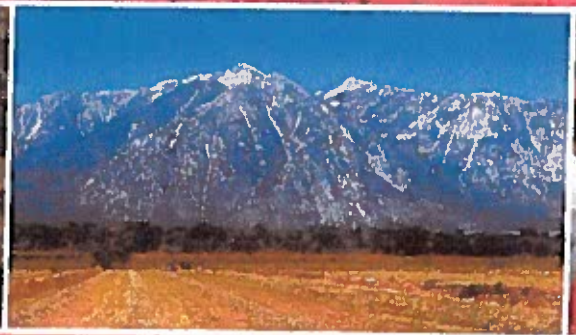
EXHIBIT A

FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT

Prepared for:
Hope Sullivan, Planning Manager
Douglas County Community Development Department
1594 Esmeralda Ave.
Minden, NV 89423

Prepared by:
Alta Consulting, Ltd.
PO Box 905
Genoa, NV 89411

Douglas County, Nevada
July 10, 2015


FARMSTEAD AT CORLEY RANCH TEAM

ALTA CONSULTING, LTD., APPLICANT/PROJECT MANAGER

Mark Neuffer, Principal
P.O. Box 905
Genoa, NV 89411
(775) 720-9087

DESIGN WORKSHOP, LANDSCAPE ARCHITECTURE/LAND USE PLANNING

Steve Noll, Principal
P.O. Box 5666/128 Market Street, Suite 3E
Stateline, NV 89449
(775) 588-5929

LUMOS & ASSOCIATES, CIVIL ENGINEERING

Randall Long, Chief Operating Officer
9222 Prototype Drive
Reno, NV 89521
(775) 883-7077

RUBICON DESIGN GROUP, LAND USE PLANNING

Derek Wilson, Principal
100 California Avenue, Suite 202
Reno, NV 89509
(775) 425-4800

TRAFFIC WORKS, TRAFFIC ENGINEERING

Loren Chilson, Principal
6170 Ridgeview Court, Suite B
Reno, NV 89519
(775) 322-4300

NEW ECONOMINCS & ADVISORY, ECONOMIC PLANNING

Jesse Walker, Principal
PO Box 33
Zephyr Cove, NV 89448
(775) 339-8045

TABLE OF CONTENTS

LIST OF FIGURES

EXECUTIVE SUMMARY

The Douglas County Community Development Department requires the preparation of this Specific Plan to allow development of the area south of Pinenut Road and east of Highway 395 South, known as the Farmstead at Corley Ranch. The Farmstead at Corley Ranch Specific Plan is intended to provide a mechanism to ensure the 130 acre Farmstead at Corley Ranch Specific Plan Area will be comprehensively planned, allowing for limited development while preserving the ranching and agricultural heritage of the site.

CHAPTER 1: INTRODUCTION

1.1 PURPOSE

The Farmstead at Corley Ranch Specific Plan is a guide for the future residential growth and development in the Ruhenstroth Community of Douglas County, Nevada. The Specific Plan is designed to: (1) preserve the agricultural and ranching culture of Douglas County; (2) provide for community infrastructure needs and development; and (3) create a strong, sustainable future for Douglas County.

1.2 GUIDING GOALS

The Farmstead at Corley Ranch is envisioned as a new, active adult residential community with a mix of commercial village space, artisan studios, active adult living, cottage and ranch homes, community green with iconic barn, orchard, and greenhouse, and a working community ranch and farm. The Specific Plan outlines mechanisms for the implementation of public services and utilities and encourages the creation of cultural community spaces. The Farmstead at Corley Ranch is guided by the following objectives:

- Preserve historic agricultural and ranching land through compatible architectural design, and the creation of a working farm and ranch open space area of the project;
- Promote mixed-use development that strives to provide a balance of uses, diverse housing choices, and sense of community;
- Establish a bicycle and pedestrian-friendly community with trails and access to BLM lands;
- Provides a critical link and solution to regional public utilities concerns to surrounding communities.

The Specific Plan and subsequent entitlement process is consistent with the goals and policies identified by the Douglas County Master Plan and allows for a sequence of community input and government review to ensure that development occurs in a logical, consistent, and timely manner.

1.3 PROJECT LOCATION

The Farmstead at Corley Ranch includes the northerly 130 acres of the total 286 acre Project Area, located at 859 Highway 395 South, Gardnerville, Nevada 89410, APN 1220-14-000-007. The Farmstead at Corley Ranch is bounded to the north by Pinenut Road, to the south by the existing Conservation Easement, to the east by Allerman Canal, and to the west by Highway 395 and Washoe Tribal Land. The Farmstead at Corley Ranch's primary access is proposed on Pinenut Road, in the segment just east of the recent (Peri Enterprises) roadway realignment project.

The Farmstead at Corley Ranch Specific Plan area is primarily level, gently sloping to the west at an approximate rate of 30/2000ft. The Allerman Canal is the primary irrigation source, with a number of small irrigation ditches dispersed throughout the site. The land consists of undeveloped grazing and agricultural land and the current zoning classification is A-19 and FR-19.

CHAPTER 2: VISION

2.1 THE FARMSTEAD AT CORLEY RANCH VISION

Envisioned as a sustainable farmstead community rich in agricultural and ranching culture, the Farmstead at Corley Ranch is comprehensively planned to include a mix of commercial village space, artisan studios, cottage and ranch homes, community green with iconic barn, orchard, and greenhouse, and a working community ranch and farm.

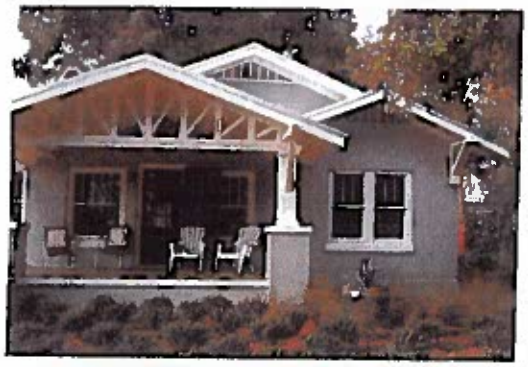
The Farmstead at Corley Ranch is a place where the agricultural and residential landscapes are woven together to create a distinct 'farm-to-table' community. Utilizing the community's focal amenities of farm and orchard, residents and the surrounding community can enjoy fresh seasonal fruits and produce from the Farmstead Farmer's Market. Grown and harvested by an expert cultivator, the Farmstead's bounty will be as masterfully planned as the details of the community itself.

A network of bicycle and pedestrian-friendly sidewalks weaves throughout the community, connecting residential neighborhoods to the Village Center, Community Green, farm, orchard, and greenhouse. Access to the regional BLM lands trail network is also available for extended recreation opportunities.

The Village Center and Community Green at the Farmstead at Corley Ranch are located within the heart of the community—a cultural and communal center. The Village Center provides a mix of retail shops, services, community facilities, entertainment activities, and artisan studios where shaded, pedestrian-friendly streets provide a warm and inviting atmosphere for residents and visitors. The Community Green is a welcoming space where people intermingle amongst the agricultural backdrop of the Farmstead Farmer's Market, Iconic Barn, community farm, and orchard.

Active Living, live-work artisan studios, Cottage Homes, and Ranch Houses are designed to incorporate craftsman/bungalow architecture, creating a warm and relaxed sense of home. Energy efficient and thoughtfully integrated passive solar designs will complement the Farmstead at Corley Ranch's goal of building a sustainable future for Douglas County residents.







CHAPTER 3: MASTER PLAN CONSISTENCY

The Farmstead site is within the existing Ruhenstroth Community Plan. The Farmstead project seeks to include provisions that will promote the long-term viability of existing Ruhenstroth development. Specifically, Farmstead will facilitate infrastructure provision to current Ruhenstroth residents and will provide a buffer zone between forthcoming development and existing homes. From a planning standpoint, the most efficient method of achieving this is to designate the Farmstead site as a transitional area within the Ruhenstroth Plan.

Area Development

The Ruhenstroth Plan area is bounded by property to the west and north that is capable of development. To the west, on the Washoe Tribe property, development is underway. The first phase of this development includes a casino, truck stop, and RV campground. Future phases may include a hotel or other commercial ventures. To the north, across Pinenut Road, is commercially zoned property which is suitable for regional retail services.

Given these present and potential changes, Farmstead can serve as a buffer for impacts from new development. The truck stop and casino have the potential to bring highly visible lighting and noise to the area. Farmstead, through the use of enhanced landscaping and screening, can reduce these impacts. Additionally, the owners of the Farmstead site are working to develop a relationship with the casino/truck stop developers in an effort to coordinate on design goals and to cooperatively manage any impacts. These efforts will benefit the entire Ruhenstroth Plan area.

Infrastructure

As noted elsewhere in this document, there are existing water delivery concerns for Ruhenstroth residents. Farmstead will help address this by bringing the area water infrastructure closer to existing homes, thereby facilitating their eventual hookup to the system. Please see section 4.6 Public Facilities & Services Plan for additional detail on water delivery issues.

Transitional Area

Farmstead is proposing to receive a Transitional Area designation within the Ruhenstroth Plan. The project forms a transition from the developed (and developing) area along Highway 395 and the commercial area to the north, and the existing development to the southeast. The open space of the conservation easement on the southern portion of the Corley Ranch will remain in place.

In practical terms, the area of the Farmstead project, as defined in this Specific Plan, would be designated "Transitional Area" in the Ruhenstroth Plan. The allowed uses and total development of this transitional area will be defined in Chapter 4: Application for Specific Plan Requirements (20.612.020).

3.1 LAND USE

The Douglas County Development Code establishes four findings (A through D) that must be met in order for the Planning Commission and Board of Commissioners to approve a Master Plan Amendment request. Each of these findings is listed below.

> *DCC20.608.040 (A) The proposed amendment is consistent with the policies embodied in the adopted master plan and the applicant has demonstrated the amendment promotes the overall goals and objectives of the master plan has demonstrated a change in circumstances since the adoption of the plan that makes it appropriate to reconsider one or more of the goals and objectives of land use designations.*

The Farmstead at Corley Ranch (Farmstead) provides consistency with numerous Master Plan goals and policies. In fact, the project affords a unique opportunity for Douglas County in that it can serve to implement many of the goals and policies of the Master Plan. Individual policies from the Master Plan, relevant to the Farmstead are listed below and addressed in further detail.

> *LU Goal 1 To maintain a land use plan that manages growth at a sustainable rate to maintain the treasured qualities of the county.*

Managed growth is an important consideration when evaluating a proposed Master Plan Amendment. In the case of Farmstead, the plan proposed is consistent with existing levels of infrastructure and will complement adjoining uses through careful land use planning and buffering measures. Additionally, the proposed land uses will serve to fill demand for active adult housing, a growing demographic within Douglas County.

The Farmstead Specific Plan, as proposed provides for orderly physical and fiscal growth for Douglas County. The project can be served by existing utility purveyors (Appendix A & Appendix B) and has direct access from the newly upgraded Pinenut Road. Additionally, the site is strategically located in the direct vicinity of regional medical facilities, shopping, and community centers.

The southern end of the Corley Ranch is covered by an existing conservation easement which remains intact with this project. This maintains appropriate transitions to rural and agricultural uses. Also, the project itself incorporates an

agricultural element that also serves to further buffer new development and provide for complimentary land use transitions.

The Farmstead intends to limit the project to 250 units, therefore population impacts will not generate undue burden on areas roads, existing infrastructure, etc. Also, as an active adult community, impacts to local schools are minimal. Adding units at Farmstead is sustainable in terms of impacts and, in fact, can create positive impacts in terms of addressing existing regional water quality issues within the Ruhenstroth plan by extending community water systems.

LU Policy 1.1 *Douglas County shall work with the State Demographer to determine the growth projections on a regular basis. This shall be used as a basis for updates to the land use plan and build out analysis.*

Current State Demographer projections depict a surprising trend for Douglas County's population. Population in the County is actually expected to decrease in 2015 by 206 persons. It is not until 2018 that population is expected to increase. Further analysis of State Demographer data shows that elderly populations (age 55+) account for the largest segments of population growth, including year to year increases, even as overall population decreases. This can be attributed to several key factors. First, baby boomers have historically accounted for a significant percentage of the County's population. This, coupled with an influx of retirees from outside the County has served to increase the overall 55+ population. The 55 to 65 age demographic has increased by 40% in the last 15 years. The largest decrease in population is within the 20 to 30 year old demographic. This can be largely attributed to a lack of housing diversity and affordability within the County. Also, many of the "millennials" leave the County for employment opportunities within more urban areas.

What this demographic data suggests is that as the County ages, there needs to be additional housing resources to accommodate the increased population. Farmstead can serve to fill this need in a location that is convenient to facilities such as the hospital, regional shopping, and community activity centers. Also, by providing housing that baby boomers can transition into, existing homes will come on the market that are appealing to "gen x'ers" that are looking for housing within the County, thus opening up additional housing opportunities for millennials. Essentially, it forms a sort of housing cycle that reflects the demographic demands of Douglas County's population.

LU Goal 2 *To retain the beauty, the natural setting and resources, and the rural/agricultural character of the county while providing opportunities for managed growth and development.*

Unlike conventional subdivisions, Farmstead is a master planned community. The project has been planned not by national design firms or homebuilders, but by a local design team that understands and respects the rural character and agricultural heritage of Douglas County. As such, the project has been designed to complement adjoining uses by clustering new development at the north end of the ranch while preserving open space and agricultural at the south. Additionally, the project itself incorporates an agricultural element in promoting a sustainable farm-to-table concept with community garden and agriculture opportunities. A central green provides open space and recreational opportunities for residents. Events such as community farmer's markets, holiday celebrations, etc. will be held here promoting a strong sense of community and carrying on the small town atmosphere of the Carson Valley.

Careful consideration has been given to the planned densities to ensure that negative impacts do not occur to area roadways, public services, or facilities. The entire Farmstead project consists of 250 units. This density is often associated with a single subdivision, but in the case of Farmstead it is thoughtfully distributed between four distinct villages.

The project is consistent with this policy by not developing land that is environmentally sensitive, visually obtrusive, or not in areas where access and infrastructure do not already exist.

LU Policy 2.4 *Douglas County shall use its planning and development regulations to protect residential neighborhoods from encroachment of incompatible activities or land uses which may have a negative impact on the residential living environment.*

The Specific Plan approach proposed for Farmstead ensures that this policy is implemented. The land use plan developed for the project includes exterior buffering and the retention of agricultural use on the west side. Additionally, development will occur on gently sloping terrain and will not obstruct the views from adjoining properties. By maintaining the south end of the Corley Ranch in a conservation easement, a permanent transition between developed areas within Farmstead and rural areas to the south is created. The densities and intensities proposed within Farmstead are consistent with zoning patterns to the north and will provide for complementary land use patterns. Furthermore, as the attached traffic and engineering analysis demonstrates, the project will not result in negative impacts to roadways and infrastructure and maintains appropriate levels of service.

LU Policy 2.7 *In reviewing development proposals, Douglas County shall consider issues of community character, environmental impact, resident security and safety, aesthetics, and efficient service provision.*

Farmstead can be a model project on how LU Policy 2.7 can be implemented. The project seamlessly incorporates an efficient land use pattern while retaining a rural character. This is accomplished by providing a compact development pattern that maximizes infrastructure efficiencies while at the same time provides opportunity for large buffers and open space preserves which create a rural buffer around the project. This not only serves to complement the overall character of the area but also provides for a logical transition between the project and properties that directly adjoin the site.

LU Policy 3.3 — *Douglas County shall revise its zoning districts and other development regulations as appropriate and on a continuing basis to allow development compatible with the Master Plan land use designations.*

With this policy, it is recognized that the Master Plan is intended to be a fluid document. It is recognized that a single document cannot be reactive to all proposals, but must be proactive to address changes in the community. Farmstead reflects a community demand for active adult living in Douglas County and is situated in a logical location near regional facilities and serves as a complementary plan to surrounding land use patterns.

LU Policy 3.5 — *Douglas County shall allow higher densities than shown in the land use plan in Receiving Areas provided there are significant densities being transferred from the Sending Areas and the development character is consistent with the overall residential area where the project is proposed.*

As noted under the previous policies, careful thought has been given to the densities and land uses contained within Farmstead. The project has been designed from the ground up to respect existing levels of service and infrastructure. In fact, project densities were determined largely based on the availability of infrastructure and to ensure that area residents were not negatively impacted in terms of traffic, etc. Once this Master Plan Amendment process is complete, the project will proceed with further entitlements such as tentative maps. At that time, this policy will be further implemented by demonstrating appropriate density transfers from the Sending Areas, site specific impact analysis(s), etc.

LU Policy 3.7 — *Within all land use designations, the following factors, as further defined in the Development Code, shall be considered in reviewing and approving individual development proposals: a)outstanding project design including sustainable planning practices; b) retention of the site's natural topography and vegetation; c) design supportive of conservation of energy use; d) inclusion of amenities or designs that enhance the community's desired character; e) protection of moderate or steep slopes,*

floodplains, or active fault zone areas; f)location in a high fire hazard area; g) appropriate setbacks, access and traffic circulation according to established standards; h) the County's ability to achieve other Master Plan goals and policies; i) ability to meet established levels of service and follow facility design requirements; and j) provision of affordable housing units or employment opportunity for low and moderate income residents.

Farmstead provides consistency with this policy in numerous ways, as detailed in the following list:

a) the project is a model of sustainable development for Douglas County in that its planning was driven largely by the availability of existing infrastructure and services. This, coupled with the farm-to-table concept, mixed use land uses, etc. make for a thoughtful land plan reflective of new-urbanism ideals;

b) site topography is essentially flat and unencumbered by natural hazards making it well suited for the type of development proposed. Buffering, the preservation of agricultural uses within the plan, and the conservation easement to the south all ensure proper relationships with existing and planned uses;

c) clustering of development promotes energy conservation and efficient use of infrastructure;

d) the project is designed with community amenities that far exceed most others in Douglas County including community gardens, a center green with passive and active recreational opportunities, community buildings and gathering places, and the potential for neighborhood-serving commercial support uses;

e) development of the site will not impact steep slopes, environmentally sensitive areas, or those subject to natural hazards;

f) the property is not located in a high fire hazard area;

g) perimeter buffering and setbacks are established in the Farmstead Specific Plan to ensure proper land use relationships with adjoining parcels. Extensive traffic analysis has been completed (attached) that demonstrates that impacts generated by the project will not unduly burden area roads and are consistent with accepted levels of service;

h) the project is consistent with all accepted levels of service established by Douglas County and utility purveyors. This is reflected in the will serve letters already issued for the project; and

i) Farmstead will provide active adult living for the fastest growing demographic in the County and has the potential to provide transitional housing as the population continues to age in terms of providing an overall housing mix for those 55+ years of age.

LU Goal 4 — *To recognize the distinct character of individual communities and encourage land uses consistent with this character.*

As mentioned throughout this analysis, Farmstead has been designed from the ground up to respect the community character of the southern Carson Valley and Ruhenstroth areas. This includes the incorporation of large buffer areas into the project design, community based agricultural uses and maintenance of the southern portion of Corley Ranch within a conservation easement.

LU Goal 8 — *To provide flexibility in project phasing to meet changing market conditions while ensuring improvements are provided concurrent with the demand for infrastructure and services.*

Farmstead will fill a community void by providing high quality active adult housing opportunities. Phasing is planned to meet this community demand and, as noted previously, to ensure that proper infrastructure and service levels are maintained.

LU Policy 8.2 — *Phasing of large development projects may utilize the Specific Plan process. The Specific Plan shall include, but not be limited to, provisions for land use, circulation, parcelization, infrastructure, open space, and phasing or timeline for overall development. The timeframe for completion of improvements shall be established through the resolution adopting the Specific Plan or a Development Agreement.*

Farmstead is in direct conformance with this policy in terms of implementing a Specific Plan approach. The plan clearly outlines the land uses envisioned, proper impact mitigation measures, and timelines for their completion and the developer's ultimate transition from the project. This gives the County and residents assurances as to how Farmstead will develop and look in the future.

3.2 RUHENSTROTH COMMUNITY PLAN

RU Goal 1 — *To preserve the existing rural residential character of the Ruhenstroth community.*

Although new development at higher densities is proposed within Farmstead, overall density is directly compatible with those within the Ruhenstroth area. This is achieved through clustering which allows for the preservation of large buffer

areas, community serving agricultural uses and preservation of the southern portion of Corley Ranch.

RU Policy 1.4 *Douglas County shall seek to create a permanent buffer of open space around the developed part of the Ruhenstroth community.*

Farmstead maintains a permanent buffer of open space through the maintenance of the conservation easement to the south of the site. This ensures appropriate land use transitions and buffers between developed areas of the County and the existing Ruhenstroth development.

RU Goal 2 *To ensure the timely provision of community facilities and infrastructure, at levels adequate for the rural Ruhenstroth community.*

This is a key policy that Farmstead can help to implement. By extending municipal water service into Farmstead, the opportunity exists to provide further extension to areas of Ruhenstroth that are currently experiencing problems related to individual wells, etc.

RU Policy 2.1 *Douglas County shall plan and provide public facilities and services to the Ruhenstroth community at established rural levels of service.*

As noted under the previous policy, Farmstead can serve to be a vital link in ultimately providing regional municipal water service within the Ruhenstroth plan area, a long and well recognized goal of the County and area residents.

RU Policy 2.3 *Douglas County shall allow the use of individual sewage disposal systems and domestic wells for service in this rural community, unless continuing water quality studies identify the need for community systems. Long-range plans are to provide community water and sewer services to the area.*

Water studies have identified serious water service concerns within the Ruhenstroth area. By extending municipal services within Farmstead, the viable opportunity to further extend these services in order to address these concerns exists.

3.3 HOUSING ELEMENT

H Goal 1 *To increase opportunities in Douglas County by removing regulatory barriers.*

With the approval of this Master Plan Amendment and Specific Plan, consistency with this policy will be provided. Farmstead will provide a plan that is physically and fiscally responsible and provides the County and residents with assurances as to how the property will develop over time.

H Action 1.3 — *Amend the Douglas County Development Code to include minimum density requirements in the multifamily and mixed use commercial zoning districts.*

Douglas County currently has a lack of multi-family options, especially for senior citizens. By providing opportunities for a variety of densities, including senior living multi-family units within the village center areas, this void can be filled and the intent of this policy implemented.

H Action 4.1 — *Determine possible locations for the development of affordable senior housing in proximity to the new Douglas County Community/Senior Center in Gardnerville and solicit interest from potential developers.*

Farmstead will provide senior housing opportunities at varying densities and price ranges in direct proximity to the community/senior center, effectively implementing this action plan.

H Goal 8 — *To increase resources to maintain owner-occupied units in Douglas County with preference for elderly households.*

Well planned active adult communities are scarce in Douglas County. Farmstead will be a premier project with amenities that far exceed any that currently exist. As such, this project will be highly appealing to seniors (in all age ranges) and promotes this policy directly.

3.4 GROWTH MANAGEMENT

GM Goal 1 — *To keep growth in Douglas County to a sustainable level that natural and fiscal resources can support.*

Orderly fiscal growth is a key concern of any municipality. In the case of Farmstead, the project represents orderly and responsible growth by locating in an area of existing and adequate infrastructure, clustering of uses to provide efficient use of infrastructure and services, and ensuring appropriate land use relationships. The project is located on property well suited for the densities and intensities proposed and does not represent a threat to natural resources.

GM Goal 2 *To direct new development to locations within or adjacent to existing communities where public services and facilities can be provided and a sense of community can be creates or enhanced.*

As noted previously throughout this policy analysis, Farmstead is located within an area where public services and facilities exist and is designed to complement adjoining uses. The plan will incorporate community amenities not only for residents, but opportunities such as farmers markets, events, and gatherings that will bring the community together as a whole.

GM Policy 2.2 *Douglas County shall limit extension of urban levels of public services outside identified Urban Service Areas identified on the Land Use Map, except in cases where said extension is necessary for the provision of public health and safety.*

Farmstead is asking for an extension of urban levels of service, but is entirely consistent with existing levels of infrastructure. Furthermore, development of Farmstead can serve to help address long standing community infrastructure needs such as bridging the extension of municipal water service to the Ruhenstroth area.

GM Policy 2.3 *Douglas County shall manage the appropriate timing and location of development to achieve the County's goals related to natural resources, community character, and provision of public services and facilities.*

The analysis included with this Master Plan Amendment request clearly demonstrates that development proposed with Farmstead is consistent with County adopted service levels and goals and policies of the Master Plan. The project has been designed to be consistent with the existing community character and will enhance through the provision of needed housing types, community activity and involvement, and sustainability.

3.5 AGRICULTURE

AG Goal 1 *To maintain agriculture as an important land use and preserve the rural character, cultural heritage and economic value of Douglas County.*

The project developers recognize the importance of agriculture within the Carson Valley and have developed Farmstead as a project that bridges the gap between needed housing options and rural uses. This is achieved by providing for small scale agricultural uses within the land use plan, extensive buffering, and preservation of the southern portion of Corley Ranch as agricultural. Farmstead is not intended to provide industrial agriculture operations but to allow for boutique-type operations

such as organic vegetable production, community gardens, and other low-key rural activities that maintain an agricultural character without imposing impacts on residential development.

AG Policy 1.1 — *Douglas County shall plan for the continuation of agriculture as a distinct and significant land use in the county.*

Farmstead is consistent with this policy in that the conservation easement on the southern portion of Corley Ranch remains intact. Additionally, the project development plan incorporates small scale agricultural use such as organic vegetable production and community gardens.

AG Policy 1.5 — *Douglas County shall preserve a distinction between urban and rural areas, direct new growth to areas already committed to an urban level of development (e.g. cities, areas adjacent to cities, and densely developed unincorporated communities) and preserve rural industries (e.g. farming, livestock grazing, mining), natural resource protection, and open space recreation uses.*

The recent improvements to Pinenut Road, adjacent commercial zoning, availability of infrastructure and municipal services, and planned developments on adjoining Tribal lands have all altered the ultimate character of the area. By clustering development at the northern portion of Corley Ranch, Farmstead provides for a well-planned transition between more intense development (both existing and future) and rural areas to the east and south. The plan is respectful of adjoining land uses and infrastructure levels and represents sound planning principles in terms of land use, densities, buffering, infrastructure availability, and fiscal responsibility.

AG Goal 2 — *To create alternatives to the urban development of existing agricultural lands, such as market based incentives, programs for financing compensation or development rights transfers, or the purchase of development rights in order to preserve these agricultural areas.*

As noted previously, Farmstead strikes a balance between preservation of agricultural uses and meeting the housing demands of the community. This is accomplished through the clustering of development adjacent to existing infrastructure, roadways, and planned intensification while preserving appropriate buffers.

AG Policy 2.1 — *Douglas County shall minimize development of commercially viable agricultural land and ensure that recognized needs for growth are met by infill and contiguous, compact development.*

Compact development is the key to implementation of this policy and Farmstead is an example of how this can be effectively accomplished. Clustering of development, as proposed with Farmstead not only provides for efficiencies in infrastructure use and promotion of energy conservation, it allows for the preservation and ongoing operation of agricultural uses. Rather than develop large lots and eliminate agricultural use altogether at Corley Ranch, Farmstead manages to meet community needs utilizing a fraction of the area and allows for continued agricultural uses at the south end of the ranch while complementing adjoining properties with the incorporation of buffering provisions.

AG Policy 2.2 — *Douglas County shall provide for a range of compatible uses on agricultural lands and means for agricultural property owners to obtain benefit from this land while achieving the public goal of agricultural preservation.*

It can be argued that Farmstead directly implements this policy by balancing new development with ongoing agricultural operations. In fact, the project theme pulls largely from the agricultural heritage of the area with a farm-to-table and community based agricultural theme. This new development will be balanced to ensure proper buffering and to allow agricultural activities to continue at the south end of the ranch.

AG Policy 2.4 — *Douglas County shall provide procedures for the acquisition, dedication, or purchase of agricultural preservation easements, by public or non-profit entities, as a means to retain land in agriculture.*

Consistent with this policy, the southern portion of the Corley Ranch is encumbered with a conservation easement, ensuring that it will not be developed in the future.

AG Goal 3 — *To limit residential development in intensely farmed areas primarily to housing for farm and ranch families and agricultural workers.*

The need for active adult living opportunities is evident in demographic data and reflected in actual demands that are occurring now in Douglas County. Thus, the County must consider appropriate locations for such uses. Farmstead is ideal in that it is well located to regional facilities including the hospital, shopping, and community/senior center. Rather than simply just subdividing the north end of the existing Corley Ranch, Farmstead is respectful of the community character and vision of the area residents and provides a master plan that complements adjoining land uses and incorporates amenities that the entire community can enjoy, building a sense of place.

AG Goal 5 *To increase Douglas County's capacity to acquire permanent open space with the cooperation of the agricultural community.*

As part of the Farmstead project, permanent open space will be dedicated within the project in terms of common areas or conservation easements, consistent with this policy.

3.6 PUBLIC SERVICES AND FACILITIES

PSF Goal 1 *To develop regional approaches to providing public services and facilities in Douglas County in coordination with GID's, Towns, the state, and other jurisdictions.*

As is the case with Farmstead, new development can serve to address farther reaching infrastructure deficiencies. By extending municipal water service to Farmstead, opportunity exists for further extension to Ruhenstroth, addressing a long standing regional community concern and need.

PSF Goal 3 *To provide levels of services for its residents to maintain at a minimum, the current quality of life for the county's citizens.*

The design of The Farmstead Specific Plan allows for the maintenance or enhancement of current levels of service. A traffic analysis has been completed that outlines the relatively minor road enhancements required in order to manage site traffic. By extending water service to the project, additional extensions of water service are facilitated. This will allow for improved levels of service to areas of the County that are currently experiencing water delivery problems.

PSF Goal 4 *To ensure that new development pays its equitable share of the costs for public services and facilities needed to serve it.*

Farmstead will bear the cost of infrastructure improvements specifically necessary to serve the project including extensions of utilities. This has the potential to benefit adjoining properties and communities as well in terms of addressing long term regional water issues in the area.

In addition to the policies described and analyzed, it is also important to consider the overall land use trends that have occurred since the Master Plan was first adopted in 1996. This includes more urban and suburban development south of Gardnerville along with transportation improvements including the Pinenut Road realignment and Muller Parkway extension that drastically improve access to the Farmstead site.

Based on land use changes that have occurred over the last 19 years, the current Urban Service Boundary for the southern Carson Valley is not reflective of current development patterns and land use changes that have taken place. This Master Plan Amendment and the uses proposed with Farmstead are consistent with recent development trends and availability of infrastructure and services. As such, the request is logical and reflects sound land use planning principles.

DCC20.608.040 (B) The proposed amendment is based on a demonstrated need for additional land to be used for the proposed use, and that the demand cannot be reasonably accommodated within the current boundaries of the area.

Directly to the north of the Farmstead site is a receiving area that was recently reduced in size due to changes to Pinenut Road. In terms of the number of proposed housing units, Farmstead is effectively a replacement of this lost receiving area. Specifically, Farmstead is proposing to construct 250 housing units. The lost receiving area could have been built out at approximately 300 total units. Farmstead can therefore be viewed as a simple relocation of receiving area from the north side of Pinenut Road to the south side.

The Douglas County market includes a variety of single family product types. However, there is currently a lack of active adult offerings, especially in a master planned community setting. Given the demographic projections for the County, there is an identified need for active adult offerings. Farmstead can serve to fill this need in a location that is well suited by offering convenient access to regional medical facilities, regional shopping, and the new community/senior center in Gardnerville.

By providing new active adult housing products, there is a "ripple" effect created in the existing housing market that will open up additional opportunities for gen x-ers and millennials to absorb existing units. This will help capture some of the lost population estimates anticipated by the State Demographer.

DCC20.608.040 (C) The proposed amendment would not materially affect the availability, adequacy, or level of service of any public improvement serving people outside of the applicant's property and will not be inconsistent the adequate public facilities policies contained in chapter20.100 of this title;

Recent improvements and changes in the area of Farmstead warrant the proposed amendment. For example, the reconstruction, realignment, and improvements to Pinenut Road will ensure that adequate access and roadway capacity exist to serve the project. Additionally, Douglas County has approved more intense zoning (i.e. commercial use) adjacent to the northern project boundary. This, coupled with plans to construct a casino and truck stop on the adjoining Tribal lands have fundamentally changed the character of the area. Farmstead proposes to "bridge the gap" between these more intense uses and rural/agricultural uses to the south and east.

The land use changes discussed above have also brought infrastructure improvements with them. As such, all public facilities and services to serve the project are in place or can be extended (by the developer) to serve Farmstead. The project has secured commitments from Gardnerville Water Company and the Minden-Gardnerville Sanitation District to provide municipal water and sewer service to the project. This is an important consideration in that this is also a key step in supplying Ruhenstroth with municipal water service. This will help resolve a long-standing County goal and can serve to address regional water supply issues occurring within the Ruhenstroth community.

Included with this submittal is a detailed traffic impact analysis that demonstrates Farmstead's consistency with existing infrastructure and levels of service. As discussed under Finding "A," the Farmstead Specific Plan was developed from the ground up to reflect existing infrastructure levels without creating additional burden for the County and without impacting adjoining properties.

> *DCC20.608.040 (D) The proposed amendment is compatible with the actual and master planned use of the adjacent properties and reflects a logical change to the boundaries of the area in that allows infrastructure to be extended in efficient increment and patterns, it creates a perceivable community edge as strong as the one it replaces, and it maintains relatively compact development patterns.*

Farmstead has purposely been designed to provide compatibility with adjoining land uses. In terms of intensities, Farmstead provides a transition between higher densities to the north and lower densities to the south and east. Proper relationships with adjoining properties are achieved through the incorporation of perimeter buffering, the community-serving agricultural uses within the Farmstead Specific Plan, and the maintenance of the existing conservation easement encumbering the south end of the Corley Ranch.

Infrastructure to serve the project is available, and Farmstead has received commitments for municipal water and sewer service. Additionally, the recent improvements to Pinenut Road ensure proper access. As noted in the attached traffic impact analysis (Appendix C), the project will adequately mitigate all traffic impacts to ensure compliance with Douglas County standards. In fact, the project has been designed based on the availability of infrastructure and planned capacities in order to ensure that Farmstead was compatible and fulfilled all applicable requirements.

In terms of creating a perceivable community edge, the Farmstead Specific Plan is ideal. The Corley Ranch conservation easement that encumbers the south end of the ranch ensures that a clear edge of development is defined on the south. Topographic variation and the "bluff" condition to the east clearly define the

eastern edge of development as well. The plan clusters development within the northern portion of Corley Ranch and provides perimeter buffering. This compact development form provides further consistency with this finding.

CHAPTER 4: APPLICATION FOR SPECIFIC PLAN REQUIREMENTS (20.612.020)

4.1 THE FARMSTEAD AT CORLEY RANCH WITHIN THE REGIONAL CONTEXT

The Farmstead at Corley Ranch is identified in the larger Carson Valley Regional Plan, and subsequently within the Ruhenstroth Community Plan. At the northernmost boundary of the Ruhenstroth Community, the Farmstead is positioned adjacent to the Gardnerville Town Boundary (Figure 4.1) below (see the List of Figures for full-size exhibits).

The main access point to the Farmstead is Pinenut Road, which connects directly to the proposed Muller Parkway and roundabout leading to Highway 395 South, providing future residents of the Farmstead convenient access to facilities such as the Carson Valley Medical Center, Douglas County Community and Senior Center, regional shopping, and public parks.

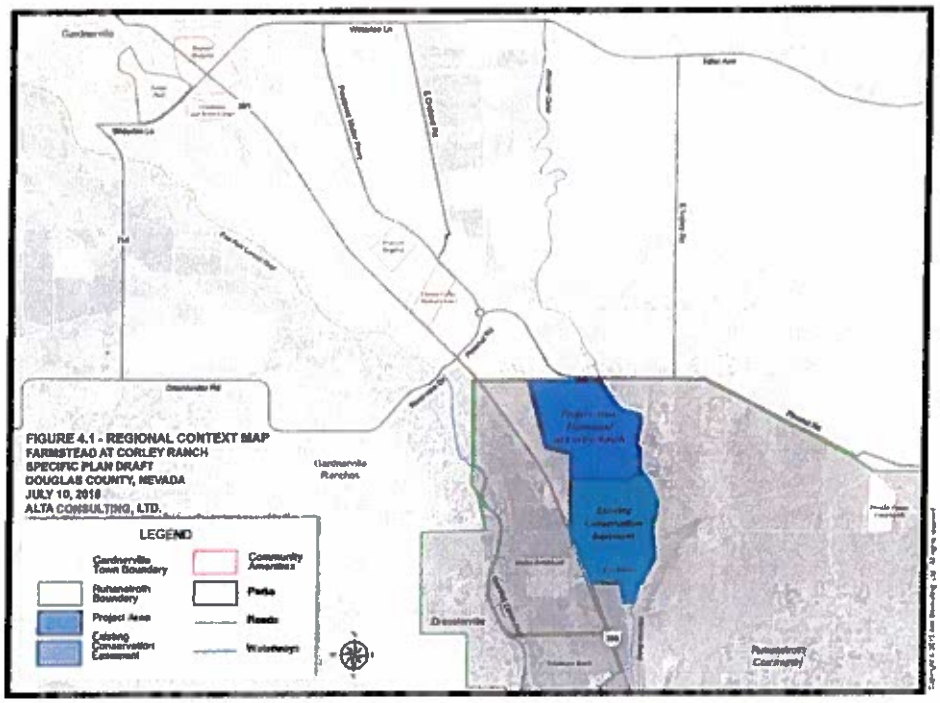


Figure 4.1 - Regional Context Map

4.2 TOPOGRAPHIC & GEOLOGIC HAZARDS MAP

The Farmstead at Corley Ranch Specific Plan area is primarily level, gently sloping to the west at an approximate rate of 30/2000ft and is not located in any of the classified FEMA Primary Flood Zones. Additionally, no active or potentially active faults run through the Farmstead project area (Figure 4.2).

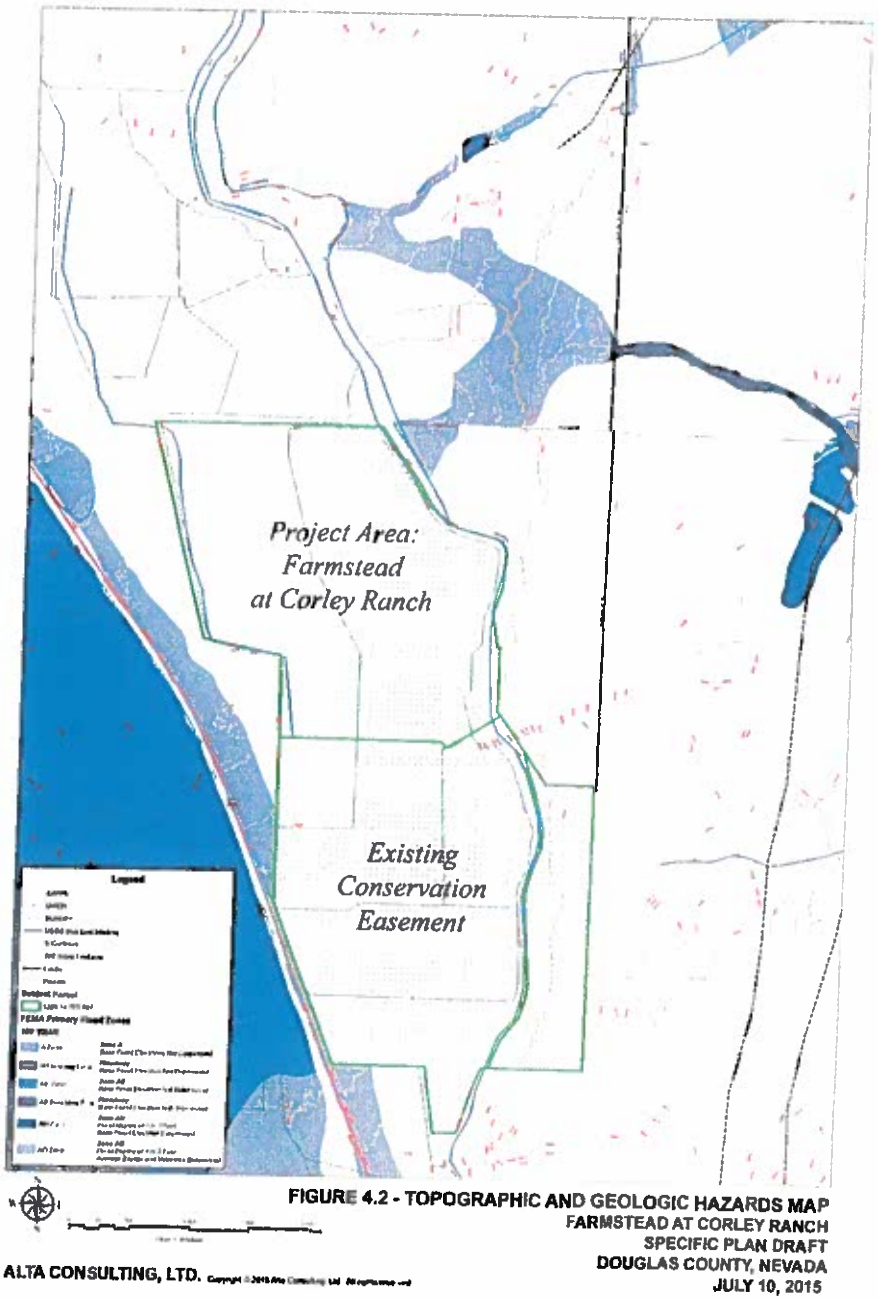


Figure 4.2 - Topographic & Geologic Hazards Map

4.3 PROPOSED USES PLAN

The Farmstead at Corley Ranch will be developed to conform to existing Douglas County zoning standards as detailed below. In general, the Village Center will conform to Mixed-Use Commercial zoning. The Community Green is primarily open space, with limited building area and is designed to conform to Douglas County's "Agricultural Products and Related Limited Commercial Uses" (Figure 4.3).

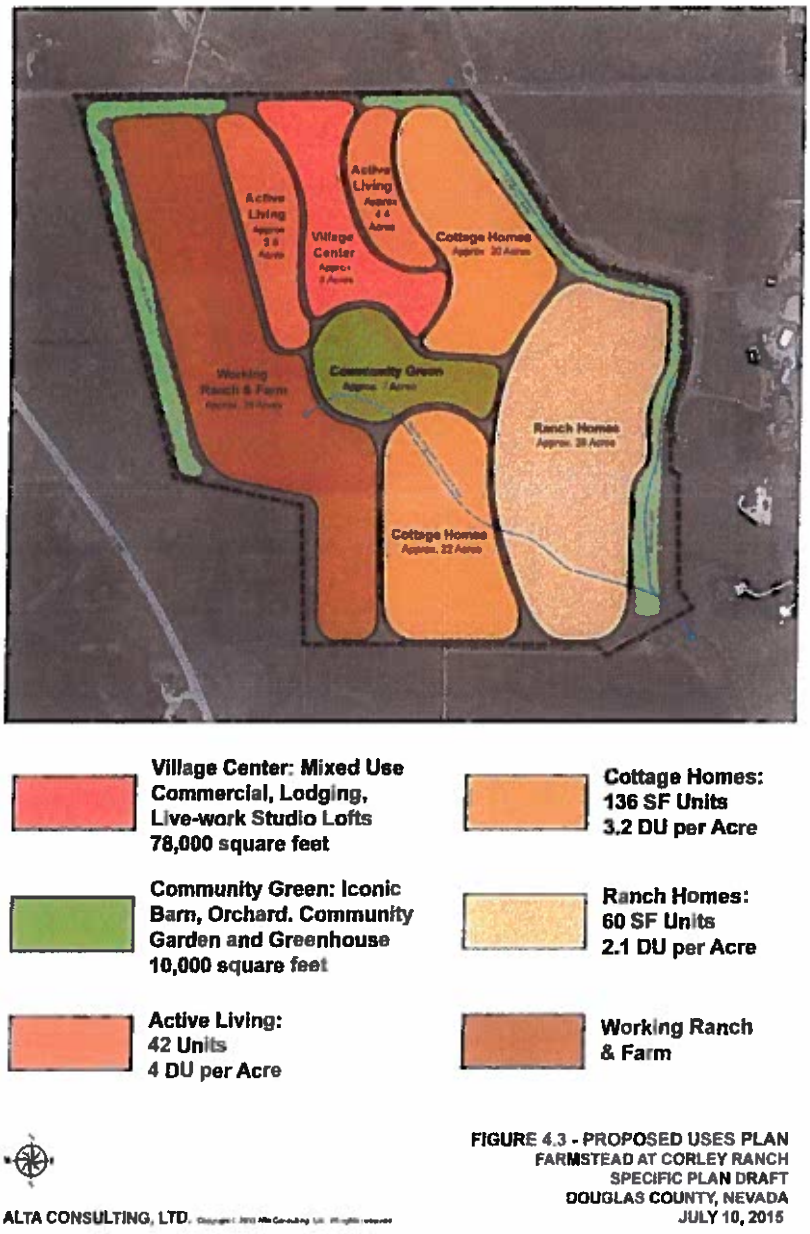


Figure 4.3 - Proposed Uses Plan

Development	Max. Size	Max. Height	Building Setback	Parking Rate
Mixed-Use Commercial	58,000 square feet	35'	Front 15' Rear 10' Side 0, 10' adjacent to street	Per Section 20.692.010 Douglas County Development Code, including Table 20.692.1
Live/Work Studios	12 units, 1,600 square feet each	35'	Front 15' Rear 10' Side 0, 10' adjacent to street	Per Section 20.692.010 Douglas County Development Code, including Table 20.692.1
Community Green and Barn	Barn: 5,000 square feet. Other Structures: total of 5,000 square feet	35'	Front 15' Rear 10' Side 0, 10' adjacent to street	Per Table 20.692.1 Douglas County Development Code, "Agricultural Products and Related Limited Commercial Uses"

Coverage for all commercial development in Farmstead at Corley Ranch shall conform to Douglas County Development Code Section 20.658.010. The Community Green area shall not be subject to a minimum coverage standard as it is intended primarily as open space.

Residential development will be comparable to existing residential design and standards within Douglas County. Specific standards are contained in the following table.

Development	Units	Max. Height	Building Setback	Parking Rate
Active Living	42	25'	Front 20' Rear 10' Side 0, 10' adjacent to street	Minimum two off-street spaces per unit
Cottages	136	25'	Front 20' Rear 10' Side 0, 10' adjacent to street	Minimum two off-street spaces per unit
Ranch Homes	60	25'	Front 20' Rear 10' Side 0, 10' adjacent to street	Minimum two off-street spaces per unit

4.4 CIRCULATION PLAN

In accordance with the County's Specific Plan requirements (Code Section 20.612.020), the site plan includes a conceptual major roadway layout diagram. This diagram, based on topography, existing roadways, and proposed layout and density, reflects the general approach that will be employed to serve all areas of the project in a safe and appealing manner. The exact layout of roadways will be determined as additional design and engineering analysis is performed.

Specific and detailed traffic analysis work has been performed as part of this application (Appendix C). This analysis has identified infrastructure and design needs likely to be triggered by the project. These items have been identified on the conceptual roadway diagram.

The project will include secondary emergency access. There are multiple locations where this access can be easily accommodated by the project, including along Pinenut Road or to the south of the project, connecting to the existing ranch road.

The primary project entry area and secondary access will require upgrades and reconfiguration in order to ensure proper levels of service are maintained. This includes widening Pinenut Road by extending the middle turn lane south and east to the project entry. Additionally, a sidewalk and bike path is recommended for the south side of Pinenut Road to the entryway. The entry area is to include dedicated left and right turn lanes for project exit. Combined with the Pinenut Road improvements, traffic both entering and exiting the project will therefore have available turn lanes.

In general, roadway needs within the project are easily managed due to the moderate density of the proposed development. Offsite needs are also moderate and can be managed through effective design of the project entry area. The Circulation Plan, or road backbone, for the Farmstead at Corley Ranch intends to provide an attractive and distinctive entryway while also minimizing overall road construction needs (Figure 4.4). Also included is a potential road section for the entry road. This includes a landscaped median.

Housing density does not warrant substantial road sections. The majority of the project can be served by residential streets. Alternatives for emergency access are included at the northern boundary where the project meets Pinenut Road.

The farm area of the site is included in the roadway backbone plan as it is assumed that farm and possibly tourist traffic will need motorized access to this area. This farm area will also be served by a pedestrian/bicycle pathway connecting to the village center. Farm operation traffic will be minimal and will be separated from the developed areas.

LEGEND

- Residential Connector
- Local Street
- Farm Access Road
- Gated Emergency Access

LOCAL STREET CROSS SECTION

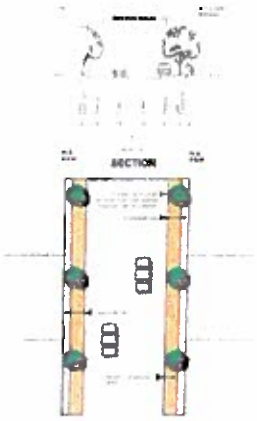


FIGURE 4.4 CIRCULATION PLAN
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

ALTA CONSULTING, LTD.

Figure 4.4 - Circulation Plan

4.5 DEVELOPMENT PHASING PLAN

The Farmstead anticipates an 8 year phased build out. Phase 1 includes a portion of the Village Center, Community Green, Working Ranch and Farm, and Active Living. Phase 2 will complete the Village Center and Active Living. Phases 3, 4, 5, and 6 address the build out of Cottage Homes, while Phases 7 and 8 complete the Farmstead with the development of the Ranch Homes (Figure 4.5).

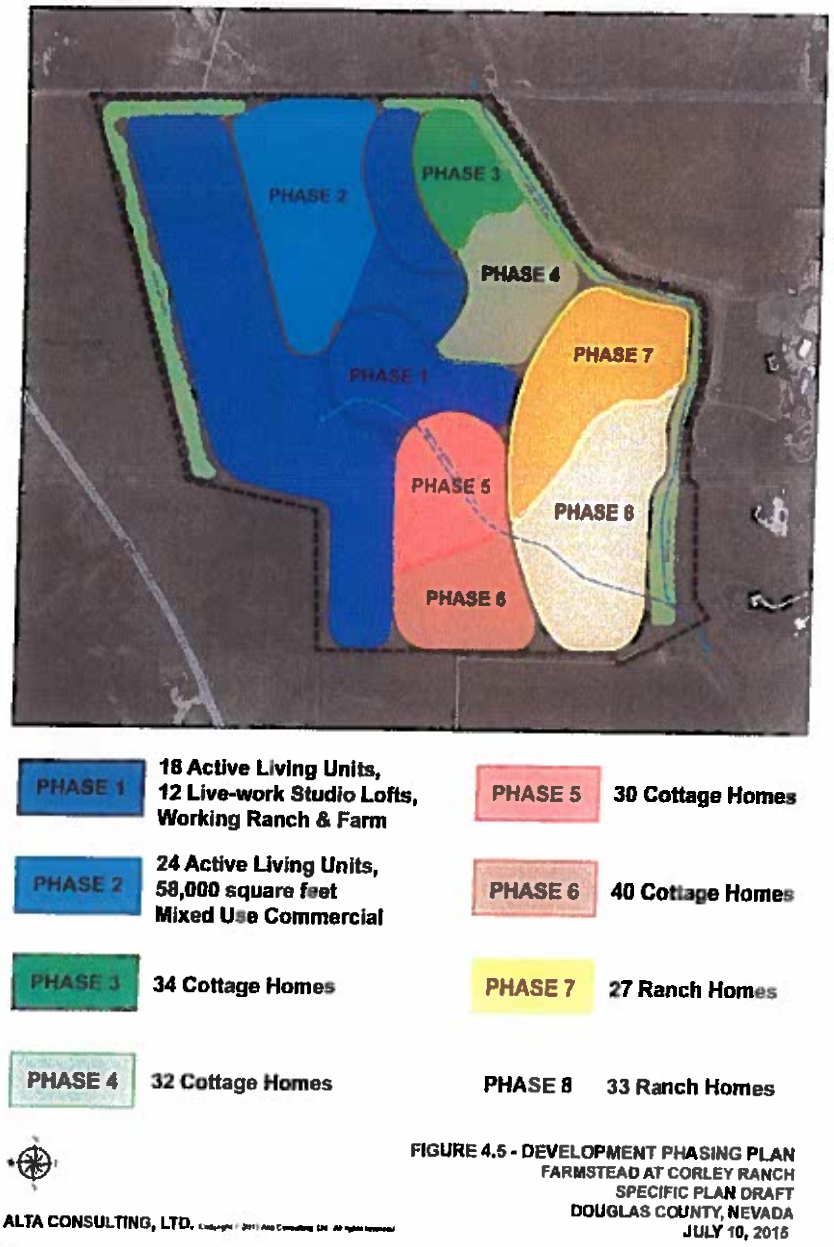


Figure 4.5 - Development Phasing Plan

4.6 PUBLIC FACILITIES & SERVICES PLAN

In order to approve a Specific Plan, funding and provision of public facilities must be addressed. The Farmstead at Corley Ranch intends to provide necessary infrastructure to support the project and to enhance the overall area. Facilities serving the project shall be provided and maintained according to the provisions included here.

Purpose

The purpose of this section is to address phasing and timing of key elements of public infrastructure. Those include:

Principal Access
Timing of Roadway Improvements
Sanitary Sewer
Storm Water Management
Public Water System

Principal Access

Principal access to the Farmstead is proposed to connect to Pinenut Road. This access shall be constructed with the final map for Phase 1 of the project and shall be in accordance with Douglas County Community Development standards.

Timing of Roadway Improvements

In accordance with the County's Specific Plan requirements (Code Section 20.612.020), the site plan includes a conceptual major roadway layout diagram. This diagram, based on topography, existing roadways, and proposed layout and density, reflects the general approach that will be employed to serve all areas of the project in a safe and appealing manner. The exact layout of roadways will be determined as additional design and engineering analysis is performed.

Specific and detailed traffic analysis work has been performed as part of this application (Appendix C). This analysis has identified infrastructure and design needs likely to be triggered by the project. These items have been identified on the conceptual roadway diagram.

The project will include secondary emergency access. There are multiple locations where this access can be easily accommodated by the project, including along Pinenut Road or to the south of the project, connecting to the existing ranch road.

The primary project entry area and secondary access will require upgrades and reconfiguration in order to ensure proper levels of service are maintained. This

includes widening Pinenut Road by extending the middle turn lane south and east to the project entry. Additionally, a sidewalk and bike path is recommended for the south side of Pinenut Road to the entryway. The entry area is to include dedicated left and right turn lanes for project exit. Combined with the Pinenut Road improvements, traffic entering and exiting the project will therefore have available turn lanes.

In general, roadway needs within the project are easily managed due to the moderate density of the proposed development. Offsite needs are also moderate and can be managed through effective design of the project entry area.

Since the project will be developed in multiple phases, it makes sense to coordinate road improvements by phase. According to the included phasing plan, development will begin near the center of the site and extend north. Phases one and two include a limited amount of residential development, retail/commercial space, and the ranch/farm facility. Traffic from residential development in Phases one and two will not be substantial however, the retail development may require road upgrades. If determined, though discussion with Douglas County Engineering, that the Pinenut Road modifications are required with Phase two commercial development, they will be installed prior to the completion of this phase.

Internal roadways will be provided concurrent with each phase. Secondary emergency access will be provided when required by Douglas County.

Sanitary Sewer

The Farmstead at Corley Ranch includes sanitary sewer infrastructure in accordance with Douglas County Code. The sewer connection main from the project will be sized to accommodate flows from the expected build out described in the Plan. The Minden Gardnerville Sanitation District (MGSD) is to be the sewer provider. A Will Serve letter has already been obtained and is provided here in Appendix A. This project area and attendant sewer infrastructure will be annexed into the MGSD service area.

The Minden Gardnerville Sanitation District (MGSD) has existing facilities in place along the northeast side of Hwy 395. These facilities extend south of Muller Parkway approximately 400 to 500 feet, and Farmstead should be able to connect to these facilities via a new main along Pinenut Road and the westerly extension of Pinenut Road (Figure 4.6). This will entail approximately 1,800 linear feet of new offsite sewer main to connect the new development area to the existing MGSD facilities. MGSD is currently working on analyzing their internal routing and capacity. It is not anticipated at this time that Farmstead would significantly impact the existing collection system; however, further analysis will be necessary.

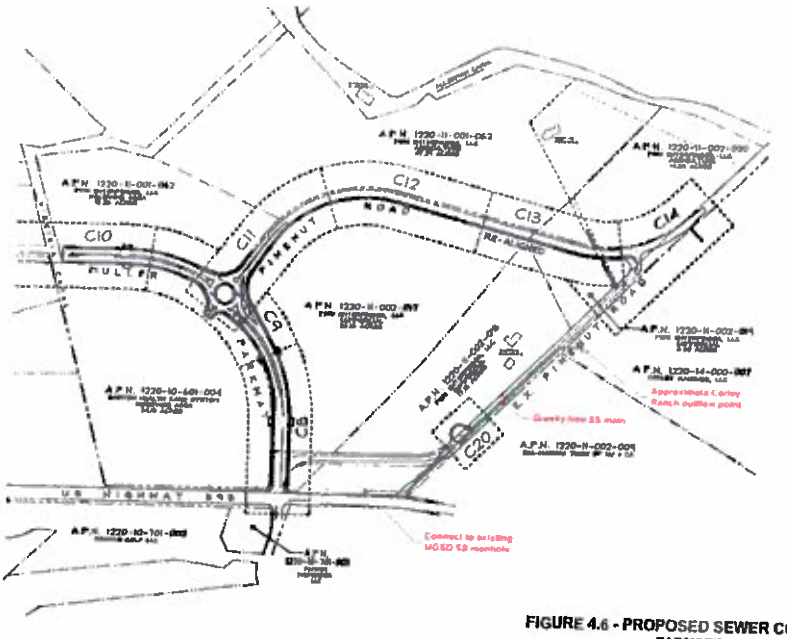


FIGURE 4.6 - PROPOSED SEWER CONNECTION
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

ALTA CONSULTING, LTD.

Figure 4.6 - Proposed Sewer Connection

Storm Water Management

The Farmstead at Corley Ranch includes generous open space. It contains no steep or unstable slopes. These factors ensure that storm water management can easily be accommodated on site with no impacts to surrounding property. A project hydrology study will be provided as required as a part of the tentative map process. It is anticipated that storm water management can be achieved through a use of natural contours, utilizing open space infiltration, and existing overall drainage patterns, utilizing a "low impact drainage" design per Douglas County standards.

Public Water System

With the location of the proposed Farmstead at Corley Ranch development in the area southwest of the intersection of Pinenut Road and the Allerman Canal, there are existing water systems within reasonable proximity to allow for connection to and service of the development. Figure 4.7 Gardnerville Water Company Infrastructure Map depicts the current and proposed infrastructure of the Gardnerville Water Company water system. Utilizing 3 existing wells, 1 proposed well, 2 existing storage tanks, 1 proposed storage tank, and new water mains, the Gardnerville Water Company has provided a Will Serve Letter (Appendix B) to extend service to the Farmstead, opening up possibilities of further extending service to the Ruhenstroth Community Area. The connection to the Gardnerville

Water Company system brings with it the potential for further regionalization of the Carson Valley Water Systems which may allow for alternative financing options with the State Revolving Fund.

Water and sanitary sewer infrastructure for the project will be sized to accommodate overall demand from the expected build out described in the Plan.

The following summary is a preliminary estimate of the water use for the Farmstead at Corley Ranch development:

- Total Annual Usage: 212 acre-ft
- Estimated Average Gallons Per Day: 189,400 gallons
- Estimated Average gpm: 131.5 gpm
- Estimated Max Day: 473,500 gallons (assumes peaking factor of 2.5)
- Estimated Max Day gpm: 329 gpm
- Estimated Peak Hour Demand: 526 gpm (assumes peaking factor of 4)
- Estimated Operating Storage: 473,500 gallons (per NRS 445)
- Estimated Emergency Storage: 355,125 gallons (per NRS 445)
- Estimated Fire Storage: 240,000 gallons (2,000 gpm for 2 h hours)

These needs can be met through the construction of additional production and storage facilities within the Gardnerville Water Company water system. All new water infrastructure will be designed and sized to meet the requirements of NRS 445A and the Douglas County Design Standards.

As stated in the Will Serve letter from Gardnerville Water Company (Appendix B), it is the intent of Gardnerville Water Company to extend infrastructure and water service area to include the Farmstead at Corley Ranch.

Figure 4.7 – Gardnerville Water Company Infrastructure Map

Utilities

Gas and Electric service will be provided by NV Energy and Southwest Gas. The project will obtain will serve letters. Cable television service will be provided by Frontier Communications. Verizon is the telephone service provider.

Concurrency

Infrastructure upgrades are intended to occur in conjunction with land development phasing (Figure 4.5). The Farmstead will conform to Douglas County's requirements for infrastructure improvements as part of the tentative and final map process.

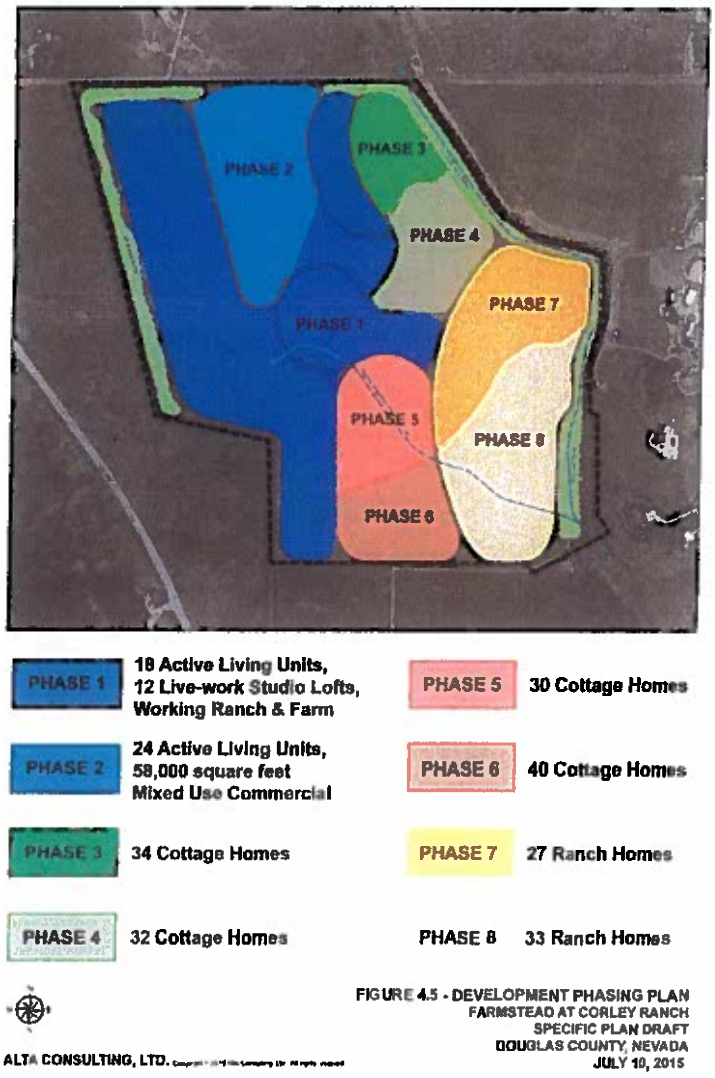


Figure 4.5 - Development Phasing Plan

Drainage

The proposed development area is within an unshaded Zone X, and therefore there are no special considerations in terms of FEMA or flood zone mitigation for developing the area. The drainage for the project area will need to be designed and runoff mitigated per Douglas County Improvement Standards. A project Drainage Study report will be provided at the time of Tentative Subdivision Map submittal. Drainage will be routed to match historic drainage patterns with the conveyance being generally from southeast to northwest across the site.

4.7 ADDITIONAL REQUIREMENTS

The Farmstead at Corley Ranch Specific Plan anticipates no additional requirements at this time.

4.8 TERMS FOR ABANDONMENT

In order to approve a Specific Plan, it is required that the Plan contain a provision for termination, should construction not be pursued to the satisfaction of Douglas County or if the developer abandons the Plan. The Farmstead at Corley Ranch proposes that, upon written notification to the County from the developer that the Plan is being abandoned, the County shall have the ability to forbid further development of the site and to require site stabilization (i.e. dust control, revegetation, slope stabilization). The County shall have the ability to amend the zoning ordinance in a manner that is deemed suitable by the County administrator.

4.9 BUILDING PERMIT ALLOCATION & GROWTH MANAGEMENT PLAN

As part of the review process for a Specific Plan, it is necessary to provide a review of the Douglas County Permit Allocation system. This section outlines how the project will comply with this system, as defined in Code Section 20.560.

Each new dwelling unit requires an allocation. The Farmstead at Corley Ranch will therefore require 250 allocations. These allocations are to be obtained under the system maintained by the Douglas County Planning Department.

According to the Planning Department, there are numerous allocations banked by the County, waiting for use by residential developers. These allocations are left over from the recent slow building years that saw very little new residential development. Additionally, the allocation system has allotted an additional 197 allocations for the 2015 calendar year and an additional 201 for 2016. Allocations therefore exist for the project as a whole and this Specific Plan will easily comply with the existing permit allocation system and growth management plan.

In practice, the project proposes to acquire and use allocations on an as-needed basis, as building permits are brought forward. Given the phasing schedule contained in this Specific Plan, this process is likely to occur over several years.

CHAPTER 5: FINDINGS FOR APPROVAL OF SPECIFIC PLAN (20.612.050)

The Douglas County Development Code contains findings that must be made in order to support a Specific Plan. This Code section is included below (*in italics*), along with an explanation of how the project fulfills each requirement.

> *20.612.050 Findings for approval of specific plan. In order for the planning commission to recommend approval and the board to approve the proposed specific plan, the following findings shall be made:*
>
> *A. That the proposed location of the development and the proposed conditions under which it will be operated or maintained is consistent with the goals and policies embodied in the master plan;*

The Master Plan has been thoroughly reviewed in relation to this project. An explanation of how this project meets Master Plan goals and policies is included in this application package. In general, this project seeks to develop land that is already bordered by development, is close to major roadways in the area, and provides a transition between the intensively developed areas along Highway 395 and the rural areas to the east.

Additionally, the project locates development on the northern end of the site while preserving the more viable ranch land and open space to the south and less accessible to Pinenut Road and Highway 395.

> Land Use Goal 2 of the Master Plan is: *To retain the beauty, the natural setting and resources, and the rural/agricultural character of the county while providing opportunities for managed growth and development.*

This project provides managed growth by adding residential options close to existing development while providing open space protection for the southern end of the site.

> *B. That the proposed development is in accordance with the purposes and objectives of this title and, in particular, will further the purposes stated for each zoning district;*

The project is in accordance with this title by providing a Specific Plan that is definitive about overall units, allowed land uses, infrastructure provision, and overall growth management. Without a Specific Plan, this area could be developed in a piecemeal fashion without comprehensive design of roadways, utilities, or structures. Driveways and intersections could likewise be developed on an ad hoc basis with no ability to coordinate. This Specific Plan provides a logical and reasoned layout that ensures an appealing appearance, proper grading and

drainage, coordinated traffic circulation, timely infrastructure development, and limits to overall density.

In general, zoning regulations are intended to provide predictability and structure so as to ensure orderly development. The whole intent of this Plan is to show, up front, what is being proposed and what the final project will entail.

> *C. That the proposed development conforms to the adequate public facilities policies of this title;*

Included in this project is the provision of public facilities at the site. The project therefore meets the criteria of having adequate public facilities.

However, there is an additional benefit from this project. Residential areas to the south of this project are experiencing water quality and delivery problems. By extending water service to this project, this could provide a critical link to upgrade service to the communities to the south. This project therefore has the ability to improve public facilities for the overall area.

> *D. That the development will not be detrimental to the public health, safety or welfare of persons residing or working in or adjacent to such a development; and will not be detrimental to the properties or improvements in the vicinity or to the general welfare of the county; and*

This project will not be detrimental to public health, safety, or welfare. It could be argued that by providing a critical link to upgrade the regional water systems, this development is a safety and welfare benefit to the county.

The proposed uses at the site are of a generally low intensity, do not generate undue noise or traffic, and are fairly similar to the existing residential and retail uses in the area.

> *E. That the applicant has demonstrated the ability to provide transfer development rights (TDR's) to meet project phasing. (Ord. 763, 1996).*

Transfer of Development Rights

Transfer of Development Rights (TDRs) is allowed under Douglas County Code Section 20.500 and is discussed in Master Plan Chapter 6: Growth Management Element. The TDR program is designed to allow, and to provide incentives for, moving development from outlying areas (sending areas) of the County to areas closer to existing development (receiving areas).

The land inventory in Douglas County creates the potential for a large number of transferable housing units. The 2011 Douglas County Master Plan identified 38,469

potential units within the Carson Valley, based on a sending area total of approximately 5,000 acres.

In practice, the absorption rate of these potential units is moderate and this inventory is likely to remain available into the foreseeable future. At the time of the study, roughly 3,000 TDRs had been utilized by development projects. Obviously, this comparison of usage rate to supply indicates that a substantial reserve of units remains within the County.

Required TDRs for Farmstead at Corley Ranch

The Farmstead at Corley Ranch proposes to develop 250 single family and artisan studio units, for a total of 250 housing units. These Farmstead units therefore represent less than 1% of the potential units in the County.

Given the 130 acres of project area, the proposed density of approximately 1.9 dwelling units per acre is well below what is normally envisioned for a receiving area. The Douglas County Master Plan envisions an average density of 5 units per acre for receiving areas. This low density was chosen as both a means of providing an attractive housing product and as a means of designing the project to be compatible with other development in the area.

Review of Existing Receiving Areas

The receiving area designation is a tool that has been successfully used in past Douglas County Planning actions. There are existing receiving areas in Douglas County, including a site directly north of Farmstead, across Pinenut Road. This receiving area was recently reduced in size due to a realignment and construction of Pinenut Road.

The road formerly continued in a straight line east and west and connected to Highway 395. As part of an intersection redesign, the road now loops to the north at its western end. The area south of this loop, which used to be designated receiving area is now designated commercial (APNs 122011002021; -02; -03). The Farmstead at Corley Ranch will therefore function as a replacement for this lost receiving area.

In terms of overall development in the area, Farmstead will almost exactly replace the housing units that could have been built on the lost receiving area acreage. Farmstead is proposing 250 total housing units. The lost receiving area could have been built out at approximately 300 housing units. Therefore, establishing a receiving area at the Farmstead site will not increase regional development beyond what was envisioned with the old receiving area.

Figure 4.8 provides a graphic depiction of this relocation of receiving area from the north side of Pinenut Road to the south side.

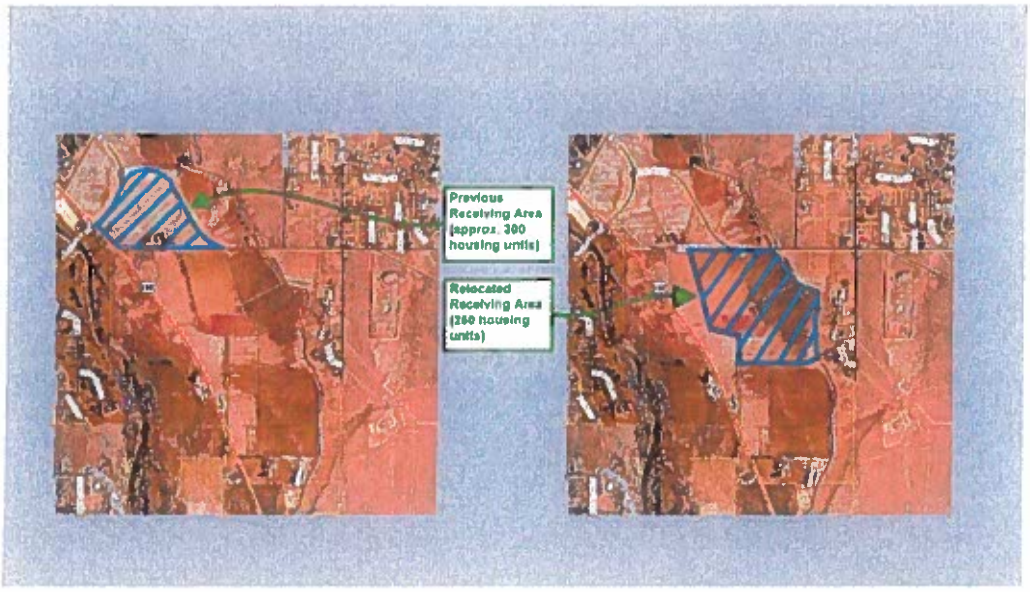


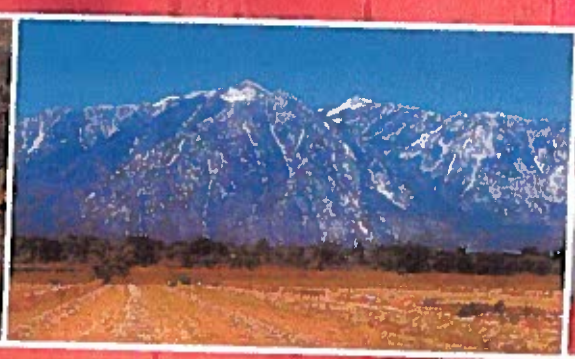
FIGURE 4.8 - RELOCATION OF RECEIVING AREA
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

ALTA CONSULTING, LTD.

Figure 4.8 – Relocation of Receiving Area

APPENDIX A
MINDEN GARDNERVILLE SANATATION DISTRICT WILL SERVE LETTER

Farmstead at Corley Ranch
Specific Plan Draft
Douglas County, Nevada
July 10, 2015


MGSD
Minden Gardnerville
Sanitation District

November 25, 2014

Mark Neuffer, Principal
Alta Consulting, Ltd.
P.O.Box 905
Genoa, NV 89411

Re: Master Plan Amendment for the
Proposed "Farmstead" Development at the Corley Ranch
859 Hwy. 395, Gardnerville
APN 1220-14-000-007

Dear Mark:

In regards to the above referenced subdivision, the situation is as follows:

1. The existing parcel is located within the District's Service Area Boundary and is eligible for sewer service by MGSD. Annexation into the District Boundary will need to be completed prior to approval of capacity.
2. No improvement plans have been submitted. Improvement plans showing all existing and proposed sewer mains and laterals will need to be submitted to the District for review and approval.
3. There is no capacity assigned to the subject parcel at this time. MGSD Code requires a minimum of 1.0 units of capacity per proposed parcel, and allocation of capacity by the District will need to be granted prior to issuance of any connection permits.

Please do not hesitate to call with any questions you may have concerning the above information.

Sincerely,

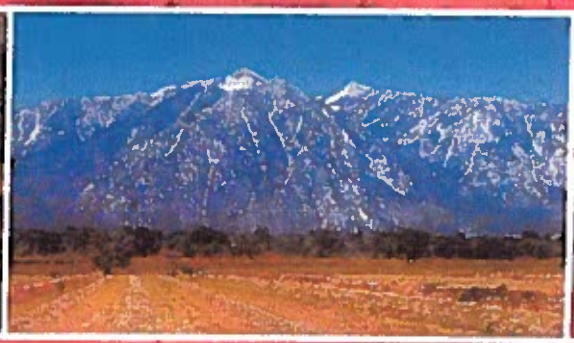
Frank T. Johnson
District Manager

FTJ:ab

1790 Hwy. 395 Minden, Nevada 89423 775-782-3546 775-782-4915 fax

APPENDIX B
GARDNERVILLE WATER COMPANY WILL SERVE LETTER

Farmstead at Corley Ranch
Specific Plan Draft
Douglas County, Nevada
July 10, 2015


Best Water! Best Service!

Gardnerville WATER COMPANY
YOUR WATER COMPANY

1579 Virginia Ranch Road
Gardnerville, NV 89410
775-782-2339
Fax: 775-782-2491
www.gardnervillewater.org

July 7, 2015

Mark Neuffer
Alta Consulting, Ltd.
P.O. Box 905
Genoa, Nevada 89411

Re: Water Service for Farmstead at Corley Ranch
Conditional Intent to Serve APN 1220-14-000-007

The Gardnerville Water Company shall provide water service to the Farmstead at Corley Ranch, APN 1220-14-000-007 (hereby referenced a The Project) contingent on the following:

1. The Project shall proceed with annexation of property requesting water service to the Gardnerville Water Company and make application to the Gardnerville Water Company (GWC) for annexation. All GWC annexation rules and regulations shall be complied with including approval of the Project annexation by the Nevada Public Utilities Commission (NPUC).

2. The Project shall construct and offer for dedication all required water infrastructure necessary to serve the subject property.

3. The Project shall be subject to all current GWC domestic and fire impact fees. The Project shall comply with all provisions of the GWC and NPUC tariff and conditions included within the GWC Rules and Regulations.

4. The Project shall be required to pay all applicable fees, including current water user charges.

A final Intent to Serve (Will Serve) will be written to the Nevada Division of Water Resources State Engineer prior to recordation of an approved subdivision and subject to final approval of the Gardnerville Water Company Board of Directors.

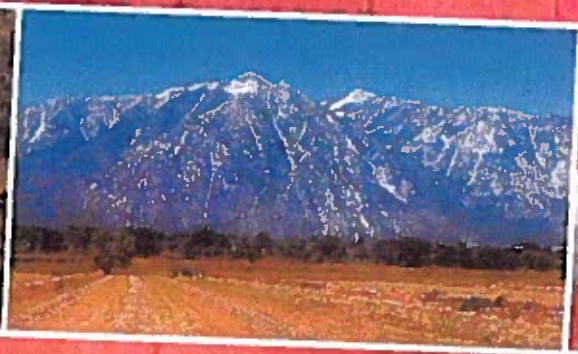
Sincerely,

Mark V. Gonzales

Mark V. Gonzales, P.E.
Manager / Engineer

APPENDIX C
FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY

Farmstead at Corley Ranch
Specific Plan Draft
Douglas County, Nevada
July 10, 2015


TRAFFIC WORKS

Traffic Engineering & Transportation Planning

December 1, 2014

Jon S. Erb, PE
Civil Engineer III
Douglas County Public Works
1120 Airport Road
Minden, NV 89423

Farmstead at Corley Ranch - Traffic Impact Study

EXECUTIVE SUMMARY

Site Location & Study Area

This study considers the potential effects on travel capacity and traffic flows associated with the proposed Farmstead at Corley Ranch. The project site is located south of Pinenut Road and east of US 395 in the northern portion of the Corley Ranch as shown on ***Figure 1***. The project's primary access is proposed on Pinenut Road, in the segment just east of the recent (Peri Enterprises) roadway realignment. The proposed access location and other key intersections in the vicinity (also shown on ***Figure 1***) were evaluated in this study.

Project Description

The Farmstead at Corley Ranch is intended to be a master planned community based on the ranching and agriculture heritage of the project site. A few of the unique features could include an iconic barn, community garden, fruit stand, artist lofts, and several different "ranch style" residential options. Lodging and commercial spaces would be created to fit the theme and compliment the residential land uses. The conceptual development layout is shown on ***Figure 3***. For the purposes of preparing a master plan level traffic study and trip generation estimate, the project is assumed to include:

- 65 "Ranch" Homes
- 145 "Cottage" Homes
- 40 Active Living Homes (Active Adult/Senior Housing Units)
- Lodging (up to 100 rooms)
- 78,000 sqft. of commercial/retail/office space
- Community space and accessory features for the benefit of community residents

Project Trip Generation

The project is estimated to generate up to 5,295 daily trips, 494 AM peak hour trips, and 478 PM peak hour trips on an average weekday. Details of the trip generation calculations are shown in ***Table 5***. Note that the land uses and quantities shown could be changed so long as the total trip generation values are not exceeded.

Level of Service Analysis

All the study intersections and study roadway segments are shown to operate at acceptable levels of service, through the 20-year horizon, with the project generated traffic, except for the US 395/Waterloo Lane intersection.

The US 395/Waterloo Lane intersection is anticipated to degrade to LOS 'E' (during the PM peak hour), without the project, in the interim scenario. LOS 'E' is shown for this intersection (PM peak hour only) in each study scenario unless improvements are made. Actual operating conditions are dependent on the level of build-out and activity at the Community Center, on the Peri project site, and at other developments. The simplest solution that would improve operations to an acceptable LOS would be the addition of an eastbound right-turn lane on Waterloo Lane. With the addition of an eastbound right-turn lane, the intersection would function at acceptable LOS 'D' in all scenarios. Additional right-of-way may be needed to widen the eastbound approach for the additional (right-turn) lane. Douglas County should consider this potential need as it addresses other projects and improvements affecting the US 395/Waterloo Lane intersection. The need is primarily a result of the planned conversion of the current eastbound through lane to a second left-turn lane in association with the Community Center project, forcing all through and right turn traffic into the current right-turn lane. It is our recommendation that the eastbound Waterloo approach may ultimately need dual left-turn lanes, a through lane, and an eastbound right-turn lane, with or without the Farmstead at Corley Ranch project. The Farmstead at Corley Ranch project adds only 12 vehicles to the right-turn movement during the peak hours. This is a less than significant amount compared to 225 eastbound right-turns in the 20-year background volumes; therefore the conditions are not considered an impact of the project.

Project Access Recommendations

The project access approach to Pinenut Road should be constructed with exclusive northbound left-turn and right-turn lanes. STOP sign control on the project approach is shown to be adequate.

To provide safe traffic movements at the Pinenut Road/project access intersection, the applicant should construct an eastbound right-turn deceleration lane on Pinenut Road into the project access.

The Pinenut Road/project access intersection design and improvement plans should provide adequate intersection sight distance and be designed in accordance with Douglas County design standards.

Recognizing the need to provide two access points for emergency response, an emergency only access will be provided to the project site in addition to the main access on Pinenut Road. The precise location of the emergency access point has not yet been defined, but it would likely be south of the development area via the historic ranch access to US 395, or at a second location on Pinenut Road.

Off-site Improvements

The off-site improvements recommended for this project consist of extending the 3-lane cross-section on Pinenut Road, with bicycle lanes and a setback sidewalk on the south side of the roadway, to the proposed project access. These improvements will provide safe left-turn movements in the future, support alternate travel mode options between the project and adjacent future development, and provide a fully improved roadway to the project site.

INTRODUCTION

This study considers the potential effects on travel capacity and traffic flows associated with proposed development of The Farmstead at Corley Ranch. The purpose of this study is to identify potential impacts on the roadway network and develop recommendations to mitigate the impacts if any are found.

The study methodologies, background traffic volumes, and assumed future roadway network, are all consistent with the *Douglas County Transportation Plan (2007)*, and the approved *Peri Enterprises Traffic Impact Study (2009)*. To provide a consistent and conservative traffic analysis, we assumed the full development potential of the adjacent Peri Enterprises development area in the background evaluation scenarios.

This study is associated with a Master Plan Amendment and "planning level" development concept. The details of an internal roadway network and precise land uses are not yet known. With this in mind, the total trip generation values should be used as the basis for the project and potential impacts, rather than the assumed land uses and quantities. Any mix of land uses contemplated in the future that creates equal or fewer trips would have equal or lesser impacts on the study intersections and roadway segments.

There are no previous traffic studies for the project site.

SETTING

Existing Land Use

The project site is currently a 287 acre working ranch situated south of Pinenut Road and east of US 395 as shown in ***Figure 1***. Approximately 95 acres of the most northerly portion of the ranch would be converted to receiving area to be later developed, and the southern 192 acres would be preserved as ranch/farm land. No trip generation reductions have been taken for existing uses or activities.

Future Development

Other approved developments in the study area are the Peri Enterprises project located on the north side of Pinenut Road, opposite this site, and the Barton Healthcare Systems project which is located on the northeast quadrant of the US 395/Riverview/Muller Parkway intersection. The Peri project is a 77 acre property entitled for commercial and office uses. The Barton Health site is anticipated to include roughly 15 acres of hospital expansion, 10 acres of medical office building, and 5 acres of commercial retail space. Both of these projects are included in the background traffic volumes used in this study.

Recent Roadway Network Improvements

Two recent roadway improvement projects have provided additional travel capacity in the project area. First, Muller Parkway is now constructed between US 395 and Grant Avenue, providing an alternative route between Pinenut Road and US 395. The US 395/Grant Avenue intersection is signalized. Second, Pinenut Road was realigned to Muller Parkway, removing its direct connection to US 395, and a modern, high capacity, two-lane roundabout has been constructed at the Muller Parkway/Pinenut Road intersection. These improvements are accounted for in the background roadway conditions and analysis.

Long-term Roadway Improvement Plans

The *Douglas County Transportation Plan (2007)* and recently updated *Douglas County Master Plan (2011)* outline a comprehensive set of roadway improvements aimed at maintaining efficient traffic flows with increased travel and development throughout the County. ***Figure 2*** is an excerpt from the 2011 Master Plan and illustrates the planned roadway improvements. Of particular note related to this study are the following:

- Muller Parkway Extension (US 395 to US 395, four-lane arterial roadway)
- US 395 widening (widen to five-lane cross-section from Riverview Drive south to Dressler Lane)
- East Valley Road Realignment (realign to Toler Lane)
- East Valley Road Extension south to US 395
- Improvement of Sawmill Road to Collector design standards between Pinenut Road and Toler Lane

Additionally, the *5-Year Transportation Plan for Douglas County* indicates an improvement at the US 395/Waterloo Lane intersection (one of the intersections evaluated in this report). It is anticipated that dual eastbound left-turn lanes will be constructed on Waterloo lane within the 5-year horizon.

STUDY METHODOLOGIES & POLICIES

Level of Service Methodology

Level of service (LOS) is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades "A" through "F" with "A" representing optimum conditions and "F" representing breakdown or over capacity flows. The complete methodology is established in the Highway Capacity Manual (HCM), 2010, published by the Transportation Research Board.

Table 1 presents the delay thresholds for each level of service grade at unsignalized and signalized intersections. Level of service calculations were performed for the study intersections using the Synchro 8/SimTraffic software package with analysis and results reported in accordance with HCM methodology.

Roadway segments were analyzed using the Daily Traffic Thresholds outlined in the *Douglas County Transportation Plan*. Level of service was estimated by comparing the projected average daily traffic volumes to the LOS threshold values shown in ***Table 2.***

Level of Service Policy

The level of service policy for Douglas County study intersections and road segments was obtained from the *Douglas County Transportation Plan*. Adopted goal 12.13 aims to maintain LOS "C" or better for all Douglas County streets and roadways. We have therefore used Level of Service (LOS) "C" as the criteria for County owned roadway facilities (intersections and roadway segments) consistent with these objectives.

The level of service policy for State owned facilities was obtained from the Nevada Department of Transportation's (NDOT) *Traffic Impact Study Requirements* publication. That document states "Level of Service "C" will be the design objective for capacity (for new facilities) and under no circumstances will less than Level of Service "D" be accepted for site and non-site traffic." We have therefore used Level of Service (LOS) "D" as the criteria for existing facilities on US 395, consistent with NDOT objectives.

Table 1: Level of Service Definitions for Intersections

Level of Service	Brief Description	Unsignalized Intersections (average delay/vehicle in seconds)	Signalized Intersections (average delay/vehicle in seconds)
A	Free flow conditions.	< 10	< 10
B	Stable conditions with some affect from other vehicles.	10 to 15	10 to 20
C	Stable conditions with significant affect from other vehicles.	15 to 25	20 to 35
D	High density traffic conditions still with stable flow.	25 to 35	35 to 55
E	At or near capacity flows.	35 to 50	55 to 80
F	Over capacity conditions.	> 50	> 80

Source: Highway Capacity Manual (2010), Chapters 16 and 17.

Table 2: Level of Service Definitions for Roadway Segments

Functional Classification	Number of Lanes	Daily Traffic LOS C	Daily Traffic LOS D*	Daily Traffic LOS E*
Major Arterial	4	24,000	34,200	NA
Minor Arterial/ Collector	4	21,000	29,300	30,900
Collector	2	10,500	13,600	14,600

Notes: NA = value not available in the 2007 Douglas County Transportation Plan
*Volume thresholds obtained from Florida DOT as referenced in the 2007 Douglas County Transportation Plan

Source: Douglas County Transportation Plan (2007), Table 4.5.

EXISTING CONDITIONS

Roadway Network

Following is a brief description of the key study roadways (also shown in ***Figure 2***):

US 395 is a Principal Highway (major arterial) running generally north-south through the towns of Minden and Gardnerville. US 395 has two lanes in each direction and a center turn lane north of Riverview Drive and one lane each direction with a center turn lane south of Riverview Drive. The posted speed is 55 mph in the project area.

Muller Parkway is a planned four-lane Minor Arterial that will extend south from Muller Lane (north side of Minden) to intersect US 395 opposite Riverview Drive. Several segments of the ultimate extension have been completed, including the portion from the US 395/Riverview/Muller intersection north to Grant Avenue.

Pinenut Road is classified as a Minor Collector roadway. The west end of the roadway was recently realigned to Muller Parkway with the Peri Enterprise off-site improvements. A three-lane section (one lane each direction plus a center turn lane) was constructed in the realigned portion. East of the realignment, Pinenut Road is a two lane roadway with a 35 mph posted speed limit.

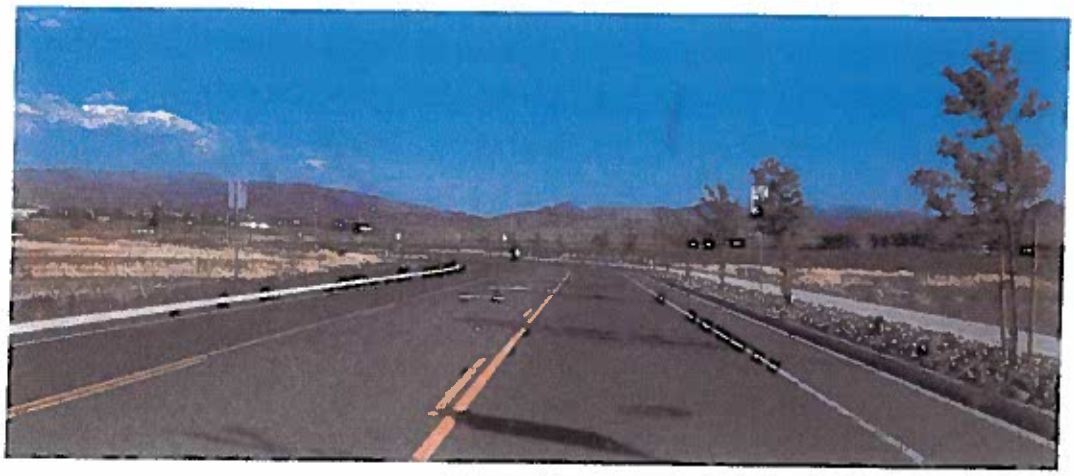
Toler Lane is a two-lane Minor Collector roadway running east-west. This roadway intersects US 395 opposite Waterloo Lane. The posted speed limit on Toler Lane is 35 mph.

Public Transit System

There are no existing public transit facilities in the immediate project area. Douglas Area Rural Transit (DART) does, however, operate a fixed route transit service that extends as far south as the Wal-Mart shopping center near the intersection of Grant Avenue/US 395.

Bicycle & Pedestrian Facilities

Bicycle lanes on both sides of the roadway and a set-back sidewalk (south side only) were recently constructed on Pinenut Road in the segment that was realigned through the Peri Enterprises project area. East from the realignment, Pinenut Road is a rural roadway with no bicycle lanes or sidewalks.



Pinenut Road (realigned segment) – Looking southeast toward Corley Ranch

INTERIM BACKGROUND CONDITIONS

Interim Background Traffic Volumes

Through a scoping meeting with Douglas County staff, it was determined that, since the subject project would not likely be constructed for several years, there would be little value in evaluating or using 2014 traffic volumes as the baseline condition. Rather, staff asked that we identify an "interim" background scenario that could be used as a baseline to evaluate the project's potential impacts in roughly a 10-year horizon.

The best source of 10-year range background traffic volumes is the *Peri Enterprises Traffic Impact Study (2009)*, accepted by Douglas County in association with the Peri Enterprises project entitlements. That study well represented not only all known approved adjacent development projects, but also the reasonably anticipated roadway improvements consistent with the Douglas County Transportation Plan. The "Existing Plus Project" volumes from the Peri Enterprises Traffic Impact Study (which include 50% build-out of the Peri project) were therefore used as the background volumes for this project's interim background scenario. The direct use of those volumes is valid because 1) traffic volumes in the study area have not changed significantly in the last 4 years, in fact daily volumes have declined in many locations, 2) the Peri study is conservative in that more roadway capacity projects have been built than were anticipated in the interim scenario (i.e. Muller Parkway extension to Grant Avenue was not anticipated), and 3) the changes in existing volumes are minor in comparison to the volume of traffic generated by the Peri project. The interim background traffic volumes and lane configurations at the study intersections are shown in ***Figure 3***.

Interim Roadway Network

The roadway network used in the interim scenario consists of only what exists today and is shown as "Funded" in the 5-Year Transportation Plan. The only unconstructed project included from the 5-Year plan is the restriping and signal modification for dual eastbound left-turn lanes on Waterloo Lane (associated with the Community Center project and funded by Douglas County). Muller Parkway extends only to Grant Avenue in this scenario.

Interim Background Intersection Operations

Table 3 presents the level of service analysis summary for this study scenario and detailed calculation sheets are provided in **Appendix A**, attached.

Table 3: Interim Background Conditions Level of Service (Intersections)

Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
US 395 / Waterloo Lane	38.8	D	61.2	E
US 395 / Waterloo Lane (with new EB RT turn lane)	*33.1*	*C*	*44.0*	*D*
Toler Lane / Muller Parkway	10.5	B	12.1	B
US 395 / Muller Parkway / Riverview Drive	25.9	C	35.0	C

Worst approach Delay and LOS reported at unsignalized intersections.

As shown in ***Table 3***, the study intersections are anticipated to operate at acceptable levels of service with the exception of the US 395/Waterloo Lane intersection during the PM peak hour. Depending on the level of build-out and activity at the Community Center, on the Peri project site, and at other developments, the US 395/Waterloo intersection may fall below policy level of service in the 10-year horizon. The simplest solution that would improve operations to an acceptable LOS would be the addition of an eastbound right-turn lane on Waterloo Lane. With the addition of an eastbound right-turn lane, the intersection would function at acceptable LOS 'D'. Additional right-of-way may be needed to widen the eastbound approach for the additional (right-turn) lane. Douglas County should consider this potential need as it addresses other projects and improvements affecting the US 395/Waterloo Lane intersection. The need is largely a result of the planned conversion of the current eastbound through lane to a second left-turn lane in association with the Community Center project, forcing all through and right turn traffic into the current right-turn lane.

Interim Background Road Segment Analysis

Existing roadway segment traffic volumes were obtained from the Nevada Department of Transportation (NDOT) Annual Traffic Report (2013). Interim background road segment volumes were developed by adding the Peri Enterprises near-term trip generation (50% build-out) to the existing volumes reported by NDOT. The ADT values were compared to the thresholds shown in ***Table 2*** to determine levels of service.

Table 4: Interim Background Conditions Road Segment LOS

Road	Segment	Class	Lanes	Existing		Interim Background	
				ADT	LOS	ADT	LOS
US 395 (NDOT)	South of Waterloo	Principal Arterial	4	17,500	C	27,240	D
US 395 (NDOT)	South of Riverview	Principal Arterial	2	10,000	C	11,950	D
Waterloo Lane	East of US 395	Minor Collector	2	5,800	C	6,450	C
Toler Avenue	Waterloo to Orchard	Minor Collector	2	3,200	C	4,500	C
Pinenut Road	West of project access	Minor Collector	3	2,300	C	2,950	C

As shown in ***Table 4***, all the roadway segments are anticipated to operate within policy level of service (LOS "C" for County roads and LOS "D" for NDOT facilities).

PROPOSED DEVELOPMENT

Project Description

The Farmstead at Corley Ranch is intended to be a master planned community based on the ranching and agriculture heritage of the project site. A few of the unique features could include an iconic barn, community garden, fruit stand, artist lofts, and several different "ranch style" residential options. Lodging and commercial spaces would be created to fit the theme and compliment the residential land uses. The conceptual development layout is shown on ***Figure 4***. For the purposes of preparing a master plan level traffic study and trip generation estimate, the project is assumed to include:

- 65 "Ranch" Homes
- 145 "Cottage" Homes
- 40 Active Living Homes (Active Adult/Senior Housing Units)
- Lodging (up to 100 rooms)
- 78,000 sqft. of commercial/retail/office space
- Community space and accessory features for the benefit of community residents

Project Trip Generation

The project is estimated to generate up to 5,295 daily trips, 494 AM peak hour trips, and 478 PM peak hour trips on an average weekday. Details of the trip generation calculations are shown in ***Table 5***. Note that the land uses and quantities shown could be changed so long as the total trip generation values are not exceeded. Further studies would be necessary to evaluate a higher number of project trips. For the purposes of this study, the Interim Plus Project scenario assumes 50% build-out of the total project and the 20-year Plus Project scenario assumes full build-out of the Farmstead at Corley Ranch Master Plan.

TABLE 5
PROJECT TRIP GENERATION - Farmstead at Corley Ranch

Description / ITE Code	Units	ITE Vehicle Trip Generation Rates								Units Independent Variable	Quantity	Total Generated Trips			Total Distribution of Generated Trips					
		Weekday	AM	PM	Pass-By	AM In	AM Out	PM In	PM Out			Daily	AM Hour	PM Hour	AM In	AM Out	Pass-By	PM In	PM Out	Pass-By
Residential																				
Single Family Homes 210	DU	9.57	0.75	1.01		25%	75%	63%	37%	DU	210.0	2,010	158	212	39	119	0	134	78	0
Senior Adult Housing-Detached 251	DU	3.71	0.22	0.27		35%	65%	61%	39%	DU	40.0	148	9	11	3	6	0	7	4	0
Village Center																				
Hotel 310	Rooms	8.17	0.56	0.59		61%	39%	53%	47%	Rooms	100.0	817	56	59	34	22	0	31	28	0
General Office 710	KSF	11.01	1.55	1.49		88%	12%	17%	83%	KSF	28.0	308	43	42	36	5	0	7	35	0
Medical Dental Office 720	KSF	36.13	2.30	3.46		78%	21%	27%	73%	KSF	25.0	903	58	87	45	12	0	23	63	0
Specialty Retail Center 814	KSF	44.32	6.84	2.71		48%	52%	44%	56%	KSF	25.0	1,108	171	68	82	89	0	30	38	0
Total Project Trips												5,295	494	478	242	252	0	232	246	0

Source: TRAFFIC WORKS, 2014

Project Access

The project proposes to construct one main access on Pinenut Road, just east of the realigned and widened portion of Pinenut Road (see ***Figure 4***). An emergency vehicle access would be constructed at a second location, yet to be determined. Specific recommendations for the project access intersection are provided later in this report based on the traffic volumes at full build-out.

Trip Distribution and Assignment

Traffic generated by the project was distributed to the road network based on the location of the project, major activity centers, existing travel patterns, and roadway connections. The distribution is consistent with the estimates made in the Peri Enterprises Traffic Study. Note that the different trip distribution and assignment patterns were created for the interim and build-out scenarios because of the different roadway networks assumed for each scenario. The project trip distribution and assignment for interim conditions is shown in ***Figure 5***. Trip distribution and assignment for full build-out of the project is shown in ***Figure 6***.

INTERIM PLUS PROJECT CONDITIONS

Roadway Network

Consistent with the interim background scenario, the interim plus project scenario includes only roadways and intersections already in place. The only planned project not yet built is the modification of the eastbound lane configuration and the signal at US 395/Waterloo lane in association with the Community Center project. The project access was evaluated with STOP controlled exclusive northbound left-turn and right-turn lanes and an eastbound exclusive right-turn (deceleration) lane in addition to the exiting east and westbound lanes.

Traffic Volumes

Interim plus project traffic volumes (***Figure 7***) were developed by adding the interim project trips (***Figure 5***) to the interim background traffic volumes (***Figure 3***).

Interim Plus Project Intersection Operations

Table 6 presents the level of service analysis summary for this study scenario and detailed calculation sheets are provided in **Appendix B**, attached.

Table 6: Interim Plus Project Level of Service (Intersections)

Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
US 395 / Waterloo Lane	39.9	D	**66.9**	**E**
US 395 / Waterloo Lane (with new EB RT turn lane)	*33.6*	*C*	*48.3*	*D*
Toler Lane / Muller Parkway (STOP control)	10.6	B	12.2	B
US 395 / Muller Parkway / Riverview Drive	31.5	C	41.1	D
Pinenut Road / Project Access (proposed STOP control)	10.5	B	12.8	B

Worst approach Delay and LOS reported at unsignalized intersections.

As shown in ***Table 6***, with the exception of the US 395/Waterloo Lane intersection, all study intersections are shown to operate at acceptable levels of service. The US 395/Waterloo Lane intersection is shown to reach LOS 'E' operating conditions with or without the project. As discussed on page 7 of this report, the solution appears to be adding an exclusive eastbound right-turn lane to replace the one displaced by other planned intersection modifications.

Interim Plus Project Road Segment Analysis

Interim Plus Project roadway segment traffic volumes were developed by adding 50% of the project trips to the interim background scenario volumes (which include 50% build-out of the Peri Enterprises project). The resulting ADT values were again compared to the thresholds shown in ***Table 2*** to determine levels of service, and are shown in ***Table 7***.

Table 7: Interim Plus Project Road Segment LOS

Road	Segment	Class	Lanes	Interim Background		Interim + Project	
				ADT	LOS	ADT	LOS
US 395 (NDOT)	South of Waterloo	Principal Arterial	4	27,240	D	29,090	D
US 395 (NDOT)	South of Riverview	Principal Arterial	2	11,950	D	12,350	D
Waterloo Lane	East of US 395	Minor Collector	2	6,450	C	6,580	C
Toler Avenue	Waterloo to Orchard	Minor Collector	2	4,500	C	4,630	C
Pinenut Road	West of project access	Minor Collector	3	2,950	C	5,470	C

As shown in ***Table 7***, all the roadway segments are anticipated to operate within policy level of service (LOS "C" for County roads and LOS "D" for NDOT facilities).

20-YEAR HORIZON BACKGROUND CONDITIONS

20-Year Horizon Background Traffic Volumes

With regard to intersections and turning movements, the best source of 20-year range background traffic volumes is again the *Peri Enterprises Traffic Impact Study (2009).* That study projected AM and PM peak hour turn movements for not only full-build-out of the Peri project but also for the nearby Barton Health project site (approx. 30 acres). The detailed assignment of these trips per that prior study is considered superior to the limited available AM/PM peak hour regional travel demand model outputs which do not provide accurate turn movement data. The 20-year horizon background traffic volumes and lane configurations at the study intersections are shown in ***Figure 8***.

Daily roadway segment volumes were obtained from the 2007 Douglas County Transportation Plan travel demand model outputs (***Appendix C***). The model outputs are expected to provide better estimates of daily regional travel on major roadways and better estimates of the affects of planned network improvements and new roadway extensions. Additionally, we were able to obtain enough model output ADT data to complete the analysis for each study road segment and compare the data to the Peri Enterprises data used for turn movements. The turn movement projections from the Peri traffic report and the daily volume model outputs are within an appropriate

range to be considered consistent with one another. It should be noted that the 2007 Douglas County Transportation Plan and associated model turned out to be quite conservative regarding development and travel growth projections. The "Great Recession" slowed growth well below expectations. In fact, traffic volumes throughout Douglas County have declined in many locations since 2007. For these reasons, we recommend that the 2007 model outputs (labeled Year 2030 at the time) are still representative of a 20-year horizon forecast. The model outputs were used directly as there would be no justified basis for increasing the projections any further.

Future Roadway Network

For the purposes of intersection analysis, the 20-year horizon roadway network is assumed to consist of existing (2014) roadways/intersections PLUS only the following projects outlined in the Douglas County Master Plan:

- Muller Parkway Extension – Full length, US 395 at Riverview to US 395 at Muller Lane
- Roundabout at Muller Parkway/Toler Lane intersection - with Muller Parkway Extension
- US 395 widening – 5-lane section from Riverview Drive south to Palomino Drive (NDOT project)
- Additional turn lanes at US 395/Muller Parkway/Riverview intersection - with US 395 widening (anticipated future lane configuration ***Figure 8***)

Background daily volume projections, obtained from travel demand model outputs, would be somewhat influenced by the following additional planned projects, shown in the Douglas County Master Plan (see ***Figure 2***):

- East Valley Road Realignment – realign to Toler Lane, connect Toler Lane to East Valley Road
- East Valley Road Extension – extend East Valley Road south of Pinenut to US 395
- East Ranchos Connection – US 395 to Long Valley development

It should be noted that, to remain conservative in our analysis, none of these future projects were used for the assignment of project generated trips or considered as available future capacity for the project since their construction timing is unknown.

20-Year Horizon Background Intersection Operations

Table 8 presents the level of service analysis summary for this study scenario and detailed calculation sheets are provided in **Appendix D**, attached.

Table 8: 20-year Horizon Background Conditions Level of Service (Intersections)

Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
US 395 / Waterloo Lane	41.5	D	**63.0**	**E**
US 395 / Waterloo Lane (with new EB RT turn lane)	*34.3*	*C*	*43.7*	*D*
Toler Lane / Muller Parkway (Roundabout)	6.4	A	9.3	A
US 395 / Muller Parkway / Riverview Drive	29.6	C	42.4	D

Worst approach Delay and LOS reported at unsignalized intersections.

As shown in ***Table 8***, with the exception of the US 395/Waterloo Lane intersection, all study intersections are shown to operate at acceptable levels of service. The US 395/Waterloo Lane intersection is shown to reach LOS 'E' operating conditions with or without the project. As discussed on page 7 of this report, the solution appears to be

adding an exclusive eastbound right-turn lane to replace the one displaced by other planned intersection modifications.

20-year Horizon Background Road Segment Analysis

20-year horizon background roadway segment traffic volumes were obtained from 2007 Douglas County Transportation Plan travel demand model outputs as previously described. The projected ADT values were compared to the thresholds shown in ***Table 2*** to determine levels of service, and are shown in ***Table 9***.

Table 9: 20-Year Horizon Background Road Segment LOS

Road	Segment	Class	Lanes	20-year Horizon	
				ADT	LOS
US 395 (NDOT)	South of Waterloo	Principal Arterial	4	23,260	C
US 395 (NDOT)	South of Riverview	Principal Arterial	4	30,730	D
Waterloo Lane	East of US 395	Minor Collector	2	3,540	C
Toler Avenue	Waterloo to Orchard	Minor Collector	2	3,920	C
Pinenut Road	West of project access	Minor Collector	3	2,120	C

All the roadway segments are anticipated to operate within policy level of service (LOS "C" for County roads and LOS "D" for NDOT facilities).

20-YEAR HORIZON PLUS PROJECT CONDITIONS

Roadway Network

The roadway network assumed in this scenario consists of exiting roadways PLUS the planned projects stated in the 20-year horizon background condition. The project access was evaluated with STOP controlled exclusive northbound left-turn and right-turn lanes and an eastbound exclusive right-turn (deceleration) lane in addition to the exiting east and westbound lanes.

Traffic Volumes

20-Year Horizon Background Plus Project traffic volumes (***Figure 9***) were developed by adding the Full Build-out project trips (***Figure 6***) to the 20-year background traffic volumes (***Figure 8***).

20-Year Horizon Plus Project Intersection Operations

Table 10 presents the level of service analysis summary for this study scenario and detailed calculation sheets are provided in **Appendix E**, attached.

Table 10: 20-Year Horizon Plus Project Level of Service (Intersections)

Intersection	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
US 395 / Waterloo Lane	50.9	D	69.3	E
US 395 / Waterloo Lane (with new EB RT turn lane)	*41.8*	*C*	*47.5*	*D*
Toler Lane / Muller Parkway (Roundabout)	9.7	A	24.9	C
US 395 / Muller Parkway / Riverview Drive	34.4	C	52.9	D
Pinenut Road / Project Access (proposed STOP control)	12.4	B	17.9	C

Worst approach Delay and LOS reported at unsignalized intersections.

As shown in ***Table 10***, with the exception of the US 395/Waterloo Lane intersection, all the study intersections are shown to operate at acceptable levels of service. The US 395/Waterloo Lane intersection is shown to reach LOS 'E' operating conditions with or without the project. As discussed on page 7 of this report, the solution appears to be adding an exclusive eastbound right-turn lane to replace the one displaced by other planned intersection modifications.

20-Year Horizon Plus Project Road Segment Analysis

20-year Plus Project roadway segment traffic volumes were developed by adding 100% of the project trips to the 20-year background scenario volumes obtained from the travel demand model outputs. The resulting ADT values were compared to the thresholds shown in ***Table 2*** to determine levels of service, and are shown in ***Table 11***.

Table 11: 20-Year Horizon Plus Project Road Segment LOS

Road	Segment	Class	Lanes	20-year Horizon		20-year + Project	
				ADT	LOS	ADT	LOS
US 395 (NDOT)	South of Waterloo	Principal Arterial	4	23,260	C	24,850	D
US 395 (NDOT)	South of Riverview	Principal Arterial	4	30,730	D	31,520	D
Waterloo Lane	East of US 395	Minor Collector	2	3,540	C	3,800	C
Toler Avenue	Waterloo to Orchard	Minor Collector	2	3,920	C	4,180	C
Pinenut Road	West of project access	Minor Collector	3	2,120	C	7,150	C

All the roadway segments are anticipated to operate within policy level of service (LOS "C" for County roads and LOS "D" for NDOT facilities).

CONCLUSIONS & RECOMMENDATIONS

The project is estimated to generate up to 5,295 daily trips, 494 AM peak hour trips, and 478 PM peak hour trips on an average weekday. For the purposes of this study, we have assumed 50% build-out within approximately a 10 year time frame and full project build-out with a 20 year horizon.

The project traffic can be accommodated with a single access on Pinenut Road. The northbound (project) approach should be constructed with exclusive left-turn and right-turn lanes and be STOP controlled. An eastbound deceleration and right-turn lane should be constructed on Pinenut Road to provide a safe and efficient project entry since the eastbound right-turn movement at the project access is anticipated to reach 200+ vehicles during the AM and PM peak hours. The Pinenut Road/project access intersection should be design in accordance with Douglas County design standards and provide appropriate intersection sight triangles. It should be recognized that this intersection could potentially be a four-legged intersection in the future if the Peri project developers chose to take access onto Pinenut Road opposite the project access. It is our opinion that the Peri and Corley Ranch projects are complimentary (Peri is primarily office/commercial uses and Corley is primarily residential uses) and that easy access across Pinenut Road, at the proposed access point, would benefit both projects and provide good access management on Pinenut Road.

Recognizing the need to provide two points of access for emergency response, an emergency only access will be provided to the project site in addition to the main access on Pinenut Road. The precise location of the emergency access point has not yet been defined, but it would likely be south of the development area via the historic ranch access to US 395, or at a second location on Pinenut Road.

Since the project is currently at the Master Plan level, the details of internal roadways, circulation, and parking cannot be evaluated at this time. These aspects will be discussed with future, parcel level applications.

All the study intersections and study roadway segments are shown to operate at acceptable levels of service, through the 20-year horizon, with the project generated traffic, except for the US 395/Waterloo Lane intersection.

The US 395/Waterloo Lane intersection is anticipated to degrade to LOS 'E' during the PM peak hour, without the project, in the interim scenario. LOS 'E' is shown for this intersection (PM peak hour only) in each study scenario unless improvements are made. Actual operating conditions are dependent on the level of build-out and activity at the Community Center, on the Peri project site, and at other developments. The simplest solution that would improve operations to an acceptable LOS would be the addition of an eastbound right-turn lane on Waterloo Lane. With the addition of an eastbound right-turn lane, the intersection would function at acceptable LOS 'D' in all scenarios. Additional right-of-way may be needed to widen the eastbound approach for the additional (right-turn) lane. Douglas County should consider this potential need as it addresses other projects and improvements affecting the US 395/Waterloo Lane intersection. The need is primarily a result of the planned conversion of the current eastbound through lane to a second left-turn lane in association with the Community Center project, forcing all through and right turn traffic into the current right-turn lane. It is our recommendation that the eastbound Waterloo approach may ultimately need dual left-turn lanes, a through lane, and an eastbound right-turn lane, with or without the project. The Farmstead at Corley Ranch project adds only 12 vehicles to the right-turn movement during the peak hours. This is a less than significant amount compared to 225 eastbound right-turns in the 20-year background volumes; therefore the conditions are not considered an impact of the project.

Consistent with the Peri Enterprises Traffic Study, we noted that additional turn lanes will be needed at the Muller/Riverview/US 395 intersection when Muller Parkway is completed and regional traffic patterns change. Those additional lanes are expected to be constructed with either a Muller Parkway improvement package or as part of the project that would widen US 395 south of Riverview Drive.

Similarly, it is anticipated that a roundabout or traffic signal would be constructed at the Muller Parkway/Toler Lane intersection with the Muller Lane Extension projects.

The off-site improvements recommended for this project consist of extending the 3-lane cross-section on Pinenut Road, with bicycle lanes and a setback sidewalk on the south side of the roadway, to the proposed project access. These improvements will provide safe left-turn movements in the future, support alternate travel mode options between the project and adjacent future development, and provide a fully improved roadway to the project site.

Please do not hesitate to contact us at (775) 322-4300 with any questions you may have regarding this study.

Sincerely,
TRAFFIC WORKS, LLC

Loren E. Chilson, PE
Principal

Attachments:
Figure 1 – Vicinity Map
Figure 2 – 2011 Douglas County Master Plan (Transportation)
Figure 3 – Interim Background Volumes
Figure 4 – Conceptual Site Plan
Figure 5 – Interim Project Trips
Figure 6 – Full Build-out Project Trips
Figure 7 – Interim Plus Project Volumes
Figure 8 – 20 Year Horizon Background Volumes
Figure 9 – 20 Year Horizon Plus Project Volumes

Appendix A – Interim Background Conditions LOS Calculations
Appendix B – Interim Plus Project LOS Calculations
Appendix C – Travel Demand Model Outputs
Appendix D – 20 Year Background Conditions LOS Calculations
Appendix E – 20 Year Plus Project LOS Calculations
Appendix F – Peri Enterprises Traffic Impact Study (2009)

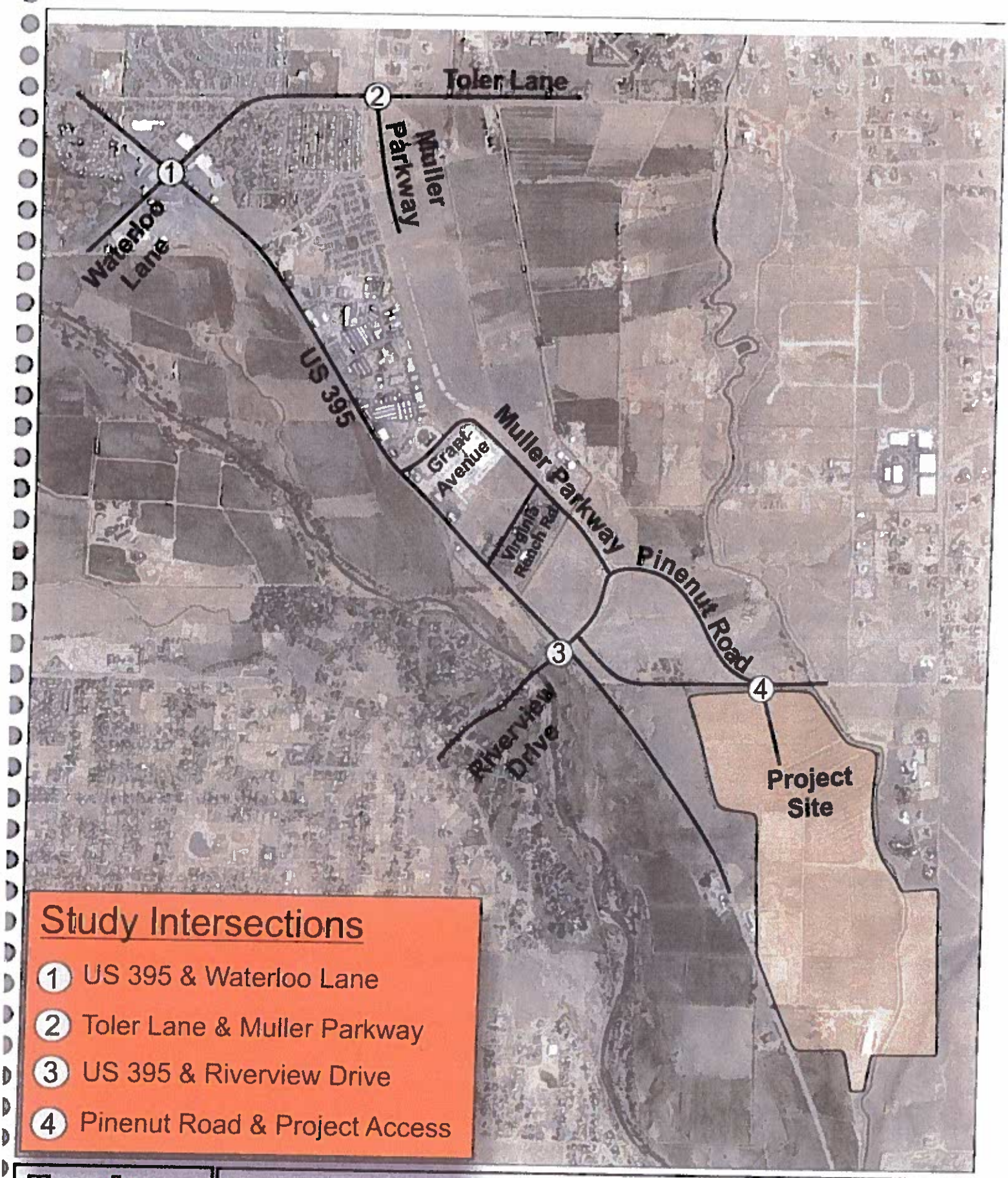
HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	188	193	206	145	92	119	1034	227	141	1015	84
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	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3444		1770	3498	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1863	1583	1770	1863	1583	1770	3444		1770	3498	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	275	216	222	237	167	106	137	1189	261	162	1167	97
RTOR Reduction (vph)	0	0	162	0	0	86	0	14	0	0	4	0
Lane Group Flow (vph)	275	216	60	237	167	20	137	1436	0	162	1260	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.1	19.1	19.1	17.3	22.3	22.3	11.0	50.6		12.2	51.8	
Effective Green, g (s)	14.1	19.1	19.1	17.3	22.3	22.3	11.0	50.6		12.2	51.8	
Actuated g/C Ratio	0.12	0.16	0.16	0.15	0.19	0.19	0.09	0.43		0.10	0.44	
Clearance Time (s)	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	
Lane Grp Cap (vph)	413	303	257	261	354	301	166	1486		184	1546	
v/s Ratio Prot	0.08	c0.12		c0.13	c0.09		0.08	c0.42		c0.09	0.36	
v/s Ratio Perm			0.04			0.01						
v/c Ratio	0.67	0.71	0.23	0.91	0.47	0.07	0.83	0.97		0.88	0.81	
Uniform Delay, d1	49.3	46.5	42.7	49.2	42.2	38.9	52.2	32.5		51.8	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	7.7	0.5	32.2	1.0	0.1	27.1	16.6		35.2	4.8	
Delay (s)	53.3	54.2	43.1	81.3	43.2	39.0	79.3	49.0		87.0	33.4	
Level of Service	D	D	D	F	D	D	E	D		F	C	
Approach Delay (s)		50.4			60.1			51.7			39.4	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	117.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Study Intersections

1. US 395 & Waterloo Lane
2. Toler Lane & Muller Parkway
3. US 395 & Riverview Drive
4. Pinenut Road & Project Access

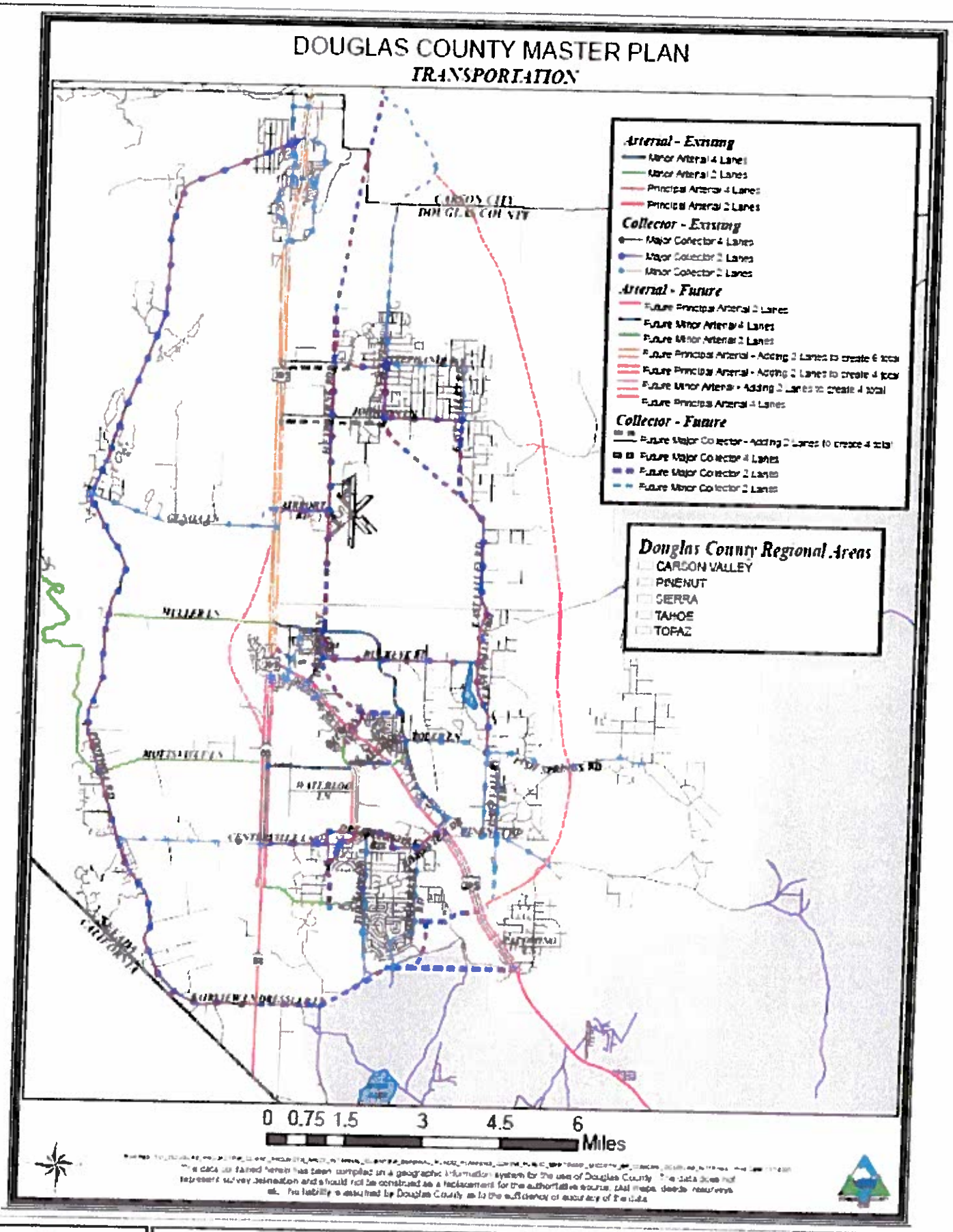
TRAFFIC WORKS, LLC

○ - Study Intersection

NO SCALE

Figure 1

FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY
Vicinity Map



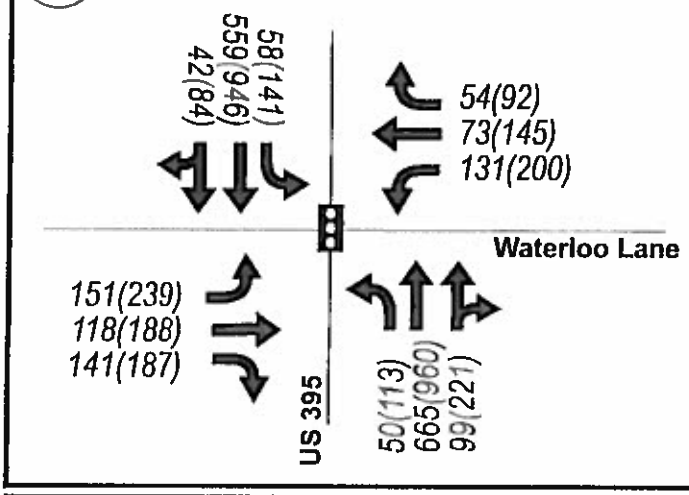
TRAFFIC WORKS

NO SCALE

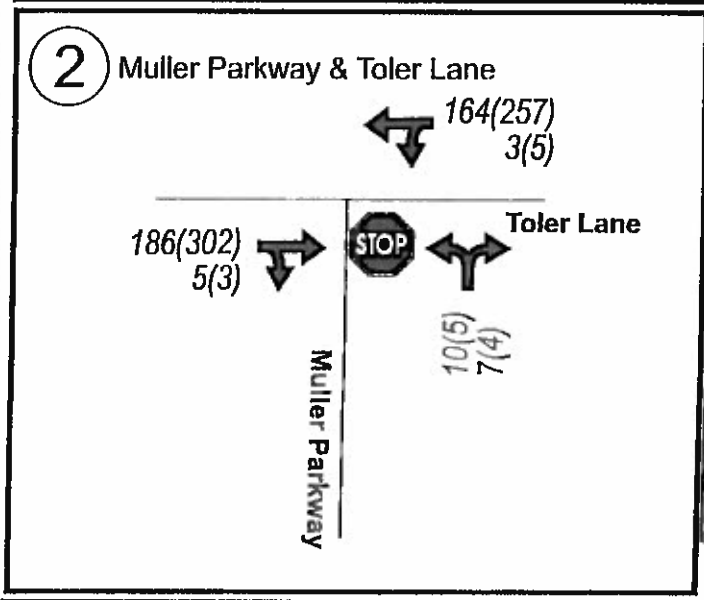
Figure 2

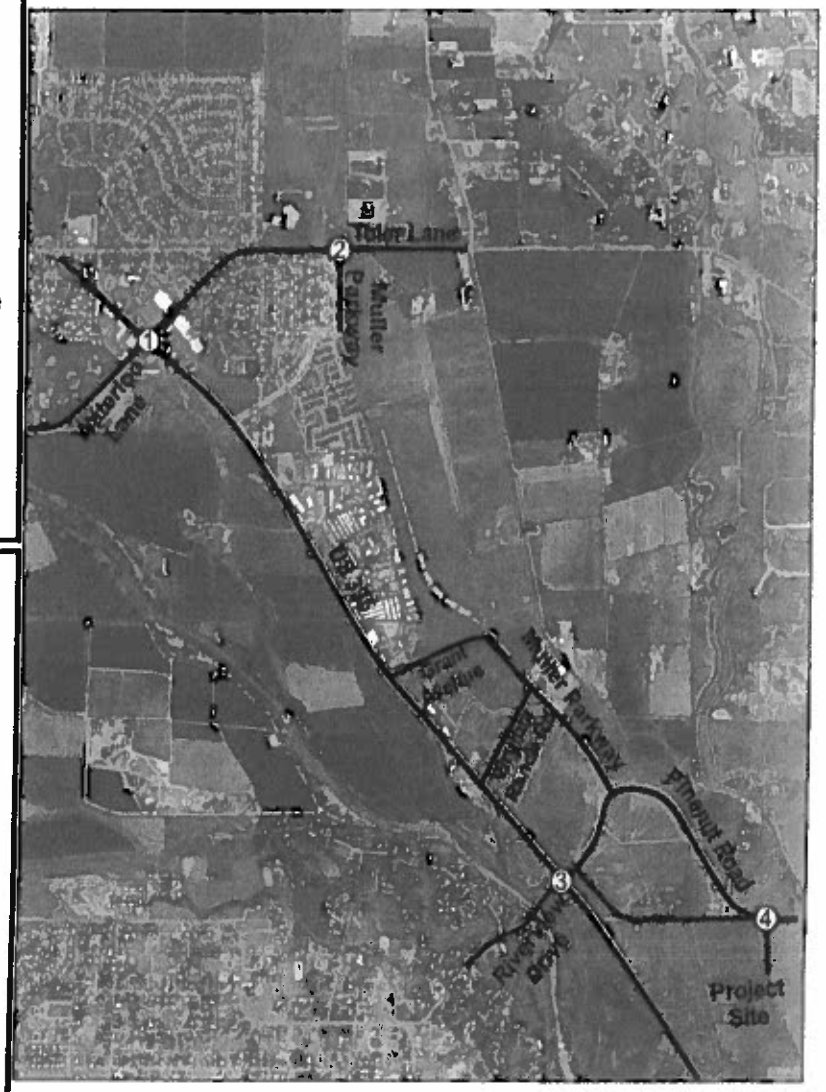
FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY
2011 Douglas County Master Plan

1 US 395 & Waterloo Lane

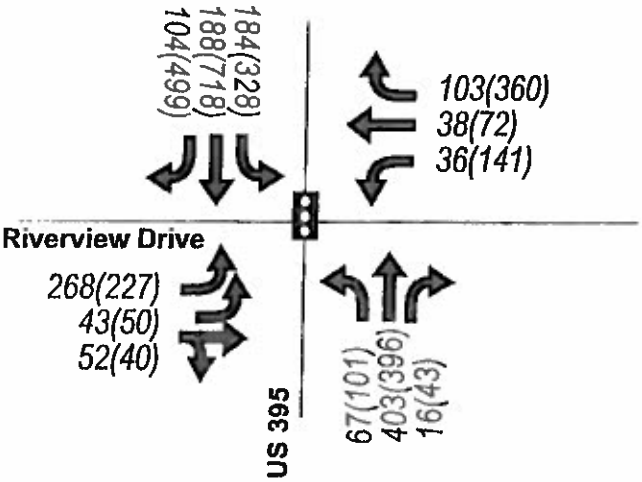


2 Muller Parkway & Toler Lane

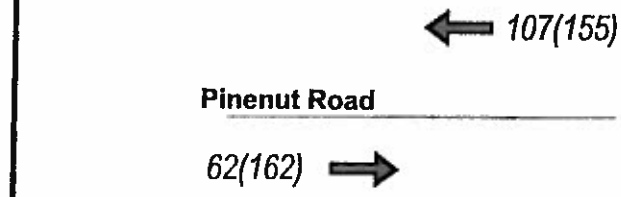




3 US 395 & Riverview Drive



4 Pinenut Road



TRAFFIC WORKS

LEGEND

AM(PM) - Peak Hour Traffic Volumes

- Lane Configuration

- Traffic Signal

STOP - Stop Sign

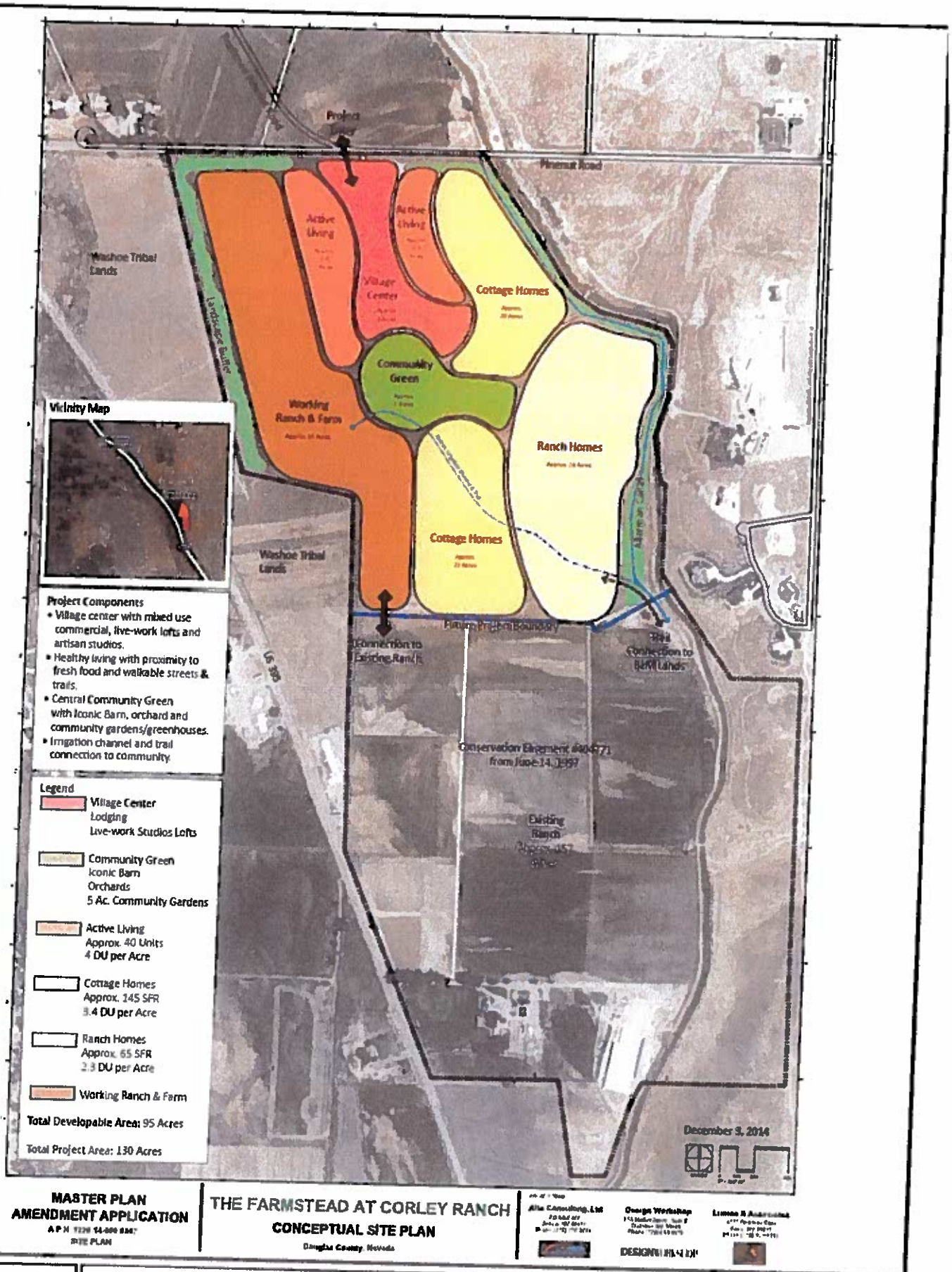
NO SCALE

Figure 3

FARMSTEAD AT CORLEY RANCH

TRAFFIC IMPACT STUDY

Interim Background Volumes



MASTER PLAN AMENDMENT APPLICATION
APN
SITE PLAN

THE FARMSTEAD AT CORLEY RANCH
CONCEPTUAL SITE PLAN
Douglas County, Nevada

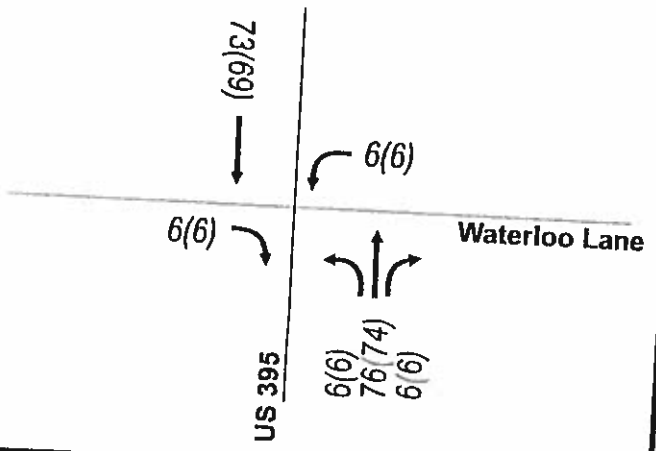
Alta Consulting, Ltd
Design Workshop
Lumos & Associates
DESIGN TEAM

TRAFFIC WORKS LLC

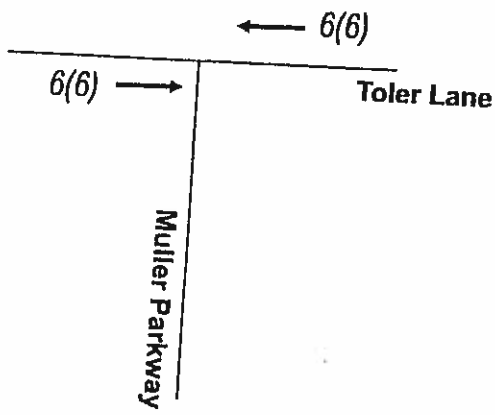
NO SCALE

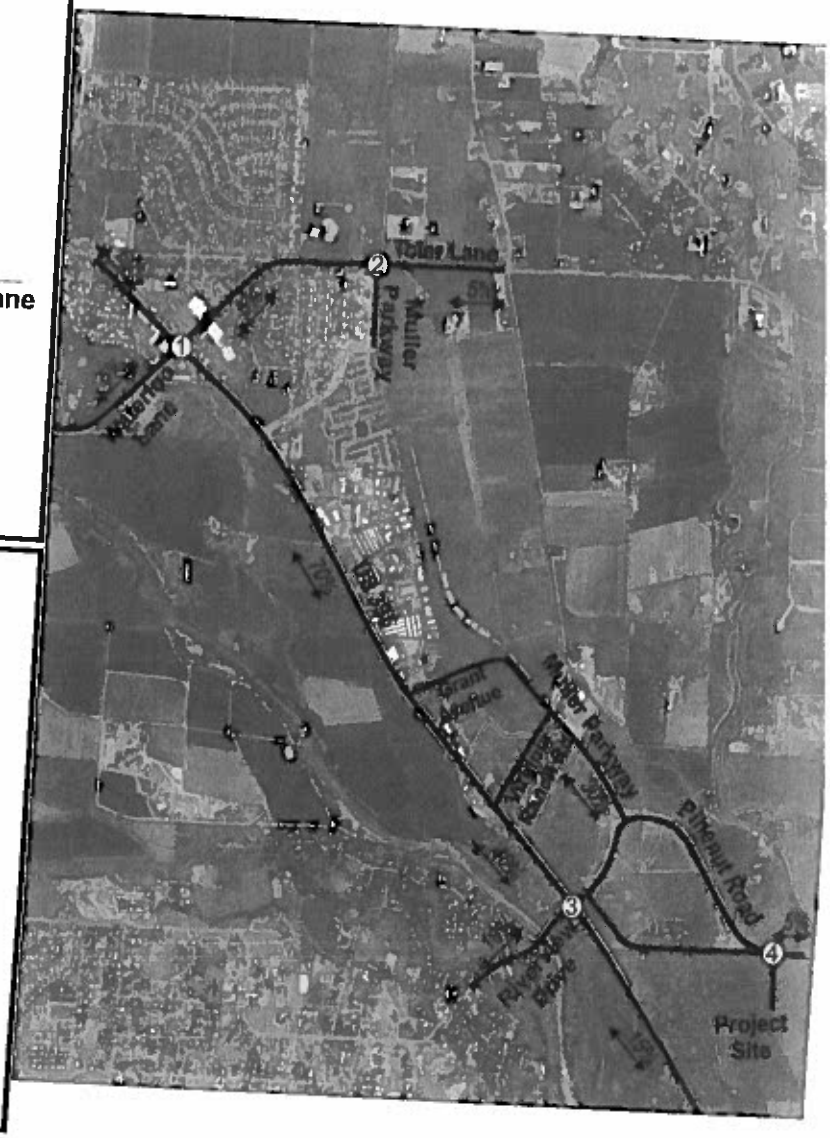
Figure 4
FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY
Conceptual Site Plan

1 US 395 & Waterloo Lane

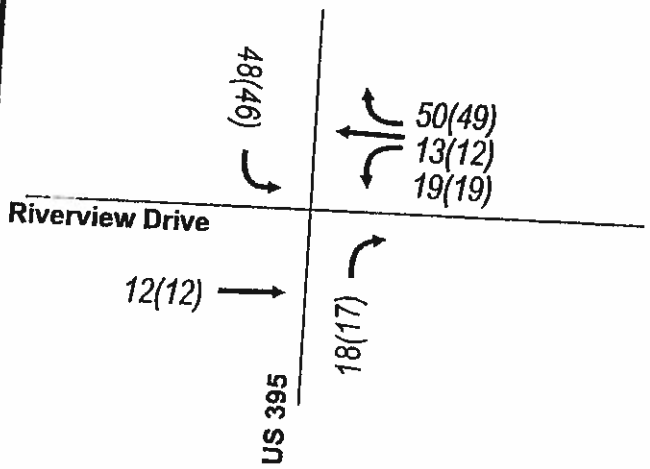


2 Muller Parkway & Toler Lane

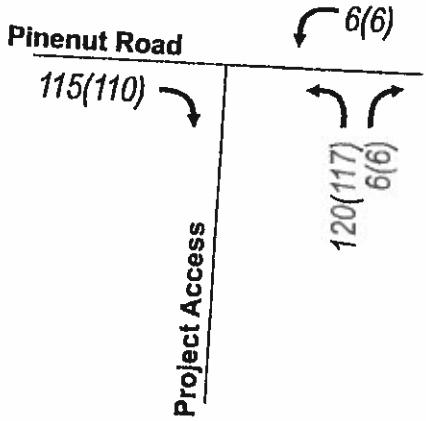




3 US 395 & Riverview Drive



4 Pinenut Road & Project Access



TRAFFIC WORKS

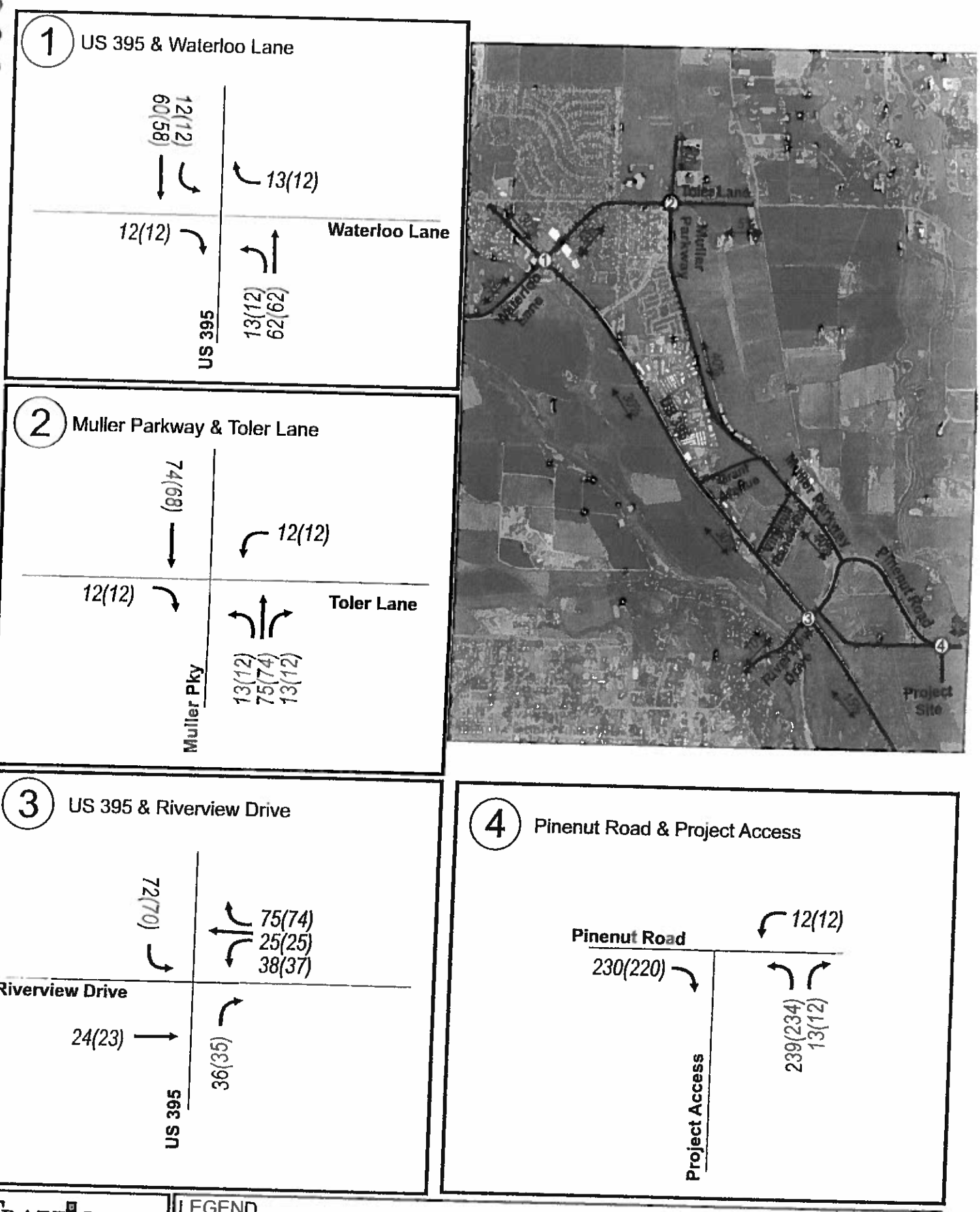
LEGEND

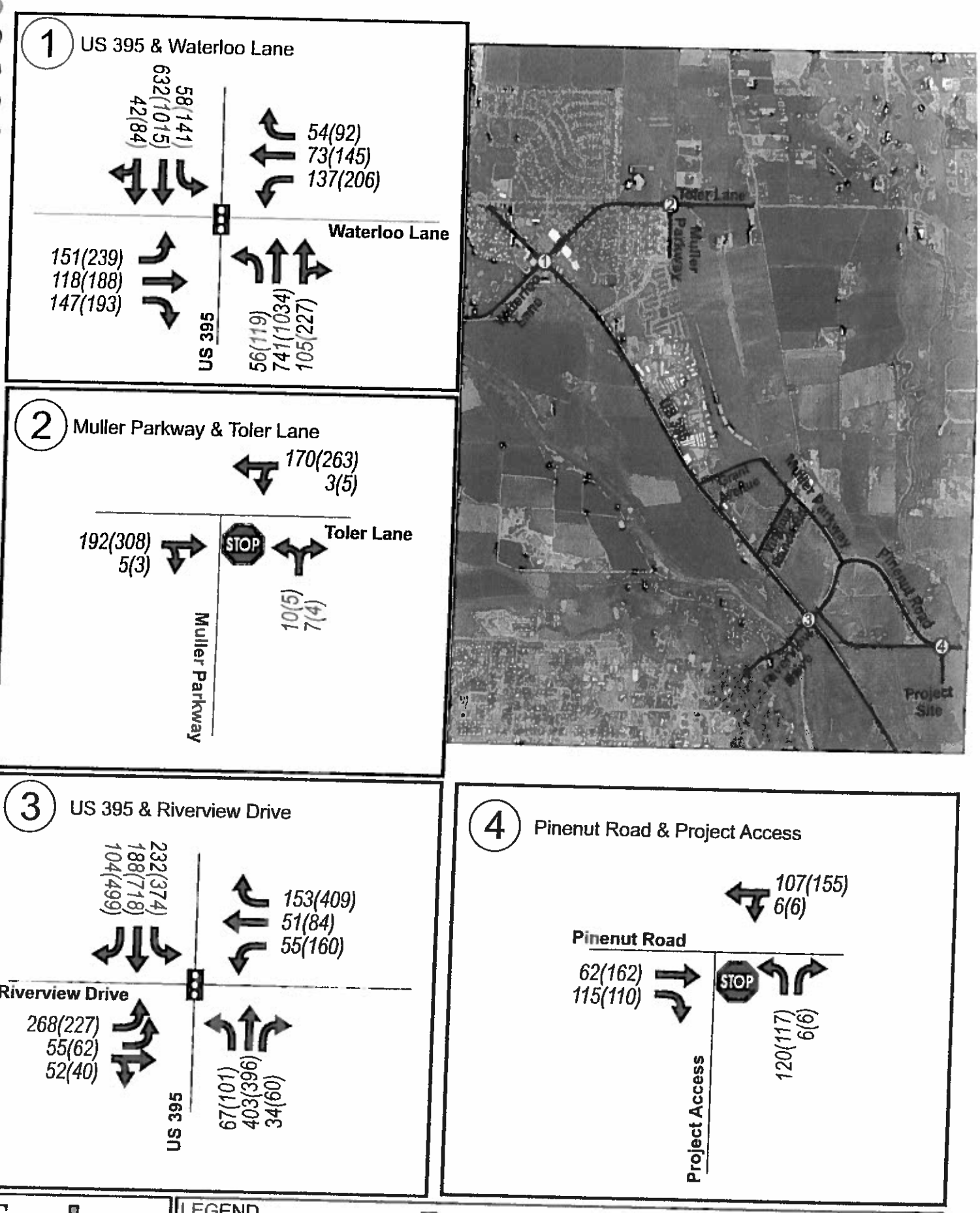
AM(PM) - Peak Hour Trip Assignment

NO SCALE

Figure 5

FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY
Interim Project Trips


1
US 395 & Waterloo Lane
12(12)
60(58)
13(12)
12(12)
Waterloo Lane
US 395
13(12)
62(62)
2
Muller Parkway & Toler Lane
74(68)
12(12)
12(12)
Toler Lane
Muller Pky
13(12)
75(74)
13(12)
3
US 395 & Riverview Drive
72(70)
75(74)
25(25)
38(37)
Riverview Drive
24(23)
36(35)
US 395
4
Pinenut Road & Project Access
12(12)
Pinenut Road
230(220)
239(234)
13(12)
Project Access
Toler Lane
Muller Parkway
Pinenut Road
Project Site
TRAFFIC WORKS
LEGEND
AM(PM) - Peak Hour Trip Assignment
NO SCALE
Figure 6
FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY
Full Build-out Project Trips



TRAFFIC WORKS

LEGEND

AM(PM) - Peak Hour Traffic Volumes

- Lane Configuration

- Traffic Signal

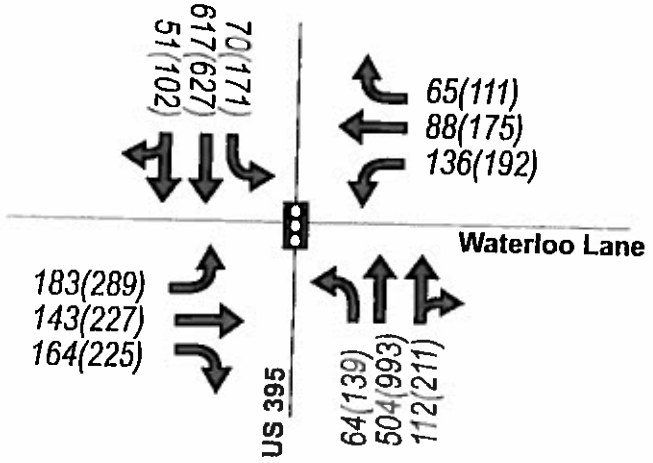
STOP - Stop Sign

NO SCALE

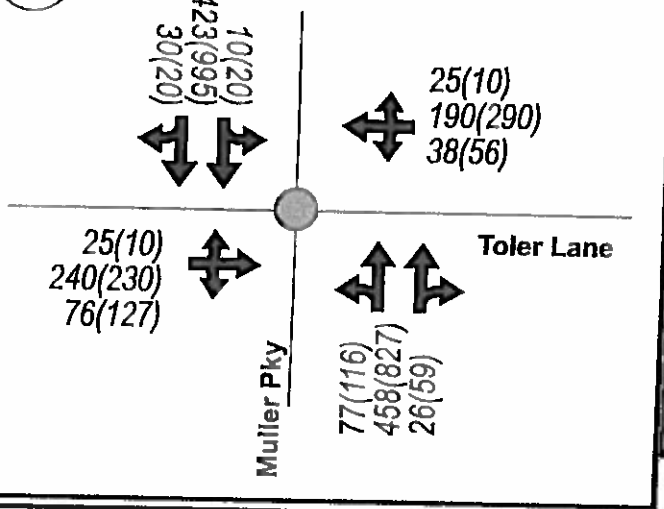
Figure 7

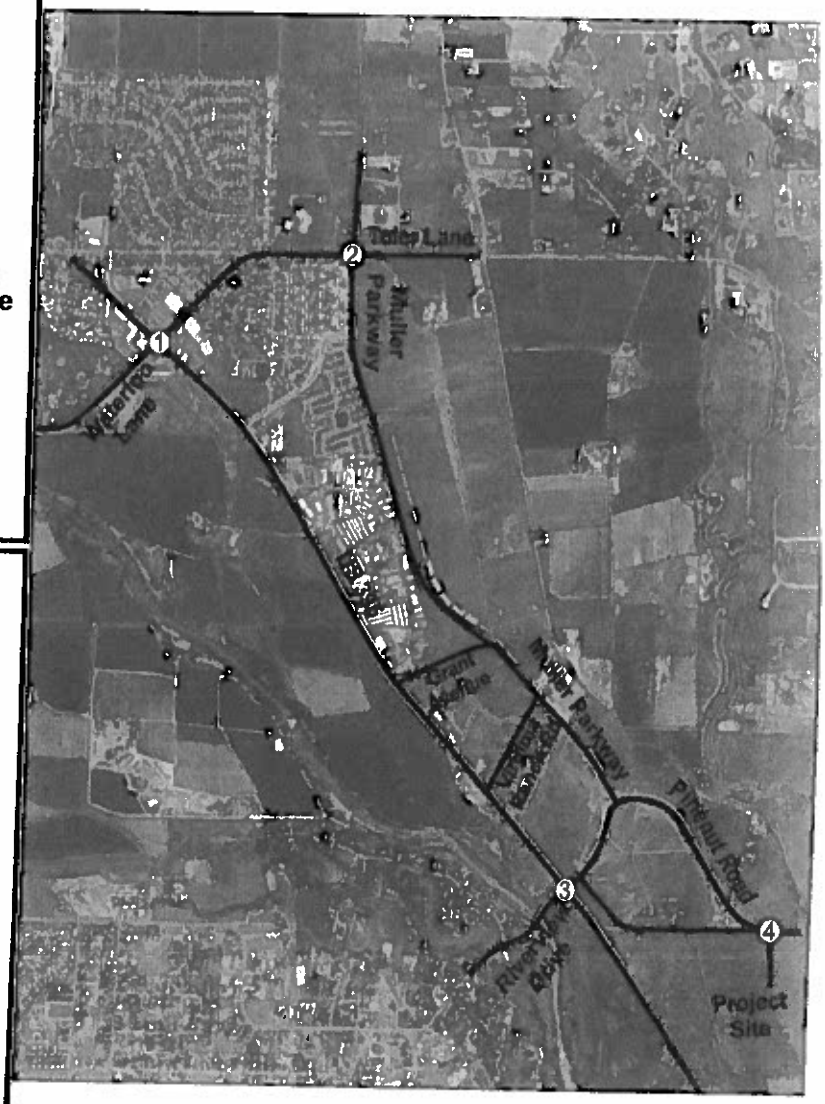
FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY
Interim Plus Project Volumes

1 US 395 & Waterloo Lane

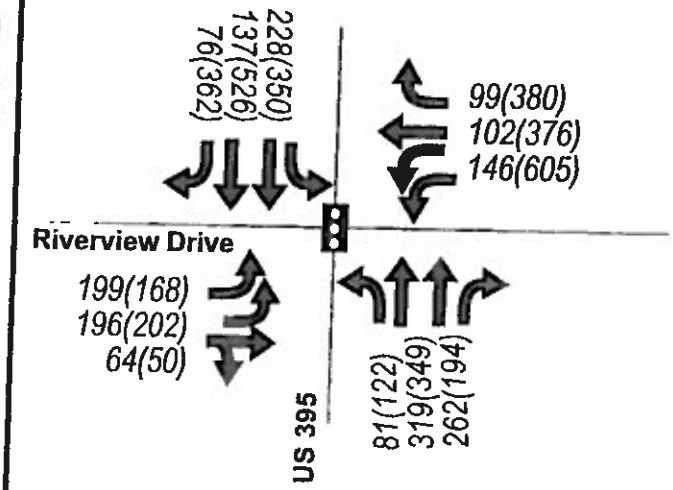


2 Muller Parkway & Toler Lane

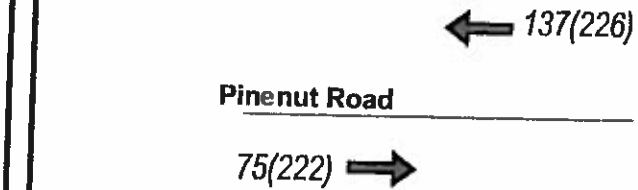




3 US 395 & Riverview Drive



4 Pinenut Road



TRAFFIC WORKS

LEGEND

AM(PM) - Peak Hour Traffic Volumes

- Lane Configuration

- Roundabout

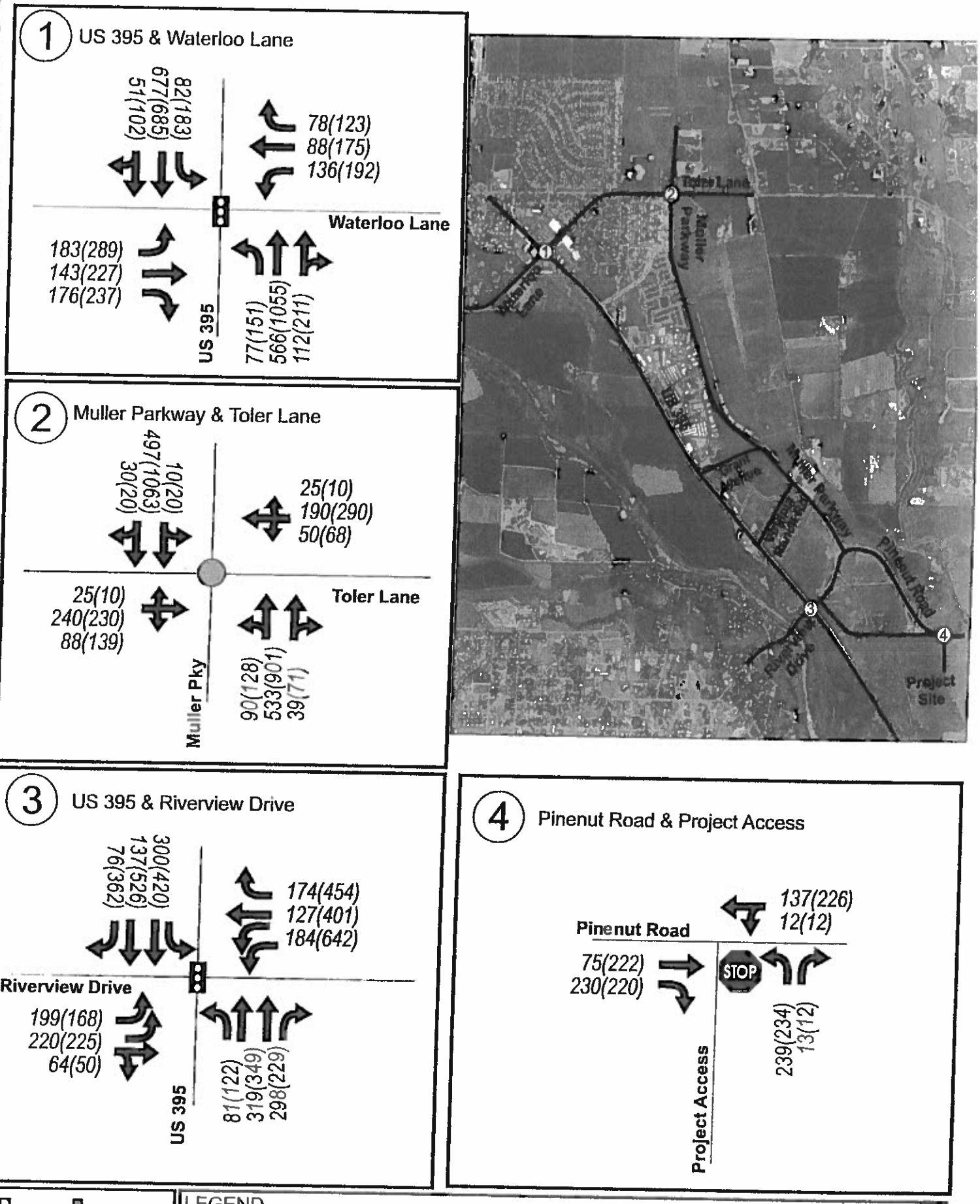
STOP - Stop Sign

- Traffic Signal

NO SCALE

Figure 8

FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY
20 Year Horizon Background Volumes


1 US 395 & Waterloo Lane
82(183)
677(685)
51(102)
78(123)
88(175)
136(192)
Waterloo Lane
183(289)
143(227)
176(237)
US 395
77(151)
566(1055)
112(211)
2 Muller Parkway & Toler Lane
497(1063)
30(20)
10(20)
25(10)
190(290)
50(68)
Toler Lane
25(10)
240(230)
88(139)
Muller Pky
90(128)
533(901)
39(71)
3 US 395 & Riverview Drive
300(420)
137(526)
76(362)
174(454)
127(401)
184(642)
Riverview Drive
199(168)
220(225)
64(50)
US 395
81(122)
319(349)
298(229)
4 Pinenut Road & Project Access
137(226)
12(12)
Pinenut Road
75(222)
230(220)
STOP
239(234)
13(12)
Project Access
Toler Lane
Muller Parkway
Pinenut Road
Project Site
LEGEND
AM(PM) - Peak Hour Traffic Volumes
- Lane Configuration
- Roundabout
STOP - Stop Sign
- Traffic Signal
NO SCALE
TRAFFIC WORKS
Figure 9
FARMSTEAD AT CORLEY RANCH
TRAFFIC IMPACT STUDY
20 Year Horizon Plus Project Volumes

APPENDICES

Appendix A: Interim Background Conditions LOS Calculations

Appendix B: Interim Plus Project LOS Calculations

Appendix C: Travel Demand Model Outputs

Appendix D: 20 Year Background Conditions LOS Calculations

Appendix E: 20 Year Plus Project LOS Calculations

Appendix F: Peri Enterprises Traffic Impact Study (2009)

Appendix A:
Interim Background Conditions LOS Calculations

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	118	141	131	73	54	50	665	99	58	559	42
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	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1711		1770	1863	1583	1770	3470		1770	3502	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1711		1770	1863	1583	1770	3470		1770	3502	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	174	136	162	151	84	62	57	764	114	67	643	48
RTOR Reduction (vph)	0	50	0	0	0	52	0	12	0	0	5	0
Lane Group Flow (vph)	174	248	0	151	84	10	57	866	0	67	686	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	10.0	18.2		5.5	13.7	13.7	6.3	41.7		4.0	39.4	
Effective Green, g (s)	10.0	18.2		5.5	13.7	13.7	6.3	41.7		4.0	39.4	
Actuated g/C Ratio	0.11	0.21		0.06	0.16	0.16	0.07	0.48		0.05	0.45	
Clearance Time (s)	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	
Lane Grp Cap (vph)	392	356		111	292	248	127	1655		81	1578	
v/s Ratio Prot	0.05	c0.15		c0.09	0.05		0.03	c0.25		c0.04	0.20	
v/s Ratio Perm						0.01						
v/c Ratio	0.44	0.70		1.36	0.29	0.04	0.45	0.52		0.83	0.43	
Uniform Delay, d1	36.1	32.0		41.0	32.5	31.3	38.9	15.9		41.4	16.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	5.8		209.5	0.5	0.1	2.5	1.2		47.1	0.9	
Delay (s)	36.9	37.9		250.5	33.1	31.3	41.4	17.1		88.5	17.3	
Level of Service	D	D		F	C	C	D	B		F	B	
Approach Delay (s)		37.5			143.3			18.6			23.6	
Approach LOS		D			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	38.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	87.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	118	141	131	73	54	50	665	99	58	559	42
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	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3470		1770	3502	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1863	1583	1770	1863	1583	1770	3470		1770	3502	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	174	136	162	151	84	62	57	764	114	67	643	48
RTOR Reduction (vph)	0	0	138	0	0	56	0	11	0	0	4	0
Lane Group Flow (vph)	174	136	24	151	84	6	57	867	0	67	687	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	9.3	12.2	12.2	5.5	8.4	8.4	4.9	42.4		4.0	41.5	
Effective Green, g (s)	9.3	12.2	12.2	5.5	8.4	8.4	4.9	42.4		4.0	41.5	
Actuated g/C Ratio	0.11	0.15	0.15	0.07	0.10	0.10	0.06	0.52		0.05	0.51	
Clearance Time (s)	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	
Lane Grp Cap (vph)	388	276	235	118	190	161	105	1792		86	1770	
v/s Ratio Prot	0.05	c0.07		c0.09	0.05		0.03	c0.25		c0.04	0.20	
v/s Ratio Perm			0.02			0.00						
v/c Ratio	0.45	0.49	0.10	1.28	0.44	0.04	0.54	0.48		0.78	0.39	
Uniform Delay, d1	34.0	32.1	30.2	38.3	34.6	33.2	37.5	12.8		38.6	12.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	1.4	0.2	175.8	1.6	0.1	5.6	0.9		34.9	0.6	
Delay (s)	34.8	33.5	30.4	214.1	36.3	33.3	43.1	13.7		73.5	13.1	
Level of Service	C	C	C	F	D	C	D	B		E	B	
Approach Delay (s)		32.9			126.1			15.5			18.5	
Approach LOS		C			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	33.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1709		1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1709		1770	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	268	43	52	36	38	103	67	403	16	184	188	104
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	308	49	60	41	44	118	77	463	18	211	216	120
RTOR Reduction (vph)	0	49	0	0	0	106	0	0	11	0	0	67
Lane Group Flow (vph)	308	60	0	41	44	12	77	463	7	211	216	53
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	8.7	12.2		3.3	6.8	6.8	6.4	26.1	26.1	11.2	30.9	30.9
Effective Green, g (s)	9.2	12.7		3.8	7.3	7.3	6.9	26.6	26.6	11.7	31.4	31.4
Actuated g/C Ratio	0.13	0.18		0.05	0.10	0.10	0.10	0.38	0.38	0.17	0.44	0.44
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)	446	307		95	192	163	173	700	595	293	826	702
v/s Ratio Prot	c0.09	c0.03		0.02	0.02		0.04	c0.25		c0.12	0.12	
v/s Ratio Perm						0.01			0.00			0.03
v/c Ratio	0.69	0.19		0.43	0.23	0.07	0.45	0.66	0.01	0.72	0.26	0.08
Uniform Delay, d1	29.4	24.7		32.5	29.2	28.7	30.1	18.4	13.9	28.0	12.4	11.3
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	4.6	0.3		3.1	0.6	0.2	1.8	4.9	0.0	8.4	0.8	0.2
Delay (s)	34.0	25.0		35.6	29.8	28.9	32.0	23.2	13.9	36.4	13.2	11.6
Level of Service	C	C		D	C	C	C	C	B	D	B	B
Approach Delay (s)		31.7			30.4			24.1			21.8	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	186	5	3	164	10	7
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	214	6	3	189	11	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			220		412	217
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			220		412	217
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		98	99
cM capacity (veh/h)			1350		595	823

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	220	192	20
Volume Left	0	3	11
Volume Right	6	0	8
cSH	1700	1350	671
Volume to Capacity	0.13	0.00	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.2	10.5
Lane LOS		A	B
Approach Delay (s)	0.0	0.2	10.5
Approach LOS			B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	188	187	200	145	92	113	960	221	141	946	84
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	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1723		1770	1863	1583	1770	3440		1770	3496	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1723		1770	1863	1583	1770	3440		1770	3496	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	275	216	215	230	167	106	130	1103	254	162	1087	97
RTOR Reduction (vph)	0	29	0	0	0	80	0	16	0	0	5	0
Lane Group Flow (vph)	275	402	0	230	167	26	130	1341	0	162	1179	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	14.6	28.5		16.7	30.6	30.6	11.6	49.6		12.2	50.2	
Effective Green, g (s)	14.6	28.5		16.7	30.6	30.6	11.6	49.6		12.2	50.2	
Actuated g/C Ratio	0.12	0.23		0.13	0.24	0.24	0.09	0.40		0.10	0.40	
Clearance Time (s)	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	
Lane Grp Cap (vph)	400	392		236	456	387	164	1364		172	1403	
v/s Ratio Prot	0.08	c0.23		c0.13	0.09		0.07	c0.39		c0.09	0.34	
v/s Ratio Perm						0.02						
v/c Ratio	0.69	1.03		0.97	0.37	0.07	0.79	0.98		0.94	0.84	
Uniform Delay, d1	53.0	48.2		53.9	39.2	36.2	55.5	37.3		56.0	33.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.9	52.4		51.0	0.5	0.1	22.5	20.7		51.6	6.2	
Delay (s)	57.9	100.7		104.9	39.7	36.3	78.0	58.0		107.6	40.0	
Level of Service	E	F		F	D	D	E	E		F	D	
Approach Delay (s)		84.0			68.8			59.8			48.1	
Approach LOS		F			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	61.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	188	187	200	145	92	113	960	221	141	946	84
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	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3440		1770	3496	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1863	1583	1770	1863	1583	1770	3440		1770	3496	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	275	216	215	230	167	106	130	1103	254	162	1087	97
RTOR Reduction (vph)	0	0	164	0	0	86	0	16	0	0	5	0
Lane Group Flow (vph)	275	216	51	230	167	20	130	1341	0	162	1179	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	13.1	17.9	17.9	15.3	20.1	20.1	9.9	43.8		11.1	45.0	
Effective Green, g (s)	13.1	17.9	17.9	15.3	20.1	20.1	9.9	43.8		11.1	45.0	
Actuated g/C Ratio	0.12	0.17	0.17	0.14	0.19	0.19	0.09	0.41		0.10	0.42	
Clearance Time (s)	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	
Lane Grp Cap (vph)	423	314	267	255	352	299	165	1420		185	1482	
v/s Ratio Prot	0.08	c0.12		c0.13	0.09		0.07	c0.39		c0.09	0.34	
v/s Ratio Perm			0.03			0.01						
v/c Ratio	0.65	0.69	0.19	0.90	0.47	0.07	0.79	0.94		0.88	0.80	
Uniform Delay, d1	44.3	41.5	37.9	44.7	38.3	35.3	47.1	30.0		46.8	26.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.6	6.1	0.4	31.7	1.0	0.1	21.6	13.8		33.8	4.5	
Delay (s)	47.9	47.6	38.2	76.4	39.3	35.4	68.6	43.8		80.6	31.1	
Level of Service	D	D	D	E	D	D	E	D		F	C	
Approach Delay (s)		44.9			55.4			46.0			37.0	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	44.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	106.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	77.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1738		1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1738		1770	1863	1583	1770	1863	1583	1770	1863	1583
Volume (vph)	227	50	40	141	72	360	101	396	43	328	718	499
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	261	57	46	162	83	414	116	455	49	377	825	574
RTOR Reduction (vph)	0	32	0	0	0	358	0	0	32	0	0	276
Lane Group Flow (vph)	261	71	0	162	83	56	116	455	17	377	825	298
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	8.5	8.8		12.0	12.3	12.3	7.5	33.3	33.3	23.3	49.1	49.1
Effective Green, g (s)	9.0	9.3		12.5	12.8	12.8	8.0	33.8	33.8	23.8	49.6	49.6
Actuated g/C Ratio	0.09	0.10		0.13	0.13	0.13	0.08	0.35	0.35	0.25	0.52	0.52
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)	324	169		232	250	212	148	660	561	442	969	823
v/s Ratio Prot	0.08	c0.04		c0.09	c0.04		0.07	0.24		c0.21	c0.44	
v/s Ratio Perm						0.04			0.01			0.19
v/c Ratio	0.81	0.42		0.70	0.33	0.26	0.78	0.69	0.03	0.85	0.85	0.36
Uniform Delay, d1	42.3	40.5		39.6	37.4	37.1	42.9	26.3	20.1	34.1	19.7	13.5
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	1.7		8.8	0.8	0.7	23.2	5.8	0.1	14.7	9.3	1.2
Delay (s)	55.9	42.2		48.5	38.2	37.7	66.1	32.1	20.2	48.8	29.1	14.8
Level of Service	E	D		D	D	D	E	C	C	D	C	B
Approach Delay (s)		52.0			40.4			37.5			28.6	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	35.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	95.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	302	3	5	257	5	4
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	347	3	6	295	6	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			351		656	349
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			351		656	349
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		99	99
cM capacity (veh/h)			1208		428	694

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	351	301	10
Volume Left	0	6	6
Volume Right	3	0	5
cSH	1700	1208	516
Volume to Capacity	0.21	0.00	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.2	12.1
Lane LOS		A	B
Approach Delay (s)	0.0	0.2	12.1
Approach LOS			B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	27.5%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix B:

Interim Plus Project LOS Calculations

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	118	147	137	73	54	56	741	105	58	632	42
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	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1708		1770	1863	1583	1770	3473		1770	3506	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1708		1770	1863	1583	1770	3473		1770	3506	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	174	136	169	157	84	62	64	852	121	67	726	48
RTOR Reduction (vph)	0	52	0	0	0	52	0	11	0	0	4	0
Lane Group Flow (vph)	174	253	0	157	84	10	64	962	0	67	770	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	10.1	18.6		5.5	14.0	14.0	6.5	41.6		4.0	39.1	
Effective Green, g (s)	10.1	18.6		5.5	14.0	14.0	6.5	41.6		4.0	39.1	
Actuated g/C Ratio	0.12	0.21		0.06	0.16	0.16	0.07	0.47		0.05	0.45	
Clearance Time (s)	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	
Lane Grp Cap (vph)	395	362		111	297	252	131	1647		80	1563	
v/s Ratio Prot	0.05	c0.15		c0.09	0.05		0.04	c0.28		c0.04	0.22	
v/s Ratio Perm						0.01						
v/c Ratio	0.44	0.70		1.41	0.28	0.04	0.49	0.58		0.84	0.49	
Uniform Delay, d1	36.2	32.0		41.1	32.4	31.2	39.0	16.8		41.5	17.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	5.8		231.1	0.5	0.1	2.9	1.5		50.1	1.1	
Delay (s)	37.0	37.8		272.2	33.0	31.2	41.9	18.3		91.6	18.4	
Level of Service	D	D		F	C	C	D	B		F	B	
Approach Delay (s)		37.5			156.6			19.7			24.2	
Approach LOS		D			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	39.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	18.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	118	147	137	73	54	56	741	105	58	632	42
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	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3473		1770	3506	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1863	1583	1770	1863	1583	1770	3473		1770	3506	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	174	136	169	157	84	62	64	852	121	67	726	48
RTOR Reduction (vph)	0	0	144	0	0	56	0	10	0	0	4	0
Lane Group Flow (vph)	174	136	25	157	84	6	64	963	0	67	770	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	9.3	12.2	12.2	5.5	8.4	8.4	6.5	41.5		4.0	39.0	
Effective Green, g (s)	9.3	12.2	12.2	5.5	8.4	8.4	6.5	41.5		4.0	39.0	
Actuated g/C Ratio	0.11	0.15	0.15	0.07	0.10	0.10	0.08	0.51		0.05	0.48	
Clearance Time (s)	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	
Lane Grp Cap (vph)	393	279	237	119	192	163	141	1774		87	1683	
v/s Ratio Prot	0.05	c0.07		c0.09	0.05		0.04	c0.28		c0.04	0.22	
v/s Ratio Perm			0.02			0.00						
v/c Ratio	0.44	0.49	0.11	1.32	0.44	0.04	0.45	0.54		0.77	0.46	
Uniform Delay, d1	33.5	31.6	29.8	37.9	34.2	32.8	35.7	13.4		38.1	14.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	1.3	0.2	190.8	1.6	0.1	2.3	1.2		33.4	0.9	
Delay (s)	34.3	33.0	30.0	228.6	35.8	32.9	38.0	14.6		71.6	15.0	
Level of Service	C	C	C	F	D	C	D	B		E	B	
Approach Delay (s)		32.4			135.1			16.1			19.5	
Approach LOS		C			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	81.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	192	5	3	170	10	7
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	221	6	3	195	11	8
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			226		426	224
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			226		426	224
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		98	99
cM capacity (veh/h)			1342		584	816

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	226	199	20
Volume Left	0	3	11
Volume Right	6	0	8
cSH	1700	1342	661
Volume to Capacity	0.13	0.00	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.2	10.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.2	10.6
Approach LOS			B

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	21.3%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: US 395 & Riverview Dr

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	268	55	52	55	51	153	67	403	34	232	188	140
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	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1726		1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1726		1770	1863	1583	1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	308	63	60	63	59	176	77	463	39	267	216	161
RTOR Reduction (vph)	0	43	0	0	0	155	0	0	25	0	0	90
Lane Group Flow (vph)	308	80	0	63	59	21	77	463	14	267	216	71
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	12.3		6.4	9.2	9.2	6.9	27.9	27.9	13.5	34.5	34.5
Effective Green, g (s)	9.5	12.3		6.4	9.2	9.2	6.9	27.9	27.9	13.5	34.5	34.5
Actuated g/C Ratio	0.12	0.16		0.08	0.12	0.12	0.09	0.36	0.36	0.17	0.44	0.44
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)	417	271		145	219	186	156	665	565	305	822	699
v/s Ratio Prot	c0.09	c0.05		0.04	0.03		0.04	c0.25		c0.15	0.12	
v/s Ratio Perm						0.01			0.01			0.04
v/c Ratio	0.74	0.30		0.43	0.27	0.11	0.49	0.70	0.02	0.88	0.26	0.10
Uniform Delay, d1	33.1	29.1		34.1	31.4	30.8	33.9	21.5	16.3	31.5	13.8	12.7
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	6.7	0.6		2.1	0.7	0.3	2.4	5.9	0.1	23.2	0.8	0.3
Delay (s)	39.8	29.7		36.2	32.1	31.1	36.4	27.4	16.4	54.7	14.5	13.0
Level of Service	D	C		D	C	C	D	C	B	D	B	B
Approach Delay (s)		36.9			32.3			27.9			30.8	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	78.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	62	115	6	107	120	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	71	132	7	123	138	7
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			203		208	71
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			203		208	71
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		82	99
cM capacity (veh/h)			1368		776	991

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	71	132	130	138	7
Volume Left	0	0	7	138	0
Volume Right	0	132	0	0	7
cSH	1700	1700	1368	776	991
Volume to Capacity	0.04	0.08	0.01	0.18	0.01
Queue Length 95th (ft)	0	0	0	16	1
Control Delay (s)	0.0	0.0	0.4	10.6	8.7
Lane LOS			A	B	A
Approach Delay (s)	0.0		0.4	10.5	
Approach LOS				B	

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	188	193	206	145	92	119	1034	227	141	1015	84
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	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1721		1770	1863	1583	1770	3444		1770	3498	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1721		1770	1863	1583	1770	3444		1770	3498	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	275	216	222	237	167	106	137	1189	261	162	1167	97
RTOR Reduction (vph)	0	30	0	0	0	81	0	15	0	0	5	0
Lane Group Flow (vph)	275	408	0	237	167	25	137	1435	0	162	1259	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	14.6	27.5		16.5	29.4	29.4	11.1	51.4		11.6	51.9	
Effective Green, g (s)	14.6	27.5		16.5	29.4	29.4	11.1	51.4		11.6	51.9	
Actuated g/C Ratio	0.12	0.22		0.13	0.24	0.24	0.09	0.41		0.09	0.42	
Clearance Time (s)	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	
Lane Grp Cap (vph)	400	378		233	438	372	157	1416		164	1452	
v/s Ratio Prot	0.08	c0.24		c0.13	0.09		0.08	c0.42		c0.09	0.36	
v/s Ratio Perm						0.02						
v/c Ratio	0.69	1.08		1.02	0.38	0.07	0.87	1.01		0.99	0.87	
Uniform Delay, d1	53.0	48.8		54.2	40.2	37.1	56.3	36.8		56.6	33.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.9	69.5		63.5	0.6	0.1	37.6	27.3		66.0	7.2	
Delay (s)	57.9	118.2		117.7	40.7	37.2	93.8	64.1		122.7	40.6	
Level of Service	E	F		F	D	D	F	E		F	D	
Approach Delay (s)		94.9			75.8			66.7			49.9	
Approach LOS		F			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	66.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	125.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	91.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	308	3	5	263	5	4
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	354	3	6	302	6	5
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			357		670	356
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			357		670	356
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		99	99
cM capacity (veh/h)			1201		420	688

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	357	308	10
Volume Left	0	6	6
Volume Right	3	0	5
cSH	1700	1201	508
Volume to Capacity	0.21	0.00	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.2	12.2
Lane LOS		A	B
Approach Delay (s)	0.0	0.2	12.2
Approach LOS			B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
3: US 395 & Riverview Dr

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	227	62	40	160	84	409	101	396	60	374	718	499
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	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1753		1770	1863	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1753		1770	1863	1583	1770	1863	1583	1770	1863	1583
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	1.00
Adj. Flow (vph)	261	71	46	184	97	470	116	455	69	430	825	499
RTOR Reduction (vph)	0	24	0	0	0	396	0	0	48	0	0	126
Lane Group Flow (vph)	261	93	0	184	97	74	116	455	21	430	825	373
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	10.8	12.0		11.9	13.1	13.1	7.8	31.1	31.1	27.2	50.5	50.5
Effective Green, g (s)	10.8	12.0		11.9	13.1	13.1	7.8	31.1	31.1	27.2	50.5	50.5
Actuated g/C Ratio	0.11	0.12		0.12	0.13	0.13	0.08	0.31	0.31	0.27	0.50	0.50
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)	370	209		210	243	206	137	578	491	480	938	797
v/s Ratio Prot	0.08	c0.05		c0.10	0.05		0.07	0.24		c0.24	c0.44	
v/s Ratio Perm						0.05			0.01			0.24
v/c Ratio	0.71	0.45		0.88	0.40	0.36	0.85	0.79	0.04	0.90	0.88	0.47
Uniform Delay, d1	43.2	41.0		43.4	39.9	39.7	45.6	31.5	24.2	35.1	22.1	16.1
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.0	1.5		30.9	1.1	1.1	35.6	10.4	0.2	18.9	11.5	2.0
Delay (s)	49.2	42.5		74.3	41.0	40.8	81.2	41.9	24.3	54.1	33.7	18.1
Level of Service	D	D		E	D	D	F	D	C	D	C	B
Approach Delay (s)		47.1			49.0			47.1			34.2	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	41.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

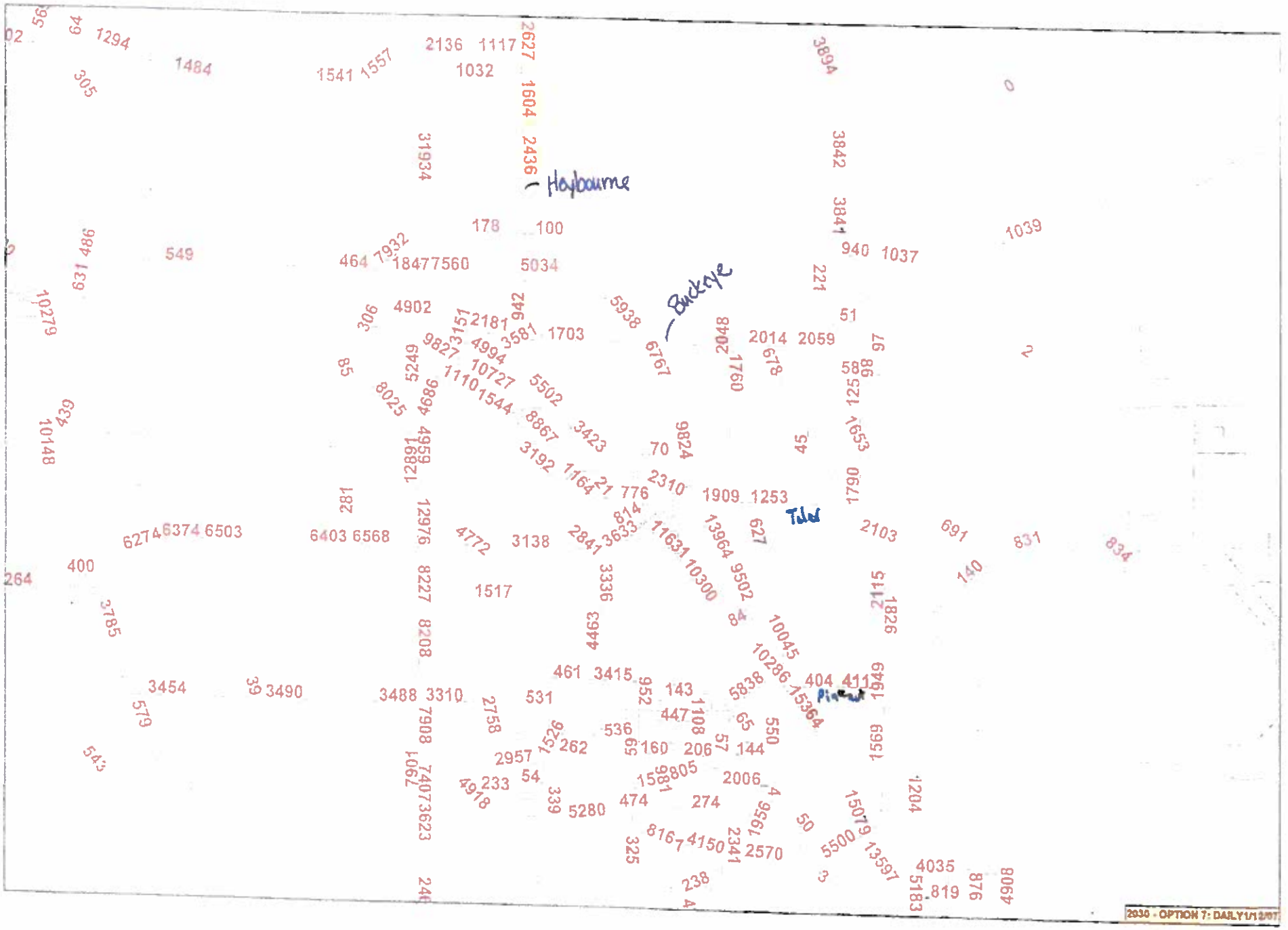
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	162	110	6	155	177	6
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	174	118	6	167	190	6
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			292		354	174
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			292		354	174
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		70	99
cM capacity (veh/h)			1269		641	869

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	174	118	173	190	6
Volume Left	0	0	6	190	0
Volume Right	0	118	0	0	6
cSH	1700	1700	1269	641	869
Volume to Capacity	0.10	0.07	0.01	0.30	0.01
Queue Length 95th (ft)	0	0	0	31	1
Control Delay (s)	0.0	0.0	0.3	13.0	9.2
Lane LOS			A	B	A
Approach Delay (s)	0.0		0.3	12.8	
Approach LOS				B	

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C:

Travel Demand Model Outputs



- Double volumes for total 2-way daily volume


ORCHARD
MILLER
DOUBLE VOLUMES FOR ADT
2030 - OPTION 7: DAILY 1/12/07

- Heybourne Road would be extended from Airport Road to Buckeye Road
- Muller Lane would be extended from U.S. 395 south of Minden to U.S. 395 south of Gardnerville
- Waterloo Lane (four-lane) connection between SR 88 and U.S. 395
- Ironwood Drive connection between Lucerne Street and Muller Lane
- Zerolene Road connection between U.S. 395 and Ironwood Drive
- Vicky Lane connection between Johnson Lane and East Valley Road
- East Valley Road would be realigned south of Fish Springs Road
- Vista Grande Boulevard connection between Old Clear Creek Road and Jacks Valley Road
- Lucerne Street connection between Muller Lane and U.S. 395
- Stephanie Lane would be widened to four lanes between U.S. 395 and Santa Barbara Drive
- Johnson Lane would be widened to four lanes between U.S. 395 and Vicky Lane
- Jacks Valley Road would be widened to four lanes between U.S. 395 and Shawnee Drive
- Sixth Street would be widened to four lanes between Ironwood Drive and Heybourne Road
- East Valley Road would be upgraded to a two-lane major collector between Johnson Lane and Toler Lane
- SR 756 (Centerville Lane/Gilman Lane) would be upgraded to a three-lane minor arterial
- Drayton Boulevard would be extended between Centerville Road and Kimmerling Road
- SR 88 would be widened to four lanes from U.S. 395 to Waterloo Lane
- Various intersection improvements would be completed, i.e., widening, traffic signals, as needed

ADVANTAGES

- Carson Freeway would be completed to U.S. 50 (Spooner Junction)
- 2030 traffic volumes on U.S. 395 would be lower than 2005 levels through Minden and Gardnerville

DISADVANTAGES

- U.S. 395 would operate at LOS E and F from U.S. 50 to Ironwood Drive and LOS D and E south of Pinenut Road/Riverview Drive.
- Douglas County roads would operate at LOS C or better except for Riverview Drive between U.S. 395 and Dresslerville Road which is LOS E and D
- Vista Grande Boulevard would operate at LOS F between Old Clear Creek Road and Jacks Valley Road

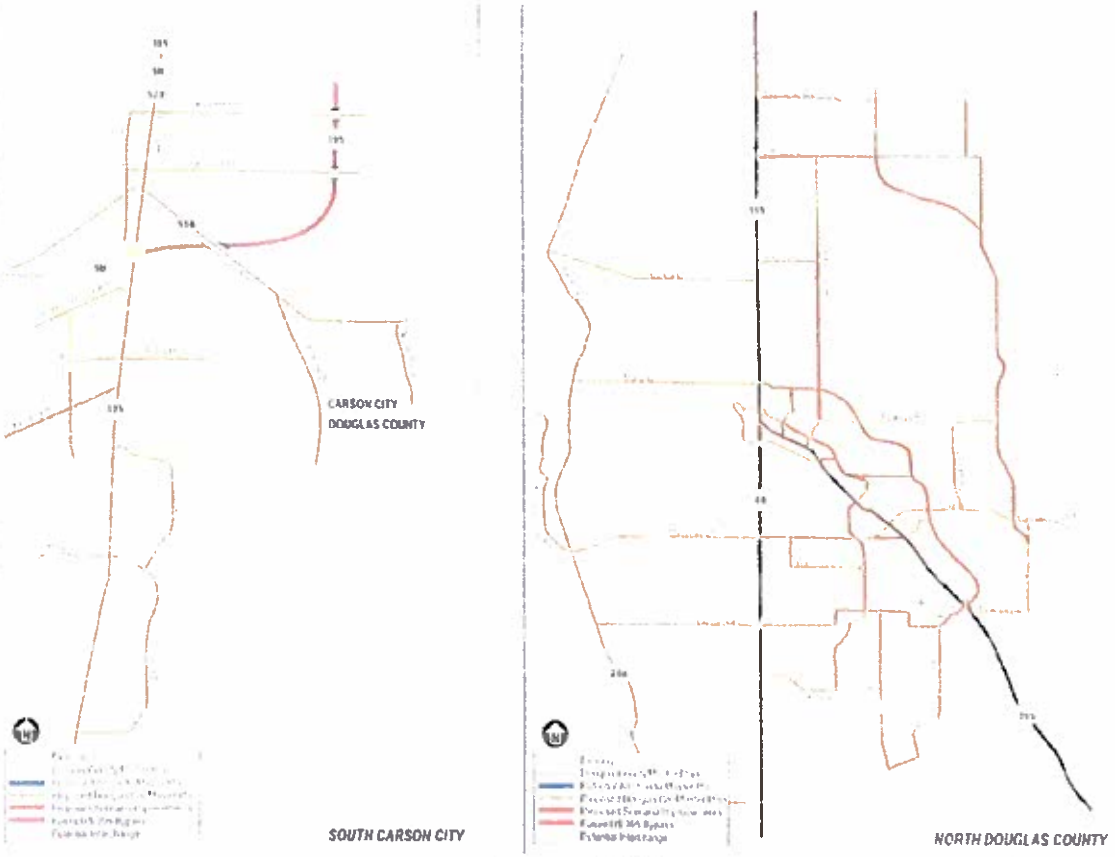


Figure 5-8 *Current Douglas County Carson City Master Planned Improvements*

- Tupsy Lane would operate at LOS F between U.S. 395 and Lyla Lane

5.5.9 U.S. 395 Freeway with West Side Bypass

Scenario 7 includes the improvements in Scenario 5 plus the following:

- New West Side Bypass would operate as four-lane facility from U.S. 395 between Muller and Genoa Lanes with an alignment west of the Ironwood area that ties into SR 88 south of the Carson River. It would continue as a four-lane facility along SR 88 to Dressler Lane (or at some point north of Dressler) and continue as a four-lane facility between SR 88 and U.S. 395.

ADVANTAGES

- U.S. 395 would operate at LOS D or better between U.S. 50 and Ironwood Drive.
- West Side Bypass would accommodate large trucks and other interstate traffic that could bypass Minden and Gardnerville. The bypass would also provide alternate routing if U.S. 395 closed due to incidents between Muller Lane and Pinenut Road.
- Frontage roads would allow for bicycle travel adjacent to the freeway and serve as parallel routes when incidents close the freeway.

DISADVANTAGES

- Johnson Lane would operate at LOS D between Heybourne Road and Nowlin Road.
- Topsy Lane would operate at LOS F between U.S. 395 and Lyla Lane.
- Vista Grande would operate at LOS F between Old Clear Creek Road and Topsy Lane.

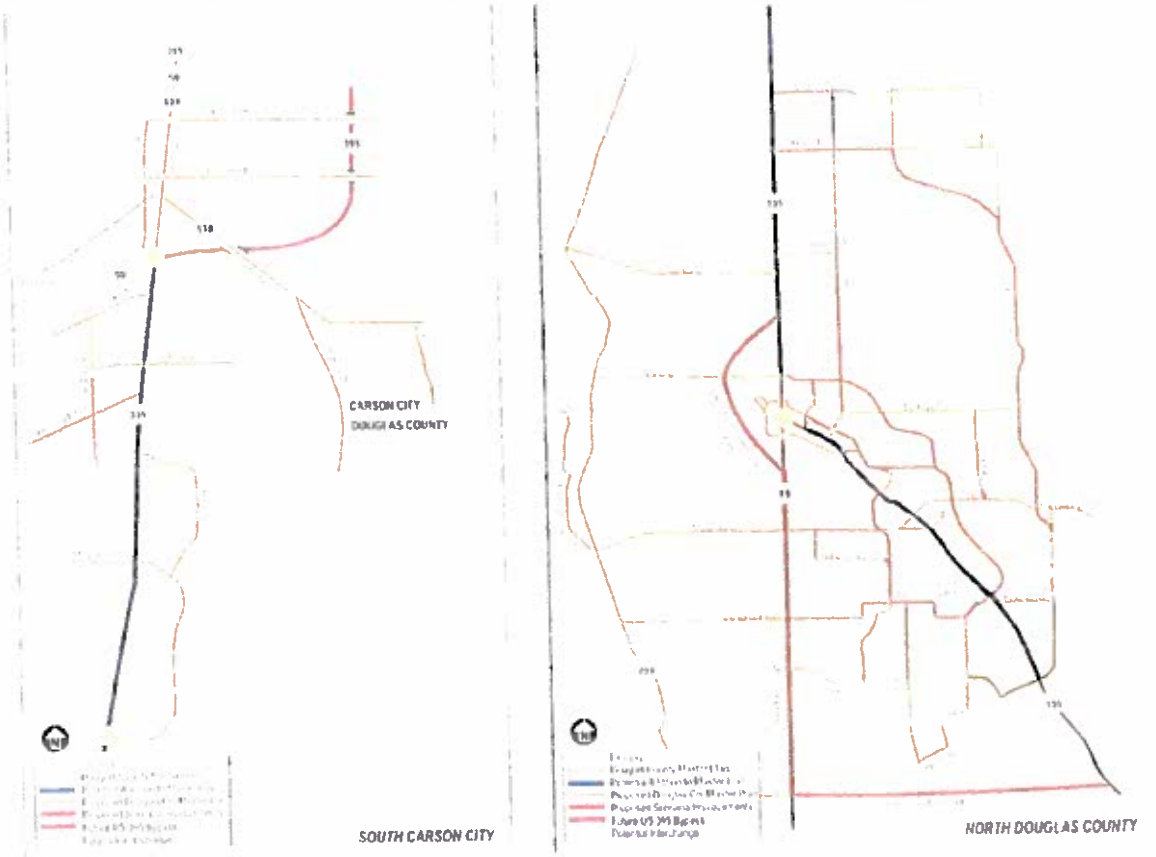


Figure 5-16 *Scenario 7 – U.S. 395 Freeway with West Side Bypass*

Appendix D:

20 Year Background Conditions LOS Calculations

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	143	164	136	88	65	64	504	112	70	617	51
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	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1714		1770	1863	1583	1770	3443		1770	3499	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1714		1770	1863	1583	1770	3443		1770	3499	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	197	154	176	146	95	70	69	542	120	75	663	55
RTOR Reduction (vph)	0	47	0	0	0	58	0	19	0	0	6	0
Lane Group Flow (vph)	197	283	0	146	95	12	69	643	0	75	712	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	10.8	20.0		5.5	14.7	14.7	6.8	41.7		4.0	38.9	
Effective Green, g (s)	10.8	20.0		5.5	14.7	14.7	6.8	41.7		4.0	38.9	
Actuated g/C Ratio	0.12	0.22		0.06	0.16	0.16	0.08	0.47		0.04	0.44	
Clearance Time (s)	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	
Lane Grp Cap (vph)	415	384		109	307	260	134	1609		79	1525	
v/s Ratio Prot	0.06	c0.16		c0.08	0.05		0.04	c0.19		c0.04	c0.20	
v/s Ratio Perm						0.01						
v/c Ratio	0.47	0.74		1.34	0.31	0.04	0.51	0.40		0.95	0.47	
Uniform Delay, d1	36.6	32.1		41.9	32.8	31.3	39.6	15.6		42.5	17.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	7.2		202.0	0.6	0.1	3.3	0.7		83.1	1.0	
Delay (s)	37.4	39.3		243.9	33.4	31.4	42.9	16.3		125.6	18.8	
Level of Service	D	D		F	C	C	D	B		F	B	
Approach Delay (s)		38.6			131.7			18.8			28.9	
Approach LOS		D			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	41.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	89.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	143	164	136	88	65	64	504	112	70	617	51
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	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3443		1770	3499	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1863	1583	1770	1863	1583	1770	3443		1770	3499	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	197	154	176	146	95	70	69	542	120	75	663	55
RTOR Reduction (vph)	0	0	148	0	0	63	0	17	0	0	5	0
Lane Group Flow (vph)	197	154	28	146	95	7	69	645	0	75	713	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	9.9	13.0	13.0	5.5	8.6	8.6	6.7	41.5		4.0	38.8	
Effective Green, g (s)	9.9	13.0	13.0	5.5	8.6	8.6	6.7	41.5		4.0	38.8	
Actuated g/C Ratio	0.12	0.16	0.16	0.07	0.10	0.10	0.08	0.51		0.05	0.47	
Clearance Time (s)	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	
Lane Grp Cap (vph)	414	295	250	118	195	166	144	1742		86	1655	
v/s Ratio Prot	0.06	c0.08		c0.08	0.05		0.04	c0.19		c0.04	c0.20	
v/s Ratio Perm			0.02			0.00						
v/c Ratio	0.48	0.52	0.11	1.24	0.49	0.04	0.48	0.37		0.87	0.43	
Uniform Delay, d1	33.6	31.6	29.6	38.2	34.6	33.0	36.0	12.3		38.7	14.3	
Progression Factor	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	1.7	0.2	159.9	1.9	0.1	2.5	0.6		56.9	0.8	
Delay (s)	34.5	33.3	29.8	198.1	36.5	33.1	38.5	12.9		95.6	15.1	
Level of Service	C	C	C	F	D	C	D	B		F	B	
Approach Delay (s)		32.6			111.6			15.3			22.7	
Approach LOS		C			F			B			C	

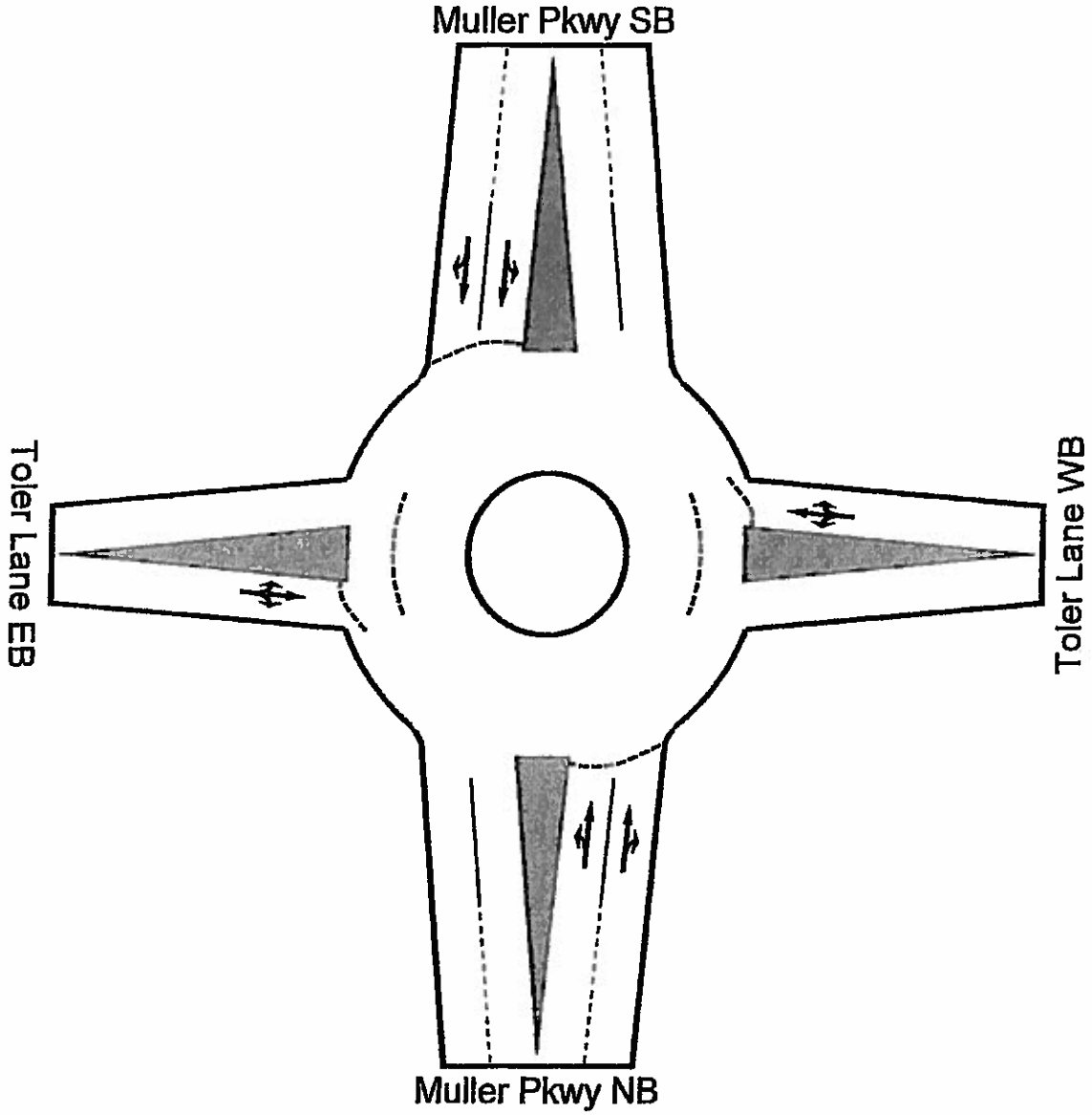
Intersection Summary			
HCM 2000 Control Delay	34.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	82.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1794		3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1794		3433	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	199	196	64	146	102	99	81	319	262	228	137	76
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	214	211	69	157	110	106	87	343	282	245	147	82
RTOR Reduction (vph)	0	14	0	0	0	85	0	0	194	0	0	50
Lane Group Flow (vph)	214	266	0	157	110	21	87	343	88	245	147	32
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.8	17.9		7.6	15.7	15.7	6.9	25.2	25.2	13.7	32.0	32.0
Effective Green, g (s)	10.3	18.4		8.1	16.2	16.2	7.4	25.7	25.7	14.2	32.5	32.5
Actuated g/C Ratio	0.12	0.22		0.10	0.20	0.20	0.09	0.31	0.31	0.17	0.39	0.39
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)	429	401		337	366	311	159	1104	494	305	1396	624
v/s Ratio Prot	c0.06	c0.15		0.05	0.06		0.05	c0.10		c0.14	0.04	
v/s Ratio Perm						0.01			0.06			0.02
v/c Ratio	0.50	0.66		0.47	0.30	0.07	0.55	0.31	0.18	0.80	0.11	0.05
Uniform Delay, d1	33.6	29.2		35.1	28.3	26.9	35.9	21.6	20.7	32.8	15.8	15.4
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	0.9	4.1		1.0	0.5	0.1	3.8	0.7	0.8	14.1	0.2	0.2
Delay (s)	34.6	33.3		36.1	28.7	27.0	39.7	22.3	21.4	46.9	15.9	15.6
Level of Service	C	C		D	C	C	D	C	C	D	B	B
Approach Delay (s)		33.8			31.4			24.1			31.9	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	82.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group


Muller Pkwy SB
Toler Lane EB
Toler Lane WB
Muller Pkwy NB

SIDRA INTERSECTION

Movement Summary

Peri Enterprises Traffic Analysis - 2030 Background Plus Project Conditions

Muller Parkway/Toler Lane - AM Peak

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
Muller Pkwy NB										
3L	L	84	2.4	0.261	14.0	LOS B	53	0.54	0.70	28.7
8T	T	498	2.0	0.260	4.8	LOS A	55	0.53	0.44	33.0
8R	R	28	3.4	0.261	6.3	LOS A	55	0.52	0.54	32.1
Approach		**611**	**2.1**	**0.260**	**6.1**	**LOS A**	**55**	**0.53**	**0.48**	**32.2**
Toler Lane WB										
1L	L	41	2.4	0.363	15.2	LOS B	55	0.62	0.85	28.5
6T	T	207	1.9	0.363	6.2	LOS A	55	0.62	0.57	32.5
6R	R	27	3.6	0.364	7.5	LOS A	55	0.62	0.65	31.8
Approach		**275**	**2.2**	**0.363**	**7.7**	**LOS A**	**55**	**0.62**	**0.62**	**31.7**
Muller Pkwy SB										
7L	L	11	8.3	0.218	14.1	LOS B	42	0.53	0.71	28.8
4T	T	460	2.0	0.219	4.9	LOS A	44	0.52	0.45	33.0
4R	R	33	3.0	0.219	6.4	LOS A	44	0.52	0.54	32.1
Approach		**505**	**2.2**	**0.219**	**5.2**	**LOS A**	**44**	**0.52**	**0.46**	**32.9**
Toler Lane EB										
5L	L	27	3.6	0.459	15.5	LOS B	82	0.64	0.88	28.5
2T	T	261	1.9	0.463	6.5	LOS A	82	0.64	0.62	32.4
2R	R	83	2.4	0.464	7.8	LOS A	82	0.64	0.69	31.7
Approach		**372**	**2.2**	**0.462**	**7.5**	**LOS A**	**82**	**0.64**	**0.65**	**31.9**
All Vehicles		**1763**	**2.2**	**0.464**	**6.4**	**LOS A**	**82**	**0.56**	**0.53**	**32.2**

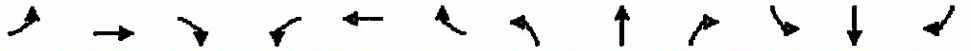
Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	289	227	225	192	175	111	139	993	211	171	627	102
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	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1724		1770	1863	1583	1770	3446		1770	3465	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1724		1770	1863	1583	1770	3446		1770	3465	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	311	244	242	206	188	119	149	1068	227	184	674	110
RTOR Reduction (vph)	0	31	0	0	0	91	0	16	0	0	11	0
Lane Group Flow (vph)	311	455	0	206	188	28	149	1279	0	184	773	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	14.9	28.5		13.5	27.1	27.1	13.0	43.1		11.9	42.0	
Effective Green, g (s)	14.9	28.5		13.5	27.1	27.1	13.0	43.1		11.9	42.0	
Actuated g/C Ratio	0.13	0.25		0.12	0.24	0.24	0.11	0.37		0.10	0.37	
Clearance Time (s)	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	
Lane Grp Cap (vph)	444	427		207	439	373	200	1291		183	1265	
v/s Ratio Prot	0.09	c0.26		c0.12	0.10		0.08	c0.37		c0.10	0.22	
v/s Ratio Perm						0.02						
v/c Ratio	0.70	1.07		1.00	0.43	0.08	0.74	0.99		1.01	0.61	
Uniform Delay, d1	47.9	43.2		50.7	37.4	34.2	49.4	35.8		51.5	29.8	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.9	62.2		60.8	0.7	0.1	14.0	23.0		68.0	2.2	
Delay (s)	52.9	105.4		111.5	38.0	34.3	63.4	58.7		119.5	32.0	
Level of Service	D	F		F	D	C	E	E		F	C	
Approach Delay (s)		84.9			66.7			59.2			48.7	
Approach LOS		F			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	63.0	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	289	227	225	192	175	111	139	993	211	171	627	102
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	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3446		1770	3465	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1863	1583	1770	1863	1583	1770	3446		1770	3465	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	311	244	242	206	188	119	149	1068	227	184	674	110
RTOR Reduction (vph)	0	0	186	0	0	98	0	15	0	0	10	0
Lane Group Flow (vph)	311	244	56	206	188	21	149	1280	0	184	774	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.1	19.6	19.6	13.8	19.3	19.3	13.8	43.9		12.5	42.6	
Effective Green, g (s)	14.1	19.6	19.6	13.8	19.3	19.3	13.8	43.9		12.5	42.6	
Actuated g/C Ratio	0.13	0.18	0.18	0.13	0.18	0.18	0.13	0.41		0.12	0.40	
Clearance Time (s)	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	
Lane Grp Cap (vph)	449	338	287	226	333	283	226	1403		205	1369	
v/s Ratio Prot	0.09	c0.13		c0.12	0.10		0.08	c0.37		c0.10	0.22	
v/s Ratio Perm			0.04			0.01						
v/c Ratio	0.69	0.72	0.20	0.91	0.56	0.08	0.66	0.91		0.90	0.57	
Uniform Delay, d1	44.8	41.5	37.4	46.4	40.4	36.8	44.8	30.1		47.0	25.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.6	7.4	0.3	36.6	2.2	0.1	6.8	10.5		35.7	1.7	
Delay (s)	49.4	48.9	37.8	83.0	42.6	36.9	51.6	40.7		82.7	27.1	
Level of Service	D	D	D	F	D	D	D	D		F	C	
Approach Delay (s)		45.7			57.5			41.8			37.7	
Approach LOS		D			E			D			D	

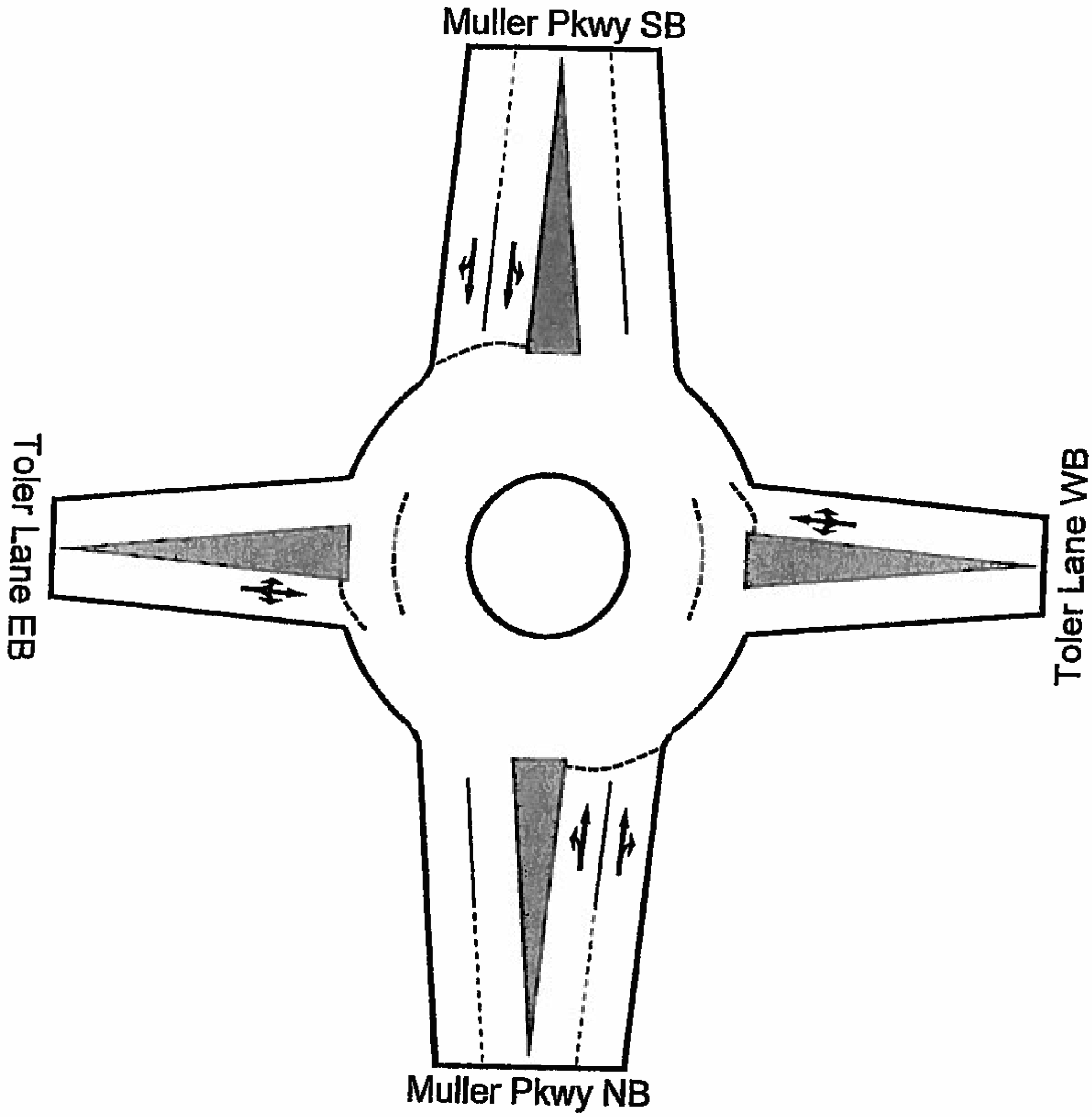
Intersection Summary			
HCM 2000 Control Delay	43.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	107.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1807		3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1807		3433	1863	1583	1770	3539	1583	1770	3539	1583
Volume (vph)	168	202	50	605	376	380	122	349	194	350	526	362
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	181	217	54	651	404	409	131	375	209	376	566	389
RTOR Reduction (vph)	0	9	0	0	0	288	0	0	162	0	0	259
Lane Group Flow (vph)	181	262	0	651	404	121	131	375	47	376	566	130
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	9.5	19.4		20.6	30.5	30.5	12.3	23.1	23.1	23.8	34.6	34.6
Effective Green, g (s)	10.0	19.9		21.1	31.0	31.0	12.8	23.6	23.6	24.3	35.1	35.1
Actuated g/C Ratio	0.10	0.19		0.20	0.30	0.30	0.12	0.22	0.22	0.23	0.33	0.33
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)	327	343		691	551	468	216	796	356	410	1184	530
v/s Ratio Prot	0.05	0.15		c0.19	c0.22		0.07	0.11		c0.21	c0.16	
v/s Ratio Perm						0.08			0.03			0.08
v/c Ratio	0.55	0.76		0.94	0.73	0.26	0.61	0.47	0.13	0.92	0.48	0.25
Uniform Delay, d1	45.3	40.3		41.3	33.2	28.2	43.7	35.2	32.5	39.3	27.6	25.3
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	2.0	9.7		21.2	5.0	0.3	4.8	2.0	0.8	24.9	1.4	1.1
Delay (s)	47.3	50.0		62.4	38.2	28.5	48.4	37.2	33.2	64.2	29.0	26.4
Level of Service	D	D		E	D	C	D	D	C	E	C	C
Approach Delay (s)		48.9			46.3			38.1			38.2	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	42.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	104.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group


Muller Pkwy SB
Toler Lane EB
Toler Lane WB
Muller Pkwy NB

SIDRA INTERSECTION

Movement Summary

Peri Enterprises Traffic Analysis - 2030 Background Plus Project Conditions

Muller Parkway/Toler Lane - PM Peak

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
Muller Pkwy NB										
3L	L	126	2.4	0.462	14.2	LOS B	115	0.64	0.72	28.4
8T	T	899	2.0	0.461	5.0	LOS A	120	0.63	0.46	32.4
8R	R	64	1.6	0.460	6.5	LOS A	120	0.63	0.55	31.6
Approach		**1090**	**2.0**	**0.461**	**6.2**	**LOS A**	**120**	**0.63**	**0.50**	**31.8**
Toler Lane WB										
1L	L	61	1.6	0.670	20.3	LOS C	141	0.84	1.06	26.4
6T	T	315	1.9	0.673	11.3	LOS B	141	0.84	0.99	30.1
6R	R	11	8.3	0.667	12.6	LOS B	141	0.84	1.01	29.3
Approach		**388**	**2.1**	**0.673**	**12.8**	**LOS B**	**141**	**0.84**	**1.00**	**29.4**
Muller Pkwy SB										
7L	L	22	4.5	0.579	17.5	LOS B	167	0.84	0.91	27.7
4T	T	1082	2.0	0.576	7.9	LOS A	173	0.83	0.77	31.3
4R	R	22	4.5	0.579	9.0	LOS A	173	0.83	0.81	30.6
Approach		**1126**	**2.1**	**0.576**	**8.1**	**LOS A**	**173**	**0.83**	**0.77**	**31.2**
Toler Lane EB										
5L	L	11	8.3	0.800	25.9	LOS C	209	0.93	1.17	24.1
2T	T	250	2.0	0.814	16.9	LOS B	209	0.93	1.15	26.8
2R	R	138	2.2	0.817	18.2	LOS B	209	0.93	1.16	26.1
Approach		**400**	**2.2**	**0.815**	**17.7**	**LOS B**	**209**	**0.93**	**1.15**	**26.5**
All Vehicles		**3004**	**2.1**	**0.817**	**9.3**	**LOS A**	**209**	**0.77**	**0.75**	**30.4**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Appendix E:

20 Year Plus Project LOS Calculations

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	143	176	136	88	78	77	566	112	82	677	51
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	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1709		1770	1863	1583	1770	3452		1770	3502	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1709		1770	1863	1583	1770	3452		1770	3502	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	197	154	189	146	95	84	83	609	120	88	728	55
RTOR Reduction (vph)	0	50	0	0	0	70	0	16	0	0	5	0
Lane Group Flow (vph)	197	293	0	146	95	14	83	713	0	88	778	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	9.7	20.4		4.5	15.2	15.2	7.3	42.7		4.0	39.4	
Effective Green, g (s)	9.7	20.4		4.5	15.2	15.2	7.3	42.7		4.0	39.4	
Actuated g/C Ratio	0.11	0.23		0.05	0.17	0.17	0.08	0.48		0.04	0.44	
Clearance Time (s)	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	
Lane Grp Cap (vph)	371	389		88	316	268	144	1645		79	1539	
v/s Ratio Prot	0.06	c0.17		c0.08	0.05		0.05	c0.21		c0.05	c0.22	
v/s Ratio Perm						0.01						
v/c Ratio	0.53	0.75		1.66	0.30	0.05	0.58	0.43		1.11	0.51	
Uniform Delay, d1	37.8	32.2		42.5	32.5	31.2	39.7	15.5		42.8	18.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	8.0		341.3	0.5	0.1	5.5	0.8		135.5	1.2	
Delay (s)	39.3	40.3		383.9	33.1	31.3	45.1	16.3		178.3	19.3	
Level of Service	D	D		F	C	C	D	B		F	B	
Approach Delay (s)		39.9			190.2			19.3			35.3	
Approach LOS		D			F			B			D	

Intersection Summary			
HCM 2000 Control Delay	50.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	89.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	65.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	183	143	176	136	88	78	77	566	112	82	677	51
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	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3452		1770	3502	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1863	1583	1770	1863	1583	1770	3452		1770	3502	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	197	154	189	146	95	84	83	609	120	88	728	55
RTOR Reduction (vph)	0	0	159	0	0	75	0	15	0	0	5	0
Lane Group Flow (vph)	197	154	30	146	95	9	83	714	0	88	778	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	8.7	12.9	12.9	4.5	8.7	8.7	7.2	42.5		4.0	39.3	
Effective Green, g (s)	8.7	12.9	12.9	4.5	8.7	8.7	7.2	42.5		4.0	39.3	
Actuated g/C Ratio	0.11	0.16	0.16	0.05	0.11	0.11	0.09	0.52		0.05	0.48	
Clearance Time (s)	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	
Lane Grp Cap (vph)	364	293	249	97	197	168	155	1791		86	1680	
v/s Ratio Prot	0.06	c0.08		c0.08	0.05		0.05	c0.21		c0.05	c0.22	
v/s Ratio Perm			0.02			0.01						
v/c Ratio	0.54	0.53	0.12	1.51	0.48	0.05	0.54	0.40		1.02	0.46	
Uniform Delay, d1	34.7	31.7	29.6	38.7	34.5	32.9	35.7	11.9		39.0	14.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	1.7	0.2	273.3	1.9	0.1	3.5	0.7		103.5	0.9	
Delay (s)	36.4	33.4	29.8	312.0	36.3	33.0	39.3	12.6		142.5	15.2	
Level of Service	D	C	C	F	D	C	D	B		F	B	
Approach Delay (s)		33.2			159.3			15.3			28.0	
Approach LOS		C			F			B			C	

Intersection Summary			
HCM 2000 Control Delay	41.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	81.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: Toler Ln and Muller Pky - 2030 AM

New Site
Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Muller Pky											
3	L2	97	2.0	0.400	8.8	LOS A	1.5	11.3	0.41	0.36	53.2
8	T1	573	2.0	0.400	8.7	LOS A	1.5	11.3	0.40	0.35	53.7
18	R2	42	2.0	0.400	8.7	LOS A	1.4	10.7	0.39	0.34	52.6
Approach		712	2.0	0.400	8.7	LOS A	1.5	11.3	0.40	0.35	53.6
East: Toler Ln											
1	L2	54	2.0	0.423	11.3	LOS B	1.5	11.5	0.55	0.58	51.7
6	T1	204	2.0	0.423	11.3	LOS B	1.5	11.5	0.55	0.58	51.6
16	R2	27	2.0	0.423	11.3	LOS B	1.5	11.5	0.55	0.58	50.2
Approach		285	2.0	0.423	11.3	LOS B	1.5	11.5	0.55	0.58	51.4
North: Muller Pky											
7	L2	11	2.0	0.339	8.1	LOS A	1.1	8.8	0.42	0.38	54.7
4	T1	534	2.0	0.339	8.1	LOS A	1.1	8.8	0.40	0.37	54.7
14	R2	32	2.0	0.339	8.0	LOS A	1.1	8.4	0.39	0.36	53.1
Approach		577	2.0	0.339	8.1	LOS A	1.1	8.8	0.40	0.37	54.6
West: Toler Ln											
5	L2	27	2.0	0.525	13.0	LOS B	2.2	16.9	0.58	0.61	50.9
2	T1	258	2.0	0.525	13.0	LOS B	2.2	16.9	0.58	0.61	50.8
12	R2	95	2.0	0.525	13.0	LOS B	2.2	16.9	0.58	0.61	49.5
Approach		380	2.0	0.525	13.0	LOS B	2.2	16.9	0.58	0.61	50.5
All Vehicles		1954	2.0	0.525	9.7	LOS A	2.2	16.9	0.46	0.44	52.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM Signalized Intersection Capacity Analysis
3: US 395 & Riverview Dr

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	199	220	64	184	127	174	81	319	298	300	137	76
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	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1800		3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1800		3433	1863	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	214	237	69	198	137	187	87	343	320	323	147	82
RTOR Reduction (vph)	0	13	0	0	0	149	0	0	229	0	0	48
Lane Group Flow (vph)	214	293	0	198	137	38	87	343	91	323	147	34
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	7.5	18.1		6.5	17.1	17.1	7.2	24.2	24.2	18.1	35.1	35.1
Effective Green, g (s)	7.5	18.1		6.5	17.1	17.1	7.2	24.2	24.2	18.1	35.1	35.1
Actuated g/C Ratio	0.09	0.21		0.08	0.20	0.20	0.08	0.29	0.29	0.21	0.41	0.41
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)	303	383		262	375	318	150	1008	451	377	1463	654
v/s Ratio Prot	c0.06	c0.16		0.06	0.07		0.05	c0.10		c0.18	0.04	
v/s Ratio Perm						0.02			0.06			0.02
v/c Ratio	0.71	0.77		0.76	0.37	0.12	0.58	0.34	0.20	0.86	0.10	0.05
Uniform Delay, d1	37.6	31.4		38.4	29.2	27.7	37.4	24.0	23.0	32.2	15.2	14.9
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	7.3	8.9		11.7	0.6	0.2	5.4	0.9	1.0	17.1	0.1	0.2
Delay (s)	44.9	40.3		50.1	29.8	27.9	42.7	24.9	24.0	49.3	15.4	15.1
Level of Service	D	D		D	C	C	D	C	C	D	B	B
Approach Delay (s)		42.2			36.8			26.6			35.2	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	75	230	12	137	239	13
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	81	247	13	147	257	14
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			328		254	81
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			328		254	81
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		65	99
cM capacity (veh/h)			1232		727	979

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	81	247	160	257	14
Volume Left	0	0	13	257	0
Volume Right	0	247	0	0	14
cSH	1700	1700	1232	727	979
Volume to Capacity	0.05	0.15	0.01	0.35	0.01
Queue Length 95th (ft)	0	0	1	40	1
Control Delay (s)	0.0	0.0	0.7	12.6	8.7
Lane LOS			A	B	A
Approach Delay (s)	0.0		0.7	12.4	
Approach LOS				B	

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	34.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	289	227	237	192	175	123	151	1055	211	183	685	102
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	
Lane Util. Factor	0.97	1.00		1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	0.92		1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1720		1770	1863	1583	1770	3451		1770	3470	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1720		1770	1863	1583	1770	3451		1770	3470	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	311	244	255	206	188	132	162	1134	227	197	737	110
RTOR Reduction (vph)	0	36	0	0	0	101	0	16	0	0	11	0
Lane Group Flow (vph)	311	463	0	206	188	31	162	1345	0	197	836	0
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8						
Actuated Green, G (s)	12.1	27.0		9.5	24.4	24.4	12.7	41.0		9.5	37.8	
Effective Green, g (s)	12.1	27.0		9.5	24.4	24.4	12.7	41.0		9.5	37.8	
Actuated g/C Ratio	0.12	0.26		0.09	0.23	0.23	0.12	0.39		0.09	0.36	
Clearance Time (s)	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	
Lane Grp Cap (vph)	395	442		160	432	367	214	1347		160	1249	
v/s Ratio Prot	0.09	c0.27		c0.12	0.10		0.09	c0.39		c0.11	0.24	
v/s Ratio Perm						0.02						
v/c Ratio	0.79	1.05		1.29	0.44	0.08	0.76	1.00		1.23	0.67	
Uniform Delay, d1	45.2	39.0		47.8	34.4	31.5	44.7	32.0		47.8	28.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.0	56.0		168.1	0.7	0.1	14.2	24.2		146.6	2.9	
Delay (s)	55.2	95.0		215.9	35.1	31.6	58.8	56.2		194.3	31.2	
Level of Service	E	F		F	D	C	E	E		F	C	
Approach Delay (s)		79.7			105.0			56.5			62.0	
Approach LOS		E			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	69.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
1: US 395 & Waterloo Ln

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	289	227	237	192	175	123	151	1055	211	183	685	102
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	
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95		1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	3433	1863	1583	1770	1863	1583	1770	3451		1770	3470	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	3433	1863	1583	1770	1863	1583	1770	3451		1770	3470	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	311	244	255	206	188	132	162	1134	227	197	737	110
RTOR Reduction (vph)	0	0	177	0	0	108	0	13	0	0	9	0
Lane Group Flow (vph)	311	244	78	206	188	24	162	1348	0	197	838	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	14.5	20.8	20.8	15.1	21.4	21.4	15.6	50.5		14.5	49.4	
Effective Green, g (s)	14.5	20.8	20.8	15.1	21.4	21.4	15.6	50.5		14.5	49.4	
Actuated g/C Ratio	0.12	0.17	0.17	0.13	0.18	0.18	0.13	0.42		0.12	0.42	
Clearance Time (s)	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	
Lane Grp Cap (vph)	418	325	276	224	335	284	232	1465		215	1441	
v/s Ratio Prot	0.09	c0.13		c0.12	0.10		0.09	c0.39		c0.11	0.24	
v/s Ratio Perm			0.05			0.02						
v/c Ratio	0.74	0.75	0.28	0.92	0.56	0.08	0.70	0.92		0.92	0.58	
Uniform Delay, d1	50.4	46.6	42.6	51.3	44.5	40.6	49.4	32.3		51.6	26.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.0	9.4	0.6	38.3	2.1	0.1	8.8	10.9		38.7	1.7	
Delay (s)	57.4	56.0	43.1	89.6	46.6	40.7	58.2	43.2		90.3	28.5	
Level of Service	E	E	D	F	D	D	E	D		F	C	
Approach Delay (s)		52.5			62.0			44.8			40.2	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	47.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	118.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: Toler Ln and Muller Pky - 2030 PM

New Site
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Muller Pky											
3	L2	138	2.0	0.656	14.6	LOS B	4.1	31.6	0.57	0.55	49.3
8	T1	969	2.0	0.656	14.6	LOS B	4.1	31.6	0.55	0.54	49.6
18	R2	76	2.0	0.656	14.5	LOS B	3.9	30.0	0.54	0.52	48.7
Approach		1183	2.0	0.656	14.6	LOS B	4.1	31.6	0.56	0.54	49.5
East: Toler Ln											
1	L2	73	2.0	0.793	33.5	LOS D	4.3	33.1	0.85	1.02	39.7
6	T1	312	2.0	0.793	33.5	LOS D	4.3	33.1	0.85	1.02	39.6
16	R2	11	2.0	0.793	33.5	LOS D	4.3	33.1	0.85	1.02	38.8
Approach		396	2.0	0.793	33.5	LOS D	4.3	33.1	0.85	1.02	39.6
North: Muller Pky											
7	L2	22	2.0	0.788	24.3	LOS C	5.9	45.8	0.78	0.91	44.3
4	T1	1143	2.0	0.788	24.0	LOS C	5.9	45.8	0.77	0.89	44.4
14	R2	22	2.0	0.788	23.8	LOS C	5.7	44.0	0.76	0.88	43.5
Approach		1186	2.0	0.788	24.0	LOS C	5.9	45.8	0.77	0.89	44.4
West: Toler Ln											
5	L2	11	2.0	0.890	48.9	LOS E	6.0	46.2	0.92	1.22	34.3
2	T1	247	2.0	0.890	48.9	LOS E	6.0	46.2	0.92	1.22	34.2
12	R2	149	2.0	0.890	48.9	LOS E	6.0	46.2	0.92	1.22	33.6
Approach		408	2.0	0.890	48.9	LOS E	6.0	46.2	0.92	1.22	34.0
All Vehicles		3172	2.0	0.890	24.9	LOS C	6.0	46.2	0.72	0.82	43.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCM Signalized Intersection Capacity Analysis
3: US 395 & Riverview Dr

12/2/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	168	225	50	642	401	454	122	349	229	420	526	363
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	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	1812		3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	1812		3433	1863	1583	1770	3539	1583	1770	3539	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	181	242	54	690	431	488	131	375	246	452	566	390
RTOR Reduction (vph)	0	7	0	0	0	263	0	0	195	0	0	242
Lane Group Flow (vph)	181	289	0	690	431	225	131	375	51	452	566	148
Turn Type	Prot	NA		Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	8.2	20.2		20.9	32.9	32.9	12.7	22.6	22.6	26.5	36.4	36.4
Effective Green, g (s)	8.2	20.2		20.9	32.9	32.9	12.7	22.6	22.6	26.5	36.4	36.4
Actuated g/C Ratio	0.08	0.19		0.19	0.30	0.30	0.12	0.21	0.21	0.24	0.34	0.34
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)	260	338		663	566	481	207	739	330	433	1190	532
v/s Ratio Prot	0.05	0.16		c0.20	c0.23		0.07	0.11		c0.26	c0.16	
v/s Ratio Perm						0.14			0.03			0.09
v/c Ratio	0.70	0.85		1.04	0.76	0.47	0.63	0.51	0.16	1.04	0.48	0.28
Uniform Delay, d1	48.8	42.6		43.7	34.1	30.5	45.5	37.9	35.0	40.9	28.4	26.3
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	7.9	18.5		46.0	6.0	0.7	6.2	2.5	1.0	55.2	1.4	1.3
Delay (s)	56.6	61.1		89.6	40.1	31.3	51.7	40.4	36.0	96.0	29.7	27.6
Level of Service	E	E		F	D	C	D	D	D	F	C	C
Approach Delay (s)		59.4			58.7			40.9			50.4	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	108.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	222	220	12	226	234	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	239	237	13	243	252	13
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			475		508	239
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			475		508	239
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		52	98
cM capacity (veh/h)			1087		519	800

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2
Volume Total	239	237	256	252	13
Volume Left	0	0	13	252	0
Volume Right	0	237	0	0	13
cSH	1700	1700	1087	519	800
Volume to Capacity	0.14	0.14	0.01	0.48	0.02
Queue Length 95th (ft)	0	0	1	65	1
Control Delay (s)	0.0	0.0	0.5	18.3	9.6
Lane LOS			A	C	A
Approach Delay (s)	0.0		0.5	17.9	
Approach LOS				C	

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	41.3%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix F:

Peri Enterprises Traffic Impact Study (2009)

Planning File Copy

PERI ENTERPRISES
TRAFFIC IMPACT STUDY
AUGUST 13, 2009

Prepared for: R O Anderson
&
Peri Enterprises

Prepared by: Fehr & Peers
TRANSPORTATION CONSULTANTS

50 W. Liberty Street,
Suite 301
Reno, NV 89501

Peri Enterprises
Traffic Impact Study

Prepared for:

R O Anderson
&
Peri Enterprises

Prepared by:

Fehr & Peers
50 West Liberty Street, Suite 301
Reno, NV 89501
(775) 826-3200

8-13-09

August 13, 2009

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

This executive summary presents the results of the traffic impact assessment prepared for the Peri Enterprises Master Plan Amendment.

PROJECT DESCRIPTION

The Peri Enterprises planning area is located in Douglas County, Nevada, south of Gardnerville. The project area, as shown on **Figure 1**, is east of US 395 and southeast of the proposed Muller Parkway Extension. Pinenut Road is currently the southern boundary of the project area. To accommodate the proposed Muller Parkway Extension, Pinenut Road would be realigned within the Peri Enterprises property. The Peri Enterprises parcels included in the Master Plan amendment request are 1220-11-002-002 and portions of 1220-11-002-003 and 1220-11-001-040. The Master Plan amendment request includes re-zoning portions of these parcels from receiving area and agriculture to commercial. Ultimately, this study analyzes the effects of approximately 60 acres of commercial and 17 acres of receiving area. This analysis assumes that the commercial area would be developed as a shopping center/retail use and the receiving area would be developed as office/business park space. The zoning plan is shown on **Figure 2**. For additional information regarding the Master Plan amendment request and zoning information please refer to the Master Plan amendment application.

Vehicle trips were generated for the Peri Enterprises planning area project using equations and average trip rates in *Trip Generation* (Institute of Transportation Engineers (ITE), Eighth Edition, 2008). The total net new trip generation estimate is 25,960 daily trips, 832 AM peak hour trips, and 2,349 PM peak hour trips.

SCOPE OF STUDY

This study evaluates near term and future year traffic conditions assuming build-out of the Peri Enterprises property. The following study scenarios were analyzed:

- Existing Conditions
- Existing Plus Near Term Project Conditions: Includes Muller Parkway extended from US 395 (south of Gardnerville) to Virginia Ranch Road, realignment of Pinenut Road, and build-out of 50% of the Peri Enterprises property (50% of the commercial and 50% of the office).
- 2030 Background Conditions: Includes build-out of the 30 acre Barton Healthcare Systems parcel 1220-10-601-004 (assumes hospital expansion, medical office buildings, and commercial), Muller Parkway extended from US 395 (south of Gardnerville) to US 395 (north of Minden), realignment of Pinenut Road, and regional traffic growth.
- 2030 Background Plus Project: Includes the 2030 Background traffic volumes plus full build-out of the Peri Enterprises property.

We coordinated with Douglas County staff to determine the study intersections analyzed in this report. The following existing intersections are analyzed:

- US 395/Waterloo Lane
- US 395/Riverview Drive/Pinenut Road
- Muller Parkway/Toler Lane
- US 395/Riverview Drive/Muller Parkway Extension (future)
- Muller Parkway/Pinenut Road (future)

SUMMARY OF RECOMMENDATIONS

The following roadway network and intersection improvements will be necessary to accommodate the proposed land use plan.

Existing Plus Near Term Project Conditions

- Muller Parkway: Construct four lanes on Muller Parkway between US 395 and Pinenut Road. Construct two lanes on Muller Parkway between Pinenut Road and the current terminus at the irrigation canal south of Virginia Ranch Road.

- Pinenut Road: Realign Pinenut Road as shown on **Figure 4**, in accordance with Douglas County Design Criteria and Improvement Standards including Standard Detail DC-A01. Construct two lanes with a center left-turn lane on Pinenut Road within the Peri Enterprises property. The center left-turn lane will facilitate turning movements to/from the subject parcels.

- Muller Parkway/Pinenut Road Intersection: Construct at least a single lane roundabout. Right-of-way should be reserved to accommodate an ultimate dual lane roundabout with a right-turn bypass lane as shown on **Figure 4**.

- US 395/Muller Parkway Intersection: Construct the Muller Parkway approach to provide a right-turn lane, through lane, and left-turn lane. Right-of-way should be reserved to accommodate future dual left-turn lanes. Modify the traffic signal as appropriate to accommodate the Muller Parkway intersection approach.

2030 Plus Project Conditions

- Muller Parkway: The infrastructure identified above will need additional improvements to accommodate the project traffic at build-out. These improvements include widening Muller Parkway to four lanes north of Pinenut Road to the irrigation canal, constructing the additional lanes through the roundabout at the Muller Parkway/Pinenut Road intersection, and implementing dual left-turn lanes at the Muller Parkway approach of the US 395/Muller Parkway intersection.

1. INTRODUCTION

The purpose of this study is to assess the effect of build-out of the proposed Peri Enterprises planning area on roadways and intersections in the project vicinity. The study identifies new project access needs and identifies potential impacts to off-site intersections and roadways. This study analyzes existing plus near term project conditions and build-out of the Peri Enterprises property under 2030 conditions, to be consistent with other approved planning documents such as the *2007 Douglas County Transportation Plan* and the *U.S. 395 Southern Sierra Corridor Study*. Actual build-out of the planning area will likely occur over a longer period of time.

PROJECT DESCRIPTION

The Peri Enterprises planning area is located in Douglas County, Nevada, south of Gardnerville. The project area, as shown on **Figure 1**, is east of US 395 and southeast of the proposed Muller Parkway Extension. Pinenut Road is currently the southern boundary of the project area. To accommodate the proposed Muller Parkway Extension, Pinenut Road would be realigned within the Peri Enterprises property. The Peri Enterprises parcels included in the Master Plan amendment are 1220-11-002-002 and portions of 1220-11-002-003 and 1220-11-001-040. The Master Plan amendment request includes re-zoning portions of these parcels from receiving area and agriculture to commercial. Ultimately, this study analyzes the effects of 60 acres of commercial and 17 acres of receiving area. This analysis assumes that the commercial area would be developed as a shopping center/retail use and the receiving area would be developed as office/business park space.

The project location and vicinity map is shown on **Figure 1**, and the proposed zoning plan is shown on **Figure 2**.

SCOPE OF STUDY

The following intersections were selected for evaluation during the weekday AM and PM peak hours:

- US 395/Waterloo Lane
- US 395/Riverview Drive/Pinenut Road
- Muller Parkway/Toler Lane
- US 395/Riverview Drive/Muller Parkway Extension (plus project conditions only)
- Muller Parkway/Pinenut Road (plus project conditions only)

Segments of the following roadways were analyzed based on existing and 2030 daily traffic with and without the project:

- US 395
- Muller Parkway
- Pinenut Road
- Toler Lane
- Waterloo Lane

The following study scenarios are analyzed:

- Existing Conditions
- Existing Plus Near Term Project Conditions: Includes Muller Parkway extended from US 395 (south of Gardnerville) to Virginia Ranch Road, realignment of Pinenut Road, and build-out of 50% of the Peri Enterprises property (50% of the commercial and 50% of the research/business park).

- 2030 Background Conditions: Includes build-out of the 30 acre Barton Healthcare Systems parcel 1220-10-601-004 (assuming hospital expansion, medical office buildings, and commercial), Muller Parkway extended from US 395 (south of Gamderville) to US 395 (north of Minden), realignment of Pinenut Road, and regional traffic growth.

- 2030 Background Plus Project: Includes the 2030 Background traffic volumes plus full build-out of the Peri Enterprises property.

ANALYSIS METHODOLOGY

Transportation engineers and planners commonly use the term level of service (LOS) to measure and describe the operational status of the local roadway network. An intersection or roadway segment's level of service can range from LOS A (indicating free-flow traffic conditions with little or no delay), to LOS F (representing oversaturated conditions where traffic flows exceed design capacity, resulting in long queues and delays).

The analysis methods presented in the Transportation Research Board's *2000 Highway Capacity Manual* (HCM 2000) were used to calculate LOS for signalized and unsignalized intersections.

Intersections

Signalized intersections were analyzed using the methodology contained in HCM 2000. This methodology determines the level of service by comparing the average control delay for all vehicles approaching the intersection to the delay thresholds shown in **Table 1**.

Unsignalized (side-street stop-controlled) intersection LOS calculations were conducted using the method in Chapter 17 of HCM 2000. The LOS rating is based on the average control delay expressed in seconds per vehicle. At side-street stop-controlled intersections, the control delay (and LOS) is calculated for each controlled movement, the left-turn movement from the major street, and for the entire intersection. For controlled approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. **Table 1** also presents the thresholds for unsignalized intersections.

TABLE 1
INTERSECTION LEVEL OF SERVICE DEFINITIONS

Level of Service	Description	Signalized Intersections	Unsignalized Intersections
A	Represents free flow. Individual users are virtually unaffected by others in the traffic stream.	≤ 10	≤10
B	Stable flow, but the presence of other users in the traffic stream begins to be noticeable.	> 10 to 20	> 10 to 15
C	Stable flow, but the operation of individual users becomes significantly affected by interactions with others in the traffic stream.	> 20 to 35	> 15 to 25
D	Represents high-density, but stable flow.	> 35 to 55	> 25 to 35
E	Represents operating conditions at or near the capacity level.	> 55 to 80	> 35 to 50
F	Represents forced or breakdown flow.	> 80	> 50

Notes: Values are shown for average control delay in seconds/vehicle.
Sources: *HCM 2000*, Chapter 16, Signalized Intersections and *HCM 2000*, Chapter 17, Unsignalized Intersections.

Roadway Segments

Roadway level of service was determined based on the Annual Average Daily Traffic (AADT) thresholds presented in the *Douglas County Master Plan* (Douglas County, 2007) as shown in **Table 2.**

TABLE 2
DOUGLAS COUNTY DAILY ROADWAY LEVEL OF SERVICE CRITERIA

Functional Classification	Number of Lanes	Daily Traffic LOS C	Daily Traffic LOS D	Maximum Capacity LOS E
Principal Arterial (Rural)	2	9,750	15,800	26,000
	4	54,000	66,000	87,000
	6	81,000	99,000	131,000
Freeway [1]	4	52,500	62,200	69,100
	6	81,100	96,000	106,700
Principal Arterial (Urban)	2	12,000	14,400	16,000
	4	24,000	28,800	32,000
	6	36,000	43,100	48,000
Major Arterial	4	24,000	28,800	32,000
	6	36,000	43,200	48,000
Minor Arterial Major Collector (Urban)	2	10,500	ND	14,000
	4	21,000	ND	28,000
	6	31,500	ND	42,000
Major Collector (Rural)	2	8,800	ND	26,000
Minor Collector (Rural)	2	7,650	ND	25,000
Minor Collector (Urban)	2	9,000	ND	12,000

Notes: ND = Not Defined
[1] Volume thresholds obtained from Florida DOT as referenced in the *2007 Douglas County Transportation Plan.*
Source: Douglas County, 2003

LEVEL OF SERVICE (LOS) STANDARDS

The 2007 *Douglas County Transportation Plan* (Douglas County, 2007), has the following Vision/Guiding Policies and Principles:

- 12.5 Identify high accident locations and take appropriate actions to ensure continued public health and safety.
- 12.6 Provide appropriate traffic control devices on new and existing transportation facilities.
- 12.7 Post appropriate speed limits based on current speed limit studies.
- 12.8 Protect public safety by removing snow and other hazards from roadways.
- 12.9 Remove litter, trash and debris from the roadside and the right-of-way to keep roadways within Douglas County aesthetically pleasant.
- 12.10 Implement selected near-term traffic safety and traffic operations improvements from 2007 to 2011.
- 12.11 Implement mid-term road improvements to provide acceptable traffic operations from 2007 to 2015.
- 12.12 Implement long-term road improvements to provide capacity and mobility from 2016 to 2030.
- 12.13 Maintain a traffic level of service "C" or better on all Douglas County streets and roadways.
- 12.14 Develop a "pedestrian-friendly" U.S. 395/Main Street corridor through Minden and Gardnerville.
- 12.15 Support NDOT projects that maintain traffic flow (high speed and capacity) on U.S. 395 between Minden and Carson City, as identified in the U.S. 395 Southern Sierra Corridor Study (2007).
- 12.16 Support possible bypass facilities to keep traffic moving through Minden and Gardnerville.
- 12.17 Develop a truck routes plan to keep excessive through traffic out of neighborhoods.
- 12.18 Resolve/prevent neighborhood traffic issues by providing adequate through traffic facilities on major collectors and arterials.
- 12.19 Provide traffic transitional facilities (such as traffic circles/roundabouts) in the Minden/Gardnerville area.
- 12.20 Maintain a current map of proposed Douglas County transportation improvement projects.
- 12.21 Maintain current design standards for Douglas County roadway classifications as identified in the *Douglas County Engineering Design Manual.*

The Douglas County Master Plan's level of service policy states, "Maintain a traffic level of service 'C' or better on all Douglas County streets and roadways." This standard is also applicable to intersections.

The level of service standard for NDOT principal arterials (US 395) is LOS D or better.

Therefore we applied the following level of service significance criteria:

- If the project causes the level of service on a county road, or at an intersection of two county roads, to degrade from LOS A, B, or C to LOS D, E, or F, the project significantly impacts the intersection.
- If the project causes the level of service on a roadway segment or intersection that includes an NDOT principal arterial (US 395) to degrade from LOS A, B, C, or D to LOS E or F, the project significantly impacts the intersection.
- If an intersection is currently operating at an unacceptable level of service, the project would impact the facility if it increases the average delay at that intersection by 5 seconds or more.

2. EXISTING CONDITIONS

This chapter describes the transportation characteristics of the project study area including area roadways, existing traffic volumes, and transit.

ROADWAY SYSTEM

A brief description of the key roadways near the Project site is provided below.

US 395 is a four-lane Principal Arterial that runs through downtown Minden and Gardnerville. North of the US 395/SR 88 intersection, US 395 runs north-south. South of the US 395/SR 88 intersection, US 395 runs southeast-northwest. The speed limit on US 395 varies throughout the county, from 25 mph in the downtown areas of Minden and Gardnerville, to 65 mph in the more rural, less congested areas. Near the Peri Enterprises property, US 395 has a posted speed limit of 55 mph. North of the US 395/Riverview Drive intersection, US 395 has two lanes in each direction with a center left-turn lane. South of the US 395/Riverview Drive intersection, US 395 has one lane in each direction with a center left-turn lane.

Muller Lane/Muller Parkway is currently an east-west Minor Arterial with two lanes west of US 395 (north of Minden) and four lanes east of US 395 (north of Minden). The posted speed limit on Muller Lane is 55 mph. In addition, two short, discontinuous segments of Muller Parkway are constructed: one at Toler Lane and one at Virginia Ranch Road (known as Mathias Parkway).

Pinenut Road is a two lane roadway that intersects US 395 at Riverview Drive. Pinenut Road provides access to the dump.

Toler Lane is an east-west roadway that intersects US 395 is Gardnerville. The posted speed limit on Toler Lane is 35 mph.

Waterloo Lane is a two-lane roadway that intersects US 395 and SR 756. The speed limit on Waterloo Lane is 25 mph.

EXISTING TRAFFIC VOLUMES AND LEVELS OF SERVICE

Existing Conditions Intersection Levels of Service

Intersection turning movement counts were collected during the AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak periods at the US 395/Waterloo Lane and Muller Parkway/Toler Lane intersections in March and April of 2008. AM and PM peak hour counts were performed at the US 395/Riverview Drive/Pinenut Road intersection in May 2009. The existing intersection volumes and lane configurations are shown on **Figure 3**. The raw existing intersection turning movement count data is provided in **Appendix A**. **Table 3** displays the existing AM and PM peak hour levels of service at each study intersection. The technical calculations can be found in **Appendix B**.

TABLE 3
LEVEL OF SERVICE RESULTS – EXISTING CONDITIONS

Intersection	Control Type[1]	AM Peak Hour		PM Peak Hour	
		Delay[2]	LOS	Delay[2]	LOS
US 395/Waterloo Lane	Signal	21.4	C	31.3	C
US 395/Riverview Drive/Pinenut Road	Signal	28.8	C	23.9	C
Muller Parkway/Toler Lane	SSSC	0.6 (10.3)	A (B)	0.3 (11.3)	A (B)

Notes: [1] SSSC = Side Street Stop Control
[2] Delay is reported in seconds per vehicle. For signalized intersections the overall delay is reported. For unsignalized intersections the overall delay (highest movement delay) is reported.
Source: Fehr & Peers, 2009

The existing study intersections currently operate at acceptable levels of service.

Existing Conditions Roadway Levels of Service

The existing roadway volumes for the roadway segments included in this study were obtained from NDOT's 2007 Douglas County Annual Traffic Report.

Existing roadway segment levels of service were found by comparing the existing roadway volumes to the Douglas County Daily Roadway Level of Service Criteria shown in Table 2 of this report. The existing roadway segment level of service results are displayed in **Table 4**.

TABLE 4
ROADWAY SEGMENT CAPACITY ANALYSIS – EXISTING CONDITIONS

Roadway	Location	Functional Classification	Lanes	Daily Two-Way Traffic Volume (2007)	LOS
US 395	South of Waterloo Lane	Principal Arterial (Rural)	4	20,000	C
US 395	South of Riverview Drive/Pinenut Road	Principal Arterial (Rural)	2	12,000	D
Waterloo Lane	East of US 395	Minor Arterial	2	7,200	C
Toler Lane	Waterloo Lane to Orchard Road	Minor Collector (Rural)	2	4,200	C
Pinenut Road	East of US 395	Minor Collector (Rural)	2	3,600	C

Source: Fehr & Peers, 2009

All of the study roadway segments currently operate at acceptable levels of service.

TRANSIT

Douglas Area Rural Transit (DART)

In 2001 the Douglas Area Rural Transit (DART) began its service throughout Douglas County. The transit service has two fixed route buses that run the full length of the county (on US 395) from the Topaz Ranch Estates to Super Wal-Mart in Carson City. The buses run weekdays from 6:30 AM to 7:00 PM. DART also offers an on-call service with five pick-up locations. 24 hours advanced notice is requested for on-call rides.

RTC Intercity

RTC Intercity provides transit service between Reno and the northernmost portion of Douglas County (within the Carson City metropolitan area). RTC Intercity creates a connection for DART riders between Douglas County and Reno.

Blue GO/Kingsbury Express

Kingsbury Express provides transit service between the Carson Valley and Lake Tahoe. Buses run from 6:00 AM to 9:00 AM and 3:30 PM to 7:30 PM seven days a week. The Kingsbury Express route runs along SR 207 from Lampe Park in Gardnerville to the California/Nevada state line on US 50.

3. PROJECT CONDITIONS

PROJECT DESCRIPTION

The Peri Enterprises planning area is located in Douglas County, Nevada, south of Gardnerville. The project area, as shown on **Figure 1**, is east of US 395 and southeast of the proposed Muller Parkway Extension. Pinenut Road is currently the southern boundary of the project area. To accommodate the proposed Muller Parkway Extension, Pinenut Road would be realigned within the Peri Enterprises property. The Peri Enterprises parcels included in the Master Plan amendment are 1220-11-002-002 and portions of 1220-11-002-003 and 1220-11-001-040. The Master Plan amendment request includes re-zoning portions of these parcels from receiving area and agriculture to commercial. Ultimately, this study analyzes the effects of 60 acres of commercial and 17 acres of receiving area. This analysis assumes that the commercial area would be developed as a shopping center/retail use and the receiving area would be developed as office/business park space. The proposed zoning plan is displayed on **Figure 2**.

PROJECT ACCESS

Proposed Roadway Network

As documented in the *2007 Douglas County Transportation Plan*, the south end of Muller Parkway is planned to connect to US 395 where Pinenut Road currently intersects US 395, opposite Riverview Drive. Pinenut Road must therefore be realigned further east (away from US 395), to intersect Muller Parkway, and support proper alignment of the Muller Parkway extension to US 395.

As part of this project, two lanes of the ultimate Muller Parkway cross-section would be constructed from the current south terminus (at the irrigation canal south of Virginia Ranch Road) to Pinenut Road and four lanes (the ultimate cross-section) would be constructed between Pinenut Road and US 395 within the previously dedicated alignment on the project site. The project would also realign Pinenut Road through the project site resolving the current conflict for the Muller Parkway extension.

Figure 4 illustrates the proposed realignment concept for Pinenut Road that meets Douglas County roadway design standards (which reference NDOT access management guidelines for spacing of intersections and driveways on arterial roadways). NDOT's access management guidelines recommend 1,320' (0.25 miles) between public street intersections on arterials roadways. The conceptual design provides this recommended intersection spacing, follows AASHTO and MUTCD roadway and intersection design guidance, and is in accordance with Douglas County Design Criteria and Improvement Standards including Standard Detail DC-A01 (included in **Appendix D**). This concept is based on build-out of the Peri Enterprises property and the Barton Healthcare Systems property.

The lane configurations shown on **Figure 4** are assumed for 2030 conditions. The 2030 study scenarios assume Muller Parkway will be completed, creating the full connection to US 395 at both ends of the roadway. At the time the full connection is made, four travel lanes plus left-turn lanes and medians should be in place through the project site. Additionally, the ultimate two-lane roundabout configuration shown on **Figure 4**, or a traffic signal with appropriate turn lanes (see **Appendix D**), would be necessary at the Muller Parkway/Pinenut Road intersection.

In the near term condition, Muller Parkway should be constructed with one lane in each direction north of Pinenut Road. Four lanes are not needed north of Pinenut Road until Muller Parkway is fully connected between US 395 south of Gardnerville and US 395 north of Minden. Muller Parkway, between US 395 and Pinenut Road, should be constructed as four lanes to accommodate the near term daily traffic volumes.

Muller Parkway

Muller Parkway is ultimately planned as a four-lane arterial adjacent to the project site. Since Douglas County uses NDOT access management guidelines for arterial roadways, we have applied the "Principal Arterial" classification and a design speed of 35-45 miles per hour (mph) for this roadway. Right-of-way has already been dedicated for the Muller Parkway extension (105' width) and this study assumes the roadway will follow the dedicated alignment.

Pinenut Road

Pinenut Road is presently a two-lane rural roadway with a 35 mph posted speed limit. As commercial related development continues along Muller Parkway, the study area will become more urban in nature. We therefore recommend the realigned section of Pinenut Road be constructed in accordance with the Douglas County typical cross-section for Urban Collectors. Two through lanes (one in each direction) will adequately accommodate the 2030 plus project daily traffic volumes on Pinenut Road (approximately 10,240 daily trips). In addition, the proposal includes a two-way left-turn lane for more efficient access and safer turning movements, resulting in a three-lane cross-section.

The conceptual realignment assumes the roadway would have a 40 mph design speed and 35 mph posted speed limit. Based on AASHTO design guidance, Pinenut Road should have a minimum centerline radius of 765' for the 40 mph design speed. A minimum distance of 100' should be provided between back-to-back reversing curves. Approximately 400' of tangent section should be provided approaching intersections that have the potential to be signalized, to insure proper sight distance to signal heads, as outlined in the MUTCD. In addition, access will be maintained to the parcels south of Peri Enterprises' parcel 1220-11-002-002.

Muller Parkway/Pinenut Road Intersection

The conceptual design includes a roundabout at the Muller Parkway/Pinenut Road intersection to manage future (2030) traffic volumes. Roundabouts are considerably safer intersections than traffic signals, and provide the additional benefits of higher efficiency during off-peak travel periods (and many times during peak periods), improved landscaping opportunities, less maintenance of equipment, and little to no impact during power outages, to name a few. For 2030 conditions, we recommend a two-lane roundabout configuration, with an inscribed circle diameter of 180' to 200' and a right-turn bypass lane for the northbound Muller Parkway to eastbound Pinenut Road movement (see **Figure 4**).

The roundabout could potentially have an single lane configuration to accommodate near term project traffic until the Muller Parkway Extension is completed (this is assumed in the existing plus near term project conditions analysis). However, right-of-way should be reserved now for the ultimate roundabout configuration. Phased roundabout construction is feasible, but must be well planned to avoid "throw away" construction. Similar to phased arterial roadway construction, typically the best approach is constructing the ultimate outside curb lines and widening to the inside in the future.

A traffic signal is also feasible at this location; however, if a signal is the desired improvement, installation should not occur until traffic signal warrants are met.

US 395/Muller Parkway Intersection

This intersection is currently signalized, but will require modification for the Muller Parkway extension. The existing lane configurations at the US 395 and Riverview Drive intersection approaches can accommodate near term project traffic volumes. An exclusive left-turn lane, through lane, and exclusive right-turn lane should be constructed at the Muller Parkway intersection approach, and right-of-way to accommodate future dual left-turn lanes should be reserved.

Driveways

Driveways on Muller Parkway

As shown on **Figure 4**, two driveway locations are proposed on Muller Parkway between US 395 and Pinenut Road and one driveway location is proposed between Pinenut Road and the north property boundary. All proposed locations meet NDOT access management guidelines (350' spacing) for unsignalized driveways on a 45 mph arterial roadway. The driveways between US 395 and Pinenut Road should be restricted to right-in/right-out movements only. We recommend the driveway between Pinenut Road and the north property boundary have a left-in movement in addition to right-in/right-out movements. A second southbound left-turn access into the project site is necessary to distribute traffic and minimize queuing and delay at the Muller Parkway/Pinenut Road intersection.

Driveway on US 395

We recommend a left-in/right-in/right-out driveway be permitted on US 395 at a location within the property boundary, but as far south as possible from the US 395/Muller Parkway intersection. This driveway would prove beneficial by removing a portion of the entering, northbound, right-turn traffic from the US 395/Muller Parkway intersection, reducing queuing and delay at the signalized intersection.

TRIP GENERATION

Vehicle trips were generated for the proposed Peri Enterprises planning area project using equations and average trip rates in *Trip Generation* (Institute of Transportation Engineers (ITE), Eighth Edition, 2008).

We utilized the following land use assumptions to develop planning level ("order-of-magnitude") trip generation estimates. A floor area ratio of 25% was used for all uses.

- Peri Enterprises parcels designated as Receiving Area: 60.10 Acres
    - 654,500 square feet of shopping center
- Peri Enterprises parcels being considered for re-zoning: 17.0 Acres
    - 185,130 square feet of general office

An internal capture rate was applied to the project, which accounts for trips within the development (for example, people who work at the office and eat lunch at the shopping center). The internal capture rates were calculated using the methodology and data contained in the ITE *Trip Generation Handbook, 2nd Edition* (2004). Approximately 5% of the trips generated by this project are expected to remain internal within the development on a daily basis.

In addition, pass-by trips were evaluated for the project. Pass-by trips are made as intermediate stops on the way from an origin to a primary destination without a route diversion. For example, if a vehicle that typically commutes on US 395 stops at the shopping center on their way home from work, they would be considered a pass-by trip. Pass-by rates are presented in the *Trip Generation Handbook*. Based on the shopping center (ITE Land Use Code 820) data provided in the Handbook, an average of 34% of retail trips are pass-by; however, because of the limited amount of existing traffic on US 395 in the Peri Enterprises project vicinity, the full pass-by rate should not be applied. We estimate that approximately 10% of the shopping center trips can reasonably be pass-by trips.

Table 5 displays the estimated trip generation for the planning area.

TABLE 5
BUILD-OUT TRIP GENERATION

ITE Land Use – ITE Code	Size	Daily Trips	AM Peak			PM Peak		
			Total	In	Out	Total	In	Out
Shopping Center	654.5 ksf	28,100	654	399	255	2,441	1,196	1,245
Office	185.1 ksf	2,040	287	253	34	276	47	229
Sub-Total		*30,140*	*941*	*652*	*289*	*2,717*	*1,243*	*1,474*
Internal Capture (5%)		-1,510	-47	-33	-15	-136	-62	-73
Total Vehicle Trips (at Driveways)		28,630	894	619	274	2,581	1,181	1,401
Retail Pass-By Trips (10%)		-2,670	-62	-38	-24	-232	-114	-118
Net New Project Trips		**25,960**	**832**	**581**	**250**	**2,349**	**1,067**	**1,283**

Notes: ksf = 1,000 square feet
Source: Fehr & Peers, 2008

The Peri Enterprises project is expected to generate a total net new trip generation of 25,960 daily trips, 832 AM peak hour trips, and 2,349 PM peak hour trips. For the existing plus near term project analysis, 50% of the project was assumed to be constructed.

TRIP DISTRIBUTION AND ASSIGNMENT

Project generated trips were distributed to the roadway network based on the location of complementary land uses and travel patterns predicted by the Douglas County travel demand model. Two trip distribution scenarios were developed due to phased construction of the Muller Parkway extension. Under existing plus near term project conditions, Muller Parkway was assumed to connect from US 395 (south of Gardnerville) to Virginia Ranch Road. For this scenario, all project traffic traveling to/from the north would utilize US 395. Trips were distributed as follows for existing plus near term project conditions:

- 75% to/from the north on US 395
- 15% to/from the south on US 395
- 5% to/from the west on Riverview Drive
- 5% to/from the east on Pinenut Road

For the 2030 analysis, Muller Parkway was assumed to connect from US 395 south of Gardnerville to US 395 north of Minden. Project traffic was distributed as follows:

- 35% to/from the north on US 395
- 40% to/from the north on Muller Parkway
- 15% to/from the south on US 395
- 5% to/from the west on Riverview Drive
- 5% to/from the east on Pinenut Road

Figures 5 and 6 display the near term project and 2030 project trip distribution and trip assignment, respectively.

4. EXISTING PLUS PROJECT CONDITIONS

This chapter describes the potential impacts associated with near term development on the Peri Enterprises property.

The analysis includes the following land use and roadway network assumptions.

- 50% of the Peri Enterprises property is developed (approximately 327,000 square feet of shopping center and 92,500 square feet of office).
- Muller Parkway is constructed as two lanes (one lane in each direction) from Virginia Ranch Road to Pinenut Road and four lanes (two lanes in each direction) from Pinenut Road to US 395.
- Pinenut Road is realigned and constructed as a three lane cross-section within the project site (one through lane in each direction and a center left-turn lane).
- A single lane roundabout is constructed at the Muller Parkway/Pinenut Road intersection.
- The traffic signal at the US 395/Muller Parkway intersection is modified to accommodate the Muller Parkway extension. The existing lane configurations were assumed at the US 395 and Riverview Drive intersection approaches. An exclusive left-turn lane, through lane, and exclusive right-turn lane were assumed at the Muller Parkway intersection approach.

LEVELS OF SERVICE ANALYSIS

Existing Plus Project Conditions Intersection Levels of Service

Existing traffic volumes at the US 395/Riverview Drive/Pinenut Road intersection were redistributed to reflect the Pinenut Road realignment. 50% of the traffic volumes generated by the Peri Enterprises project were added to the existing traffic volumes resulting in existing plus project traffic volumes. The existing plus near term project intersection volumes and lane configurations are shown in **Figure 7**. **Table 6** displays the existing plus project AM and PM peak hour levels of service at the study intersections. The technical calculations can be found in **Appendix B.**

TABLE 6
LEVEL OF SERVICE RESULTS – EXISTING PLUS NEAR TERM PROJECT CONDITIONS

Intersection	Control Type[1]	AM Peak Hour		PM Peak Hour	
		Delay[2]	LOS	Delay[2]	LOS
US 395/Waterloo Lane	Signal	26.0	C	47.7	D
US 395/Riverview Drive/Muller Parkway	Signal	25.9	C	35.0	C
Muller Parkway/Toler Lane	SSSC	0.5 (10.5)	A (B)	0.3 (12.1)	A (B)
Muller Parkway/Pinenut Road	RAB	8.9	A	10.3	B

Notes: [1] SSSC = Side Street Stop Control, RAB = Roundabout.
[2] Delay is reported in seconds per vehicle. For signalized intersections the overall delay is reported. For unsignalized intersections the overall delay (highest movement delay) is reported.
Shading indicates deficient operations based on agency thresholds.
Source: Fehr & Peers, 2009

All of the study intersections will operate at acceptable levels of service with the addition of near term project generated traffic.

Existing Plus Project Conditions Roadway Levels of Service

The existing plus project roadway volumes were developed by adding the daily project trips to the existing daily roadway volumes.

The existing plus project roadway segment level of service results are displayed in **Table 7**.

TABLE 7
ROADWAY SEGMENT CAPACITY ANALYSIS – EXISTING PLUS NEAR TERM PROJECT CONDITIONS

Roadway	Location	Functional Classification	Lanes	Existing Conditions		Existing Plus Project Conditions	
				Daily Two-Way Traffic Volume	LOS	Daily Two-Way Traffic Volume	LOS
US 395	South of Waterloo Lane	Principal Arterial (Rural)	4	20,000	C	29,740	C
US 395	South of Riverview Drive/Pinenut Road	Principal Arterial (Rural)	2	12,000	D	13,950	D
Waterloo Lane	East of US 395	Minor Arterial	2	7,200	C	7,850	C
Toler Lane	Waterloo Lane to Orchard Road	Minor Collector (Rural)	2	4,200	C	5,500	C
Pinenut Road[1]	Southeast of Muller Parkway (within project site)	Major Collector (Urban)	3	3,600	C	6,745	C
Muller Parkway	US 395 to Pinenut Road	Major Arterial	4	--	--	9,825	C
Muller Parkway	Northeast of Pinenut Road	Major Arterial	2	--	--	880	C

Notes: [1] Analyzed as a Major Collector (Urban) under existing plus project conditions because of the design features/standards proposed with the realignment. The cross-section is proposed as three lanes: two through lanes and a center left-turn lane.
-- Not analyzed under existing conditions.
Source: Fehr & Peers, 2009

Assuming the recommended cross-sections on Muller Parkway and Pinenut Road, all of the study roadway segments will operate within the policy level of service thresholds on a daily volume basis.

5. 2030 AND 2030 PLUS PROJECT CONDITIONS

This chapter describes the level of service at the study intersections and roadway segments under 2030 background and 2030 background plus project conditions.

ROADWAY NETWORK IMPROVEMENT PROJECTS (BY OTHERS)

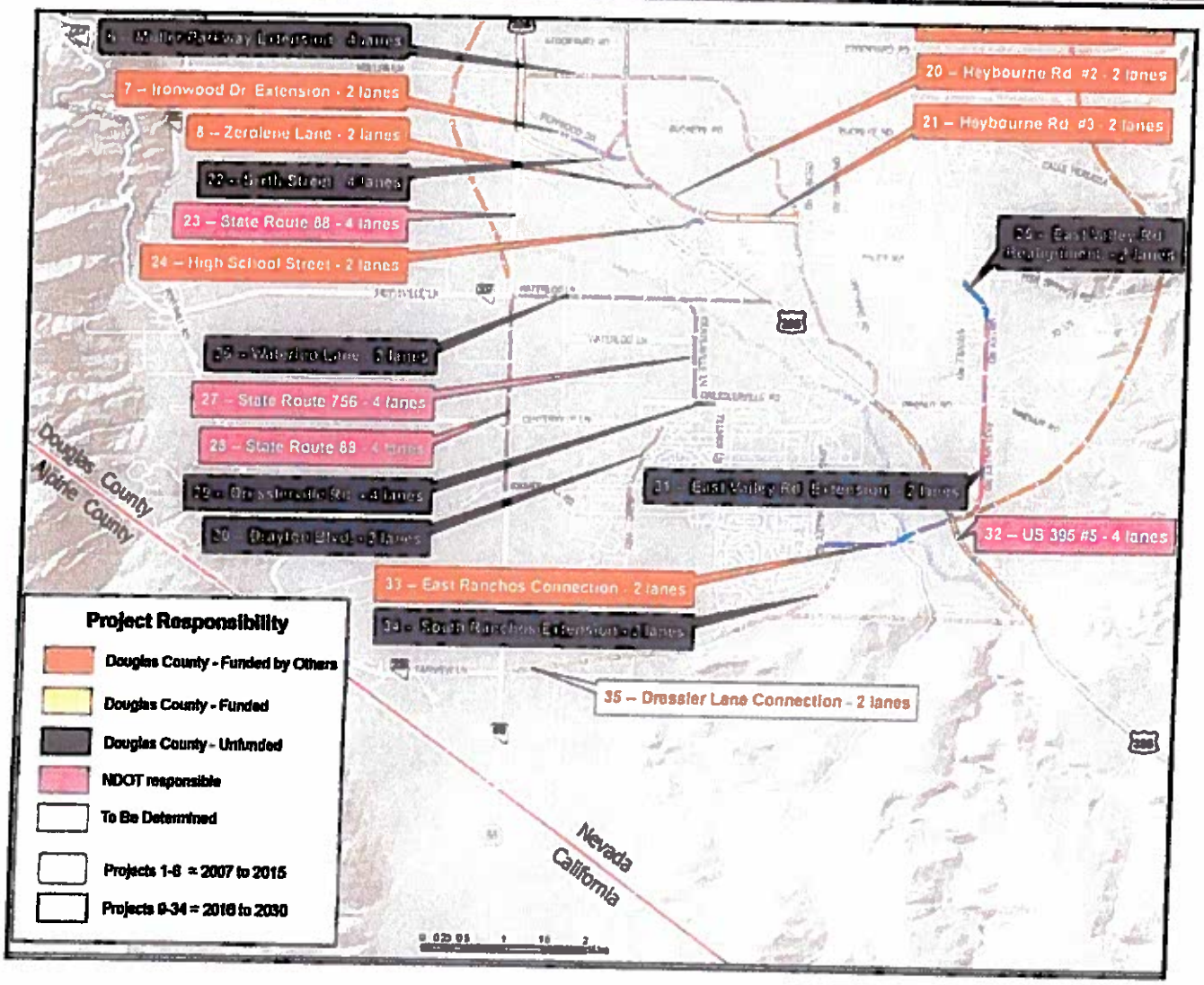
The *2007 Douglas County Transportation Plan* and the *U.S. 395 Southern Sierra Corridor Study*, include several improvements necessary by 2030 to maintain acceptable levels of service on the roadway network in Douglas County. The following improvements in the Peri Enterprises property vicinity are included in the *2007 Douglas County Transportation Plan*.

- Muller Parkway Extension: US 395/Muller Lane to US 395/Riverview Drive/Pinenut Road – New 4-lane Road
- East Valley Road Realignment: Realign to Toler Road – Connect Toler Road to East Valley Road
- East Valley Road Connection: US 395 south of Pinenut Road – New 2-lane roadway
- East Ranchos Connection: US 395 to Long Valley Road development – New 2-lane roadway
- US 395: Pinenut Road to Palomino Drive – Widen to a 5-lane cross-section

The following exhibit, from the *2007 Douglas County Transportation Plan*, displays the roadway improvements in the Peri Enterprises property vicinity.

The 2030 analysis included the following land use and roadway network assumptions. Not all of the improvements listed above are assumed to be in place. We have only assumed the Muller Parkway extension (because it has been partially built-out, and the proposed project will contribute to this improvement) and widening on US 395 from Pinenut Road to Palomino Drive (because it is an NDOT project).

- For 2030 background conditions, the 30 Acre Barton Healthcare Systems property (parcel 1220-10-601-004) located on the northeast quadrant of the US 395/Riverview Drive/Muller Parkway intersection is developed. The following land uses were assumed: 15 acres of Hospital Expansion, 10 acres of Medical Office Building, and 5 acres of Commercial/Retail. Based on this land use mix, the Barton Healthcare Systems parcel is estimated to generate 8,070 daily trips, 440 PM peak hour trips, and 690 PM peak hour trips.
- Muller Parkway is completely connected between US 395 north of Minden and US 395 south of Gardnerville, resulting in diversion of regional traffic from US 395 to Muller Parkway.
- The widening improvement identified by NDOT on US 395 from Pinenut Road to Palomino Drive is constructed. The ultimate lane configuration at the US 395/Riverview Drive/Muller Parkway intersection includes dual left-turn lanes at the Muller Parkway intersection approach to accommodate regional through traffic traveling south on Muller Parkway. The widening improvement on US 395 will provide the lanes necessary to receive the dual left-turn lanes from Muller Parkway.
- The ultimate lane configurations shown on **Figure 4** are in place at the US 395/Riverview Drive/Muller Parkway intersection (with signal modification) and the Muller Parkway/Pinenut Road intersection (two-lane roundabout).
- A roundabout or traffic signal is constructed at the Muller Parkway/Toler Lane intersection as part of the Muller Parkway extension.



2030 TRAFFIC VOLUMES AND LEVEL OF SERVICE ANALYSIS

2030 background traffic growth was estimated using the Douglas County travel demand model and historical traffic volume data. The Douglas County travel demand model was used to determine future roadway travel patterns. Based on the travel demand model, approximately 40% of the traffic on US 395 will shift to Muller Parkway.

Historical traffic volume data was used to determine a typical traffic volume growth rate in the project vicinity. The data showed growth of approximately 1.5% per year. It is reasonable to assume that the Peri Enterprises development will contribute to traffic volume growth in the area, therefore existing peak hour and daily traffic volumes were increased by 1% per year to account for background growth. After increasing volumes, traffic was redistributed to the roadway network to account for travel pattern changes that will occur with the completion of the Muller Parkway Extension and realignment of Pinenut Road to intersect Muller Parkway. **Figure 8** shows 2030 peak hour traffic volumes and lane configurations.

2030 background plus project conditions analysis assumed the Peri Enterprises property to be built out per the proposed zoning plan (**Figure 2**). Peri Enterprises project generated traffic was added to the 2030 background traffic volumes for 2030 plus project conditions analysis. **Figure 9** shows the 2030 background plus project peak hour traffic volumes and lane configurations assumed at the study intersections.

2030 Background Conditions Intersection Levels of Service

Table 8 shows levels of service for the study intersections under 2030 background conditions. The technical calculations can be found in **Appendix C**.

TABLE 8
LEVEL OF SERVICE RESULTS – 2030 BACKGROUND CONDITIONS

Intersection	Control Type[1]	2030 Background		2030 Background Plus Peri Enterprises Build-out	
		AM Peak Delay (LOS)[2]	PM Peak Delay (LOS)[2]	AM Peak Delay (LOS)[2]	PM Peak Delay (LOS)[2]
US 395/Waterloo Lane	Signal	26.1 (C)	39.0 (D)	26.7 (C)	48.4 (D)
US 395/Riverview Drive/Muller Parkway	Signal	24.9 (C)	27.2 (C)	29.6 (C)	42.4 (D)
Muller Parkway/Toler Lane	RAB	6.0 (A)	6.7 (A)	6.4 (A)	9.3 (A)
	Signal	14.8 (B)	13.0 (B)	15.1 (B)	16.7 (B)
Muller Parkway/Pinenut Road	RAB	6.6 (A)	7.6 (A)	8.2 (A)	13.2 (B)
	Signal	29.4 (C)	34.3 (C)	36.0 (D)	51.7 (D)

Notes: [1] Control Type is based on future year improvements (by others) and our assessment of needs at future intersections. RAB = Roundabout

[2] Delay is reported in seconds per vehicle. For signalized intersections the overall delay is reported. For unsignalized intersections the overall delay (highest movement delay) is reported.

Shading indicates deficient operations based on agency thresholds.

Source: Fehr & Peers, 2009

As shown in **Table 8**, a traffic signal at the Muller Parkway/Pinenut Road intersection is anticipated to operate at LOS D during the AM and PM peak hours; therefore, we recommend that a roundabout is constructed at this intersection.

The lane configurations and turn pocket lengths needed to achieve the levels of service shown in Table 8, at the Muller Parkway/Pinenut Road and US 395/Muller Parkway intersections, are summarized in **Table 9** and shown on **Figure 4**.

TABLE 9
2030 LANE CONFIGURATION RECOMMENDATIONS

Intersection Approach	Ultimate Lane Configuration	Recommended Turn Pocket Length
US 395/Muller Parkway/Riverview Drive[1]		
US 395 Northbound	• 1 Left Turn Lane • 2 Through Lanes • 1 Right Turn Lane	• No Change to Existing Configurations • 150 feet
US 395 Southbound	• 1 Left Turn Lane • 2 Through Lanes • 1 Right Turn Lane	• 350 feet • 250 feet
Riverview Drive	• 2 Left Turn Lanes • 1 Shared Through Lane/ Right Turn Lane	• No Changes to Existing Configurations
Muller Parkway	• 2 Left Turn Lanes • 1 Through Lane • 1 Right Turn Lane	• 375 feet • 275 feet
Muller Parkway/Pinenut Road (Roundabout)		
Pinenut Road	• 1 Left Turn Lane • 1 Shared Left Turn Lane/ Through Lane/ Right Turn Lane	• 350 feet
Hospital Parcel Access	• 1 Shared Left Turn Lane/ Through Lane/ Right Turn Lane	
Muller Parkway Northbound	• 1 Shared Left Turn Lane/ Through Lane • 1 Shared Through Lane/ Right Turn Lane • Right Turn By-Pass Lane	
Muller Parkway Southbound	• 1 Shared Left Turn Lane/ Through Lane • 1 Shared Through Lane/ Right Turn Lane	

Notes: [1] The ultimate configuration is not necessary until Muller Parkway is connected to US 395 north of Minden. Dual left-turn lanes are shown for the ultimate configuration at the Muller Parkway approach. NDOT plans to widen US 395 south of the existing Pinenut Road, which would provide the receiving lanes necessary to accommodate the dual left-turn lanes.

Source: Fehr & Peers, 2009

As shown in **Table 9**, we have recommended no changes to the existing configurations at the Riverview Drive intersection approach. Based on queuing analysis, the maximum queue for the Riverview Drive left-turn lane is 140 feet under 2030 background conditions. Under 2030 plus project conditions, the maximum queue is estimated at 150 feet. Typically, the average queue length per vehicle is 20-25 feet (including the vehicle and space in front of and behind the vehicle); therefore, the project does not significantly increase the vehicle queue at this approach. In addition, the proposed project does not add any left-turning traffic to the Riverview Drive approach. The analysis also does not include the East Ranchos Connection project listed in the *2007 Douglas County Regional Transportation Plan*, which would reduce congestion and vehicle queues at the Riverview Drive approach to the US 395/Riverview Drive/Muller Parkway intersection.

2030 Conditions Roadway Segment Levels of Service

The daily roadway volumes generated by the Peri Enterprises property (full build-out) were added to the projected 2030 background volumes for 2030 plus project conditions analysis. The Muller Parkway Extension and the US 395 widening between the existing Pinenut Road and Palomino Drive were assumed to be in place.

Table 10 shows the level of service results for the 2030 background and 2030 background plus project conditions.

TABLE 10
ROADWAY SEGMENT CAPACITY ANALYSIS – 2030 BACKGROUND AND 2030 BACKGROUND PLUS PROJECT CONDITIONS

Roadway	Location	Functional Classification	Lanes	2030 Background		2030 Plus Project	
				Daily Traffic Volume	LOS	Daily Traffic Volume	LOS
US 395	South of Waterloo Lane	Principal Arterial (Rural)	4	17,340	C	26,430	C
US 395	South of Riverview Drive/Pinenut Road	Principal Arterial (Rural)	4*	15,730	C	19,620	C
Waterloo Lane	East of US 395	Minor Arterial	2	8,700	C	10,000	C
Toler Lane	Waterloo Lane to Orchard Road	Minor Collector (Rural)	2	5,080	C	6,380	C
Pinenut Road[1]	Southeast of Muller Parkway (within the project site)	Major Collector (Urban)	3	4,000	C	10,240	C
Muller Parkway	US 395 to Pinenut Road	Major Arterial	4	9,170	C	16,260	C
Muller Parkway	Northeast of Pinenut Road	Major Arterial	4*	10,470	C	20,855	C

Notes: * Includes improvements listed in the *2007 Douglas County Transportation Plan.*
[1] Analyzed as a Major Collector (Urban) under 2030 conditions because of the design features/standards proposed with the realignment. The cross-section is proposed as three lanes: two through lanes and a center left-turn lane.
Source: Fehr & Peers 2009

As shown in **Table 10**, all of the study roadway segments are expected to operate at acceptable levels of service under 2030 plus project conditions.

6. SUMMARY OF RECOMMENDATIONS

The following roadway network and intersection improvements will be necessary to accommodate the proposed land use plan.

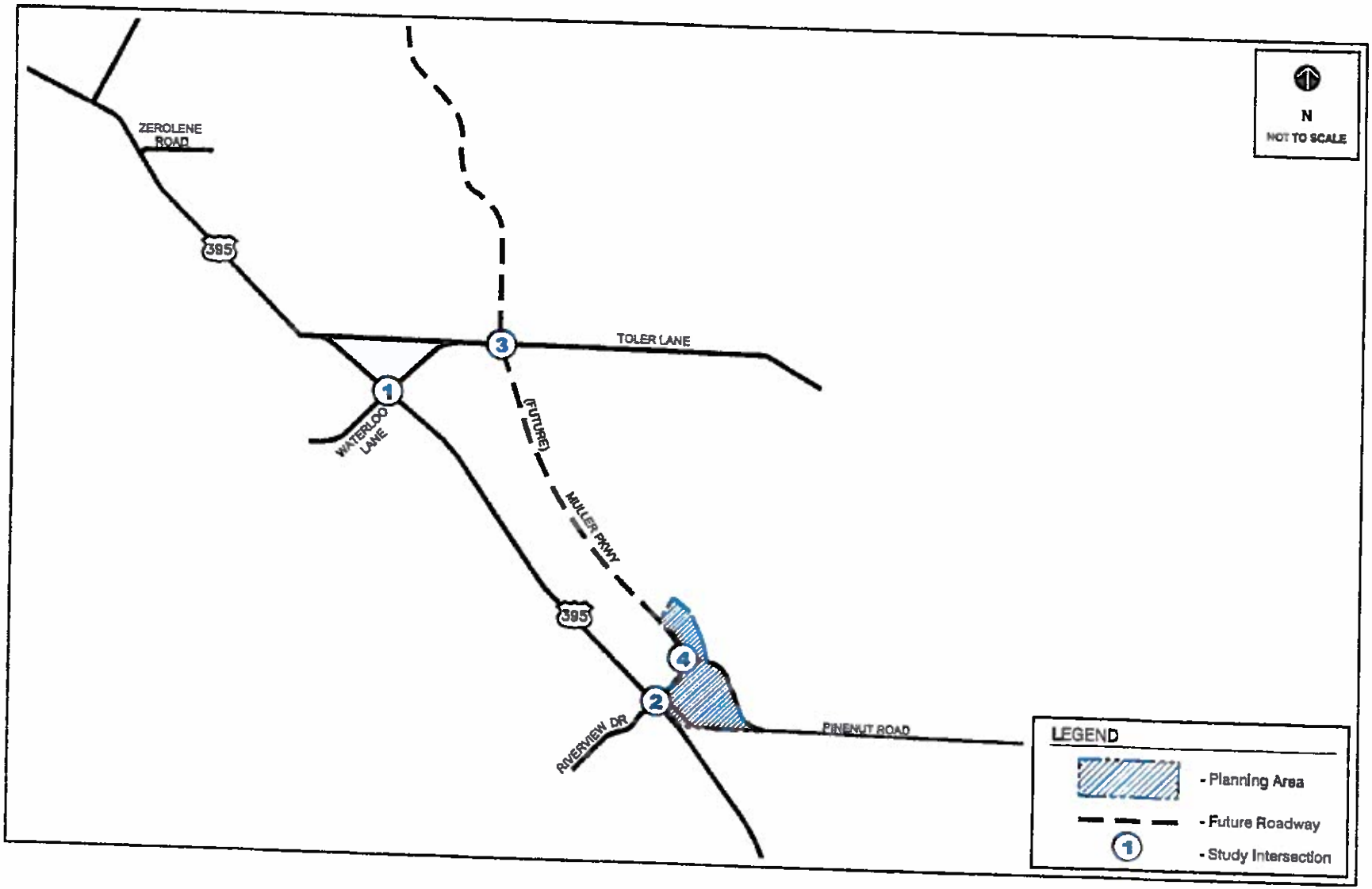
EXISTING PLUS NEAR TERM PROJECT CONDITIONS

- Muller Parkway: Construct four lanes on Muller Parkway between US 395 and Pinenut Road. Construct two lanes on Muller Parkway between Pinenut Road and the current terminus at the irrigation canal south of Virginia Ranch Road.
- Pinenut Road: Realign Pinenut Road as shown on **Figure 4**, in accordance with Douglas County Design Criteria and Improvement Standards including Standard Detail DC-A01. Construct two lanes with a center left-turn lane on Pinenut Road within the Peri Enterprises property.
- Muller Parkway/Pinenut Road Intersection: Construct at least a single lane roundabout. Right-of-way should be reserved to accommodate an ultimate dual lane roundabout with a right-turn bypass lane as shown on **Figure 4**.
- US 395/Muller Parkway Intersection: Construct the Muller Parkway approach to provide a right-turn lane, through lane, and left-turn lane. Right-of-way should be reserved to accommodate future dual left-turn lanes. Modify the traffic signal as appropriate to accommodate the Muller Parkway intersection approach.

2030 PLUS PROJECT CONDITIONS

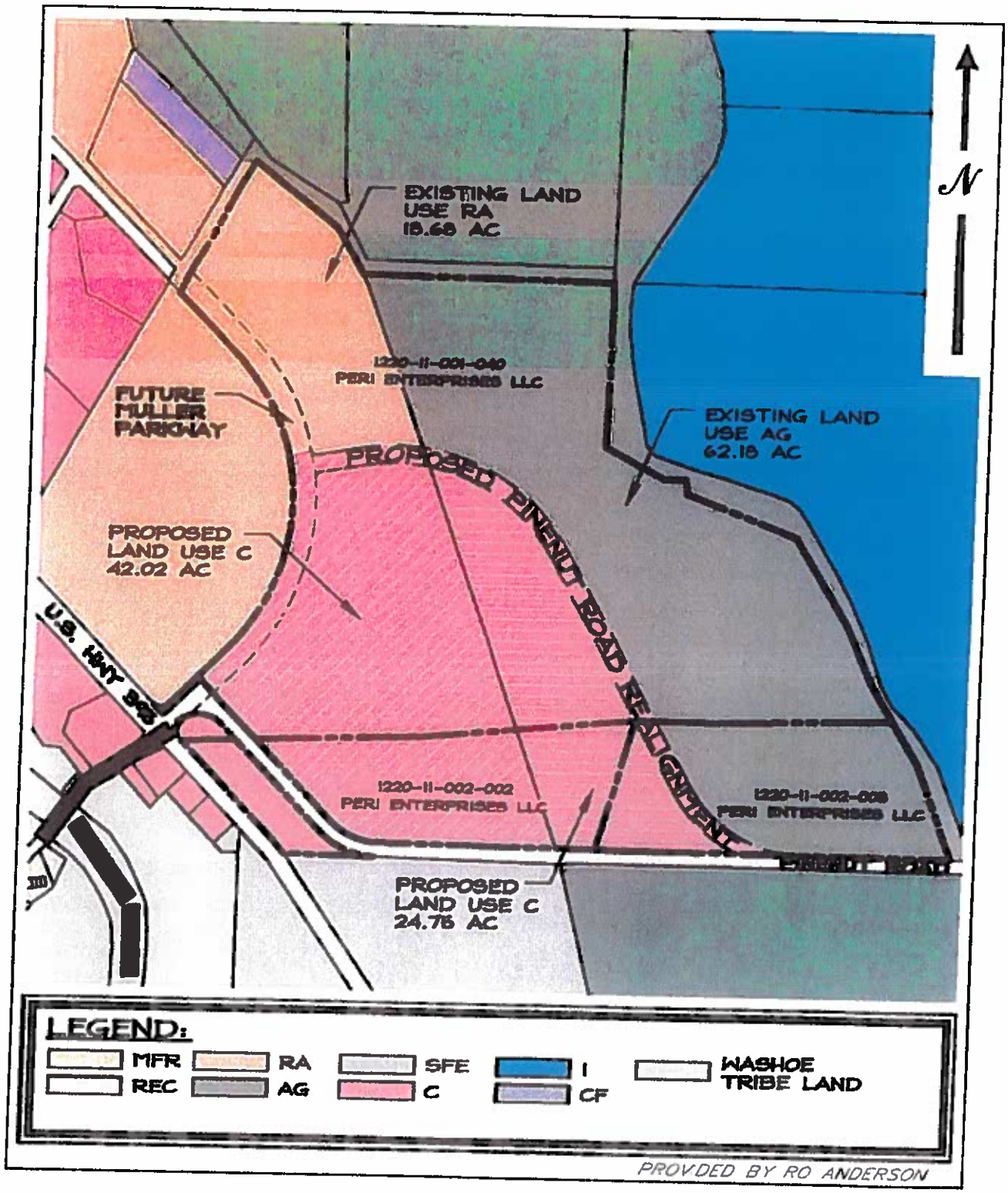
- Muller Parkway: The infrastructure identified above will need additional improvements to accommodate the project traffic at build-out. These improvements include widening Muller Parkway to four lanes north of Pinenut Road to the irrigation canal, constructing the additional lanes through the roundabout at the Muller Parkway/Pinenut Road intersection, and implementing dual left-turn lanes at the Muller Parkway approach of the US 395/Muller Parkway intersection. **Figure 4** displays the recommended ultimate configuration.

FIGURES



FEHR & PEERS
TRANSPORTATION CONSULTANTS

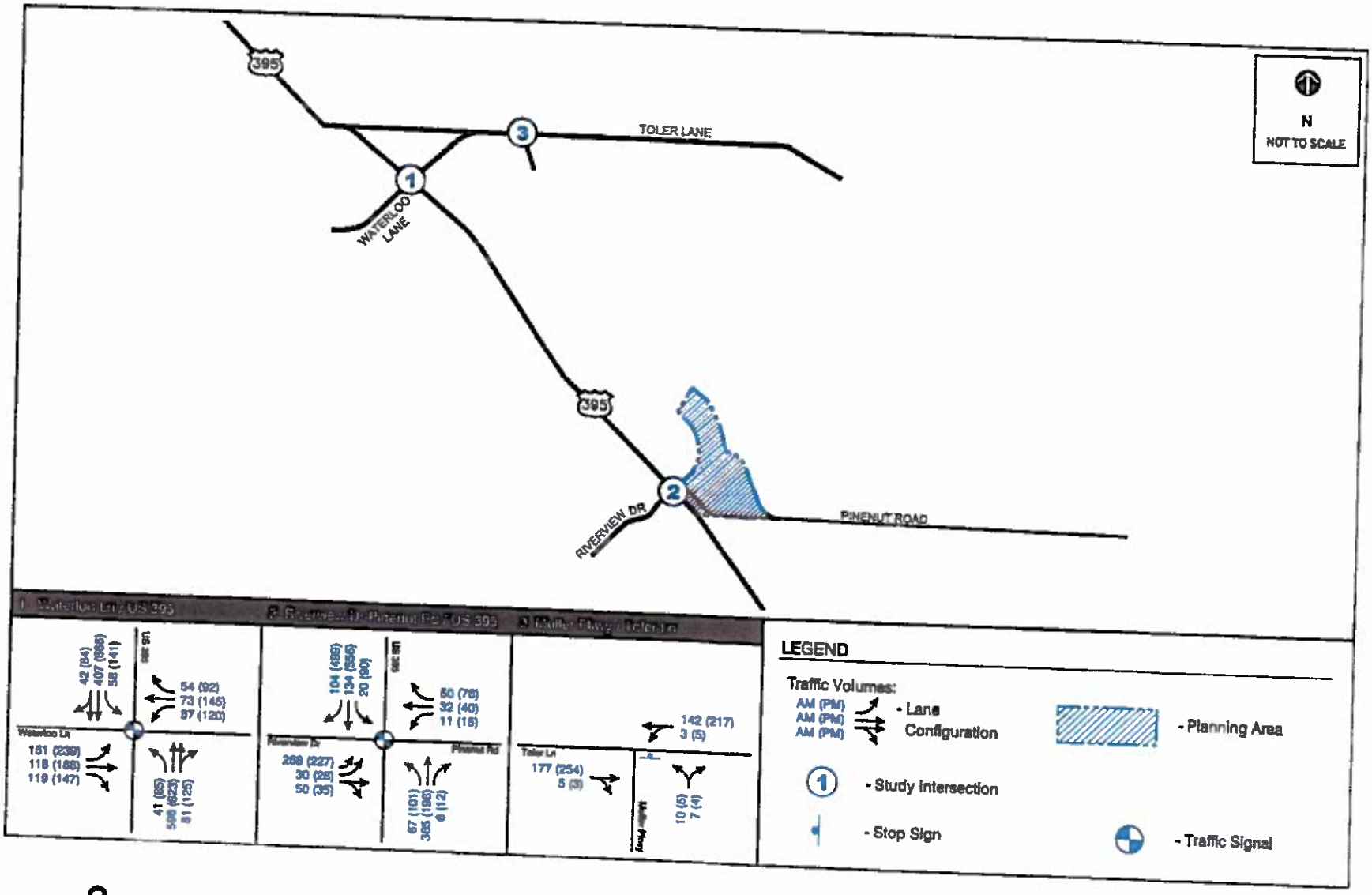
PERI ENTERPRISES TRAFFIC IMPACT STUDY
VICINITY MAP
FIGURE 1



FEHR & PEERS
TRANSPORTATION CONSULTANTS

PERI ENTERPRISES TRAFFIC IMPACT STUDY
ZONING PLAN

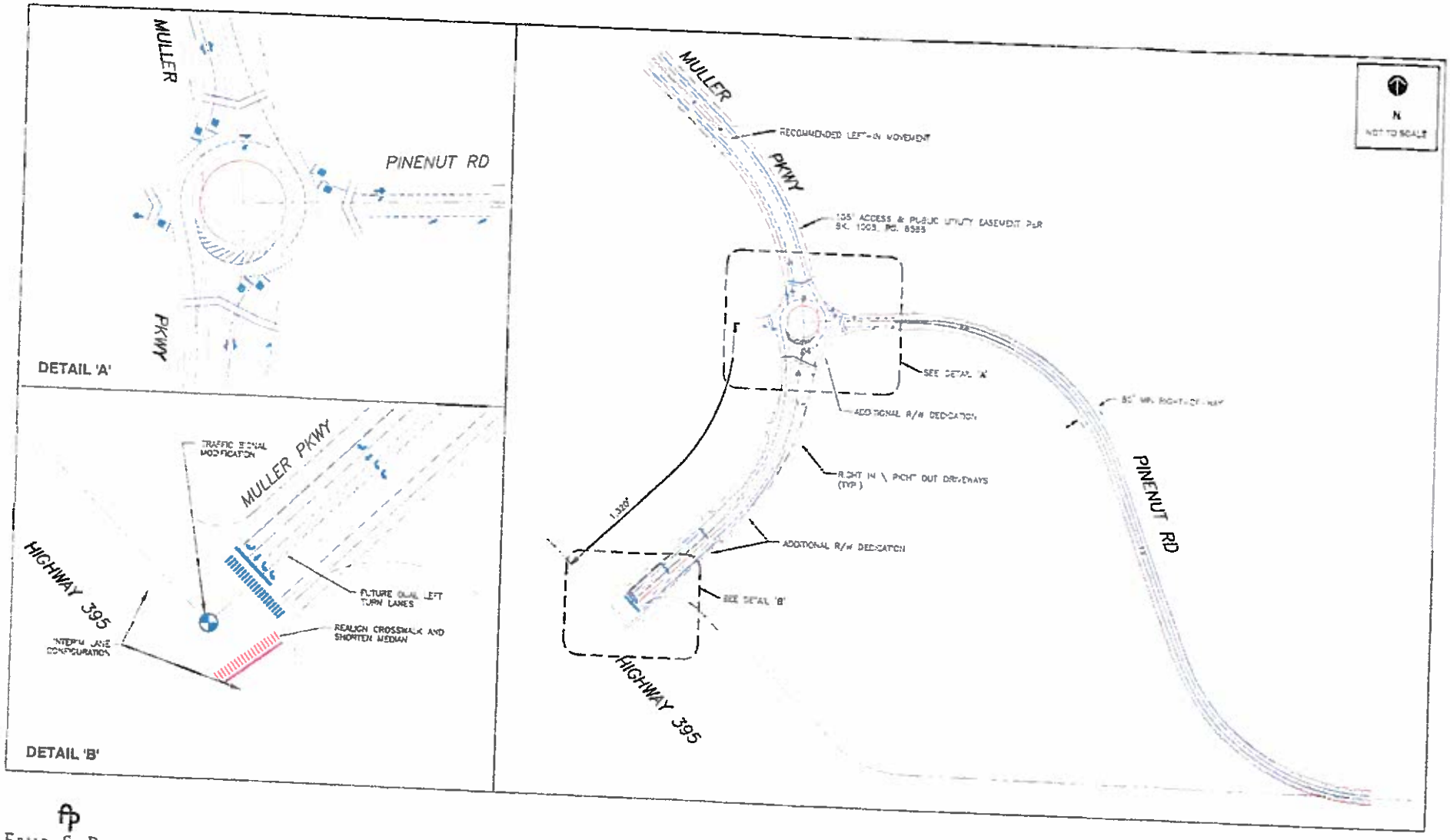
FIGURE 2



FEHR & PEERS
TRANSPORTATION CONSULTANTS

PERI ENTERPRISES TRAFFIC IMPACT STUDY
EXISTING TRAFFIC VOLUMES AND LANE CONFIGURATIONS

FIGURE 3

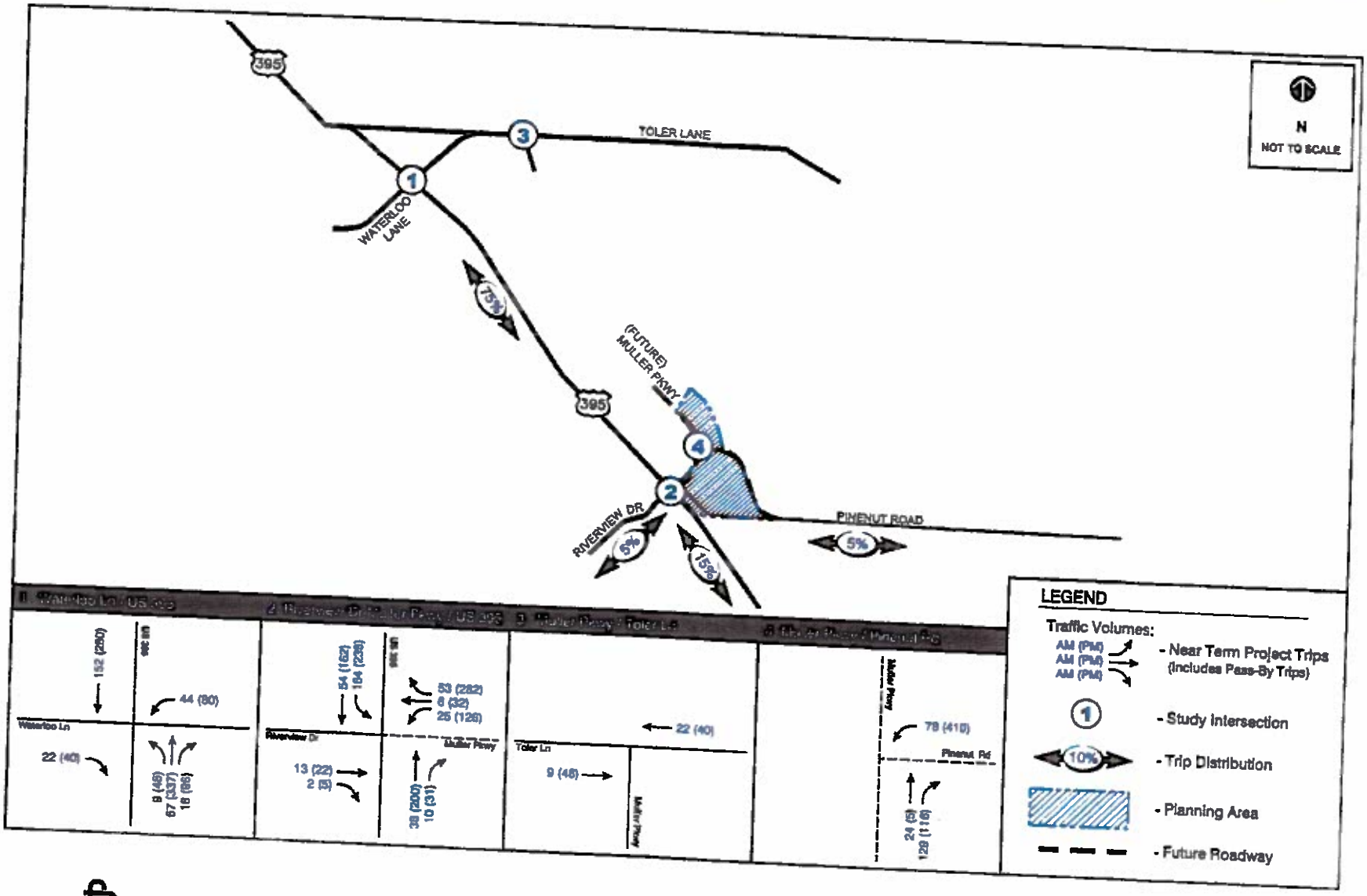


FEHR & PEERS
TRANSPORTATION CONSULTANTS

PINENUT ROAD PROPOSED RE-ALIGNMENT WITH ROUNDABOUT (ULTIMATE BUILD-OUT CONFIGURATION)

PERI ENTERPRISES TRAFFIC IMPACT STUDY

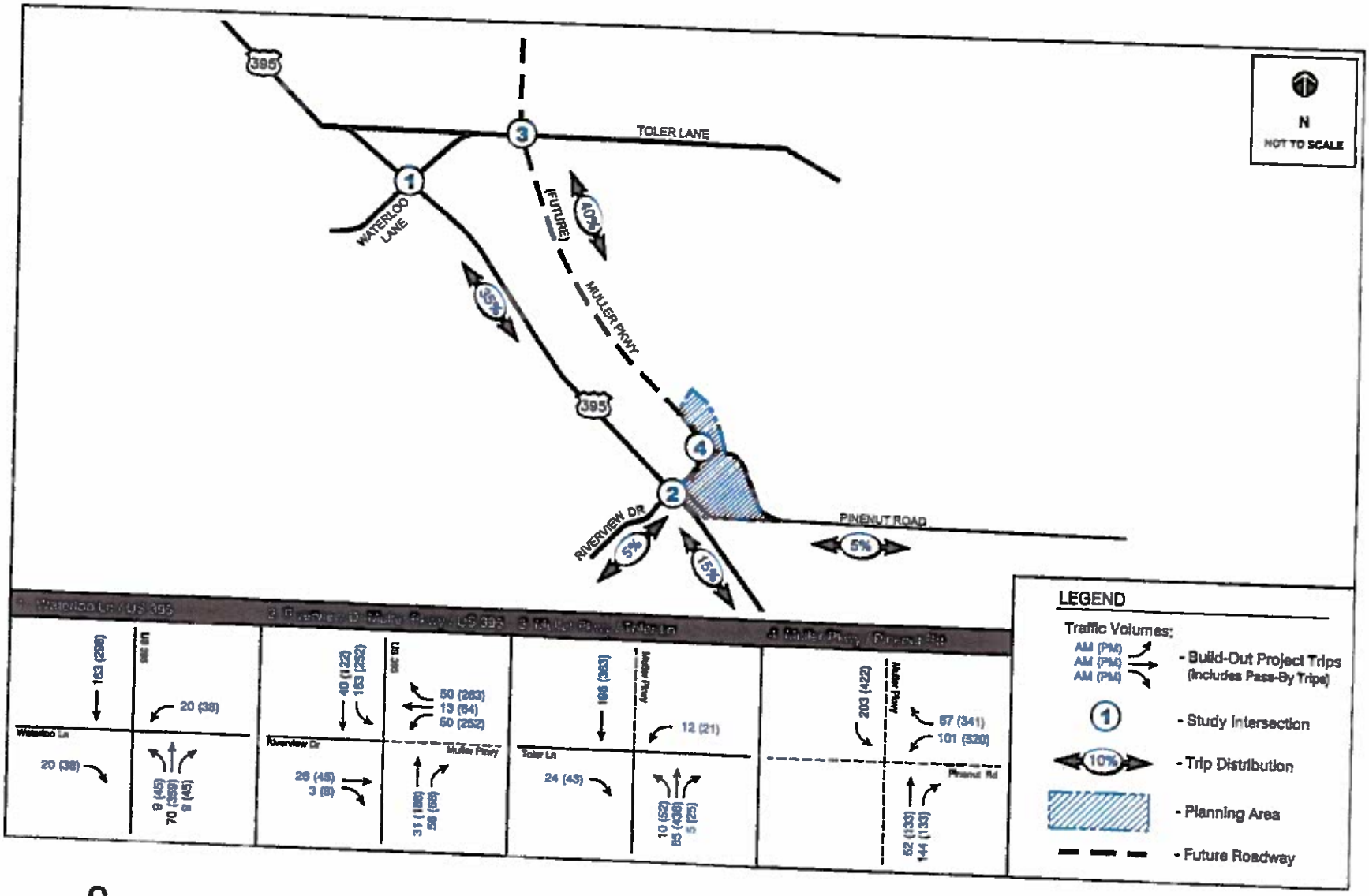
FIGURE 4



FEHR & PEERS
TRANSPORTATION CONSULTANTS

PERI ENTERPRISES TRAFFIC IMPACT STUDY
NEAR TERM PLANNING AREA TRIP DISTRIBUTION AND ASSIGNMENT

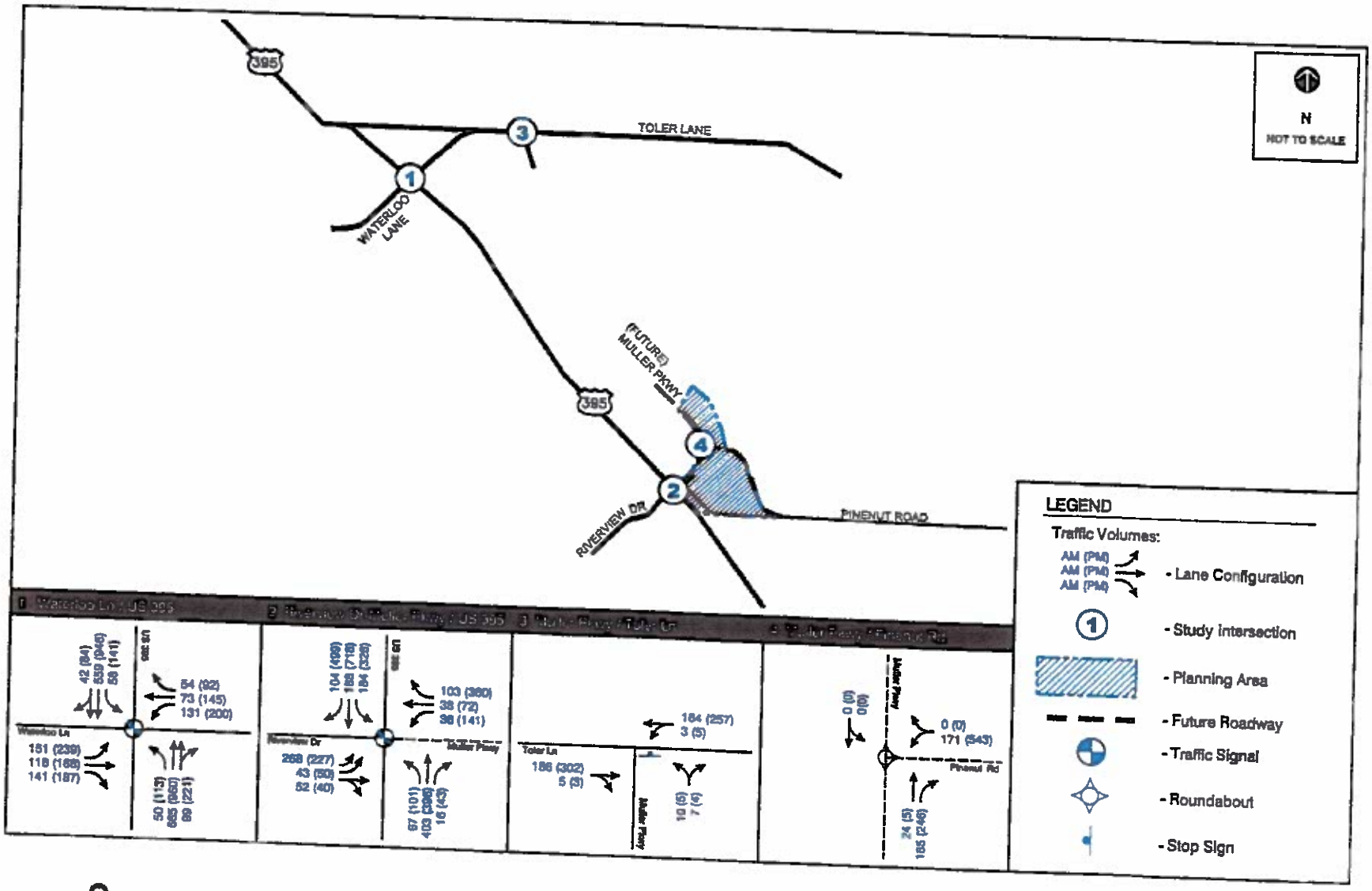
FIGURE 5



FEHR & PEERS
TRANSPORTATION CONSULTANTS

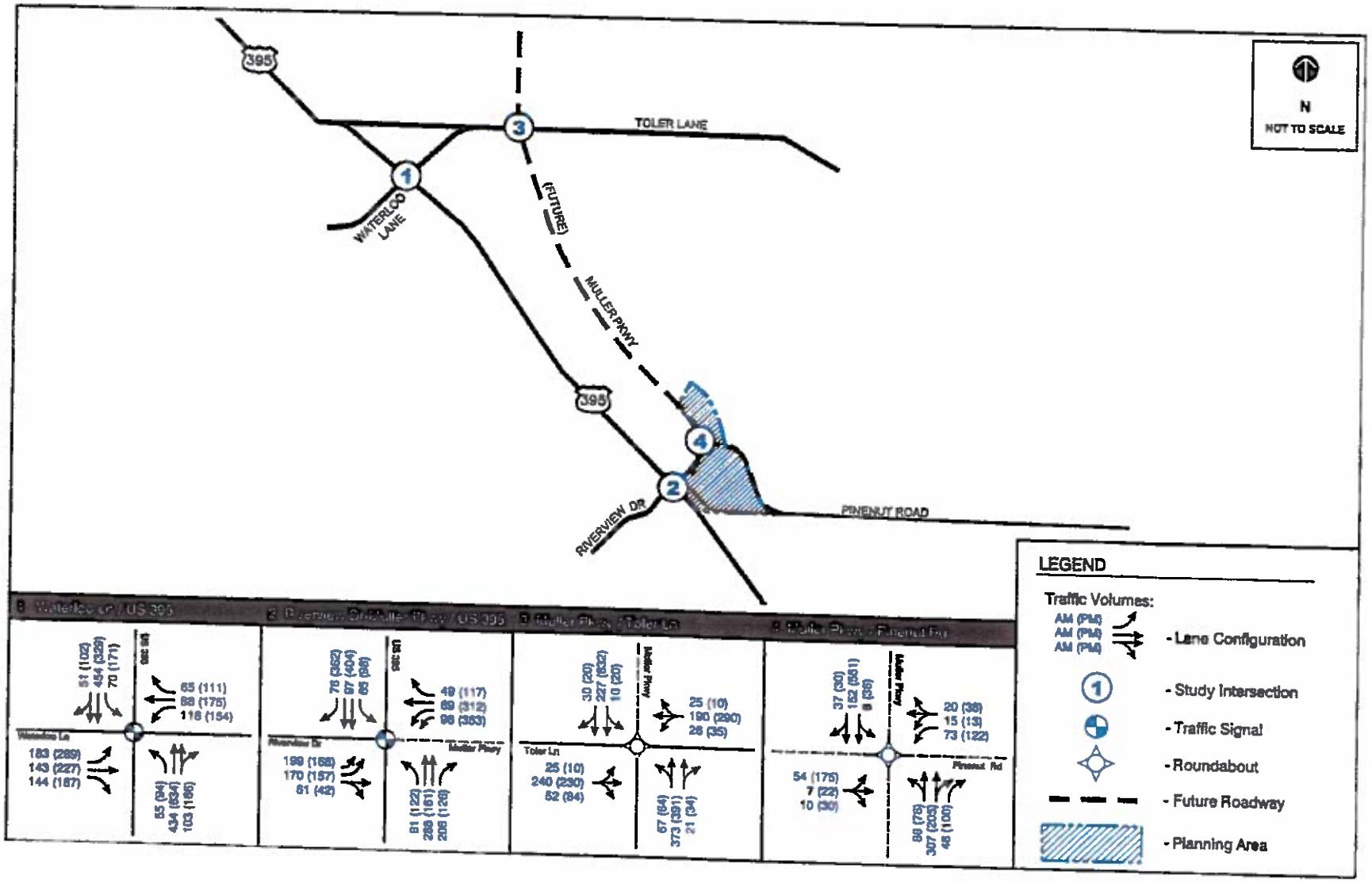
PERI ENTERPRISES TRAFFIC IMPACT STUDY
2030 PLANNING AREA TRIP DISTRIBUTION AND ASSIGNMENT

FIGURE 6



FEHR & PEERS
TRANSPORTATION CONSULTANTS

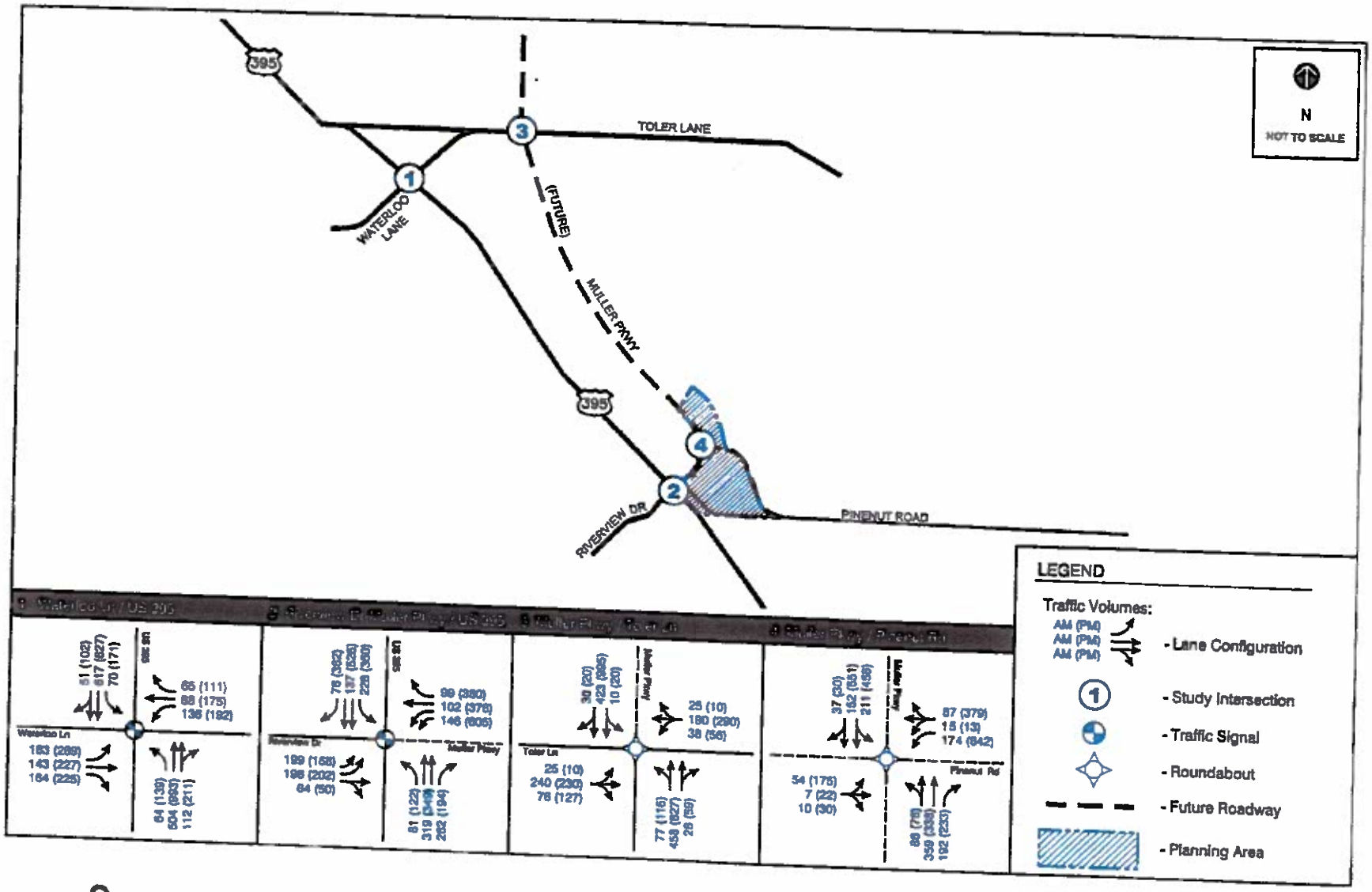
PERI ENTERPRISES TRAFFIC IMPACT STUDY
EXISTING PLUS NEAR TERM PROJECT TRAFFIC VOLUMES AND LANE CONFIGURATIONS
FIGURE 7



FEHR & PEERS
TRANSPORTATION CONSULTANTS

PERI ENTERPRISES TRAFFIC IMPACT STUDY
2030 BACKGROUND TRAFFIC VOLUMES AND LANE CONFIGURATIONS

FIGURE 8



FEHR & PEERS
TRANSPORTATION CONSULTANTS

PERI ENTERPRISES TRAFFIC IMPACT STUDY
2030 BACKGROUND PLUS PROJECT TRAFFIC VOLUMES AND LANE CONFIGURATIONS
FIGURE 9

LIST OF FIGURES

Farmstead at Corley Ranch
Specific Plan Draft
Douglas County, Nevada
July 10, 2015



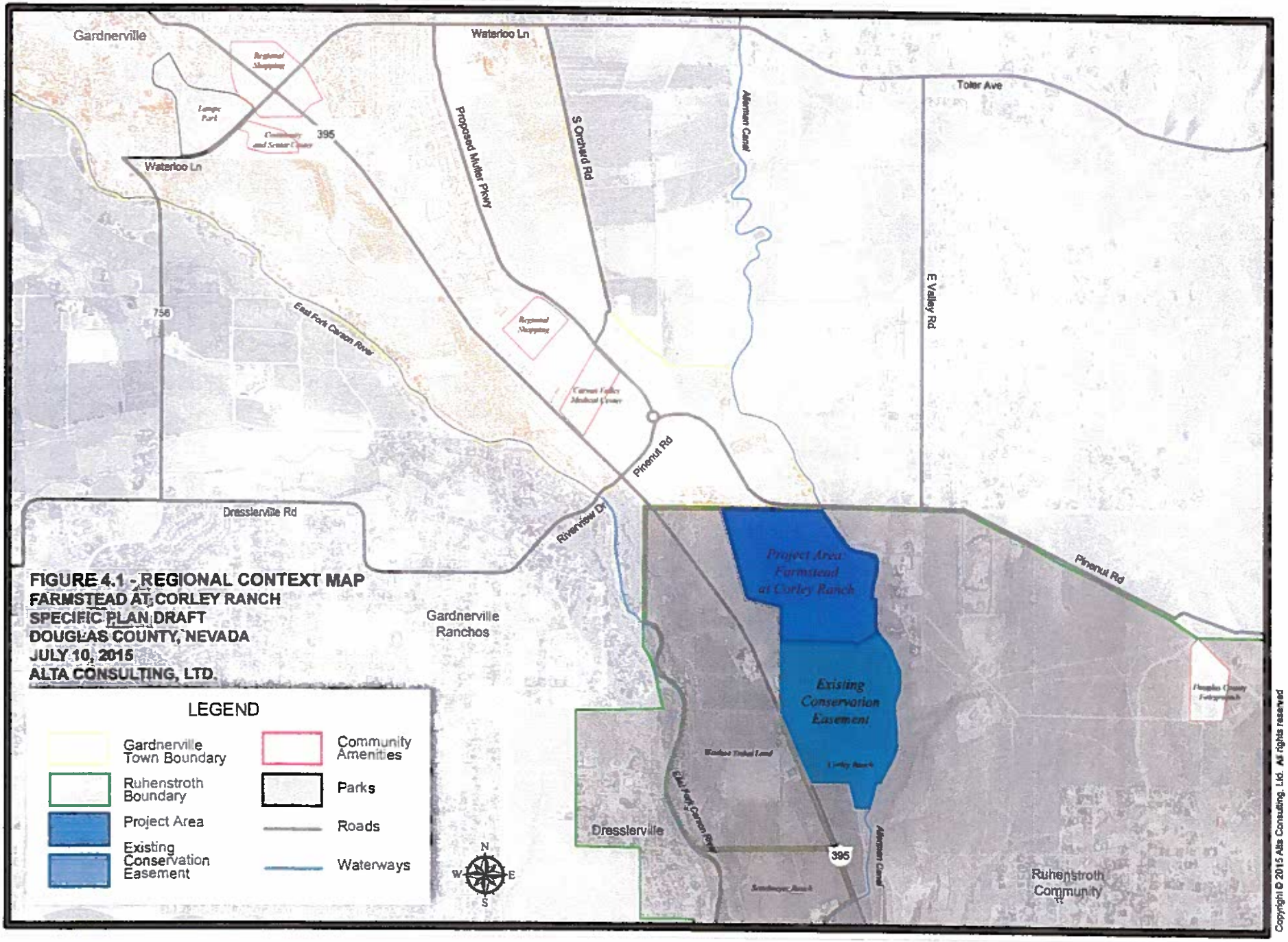


FIGURE 4.1 - REGIONAL CONTEXT MAP
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015
ALTA CONSULTING, LTD.

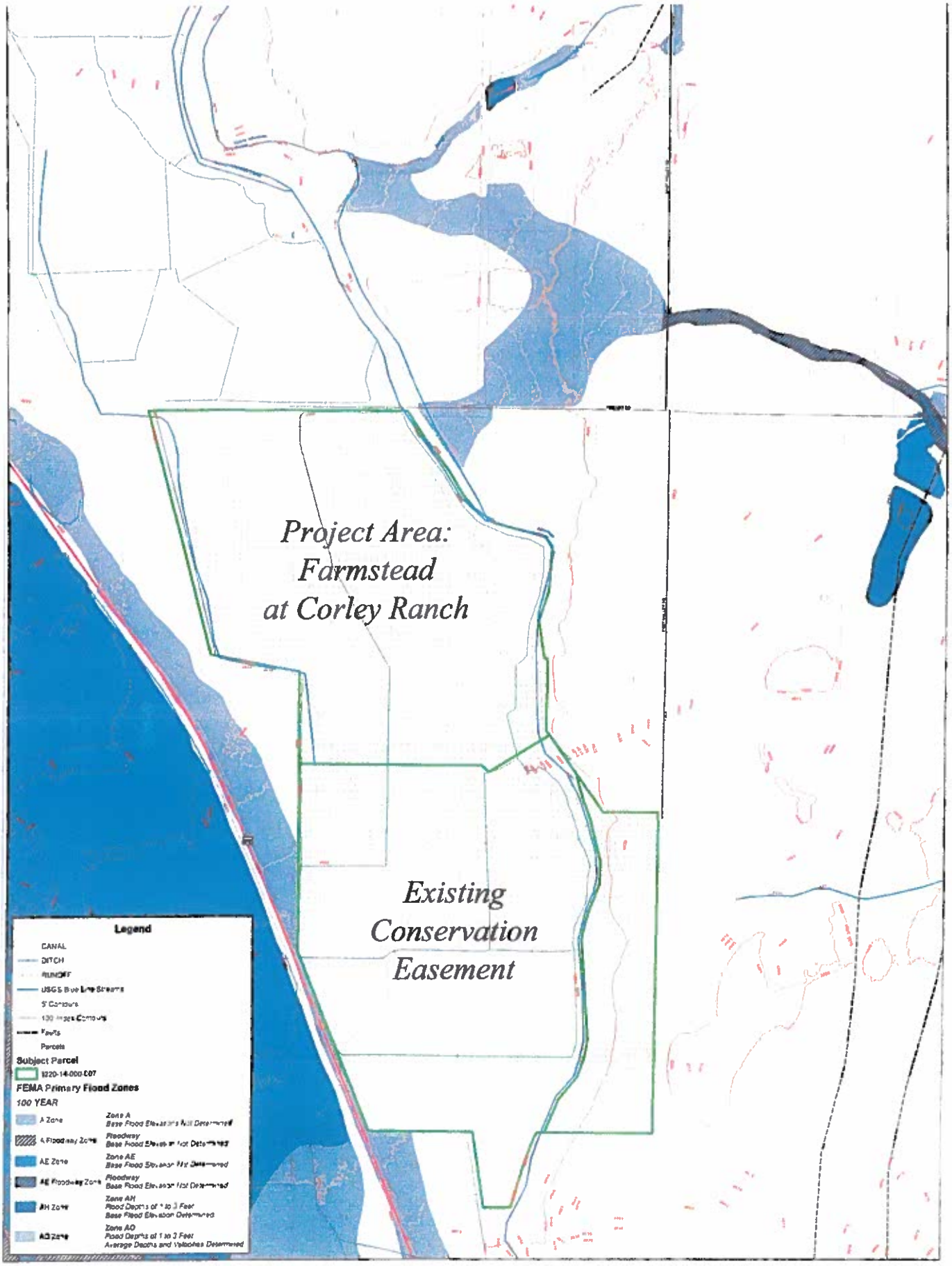


FIGURE 4.2 - TOPOGRAPHIC AND GEOLOGIC HAZARDS MAP
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

ALTA CONSULTING, LTD.

Village Center: Mixed Use Commercial, Lodging, Live-work Studio Lofts 78,000 square feet

Community Green: Iconic Barn, Orchard. Community Garden and Greenhouse 10,000 square feet

Active Living: 42 Units 4 DU per Acre

Cottage Homes: 136 SF Units 3.2 DU per Acre

Ranch Homes: 60 SF Units 2.1 DU per Acre

Working Ranch & Farm

FIGURE 4.3 - PROPOSED USES PLAN
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

ALTA CONSULTING, LTD.

LEGEND

- Residential Connector
- Local Street
- Farm Access Road
- Gated Emergency Access

LOCAL STREET CROSS SECTION

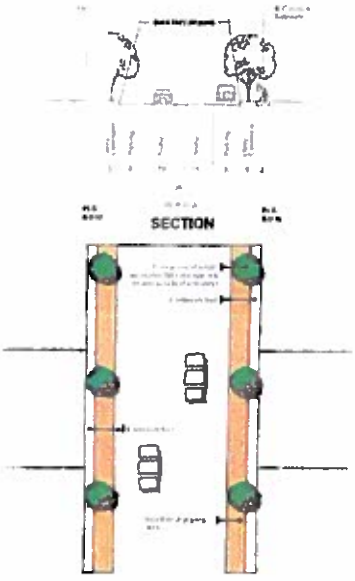
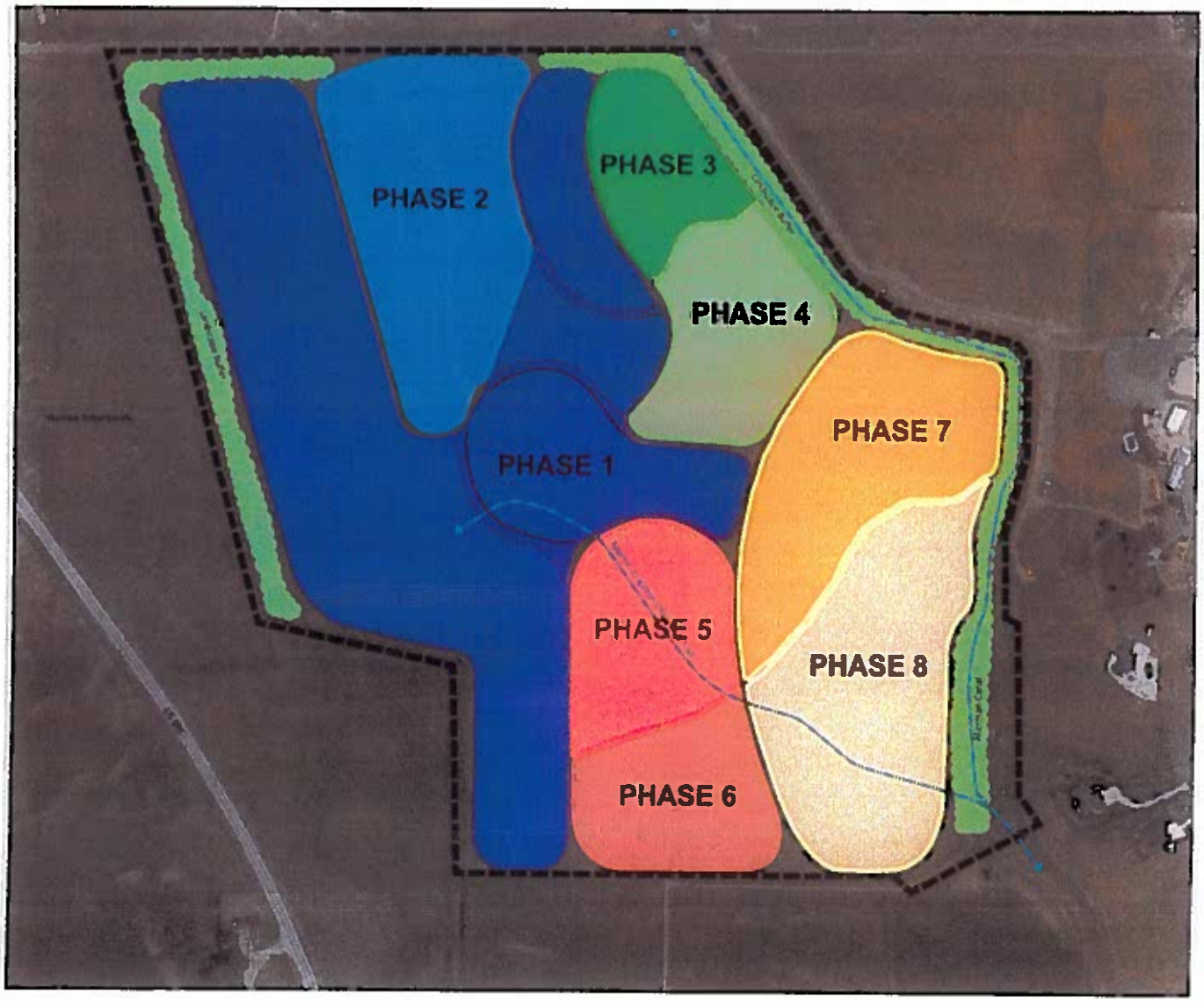


FIGURE 4.4 CIRCULATION PLAN
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

ALTA CONSULTING, LTD.



PHASE 1	18 Active Living Units, 12 Live-work Studio Lofts, Working Ranch & Farm	PHASE 5	30 Cottage Homes
PHASE 2	24 Active Living Units, 58,000 square feet Mixed Use Commercial	PHASE 6	40 Cottage Homes
PHASE 3	34 Cottage Homes	PHASE 7	27 Ranch Homes
PHASE 4	32 Cottage Homes	PHASE 8	33 Ranch Homes

FIGURE 4.5 - DEVELOPMENT PHASING PLAN
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

ALTA CONSULTING, LTD.

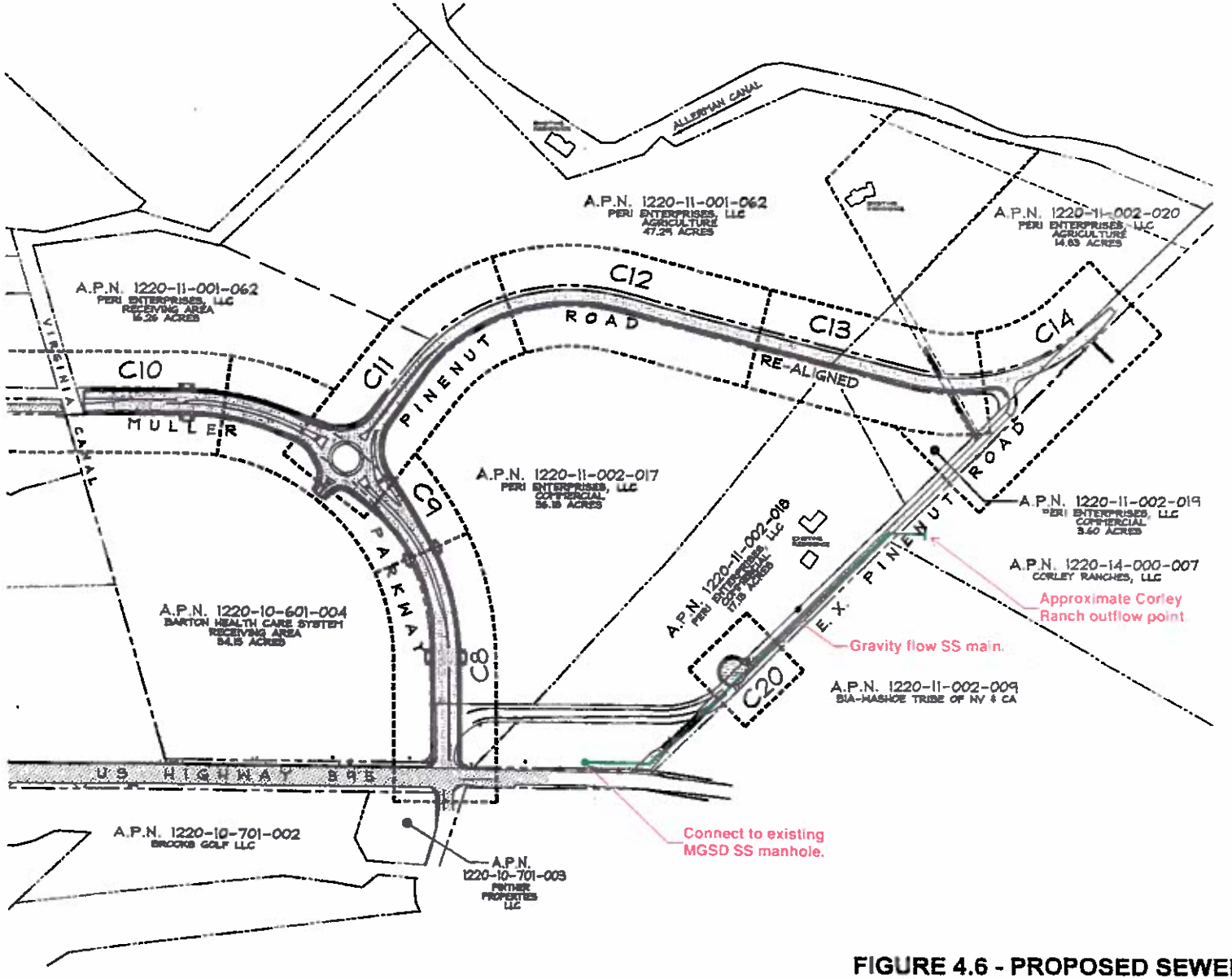


FIGURE 4.6 - PROPOSED SEWER CONNECTION
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

FIGURE 4.7 - GARDNERVILLE WATER COMPANY INFRASTRUCTURE MAP
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015

ALTA CONSULTING, LTD.

RCI

FIGURE 4.8 - RELOCATION OF RECEIVING AREA
FARMSTEAD AT CORLEY RANCH
SPECIFIC PLAN DRAFT
DOUGLAS COUNTY, NEVADA
JULY 10, 2015