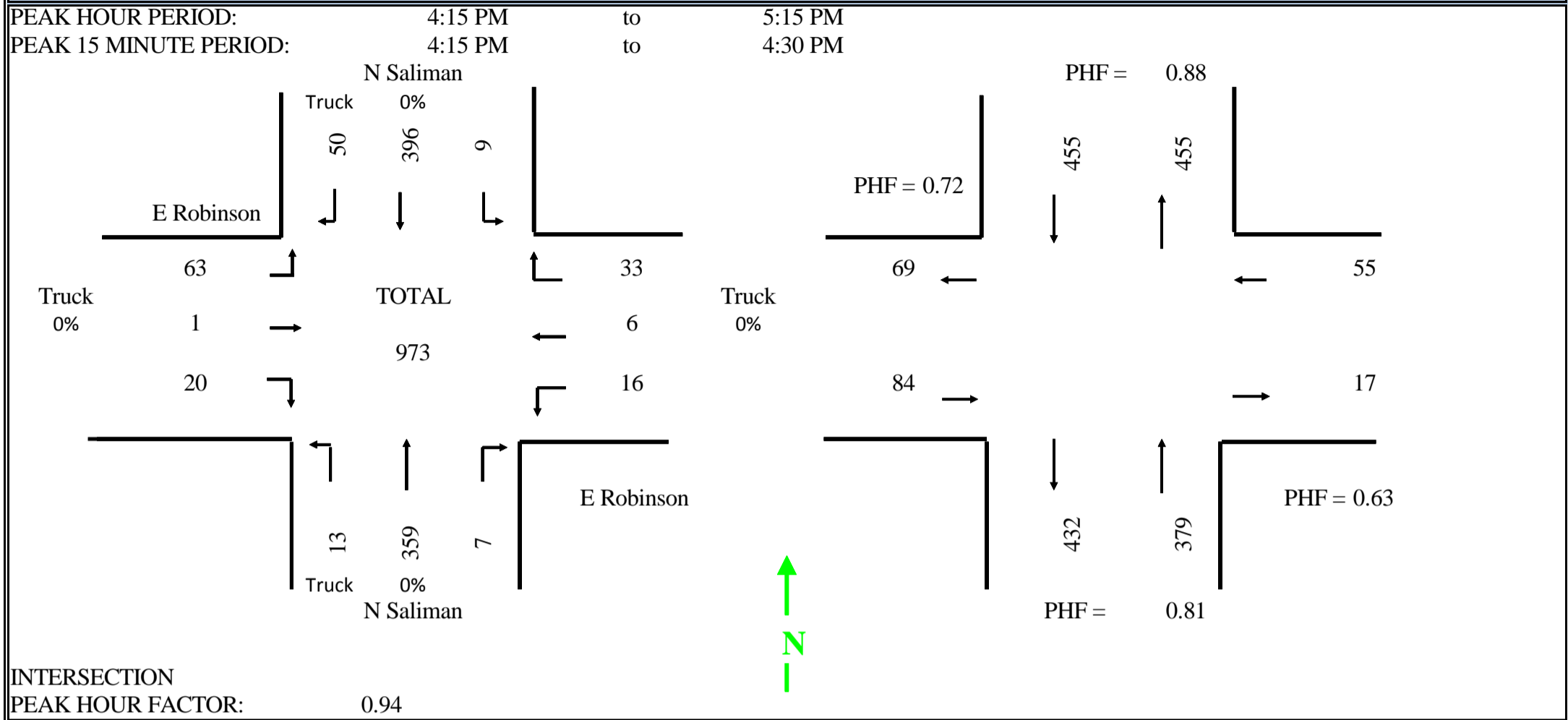
PERIOD COUNTS	E Robinson St Eastbound			E Robinson St Westbound			N Saliman Rd Northbound			N Saliman Rd Southbound			TOTAL
	A	B	C	D	E	F	G	H	I	J	K	L	
7:15 AM	14	14	3	15	9	15	2	57	37	15	33	4	218
7:30 AM	22	11	7	27	10	11	9	93	34	2	42	11	279
7:45 AM	52	20	10	30	17	12	7	100	22	5	43	23	341
8:00 AM	17	0	3	5	3	5	4	64	7	2	65	11	186
8:15 AM	10	0	0	2	2	0	0	68	5	0	41	7	135
8:30 AM	9	1	1	6	2	8	1	54	15	7	49	1	154
8:45 AM	11	0	0	7	3	6	2	64	5	7	3	6	114
9:00 AM	3	0	1	1	0	5	0	47	0	2	38	3	100

* No Truck Movements were observed at the intersection



VEHICLE MOVEMENT SUMMARY

INTERSECTION: E Robinson & N Saliman	TIME: 4:00 PM to 6:00 PM
JURISDICTION: Carson City	DATE: 12/1/2015
PROJECT TITLE: Lompa Ranch Counts	PROJECT NO: J170



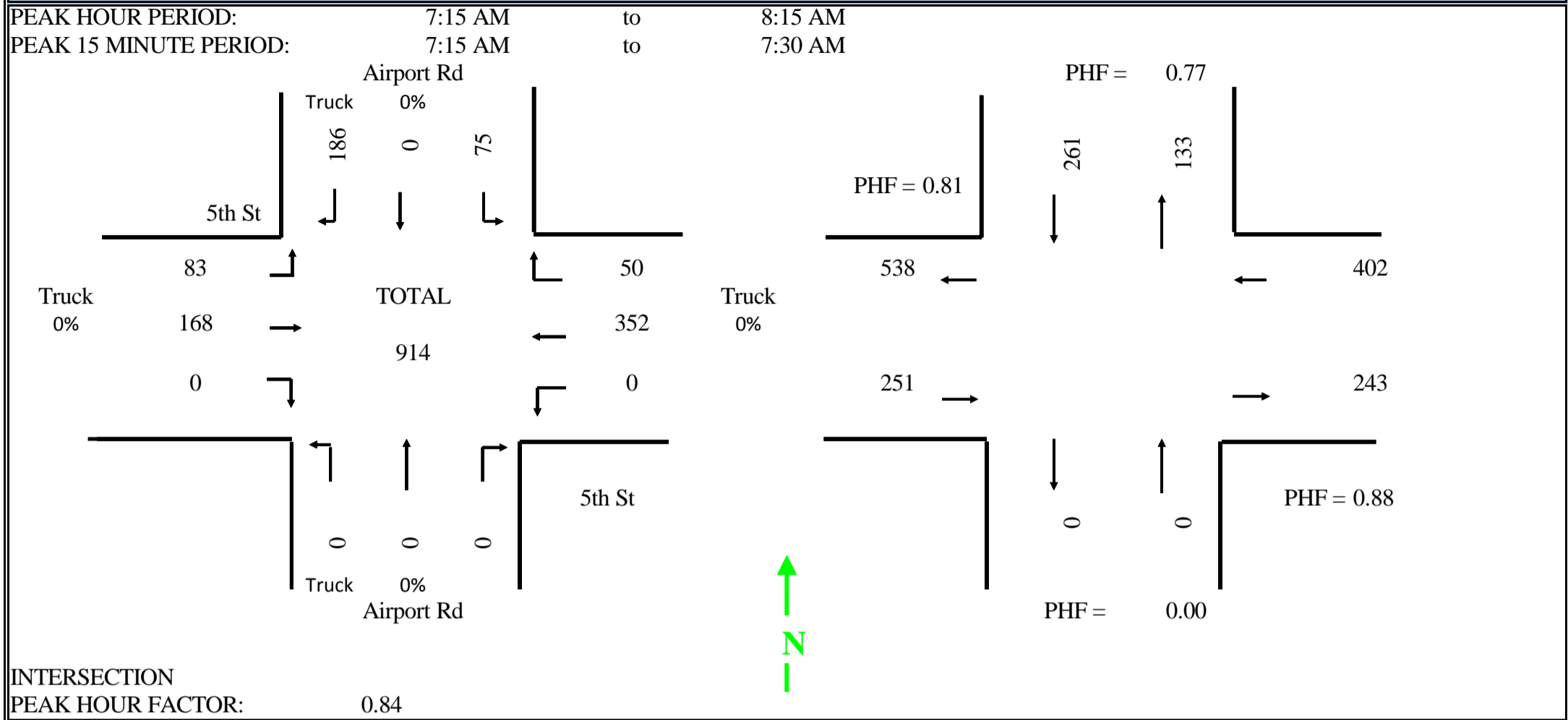
RUNNING COUNTS	E Robinson Eastbound			E Robinson Westbound			N Saliman Northbound			N Saliman Southbound			TOTAL
	A	B	C	D	E	F	G	H	I	J	K	L	
4:15 PM	11	3	0	9	3	12	1	90	7	3	89	6	234
4:30 PM	25	4	8	14	6	26	5	166	11	7	198	22	492
4:45 PM	33	4	11	18	8	33	9	247	13	9	289	38	712
5:00 PM	50	4	15	23	8	39	9	338	13	9	393	49	950
5:15 PM	74	4	20	25	9	45	14	449	14	12	485	56	1207
5:30 PM	93	5	23	27	12	46	18	546	18	12	592	72	1464
5:45 PM	101	6	27	30	12	46	20	640	21	12	686	80	1681
6:00 PM	111	6	32	32	12	48	22	711	23	12	767	92	1868

PERIOD COUNTS	E Robinson Eastbound			E Robinson Westbound			N Saliman Northbound			N Saliman Southbound			TOTAL
	A	B	C	D	E	F	G	H	I	J	K	L	
4:15 PM	11	3	0	9	3	12	1	90	7	3	89	6	234
4:30 PM	14	1	8	5	3	14	4	76	4	4	109	16	258
4:45 PM	8	0	3	4	2	7	4	81	2	2	91	16	220
5:00 PM	17	0	4	5	0	6	0	91	0	0	104	11	238
5:15 PM	24	0	5	2	1	6	5	111	1	3	92	7	257
5:30 PM	19	1	3	2	3	1	4	97	4	0	107	16	257
5:45 PM	8	1	4	3	0	0	2	94	3	0	94	8	217
6:00 PM	10	0	5	2	0	2	2	71	2	0	81	12	187



VEHICLE MOVEMENT SUMMARY

INTERSECTION: 5th St & Airport Rd	TIME: 7:00 AM to 9:00 AM
JURISDICTION: Carson City	DATE: 12/1/2015
PROJECT TITLE: Lompa Ranch Counts	PROJECT NO: J170



RUNNING COUNTS	5th St Eastbound			5th St Westbound			Airport Rd Northbound			Airport Rd Southbound			TOTAL
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Period End	A	B	C	D	E	F	G	H	I	J	K	L	
7:15 AM	21	18	0	0	64	8	0	0	0	11	0	24	146
7:30 AM	43	73	0	0	163	21	0	0	0	33	0	85	418
7:45 AM	65	122	0	0	250	42	0	0	0	64	0	139	682
8:00 AM	87	157	0	0	353	53	0	0	0	78	0	179	907
8:15 AM	104	186	0	0	416	58	0	0	0	86	0	210	1060
8:30 AM	124	212	0	0	467	65	0	0	0	94	0	248	1210
8:45 AM	141	241	0	0	492	68	0	0	0	101	0	282	1325
9:00 AM	148	262	0	0	524	70	0	0	0	113	0	295	1412

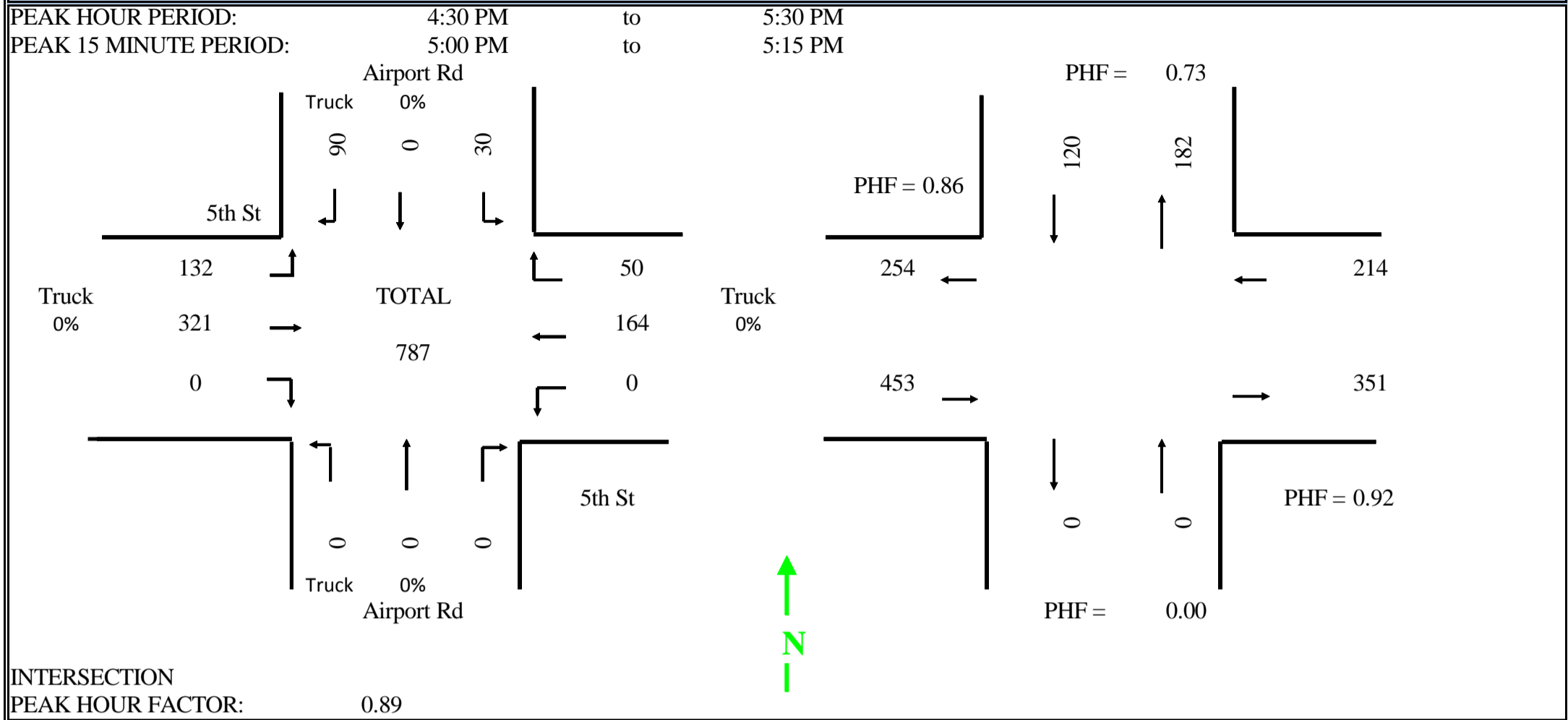
PERIOD COUNTS	5th St Eastbound			5th St Westbound			Airport Rd Northbound			Airport Rd Southbound			TOTAL
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Period End	A	B	C	D	E	F	G	H	I	J	K	L	
7:15 AM	21	18	0	0	64	8	0	0	0	11	0	24	146
7:30 AM	22	55	0	0	99	13	0	0	0	22	0	61	272
7:45 AM	22	49	0	0	87	21	0	0	0	31	0	54	264
8:00 AM	22	35	0	0	103	11	0	0	0	14	0	40	225
8:15 AM	17	29	0	0	63	5	0	0	0	8	0	31	153
8:30 AM	20	26	0	0	51	7	0	0	0	8	0	38	150
8:45 AM	17	29	0	0	25	3	0	0	0	7	0	34	115
9:00 AM	7	21	0	0	32	2	0	0	0	12	0	13	87

* No Pedestrian or Bicycle Movements were observed at the intersection



VEHICLE MOVEMENT SUMMARY

INTERSECTION: 5th St & Airport Rd	TIME: 4:00 PM to 6:00 PM
JURISDICTION: Carson City	DATE: 12/1/2015
PROJECT TITLE: Lompa Ranch Counts	PROJECT NO: J170



RUNNING COUNTS	5th St Eastbound			5th St Westbound			Airport Rd Northbound			Airport Rd Southbound			TOTAL
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Period End	A	B	C	D	E	F	G	H	I	J	K	L	TOTAL
4:15 PM	28	67	0	0	41	5	0	0	0	9	0	26	176
4:30 PM	58	124	0	0	80	13	0	0	0	21	0	42	338
4:45 PM	81	209	0	0	126	22	0	0	0	34	0	70	542
5:00 PM	117	276	0	0	167	33	0	0	0	44	0	89	726
5:15 PM	156	369	0	0	209	49	0	0	0	48	0	117	948
5:30 PM	190	445	0	0	244	63	0	0	0	51	0	132	1125
5:45 PM	224	502	0	0	272	71	0	0	0	55	0	159	1283
6:00 PM	237	550	0	0	298	76	0	0	0	65	0	182	1408































PERIOD COUNTS	5th St Eastbound			5th St Westbound			Airport Rd Northbound			Airport Rd Southbound			TOTAL
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Period End	A	B	C	D	E	F	G	H	I	J	K	L	TOTAL
4:15 PM	28	67	0	0	41	5	0	0	0	9	0	26	176
4:30 PM	30	57	0	0	39	8	0	0	0	12	0	16	162
4:45 PM	23	85	0	0	46	9	0	0	0	13	0	28	204
5:00 PM	36	67	0	0	41	11	0	0	0	10	0	19	184
5:15 PM	39	93	0	0	42	16	0	0	0	4	0	28	222
5:30 PM	34	76	0	0	35	14	0	0	0	3	0	15	177
5:45 PM	34	57	0	0	28	8	0	0	0	4	0	27	158
6:00 PM	13	48	0	0	26	5	0	0	0	10	0	23	125

* No Truck, Pedestrian or Bicycle Movements were observed at the intersection.

HCM Signalized Intersection Capacity Analysis

3: Saliman Rd & William St

12/10/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 					 	 	
Traffic Volume (vph)	15	310	110	261	848	32	96	138	219	37	262	23
Future Volume (vph)	15	310	110	261	848	32	96	138	219	37	262	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	0.99
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	1863	1583	1770	3496	3496
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.38	1.00	1.00	0.66	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	717	1863	1583	1232	3496	3496
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	337	120	284	922	35	104	150	238	40	285	25
RTOR Reduction (vph)	0	0	86	0	0	22	0	0	156	0	11	0
Lane Group Flow (vph)	16	337	34	284	922	13	104	150	82	40	299	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	NA
Protected Phases	7	4		3	8		5	2				6
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	0.8	14.9	14.9	6.1	20.2	20.2	18.0	18.0	18.0	9.7	9.7	9.7
Effective Green, g (s)	0.8	14.9	14.9	6.1	20.2	20.2	18.0	18.0	18.0	9.7	9.7	9.7
Actuated g/C Ratio	0.02	0.28	0.28	0.12	0.38	0.38	0.34	0.34	0.34	0.18	0.18	0.18
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	52	1004	449	398	1361	609	322	638	542	227	645	645
v/s Ratio Prot	0.00	0.10		c0.08	c0.26		c0.02	0.08				c0.09
v/s Ratio Perm			0.02			0.01	0.09		0.05	0.03		
v/c Ratio	0.31	0.34	0.08	0.71	0.68	0.02	0.32	0.24	0.15	0.18	0.46	0.46
Uniform Delay, d1	25.6	14.9	13.8	22.4	13.4	10.0	12.3	12.3	12.0	18.0	19.1	19.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	0.2	0.1	6.0	1.4	0.0	0.6	0.2	0.1	0.4	0.5	0.5
Delay (s)	28.9	15.1	13.8	28.3	14.8	10.0	12.8	12.5	12.1	18.4	19.6	19.6
Level of Service	C	B	B	C	B	B	B	B	B	B	B	B
Approach Delay (s)		15.2			17.8			12.4			19.5	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay			16.5								HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			52.5								Sum of lost time (s)	18.0
Intersection Capacity Utilization			55.9%								ICU Level of Service	B
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

6: Saliman St & 5th St

12/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	101	28	84	267	127	55	263	33	98	154	83
Future Volume (vph)	52	101	28	84	267	127	55	263	33	98	154	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.95		1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3425		1770	1773		1770	3480		1770	3353	
Flt Permitted	0.46	1.00		0.66	1.00		0.59	1.00		0.56	1.00	
Satd. Flow (perm)	850	3425		1235	1773		1104	3480		1037	3353	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	110	30	91	290	138	60	286	36	107	167	90
RTOR Reduction (vph)	0	18	0	0	38	0	0	25	0	0	62	0
Lane Group Flow (vph)	57	122	0	91	390	0	60	297	0	107	195	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.1	12.1		12.1	12.1		9.7	9.7		9.7	9.7	
Effective Green, g (s)	12.1	12.1		12.1	12.1		9.7	9.7		9.7	9.7	
Actuated g/C Ratio	0.39	0.39		0.39	0.39		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	333	1345		485	696		347	1095		326	1055	
v/s Ratio Prot		0.04			c0.22			0.09			0.06	
v/s Ratio Perm	0.07			0.07			0.05			c0.10		
v/c Ratio	0.17	0.09		0.19	0.56		0.17	0.27		0.33	0.19	
Uniform Delay, d1	6.1	5.9		6.1	7.3		7.6	7.9		8.1	7.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.0		0.2	1.0		0.2	0.1		0.6	0.1	
Delay (s)	6.3	5.9		6.3	8.3		7.9	8.0		8.7	7.8	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		6.0			7.9			8.0			8.0	
Approach LOS		A			A			A			A	

Intersection Summary

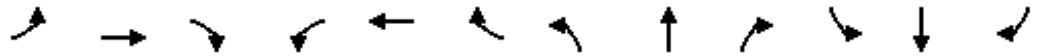
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	30.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Airport Rd & US 50

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	544	86	16	1119	26	154	60	28	43	51	93
Future Volume (vph)	24	544	86	16	1119	26	154	60	28	43	51	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1775		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.51	1.00		0.70	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	949	1775		1295	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	591	93	17	1216	28	167	65	30	47	55	101
RTOR Reduction (vph)	0	0	55	0	0	17	0	23	0	0	0	85
Lane Group Flow (vph)	26	591	38	17	1216	11	167	72	0	47	55	16
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	2.5	24.6	24.6	1.2	23.3	23.3	19.7	13.3		11.9	9.4	9.4
Effective Green, g (s)	2.5	24.6	24.6	1.2	23.3	23.3	19.7	13.3		11.9	9.4	9.4
Actuated g/C Ratio	0.04	0.41	0.41	0.02	0.39	0.39	0.33	0.22		0.20	0.16	0.16
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	74	1460	653	35	1383	618	401	396		278	293	249
v/s Ratio Prot	c0.01	0.17		0.01	c0.34		c0.04	0.04		0.01	0.03	
v/s Ratio Perm			0.02			0.01	c0.09			0.03		0.01
v/c Ratio	0.35	0.40	0.06	0.49	0.88	0.02	0.42	0.18		0.17	0.19	0.06
Uniform Delay, d1	27.8	12.3	10.5	28.9	16.8	11.1	14.9	18.7		19.6	21.8	21.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.9	0.2	0.0	10.2	6.7	0.0	0.7	0.2		0.3	0.3	0.1
Delay (s)	30.6	12.5	10.6	39.1	23.5	11.1	15.6	19.0		19.9	22.1	21.5
Level of Service	C	B	B	D	C	B	B	B		B	C	C
Approach Delay (s)		12.9			23.5			16.8			21.3	
Approach LOS		B			C			B			C	

Intersection Summary

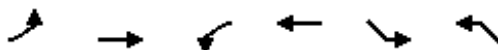
HCM 2000 Control Delay	19.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	59.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

15: US 50

12/10/2015



Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations	↖↖	↑↑↑	↗↗	↑↑↑	↘↘	↘↘
Traffic Volume (vph)	122	431	280	951	182	0
Future Volume (vph)	122	431	280	951	182	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	
Frt	1.00	1.00	1.00	1.00	1.00	
Flt Protected	0.95	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3433	5085	3433	5085	3433	
Flt Permitted	0.95	1.00	0.95	1.00	0.95	
Satd. Flow (perm)	3433	5085	3433	5085	3433	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	133	468	304	1034	198	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	133	468	304	1034	198	0
Turn Type	Prot	NA	Prot	NA	Prot	Prot
Protected Phases	5	2	1	6	7	3
Permitted Phases						
Actuated Green, G (s)	3.5	15.6	5.2	17.3	3.8	
Effective Green, g (s)	3.5	15.6	5.2	17.3	3.8	
Actuated g/C Ratio	0.09	0.41	0.14	0.45	0.10	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	315	2082	468	2308	342	
v/s Ratio Prot	0.04	0.09	c0.09	c0.20	c0.06	
v/s Ratio Perm						
v/c Ratio	0.42	0.22	0.65	0.45	0.58	
Uniform Delay, d1	16.3	7.3	15.6	7.1	16.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.1	3.1	0.1	2.4	
Delay (s)	17.3	7.4	18.7	7.3	18.8	
Level of Service	B	A	B	A	B	
Approach Delay (s)		9.6		9.9		
Approach LOS		A		A		

Intersection Summary

HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	38.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Casino Rd & William St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕↕↕		↖	↕↕↕		↖	↕		↖	↕	
Traffic Volume (vph)	25	556	7	47	1251	19	11	6	3	43	5	19
Future Volume (vph)	25	556	7	47	1251	19	11	6	3	43	5	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5075		1770	5074		1770	1779		1770	1637	
Flt Permitted	0.22	1.00		0.39	1.00		0.74	1.00		0.75	1.00	
Satd. Flow (perm)	414	5075		730	5074		1379	1779		1399	1637	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	604	8	51	1360	21	12	7	3	47	5	21
RTOR Reduction (vph)	0	3	0	0	3	0	0	2	0	0	14	0
Lane Group Flow (vph)	27	609	0	51	1378	0	12	8	0	47	12	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.0	18.0		23.0	18.0		18.5	18.5		18.5	18.5	
Effective Green, g (s)	23.0	18.0		23.0	18.0		18.5	18.5		18.5	18.5	
Actuated g/C Ratio	0.42	0.33		0.42	0.33		0.34	0.34		0.34	0.34	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Grp Cap (vph)	296	1660		399	1660		463	598		470	550	
v/s Ratio Prot	0.01	0.12		c0.01	c0.27			0.00			0.01	
v/s Ratio Perm	0.03			0.04			0.01			c0.03		
v/c Ratio	0.09	0.37		0.13	0.83		0.03	0.01		0.10	0.02	
Uniform Delay, d1	16.5	14.1		10.5	17.1		12.2	12.2		12.5	12.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.6		0.7	5.0		0.1	0.0		0.4	0.1	
Delay (s)	17.1	14.8		11.1	22.1		12.3	12.2		13.0	12.3	
Level of Service	B	B		B	C		B	B		B	B	
Approach Delay (s)		14.9			21.7			12.3			12.7	
Approach LOS		B			C			B			B	

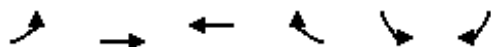
Intersection Summary

HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

11: 5th St & Airport Rd

12/10/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	83	168	352	50	75	186
Future Volume (Veh/h)	83	168	352	50	75	186
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	183	383	54	82	202
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	437				773	410
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	437				773	410
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				76	69
cM capacity (veh/h)	1123				338	642
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	90	183	437	82	202	
Volume Left	90	0	0	82	0	
Volume Right	0	0	54	0	202	
cSH	1123	1700	1700	338	642	
Volume to Capacity	0.08	0.11	0.26	0.24	0.31	
Queue Length 95th (ft)	7	0	0	23	34	
Control Delay (s)	8.5	0.0	0.0	19.0	13.2	
Lane LOS	A			C	B	
Approach Delay (s)	2.8		0.0	14.9		
Approach LOS				B		
Intersection Summary						
Average Delay			5.0			
Intersection Capacity Utilization			40.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

18: Saliman St & Robinson St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	45	23	77	39	43	22	314	100	24	183	49
Future Volume (Veh/h)	105	45	23	77	39	43	22	314	100	24	183	49
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	114	49	25	84	42	47	24	341	109	26	199	53
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	564	776	126	644	748	225	252			450		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	564	776	126	644	748	225	252			450		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	66	84	97	72	87	94	98			98		
cM capacity (veh/h)	335	314	901	296	326	778	1310			1107		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	114	74	84	89	24	227	223	26	133	119		
Volume Left	114	0	84	0	24	0	0	26	0	0		
Volume Right	0	25	0	47	0	0	109	0	0	53		
cSH	335	402	296	470	1310	1700	1700	1107	1700	1700		
Volume to Capacity	0.34	0.18	0.28	0.19	0.02	0.13	0.13	0.02	0.08	0.07		
Queue Length 95th (ft)	37	17	28	17	1	0	0	2	0	0		
Control Delay (s)	21.2	16.0	21.9	14.4	7.8	0.0	0.0	8.3	0.0	0.0		
Lane LOS	C	C	C	B	A			A				
Approach Delay (s)	19.1		18.1		0.4			0.8				
Approach LOS	C		C									
Intersection Summary												
Average Delay			6.4									
Intersection Capacity Utilization			37.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Saliman Rd & William St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↖	↗↗	↘	↖↖	↗↗	↘	↖	↗	↘	↖	↗↗	↘↘
Traffic Volume (vph)	33	862	99	261	551	47	102	129	311	82	129	34
Future Volume (vph)	33	862	99	261	551	47	102	129	311	82	129	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97	0.97
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	1863	1583	1770	3428	3428
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.44	1.00	1.00	0.67	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	812	1863	1583	1244	3428	3428
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	937	108	284	599	51	111	140	338	89	140	37
RTOR Reduction (vph)	0	0	69	0	0	29	0	0	170	0	31	0
Lane Group Flow (vph)	36	937	39	284	599	22	111	140	168	89	146	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	NA
Protected Phases	7	4		3	8		5	2				6
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	1.8	20.9	20.9	6.0	25.1	25.1	17.9	17.9	17.9	9.6	9.6	9.6
Effective Green, g (s)	1.8	20.9	20.9	6.0	25.1	25.1	17.9	17.9	17.9	9.6	9.6	9.6
Actuated g/C Ratio	0.03	0.36	0.36	0.10	0.43	0.43	0.31	0.31	0.31	0.16	0.16	0.16
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	105	1268	567	353	1523	681	311	572	486	204	564	564
v/s Ratio Prot	0.01	c0.26		c0.08	c0.17		0.02	0.08				0.04
v/s Ratio Perm			0.02			0.01	c0.09		c0.11	0.07		
v/c Ratio	0.34	0.74	0.07	0.80	0.39	0.03	0.36	0.24	0.35	0.44	0.26	0.26
Uniform Delay, d1	27.7	16.3	12.3	25.6	11.4	9.6	15.1	15.1	15.7	21.9	21.2	21.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	2.3	0.1	12.5	0.2	0.0	0.7	0.2	0.4	1.5	0.2	0.2
Delay (s)	29.6	18.6	12.3	38.1	11.5	9.6	15.8	15.4	16.1	23.4	21.5	21.5
Level of Service	C	B	B	D	B	A	B	B	B	C	C	C
Approach Delay (s)		18.4			19.5			15.9			22.1	
Approach LOS		B			B			B			C	

Intersection Summary

HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Saliman St & 5th St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	107	307	78	77	169	40	48	237	99	60	246	72
Future Volume (vph)	107	307	78	77	169	40	48	237	99	60	246	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.97		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3432		1770	1810		1770	3383		1770	3419	
Flt Permitted	0.62	1.00		0.51	1.00		0.54	1.00		0.53	1.00	
Satd. Flow (perm)	1149	3432		944	1810		1014	3383		994	3419	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	116	334	85	84	184	43	52	258	108	65	267	78
RTOR Reduction (vph)	0	54	0	0	20	0	0	75	0	0	54	0
Lane Group Flow (vph)	116	365	0	84	207	0	52	291	0	65	291	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.3	9.3		9.3	9.3		8.1	8.1		8.1	8.1	
Effective Green, g (s)	9.3	9.3		9.3	9.3		8.1	8.1		8.1	8.1	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	404	1209		332	637		311	1037		304	1049	
v/s Ratio Prot		0.11			c0.11			c0.09			0.09	
v/s Ratio Perm	0.10			0.09			0.05			0.07		
v/c Ratio	0.29	0.30		0.25	0.32		0.17	0.28		0.21	0.28	
Uniform Delay, d1	6.2	6.2		6.1	6.3		6.7	6.9		6.8	6.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.4	0.3		0.3	0.1		0.4	0.1	
Delay (s)	6.6	6.3		6.5	6.6		6.9	7.1		7.1	7.1	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		6.4			6.5			7.1			7.1	
Approach LOS		A			A			A			A	

Intersection Summary




























HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	26.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Airport Rd & US 50

12/10/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	144	1021	186	25	819	74	164	106	27	111	107	100
Future Volume (vph)	144	1021	186	25	819	74	164	106	27	111	107	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1806		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.62	1.00		0.67	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1152	1806		1239	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	1110	202	27	890	80	178	115	29	121	116	109
RTOR Reduction (vph)	0	0	91	0	0	52	0	15	0	0	0	91
Lane Group Flow (vph)	157	1110	111	27	890	28	178	129	0	121	116	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	7.5	28.3	28.3	1.9	22.7	22.7	16.7	11.7		14.5	10.6	10.6
Effective Green, g (s)	7.5	28.3	28.3	1.9	22.7	22.7	16.7	11.7		14.5	10.6	10.6
Actuated g/C Ratio	0.12	0.44	0.44	0.03	0.36	0.36	0.26	0.18		0.23	0.17	0.17
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	208	1569	702	52	1259	563	349	331		314	309	263
v/s Ratio Prot	c0.09	c0.31		0.02	0.25		c0.04	0.07		0.02	0.06	
v/s Ratio Perm			0.07			0.02	c0.09			0.06		0.01
v/c Ratio	0.75	0.71	0.16	0.52	0.71	0.05	0.51	0.39		0.39	0.38	0.07
Uniform Delay, d1	27.3	14.4	10.6	30.5	17.7	13.5	19.4	22.9		20.4	23.7	22.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	14.4	1.5	0.1	8.5	1.8	0.0	1.3	0.8		0.8	0.8	0.1
Delay (s)	41.6	15.9	10.7	39.0	19.5	13.5	20.7	23.7		21.2	24.4	22.5
Level of Service	D	B	B	D	B	B	C	C		C	C	C
Approach Delay (s)		17.9			19.6			22.0			22.7	
Approach LOS		B			B			C			C	

Intersection Summary

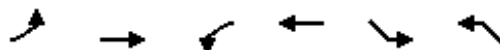
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	63.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

15: US 50

12/10/2015



Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations	↖↖	↑↑↑	↗↗	↑↑↑	↘↘	↙↙
Traffic Volume (vph)	213	654	219	723	280	61
Future Volume (vph)	213	654	219	723	280	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3433	5085	3433	5085	3433	3433
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3433	5085	3433	5085	3433	3433
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	232	711	238	786	304	66
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	232	711	238	786	304	66
Turn Type	Prot	NA	Prot	NA	Prot	Prot
Protected Phases	5	2	1	6	7	3
Permitted Phases						
Actuated Green, G (s)	3.7	12.4	5.4	14.1	5.8	5.8
Effective Green, g (s)	3.7	12.4	5.4	14.1	5.8	5.8
Actuated g/C Ratio	0.10	0.33	0.15	0.38	0.16	0.16
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	342	1699	499	1932	536	536
v/s Ratio Prot	0.07	0.14	c0.07	c0.15	c0.09	0.02
v/s Ratio Perm						
v/c Ratio	0.68	0.42	0.48	0.41	0.57	0.12
Uniform Delay, d1	16.1	9.6	14.6	8.4	14.5	13.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.3	0.2	0.7	0.1	1.4	0.1
Delay (s)	21.4	9.7	15.3	8.6	15.9	13.6
Level of Service	C	A	B	A	B	B
Approach Delay (s)		12.6		10.1		
Approach LOS		B		B		

Intersection Summary

HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	37.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Casino Rd & William St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↗↗		↗	↗↗↗		↗	↗		↗	↗	
Traffic Volume (vph)	53	1197	19	63	984	36	36	6	36	28	5	12
Future Volume (vph)	53	1197	19	63	984	36	36	6	36	28	5	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5073		1770	5058		1770	1626		1770	1661	
Flt Permitted	0.22	1.00		0.22	1.00		0.75	1.00		0.73	1.00	
Satd. Flow (perm)	419	5073		416	5058		1389	1626		1354	1661	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	1301	21	68	1070	39	39	7	39	30	5	13
RTOR Reduction (vph)	0	3	0	0	7	0	0	25	0	0	8	0
Lane Group Flow (vph)	58	1319	0	68	1102	0	39	21	0	30	10	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.6	17.8		20.8	17.9		18.6	18.6		18.6	18.6	
Effective Green, g (s)	20.6	17.8		20.8	17.9		18.6	18.6		18.6	18.6	
Actuated g/C Ratio	0.39	0.34		0.39	0.34		0.35	0.35		0.35	0.35	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	235	1710		238	1714		489	572		476	585	
v/s Ratio Prot	0.01	c0.26		c0.02	0.22			0.01			0.01	
v/s Ratio Perm	0.08			0.10			c0.03			0.02		
v/c Ratio	0.25	0.77		0.29	0.64		0.08	0.04		0.06	0.02	
Uniform Delay, d1	15.0	15.7		16.9	14.8		11.4	11.2		11.3	11.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	2.2		0.7	0.8		0.3	0.1		0.3	0.1	
Delay (s)	15.5	17.9		17.6	15.6		11.7	11.3		11.6	11.2	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		17.8			15.7			11.5			11.4	
Approach LOS		B			B			B			B	

Intersection Summary

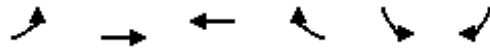
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

11: 5th St & Airport Rd

12/10/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶		↶	↷
Traffic Volume (veh/h)	132	321	164	50	30	90
Future Volume (Veh/h)	132	321	164	50	30	90
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	349	178	54	33	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	232				840	205
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	232				840	205
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				89	88
cM capacity (veh/h)	1336				299	836
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	143	349	232	33	98	
Volume Left	143	0	0	33	0	
Volume Right	0	0	54	0	98	
cSH	1336	1700	1700	299	836	
Volume to Capacity	0.11	0.21	0.14	0.11	0.12	
Queue Length 95th (ft)	9	0	0	9	10	
Control Delay (s)	8.0	0.0	0.0	18.5	9.9	
Lane LOS	A			C	A	
Approach Delay (s)	2.3		0.0	12.1		
Approach LOS				B		
Intersection Summary						
Average Delay			3.2			
Intersection Capacity Utilization			32.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

18: Saliman St & Robinson St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	1	20	16	6	33	13	359	7	9	396	50
Future Volume (Veh/h)	63	1	20	16	6	33	13	359	7	9	396	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	1	22	17	7	36	14	390	8	10	430	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	740	903	242	680	926	199	484			398		
vC1, stage 1 conf vol	477	477		422	422							
vC2, stage 2 conf vol	262	426		258	504							
vCu, unblocked vol	740	903	242	680	926	199	484			398		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	100	97	97	98	96	99			99		
cM capacity (veh/h)	470	451	759	504	440	809	1075			1157		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	68	23	17	43	14	260	138	10	287	197
Volume Left	68	0	17	0	14	0	0	10	0	0
Volume Right	0	22	0	36	0	0	8	0	0	54
cSH	470	737	504	712	1075	1700	1700	1157	1700	1700
Volume to Capacity	0.14	0.03	0.03	0.06	0.01	0.15	0.08	0.01	0.17	0.12
Queue Length 95th (ft)	13	2	3	5	1	0	0	1	0	0
Control Delay (s)	14.0	10.0	12.4	10.4	8.4	0.0	0.0	8.1	0.0	0.0
Lane LOS	B	B	B	B	A			A		
Approach Delay (s)	13.0		11.0		0.3			0.2		
Approach LOS	B		B							

Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			29.4%		ICU Level of Service						A	
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Saliman Rd & William St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑↑	↖	↖↗	↑↑	↖	↖	↑	↖	↖	↑↗	
Traffic Volume (vph)	6	296	105	283	883	51	80	139	235	57	265	16
Future Volume (vph)	6	296	105	283	883	51	80	139	235	57	265	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	1863	1583	1770	3510	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.39	1.00	1.00	0.66	1.00	
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	720	1863	1583	1231	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	322	114	308	960	55	87	151	255	62	288	17
RTOR Reduction (vph)	0	0	81	0	0	34	0	0	171	0	7	0
Lane Group Flow (vph)	7	322	33	308	960	21	87	151	84	62	298	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	0.8	14.8	14.8	5.8	19.8	19.8	16.8	16.8	16.8	9.7	9.7	
Effective Green, g (s)	0.8	14.8	14.8	5.8	19.8	19.8	16.8	16.8	16.8	9.7	9.7	
Actuated g/C Ratio	0.02	0.29	0.29	0.11	0.39	0.39	0.33	0.33	0.33	0.19	0.19	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	53	1029	460	391	1376	615	291	614	522	234	668	
v/s Ratio Prot	0.00	0.09		c0.09	c0.27		0.02	c0.08			c0.08	
v/s Ratio Perm			0.02			0.01	0.08		0.05	0.05		
v/c Ratio	0.13	0.31	0.07	0.79	0.70	0.03	0.30	0.25	0.16	0.26	0.45	
Uniform Delay, d1	24.7	14.1	13.1	22.0	13.0	9.6	12.2	12.4	12.1	17.6	18.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.2	0.1	10.1	1.6	0.0	0.6	0.2	0.1	0.6	0.5	
Delay (s)	25.8	14.3	13.1	32.0	14.6	9.7	12.8	12.6	12.2	18.2	18.7	
Level of Service	C	B	B	C	B	A	B	B	B	B	B	
Approach Delay (s)		14.2			18.5			12.4			18.6	
Approach LOS		B			B			B			B	

Intersection Summary

HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	50.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Saliman St & 5th St

12/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	115	36	91	302	122	50	240	44	103	155	79
Future Volume (vph)	53	115	36	91	302	122	50	240	44	103	155	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.96		1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3413		1770	1782		1770	3457		1770	3359	
Flt Permitted	0.42	1.00		0.65	1.00		0.59	1.00		0.56	1.00	
Satd. Flow (perm)	790	3413		1207	1782		1107	3457		1050	3359	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	125	39	99	328	133	54	261	48	112	168	86
RTOR Reduction (vph)	0	23	0	0	32	0	0	33	0	0	60	0
Lane Group Flow (vph)	58	141	0	99	429	0	54	276	0	112	194	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.6	12.6		12.6	12.6		9.5	9.5		9.5	9.5	
Effective Green, g (s)	12.6	12.6		12.6	12.6		9.5	9.5		9.5	9.5	
Actuated g/C Ratio	0.41	0.41		0.41	0.41		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	320	1382		489	721		338	1055		320	1026	
v/s Ratio Prot		0.04			c0.24			0.08			0.06	
v/s Ratio Perm	0.07			0.08			0.05			c0.11		
v/c Ratio	0.18	0.10		0.20	0.59		0.16	0.26		0.35	0.19	
Uniform Delay, d1	5.9	5.7		6.0	7.2		7.9	8.2		8.4	8.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.2	1.3		0.2	0.1		0.7	0.1	
Delay (s)	6.2	5.8		6.2	8.6		8.1	8.3		9.1	8.1	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		5.9			8.2			8.3			8.4	
Approach LOS		A			A			A			A	

Intersection Summary

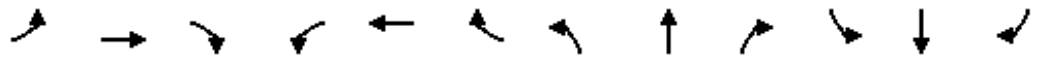
HCM 2000 Control Delay	7.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	31.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Airport Rd & US 50

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	644	123	18	1173	26	196	57	30	44	52	99
Future Volume (vph)	33	644	123	18	1173	26	196	57	30	44	52	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1766		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.54	1.00		0.70	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1008	1766		1295	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	700	134	20	1275	28	213	62	33	48	57	108
RTOR Reduction (vph)	0	0	78	0	0	17	0	25	0	0	0	89
Lane Group Flow (vph)	36	700	56	20	1275	11	213	70	0	48	57	19
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	2.7	25.2	25.2	1.3	23.8	23.8	19.3	14.1		12.3	10.6	10.6
Effective Green, g (s)	2.7	25.2	25.2	1.3	23.8	23.8	19.3	14.1		12.3	10.6	10.6
Actuated g/C Ratio	0.04	0.42	0.42	0.02	0.39	0.39	0.32	0.23		0.20	0.18	0.18
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	79	1478	661	38	1396	624	388	412		277	327	278
v/s Ratio Prot	c0.02	0.20		0.01	c0.36		c0.05	0.04		0.00	0.03	
v/s Ratio Perm			0.04			0.01	c0.13			0.03		0.01
v/c Ratio	0.46	0.47	0.08	0.53	0.91	0.02	0.55	0.17		0.17	0.17	0.07
Uniform Delay, d1	28.1	12.7	10.6	29.2	17.3	11.1	16.2	18.4		19.6	21.1	20.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.1	0.2	0.1	12.5	9.4	0.0	1.6	0.2		0.3	0.3	0.1
Delay (s)	32.2	13.0	10.6	41.7	26.6	11.1	17.8	18.6		19.9	21.4	20.8
Level of Service	C	B	B	D	C	B	B	B		B	C	C
Approach Delay (s)		13.4			26.5			18.0			20.8	
Approach LOS		B			C			B			C	

Intersection Summary

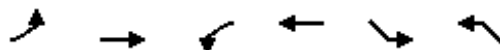
HCM 2000 Control Delay	20.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	60.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

15: US 50

12/10/2015



Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Traffic Volume (vph)	127	446	410	1048	205	106
Future Volume (vph)	127	446	410	1048	205	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3433	5085	3433	5085	3433	3433
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3433	5085	3433	5085	3433	3433
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	485	446	1139	223	115
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	138	485	446	1139	223	115
Turn Type	Prot	NA	Prot	NA	Prot	Prot
Protected Phases	5	2	1	6	7	3
Permitted Phases						
Actuated Green, G (s)	3.7	15.9	7.9	20.1	4.0	4.0
Effective Green, g (s)	3.7	15.9	7.9	20.1	4.0	4.0
Actuated g/C Ratio	0.09	0.38	0.19	0.49	0.10	0.10
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	307	1957	656	2474	332	332
v/s Ratio Prot	0.04	0.10	c0.13	c0.22	c0.06	0.03
v/s Ratio Perm						
v/c Ratio	0.45	0.25	0.68	0.46	0.67	0.35
Uniform Delay, d1	17.8	8.6	15.5	7.0	18.0	17.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1	2.8	0.1	5.3	0.6
Delay (s)	18.9	8.7	18.3	7.1	23.3	18.1
Level of Service	B	A	B	A	C	B
Approach Delay (s)		11.0		10.3		
Approach LOS		B		B		

Intersection Summary

HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	41.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	41.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Casino Rd & William St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↖↗		↖	↗↖↗		↖	↗		↖	↗	
Traffic Volume (vph)	25	578	7	47	1327	19	11	6	3	43	5	19
Future Volume (vph)	25	578	7	47	1327	19	11	6	3	43	5	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5076		1770	5074		1770	1779		1770	1637	
Flt Permitted	0.20	1.00		0.38	1.00		0.74	1.00		0.75	1.00	
Satd. Flow (perm)	376	5076		712	5074		1379	1779		1399	1637	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	628	8	51	1442	21	12	7	3	47	5	21
RTOR Reduction (vph)	0	2	0	0	2	0	0	2	0	0	14	0
Lane Group Flow (vph)	27	634	0	51	1461	0	12	8	0	47	12	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.6	19.8		25.8	21.9		19.1	19.1		19.1	19.1	
Effective Green, g (s)	21.6	19.8		25.8	21.9		19.1	19.1		19.1	19.1	
Actuated g/C Ratio	0.38	0.35		0.46	0.39		0.34	0.34		0.34	0.34	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	188	1785		399	1973		467	603		474	555	
v/s Ratio Prot	0.00	0.12		c0.01	c0.29			0.00			0.01	
v/s Ratio Perm	0.05			0.05			0.01			c0.03		
v/c Ratio	0.14	0.36		0.13	0.74		0.03	0.01		0.10	0.02	
Uniform Delay, d1	18.5	13.5		9.4	14.8		12.4	12.3		12.7	12.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.1	1.5		0.1	0.0		0.4	0.1	
Delay (s)	18.8	13.6		9.6	16.3		12.5	12.4		13.1	12.5	
Level of Service	B	B		A	B		B	B		B	B	
Approach Delay (s)		13.9			16.1			12.4			12.9	
Approach LOS		B			B			B			B	

Intersection Summary

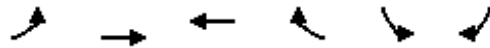
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

11: 5th St & Airport Rd

12/10/2015

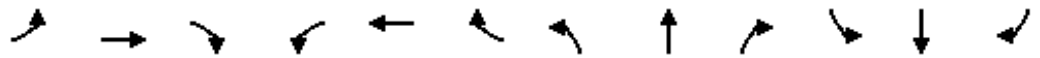


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	→	↠		↙	↘
Traffic Volume (veh/h)	83	198	389	50	75	186
Future Volume (Veh/h)	83	198	389	50	75	186
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	215	423	54	82	202
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	477				845	450
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	477				845	450
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				73	67
cM capacity (veh/h)	1085				305	609
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	90	215	477	82	202	
Volume Left	90	0	0	82	0	
Volume Right	0	0	54	0	202	
cSH	1085	1700	1700	305	609	
Volume to Capacity	0.08	0.13	0.28	0.27	0.33	
Queue Length 95th (ft)	7	0	0	27	36	
Control Delay (s)	8.6	0.0	0.0	21.1	13.8	
Lane LOS	A			C	B	
Approach Delay (s)	2.5		0.0	15.9		
Approach LOS				C		
Intersection Summary						
Average Delay			5.0			
Intersection Capacity Utilization			42.3%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

18: Saliman St & Robinson St

12/10/2015
































Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	45	23	77	39	43	22	314	100	24	183	49
Future Volume (Veh/h)	105	45	23	77	39	43	22	314	100	24	183	49
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	114	49	25	84	42	47	24	341	109	26	199	53
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	564	776	126	644	748	225	252			450		
vC1, stage 1 conf vol	278	278		444	444							
vC2, stage 2 conf vol	286	498		201	304							
vCu, unblocked vol	564	776	126	644	748	225	252			450		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	78	89	97	83	91	94	98			98		
cM capacity (veh/h)	511	464	901	488	489	778	1310			1107		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	114	74	84	89	24	227	223	26	133	119		
Volume Left	114	0	84	0	24	0	0	26	0	0		
Volume Right	0	25	0	47	0	0	109	0	0	53		
cSH	511	555	488	608	1310	1700	1700	1107	1700	1700		
Volume to Capacity	0.22	0.13	0.17	0.15	0.02	0.13	0.13	0.02	0.08	0.07		
Queue Length 95th (ft)	21	11	15	13	1	0	0	2	0	0		
Control Delay (s)	14.0	12.5	13.9	11.9	7.8	0.0	0.0	8.3	0.0	0.0		
Lane LOS	B	B	B	B	A			A				
Approach Delay (s)	13.4		12.9		0.4			0.8				
Approach LOS	B		B									
Intersection Summary												
Average Delay			4.6									
Intersection Capacity Utilization			37.7%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Saliman Rd & William St

12/10/2015

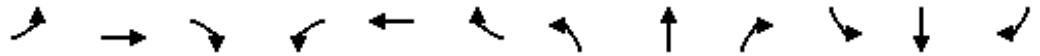
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 						 	
Traffic Volume (vph)	17	865	101	265	571	77	108	131	326	92	128	20
Future Volume (vph)	17	865	101	265	571	77	108	131	326	92	128	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	1863	1583	1770	3467	3467
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.45	1.00	1.00	0.67	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	835	1863	1583	1241	3467	3467
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	940	110	288	621	84	117	142	354	100	139	22
RTOR Reduction (vph)	0	0	70	0	0	46	0	0	170	0	18	0
Lane Group Flow (vph)	18	940	40	288	621	38	117	142	184	100	143	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	NA
Protected Phases	7	4		3	8		5	2		6		6
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	0.9	21.9	21.9	6.0	27.0	27.0	18.3	18.3	18.3	10.0	10.0	10.0
Effective Green, g (s)	0.9	21.9	21.9	6.0	27.0	27.0	18.3	18.3	18.3	10.0	10.0	10.0
Actuated g/C Ratio	0.02	0.37	0.37	0.10	0.45	0.45	0.31	0.31	0.31	0.17	0.17	0.17
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	51	1298	580	345	1600	715	315	571	485	207	580	580
v/s Ratio Prot	0.01	c0.27		c0.08	0.18		0.02	0.08				0.04
v/s Ratio Perm			0.03			0.02	0.09		c0.12	c0.08		
v/c Ratio	0.35	0.72	0.07	0.83	0.39	0.05	0.37	0.25	0.38	0.48	0.25	0.25
Uniform Delay, d1	29.1	16.3	12.3	26.4	10.9	9.2	15.6	15.5	16.2	22.5	21.6	21.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2	2.0	0.1	15.8	0.2	0.0	0.7	0.2	0.5	1.8	0.2	0.2
Delay (s)	33.3	18.3	12.3	42.2	11.0	9.2	16.3	15.8	16.7	24.3	21.8	21.8
Level of Service	C	B	B	D	B	A	B	B	B	C	C	C
Approach Delay (s)		18.0			19.9			16.4			22.8	
Approach LOS		B			B			B			C	
Intersection Summary												
HCM 2000 Control Delay			18.7									B
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			59.7								18.0	
Intersection Capacity Utilization			60.4%									B
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Saliman St & 5th St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕		↔	↕		↔	↕		↔	↕	
Traffic Volume (vph)	111	335	101	109	203	58	49	238	131	69	238	61
Future Volume (vph)	111	335	101	109	203	58	49	238	131	69	238	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.97		1.00	0.95		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3416		1770	1801		1770	3351		1770	3431	
Flt Permitted	0.59	1.00		0.48	1.00		0.56	1.00		0.52	1.00	
Satd. Flow (perm)	1091	3416		895	1801		1034	3351		961	3431	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	364	110	118	221	63	53	259	142	75	259	66
RTOR Reduction (vph)	0	67	0	0	24	0	0	98	0	0	46	0
Lane Group Flow (vph)	121	407	0	118	260	0	53	303	0	75	279	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.0	10.0		10.0	10.0		8.5	8.5		8.5	8.5	
Effective Green, g (s)	10.0	10.0		10.0	10.0		8.5	8.5		8.5	8.5	
Actuated g/C Ratio	0.36	0.36		0.36	0.36		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	396	1242		325	654		319	1035		297	1060	
v/s Ratio Prot		0.12			c0.14			c0.09			0.08	
v/s Ratio Perm	0.11			0.13			0.05			0.08		
v/c Ratio	0.31	0.33		0.36	0.40		0.17	0.29		0.25	0.26	
Uniform Delay, d1	6.3	6.3		6.4	6.5		6.9	7.2		7.1	7.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.2		0.7	0.4		0.2	0.2		0.4	0.1	
Delay (s)	6.7	6.5		7.1	6.9		7.2	7.4		7.6	7.3	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		6.5			7.0			7.4			7.3	
Approach LOS		A			A			A			A	

Intersection Summary

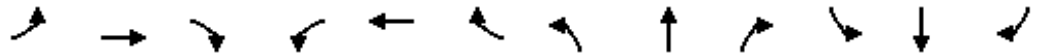
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	27.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Airport Rd & US 50

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	1141	239	28	894	76	206	107	31	113	94	114
Future Volume (vph)	152	1141	239	28	894	76	206	107	31	113	94	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1799		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.62	1.00		0.66	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1161	1799		1232	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	165	1240	260	30	972	83	224	116	34	123	102	124
RTOR Reduction (vph)	0	0	81	0	0	52	0	16	0	0	0	104
Lane Group Flow (vph)	165	1240	179	30	972	31	224	134	0	123	102	20
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	8.5	32.2	32.2	1.9	25.6	25.6	17.3	12.2		14.9	11.0	11.0
Effective Green, g (s)	8.5	32.2	32.2	1.9	25.6	25.6	17.3	12.2		14.9	11.0	11.0
Actuated g/C Ratio	0.12	0.47	0.47	0.03	0.38	0.38	0.25	0.18		0.22	0.16	0.16
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	220	1670	747	49	1328	594	340	321		299	300	255
v/s Ratio Prot	c0.09	c0.35		0.02	0.27		c0.05	0.07		0.02	0.05	
v/s Ratio Perm			0.11			0.02	c0.12			0.07		0.01
v/c Ratio	0.75	0.74	0.24	0.61	0.73	0.05	0.66	0.42		0.41	0.34	0.08
Uniform Delay, d1	28.8	14.6	10.7	32.8	18.3	13.6	22.2	24.9		22.4	25.4	24.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.4	1.8	0.2	20.5	2.1	0.0	4.6	0.9		0.9	0.7	0.1
Delay (s)	42.2	16.5	10.9	53.3	20.5	13.6	26.8	25.7		23.3	26.1	24.4
Level of Service	D	B	B	D	C	B	C	C		C	C	C
Approach Delay (s)		18.1			20.8			26.4			24.5	
Approach LOS		B			C			C			C	

Intersection Summary

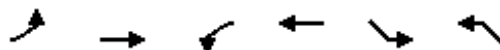
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	68.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

15: US 50

12/10/2015



Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations	↖↖	↑↑↑	↗↗	↑↑↑	↘↘	↙↙
Traffic Volume (vph)	213	926	219	662	293	172
Future Volume (vph)	213	926	219	662	293	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3433	5085	3433	5085	3433	3433
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3433	5085	3433	5085	3433	3433
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	232	1007	238	720	318	187
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	232	1007	238	720	318	187
Turn Type	Prot	NA	Prot	NA	Prot	Prot
Protected Phases	5	2	1	6	7	3
Permitted Phases						
Actuated Green, G (s)	3.7	15.8	5.4	17.5	5.8	5.8
Effective Green, g (s)	3.7	15.8	5.4	17.5	5.8	5.8
Actuated g/C Ratio	0.09	0.39	0.13	0.43	0.14	0.14
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	313	1983	457	2197	491	491
v/s Ratio Prot	0.07	c0.20	c0.07	0.14	c0.09	0.05
v/s Ratio Perm						
v/c Ratio	0.74	0.51	0.52	0.33	0.65	0.38
Uniform Delay, d1	17.9	9.4	16.3	7.6	16.4	15.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.1	0.2	1.1	0.1	2.9	0.5
Delay (s)	27.0	9.6	17.4	7.7	19.3	16.2
Level of Service	C	A	B	A	B	B
Approach Delay (s)		12.9		10.1		
Approach LOS		B		B		

Intersection Summary

HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	40.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	43.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Casino Rd & William St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↖↗		↖	↗↖↗		↖	↗		↖	↗	
Traffic Volume (vph)	53	1225	19	63	1038	36	36	6	36	82	5	21
Future Volume (vph)	53	1225	19	63	1038	36	36	6	36	82	5	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.87		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5073		1770	5060		1770	1626		1770	1633	
Flt Permitted	0.22	1.00		0.22	1.00		0.74	1.00		0.73	1.00	
Satd. Flow (perm)	416	5073		416	5060		1377	1626		1354	1633	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	1332	21	68	1128	39	39	7	39	89	5	23
RTOR Reduction (vph)	0	3	0	0	7	0	0	25	0	0	15	0
Lane Group Flow (vph)	58	1350	0	68	1160	0	39	21	0	89	13	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.7	17.9		20.7	17.9		18.6	18.6		18.6	18.6	
Effective Green, g (s)	20.7	17.9		20.7	17.9		18.6	18.6		18.6	18.6	
Actuated g/C Ratio	0.39	0.34		0.39	0.34		0.35	0.35		0.35	0.35	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	234	1719		234	1715		485	572		476	575	
v/s Ratio Prot	0.01	c0.27		c0.02	0.23			0.01			0.01	
v/s Ratio Perm	0.08			0.10			0.03			c0.07		
v/c Ratio	0.25	0.79		0.29	0.68		0.08	0.04		0.19	0.02	
Uniform Delay, d1	15.4	15.7		17.2	15.0		11.4	11.2		11.9	11.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	2.4		0.7	1.1		0.3	0.1		0.9	0.1	
Delay (s)	16.0	18.2		17.9	16.0		11.7	11.3		12.7	11.2	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		18.1			16.1			11.5			12.4	
Approach LOS		B			B			B			B	

Intersection Summary

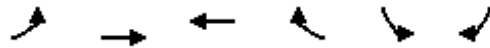
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

11: 5th St & Airport Rd

12/10/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	132	394	164	50	30	90
Future Volume (Veh/h)	132	394	164	50	30	90
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	428	178	54	33	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	232			919	205	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	232			919	205	
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	89			88	88	
cM capacity (veh/h)	1336			269	836	
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	143	428	232	33	98	
Volume Left	143	0	0	33	0	
Volume Right	0	0	54	0	98	
cSH	1336	1700	1700	269	836	
Volume to Capacity	0.11	0.25	0.14	0.12	0.12	
Queue Length 95th (ft)	9	0	0	10	10	
Control Delay (s)	8.0	0.0	0.0	20.3	9.9	
Lane LOS	A			C	A	
Approach Delay (s)	2.0	0.0		12.5		
Approach LOS				B		
Intersection Summary						
Average Delay			3.0			
Intersection Capacity Utilization			32.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

18: Saliman St & Robinson St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	1	20	16	6	33	13	359	7	9	396	50
Future Volume (Veh/h)	63	1	20	16	6	33	13	359	7	9	396	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	1	22	17	7	36	14	390	8	10	430	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	740	903	242	680	926	199	484			398		
vC1, stage 1 conf vol	477	477		422	422							
vC2, stage 2 conf vol	262	426		258	504							
vCu, unblocked vol	740	903	242	680	926	199	484			398		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	100	97	97	98	96	99			99		
cM capacity (veh/h)	470	451	759	504	440	809	1075			1157		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	68	23	17	43	14	260	138	10	287	197
Volume Left	68	0	17	0	14	0	0	10	0	0
Volume Right	0	22	0	36	0	0	8	0	0	54
cSH	470	737	504	712	1075	1700	1700	1157	1700	1700
Volume to Capacity	0.14	0.03	0.03	0.06	0.01	0.15	0.08	0.01	0.17	0.12
Queue Length 95th (ft)	13	2	3	5	1	0	0	1	0	0
Control Delay (s)	14.0	10.0	12.4	10.4	8.4	0.0	0.0	8.1	0.0	0.0
Lane LOS	B	B	B	B	A			A		
Approach Delay (s)	13.0		11.0		0.3			0.2		
Approach LOS	B		B							

Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			29.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Signalized Intersection Capacity Analysis

3: Saliman Rd & William St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖↗	↑↑	↖	↖↗	↑↑	↖	↖	↑	↖	↖	↑↕	
Traffic Volume (vph)	6	296	123	337	883	51	131	139	388	57	265	16
Future Volume (vph)	6	296	123	337	883	51	131	139	388	57	265	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	1863	1583	1770	3510	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.39	1.00	1.00	0.66	1.00	
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	720	1863	1583	1231	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	322	134	366	960	55	142	151	422	62	288	17
RTOR Reduction (vph)	0	0	97	0	0	34	0	0	278	0	7	0
Lane Group Flow (vph)	7	322	37	366	960	21	142	151	144	62	298	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8		5	2			6	
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	0.9	14.6	14.6	6.8	20.5	20.5	18.0	18.0	18.0	9.7	9.7	
Effective Green, g (s)	0.9	14.6	14.6	6.8	20.5	20.5	18.0	18.0	18.0	9.7	9.7	
Actuated g/C Ratio	0.02	0.28	0.28	0.13	0.39	0.39	0.34	0.34	0.34	0.18	0.18	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	58	976	436	441	1371	613	320	633	538	225	643	
v/s Ratio Prot	0.00	0.09		c0.11	c0.27		c0.03	0.08			0.08	
v/s Ratio Perm			0.02			0.01	c0.12		0.09	0.05		
v/c Ratio	0.12	0.33	0.08	0.83	0.70	0.03	0.44	0.24	0.27	0.28	0.46	
Uniform Delay, d1	25.6	15.3	14.2	22.5	13.6	10.1	12.7	12.5	12.7	18.6	19.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.2	0.1	12.2	1.6	0.0	1.0	0.2	0.3	0.7	0.5	
Delay (s)	26.5	15.5	14.3	34.7	15.3	10.1	13.7	12.7	12.9	19.2	19.8	
Level of Service	C	B	B	C	B	B	B	B	B	B	B	
Approach Delay (s)		15.3			20.2			13.0			19.7	
Approach LOS		B			C			B			B	

Intersection Summary

HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	52.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Saliman St & 5th St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	
Traffic Volume (vph)	57	123	36	116	319	125	50	246	56	111	181	97
Future Volume (vph)	57	123	36	116	319	125	50	246	56	111	181	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.96		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3420		1770	1784		1770	3440		1770	3355	
Flt Permitted	0.40	1.00		0.64	1.00		0.57	1.00		0.55	1.00	
Satd. Flow (perm)	740	3420		1197	1784		1057	3440		1031	3355	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	62	134	39	126	347	136	54	267	61	121	197	105
RTOR Reduction (vph)	0	23	0	0	31	0	0	42	0	0	73	0
Lane Group Flow (vph)	62	150	0	126	452	0	54	286	0	121	229	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.1	13.1		13.1	13.1		9.9	9.9		9.9	9.9	
Effective Green, g (s)	13.1	13.1		13.1	13.1		9.9	9.9		9.9	9.9	
Actuated g/C Ratio	0.41	0.41		0.41	0.41		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	302	1400		490	730		327	1064		318	1037	
v/s Ratio Prot		0.04			c0.25			0.08			0.07	
v/s Ratio Perm	0.08			0.11			0.05			c0.12		
v/c Ratio	0.21	0.11		0.26	0.62		0.17	0.27		0.38	0.22	
Uniform Delay, d1	6.1	5.8		6.2	7.5		8.0	8.3		8.6	8.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.3	1.6		0.2	0.1		0.8	0.1	
Delay (s)	6.4	5.9		6.5	9.1		8.3	8.5		9.4	8.3	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		6.0			8.5			8.4			8.6	
Approach LOS		A			A			A			A	

Intersection Summary

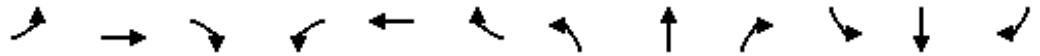
HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	32.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Airport Rd & US 50

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	695	123	18	1191	26	196	57	30	44	52	99
Future Volume (vph)	33	695	123	18	1191	26	196	57	30	44	52	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1766		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.54	1.00		0.70	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1008	1766		1295	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	755	134	20	1295	28	213	62	33	48	57	108
RTOR Reduction (vph)	0	0	78	0	0	17	0	25	0	0	0	89
Lane Group Flow (vph)	36	755	56	20	1295	11	213	70	0	48	57	19
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	2.7	25.2	25.2	1.3	23.8	23.8	19.3	14.1		12.3	10.6	10.6
Effective Green, g (s)	2.7	25.2	25.2	1.3	23.8	23.8	19.3	14.1		12.3	10.6	10.6
Actuated g/C Ratio	0.04	0.42	0.42	0.02	0.39	0.39	0.32	0.23		0.20	0.18	0.18
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	79	1478	661	38	1396	624	388	412		277	327	278
v/s Ratio Prot	c0.02	0.21		0.01	c0.37		c0.05	0.04		0.00	0.03	
v/s Ratio Perm			0.04			0.01	c0.13			0.03		0.01
v/c Ratio	0.46	0.51	0.08	0.53	0.93	0.02	0.55	0.17		0.17	0.17	0.07
Uniform Delay, d1	28.1	13.0	10.6	29.2	17.4	11.1	16.2	18.4		19.6	21.1	20.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.1	0.3	0.1	12.5	10.8	0.0	1.6	0.2		0.3	0.3	0.1
Delay (s)	32.2	13.3	10.6	41.7	28.2	11.1	17.8	18.6		19.9	21.4	20.8
Level of Service	C	B	B	D	C	B	B	B		B	C	C
Approach Delay (s)		13.6			28.1			18.0			20.8	
Approach LOS		B			C			B			C	

Intersection Summary

HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	60.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

15: US 50

12/10/2015



Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations	↖↖	↑↑↑	↗↗	↑↑↑	↘↘	↙↙
Traffic Volume (vph)	127	446	410	1066	205	106
Future Volume (vph)	127	446	410	1066	205	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3433	5085	3433	5085	3433	3433
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3433	5085	3433	5085	3433	3433
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	138	485	446	1159	223	115
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	138	485	446	1159	223	115
Turn Type	Prot	NA	Prot	NA	Prot	Prot
Protected Phases	5	2	1	6	7	3
Permitted Phases						
Actuated Green, G (s)	3.7	16.2	7.9	20.4	4.0	4.0
Effective Green, g (s)	3.7	16.2	7.9	20.4	4.0	4.0
Actuated g/C Ratio	0.09	0.39	0.19	0.49	0.10	0.10
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	305	1980	651	2493	330	330
v/s Ratio Prot	0.04	0.10	c0.13	c0.23	c0.06	0.03
v/s Ratio Perm						
v/c Ratio	0.45	0.24	0.69	0.46	0.68	0.35
Uniform Delay, d1	18.0	8.6	15.7	7.0	18.2	17.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.1	3.0	0.1	5.4	0.6
Delay (s)	19.1	8.6	18.7	7.1	23.6	18.2
Level of Service	B	A	B	A	C	B
Approach Delay (s)		10.9		10.3		
Approach LOS		B		B		

Intersection Summary

HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	41.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	41.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Casino Rd & William St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗↖↗		↖	↗↖↗		↖	↗		↖	↗	
Traffic Volume (vph)	25	612	7	47	1339	19	11	6	3	43	5	19
Future Volume (vph)	25	612	7	47	1339	19	11	6	3	43	5	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5076		1770	5074		1770	1779		1770	1637	
Flt Permitted	0.20	1.00		0.36	1.00		0.74	1.00		0.75	1.00	
Satd. Flow (perm)	363	5076		677	5074		1379	1779		1399	1637	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	665	8	51	1455	21	12	7	3	47	5	21
RTOR Reduction (vph)	0	2	0	0	2	0	0	2	0	0	14	0
Lane Group Flow (vph)	27	671	0	51	1474	0	12	8	0	47	12	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.3	20.5		25.5	22.1		19.1	19.1		19.1	19.1	
Effective Green, g (s)	22.3	20.5		25.5	22.1		19.1	19.1		19.1	19.1	
Actuated g/C Ratio	0.39	0.36		0.45	0.39		0.34	0.34		0.34	0.34	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	188	1841		371	1984		466	601		472	553	
v/s Ratio Prot	0.00	0.13		c0.01	c0.29			0.00			0.01	
v/s Ratio Perm	0.05			0.05			0.01			c0.03		
v/c Ratio	0.14	0.36		0.14	0.74		0.03	0.01		0.10	0.02	
Uniform Delay, d1	18.2	13.2		9.9	14.8		12.5	12.4		12.8	12.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.2	1.5		0.1	0.0		0.4	0.1	
Delay (s)	18.5	13.3		10.1	16.3		12.6	12.5		13.2	12.5	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		13.5			16.1			12.5			13.0	
Approach LOS		B			B			B			B	

Intersection Summary

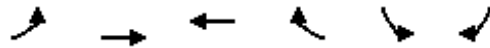
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	56.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

11: 5th St & Airport Rd

12/10/2015

























Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶		↶	↷
Traffic Volume (veh/h)	83	232	401	50	75	186
Future Volume (Veh/h)	83	232	401	50	75	186
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	90	252	436	54	82	202
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	490				895	463
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	490				895	463
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	92				71	66
cM capacity (veh/h)	1073				285	599
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	90	252	490	82	202	
Volume Left	90	0	0	82	0	
Volume Right	0	0	54	0	202	
cSH	1073	1700	1700	285	599	
Volume to Capacity	0.08	0.15	0.29	0.29	0.34	
Queue Length 95th (ft)	7	0	0	29	37	
Control Delay (s)	8.7	0.0	0.0	22.6	14.0	
Lane LOS	A			C	B	
Approach Delay (s)	2.3		0.0	16.5		
Approach LOS				C		
Intersection Summary						
Average Delay			4.9			
Intersection Capacity Utilization			42.9%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

18: Saliman St & Robinson St

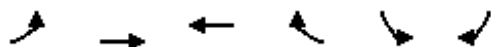
12/10/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	105	48	26	77	48	196	30	365	100	72	207	49
Future Volume (Veh/h)	105	48	26	77	48	196	30	365	100	72	207	49
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	114	52	28	84	52	213	33	397	109	78	225	53
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	911	980	139	840	952	253	278			506		
vC1, stage 1 conf vol	408	408		518	518							
vC2, stage 2 conf vol	504	572		322	434							
vCu, unblocked vol	911	980	139	840	952	253	278			506		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	52	86	97	79	87	71	97			93		
cM capacity (veh/h)	235	370	884	393	408	746	1282			1055		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	114	80	84	265	33	265	241	78	150	128		
Volume Left	114	0	84	0	33	0	0	78	0	0		
Volume Right	0	28	0	213	0	0	109	0	0	53		
cSH	235	465	393	642	1282	1700	1700	1055	1700	1700		
Volume to Capacity	0.48	0.17	0.21	0.41	0.03	0.16	0.14	0.07	0.09	0.08		
Queue Length 95th (ft)	61	15	20	51	2	0	0	6	0	0		
Control Delay (s)	33.9	14.4	16.6	14.5	7.9	0.0	0.0	8.7	0.0	0.0		
Lane LOS	D	B	C	B	A			A				
Approach Delay (s)	25.8		15.0		0.5			1.9				
Approach LOS	D		C									
Intersection Summary												
Average Delay			7.8									
Intersection Capacity Utilization			51.0%		ICU Level of Service			A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

39: 5th Street & Spine Road

12/10/2015

































Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↗	↗	↖		↘	↗
Traffic Volume (veh/h)	4	286	539	6	10	21
Future Volume (Veh/h)	4	286	539	6	10	21
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	311	586	7	11	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	593				908	590
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	593				908	590
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				96	95
cM capacity (veh/h)	983				304	508
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	4	311	593	11	23	
Volume Left	4	0	0	11	0	
Volume Right	0	0	7	0	23	
cSH	983	1700	1700	304	508	
Volume to Capacity	0.00	0.18	0.35	0.04	0.05	
Queue Length 95th (ft)	0	0	0	3	4	
Control Delay (s)	8.7	0.0	0.0	17.3	12.4	
Lane LOS	A			C	B	
Approach Delay (s)	0.1		0.0	14.0		
Approach LOS				B		
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			38.7%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

3: Saliman Rd & William St

12/10/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	 	 		 	 					 	 	
Traffic Volume (vph)	17	865	161	445	571	77	148	131	446	92	128	20
Future Volume (vph)	17	865	161	445	571	77	148	131	446	92	128	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	0.95	0.95
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.98
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3539	1583	1770	1863	1583	1770	3467	3467
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.47	1.00	1.00	0.67	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3539	1583	872	1863	1583	1241	3467	3467
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	940	175	484	621	84	161	142	485	100	139	22
RTOR Reduction (vph)	0	0	113	0	0	40	0	0	223	0	18	0
Lane Group Flow (vph)	18	940	62	484	621	44	161	142	262	100	143	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	NA
Protected Phases	7	4		3	8		5	2				6
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	0.9	26.5	26.5	13.1	38.7	38.7	21.2	21.2	21.2	11.6	11.6	11.6
Effective Green, g (s)	0.9	26.5	26.5	13.1	38.7	38.7	21.2	21.2	21.2	11.6	11.6	11.6
Actuated g/C Ratio	0.01	0.36	0.36	0.18	0.52	0.52	0.29	0.29	0.29	0.16	0.16	0.16
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	41	1262	564	605	1843	824	310	531	451	193	541	541
v/s Ratio Prot	0.01	c0.27		c0.14	0.18		0.04	0.08				0.04
v/s Ratio Perm			0.04			0.03	0.11		c0.17	0.08		
v/c Ratio	0.44	0.74	0.11	0.80	0.34	0.05	0.52	0.27	0.58	0.52	0.26	0.26
Uniform Delay, d1	36.4	20.9	16.0	29.3	10.3	8.8	21.2	20.5	22.7	28.8	27.6	27.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.3	2.4	0.1	7.5	0.1	0.0	1.5	0.3	1.9	2.3	0.3	0.3
Delay (s)	43.8	23.4	16.1	36.8	10.5	8.8	22.7	20.8	24.7	31.1	27.9	27.9
Level of Service	D	C	B	D	B	A	C	C	C	C	C	C
Approach Delay (s)		22.6			21.1			23.6			29.1	
Approach LOS		C			C			C			C	

Intersection Summary

HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	74.3	Sum of lost time (s)	18.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

6: Saliman St & 5th St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↘		↗	↗↘		↗	↗↘	
Traffic Volume (vph)	125	362	101	129	216	67	49	258	171	76	258	75
Future Volume (vph)	125	362	101	129	216	67	49	258	171	76	258	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.97		1.00	0.96		1.00	0.94		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3423		1770	1797		1770	3327		1770	3419	
Flt Permitted	0.57	1.00		0.47	1.00		0.54	1.00		0.48	1.00	
Satd. Flow (perm)	1067	3423		870	1797		998	3327		902	3419	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	393	110	140	235	73	53	280	186	83	280	82
RTOR Reduction (vph)	0	59	0	0	26	0	0	127	0	0	56	0
Lane Group Flow (vph)	136	444	0	140	282	0	53	339	0	83	306	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.1	11.1		11.1	11.1		9.3	9.3		9.3	9.3	
Effective Green, g (s)	11.1	11.1		11.1	11.1		9.3	9.3		9.3	9.3	
Actuated g/C Ratio	0.38	0.38		0.38	0.38		0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	402	1292		328	678		315	1052		285	1081	
v/s Ratio Prot		0.13			0.16			c0.10			0.09	
v/s Ratio Perm	0.13			c0.16			0.05			0.09		
v/c Ratio	0.34	0.34		0.43	0.42		0.17	0.32		0.29	0.28	
Uniform Delay, d1	6.5	6.5		6.8	6.8		7.3	7.7		7.6	7.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.2		0.9	0.4		0.3	0.2		0.6	0.1	
Delay (s)	7.0	6.7		7.7	7.2		7.5	7.8		8.1	7.7	
Level of Service	A	A		A	A		A	A		A	A	
Approach Delay (s)		6.8			7.3			7.8			7.8	
Approach LOS		A			A			A			A	

Intersection Summary

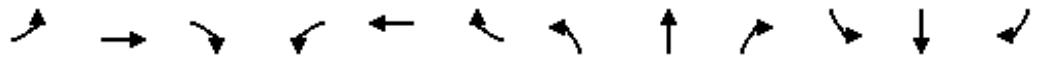
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	29.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

13: Airport Rd & US 50

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	152	1181	239	28	954	76	206	107	31	113	94	114
Future Volume (vph)	152	1181	239	28	954	76	206	107	31	113	94	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1799		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.62	1.00		0.66	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1160	1799		1232	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	165	1284	260	30	1037	83	224	116	34	123	102	124
RTOR Reduction (vph)	0	0	80	0	0	51	0	16	0	0	0	104
Lane Group Flow (vph)	165	1284	180	30	1037	32	224	134	0	123	102	20
Turn Type	Prot	NA	Perm	Prot	NA	Perm	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8	2			6		6
Actuated Green, G (s)	8.5	32.7	32.7	1.9	26.1	26.1	17.2	12.1		14.8	10.9	10.9
Effective Green, g (s)	8.5	32.7	32.7	1.9	26.1	26.1	17.2	12.1		14.8	10.9	10.9
Actuated g/C Ratio	0.12	0.48	0.48	0.03	0.38	0.38	0.25	0.18		0.22	0.16	0.16
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	219	1686	754	49	1346	602	336	317		296	296	251
v/s Ratio Prot	c0.09	c0.36		0.02	0.29		c0.05	0.07		0.02	0.05	
v/s Ratio Perm			0.11			0.02	c0.12			0.07		0.01
v/c Ratio	0.75	0.76	0.24	0.61	0.77	0.05	0.67	0.42		0.42	0.34	0.08
Uniform Delay, d1	29.0	14.7	10.6	33.0	18.6	13.4	22.5	25.1		22.7	25.7	24.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.6	2.1	0.2	20.5	2.8	0.0	4.9	0.9		0.9	0.7	0.1
Delay (s)	42.7	16.8	10.8	53.5	21.4	13.5	27.5	26.1		23.6	26.4	24.7
Level of Service	D	B	B	D	C	B	C	C		C	C	C
Approach Delay (s)		18.4			21.7			26.9			24.8	
Approach LOS		B			C			C			C	

Intersection Summary

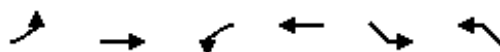
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

15: US 50

12/10/2015



Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations	↖↖	↑↑↑	↗↗	↑↑↑	↘↘	↙↙
Traffic Volume (vph)	253	966	219	662	293	232
Future Volume (vph)	253	966	219	662	293	232
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	0.97	0.91	0.97	0.91	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3433	5085	3433	5085	3433	3433
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3433	5085	3433	5085	3433	3433
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	1050	238	720	318	252
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	275	1050	238	720	318	252
Turn Type	Prot	NA	Prot	NA	Prot	Prot
Protected Phases	5	2	1	6	7	3
Permitted Phases						
Actuated Green, G (s)	5.2	17.9	5.6	18.3	5.6	5.6
Effective Green, g (s)	5.2	17.9	5.6	18.3	5.6	5.6
Actuated g/C Ratio	0.12	0.42	0.13	0.43	0.13	0.13
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	419	2136	451	2184	451	451
v/s Ratio Prot	c0.08	c0.21	0.07	0.14	c0.09	0.07
v/s Ratio Perm						
v/c Ratio	0.66	0.49	0.53	0.33	0.71	0.56
Uniform Delay, d1	17.8	9.0	17.3	8.1	17.7	17.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.7	0.2	1.1	0.1	5.0	1.5
Delay (s)	21.5	9.2	18.4	8.2	22.7	18.8
Level of Service	C	A	B	A	C	B
Approach Delay (s)		11.8		10.7		
Approach LOS		B		B		

Intersection Summary
























HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	42.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	44.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

32: Casino Rd & William St

12/10/2015

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (vph)	53	1262	19	63	1079	36	36	6	36	82	5	21
Future Volume (vph)	53	1262	19	63	1079	36	36	6	36	82	5	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	1.00		1.00	0.87		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	5074		1770	5061		1770	1626		1770	1633	
Flt Permitted	0.19	1.00		0.18	1.00		0.74	1.00		0.73	1.00	
Satd. Flow (perm)	345	5074		343	5061		1377	1626		1354	1633	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	1372	21	68	1173	39	39	7	39	89	5	23
RTOR Reduction (vph)	0	2	0	0	6	0	0	26	0	0	15	0
Lane Group Flow (vph)	58	1391	0	68	1206	0	39	20	0	89	13	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.5	21.6		24.7	21.7		18.8	18.8		18.8	18.8	
Effective Green, g (s)	24.5	21.6		24.7	21.7		18.8	18.8		18.8	18.8	
Actuated g/C Ratio	0.43	0.38		0.43	0.38		0.33	0.33		0.33	0.33	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	221	1926		224	1930		454	537		447	539	
v/s Ratio Prot	0.01	c0.27		c0.02	0.24			0.01			0.01	
v/s Ratio Perm	0.10			0.12			0.03			c0.07		
v/c Ratio	0.26	0.72		0.30	0.63		0.09	0.04		0.20	0.02	
Uniform Delay, d1	15.4	15.1		17.2	14.3		13.1	12.9		13.7	12.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	1.4		0.8	0.6		0.4	0.1		1.0	0.1	
Delay (s)	16.0	16.4		17.9	14.9		13.5	13.0		14.7	12.9	
Level of Service	B	B		B	B		B	B		B	B	
Approach Delay (s)		16.4			15.1			13.3			14.2	
Approach LOS		B			B			B			B	

Intersection Summary

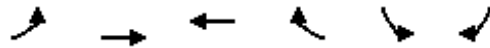
HCM 2000 Control Delay	15.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

11: 5th St & Airport Rd

12/10/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	132	431	205	50	30	90
Future Volume (Veh/h)	132	431	205	50	30	90
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	143	468	223	54	33	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	277				1004	250
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	277				1004	250
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				86	88
cM capacity (veh/h)	1286				238	789
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	143	468	277	33	98	
Volume Left	143	0	0	33	0	
Volume Right	0	0	54	0	98	
cSH	1286	1700	1700	238	789	
Volume to Capacity	0.11	0.28	0.16	0.14	0.12	
Queue Length 95th (ft)	9	0	0	12	11	
Control Delay (s)	8.1	0.0	0.0	22.5	10.2	
Lane LOS	A			C	B	
Approach Delay (s)	1.9		0.0	13.3		
Approach LOS				B		
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization			34.5%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

18: Saliman St & Robinson St

12/10/2015



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	11	30	16	12	153	20	399	7	169	476	50
Future Volume (Veh/h)	63	11	30	16	12	153	20	399	7	169	476	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	12	33	17	13	166	22	434	8	184	517	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1346	1398	286	1148	1421	221	571			442		
vC1, stage 1 conf vol	912	912		482	482							
vC2, stage 2 conf vol	434	486		666	939							
vCu, unblocked vol	1346	1398	286	1148	1421	221	571			442		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	63	95	95	94	95	79	98			83		
cM capacity (veh/h)	183	244	711	268	244	783	998			1114		

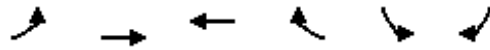
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	68	45	17	179	22	289	153	184	345	226
Volume Left	68	0	17	0	22	0	0	184	0	0
Volume Right	0	33	0	166	0	0	8	0	0	54
cSH	183	470	268	674	998	1700	1700	1114	1700	1700
Volume to Capacity	0.37	0.10	0.06	0.27	0.02	0.17	0.09	0.17	0.20	0.13
Queue Length 95th (ft)	40	8	5	27	2	0	0	15	0	0
Control Delay (s)	35.8	13.5	19.3	12.3	8.7	0.0	0.0	8.9	0.0	0.0
Lane LOS	E	B	C	B	A			A		
Approach Delay (s)	26.9		12.9		0.4			2.2		
Approach LOS	D		B							

Intersection Summary

Average Delay	4.8
Intersection Capacity Utilization	47.5%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis
 39: 5th Street & Spine Road

12/10/2015



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↶	↷	↶		↶	↷
Traffic Volume (veh/h)	13	596	396	18	6	16
Future Volume (Veh/h)	13	596	396	18	6	16
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	648	430	20	7	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	450				1116	440
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	450				1116	440
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	97
cM capacity (veh/h)	1110				227	617
Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2	
Volume Total	14	648	450	7	17	
Volume Left	14	0	0	7	0	
Volume Right	0	0	20	0	17	
cSH	1110	1700	1700	227	617	
Volume to Capacity	0.01	0.38	0.26	0.03	0.03	
Queue Length 95th (ft)	1	0	0	2	2	
Control Delay (s)	8.3	0.0	0.0	21.4	11.0	
Lane LOS	A			C	B	
Approach Delay (s)	0.2		0.0	14.0		
Approach LOS				B		
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			41.4%		ICU Level of Service	A
Analysis Period (min)			15			

Queues

3: Saliman Rd & William St

12/10/2015



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	7	322	134	366	960	55	142	151	422	62	305
v/c Ratio	0.02	0.41	0.28	0.76	0.64	0.07	0.39	0.23	0.51	0.25	0.43
Control Delay	23.2	18.5	3.4	37.1	16.8	0.2	14.8	12.4	4.1	21.1	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	18.5	3.4	37.1	16.8	0.2	14.8	12.4	4.1	21.1	19.7
Queue Length 50th (ft)	1	42	0	53	105	0	25	27	0	15	39
Queue Length 95th (ft)	6	78	21	#150	#287	0	69	72	48	47	81
Internal Link Dist (ft)		677			1275			181			412
Turn Bay Length (ft)	210		125	175		95	155			160	
Base Capacity (vph)	480	1408	735	480	1515	778	363	1062	1084	450	1289
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.23	0.18	0.76	0.63	0.07	0.39	0.14	0.39	0.14	0.24

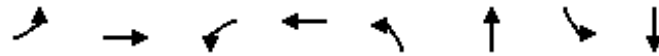
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

6: Saliman St & 5th St

12/10/2015



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	62	173	126	483	54	328	121	302
v/c Ratio	0.21	0.12	0.26	0.65	0.17	0.30	0.39	0.28
Control Delay	9.3	5.6	8.9	12.2	10.5	8.2	13.8	6.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.3	5.6	8.9	12.2	10.5	8.2	13.8	6.7
Queue Length 50th (ft)	6	6	12	48	7	17	16	12
Queue Length 95th (ft)	28	23	47	154	25	42	50	34
Internal Link Dist (ft)		675		762		283		2078
Turn Bay Length (ft)	135		100		160		160	
Base Capacity (vph)	434	2024	703	1069	621	2045	606	2014
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.09	0.18	0.45	0.09	0.16	0.20	0.15

Intersection Summary

Queues

13: Airport Rd & US 50

12/10/2015



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	36	755	134	20	1295	28	213	95	48	57	108
v/c Ratio	0.16	0.45	0.16	0.10	0.86	0.04	0.58	0.20	0.14	0.22	0.31
Control Delay	25.4	11.8	2.7	25.6	24.7	0.1	25.3	16.1	15.8	24.4	4.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	25.4	11.8	2.7	25.6	24.7	0.1	25.3	16.1	15.8	24.4	4.7
Queue Length 50th (ft)	9	67	0	5	145	0	43	11	9	14	0
Queue Length 95th (ft)	36	176	25	25	#423	0	#141	59	35	48	21
Internal Link Dist (ft)		1082			334			601		361	
Turn Bay Length (ft)	100		100	240		145	70		190		150
Base Capacity (vph)	352	1660	824	352	1513	764	370	655	352	669	666
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.10	0.45	0.16	0.06	0.86	0.04	0.58	0.15	0.14	0.09	0.16

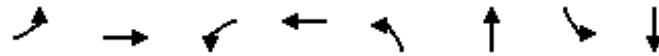
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

32: Casino Rd & William St

12/10/2015



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	27	673	51	1476	12	10	47	26
v/c Ratio	0.09	0.35	0.11	0.71	0.02	0.02	0.09	0.04
Control Delay	8.2	13.7	8.3	16.0	13.9	12.2	14.3	8.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.2	13.7	8.3	16.0	13.9	12.2	14.3	8.2
Queue Length 50th (ft)	2	42	8	115	2	1	9	1
Queue Length 95th (ft)	13	96	21	217	13	11	32	16
Internal Link Dist (ft)		411		252		440		71
Turn Bay Length (ft)	180		120		50		75	
Base Capacity (vph)	308	2148	457	2148	489	634	496	595
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.31	0.11	0.69	0.02	0.02	0.09	0.04

Intersection Summary

Queues

3: Saliman Rd & William St

12/10/2015



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	18	940	175	484	621	84	161	142	485	100	161
v/c Ratio	0.07	0.82	0.27	0.76	0.32	0.09	0.49	0.25	0.70	0.50	0.28
Control Delay	34.2	30.7	3.5	37.8	10.8	0.9	24.9	20.0	13.8	35.7	23.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.2	30.7	3.5	37.8	10.8	0.9	24.9	20.0	13.8	35.7	23.4
Queue Length 50th (ft)	4	194	0	104	64	0	55	48	60	41	28
Queue Length 95th (ft)	14	#350	31	#198	160	7	99	88	159	84	53
Internal Link Dist (ft)		677			1275			181			412
Turn Bay Length (ft)	210		125	175		95	155			160	
Base Capacity (vph)	245	1187	667	661	1940	932	326	784	847	352	1000
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.79	0.26	0.73	0.32	0.09	0.49	0.18	0.57	0.28	0.16

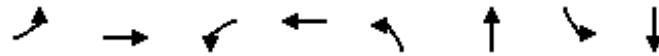
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

6: Saliman St & 5th St

12/10/2015



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	136	503	140	308	53	466	83	362
v/c Ratio	0.34	0.38	0.43	0.45	0.17	0.40	0.30	0.32
Control Delay	10.1	6.6	12.5	8.7	10.0	6.3	12.0	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.1	6.6	12.5	8.7	10.0	6.3	12.0	7.4
Queue Length 50th (ft)	13	20	14	26	5	15	9	15
Queue Length 95th (ft)	49	55	55	83	25	48	37	45
Internal Link Dist (ft)		675		762		283		2078
Turn Bay Length (ft)	135		100		160		160	
Base Capacity (vph)	680	2217	555	1160	636	2189	575	2210
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.23	0.25	0.27	0.08	0.21	0.14	0.16

Intersection Summary

Queues

13: Airport Rd & US 50

12/10/2015



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	165	1284	260	30	1037	83	224	150	123	102	124
v/c Ratio	0.71	0.72	0.30	0.22	0.82	0.12	0.67	0.43	0.38	0.36	0.33
Control Delay	47.9	18.1	6.5	33.9	26.2	0.9	30.5	25.8	21.2	28.3	5.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.9	18.1	6.5	33.9	26.2	0.9	30.5	25.8	21.2	28.3	5.7
Queue Length 50th (ft)	65	166	18	12	191	0	71	49	37	37	0
Queue Length 95th (ft)	#163	#405	77	37	#322	5	126	98	73	77	28
Internal Link Dist (ft)		1082			334			601		361	
Turn Bay Length (ft)	100		100	240		145	70		190		150
Base Capacity (vph)	233	1783	873	137	1315	684	336	556	325	559	582
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.71	0.72	0.30	0.22	0.79	0.12	0.67	0.27	0.38	0.18	0.21

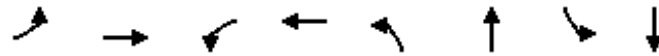
Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Queues

32: Casino Rd & William St

12/10/2015



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	58	1393	68	1212	39	46	89	28
v/c Ratio	0.19	0.70	0.22	0.60	0.08	0.08	0.19	0.05
Control Delay	10.4	16.8	10.9	15.3	15.3	7.2	16.4	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.4	16.8	10.9	15.3	15.3	7.2	16.4	8.3
Queue Length 50th (ft)	9	153	11	125	10	2	24	1
Queue Length 95th (ft)	23	201	26	167	29	21	54	16
Internal Link Dist (ft)		411		252		440		71
Turn Bay Length (ft)	180		120		50		75	
Base Capacity (vph)	308	2106	315	2121	469	580	461	572
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.66	0.22	0.57	0.08	0.08	0.19	0.05

Intersection Summary

APPENDIX 3

Wetlands Delineation Memo for Lompa Ranch North

WETLAND DELINEATION MEMO
FOR
LOMPA RANCH DEVELOPMENT

In association with a Specific Plan Amendment Application, Master Plan Amendment Application
and Rezoning Application.

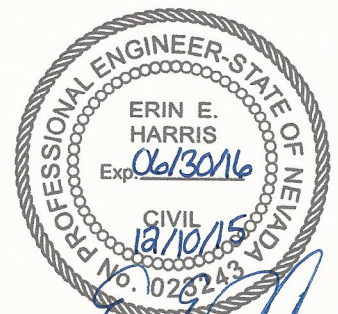
Prepared for:

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December 2015



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PURPOSE OF REPORT AND STUDY OBJECTIVES

The purpose of this report is to identify potential areas that meet the Federal 404 definition of wetlands. Following wetland identification by the Army Corps of Engineers, designated land use intensities shall be developed outside of the wetlands.

SECTION 404 PERMITTING (U.S. ENVIRONMENTAL PROTECTION AGENCY)

Section 404 of the Clean Water Act (CWA) establishes a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Activities in waters of the United States regulated under this program include fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects. Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States, unless the activity is exempt from Section 404 regulation (e.g. certain farming and forestry activities). The basic premise of the program is that no discharge of dredged or fill material may be permitted if: (1) a practicable alternative exists that is less damaging to the aquatic environment or (2) the nation's waters would be significantly degraded. In other words, when you apply for a permit, you must first show that steps have been taken to avoid impacts to wetlands, streams and other aquatic resources; that potential impacts have been minimized; and that compensation will be provided for all remaining unavoidable impacts. Proposed activities are regulated through a permit review process. An individual permit is required for potentially significant impacts. Individual permits are reviewed by the U.S. Army Corps of Engineers, which evaluates applications under a public interest review, as well as the environmental criteria set forth in the CWA Section 404(b)(1) Guidelines, regulations promulgated by EPA. However, for most discharges that will have only minimal adverse effects, a general permit may be suitable. General permits are issued on a nationwide, regional, or State basis for particular categories of activities. The general permit process eliminates individual review and allows certain activities to proceed with little or no delay, provided that the general or specific conditions for the general permit are met. For example, minor road activities, utility line backfill, and bedding are activities that can be considered for a general permit. States also have a role in Section 404 decisions, through State program general permits, water quality certification, or program assumption.

(<http://water.epa.gov/lawsregs/guidance/cwa/dredgdis/>)

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PROJECT BACKGROUND

In June 1994 a Proposed Jurisdictional Delineation Report was prepared for the Carson City Highway 395 Bypass (94-031-03 and 94-031-07) by Resource Concepts. In July 1997 an Addendum was prepared (199400539). Per NDOT, both reports were accepted by the Corps.

In June of 1998 WRC Engineering prepared a US 395 Bypass Section 404 Alternatives Development and Evaluation Report (WRC File 1879/42). Figure 9 of this report is shown on the following pages of this memo as Figure 1.

In February of 1999 Palmer and Lauder Engineers prepared a Development Constraint Analysis of the Lompa Ranch (Job No. 990101). The following excerpt is taken from this report:

WETLANDS / WATERS OF THE US: The U.S. Army Corp of Engineers (COE) regulates Section 404 of the Clean Water Act, which requires approval prior to discharging dredged or fill material into the Waters of the U.S. Waters of the U.S. include surface waters such as all navigable waters and their tributaries, all interstate waters and their tributaries, all wetlands adjacent to these waters, and all impoundments of these waters.

In conjunction with the design for the U.S. 395 Bypass, a jurisdictional delineation of wetlands and other Waters of the U.S. were performed on a portion of the Lompa Ranch by Resource Concepts, Inc.; in June 1994. An addendum to that report was issued in July 1997. The drawing illustrating the study area, waters of the U.S. and the wetland boundaries is included herein, along with the text of both reports. NDOT staff has advised us that both delineations have been verified by the Corp of Engineers.

Waters of the U.S. have been identified in several locations traversing Parcel A. Additionally; they have been identified on both Parcels B and C, near the linear ditch. A total of approximately 25 acres of wetlands were delineated on the Lompa Ranch property. It is important to note, however, that the delineation only extended as far as the project limits for the U.S. Highway 395 Bypass. The western 2,000 feet of the ranch was not included. While we are not aware of any specific areas that could be delineated as Waters of the U.S., including wetlands, an effort should be made in the future to determine if any exist.

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Development of or near "Waters of the US" requires either a permit or determination that a permit is not required from the COE. Permits are a means to assure that a conveyance is provided. With respect to the wetlands, they can be avoided, impacted minimally, or mitigated. Mitigation typically requires creation of new wetland, of equal biological value to that which was destroyed, at a two-to-one ratio. Because of the expense of developing new wetland and the development costs associated with the existing wetland, we have assumed that the wetlands would be avoided and/or subject to minimal impact. Therefore, these lands would not be available for development.

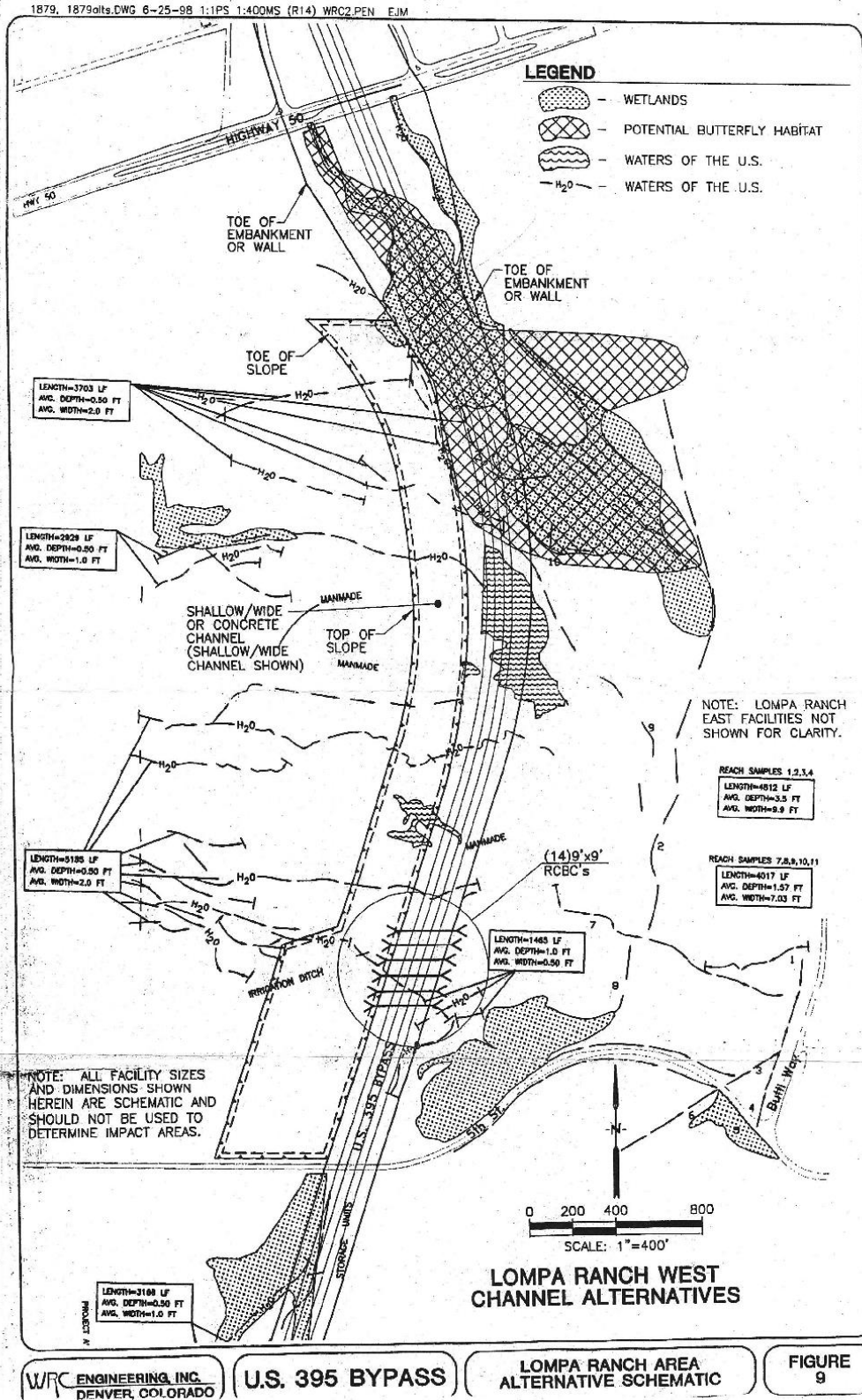
Based on aerial photography, it appears that the mitigation required for disturbance of the wetlands during the Highway 395 Bypass project were completed east of the highway and north of 5th Street. Recent topography shows this area as being a collector basin for numerous watercourses in the vicinity as well as an area subject to backwater ponding.

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FIGURE 1: 404 DELINEATION BEFORE HIGHWAY 395 CHANNEL AND ROADWAY (WRC FIGURE 9)



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FIGURE 2: EXISTING TOPOGRAPHY



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FIGURE 3: 2015 AERIAL PHOTO



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FIGURE 4: AREAS OF POTENTIAL WETLANDS



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CONCLUSION

The construction of Highway 395 and the associated drainage channels has impacted the natural waterways and wetlands in the area. These improvements have reduced or eliminated much of the previously flooded area in the immediate vicinity. Following the LOMR acceptance by FEMA, it is recommended that an updated Delineation be completed by the Corps for Lompa Ranch.

Recommended Actions:

1. Blackstone Development Group is currently working with Resource Concept Inc to conduct an updated Wetland Jurisdictional Delineation in early spring (when weather allows).
2. Engage a resource management or environmental engineering firm to study the effects of the constructed channel and highway improvements on the previously mapped waterways and wetlands and coordinate those results with the Corps. In discussion, Resource Concepts believes the wetlands will be less than the approved JD's in 1997 and 1998 due to construction of the existing highway and channel improvements.
3. Following wetland identification by the Army Corps of Engineers, designated land use intensities shall be developed outside of the wetlands.

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APPENDIX 4

**Water and Sewer Demands Technical
Engineering Memo for Lompa Ranch North**

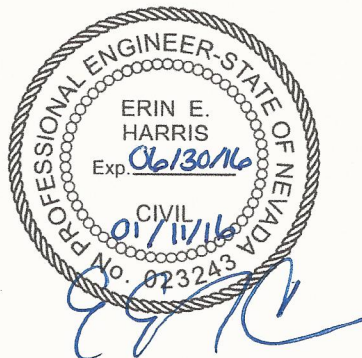
**WATER AND SEWER DEMANDS
TECHNICAL ENGINEERING MEMO
FOR
LOMPA RANCH NORTH DEVELOPMENT**

In association with a Specific Plan Amendment Application, Master Plan Amendment Application
and Rezoning Application.

Prepared for:
Blackstone Development Group
333 N. Wilmot Road, Suite 340
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(520) 618-5378

Prepared by:
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January 2016



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1. Introduction and Executive Summary

This Sewer and Water Demands Technical Engineering Memo supports a comprehensive plan amendment and rezoning application and identifies the utility-related impacts of a proposed Lompa Ranch mixed-use development. The project is generally located north of 5th Street, south of William Street/US 50, east of Saliman Road and west of Airport Road in Carson City, Nevada. The project includes proposed commercial and residential land uses. The site location is shown in Exhibit 1.

Exhibit 1 Site Location

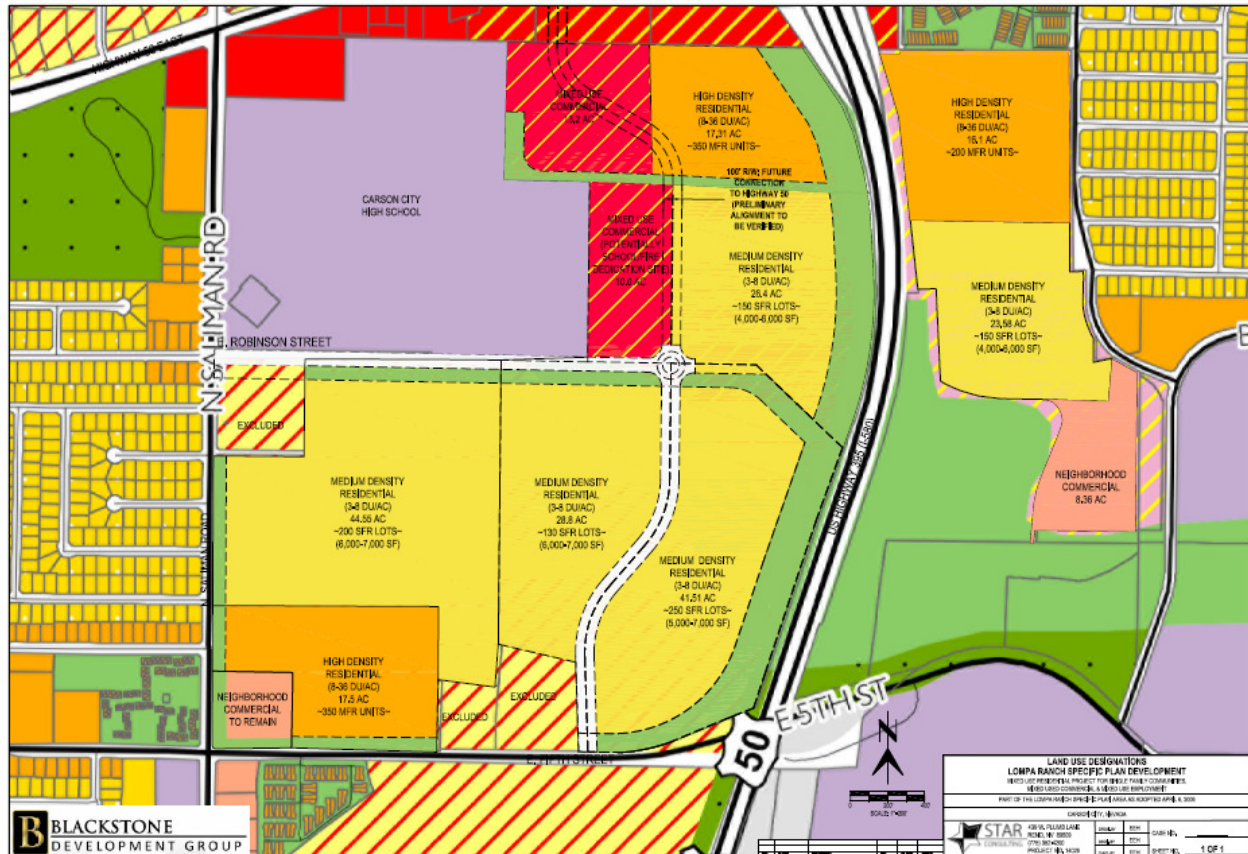


This memo provides general guidance and preliminary recommendations for anticipating sewer and water demands from the project.

Development Description

The project is within twelve areas, or parcels comprising a total of approximately 250 acres. A conceptual plan, showing the potential location of the land use types is provided in Exhibit 2. The specific locations of system connection points have not yet been determined..

Exhibit 2 Land Use Concept Plan



A preliminary land use scenario is shown in Exhibit 3. The land use designations plan identifies twelve areas either designated for medium density residential (MDR), high density residential (HDR), mixed use commercial or neighborhood commercial. The proposed residential densities are shown to range from 3 to 8 dwelling units per acre for MDR and for HDR, 8 to 36 dwelling units per acre.

The number of single family and multi-family residential units is estimated to be over 1,780. There are 310,000 square feet of commercial uses, estimated by applying a floor area ratio (FAR) of 0.20 to the acreage of the parcels designated "mixed use commercial" and "neighborhood commercial".

Study Objectives

The specific study objectives are:

- Find the range of sewer demands projected for the development
- Find the range of water demands projected for the development
- Provide a general description of how the area will be served by the existing systems

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Principal Findings

This project is located on both sides of US 395, between Saliman Road and Airport Road and 5th Street and William Street.

Assuming a preliminary land use estimate, at build out the project will generate approximately:

- 1,628,185 gpd (peak flow rate) of sewage west of the Highway
 - 503,250 gpd (peak flow rate) of sewage east of the Highway
-
- The recommended sewer line through the development on the north-south spine road is a 15" diameter line. No public sewer shall be less than 8" in diameter.
 - No individual sewer service connection shall be less than 4" in diameter.
 - All gravity sewers must be so designed and constructed to give mean velocities for the design condition, when flowing full or half full, of not less than two feet (2') per second minimum nor more than ten feet (10') per second maximum.
 - Mannings formula shall be used in determining the slope, velocity, design flow and diameter using "n" coefficients for the appropriate pipe material to be used. Mannings "n" for PVC is thirteen thousandths (0.013). The minimum pipe slope for eight-inch (8") pipe is five tenths of a percent (0.5%).
 - Minimum pipe slope for dead end sewers shall be five tenths of a percent (0.5%) unless it can be shown by calculations that the velocity in the pipe is two (2) fps or greater unless waived by the utilities director or designee.
 - The sewer collection system and HCS connections are proposed to be covered with at least 3' of earth.
 - Maximum spacing for manholes shall be four hundred feet (400') for all lines smaller than fifteen inches (15"), and five hundred feet (500') for lines fifteen inches (15") to twenty-four inches (24"), and six hundred feet (600') for twenty-four inches (24") and larger

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2. Demand Analysis

Sewer:

A Public Sewer extension line and new public manholes will be proposed with this project. The Public Sewer line will be designed and constructed via an approved Public Sewer Plan. It is anticipated that the new public sewer lines will be installed in public rights of way, to be dedicated with each phase of development. The system in each phase will drain to either existing lines in Saliman and 5th or to a trunk line in the Lompa Ranch Spine Road. The area east of the Highway will drain to Airport Road.

The following flows are based on Chapter 12.06.280 of the Carson City code.

West of Highway 395								
Parcel	Acreage	Land Use	Equivalent Population per Acre (12.06.270.B)	Population Estimate	Average Daily Flow Rate (150 gpcd)	Minimum Daily Flow Rate (90 gpcd)	Peak Design Flow Rate (250 gpcd)	Infiltration (200gal/acre/day)
A	13.2	Commercial	12	158	23,760	14,256	39,600	2,640
B	17.31	High Density Res.	60	1,039	155,790	93,474	259,650	3,462
C	4.1	Commercial	12	49	7,380	4,428	12,300	820
D	44.55	Medium Density Res.	29	1,292	193,793	116,276	322,988	8,910
E	17.5	High Density Res.	60	1,050	157,500	94,500	262,500	3,500
F	10	Commercial	12	120	18,000	10,800	30,000	2,000
G	26.4	Medium Density Res.	29	766	114,840	68,904	191,400	5,280
H	41.51	Medium Density Res.	29	1,204	180,569	108,341	300,948	8,302
I	28.8	Medium Density Res.	29	835	125,280	75,168	208,800	5,760
Totals WEST	203.37			6,513	976,911	586,147	1,628,185	40,674
East of Highway 395								
Parcel	Acreage	Land Use	Equivalent Population per Acre (12.06.270.B)	Population Estimate	Average Daily Flow Rate (150 gpcd)	Minimum Daily Flow Rate (90 gpcd)	Peak Design Flow Rate (300 gpcd)	Infiltration (200gal/acre/day)
J	16.1	High Density Res.	60	966	144,900	86,940	289,800	3,220
K	21.1	Medium Density Res.	29	612	91,785	55,071	183,570	4,220
L	8.3	Commercial	12	100	14,940	8,964	29,880	1,660
Totals EAST	45.5			1,678	251,625	150,975	503,250	9,100

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FLOW VELOCITY

Mannings equation:

$$V = k / n * (A / P)^{2/3} * S^{1/2}$$
$$k = 1.49, \text{ for unit conversion}$$
$$n = 0.013$$

For 8" Sewer Pipe:

Diameter of Pipe = 8" (0.67 ft)

Radius of Pipe = 4" (0.335 ft)

$$A = \text{Pi} * R^2$$
$$= 3.1416 * (0.335\text{ft})^2$$
$$= 0.352566 \text{ ft}^2$$

$$P = 2 * \text{Pi} * R$$
$$= 2.105 \text{ ft}$$

$$R_h = A / P$$
$$= 0.167 \text{ ft}$$

S_{min}=0.50%

S_{max}=N/A

$$V = 1.49 / 0.013 * 0.167^{2/3} * 0.005^{1/2}$$

V_{min} = 2.45fps

A velocity of 2 fps or greater is required. A minimum slope of 0.4% is permitted per section 12.06.300 of the Carson City code.

RATIO OF FLOW DEPTH

The common formula for gravity flow in pipes is called Manning's formula and is written as:

$$Q = 1.5/n * A * R^{2/3} * S^{1/2}$$

Where Q = discharge capacity in (ft³/s)

1.5 = constant for U.S. units

n = channel roughness coefficient (Manning's n) dimensionless

A = cross-sectional flow area (not the cross section of pipe) in ft²

R = hydraulic radius of the pipe in (ft)

S = slope of the channel bottom, dimensionless

From the variables above the hydraulic radius of a channel R, is defined as the ratio of the cross-sectional flow area A to the wetted perimeter P.

In formula form: $R = A/P$

Where R = hydraulic radius of the pipe in (ft)

A = cross-sectional flow area (not the cross section of pipe) in ft²

P = wetted perimeter in ft

For: d=8", 12" and 15"

s=0.5%

n=0.013

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Q(8" ff) = 0.8544 cfs
 = 383 gpm (1 cfs = 448 gpm)
 Flowing Full = 551,520 gpd
 Flowing at 75% = 349 gpm
 = 502,560 gpd

Q(12" ff) = 2.5190 cfs
 = 1131 gpm (1 cfs = 448 gpm)
 Flowing Full = 1,628,035 gpd
 Flowing at 75% = 1031 gpm
 = 1,484,640 gpd

Q(15" ff) = 4.5673 cfs
 = 2050 gpm (1 cfs = 448 gpm)
 Flowing Full = 2,952,000 gpd
 Flowing at 75% = 1869 gpm
 = 2,691,360 gpd

Peak Daily Flow (WEST) = 1,628,185 gpd
 Peak Daily Flow (EAST) = 503,250 gpd

Water:

Parcel	Acreage	Land Use	DU/Acre or FAR		Estimated Units (DU or KSF)
			Low Range	High Range	
A	13.2	Mixed Use Commercial	0.20	0.20	115
B	17.31	High Density Residential	8	36	350
C	4.1	Neighborhood Commercial to Remain	0.20	0.20	36
D	44.55	Medium Density Residential	3	8	200
E	17.5	High Density Residential	8	36	350
F	10	Mixed Use Commercial	0.20	0.20	87
G	26.4	Medium Density Residential	3	8	150
H	41.51	Medium Density Residential	3	8	250
I	28.8	Medium Density Residential	3	8	130
J	16.1	High Density Residential	8	36	200
K	21.1	Medium Density Residential	3	8	150
L	8.3	Neighborhood Commercial	0.20	0.20	72
248.87		Commercial KSF			310
		Residential Units			1,780

The International Plumbing Code fixture unit tables shall be used to determine the actual demand for all commercial users at the time of development.

West of Highway 395							
Parcel	Acreage	Land Use	Equivalent Population per Acre (12.06.270.B)	Population Estimate	Average Day Water Demand (60 gpd)	Maximum Day Water Demand (1.6XADD)	Peak Hour Water Demand (2.5XADD)
A	13.2	Commercial	12	158	9,504	15,206	23,760
B	17.31	High Density Res.	60	1,039	62,316	99,706	155,790
C	4.1	Commercial	12	49	2,952	4,723	7,380
D	44.55	Medium Density Res.	29	1,292	77,517	124,027	193,793
E	17.5	High Density Res.	60	1,050	63,000	100,800	157,500
F	10	Commercial	12	120	7,200	11,520	18,000
G	26.4	Medium Density Res.	29	766	45,936	73,498	114,840
H	41.51	Medium Density Res.	29	1,204	72,227	115,564	180,569
I	28.8	Medium Density Res.	29	835	50,112	80,179	125,280
Totals WEST	203.37			6,513	390,764	586,147	976,911
East of Highway 395							
Parcel	Acreage	Land Use	Equivalent Population per Acre (12.06.270.B)	Population Estimate	Average Day Water Demand (60 gpd)	Maximum Day Water Demand (1.6XADD)	Peak Hour Water Demand (2.5XADD)
J	16.1	High Density Res.	60	966	57,960	92,736	144,900
K	21.1	Medium Density Res.	29	612	91,785	146,856	229,463
L	8.3	Commercial	12	100	14,940	23,904	37,350
Totals EAST	45.5			1,678	251,625	150,975	411,713

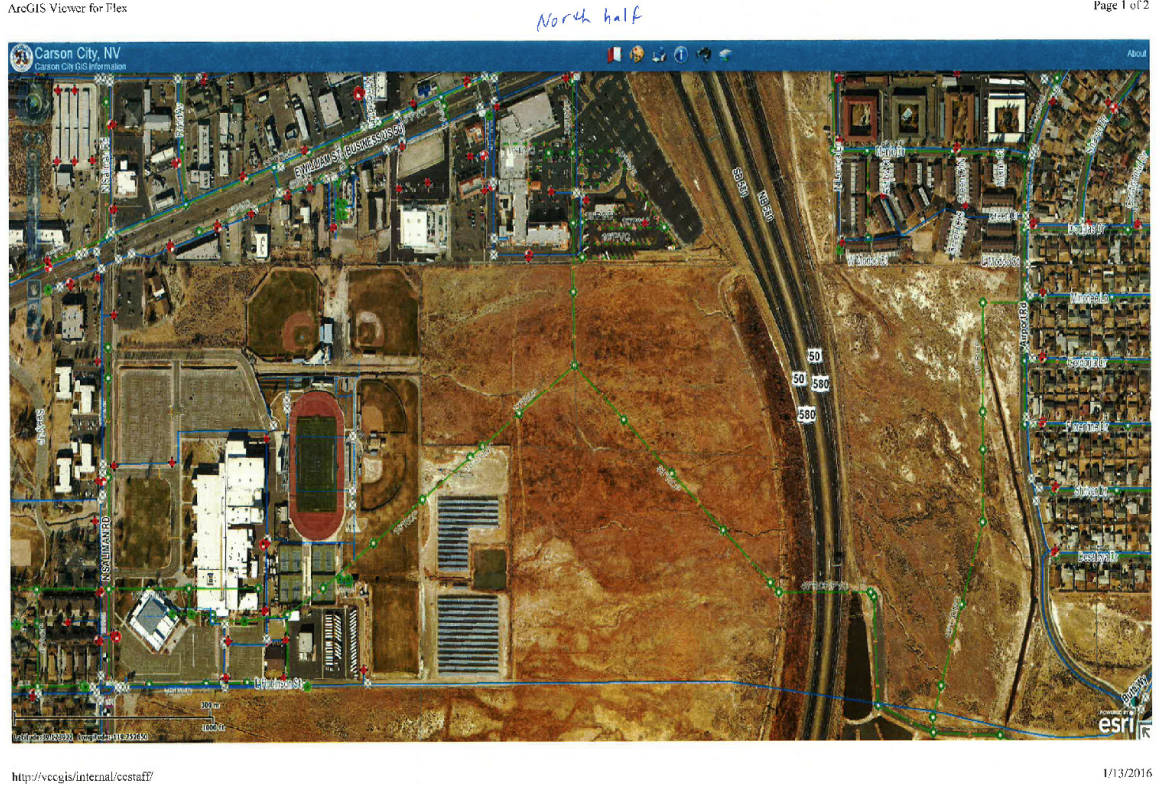
The preceding water demand is an estimation only. In many cases the fire flow requirements, not supply or demand, will determine the minimum system improvements necessary.

The proposed development west of the highway is estimated to have an average day demand of 390,764 gallons. The proposed development east of the highway is estimated to have an average day demand of 251,625 gallons.

3. Proximity to Existing System

The existing water and sewer systems are illustrated in the follow diagrams from Carson City GIS:

North of Robinson:



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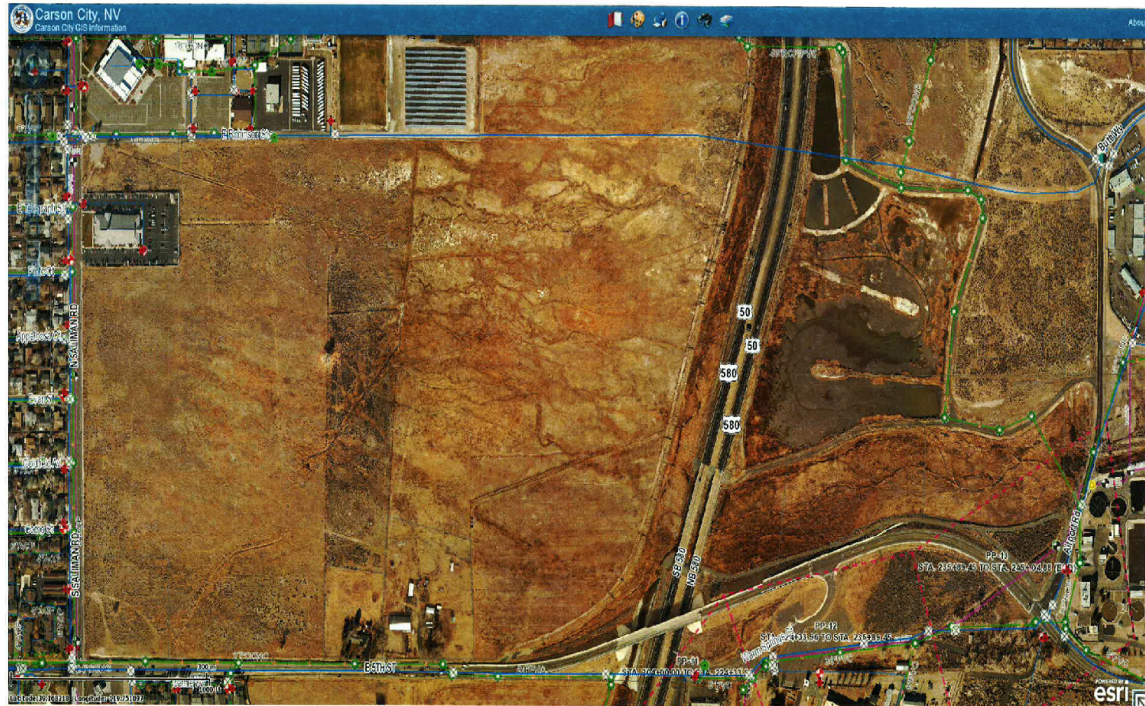


South of Robinson:

ArcGIS Viewer for Flex

SOUTH HALF

Page 1 of 2



<http://vcegis/internal/ccstaff/>

1/13/2016

The sewer sizes are as follows:

- The sewer line in Robinson is 18" PVC
- The sewer line that bisects the northern portion the Ranch is 18" PVC
- The sewer line in 5th Street is 24" PVC
- The sewer line in Airport Road is 18" PVC

The water sizes are as follows:

- The large transmission main that runs along Robinson through the middle of the property is 24" PVC
- The main in Saliman at Robinson is 8" ACP
- The main into Robinson is 8" ACP
- On Saliman at Fifth st the main is 10" ACP
- The main on Fifth St is 16" ACP
- The main along Airport Rd. varies between 6" and 8" PVC

The proposed Lompa Ranch systems will tie into these existing infrastructure systems at Saliman, Robinson, 5th and Airport.

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4. Conclusions and Recommendations

1. This project is located on both sides of US 395, between Saliman Road and Airport Road and 5th Street and William Street.
2. Assuming a preliminary land use estimate, at build out the project will generate approximately:
 - 1,628,185 gpd (peak flow rate) of sewage west of the Highway
 - 503,250 gpd (peak flow rate) of sewage east of the Highway
3. All public sewer design shall be in conformance with the Carson City Municipal Code.
4. Downstream sewer capacity shall be evaluated at the time of development.
5. Assuming a preliminary land use estimate, at build out the project will have a daily domestic water supply demand of approximately:
 - The proposed development west of the highway is estimated to have an average day demand of 390,764 gallons.
 - The proposed development east of the highway is estimated to have an average day demand of 251,625 gallons.
6. Water system capacity and fire flow shall be evaluated at the time of development.
7. The proposed Lompa Ranch water and sewer systems will tie into the existing infrastructure systems at Saliman, Robinson, 5th and Airport.