Colina Rosa

Application to Washoe County for a:

Tentative Subdivision Map

Prepared by:

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Reno, Nevada 89521

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KLS Planning & Design Group

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11060 White Rock Road, Suite 150
Rancho Cordova, CA 95670

January 15, 2016

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Project Requests

This application includes the following requests for the project:

a) **Tentative Subdivision Map** for 94 lots with a Common Open Space Development;

Property Location

The Colina Rosa site includes 2 parcels and 20.1 acres. The project site is located on My Rose Highway and adjacent to Edmonton Drive on the east. It is bordered by the county owned land on the west and a single family neighborhood on the south. *(See Figure 1, Vicinity Map).*

Current access to the site is not available, nor is it appropriate from My Rose Highway. Our sole access is being proposed on the extension of Butch Cassidy as low intensity residential street. Property to the north and east is owned by private parties. Property to the east directly across Edmonton is vacant land.

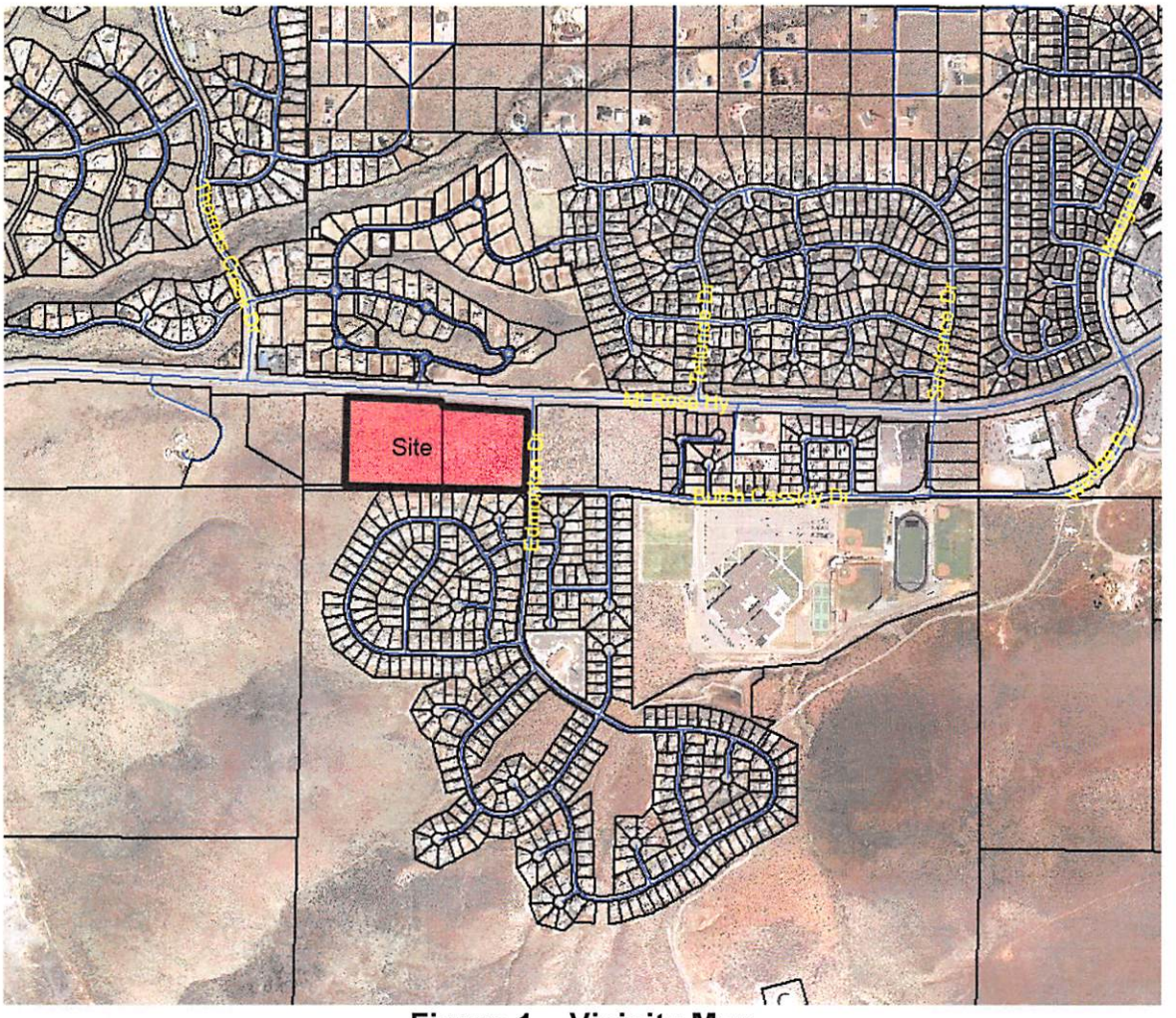


Figure 1 – Vicinity Map

Land Use & Zoning

The site has a Commercial land use regulation is the county master plan. It has a regulatory zone of Neighborhood Commercial (NC) as shown on Figure 3. This site is located in the Forest Area Plan and in the Mt Rose Scenic Highway Commercial Overlay District (MRSHOD) as shown on ht next page. NC zoning allows single family development of 5 dwellings per acre. So, there is no need to down zone the property to allow for single family

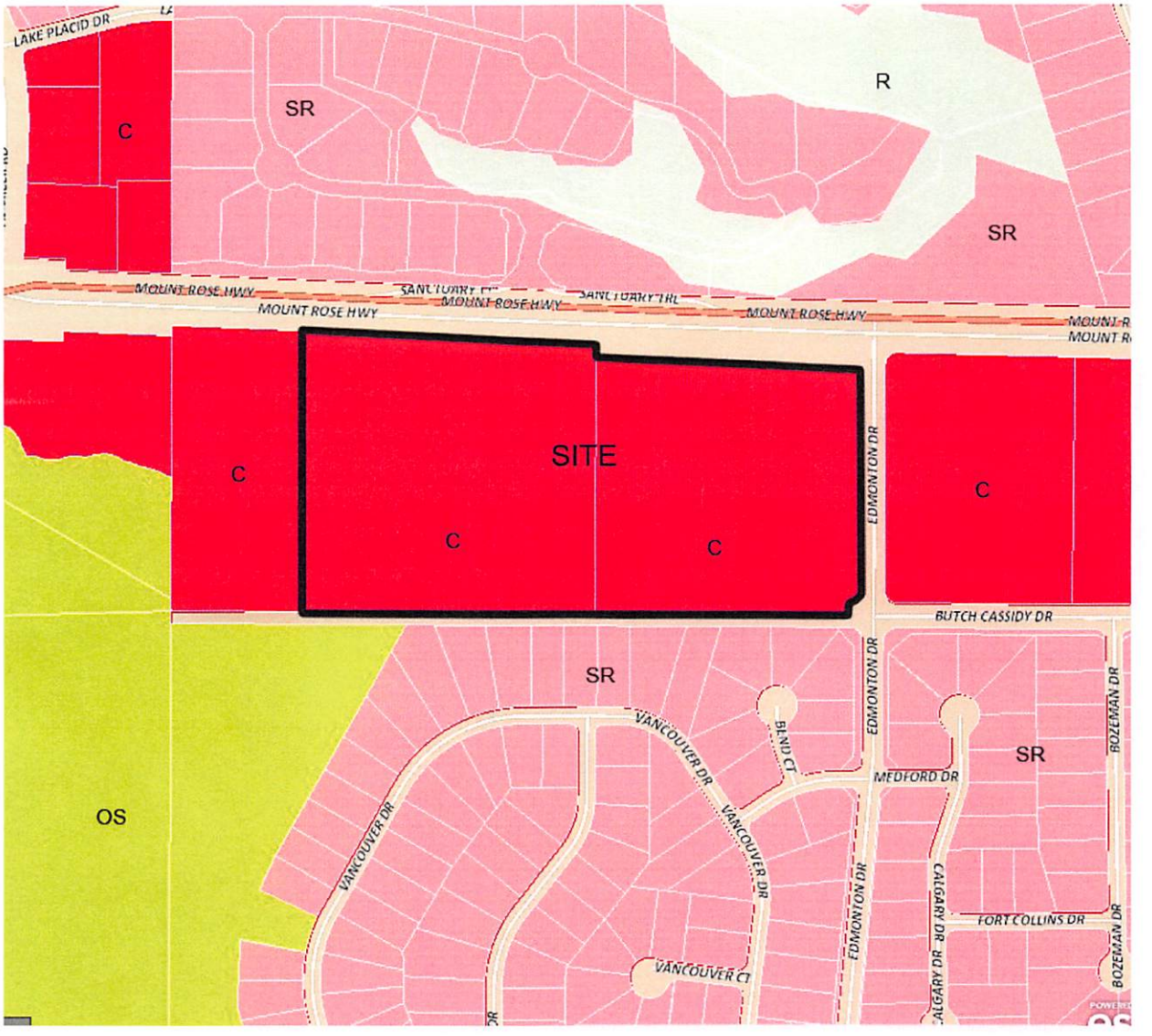


Figure 2 – County Master Plan

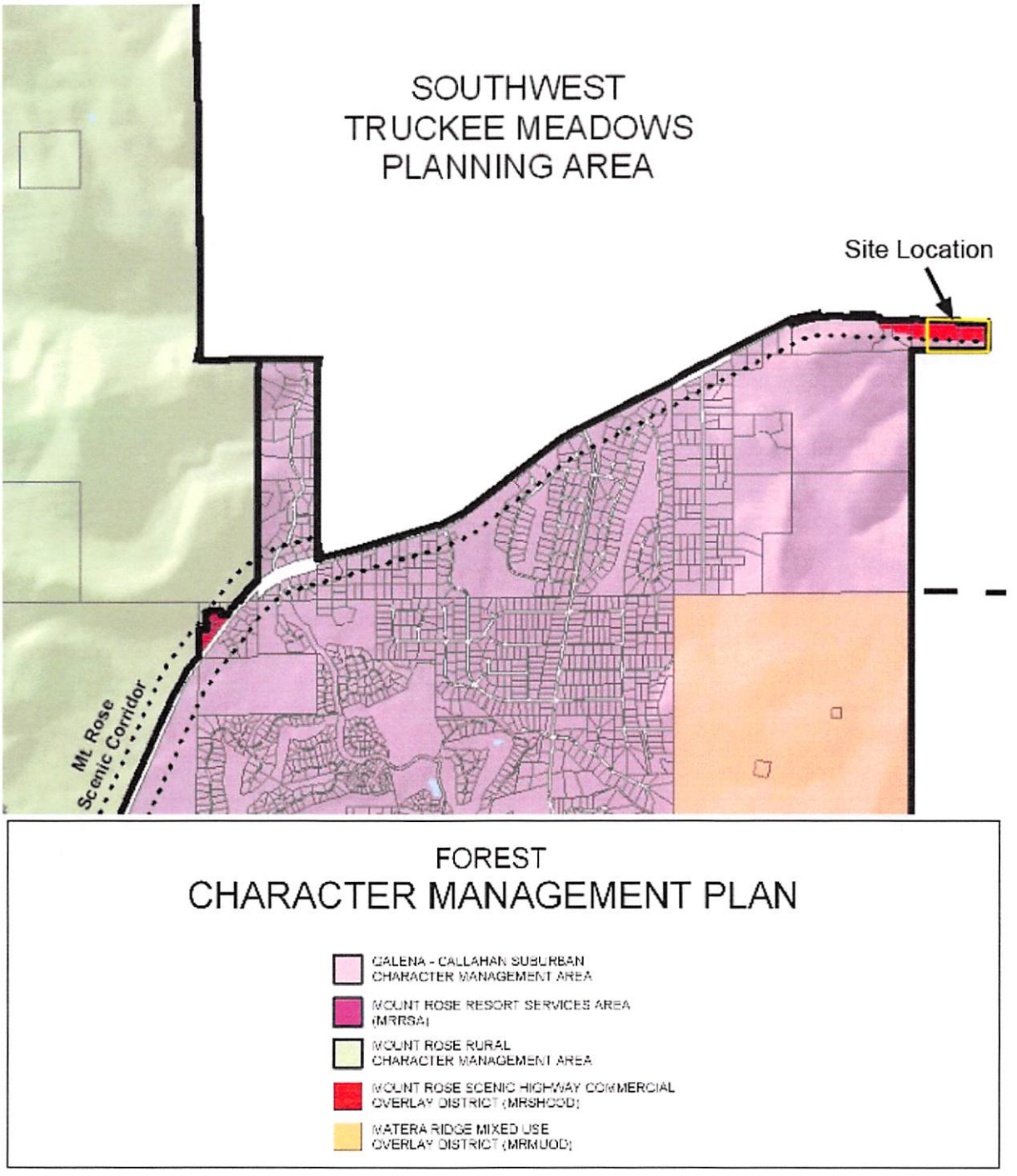


Figure 3 – Forest Area Plan (Character Management)

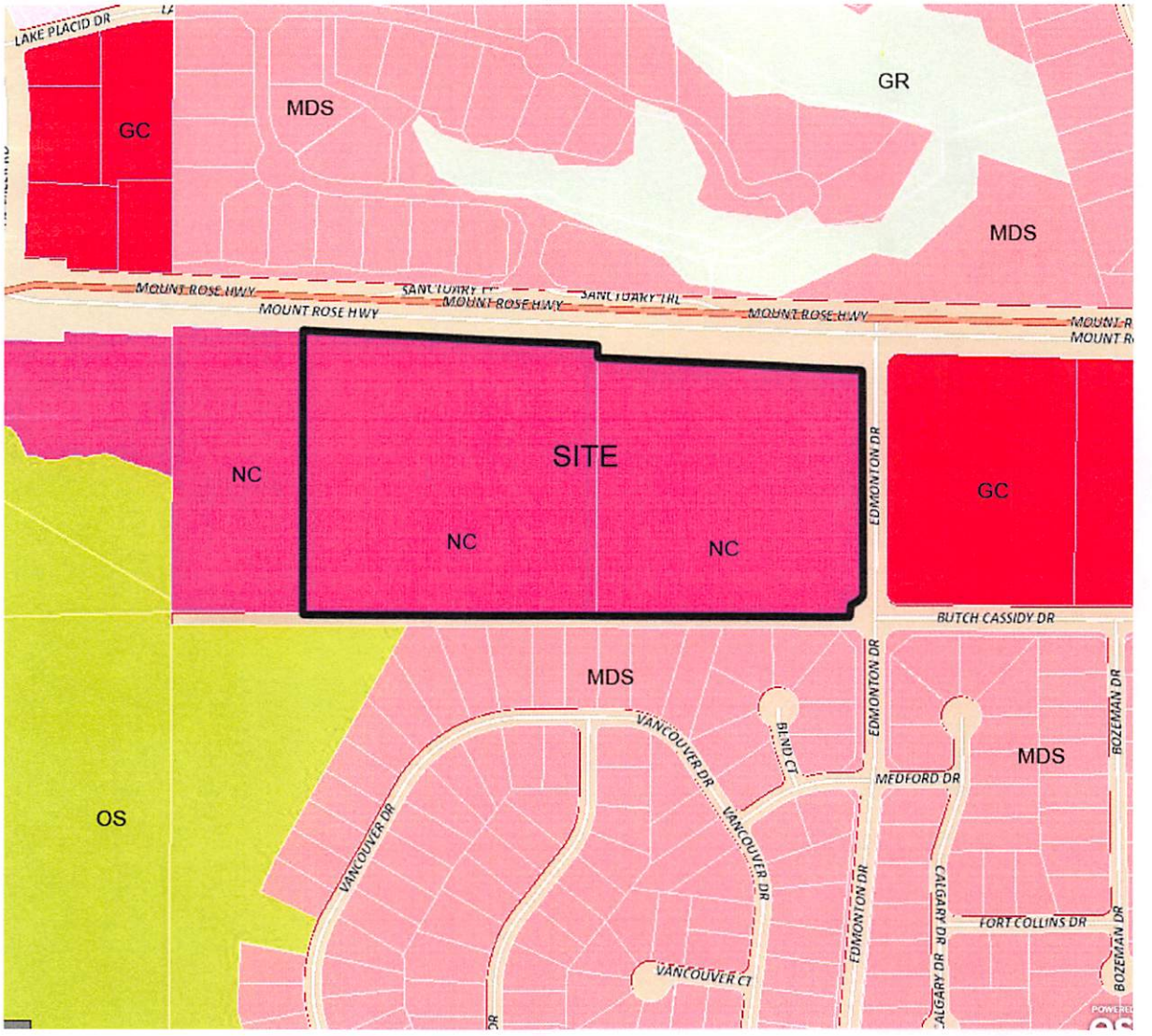


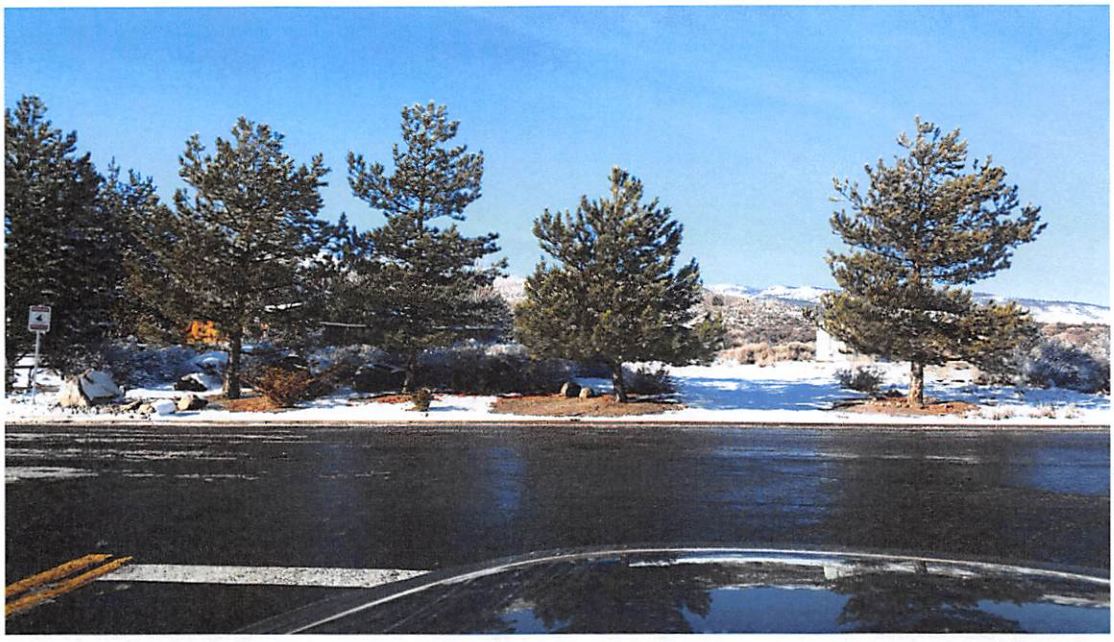
Figure 4 – County Zoning Map

Figure 5 – Overall Site Plan

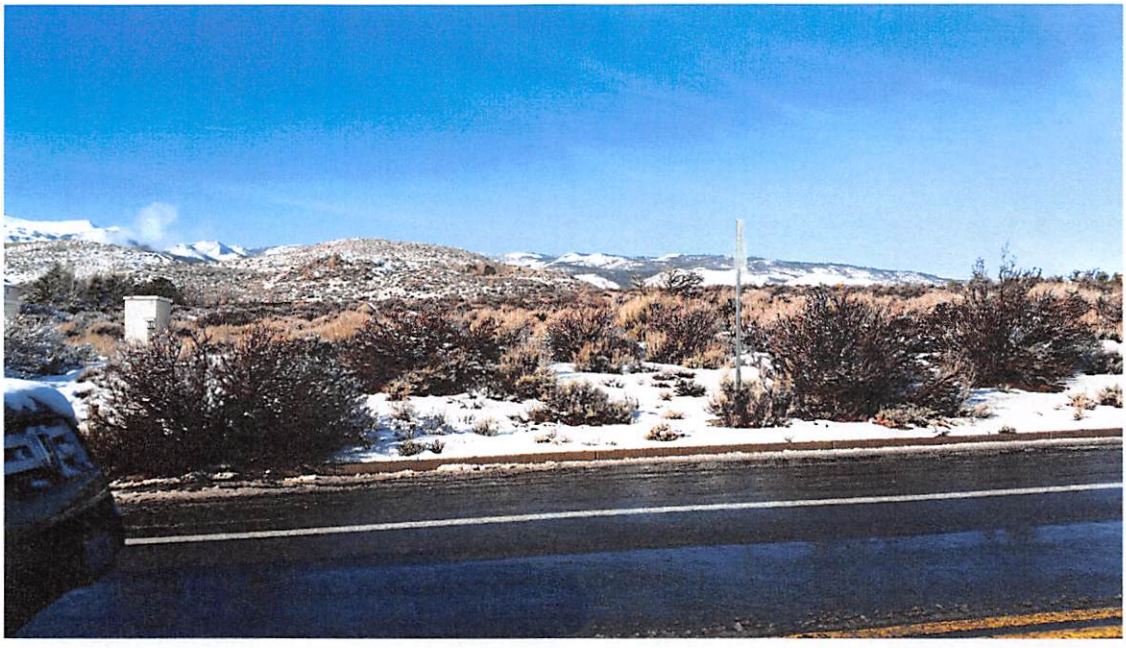
Summary of Design Features

The project area is 20.1 acres portion on two parcels. There are 94 lots on 14.75 acres with 1.75 acres of open space. Project density is 4.68 dwellings per acre. Summary of features include:

- A Landscape Parkway along Butch Cassidy and Edmonton Drive
- A 30' setback from the Mt Rose Highway with a trial and common area landscaping
- The trail plan is intended to tie all of the cul-de-sacs together
- A wide range of fencing types as shown in the design exhibits below.



Butch Cassidy Extension



Facing west from Edmonton Drive

Facing north on Edmonton

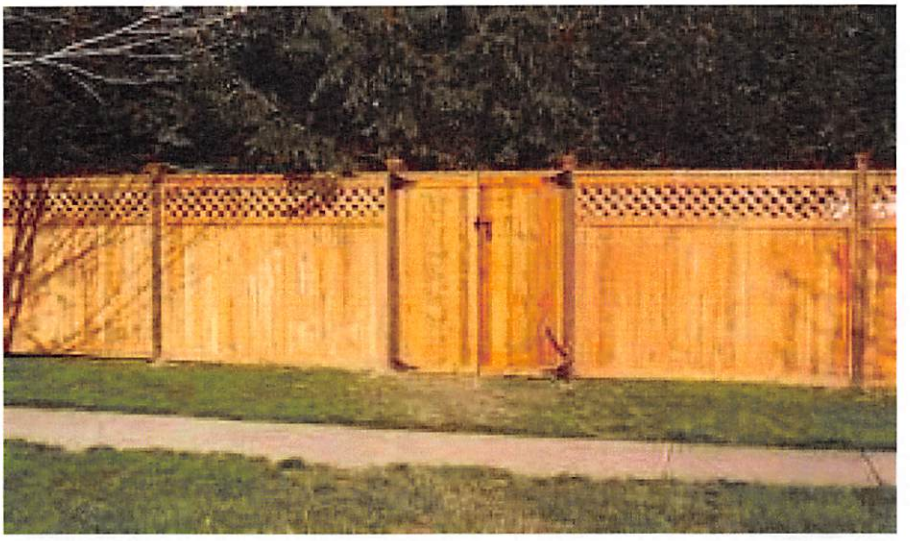
View of site facing east on Mt Rose Highway

Design Exhibits

Fencing Options

Fencing along Mt Rose Highway

Split Rail Fencing along Butch Cassidy



Fencing between lots & Side yards

Fencing between lots on north/south slopes

Tentative Map Findings:

Washoe County Code Section 110.608.25requires that all of the following findings be made to the satisfaction of the Washoe County Planning Commission before granting approval of the Tentative Map request.

1) **Plan Consistency. That the proposed map is consistent with the Master Plan and any specific plan.**

   The proposed subdivision map meets all of the pertinent goals and policies of the Master Plan, and the Forest Area Plan. The project falls under the allowable density established in the Area Plan and complies with policy F.3.5 which excludes residential uses in the commercial regulatory zones of the Forest Area Plan from any special use permit requirements.

2) **Design or Improvement. That the design or improvement of the proposed subdivision is consistent with the Master Plan and any specific plan.**

   The proposed map meets all of the density, lot size and opens space criteria of the Master Plan, and the Forest Area Plan. Specifically, the proposed development is below the allowable density of 5 units per acre of the NC zoning and master plan. Also, the proposed subdivision complies with the Common Open Space criteria for pedestrian access, open space, community amenities, etc.

3) **Type of Development. That the site is physically suited for the type of development proposed.**

   The proposed subdivision appears to be well suited to the site as reflected in all of the technical products including the lot sizes, access, and grading. The site appears to be physically suited for the type of development proposed.

4) **Availability of Services. That the subdivision will meet the requirements of Article 702, Adequate Public Facilities Management System.**

   The subdivision does meet all of the requirements of Article 702, Adequate Public Facilities Management System.

5) **Fish or Wildlife. That neither the design of the subdivision nor any proposed improvements is likely to cause substantial environmental damage, or substantial and avoidable injury to any endangered plant, wildlife or their habitat.**

   Most of the off-site infrastructure needs have been constructed. The improvements will not cause substantial environmental damage or substantial and avoidable injury to any endangered plant, wildlife or their habitat. There is no known habitat on the site. The site is covered with dense sagebrush, and dense Bitterbrush and large boulders.

6) **Public Health. That the design of the subdivision or type of improvement is not likely to cause significant public health problems**.

The design of the subdivision and improvements will not cause significant public health problems because most of the infrastructure is already in place. Dust control related to grading will be the most obvious public health issue which is tightly regulated with dust control permitting. Additionally, the proposed amenities such as pedestrian trails, landscaping and common area will enhance the aesthetic and recreational value of the immediate neighborhood.

7) **Easements. That the design of the subdivision or the type of improvements will not conflict with easements acquired by the public at large for access through, or use of property within, the proposed subdivision.**

The subdivision as designed has taken into consideration and accommodated existing public easements for access through and use of the property.

8) **Access. That the design of the subdivision provides any necessary access to surrounding, adjacent lands and provides appropriate secondary access for emergency vehicles.**

There is a public park immediately east of the subject property and there are federal lands further to the northeast of the property. The design of the subdivision will provide pedestrian and emergency vehicle access to these surrounding uses.

9) **Dedications. That any land or improvements to be dedicated to the County is consistent with the Master Plan.**

All of the roadways will be dedicated to the county. The trails and common area will remain under the ownership of the Homeowner's Association. All sewer improvements will be dedicated to Washoe County as well.

10) **Energy. That the design of the subdivision provides, to the extent feasible, for future passive or natural heating or cooling opportunities in the subdivision.**

To the extent possible, the design of the subdivision provides for future passive or natural heating or cooling opportunities. The layout is very much governed by the topographic conditions on the site which is the form of a "tilted plane" that averages about 7% grade.

Appendix A

Map Exhibits (8.5" x 11")

Illustrative Plan
Civil Plans (4 sheets)
Landscape Plans (2 sheets)

Application Materials

Washoe County Development Application
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Application Service Charges (Fee Sheet)

Tetative Map Reports

Traffic Impact Report
Preliminary Hydrology Report
Preliminary Sewer Report
Preliminary Geotechnical Report

COLINA ROSA TENTATIVE MAP

0' 100'

TENTATIVE MAP
ILLUSTRATIVE LANDSCAPE PLAN
SHEET 1 of 1

LUMOS & ASSOCIATES

DATE: 1/14/16
SCALE: 1"=50'
JOB #: KLS.011

T

COLINA ROSA TENTATIVE MAP

OWNER

TOWNE DEVELOPMENT OF SACRAMENTO, INC
11060 WHITE ROCK ROAD, SUITE 150
RANCHO CORDOVA, CA 95670

ENGINEER

TEC CIVIL ENGINEERING CONSULTANTS
9480 DOUBLE DIAMOND PARKWAY, SUITE 200
RENO, NEVADA 89521

SHEET INDEX

PROJECT DATA

TOTAL NUMBER OF LOTS	94
LOT AREA	14.75 ACRES
RIGHT-OF-WAY/ COMMON AREA	3.64 ACRES
OPEN SPACE	1.75 ACRES
TOTAL SITE AREA	20.14 ACRES
SMALLEST LOT SIZE	5,261 S.F.
LARGEST LOT SIZE	8,680 S.F.
AVERAGE LOT SIZE	6,830 S.F.

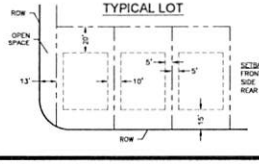
UTILITY DATA

CABLE	CHARTER COMMUNICATIONS
ELECTRIC	NV ENERGY
GAS	NV ENERGY
SANITARY SEWER (ON SITE)	WASHOE COUNTY
SOLID WASTE	WASTEWATER PLANT WASTE MANAGEMENT
TELEPHONE	AT&T
WATER	TRUCKEE MEADOWS WATER AUTHORITY

NOTE:

1) REF. SHEET 2 FOR TYPICAL STREET CROSS SECTION.

TYPICAL LOT



LEGEND

- PROPERTY BOUNDARY
- A.C. PAVEMENT AREA
- CONCRETE AREA
- PROPOSED LOT LINE
- SETBACK LINE
- 13 / 6,019 SF — PROPOSED LOT NUMBER & LOT AREA

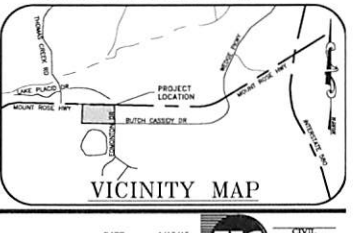
ENGINEER'S STATEMENT

THESE FIGURES (FIGURE 1 OF 6 THROUGH FIGURE 4 OF 6) HAVE BEEN PREPARED IN ACCORDANCE WITH ACCEPTED ENGINEERING PROCEDURES AND GUIDELINES, AND WILL BE IN SUBSTANTIAL COMPLIANCE WITH APPLICABLE STATUTES, COUNTY ORDINANCES, AND COMMUNITY DEVELOPMENT CODES WITH FINAL DESIGN.

JASON A. GILLES, P.E. P.E. #16019

BASIS OF BEARINGS

"OFFICIAL PLAT OF GALENA TERRACE – UNIT 1", RECORDED ON JUNE 23, 1995 AS SUBDIVISION TRACT MAP 3156, FILE No. 1903073, OFFICIAL RECORDS OF WASHOE COUNTY



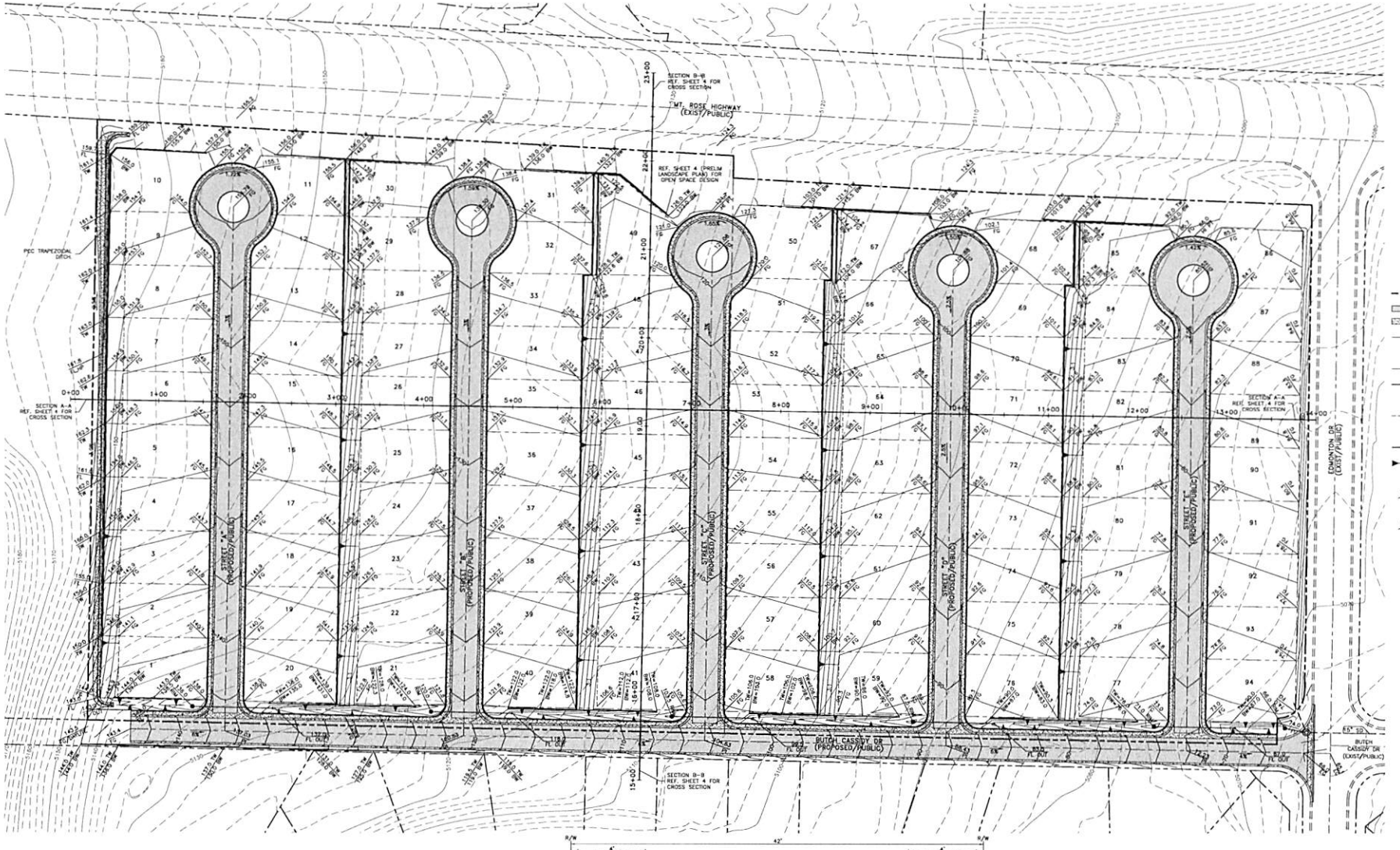
50' 25' 0 50' 100'

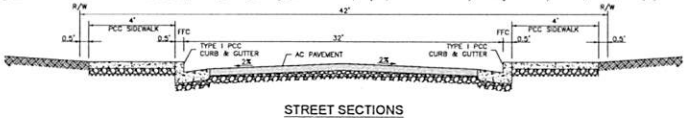
TENTATIVE MAP
PRELIMINARY SITE PLAN
SHEET 1 of 6

DATE: 1/15/15
SCALE: 1"=50'
JOB #: RLS.011

TEC CIVIL ENGINEERING CONSULTANTS

COLINA ROSA TENTATIVE MAP





STREET SECTIONS
N.T.S.

NOTE:
1) ADD 5,000 TO ALL SPOT ELEVATIONS

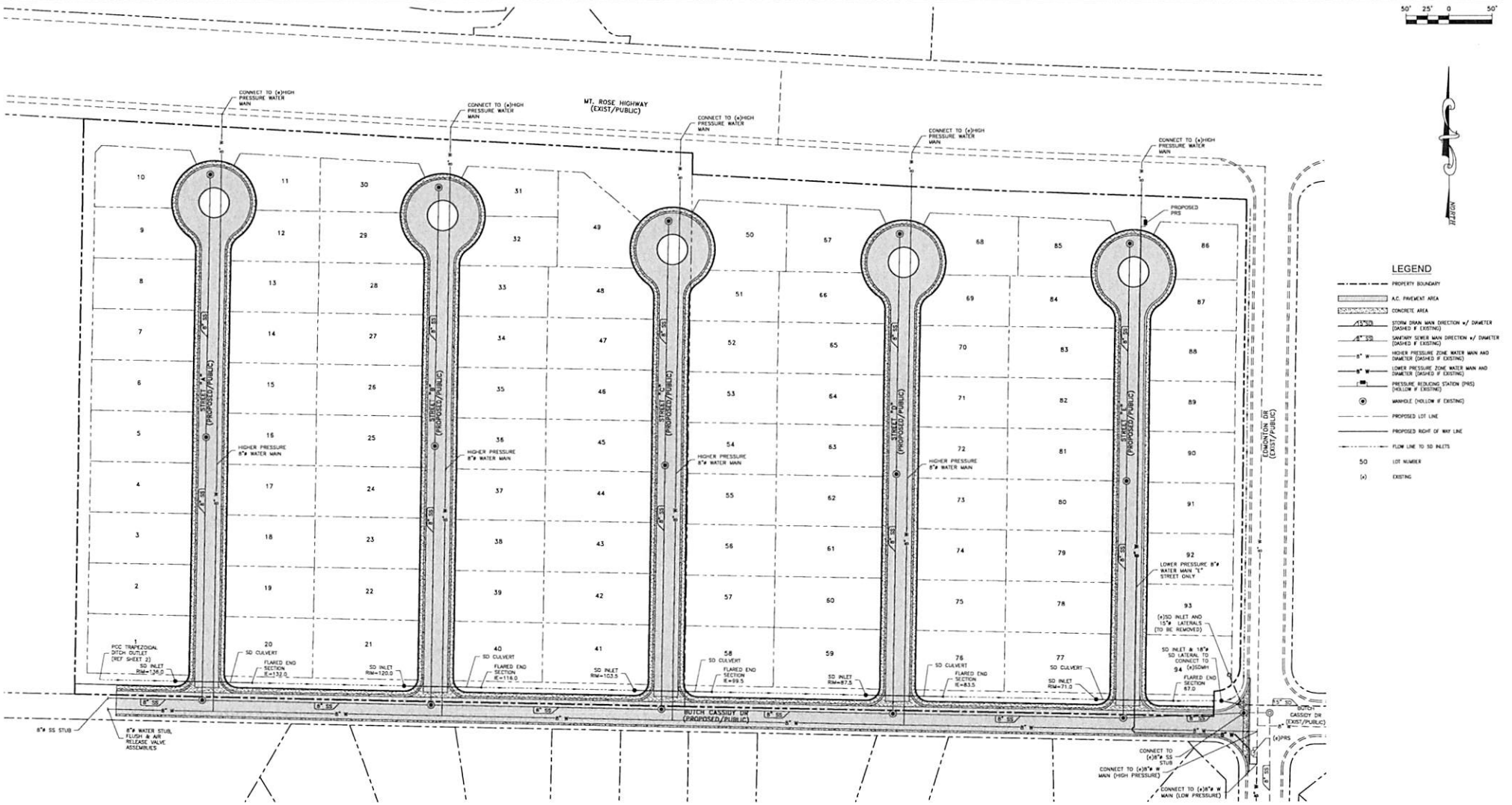
50' 25' 0 50' 100'

TENTATIVE MAP
PRELIMINARY GRADING PLAN
SHEET 2 of 6

DATE: 1/15/15
SCALE: 1"=50'
JOB #: KLS.011

TEC ENGINEERING CONSULTANTS

COLINA ROSA TENTATIVE MAP



NOTE:

1) ALL PROPOSED SANITARY SEWER MAINS TO BE OWNED AND MAINTAINED BY WASHOE COUNTY
2) ALL PROPOSED WATER MAINS TO BE OWNED AND MAINTAINED BY TMWA
3) ALL PROPOSED STORM DRAIN FACILITIES WITHIN THE RIGHT OF WAY TO OWNED AND MAINTAINED BY WASHOE COUNTY

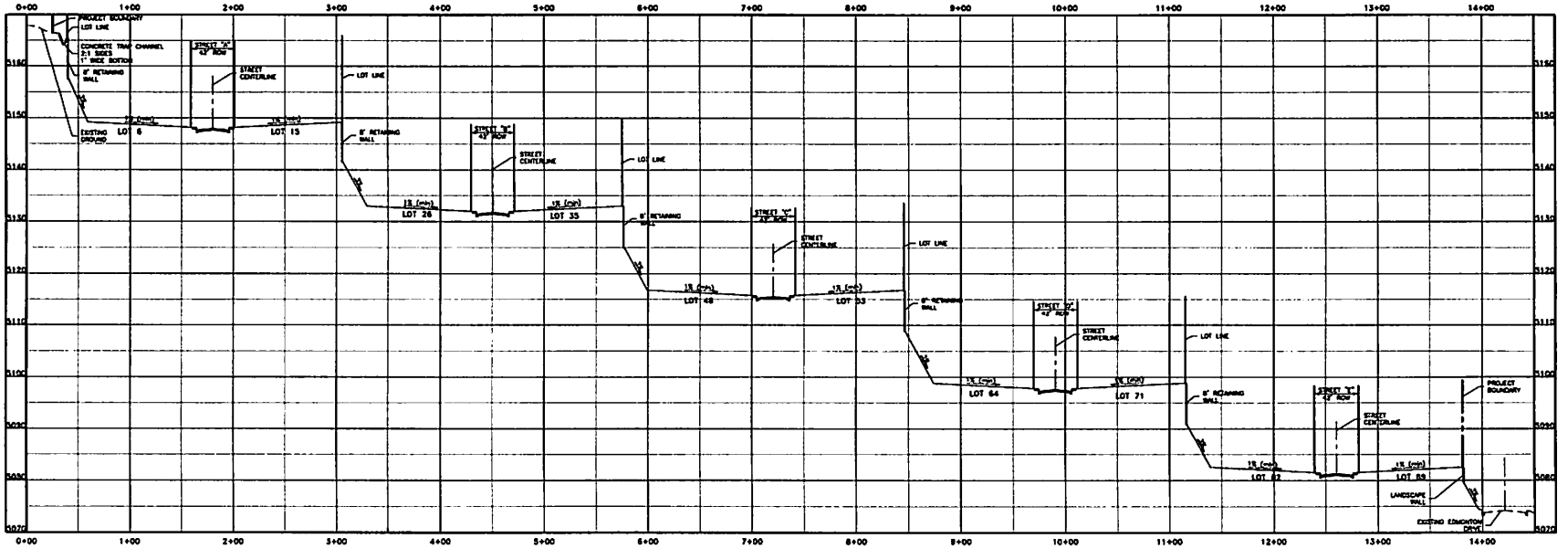
50' 25' 0 50' 100'

TENTATIVE MAP
PRELIMINARY UTILITY PLAN
SHEET 3 of 6

DATE: 1/15/15
SCALE: 1"=50'
JOB #: KLS.011

TEC ENGINEERING CONSULTANTS

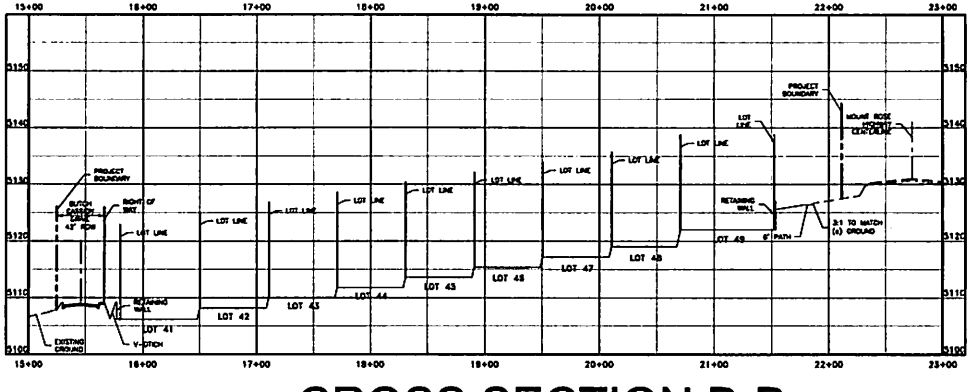
COLINA ROSA TENTATIVE MAP



HORIZONTAL SCALE
1"=50'

VERTICAL SCALE
1"=10'

CROSS SECTION A-A



HORIZONTAL SCALE
1"=50'

VERTICAL SCALE
1"=10'

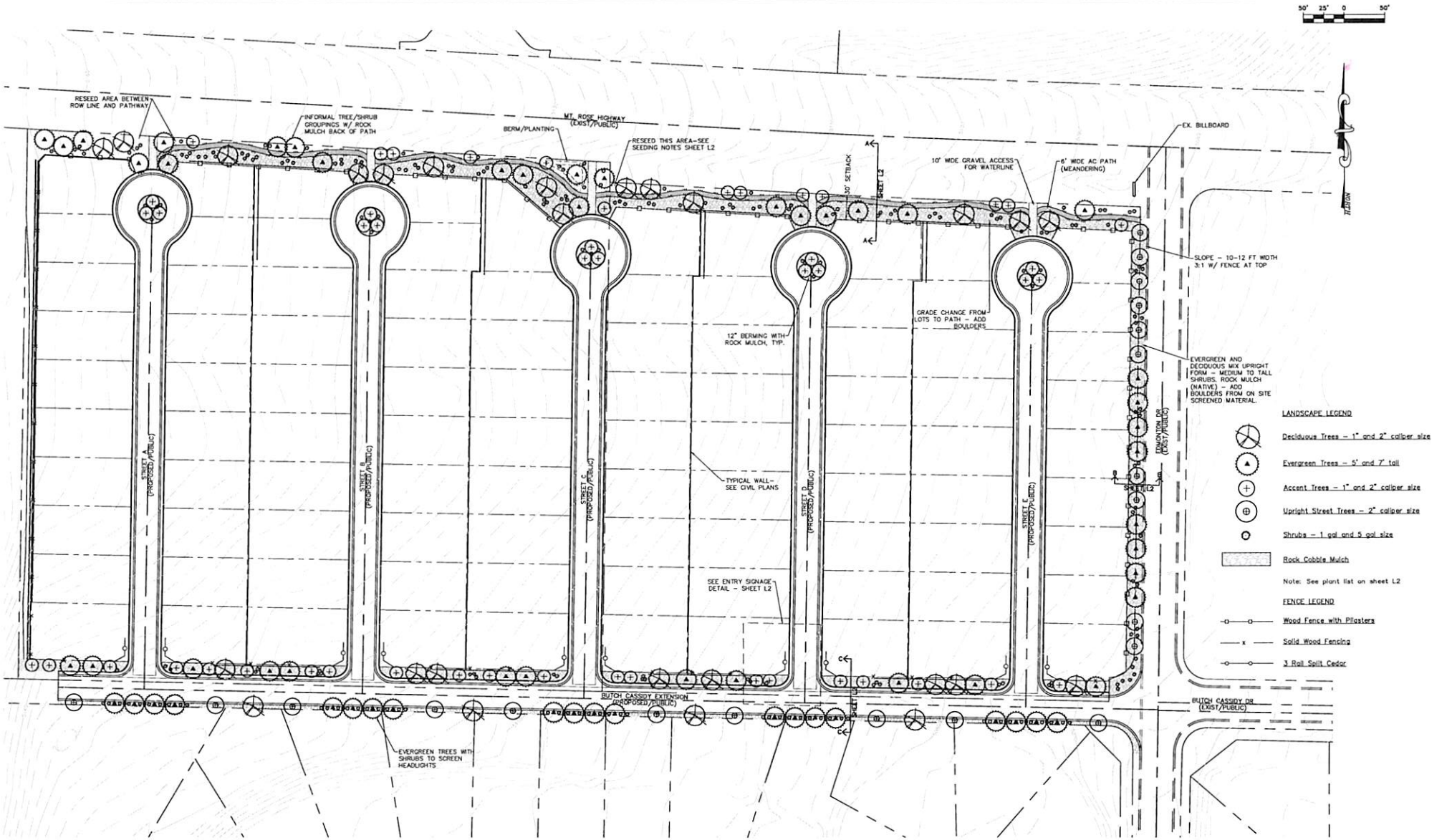
CROSS SECTION B-B

NOTES:
1) ALL STREETS WITHIN THE TENTATIVE MAP ARE PROPOSED PUBLIC.
2) REFERENCE THE GRADING PLAN FOR CROSS SECTION LOCATIONS.

DATE: 1/15/15
SCALE:
JOB #: 13.011

TEC ENGINEERING CONSULTANTS

COLINA ROSA TENTATIVE MAP



50' 25' 0 50' 100'

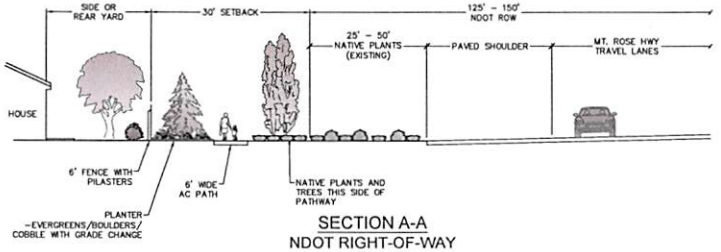
TENTATIVE MAP
PRELIMINARY LANDSCAPE PLAN
SHEET 5 of 6

LUMOS & ASSOCIATES

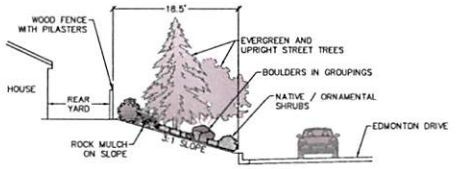
DATE: 1/14/16
SCALE: 1"=50'
JOB #: 813.011

TEC CIVIL ENGINEERING CONSULTANTS

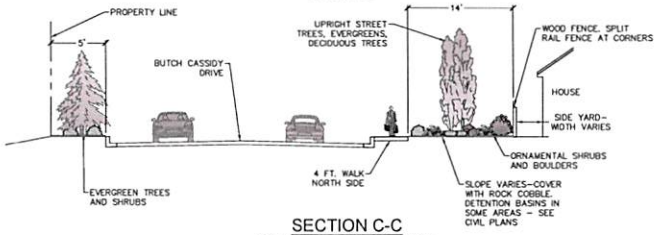
COLINA ROSA TENTATIVE MAP



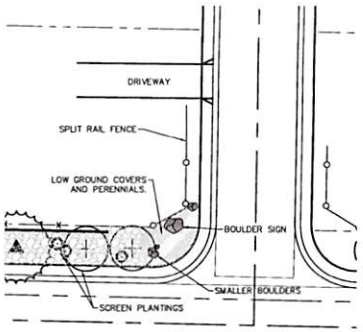
SECTION A-A
NDOT RIGHT-OF-WAY
SCALE: NTS



SECTION B-B
EDMONTON DRIVE
SCALE: NTS



SECTION C-C
BUTCH CASSIDY DRIVE
SCALE: NTS



ENTRY ENLARGEMENT

Colina Rosa Plant List

Screen plantings at the Mt. Rose Highway, Edmonton Drive and Butch Cassidy Drive, with drip irrigation

Trees

1. Pinus nigra – Austrian Pine
2. Pinus jeffreyi – Jeffrey Pine
3. Pinus sylvestri s– Scotch Pine
4. Malus sp. – Crabappie
5. Prunus virginiana – Purple Chokecherry

Shrubs

1. Caragana sp. – Peashrub
2. Buddleia alternifolia - Butterfly Bush
3. Rhus typhina – Staghorn Sumac
4. Perovskia atriplicifolia – Russian Sage
5. Caryopteris clandonensis - Bluebeard
6. Artemesia tridentata v. vaseyana - Mountain Big Sage

Interior common open space plants, with drip irrigation

Trees

1. Pinus flexilis 'Vanderwolf' – Vanderwolf Pine
2. Acer rubrum – Red Maple
3. Koelreuteria paniculata – Golden Rain Tree
4. Calocedrus decurrens – Incense Cedar

Shrubs

1. Forestiera neomexicana - New Mexico Privet
2. Forsythia intermedia – Forsythia
3. Panicum virgatum – Switch Grass
4. Viburnum dentatum – Arrowood
5. Yucca filamentosa – Adam's Needle
6. Lavendula angustifolia – Lavender
7. Ribes aureum – Golden Currant
8. Symphoricarpos albus - Snowberry

Common area plantings at disturbed areas around the project perimeter edges, without drip irrigation. An emphasis is placed on plants for erosion control and lower flammability risk.

Plants will be seeded in these areas will a drill seeder and hydroseeded in the less rocky areas.

Botanical Name	Common Name/Variety
Achillea millefolium	Yarrow
Achnatherum occidentalis	Western needlegrass
Artemesia tridentata ssp vaseyana	Mtn. sagebrush
Bromus carinatus	California brome
Elymus elymoides	Blue wildrye 'Stanislaus'
Elymus trachycaulus	Slender wheatgrass, 'Pryor'
Ericameria nauseosa	Rubber rabbitbrush
Poa secunda	Sandberg bluegrass 'Sherman'
Purshia tridentata	Bitterbrush

All dead plants and branches to be removed from these areas and the cheatgrass eliminated before the seeding completed in the late fall. Disturbed areas to be loosened and left in a rough condition. Cleared brush and topsoil from the home lots to be re-used for re-vegetation of the disturbed open spaces.

Washoe County Landscape Compliance and Applicability

Water Conservation compliance with Section 110.412.20

1. The design proposes no lawn and the use of water conserving plant material.
2. Plants to be grouped in hydrozones for water use.
3. Mulches to be used include screened on-site rock or imported rock types for slopes.
4. Soil amendments to be included into the plant pits in final design with soil testing.

Residential Use types compliance with Section 110.412.35

1. At the perimeter of the subdivision a minimum of 1 tree per 50 lineal feet is shown on the plan for arterials and collector streets.

Planting Standards compliance with Section 110.412.60

1. Climate adapted plants are shown in the planting legend.
2. Plants are compatible with the surrounding area – native plants are proposed to be extended into the site at the Mt. Rose Hwy, since they exist out to the edge of the right of way, south side of the highway. Planting types along both Edmonton and Butch Cassidy Drives are similar to those existing near the site, which include both native and ornamental types with evergreen accents.
3. Planting water use zones are compatible with the upland type plants in the area.
4. Evergreen trees proposed to be one-half 7 ft. tall and the remainder 5 ft. tall.
5. Deciduous trees proposed to be one-half 2" caliper and the remainder 1" caliper sizes.
6. Shrubs proposed to be a mixture of sizes between #1 and #5, depending on plant type, growth rate and availability.
7. Irrigation will be automatic, with main lines, valves and controllers for common area landscape
8. Common area landscape maintenance to be the responsibility of the HOA.

Compliance with Article 204 – Forest Area Section 110.204.05.c

1. Setback – A setback of 30 ft. is shown along the north side of the site, adjacent to the Mt. Rose Highway. The proposed fence with pilasters is 6 ft. tall at the edge of the setback.
2. The setback area is landscaped per the plan and section A-A. Landscaping to be similar to that on the north side of the Mt. Rose Hwy.

3-RAIL SPLIT CEDAR FENCING. 3.5 FT. TALL AT ENTRY AREAS

FENCING BETWEEN LOTS AND SIDE YARDS

ENTRY SIGN ON BOULDER

FENCING BETWEEN LOTS ON NORTH/SOUTH SLOPES

FENCING WITH PILASTERS ALONG MT. ROSE HWY

TENTATIVE MAP
DETAILS AND NOTES
SHEET 6 of 6

LUMOS & ASSOCIATES

DATE: 1/14/16
SCALE: 1"=50'
JOB #: KLS-011

TEC ENGINEERING CONSULTANTS

Staff Assigned Case No.: _____

Washoe County Development Application

Project Information

Project Name (commercial/industrial projects only):
Colina Rosa

Project
Description: a 94 lot single family project with a common open space development

Project Address: **3800 Mount Rose Highway & 5185 Edmonton Drive**

Project Area (acres or square feet): **20.1 acres**

Location Information

Project Location (with point of reference to major cross streets **AND** area locator):
The 20.1 acre site is lcate at the southwest corner of the intersection of Edmonton Dive with the Mt Rose Highway

Assessor's Parcel No(s):	Parcel Acreage:	Assessor's Parcel No(s):	Parcel Acreage:
049-402-02	10.95 acres		
049-402-07	9.18 acres		

Section(s)/Township/Range: 30 T18 R20

Indicate any previous Washoe County approvals associated with this application:
Case Nos. Not Known

Applicant Information

Property Owner:	**Professional Consultant:**
Name: Bernard Trust	Name: KLS Planning & Design
Address: 2500 E Lakeridge Shores Drive	Address: 9480 Double Diamond Parkway
Reno, NV Zip: 89519	Reno, NV Zip: 89521
Phone: 775 826 4896 Fax: N/A	Phone: 852-7606 Fax: 852-7609
Email: Dabdab2500@aol.com	**Email: : johnk@klsdesigngroup.com**
Cell: N/A Other: N/A	Cell: 857- 7710 Other: N/A
Contact Person: Donald Bernard	Contact Person: John Krmpotic, AICP
Applicant/Developer:	**Other Persons to be Contacted:**
Name: Towne Development of Sacramento, Inc.	Name: TEC Engineering
Address: : 11060 White Rock Road, Suite 150	Address: 9480 Double Diamond Parkway
Sacramento, CA 95670	Reno, NV Zip: 89521
Phone: 916 262-8820 Fax: N/A	Phone: 775-352-7800 Fax: 852-7609
Email: mrichter@hbtsac.com	**Email: jgilles@tecreno.com**
Cell: 760 -717-7221 Other: N/A	Cell: 775-846-0164 Other: N/A
Contact Person: Michael Richter	Contact Person: Jason Gilles

For Office Use Only

Date Received: Initial:	Planning Area:
County Commission District:	
CAB(s):	Land Use Designation(s):

Tentative Subdivision Map Application
Supplemental Information

(All required information may be separately attached)

Chapter 110 of the Washoe County Code is commonly known as the Development Code. Specific references to tentative subdivision maps may be found in Article 608, Tentative Subdivision Maps.

1. What is the location (address or distance and direction from nearest intersection)?

3800 Mount Rose Highway & 5185 Edmonton Drive. The site is bound by Butch Cassidy Drive, Edmonton Drive, and the Mt Rose Highway.

2. What is the subdivision name (proposed name must not duplicate the name of any existing subdivision)?

Colina Rosa

3. Density and lot design:

a. Acreage of project site	20.1
b. Total number of lots	94
c. Dwelling units per acre	4.68 gross density
d. Minimum and maximum area of proposed lots	Min is 5,260 sf, 8,680 is max sf
e. Minimum width of proposed lots	60 feet
f. Average lot size	6,830 sf

4. Utilities:

a. Sewer Service	Washoe County
b. Electrical Service	NV Energy
c. Telephone Service	ATT
d. LPG or Natural Gas Service	NV Energy
e. Solid Waste Disposal Service	Waste Management
f. Cable Television Service	Charter Communications
g. Water Service	TMWA

5. For common open space subdivisions (Article 408), please answer the following:

   a. Acreage of common open space:

   1.75 acres which is 8.7% of the site

   b. Development constraints within common open space (slope, wetlands, faults, springs, ridgelines):

   There are no wetlands, faults, springs, ridgelines, or water features on the site. One feature that is most constraining is the 6 to 7% slope that is fairly constant from one end of the site to the other. It does create more challenges for grading the site.

   c. Range of lot sizes (include minimum and maximum lot size):

   Lots sizes range from 5,260 sf to 8,680 sf

   d. Average lot size:

   The average is 6,830 sf

   e. Proposed yard setbacks if different from standard:

   Front = 15'
   Side = 5'
   Rear = 20'

   f. Justification for setback reduction or increase, if requested:

   The code allows 5 du per acre and the relationship to lot size and proposed setbacks are typical for a project of this design, character, and density. The NC code setbacks appear to be established if a commercial use was being proposed in the zone.

   g. Identify all proposed non-residential uses:

   The only use is an attached single family project. There is a walking trail located in the common area adjacent to the highway.

   h. Improvements proposed for the common open space:

There is a walking trail that will be designed at minimum grades to accommodate all types of trail users and common area landscaping. The idea in our trial plan was to have a connection to all of the cul de sacs for good circulation thru the neighborhood.

i. Describe or show on the tentative map any public or private trail systems within common open space of the development:

Please see the attached trail on the tentative map.

j. Describe the connectivity of the proposed trail system with existing trails or open space adjacent to or near the property:

The trail is established in the common area and open for public use. It will connect to each cul de sac and to the exterior of the property. The intent is to have good integration in the neighborhood and to the exterior.

k. If there are ridgelines on the property, how are they protected from development?

There are not any ridgelines on the site and thus do not need to be protected by the project.

l. Will fencing be allowed on lot lines or restricted? If so, how?

Solid perimeter fences will be allowed on lot lines. It will be 6' privacy fence on side yards and 6' open view fence on the back of slopes. We have a split rail along Butch Cassidy to create an open feel.

m. Identify the party responsible for maintenance of the common open space:

There will be a Landscape Maintenance Association or a Home Owners Association formed that will be responsible for maintenance of the common area.

6. Is the project adjacent to public lands or impacted by "Presumed Public Roads" as shown on the adopted April 27, 1999 Presumed Public Roads (see Washoe County Public Works website at http://www.washoecounty.us/pubworks/engineering.htm). If so, how is access to those features provided?

This is not applicable as the site is NOT located adjacent to public federal lands that are intended for protection or impacted by "presumed public roads". It is next to land owned by Washoe County.

7. Is the parcel within the Truckee Meadows Service Area?

☒ Yes	☐ No

8. Is the parcel within the Cooperative Planning Area as defined by the Regional Plan?

☐ Yes	☒ No	If yes, within what city?

9. Will a special use permit be required for utility improvement? If so, what special use permits are required and are they submitted with the application package?

There are no SUP's required for the project. Specifically, the site is located in the MRSHOD district of the Forest Area Plan. Policy.3.5 of that plan specifically excludes an SUP for residential projects.

10. Has an archeological survey been reviewed and approved by NV State Historic Preservation Office (SHPO) on the property? If yes, what were the findings?

There was no requirement for an archeological survey. Thus, no such survey has been prepared as there is no indication of cultural resources on site.

11. Indicate the type and quantity of water rights the application has or proposes to have available:

a. Permit #	N/A	acre-feet per year	
b. Certificate #	N/A	acre-feet per year	
c. Surface Claim #	N/A	acre-feet per year	
d. Other #	N/A	acre-feet per year	

e. Title of those rights (as filed with the State Engineer in the Division of Water Resources of the Department of Conservation and Natural Resources):

Water rights will be purchased from TMWA as the site is located in their service territory.

12. Describe the aspects of the tentative subdivision that contribute to energy conservation:

Best practices by using building materials for energy efficient design and construction. Building orientation for good solar exposure is proposed where site constraints allow such flexibility.

13. Is the subject property in an area identified by the Department of Planning & Development as potentially containing rare or endangered plants and/or animals, critical breeding habitat, migration routes or winter range? If so, please list the species and describe what mitigation measures will be taken to prevent adverse impacts to the species:

The site is not in an area containing rare or endangered plants or animals, critical breeding habitat, migration routes or winter range. Therefore, no mitigation measures are being required or proposed.

14. If private roads are proposed, will the community be gated? If so, is a public trail system easement provided through the subdivision?

The project will contain only public roads that meet county standards, However, it will not be gated.

15. Is the subject property located adjacent to an existing residential subdivision? If so, describe how the tentative map complies with each additional adopted policy and code requirement of Article 434, Regional Development Standards within Cooperative Planning Areas and all of Washoe County, in particular, grading within 50 and 200 feet of the adjacent developed properties under 5 acres and parcel matching criteria:

The project is not located adjacent to a Cooperative Planning Area, thus the article does not apply.

16. Are there any applicable policies of the adopted area plan in which the project is located that require compliance? If so, which policies and how does the project comply?

We are not aware of any policies in the Forest Area Plan that require compliance.

17. Are there any applicable area plan modifiers in the Development Code in which the project is located that require compliance? If so, which modifiers and how does the project comply?

There are no applicable Forest Area Plan modifiers that require compliance.

18. Will the project be completed in one phase or is phasing planned? If so, please provide that phasing plan:

This project will be completed in roughly 4 phases consisting of 20 to 25 lots per phase for a total of 94 lots.

19. Is the project subject to Article 424, Hillside Development? If yes, please address all requirements of the Hillside Ordinance in a separate set of attachments and maps.

❑ Yes	❑ No	If yes, include a separate set of attachments and maps.

20. Is the project subject to Article 418, Significant Hydrologic Resources? If yes, please address Special Review Considerations within Section 110.418.30 in a separate attachment.

❑ Yes	❑ No	If yes, include separate attachments.

Grading

Please complete the following additional questions if the project anticipates grading that involves: (1) Disturbed area exceeding twenty-five thousand (25,000) square feet not covered by streets, buildings and landscaping; (2) More than one thousand (1,000) cubic yards of earth to be imported and placed as fill in a special flood hazard area; (3) More than five thousand (5,000) cubic yards of earth to be imported and placed as fill; (4) More than one thousand (1,000) cubic yards to be excavated, whether or not the earth will be exported from the property; or (5) If a permanent earthen structure will be established over four and one-half (4.5) feet high:

21. How many cubic yards of material are you proposing to excavate on site?

There will be minimal grading needed for this project. Our prelim Grading Plan includes about 85,000 yards of excavation material. See below.

22. How many cubic yards of material are you exporting or importing? If exporting of material is anticipated, where will the material be sent? If the disposal site is within unincorporated Washoe County, what measures will be taken for erosion control and revegetation at the site? If none, how are you balancing the work on-site?

There may be export as there is a maximum of 11' of cut and a maximum of 8' of fill are proposed with this grading plan. There is no site identified at this time for export. However, our civil engineers have expressed that they believe they can balance the site with refined engineering. All disturbed areas on the site will be seeded or hydro seed as a minimum and many areas include plantings and landscaping

23. Can the disturbed area be seen from off-site? If yes, from which directions, and which properties or roadways? What measures will be taken to mitigate their impacts?

The intent is that disturbed area will not be visible as they are going to reseeded and/or landscaped depending on location. See the landscape plan and the detail of the plan.

24. What is the slope (Horizontal:Vertical) of the cut and fill areas proposed to be? What methods will be used to prevent erosion until the revegetation is established?

There is a maximum of 3:1 slope that includes rock mulch, evergreen trees, street trees, boulders in groupings, and native shrubs in these sloped areas.

25. Are you planning any berms and, if so, how tall is the berm at its highest? How will it be stabilized and/or revegetated?

There is a small berm proposed along the mt rose highway that will be reseeded and replanted. Its has a maximum height of 3'

26. Are retaining walls going to be required? If so, how high will the walls be, will there be multiple walls with intervening terracing, and what is the wall construction (i.e. rockery, concrete, timber, manufactured block)? How will the visual impacts be mitigated?

Yes there will be rockery walls and or retaining walls per the grading plan. These are multiple walls with terracing and landscape slopes to mitigate visual impacts. Wall heights vary throughout the site as shown on the grading plan.

27. Will the grading proposed require removal of any trees? If so, what species, how many, and of what size?

There are no trees being removed with the proposed project. It is entirely sage and bitterbrush

28. What type of revegetation seed mix are you planning to use and how many pounds per acre do you intend to broadcast? Will you use mulch and, if so, what type?

Re-vegetation is being proposed that will include a seed mix shown on the landscape plan.

Hydromulch will be applied as well.

29. How are you providing temporary irrigation to the disturbed area?

There is no need for temporary irrigation due to time of year planting for reseeded area.

30. Have you reviewed the revegetation plan with the Washoe Storey Conservation District? If yes, have you incorporated their suggestions?

We have not provided the revegetation plan WSCD. We would be glad to do so in process if that is appropriate.

Tahoe Basin

Please complete the following additional questions if the project is within the Tahoe Basin:

31. Who is the Tahoe Regional Planning Agency (TRPA) project planner and what is his/her TRPA extension?

N/A

32. Is the project within a Planning & Plan (CP) area?

☐ Yes	☒ No	If yes, which CP?

33. State how you are addressing the goals and policies of the Planning & Plan for each of the following sections:

    a. Land Use:

N/A

    b. Transportation:

N/A

    c. Conservation:

N/A

d. Recreation:

N/A

e. Public Services:

N/A

34. Identify where the development rights for the proposed project will come from:

N/A

35. Will this project remove or replace existing housing?

❑ Yes	☒ No	If yes, how many units?

36. How many residential allocations will the developer request from Washoe County?

None

37. Describe how the landscape plans conform to the Incline Village General Improvement District landscaping requirements:

Not applicable

Property Owner Affidavit

Applicant Name: KARI JOHNSON

The receipt of this application at the time of submittal does not guarantee the application complies with all requirements of the Washoe County Development Code, the Washoe County Master Plan or the applicable area plan, the applicable regulatory zoning, or that the application is deemed complete and will be processed.

STATE OF NEVADA)
)
COUNTY OF WASHOE)

I, KARI JOHNSON,
(please print name)

being duly sworn, depose and say that I am the owner* of the property or properties involved in this application as listed below and that the foregoing statements and answers herein contained and the information herewith submitted are in all respects complete, true and correct to the best of my knowledge and belief. I understand that no assurance or guarantee can be given by members of Planning and Development.

(A separate Affidavit must be provided by each property owner named in the title report.)

Assessor Parcel Number(s): 049-402-02 & 49-402-07

Printed Name KARI JOHNSON

Signed Kari Johnson

Address 2710 ATASTOR WAY
RENO, NV 89521

Subscribed and sworn to before me this 13 day of JANUARY, 2016.

Cassandra France
Notary Public in and for said county and state

My commission expires: 4-7-19

(Notary Stamp)

CASSANDRA FRANCE
Notary Public - State of Nevada
Appointment Recorded in Washoe County
No: 15-1309-2 - Expires April 7, 2019

*Owner refers to the following: (Please mark appropriate box.)

- ☒ Owner
- ☐ Corporate Officer/Partner (Provide copy of recorded document indicating authority to sign.)
- ☐ Power of Attorney (Provide copy of Power of Attorney.)
- ☐ Owner Agent (Provide notarized letter from property owner giving legal authority to agent.)
- ☐ Property Agent (Provide copy of record document indicating authority to sign.)
- ☐ Letter from Government Agency with Stewardship

Property Owner Affidavit

Applicant Name: Donald Bernard

The receipt of this application at the time of submittal does not guarantee the application complies with all requirements of the Washoe County Development Code, the Washoe County Master Plan or the applicable area plan, the applicable regulatory zoning, or that the application is deemed complete and will be processed.

STATE OF NEVADA)
)
COUNTY OF WASHOE)

I, Donald Bernard,
(please print name)

being duly sworn, depose and say that I am the owner* of the property or properties involved in this application as listed below and that the foregoing statements and answers herein contained and the information herewith submitted are in all respects complete, true and correct to the best of my knowledge and belief. I understand that no assurance or guarantee can be given by members of Planning and Development.

(A separate Affidavit must be provided by each property owner named in the title report.)

Assessor Parcel Number(s): 049-402-02

Printed Name Donald Bernard

Signed

Address 2500 East Lakeridge Shores

Reno NV 89519

Subscribed and sworn to before me this 11 day of January, 2016

Notary Public in and for said county and state

My commission expires: 2/27/18

(Notary Stamp)

SARAJ LORENZ
Notary Public - State of Nevada
Appointment Recorded in Washoe County
No: 10-1383-2 - Expires February 27, 2018

*Owner refers to the following: (Please mark appropriate box.)

- ☒ Owner
- ☐ Corporate Officer/Partner (Provide copy of recorded document indicating authority to sign.)
- ☐ Power of Attorney (Provide copy of Power of Attorney.)
- ☐ Owner Agent (Provide notarized letter from property owner giving legal authority to agent.)
- ☐ Property Agent (Provide copy of record document indicating authority to sign.)
- ☐ Letter from Government Agency with Stewardship

Washoe County Treasurer
P.O. Box 30039, Reno, NV 89520-3039
ph: (775) 328-2510 fax: (775) 328-2500

Washoe County Treasurer
Tammi Davis

Bill Detail

Back to Account Detail | Change of Address | Print this Page

Washoe County Parcel Information

Parcel ID	Status	Last Update
04940207	Active	1/15/2016 2:09:56 AM

Current Owner:
KAJ PROPERTIES II LLC
PO BOX 19765
RENO, NV 89511

SITUS:
5185 EDMONTON DR
WCTY NV

Taxing District
6000

Geo CD:

Legal Description

Township 18 Lot 2 SubdivisionName _UNSPECIFIED Range 20

Installments

Period	Due Date	Tax Year	Tax	Penalty/Fee	Interest	Total Due
INST 1	8/17/2015	2015	$0.00	$0.00	$0.00	$0.00
INST 2	10/5/2015	2015	$122.10	$10.98	$0.00	$133.08
INST 3	1/4/2016	2015	$3,174.45	$158.72	$0.00	$3,333.17
INST 4	3/7/2016	2015	$3,174.44	$0.00	$0.00	$3,174.44
		Total Due:	**$6,470.99**	**$169.70**	**$0.00**	**$6,640.69**

Tax Detail

	Gross Tax	Credit	Net Tax
State of Nevada	$666.20	$0.00	$666.20
Washoe County	$5,453.83	$0.00	$5,453.83
Washoe County Sc	$4,461.59	$0.00	$4,461.59
Sierra Fire Protection District	$2,116.17	$0.00	$2,116.17
Truckee Mdw Ungr Water	$2.48	$0.00	$2.48
Total Tax	**$12,700.27**	**$0.00**	**$12,700.27**

Payment History

Tax Year	Bill Number	Receipt Number	Amount Paid	Last Paid
2015	247560	B15.132510	$3,174.45	10/23/2015
2015	247560	B15.3294	$3,176.93	7/22/2015

Pay By Check

Please make checks payable to:
WASHOE COUNTY TREASURER

Mailing Address:
P.O. Box 30039
Reno, NV 89520-3039

Overnight Address:
1001 E. Ninth St., Ste D140
Reno, NV 89512-2845

Change of Address

All requests for a mailing address change must be submitted in writing, including a signature (unless using the online form).

To submit your address change online click here.

Address change requests may also be faxed to:
(775) 328-2500

Address change requests may also mailed to:
Washoe County Treasurer
P O Box 30039
Reno, NV 89520-3039

Washoe County Treasurer
P.O. Box 30039, Reno, NV 89520-3039
ph. (775) 328-2510 fax: (775) 328-2500

Washoe County Treasurer
Tammi Davis

Bill Detail

Back to Account Detail | Change of Address | Print this Page

Washoe County Parcel Information

Parcel ID	Status	Last Update
04940202	Active	1/15/2016 2:09:56 AM

Current Owner:
BERNARD TRUST, DONALD A & CAROLYN K
2500 E LAKERIDGE SHORES
RENO, NV 89519

SITUS:
3800 MOUNT ROSE HWY
WCTY NV

Taxing District
6000

Geo CD:

Legal Description

Lot 1 Township 18 SubdivisionName _UNSPECIFIED Range 20

Installments

Period	Due Date	Tax Year	Tax	Penalty/Fee	Interest	Total Due
INST 1	8/17/2015	2015	$0.00	$0.00	$0.00	$0.00
INST 2	10/5/2015	2015	$0.00	$0.00	$0.00	$0.00
INST 3	1/4/2016	2015	$0.00	$0.00	$0.00	$0.00
INST 4	3/7/2016	2015	$1,308.38	$0.00	$0.00	$1,308.38
		Total Due:	**$1,308.38**	**$0.00**	**$0.00**	**$1,308.38**

Tax Detail

	Gross Tax	Credit	Net Tax
State of Nevada	$397.33	($122.74)	$274.59
Washoe County	$3,252.68	($1,004.84)	$2,247.84
Washoe County Sc	$2,660.92	($822.03)	$1,838.89
Sierra Fire Protection District	$1,262.09	($389.89)	$872.20
Truckee Mdw Ungr Water	$1.48	$0.00	$1.48
Total Tax	**$7,574.50**	**($2,339.50)**	**$5,235.00**

Payment History

Tax Year	Bill Number	Receipt Number	Amount Paid	Last Paid
2015	247537	B15.109234	$1,308.38	9/30/2015
2015	247537	B15.15934	$1,309.86	7/31/2015
2015	247537	B15.175171	$1,308.38	12/31/2015

Pay By Check

Please make checks payable to:
WASHOE COUNTY TREASURER

Mailing Address:
P.O. Box 30039
Reno, NV 89520-3039

Overnight Address:
1001 E. Ninth St., Ste D140
Reno, NV 89512-2845

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Address change requests may also mailed to:
Washoe County Treasurer
P O Box 30039
Reno, NV 89520-3039

LUMOS & ASSOCIATES

922 Prototype Dr.
Reno, Nevada 89521
(775) 827-6111 • fax 827-6122

Prepared by: Dale Doerr

LANDSCAPE WATER USE CALCULATIONS

Project Name: Colina Rosa Common Area (Preliminary)
Date:1-14-16

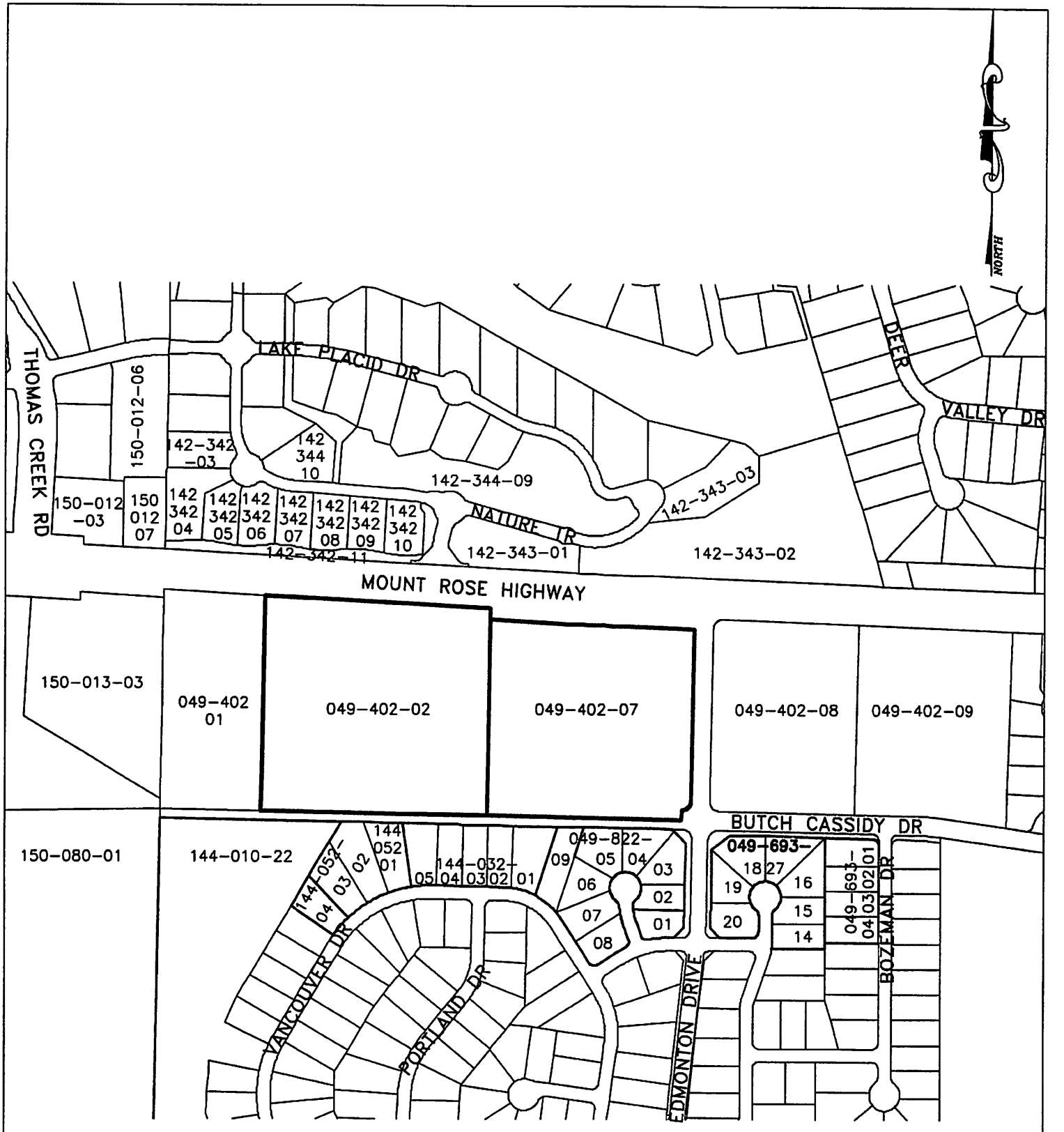
Drip System:

assumption:
1 gallon per hour emitters -
(1/1 gal. plant; 2/5 gal. plant; 3/15 gal. plant; 4/24" box plant)

no.of plants	340	1 gal shrubs (x1)
	335	5 gal shrubs (x2)
	75	Evergreen trees (x3)
	75	2" + Cal. trees (x4)
=	1,535	drip emitters @ 1 gph
x	4	hours (4 hours per day)
=	6140	gallons per day
x	64	waterings (twice/week x 32 weeks)
=	**392960**	**gallons per year**
	392960	total gallons per year
/	325851	gallons per acre foot
=	**1.206**	**acre feet per year**

Lawn/Spray System

New Turf Area	0	Area (SF)
x	2	Inches per Week
x	32	Weeks per year
=	**0**	**acre feet per year**
Existing Turf Area	0	Area (SF)
x	2	Inches per Week
x	32	Weeks per year
/	**0**	**acre feet per year**
	0	**acre feet per year**


NORTH
THOMAS CREEK RD
LAKE PLACID DR
DEER
VALLEY DR
150-012-06
142-342-03
142 344 10
142-344-09
142-343-03
150-012-03
150 012 07
142 342 04
142 342 05
142 342 06
142 342 07
142 342 08
142 342 09
142 342 10
142-342-11
NATURE TR
142-343-01
142-343-02
MOUNT ROSE HIGHWAY
150-013-03
049-402 01
049-402-02
049-402-07
049-402-08
049-402-09
BUTCH CASSIDY DR
150-080-01
144-010-22
144 052 01
144-032-
05 04 03 02 01
049-822-
09 05 04 03 02 01 06 07 08
049-693-
18 27 19 16 15 20 14
049-693-
04 03 02 01
144-052-
04 03 02
VANCOUVER DR
PORTLAND DR
EDMONTON DRIVE
BOZEMAN DR

SITE MAP

TRUCKEE MEADOWS WATER AUTHORITY
www.tmwa.com

Quality. Delivered.

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P 775.834.8080 • F 775.834.8003

January 12, 2016

Mr. Michael Richter
Towne Development of Sacramento, Inc.
11060 White Rock Road, Suite 150
Rancho Cordova, CA 95670

RE: Colina Rosa, TMWA Work Order # 16-4781
Acknowledgement of Water Service

Dear Mr. Richter:

I have reviewed the plans for the above referenced development ("Project") as submitted to the Truckee Meadows Water Authority and have determined the Project is within the Truckee Meadows Water Authority's retail water service area. This letter constitutes an Acknowledgment of Water Service pursuant to NAC 445A.6666, and the Truckee Meadows Water Authority hereby acknowledges that Truckee Meadows Water Authority is agreeable to supplying water service to the Project, subject to applicant satisfying certain conditions precedent, including, without limitation, the dedication of water resources, approval of the water supply plan by the local health authority, the execution of a Water Service Agreement, payment of fees, and the construction and dedication of infrastructure in accordance with our rules and tariffs. This Acknowledgement does not constitute a legal obligation by Truckee Meadows Water Authority to supply water service to the Project, and is made subject to all applicable Truckee Meadows Water Authority Rules.

Review of conceptual site plans or tentative maps by Truckee Meadows Water Authority does not constitute an application for service, nor implies a commitment by Truckee Meadows Water Authority for planning, design or construction of the water facilities necessary for service. The extent of required off-site and on-site water infrastructure improvements will be determined by Truckee Meadows Water Authority upon receiving a specific development proposal or complete application for service and upon review and approval of a water facilities plan by the local health authority. Because the NAC 445A Water System regulations are subject to interpretation, Truckee Meadows Water Authority cannot guarantee that a subsequent water facility plan will be approved by the health authority or that a timely review and approval of the Project will be made. The Applicant should carefully consider the financial risk associated with committing resources to their project prior to receiving all required approvals. After submittal of a complete Application for Service, the required facilities, the cost of these facilities, which could be significant, and associated fees will be estimated and will be included as part of the Water Service Agreement necessary for the Project. All fees must be paid to Truckee Meadows Water Authority prior to water being delivered to the Project.

Please call me at 834-8292 at your convenience if you have any questions.

Sincerely,
Truckee Meadows Water Authority

Keith Ristinen, P.E.
Principal Engineer

SOLAEGUI
ENGINEERS, LTD

COLINA ROSA

TRAFFIC STUDY

JANUARY, 2016

Prepared by:
Solaegui Engineers, Ltd.
715 H Street
Sparks, Nevada 89431
(775) 358-1004

TABLE OF CONTENTS

LIST OF FIGURES

COLINA ROSA

TRAFFIC STUDY

EXECUTIVE SUMMARY

The proposed Colina Rosa development will be located in Washoe County, Nevada. The project site is located in the southwest corner of the Mt. Rose Highway/Edmonton Drive intersection. The project site is currently undeveloped land. The purpose of this study is to address the project's impact upon the adjacent street network. The Edmonton Drive and Wedge Parkway intersections with Mt. Rose Highway and Edmonton Drive/Butch Cassidy Drive intersection have been identified for capacity analysis for the existing, existing pus project, 2025 base, and 2025 base plus project scenarios.

The proposed Colina Rosa development will include the construction of a residential subdivision containing 94 single family dwelling units. The project is anticipated to generate 895 average daily trips with 71 trips occurring during the AM peak hour and 94 trips occurring during the PM peak hour.

Traffic generated by the proposed Colina Rosa development will have some impact on the adjacent street network. The following recommendations are made to mitigate project traffic impacts.

It is recommended that any required signing, striping or traffic control improvements comply with Nevada Department of Transportation and Washoe County requirements.

It is recommended that the Edmonton Drive/Butch Cassidy Drive intersection be improved as a four-leg intersection with stop sign control and a shared left turn-through-right turn lane at the new west approach.

It is recommended that Butch Cassidy Drive be constructed per Washoe County standards as a new two-lane roadway from Edmonton Drive to the project's west property line with a temporary turnaround.

It is recommended that the project access street intersections with Butch Cassidy Drive be constructed with stop sign control at the north approaches and single lanes at all approaches.

It is recommended that the interior streets/cul-de-sacs be constructed per Washoe County local street standards.

INTRODUCTION

STUDY AREA

The proposed Colina Rosa development will be located in Washoe County, Nevada. The project site is located in the southwest corner of the Mt. Rose Highway/Edmonton Drive intersection. Figure 1 shows the approximate location of the project site. The purpose of this study is to address the project's impact upon the adjacent street network. The Edmonton Drive and Wedge Parkway intersections with Mt. Rose Highway and the Edmonton Drive/Butch Cassidy Drive intersection have been identified for capacity analysis for the existing, existing pus project, 2025 base, and 2025 base plus project scenarios.

EXISTING AND PROPOSED LAND USES

The project site is currently undeveloped land. Adjacent properties generally include residential development to the north and south and undeveloped land to the east and west. The proposed Colina Rosa development will include the construction of a residential subdivision containing 94 single family dwelling units.

EXISTING AND PROPOSED ROADWAYS AND INTERSECTIONS

Mt. Rose Highway is a five-lane roadway with two through lanes in each direction and a center two-way left turn lane in the vicinity of the site. The speed limit transitions from 50 to 55 miles per hour approximately 325 feet east of Edmonton Drive. Roadway improvements generally include bike lanes with paved and graded shoulders on both sides of the roadway.

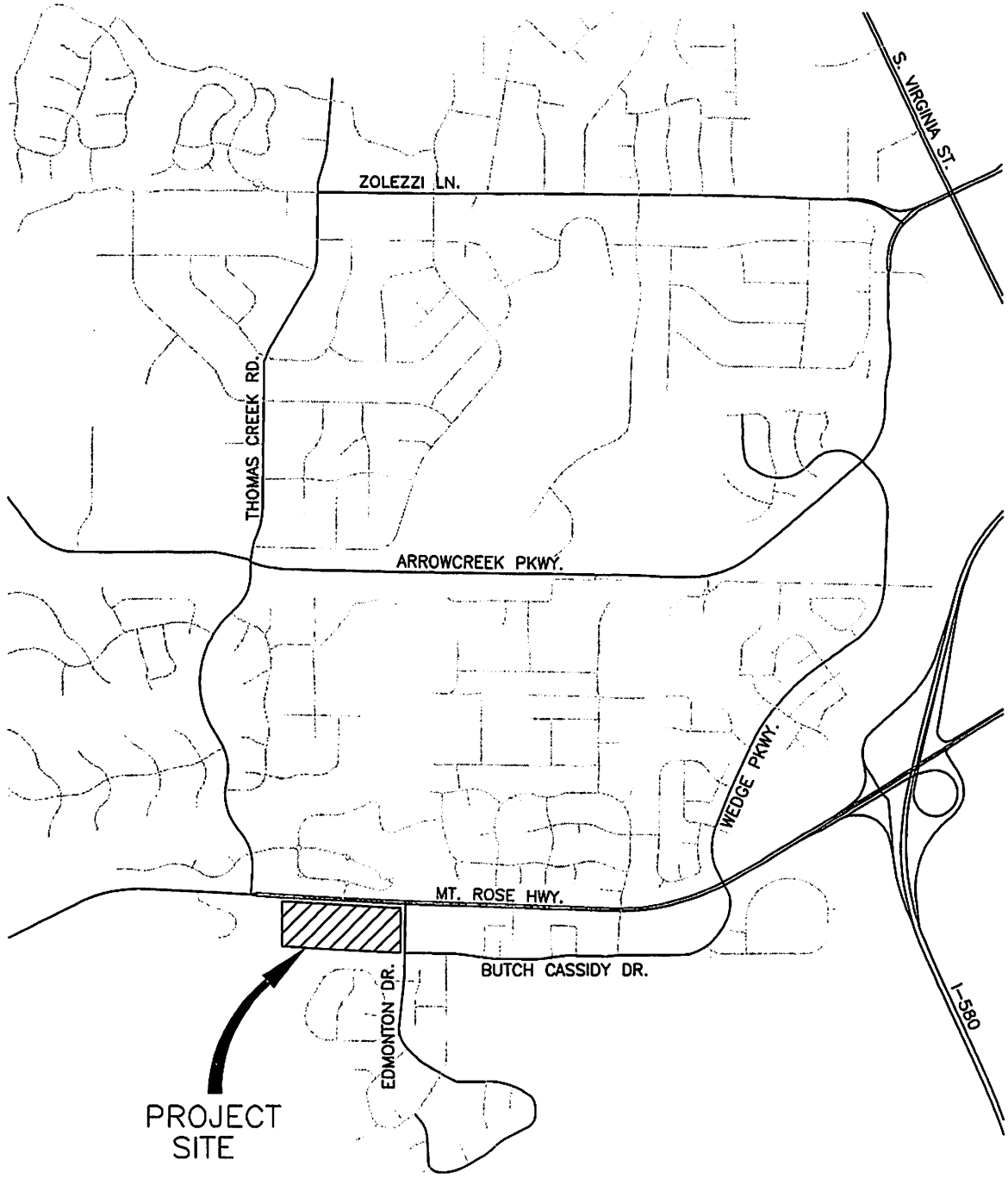
Wedge Parkway is a four-lane roadway with two through lanes in each direction north and south of Mt. Rose Highway. The speed limits is posted for 35 miles per hour. Roadway improvements include curb, gutter, sidewalk and bike lanes on both sides of the street and a raised center median.

Edmonton Drive is a two-lane roadway with one through lane in each direction south of Mt. Rose Highway. The speed limit is posted for 25 miles per hour. Roadway improvements generally include curb and gutter on both sides of the street and sidewalk on the east side of the street south of Butch Cassidy Drive.

Butch Cassidy Drive is a two-lane roadway with one through lane in each direction east of Edmonton Drive. The speed limit is posted for 25 miles per hour except near Galena High School where it is posted for 15 miles per hour. Roadway improvements include curb and gutter on both sides of the street and sidewalk on the south side of the street. The roadway will be extended west of Edmonton Drive with development of the project.

SOLAEGUI
ENGINEERS LTD.

N.T.S.



COLINA ROSA

VICINITY MAP

FIGURE 1

The Mt. Rose Highway/Wedge Parkway intersection is a signalized four-leg intersection with protected phasing for all left turn movements. The north and south approaches each contain one left turn lane, one through lane, and one right turn lane. The east approach contains dual left turn lane, two through lanes, and one right turn lane. The west approach contains dual left turn lanes, two through lanes, and one shared through-right turn lane.

The Mt. Rose Highway/Edmonton Drive intersection is an unsignalized three-leg intersection with stop control on the south Edmonton Drive approach. The east approach contains one left turn lane and two through lanes. The west approach contains one through lane and a shared through-right turn lane. The south approach contains one left turn lane and one right turn lane.

The Edmonton Drive/Butch Cassidy Drive intersection is an unsignalized three-leg intersection with stop control at the east Butch Cassidy Drive approach. The north approach contains one left turn lane and one through lane. The south approach contains one shared through-right turn lane. The east approach contains one shared left turn-right turn lane. The intersection will ultimately be a four-leg intersection with development of the project.

The site plan indicates that project access will be provided from five subdivision streets intersecting the new section of Butch Cassidy Drive. Project access will not be provided directly from Edmonton Drive. The five access intersections will operate as unsignalized three-leg intersections with stop control at the north approaches.

TRIP GENERATION

In order to assess the magnitude of traffic impacts of the proposed project on the key intersections, trip generation rates and peak hours had to be determined. Trip generation rates were obtained from the Ninth Edition of *ITE Trip Generation* (2012) for Land Use 210 "Single Family Detached Housing". The proposed Colina Rosa development will include the construction of a residential subdivision containing 94 single family dwelling units. Trips generated by the project were calculated for the peak hours occurring between 7:00 AM and 9:00 AM and 4:00 PM and 6:00 PM, which correspond to the peak hours of adjacent street traffic. Table 1 shows a summary of the average daily traffic (ADT) volume and peak hour volumes generated by the project.

TABLE 1
TRIP GENERATION

LAND USE	ADT	AM PEAK HOUR			PM PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single Family Housing (94 D.U.)	895	18	53	71	59	35	94

The Colina Rosa development is anticipated to generate 895 average weekday trips with 71 trips occurring during the AM peak hour and 94 trips occurring during the PM peak hour.

TRIP DISTRIBUTION AND ASSIGNMENT

The distribution of project traffic to the key intersections was based on existing peak hour traffic patterns and the locations of attractions and productions in the area. Figure 2 shows the anticipated trip distribution. The peak hour trips shown in Table 1 were subsequently assigned to the key intersections based on the trip distribution. Figure 3 shows the trip assignment at the key intersections for the AM and PM peak hours.

EXISTING AND PROJECTED TRAFFIC VOLUMES

Figure 4 shows the existing traffic volumes at the key intersections during the AM and PM peak hours. The existing AM and PM peak hour traffic volumes at the key intersections were obtained from traffic counts taken in December of 2015 and January of 2016.

Figure 5 shows the existing plus project AM and PM peak hour traffic volumes at the key intersections. The existing plus project traffic volumes were obtained by adding the trip assignment volumes shown on Figure 3 to the existing traffic volumes shown on Figure 4.

Figure 6 shows the 2025 base traffic volumes at the key intersections during the AM and PM peak hours. The 2025 base traffic volumes were estimated by applying a 1.5% average annual growth rate to the existing traffic volumes. The growth rate was derived from ten-year historic traffic count data obtained from the Nevada Department of Transportation's (NDOT) Annual Traffic Report for count stations on Mt. Rose Highway.

Figure 7 shows the 2025 base plus project traffic volumes at the key intersections during the AM and PM peak hours. These traffic volumes were obtained by adding traffic volumes generated by the project to 2025 base traffic volumes.

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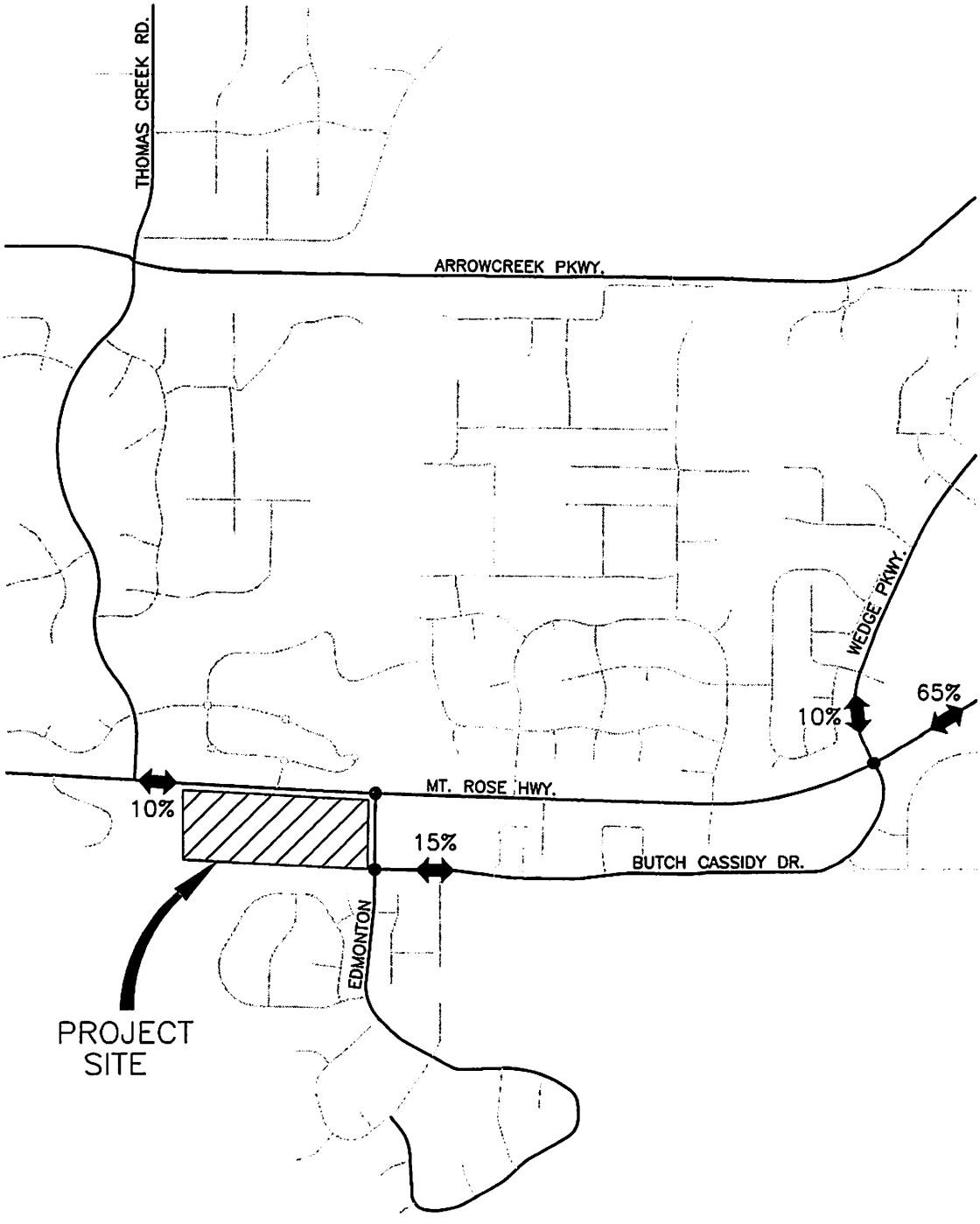

COLINA ROSA

TRIP DISTRIBUTION

FIGURE 2

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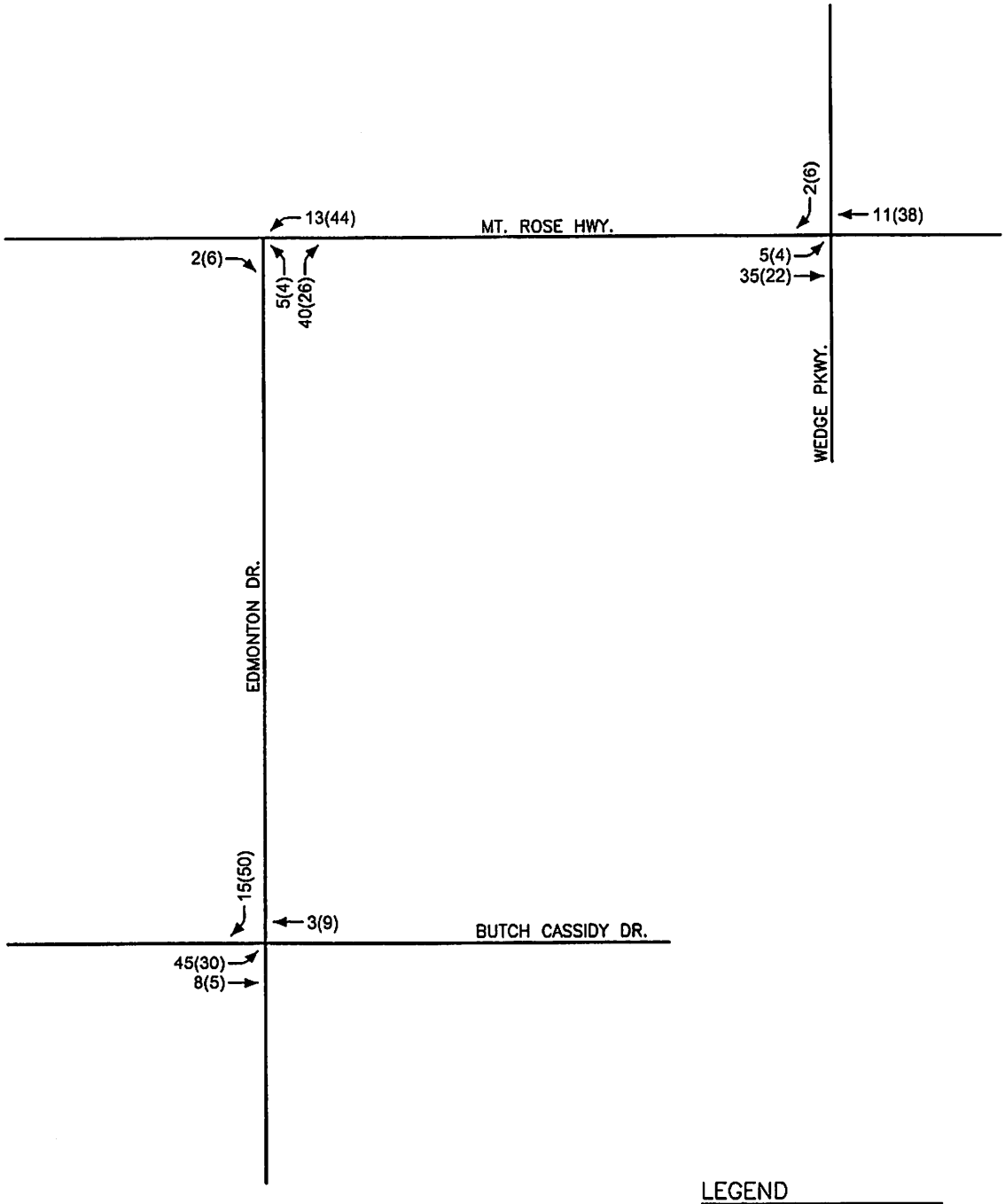

LEGEND
– AM PEAK HOUR
(–) PM PEAK HOUR

COLINA ROSA
TRIP ASSIGNMENT
FIGURE 3

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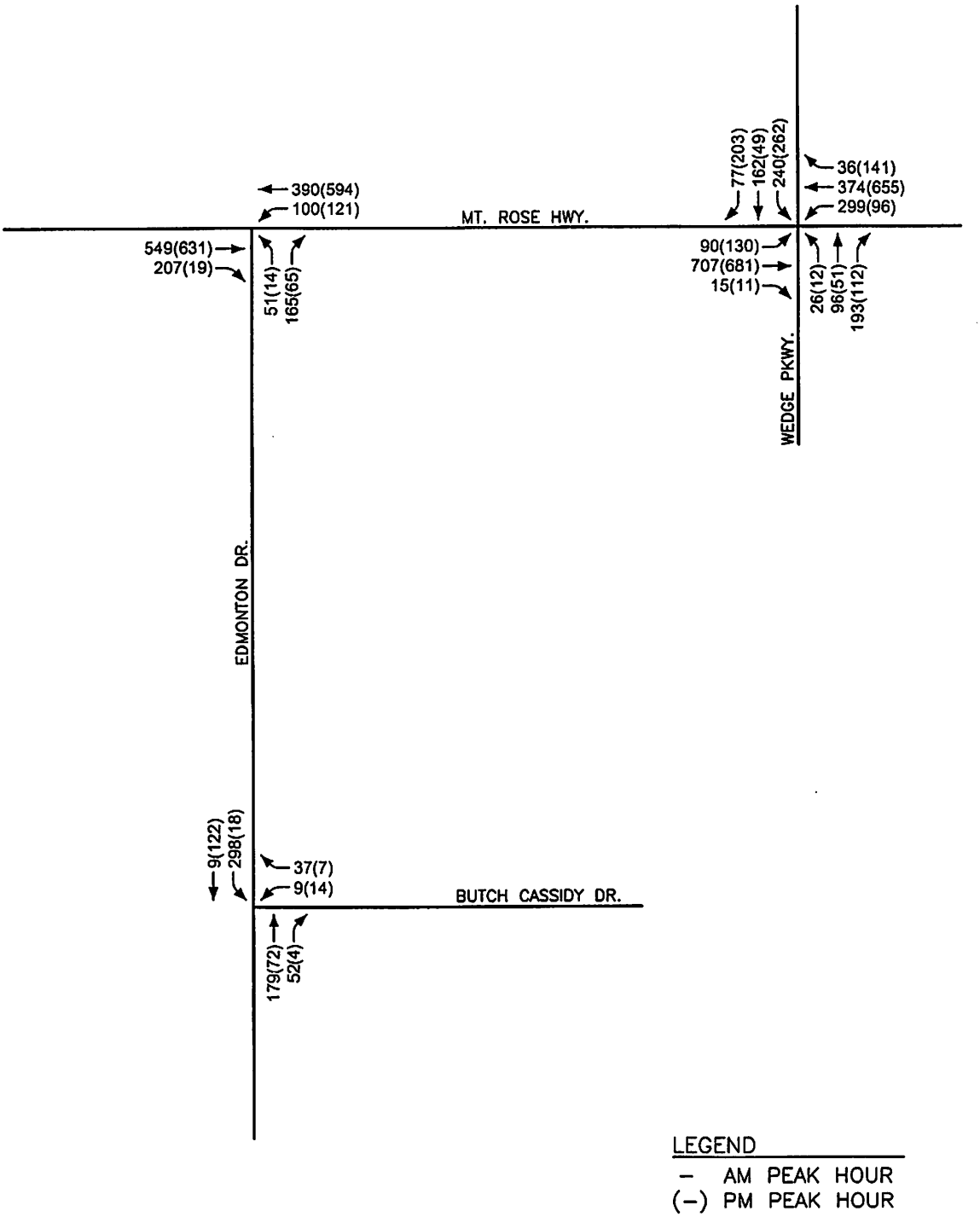

COLINA ROSA

EXISTING TRAFFIC VOLUMES

FIGURE 4

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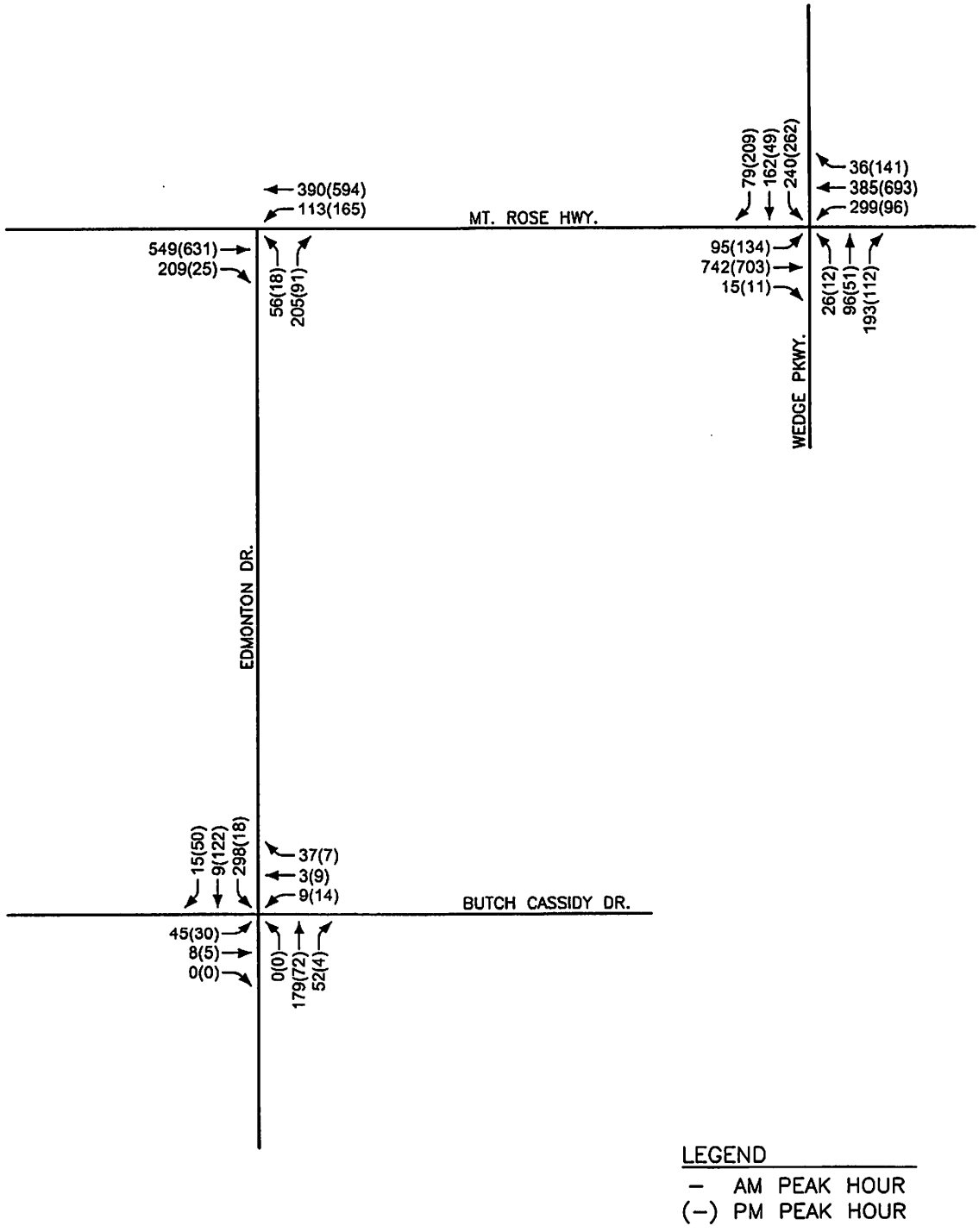

COLINA ROSA

EXISTING PLUS PROJECT TRAFFIC VOLUMES

FIGURE 5

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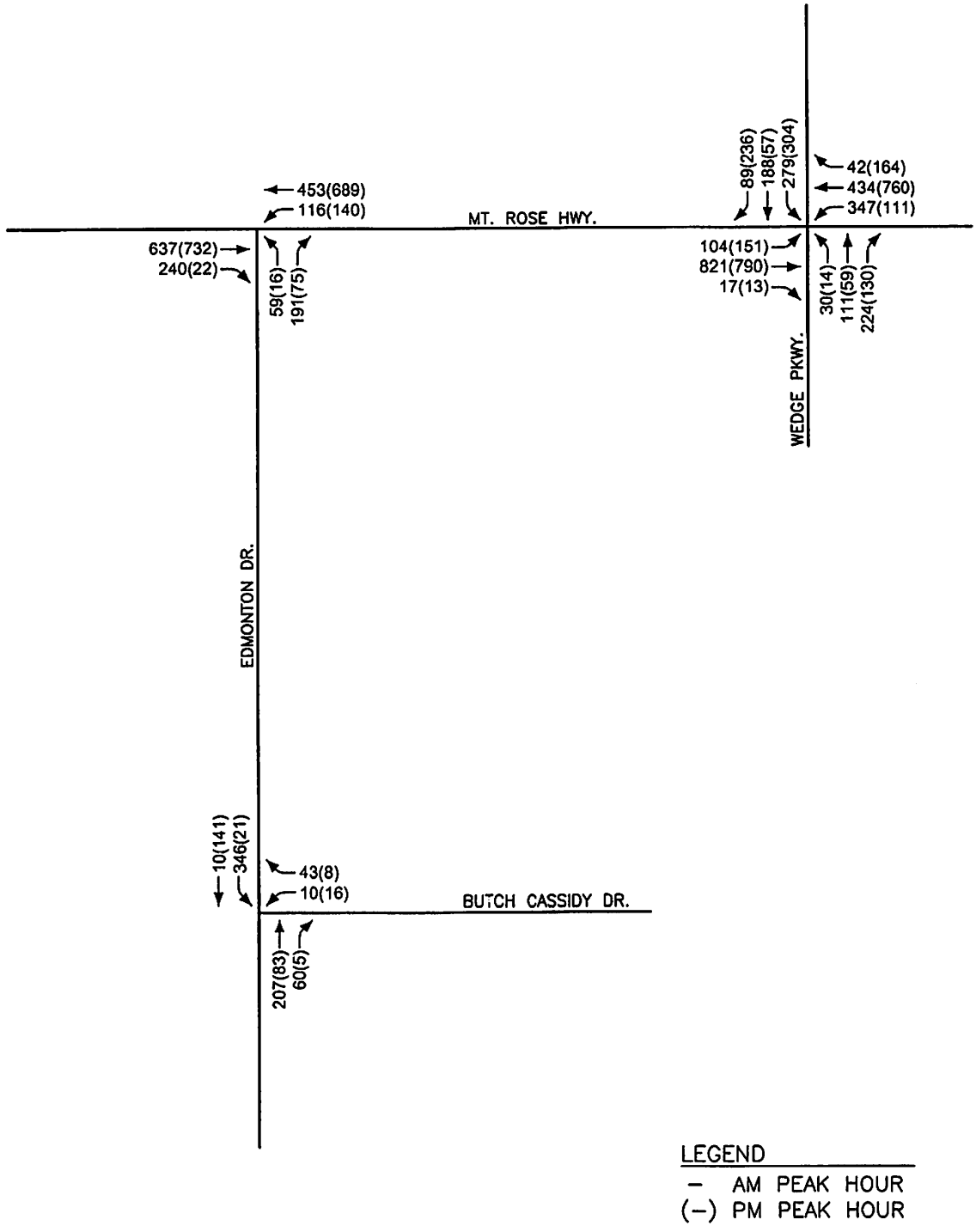

LEGEND
– AM PEAK HOUR
(–) PM PEAK HOUR

COLINA ROSA
2025 BASE TRAFFIC VOLUMES
FIGURE 6

SOLAEGUI
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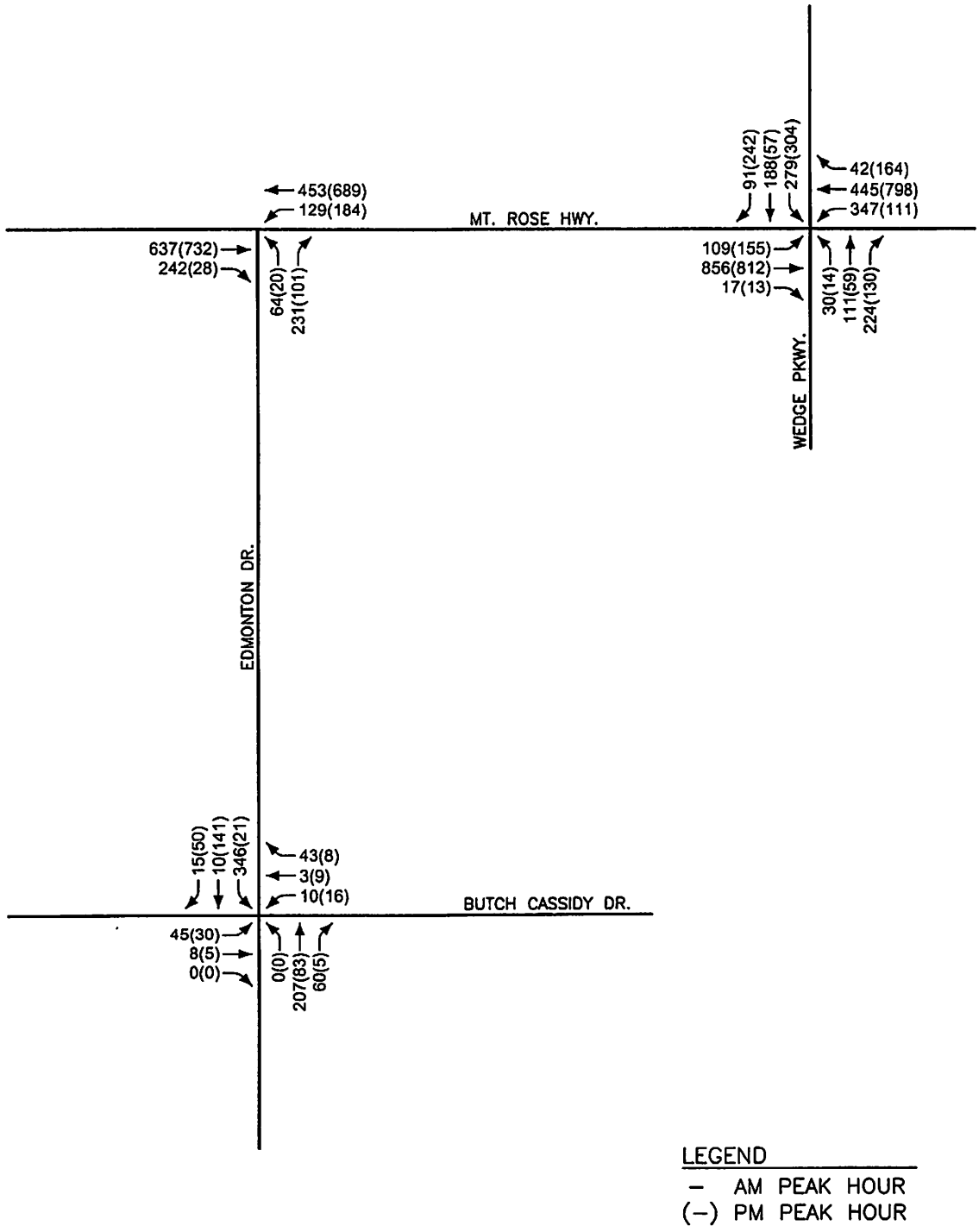


COLINA ROSA

2025 BASE PLUS PROJECT TRAFFIC VOLUMES

FIGURE 7

INTERSECTION CAPACITY ANALYSIS

The key intersections were analyzed for capacity based on procedures presented in the 2010 *Highway Capacity Manual (HCM)*, prepared by the Transportation Research Board, for unsignalized and signalized intersections using the latest version of the Highway Capacity computer software.

The result of capacity analysis is a level of service (LOS) rating for each signalized intersection or unsignalized intersection minor movement. Level of service is a qualitative measure of traffic operating conditions where a letter grade "A" through "F", corresponding to progressively worsening traffic operation, is assigned to the intersection or minor movement.

The *Highway Capacity Manual* defines level of service for stop controlled intersections in terms of computed or measured control delay for each minor movement. Level of service is not defined for the intersection as a whole. The level of service criteria for unsignalized intersections is shown in Table 2.

TABLE 2
LEVEL OF SERVICE CRITERIA FOR UNSIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	DELAY RANGE (SEC/VEH)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Level of service for signalized intersections is stated in terms of the average control delay per vehicle for a peak 15 minute analysis period. The level of service criteria for signalized intersections is shown in Table 3.

TABLE 3
LEVEL OF SERVICE CRITERIA FOR SIGNALIZED INTERSECTIONS

LEVEL OF SERVICE	CONTROL DELAY PER VEHICLE (SEC)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Table 4 shows a summary of the level of service and delay results at the key intersections for the existing, existing plus project, 2025 base, and 2025 base plus project scenarios. The capacity worksheets are included in the Appendix.

TABLE 4
INTERSECTION LEVEL OF SERVICE AND DELAY RESULTS

INTERSECTION/MOVEMENT	EXISTING		EXISTING + PROJECT		2025 BASE		2025 BASE + PROJECT	
	AM	PM	AM	PM	AM	PM	AM	PM
Mt. Rose/Wedge	C30.7	C27.9	C30.8	C28.1	C32.9	C29.6	C33.1	C29.9
Mt. Rose/Edmonton								
Westbound Left	B10.3	A9.8	B10.4	B10.1	B11.3	B10.5	B11.4	B11.0
Northbound Left	E39.0	E35.4	E44.6	E45.8	F71.3	F51.9	F87.2	F72.8
Southbound Left	B14.0	B11.3	C15.1	B11.6	C16.4	B12.1	C18.2	B12.5
Edmonton/Butch Cassidy (3-Leg)								
Westbound Left-Right	A8.8	A8.3	N/A	N/A	A9.0	A8.5	N/A	N/A
Southbound Left	A8.7	A7.4	N/A	N/A	A9.1	A7.4	N/A	N/A
Edmonton/Butch Cassidy (4-Leg)								
Eastbound Left-Thru-Right	N/A	N/A	D32:6	B11.1	N/A	N/A	E47.8	B11.4
Westbound Left-Thru-Right	N/A	N/A	A9.7	A9.3	N/A	N/A	B11.0	A9.5
Northbound Left	N/A	N/A	A0.0	A0.0	N/A	N/A	A0.0	A0.0
Southbound Left	N/A	N/A	A8.7	A7.4	N/A	N/A	A9.1	A7.4

Mt. Rose Highway/Wedge Parkway Intersection

The Mt. Rose Highway/Wedge Parkway intersection was analyzed as a signalized four-leg intersection for all scenarios. The intersection currently operates at LOS C with a delay of 30.7 seconds per vehicle during the AM peak hour and 27.9 seconds per vehicles during the PM peak hour. For the existing plus project volumes the intersection continues to operate at LOS C with delays slightly increasing to 30.8 seconds per vehicle during the AM peak hour and 28.1 seconds per vehicle during the PM peak hour. For the 2025 base volumes the intersection is anticipated to operate at LOS C with a delay of 32.9 seconds per vehicle during the AM peak hour and 29.6 seconds per vehicles during the PM peak hour. For the 2025 base plus project volumes the intersection continues to operate at LOS C with delays slightly increasing to 33.1 seconds per vehicle during the AM peak hour and 29.9 seconds per vehicle during the PM peak hour. The intersection was analyzed with the existing approach lanes and phasing for all scenarios.

Mt. Rose Highway/Edmonton Drive Intersection

The Mt. Rose Highway/Edmonton Drive intersection was analyzed as an unsignalized three-leg intersection with stop control at the south approach for all scenarios. The intersection minor movements currently operate at LOS B or better except for the northbound left turn movement which operates at LOS E during the AM and PM peak hours. For the existing plus project volumes the northbound left turn movement continues to operate at LOS E. For the 2025 base volumes the intersection minor movements are anticipated to operate at LOS C or better except for the northbound left turn movement which operates at LOS F during the AM and PM peak hours. For the 2025 base plus project volumes the northbound left turn movement continues to operates at LOS F during the AM and PM peak hours. The intersection was analyzed with the existing approach lanes for all scenarios.

Traffic signal warrant 3 per the *Manual on Uniform Traffic Control Devices* (2009) was subsequently reviewed at the Mt. Rose Highway/Edmonton Drive intersection. Traffic signal warrant 3 is met for all scenarios based on the full minor street approach volume at the south leg. However, right turn vehicles are typically not included in the minor street approach volume if they enter the traffic stream with little delay. The warrant is not met if the right turn volume at the south leg is deducted from the minor street approach volume. In addition, peak hour warrant 3 should be applied only in unusual cases such as office complexes, manufacturing plants, industrial complexes, or other high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time. The *Manual on Uniform Traffic Control Devices* has eight additional warrants that should be evaluated when considering the need for the installation of a traffic signal. The project is anticipated to add only 5 AM peak hour vehicles and 4 PM peak hour vehicles to the northbound left turn movement.

It should be noted that the northbound left turn movement currently operates at LOS F during the 30-minute period immediately prior to the adjacent high school's start time. This poor LOS operation is typical for some intersection movements near high schools. It is our understanding that there is some accident history at the Mt. Rose Highway/Edmonton Drive intersection but no students were involved. Parents of high school students have also expressed concern over the accident potential at the intersection. As previously discussed, the Mt. Rose Highway/Wedge Parkway intersection operates at LOS C which indicates the intersection has available traffic capacity. Departing high school drivers could therefore be routed to the Mt. Rose Highway/Wedge Parkway intersection for a protected left turn movement onto westbound Mt. Rose Highway.

The existing left turn pocket at the east approach of the Mt. Rose Highway/Edmonton Drive intersection was reviewed for storage and deceleration requirements. Approximately 200 feet of storage length is required for the existing plus project traffic volumes based on NDOT's unsignalized intersection criteria of providing three minutes of storage length. NDOT's access management standards also specify that 155 feet minimum and 235 feet desirable deceleration length also be provided based on the 50 mile per hour speed limit and 5-6% upgrade on Mt. Rose Highway. The existing left turn lane is striped with ±375 feet of storage/deceleration/taper length and also contains over 400 feet of additional length within the center two-way left turn lane which will serve future traffic volumes.

The need for an exclusive right turn lane at the west approach of the Mt. Rose Highway/ Edmonton Drive intersection was reviewed based on NDOT's access management standards. The access management standards indicate that an exclusive right turn deceleration lane is required based on the 55 mile per hour speed limit on Mt. Rose Highway. However, the project is anticipated to add only 2 AM peak hour vehicles and 6 PM peak hour vehicles to this movement. The intersection appears to be constructed with an NDOT Type 4 approach that provides a tapered right turn deceleration lane as well as a tapered right turn acceleration lane.

Edmonton Drive/Butch Cassidy Drive Intersection

The Edmonton Drive/Butch Cassidy Drive intersection was initially analyzed as an unsignalized three-leg intersection with stop control at the east approach for the existing and 2025 base scenarios. The intersection minor movements currently operate at LOS A during the AM and PM peak hours. For the 2025 base volumes the intersection minor movements operate at LOS A during the AM and PM peak hours. The intersection was analyzed with the existing approach lanes.

The intersection was ultimately analyzed as an unsignalized four-leg intersection with stop control at the east and west approaches for the existing plus project and 2025 base plus project volumes. For the existing plus project volumes the intersection minor movements are anticipated to operate at LOS B or better except for the eastbound movements which operates at LOS D during the AM peak hour. For the 2025 base plus project volumes the intersection minor movements operate at LOS B or better except for the eastbound movements which operates at LOS E during the AM peak hour. The intersection was analyzed with one shared left turn-through-right turn lane at the west approach.

It should be noted that the eastbound movements are anticipated to at LOS E for the existing plus project volumes and LOS F for the 2025 base plus project volumes during the 30-minute period immediately prior to the adjacent high school's start time. Again, this poor LOS operation is typical for some intersection movements near high schools. The poor level of service and delay for this movement will be contained on the new section of Butch Cassidy Drive.

It is recommended that the Edmonton Drive/Butch Cassidy Drive intersection be improved as a four-leg intersection with stop sign control and a shared left turn-through-right turn lane at the west approach.

SITE PLAN REVIEW

A copy of the preliminary site plan for the Colina Rosa development is included in this submittal. The site plan indicates that project access will be provided from five project access streets intersecting the new section of Butch Cassidy Drive west of Edmonton Drive. Project access will not be provided directly from Edmonton Drive. All access street intersections will operate with full turning movements. The five access streets will be cul-de-sacs serving between 18 and 20 lots each.

It is recommended that Butch Cassidy Drive be constructed as a new two-lane roadway from Edmonton Drive to the project's west property line with a temporary turnaround per Washoe County standards. It is recommended that the interior streets/cul-de-sacs be constructed per Washoe County local street standards. It is recommended that all project access street intersections with Butch Cassidy Drive be constructed with stop sign control at the north approaches and single lanes at all approaches.

RECOMMENDATIONS

Traffic generated by the proposed Colina Rosa development will have some impact on the adjacent street network. The following recommendations are made to mitigate project traffic impacts.

It is recommended that any required signing, striping or traffic control improvements comply with Nevada Department of Transportation and Washoe County requirements.

It is recommended that the Edmonton Drive/Butch Cassidy Drive intersection be improved as a four-leg intersection with stop sign control and a shared left turn-through-right turn lane at the west approach.

It is recommended that Butch Cassidy Drive be constructed per Washoe County standards as a new two-lane roadway from Edmonton Drive to the project's west property line with a temporary turnaround.

It is recommended that the project access street intersections with Butch Cassidy Drive be constructed with stop sign control at the north approaches and single lanes at all approaches.

It is recommended that the interior streets/cul-de-sacs be constructed per Washoe County local street standards.

APPENDIX

Trip Generation Summary - Alternative 1

Project: New Project
Alternative: Alternative 1

Open Date: 1/6/2016
Analysis Date: 1/6/2016

ITE	Land Use	Average Daily Trips			AM Peak Hour of Adjacent Street Traffic			PM Peak Hour of Adjacent Street Traffic		
		Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
210	SFHOUSE 1	448	447	895	18	53	71	59	35	94
	94 Dwelling Units									
Unadjusted Volume		0	0	0	0	0	0	0	0	0
Internal Capture Trips		0	0	0	0	0	0	0	0	0
Pass-By Trips		0	0	0	0	0	0	0	0	0
Volume Added to Adjacent Streets		0	0	0	0	0	0	0	0	0

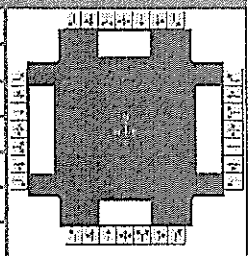
Total AM Peak Hour Internal Capture = 0 Percent

Total PM Peak Hour Internal Capture = 0 Percent

Source: Institute of Transportation Engineers, Trip Generation Manual 9th Edition, 2012

HCS 2010 Signalized Intersection Results Summary

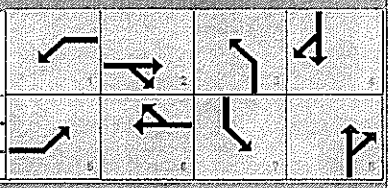
General Information				Intersection Information	
Agency	Solaegui Engineers			Duration, h	0.25
Analyst	MSH	Analysis Date	Jan 13, 2016	Area Type	Other
Jurisdiction	NDOT	Time Period	AM Peak Hour	PHF	0.84
Urban Street		Analysis Year	Existing	Analysis Period	1> 7:00
Intersection	Mt. Rose & Wedge	File Name	MrWe16ax.xus		
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	90	707	15	299	374	36	26	96	193	240	162	77

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	7.0	25.0	7.0	9.0	15.0	
Yellow	4.0	0.0	4.0	4.0	0.0	4.0	
Red	1.0	0.0	1.0	1.0	0.0	1.0	



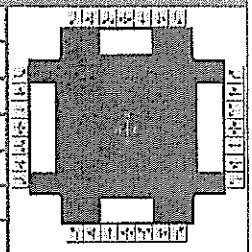
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.0	30.0	19.0	37.0	12.0	20.0	21.0	29.0
Change Period, ($Y+R_c$), s	5.0	5.0	0.0	5.0	5.0	5.0	0.0	5.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s	4.7		10.2		3.5	11.8	15.2	9.6
Green Extension Time (g_e), s	0.0	0.0	0.6	0.0	0.0	0.5	0.3	1.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.01		0.46	0.98	0.11	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	107	570	283	356	445	31	31	114	182	286	193	68
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1863	1849	1723	1773	1579	1774	1863	1579	1774	1863	1579
Queue Service Time (g_s), s	2.7	11.7	11.8	8.2	8.3	1.2	1.5	4.9	9.8	13.2	7.6	3.0
Cycle Queue Clearance Time (g_c), s	2.7	11.7	11.8	8.2	8.3	1.2	1.5	4.9	9.8	13.2	7.6	3.0
Green Ratio (*g/C*)	0.08	0.28	0.28	0.21	0.36	0.36	0.08	0.17	0.17	0.23	0.27	0.27
Capacity (*c*), veh/h	268	1035	514	727	1261	561	138	310	263	414	497	421
Volume-to-Capacity Ratio (*X*)	0.400	0.551	0.552	0.489	0.353	0.055	0.224	0.368	0.692	0.690	0.388	0.161
Available Capacity (c_a), veh/h	268	1035	514	727	1261	561	138	310	263	414	497	421
Back of Queue (*Q*), veh/ln (50 th percentile)	1.1	5.3	5.6	3.3	3.4	0.4	0.6	2.2	4.1	5.9	3.3	1.1
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	39.5	27.7	27.7	31.2	21.4	19.1	39.0	33.3	35.3	31.5	27.0	25.3
Incremental Delay (d_2), s/veh	0.4	2.1	4.2	0.2	0.8	0.2	0.3	0.3	6.4	4.1	0.2	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	39.9	29.8	31.9	31.4	22.1	19.2	39.3	33.6	41.7	35.6	27.2	25.4
Level of Service (LOS)	D	C	C	C	C	B	D	C	D	D	C	C
Approach Delay, s/veh / LOS	31.6	C		26.0	C		38.6	D		31.3	C	
Intersection Delay, s/veh / LOS	30.7						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.0	A	1.2	A	1.0	A	1.4	A

HCS 2010 Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Solaegui Engineers			Duration, h	0.25
Analyst	MSH	Analysis Date	Jan 13, 2016	Area Type	Other
Jurisdiction	NDOT	Time Period	PM Peak Hour	PHF	0.92
Urban Street		Analysis Year	Existing	Analysis Period	1> 7:00
Intersection	Mt. Rose & Wedge	File Name	MrWe16px.xus		
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	130	681	11	96	655	141	12	51	112	262	49	203

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

								1	2	3	4	
Green	7.0	31.0	7.0	10.0	15.0	0.0						
Yellow	4.0	4.0	4.0	0.0	4.0	0.0		5	6	7	8	
Red	1.0	1.0	1.0	0.0	1.0	0.0						

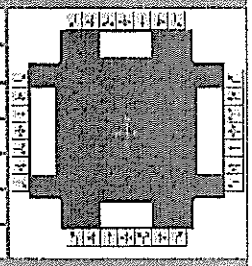
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.0	36.0	12.0	36.0	12.0	20.0	22.0	30.0
Change Period, ($Y+R_c$), s	5.0	5.0	5.0	5.0	5.0	5.0	0.0	5.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.3	3.1	3.3
Queue Clearance Time (g_s), s	5.5		4.6		2.6	6.8	15.0	9.9
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.5	0.3	0.7
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.05	0.03	0.04	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	141	503	250	104	712	115	13	55	95	285	53	172
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1863	1847	1723	1773	1579	1774	1863	1579	1774	1863	1579
Queue Service Time (g_s), s	3.5	9.2	9.2	2.6	14.8	4.6	0.6	2.3	4.8	13.0	1.9	7.9
Cycle Queue Clearance Time (g_c), s	3.5	9.2	9.2	2.6	14.8	4.6	0.6	2.3	4.8	13.0	1.9	7.9
Green Ratio (*g/C*)	0.08	0.34	0.34	0.08	0.34	0.34	0.08	0.17	0.17	0.24	0.28	0.28
Capacity (*c*), veh/h	268	1283	636	268	1222	544	138	310	263	434	517	438
Volume-to-Capacity Ratio (*X*)	0.527	0.392	0.392	0.389	0.583	0.212	0.095	0.179	0.359	0.657	0.103	0.392
Available Capacity (c_a), veh/h	268	1283	636	268	1222	544	138	310	263	434	517	438
Back of Queue (*Q*), veh/ln (50 th percentile)	1.5	4.0	4.1	1.1	6.3	1.8	0.3	1.0	1.8	5.7	0.8	2.9
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	39.9	22.4	22.4	39.5	24.2	20.9	38.6	32.2	33.2	30.6	24.2	26.3
Incremental Delay (d_2), s/veh	1.0	0.9	1.8	0.3	2.0	0.9	0.1	0.1	0.3	2.9	0.0	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	40.9	23.3	24.2	39.8	26.2	21.7	38.7	32.3	33.5	33.5	24.2	26.5
Level of Service (LOS)	D	C	C	D	C	C	D	C	C	C	C	C
Approach Delay, s/veh / LOS	26.3	C		27.2	C		33.5	C		30.2	C	
Intersection Delay, s/veh / LOS	27.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.0	A	1.3	A	0.8	A	1.3	A

HCS 2010 Signalized Intersection Results Summary

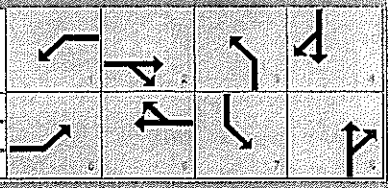
General Information				Intersection Information	
Agency	Solaegui Engineers			Duration, h	0.25
Analyst	MSH	Analysis Date	Jan 13, 2016	Area Type	Other
Jurisdiction	NDOT	Time Period	AM Peak Hour	PHF	0.84
Urban Street		Analysis Year	Existing + Project	Analysis Period	1> 7:00
Intersection	Mt. Rose & Wedge	File Name	MrWe16aw.xus		
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	95	742	15	299	385	36	26	96	193	240	162	79

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	7.0		25.0	7.0	9.0	15.0					
Yellow	4.0	0.0		4.0	4.0	0.0	4.0					
Red	1.0	0.0		1.0	1.0	0.0	1.0					



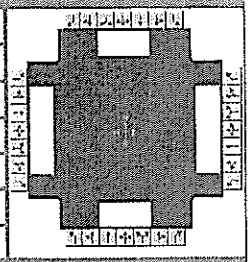
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.0	30.0	19.0	37.0	12.0	20.0	21.0	29.0
Change Period, ($Y+R_c$), s	5.0	5.0	0.0	5.0	5.0	5.0	0.0	5.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s	4.8		10.2		3.5	11.8	15.2	9.6
Green Extension Time (g_e), s	0.0	0.0	0.6	0.0	0.0	0.5	0.3	1.0
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.01		0.46	0.98	0.11	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	113	598	297	356	458	31	31	114	182	286	193	70
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1863	1849	1723	1773	1579	1774	1863	1579	1774	1863	1579
Queue Service Time (g_s), s	2.8	12.4	12.4	8.2	8.6	1.2	1.5	4.9	9.8	13.2	7.6	3.1
Cycle Queue Clearance Time (g_c), s	2.8	12.4	12.4	8.2	8.6	1.2	1.5	4.9	9.8	13.2	7.6	3.1
Green Ratio (*g/C*)	0.08	0.28	0.28	0.21	0.36	0.36	0.08	0.17	0.17	0.23	0.27	0.27
Capacity (*c*), veh/h	268	1035	514	727	1261	561	138	310	263	414	497	421
Volume-to-Capacity Ratio (*X*)	0.422	0.578	0.579	0.489	0.363	0.055	0.224	0.368	0.692	0.690	0.388	0.167
Available Capacity (c_a), veh/h	268	1035	514	727	1261	561	138	310	263	414	497	421
Back of Queue (*Q*), veh/ln (50 th percentile)	1.2	5.7	6.0	3.3	3.6	0.4	0.6	2.2	4.1	5.9	3.3	1.1
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	39.6	28.0	28.0	31.2	21.5	19.1	39.0	33.3	35.3	31.5	27.0	25.3
Incremental Delay (d_2), s/veh	0.4	2.4	4.7	0.2	0.8	0.2	0.3	0.3	6.4	4.1	0.2	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	40.0	30.3	32.7	31.4	22.3	19.2	39.3	33.6	41.7	35.6	27.2	25.4
Level of Service (LOS)	D	C	C	C	C	B	D	C	D	D	C	C
Approach Delay, s/veh / LOS	32.1	C		26.0	C		38.6	D		31.3	C	
Intersection Delay, s/veh / LOS	30.8						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.0	A	1.2	A	1.0	A	1.4	A

HCS 2010 Signalized Intersection Results Summary

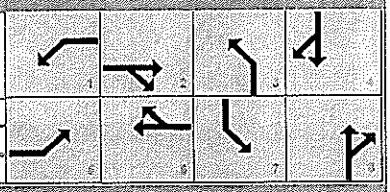
General Information				Intersection Information	
Agency	Solaegui Engineers			Duration, h	0.25
Analyst	MSH	Analysis Date	Jan 13, 2016	Area Type	Other
Jurisdiction	NDOT	Time Period	PM Peak Hour	PHF	0.92
Urban Street		Analysis Year	Existing + Project	Analysis Period	1> 7:00
Intersection	Mt. Rose & Wedge	File Name	MrWe16pw.xus		
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	134	703	11	96	693	141	12	51	112	262	49	209

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	31.0	7.0	10.0	15.0	0.0	
Yellow	4.0	4.0	4.0	0.0	4.0	0.0	
Red	1.0	1.0	1.0	0.0	1.0	0.0	



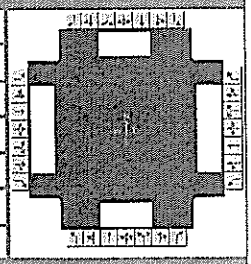
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.0	36.0	12.0	36.0	12.0	20.0	22.0	30.0
Change Period, ($Y+R_c$), s	5.0	5.0	5.0	5.0	5.0	5.0	0.0	5.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.3	3.1	3.3
Queue Clearance Time (g_s), s	5.7		4.6		2.6	6.8	15.0	10.3
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.7
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.05	0.03	0.04	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	146	519	258	104	753	115	13	55	95	285	53	178
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1863	1847	1723	1773	1579	1774	1863	1579	1774	1863	1579
Queue Service Time (g_s), s	3.7	9.5	9.6	2.6	15.9	4.6	0.6	2.3	4.8	13.0	1.9	8.3
Cycle Queue Clearance Time (g_c), s	3.7	9.5	9.6	2.6	15.9	4.6	0.6	2.3	4.8	13.0	1.9	8.3
Green Ratio (*g/C*)	0.08	0.34	0.34	0.08	0.34	0.34	0.08	0.17	0.17	0.24	0.28	0.28
Capacity (*c*), veh/h	268	1283	636	268	1222	544	138	310	263	434	517	438
Volume-to-Capacity Ratio (*X*)	0.544	0.404	0.405	0.389	0.617	0.212	0.095	0.179	0.359	0.657	0.103	0.407
Available Capacity (c_a), veh/h	268	1283	636	268	1222	544	138	310	263	434	517	438
Back of Queue (Q), veh/ln (50 th percentile)	1.6	4.2	4.3	1.1	6.7	1.8	0.3	1.0	1.8	5.7	0.8	3.0
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	40.0	22.5	22.5	39.5	24.6	20.9	38.6	32.2	33.2	30.6	24.2	26.5
Incremental Delay (d_2), s/veh	1.3	0.9	1.9	0.3	2.3	0.9	0.1	0.1	0.3	2.9	0.0	0.2
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	41.2	23.4	24.4	39.8	26.9	21.7	38.7	32.3	33.5	33.5	24.2	26.7
Level of Service (LOS)	D	C	C	D	C	C	D	C	C	C	C	C
Approach Delay, s/veh / LOS	26.5	C		27.7	C		33.5	C		30.2	C	
Intersection Delay, s/veh / LOS	28.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.0	A	1.3	A	0.8	A	1.3	A

HCS 2010 Signalized Intersection Results Summary

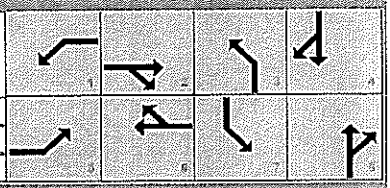
General Information				Intersection Information	
Agency	Solaegui Engineers			Duration, h	0.25
Analyst	MSH	Analysis Date	Jan 13, 2016	Area Type	Other
Jurisdiction	NDOT	Time Period	AM Peak Hour	PHF	0.84
Urban Street		Analysis Year	2025 Base	Analysis Period	1> 7:00
Intersection	Mt. Rose & Wedge	File Name	MrWe25ax.xus		
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	104	821	17	347	434	42	30	111	224	279	188	89

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	7.0		25.0	7.0	9.0	15.0					
Yellow	4.0	0.0		4.0	4.0	0.0	4.0					
Red	1.0	0.0		1.0	1.0	0.0	1.0					



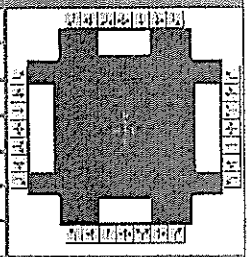
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.0	30.0	19.0	37.0	12.0	20.0	21.0	29.0
Change Period, ($Y+R_c$), s	5.0	5.0	0.0	5.0	5.0	5.0	0.0	5.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s	5.1		11.7		3.7	13.3	17.9	11.0
Green Extension Time (g_e), s	0.0	0.0	0.7	0.0	0.0	0.3	0.2	1.1
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.04		0.73	1.00	1.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	124	663	329	413	517	38	36	132	207	332	224	82
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1863	1848	1723	1773	1579	1774	1863	1579	1774	1863	1579
Queue Service Time (g_s), s	3.1	14.1	14.1	9.7	9.9	1.4	1.7	5.7	11.3	15.9	9.0	3.6
Cycle Queue Clearance Time (g_c), s	3.1	14.1	14.1	9.7	9.9	1.4	1.7	5.7	11.3	15.9	9.0	3.6
Green Ratio (*g/C*)	0.08	0.28	0.28	0.21	0.36	0.36	0.08	0.17	0.17	0.23	0.27	0.27
Capacity (*c*), veh/h	268	1035	513	727	1261	561	138	310	263	414	497	421
Volume-to-Capacity Ratio (*X*)	0.462	0.640	0.641	0.568	0.410	0.068	0.259	0.426	0.787	0.802	0.451	0.195
Available Capacity (c_a), veh/h	268	1035	513	727	1261	561	138	310	263	414	497	421
Back of Queue (Q), veh/ln (50 th percentile)	1.3	6.5	6.8	4.0	4.1	0.5	0.7	2.5	5.2	7.7	3.9	1.3
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	39.7	28.6	28.6	31.8	21.9	19.2	39.1	33.6	36.0	32.5	27.5	25.5
Incremental Delay (d_2), s/veh	0.5	3.0	6.0	0.7	1.0	0.2	0.4	0.3	13.5	10.1	0.2	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	40.2	31.6	34.6	32.5	22.9	19.4	39.4	34.0	49.5	42.6	27.7	25.6
Level of Service (LOS)	D	C	C	C	C	B	D	C	D	D	C	C
Approach Delay, s/veh / LOS	33.4	C		26.8	C		43.1	D		35.2	D	
Intersection Delay, s/veh / LOS	32.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.1	A	1.5	A

HCS 2010 Signalized Intersection Results Summary

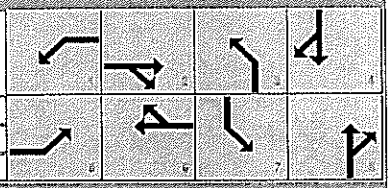
General Information				Intersection Information	
Agency	Solaegui Engineers			Duration, h	0.25
Analyst	MSH	Analysis Date	Jan 13, 2016	Area Type	Other
Jurisdiction	NDOT	Time Period	PM Peak Hour	PHF	0.92
Urban Street		Analysis Year	2025 Base	Analysis Period	1> 7:00
Intersection	Mt. Rose & Wedge	File Name	MrWe25px.xus		
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	151	790	13	111	760	164	14	59	130	304	57	236

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	31.0	7.0	10.0	15.0	0.0	
Yellow	4.0	4.0	4.0	0.0	4.0	0.0	
Red	1.0	1.0	1.0	0.0	1.0	0.0	



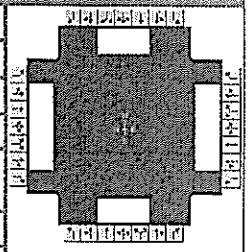
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.0	36.0	12.0	36.0	12.0	20.0	22.0	30.0
Change Period, ($Y+R_c$), s	5.0	5.0	5.0	5.0	5.0	5.0	0.0	5.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.3	3.1	3.3
Queue Clearance Time (g_s), s	6.2		5.0		2.7	7.5	17.6	11.5
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.8
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.07	0.07	0.36	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	164	583	290	121	826	135	15	64	109	330	62	202
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1863	1847	1723	1773	1579	1774	1863	1579	1774	1863	1579
Queue Service Time (g_s), s	4.2	11.0	11.0	3.0	17.9	5.5	0.7	2.7	5.5	15.6	2.2	9.5
Cycle Queue Clearance Time (g_c), s	4.2	11.0	11.0	3.0	17.9	5.5	0.7	2.7	5.5	15.6	2.2	9.5
Green Ratio (*g/C*)	0.08	0.34	0.34	0.08	0.34	0.34	0.08	0.17	0.17	0.24	0.28	0.28
Capacity (*c*), veh/h	268	1283	636	268	1222	544	138	310	263	434	517	438
Volume-to-Capacity Ratio (*X*)	0.613	0.455	0.455	0.450	0.676	0.248	0.110	0.207	0.413	0.762	0.120	0.461
Available Capacity (c_a), veh/h	268	1283	636	268	1222	544	138	310	263	434	517	438
Back of Queue (*Q*), veh/ln (50 th percentile)	1.8	4.8	5.0	1.3	7.7	2.1	0.3	1.2	2.1	7.3	1.0	3.5
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	40.2	22.9	22.9	39.7	25.2	21.1	38.6	32.4	33.6	31.6	24.3	26.9
Incremental Delay (d_2), s/veh	3.0	1.2	2.3	0.4	3.0	1.1	0.1	0.1	0.4	7.0	0.0	0.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	43.2	24.1	25.3	40.1	28.2	22.2	38.7	32.5	33.9	38.6	24.3	27.2
Level of Service (LOS)	D	C	C	D	C	C	D	C	C	D	C	C
Approach Delay, s/veh / LOS	27.4	C		28.8	C		33.8	C		33.2	C	
Intersection Delay, s/veh / LOS	29.6						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.4	A	0.8	A	1.5	A

HCS 2010 Signalized Intersection Results Summary

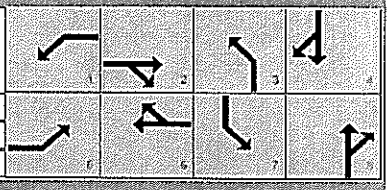
General Information				Intersection Information	
Agency	Solaegui Engineers			Duration, h	0.25
Analyst	MSH	Analysis Date	Jan 13, 2016	Area Type	Other
Jurisdiction	NDOT	Time Period	AM Peak Hour	PHF	0.84
Urban Street		Analysis Year	2025 Base + Project	Analysis Period	1> 7:00
Intersection	Mt. Rose & Wedge	File Name	MrWe25aw.xus		
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	109	856	17	347	445	42	30	111	224	279	188	91

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	7.0		25.0	7.0	9.0	15.0					
Yellow	4.0	0.0		4.0	4.0	0.0	4.0					
Red	1.0	0.0		1.0	1.0	0.0	1.0					



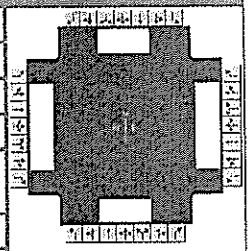
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.0	30.0	19.0	37.0	12.0	20.0	21.0	29.0
Change Period, ($Y+R_c$), s	5.0	5.0	0.0	5.0	5.0	5.0	0.0	5.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.2	3.1	3.2
Queue Clearance Time (g_s), s	5.2		11.7		3.7	13.3	17.9	11.0
Green Extension Time (g_e), s	0.0	0.0	0.7	0.0	0.0	0.3	0.2	1.1
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		0.04		0.73	1.00	1.00	0.01

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	130	690	343	413	530	38	36	132	207	332	224	85
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1863	1849	1723	1773	1579	1774	1863	1579	1774	1863	1579
Queue Service Time (g_s), s	3.2	14.8	14.8	9.7	10.2	1.4	1.7	5.7	11.3	15.9	9.0	3.7
Cycle Queue Clearance Time (g_c), s	3.2	14.8	14.8	9.7	10.2	1.4	1.7	5.7	11.3	15.9	9.0	3.7
Green Ratio (*g/C*)	0.08	0.28	0.28	0.21	0.36	0.36	0.08	0.17	0.17	0.23	0.27	0.27
Capacity (*c*), veh/h	268	1035	514	727	1261	561	138	310	263	414	497	421
Volume-to-Capacity Ratio (*X*)	0.484	0.667	0.668	0.568	0.420	0.068	0.259	0.426	0.787	0.802	0.451	0.201
Available Capacity (c_a), veh/h	268	1035	514	727	1261	561	138	310	263	414	497	421
Back of Queue (*Q*), veh/ln (50 th percentile)	1.4	6.8	7.2	4.0	4.2	0.5	0.7	2.5	5.2	7.7	3.9	1.4
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	39.8	28.8	28.8	31.8	22.0	19.2	39.1	33.6	36.0	32.5	27.5	25.6
Incremental Delay (d_2), s/veh	0.5	3.4	6.7	0.7	1.0	0.2	0.4	0.3	13.5	10.1	0.2	0.1
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	40.3	32.2	35.6	32.5	23.0	19.4	39.4	34.0	49.5	42.6	27.7	25.7
Level of Service (LOS)	D	C	D	C	C	B	D	C	D	D	C	C
Approach Delay, s/veh / LOS	34.1	C		26.9	C		43.1	D		35.2	D	
Intersection Delay, s/veh / LOS	33.1						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.3	A	1.1	A	1.5	A

HCS 2010 Signalized Intersection Results Summary

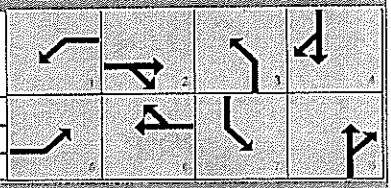
General Information				Intersection Information	
Agency	Solaegui Engineers			Duration, h	0.25
Analyst	MSH	Analysis Date	Jan 13, 2016	Area Type	Other
Jurisdiction	NDOT	Time Period	PM Peak Hour	PHF	0.92
Urban Street		Analysis Year	2025 Base + Project	Analysis Period	1> 7:00
Intersection	Mt. Rose & Wedge	File Name	MrWe25pw.xus		
Project Description					



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	155	812	13	111	798	164	14	59	130	304	57	242

Signal Information			
Cycle, s	90.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	No	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	31.0	7.0	10.0	15.0	0.0	
Yellow	4.0	4.0	4.0	0.0	4.0	0.0	
Red	1.0	1.0	1.0	0.0	1.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	2.0	4.0	2.0	3.0	2.0	3.0	2.0	3.0
Phase Duration, s	12.0	36.0	12.0	36.0	12.0	20.0	22.0	30.0
Change Period, ($Y+R_c$), s	5.0	5.0	5.0	5.0	5.0	5.0	0.0	5.0
Max Allow Headway (*MAH*), s	3.1	0.0	3.1	0.0	3.1	3.3	3.1	3.3
Queue Clearance Time (g_s), s	6.3		5.0		2.7	7.5	17.6	11.9
Green Extension Time (g_e), s	0.0	0.0	0.0	0.0	0.0	0.6	0.3	0.8
Phase Call Probability	1.00		1.00		1.00	1.00	1.00	1.00
Max Out Probability	1.00		1.00		0.07	0.08	0.36	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate (*v*), veh/h	168	599	297	121	867	135	15	64	109	330	62	209
Adjusted Saturation Flow Rate (*s*), veh/h/ln	1723	1863	1847	1723	1773	1579	1774	1863	1579	1774	1863	1579
Queue Service Time (g_s), s	4.3	11.3	11.3	3.0	19.1	5.5	0.7	2.7	5.5	15.6	2.2	9.9
Cycle Queue Clearance Time (g_c), s	4.3	11.3	11.3	3.0	19.1	5.5	0.7	2.7	5.5	15.6	2.2	9.9
Green Ratio (*g/C*)	0.08	0.34	0.34	0.08	0.34	0.34	0.08	0.17	0.17	0.24	0.28	0.28
Capacity (*c*), veh/h	268	1283	636	268	1222	544	138	310	263	434	517	438
Volume-to-Capacity Ratio (*X*)	0.629	0.467	0.468	0.450	0.710	0.248	0.110	0.207	0.413	0.762	0.120	0.476
Available Capacity (c_a), veh/h	268	1283	636	268	1222	544	138	310	263	434	517	438
Back of Queue (*Q*), veh/ln (50 th percentile)	1.9	5.0	5.1	1.3	8.2	2.1	0.3	1.2	2.1	7.3	1.0	3.6
Queue Storage Ratio (*RQ*) (50 th percentile)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Delay (d_1), s/veh	40.2	23.0	23.1	39.7	25.6	21.1	38.6	32.4	33.6	31.6	24.3	27.0
Incremental Delay (d_2), s/veh	3.5	1.2	2.5	0.4	3.5	1.1	0.1	0.1	0.4	7.0	0.0	0.3
Initial Queue Delay (d_3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (*d*), s/veh	43.8	24.3	25.5	40.1	29.1	22.2	38.7	32.5	33.9	38.6	24.3	27.3
Level of Service (LOS)	D	C	C	D	C	C	D	C	C	D	C	C
Approach Delay, s/veh / LOS	27.7	C		29.5	C		33.8	C		33.2	C	
Intersection Delay, s/veh / LOS	29.9						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.9	C	2.9	C	3.4	C	3.1	C
Bicycle LOS Score / LOS	1.1	A	1.4	A	0.8	A	1.5	A

HCS 2010 Two-Way Stop Control Summary Report

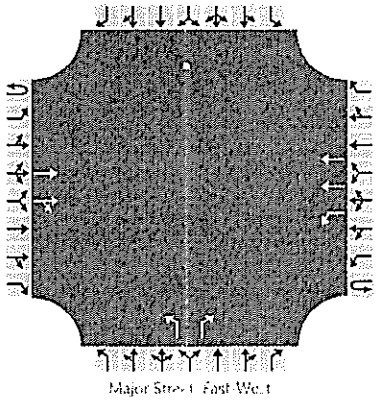
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM Existing
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			549	207		100	390			51		165				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						122				62		201				
Capacity						737				132		547				
v/c Ratio						0.17				0.47		0.37				
95% Queue Length						0.6				2.1		1.7				
Control Delay (s/veh)						10.9				54.5		15.3				
Level of Service (LOS)						B				F		C				
Approach Delay (s/veh)					2.2				24.6							
Approach LOS					A				C							

HCS 2010 Two-Way Stop Control Summary Report

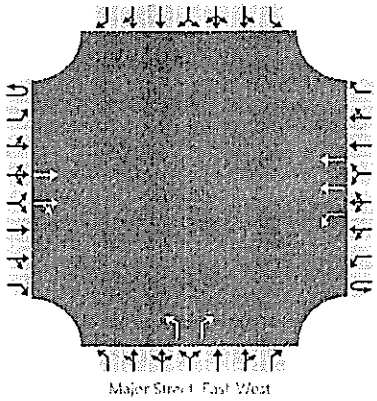
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM Existing
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			549	207		100	390			51		165				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						111				57		183				
Capacity						791				161		582				
v/c Ratio						0.14				0.35		0.31				
95% Queue Length						0.5				1.5		1.3				
Control Delay (s/veh)						10.3				39.0		14.0				
Level of Service (LOS)						B				E		B				
Approach Delay (s/veh)					2.1				19.9							
Approach LOS					A				C							

HCS 2010 Two-Way Stop Control Summary Report

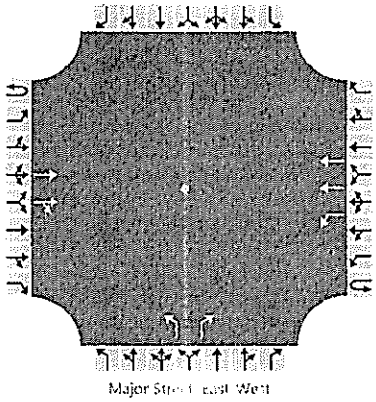
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	PM Existing
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			631	19		121	594			14		65				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						132				15		71				
Capacity						887				133		642				
v/c Ratio						0.15				0.11		0.11				
95% Queue Length						0.5				0.4		0.4				
Control Delay (s/veh)						9.3				35.4		11.3				
Level of Service (LOS)						A				E		B				
Approach Delay (s/veh)					1.7				15.5							
Approach LOS					A				C							

HCS 2010 Two-Way Stop Control Summary Report

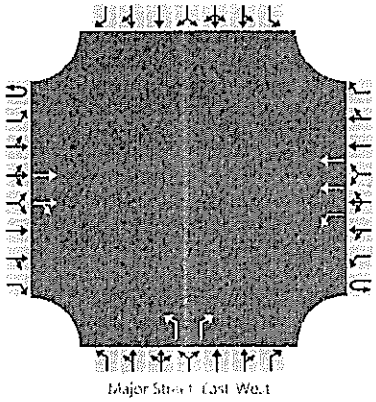
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM Existing + Project
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			549	209		113	390			56		205				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						138				68		250				
Capacity						735				122		547				
v/c Ratio						0.19				0.56		0.46				
95% Queue Length						0.7				2.7		2.4				
Control Delay (s/veh)						11.0				66.6		17.0				
Level of Service (LOS)						B				F		C				
Approach Delay (s/veh)					2.5				27.6							
Approach LOS					A				D							

HCS 2010 Two-Way Stop Control Summary Report

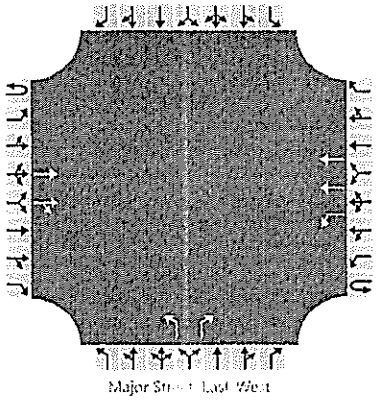
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM Existing + Project
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			549	209		113	390			56		205				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						126				62		228				
Capacity						790				151		581				
v/c Ratio						0.16				0.41		0.39				
95% Queue Length						0.6				1.8		1.9				
Control Delay (s/veh)						10.4				44.6		15.1				
Level of Service (LOS)						B				E		C				
Approach Delay (s/veh)					2.3				21.4							
Approach LOS					A				C							

HCS 2010 Two-Way Stop Control Summary Report

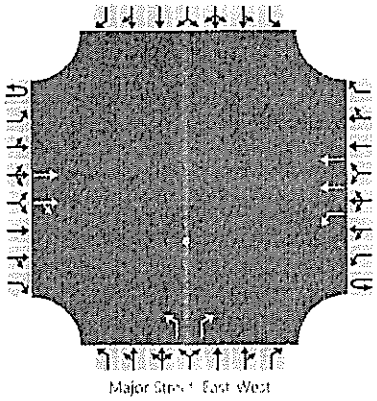
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	PM Existing + Project
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			631	25		165	594			18		91				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						179				20		99				
Capacity						883				108		641				
v/c Ratio						0.20				0.19		0.15				
95% Queue Length						0.8				0.6		0.5				
Control Delay (s/veh)						10.1				45.8		11.6				
Level of Service (LOS)						B				E		B				
Approach Delay (s/veh)					2.2				17.4							
Approach LOS					A				C							

HCS 2010 Two-Way Stop Control Summary Report

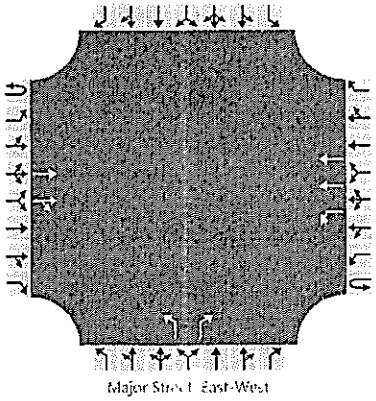
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM 2025 Base
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			637	240		116	453			59		191				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						141				72		233				
Capacity						647				91		490				
v/c Ratio						0.22				0.79		0.48				
95% Queue Length						0.8				4.2		2.5				
Control Delay (s/veh)						12.1				126.1		18.8				
Level of Service (LOS)						B				F		C				
Approach Delay (s/veh)					2.5				44.2							
Approach LOS					A				E							

HCS 2010 Two-Way Stop Control Summary Report

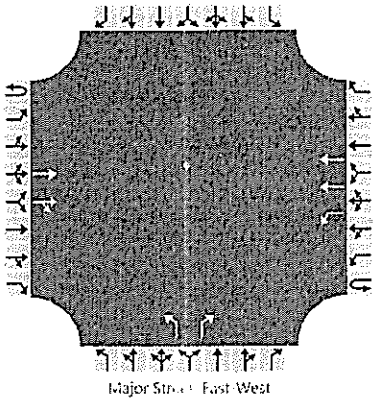
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM 2025 Base
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			637	240		116	453			59		191				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						129				66		212				
Capacity						703				116		526				
v/c Ratio						0.18				0.57		0.40				
95% Queue Length						0.7				2.8		1.9				
Control Delay (s/veh)						11.3				71.3		16.4				
Level of Service (LOS)						B				F		C				
Approach Delay (s/veh)					2.3				29.4							
Approach LOS					A				D							

HCS 2010 Two-Way Stop Control Summary Report

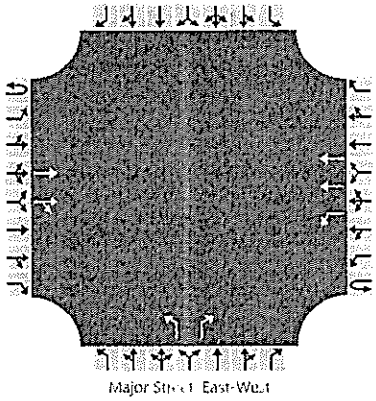
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	PM 2025 Base
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			732	22		140	689			16		75				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						152				17		82				
Capacity						805				93		591				
v/c Ratio						0.19				0.18		0.14				
95% Queue Length						0.7				0.6		0.5				
Control Delay (s/veh)						10.5				51.9		12.1				
Level of Service (LOS)						B				F		B				
Approach Delay (s/veh)					1.8				18.9							
Approach LOS					A				C							

HCS 2010 Two-Way Stop Control Summary Report

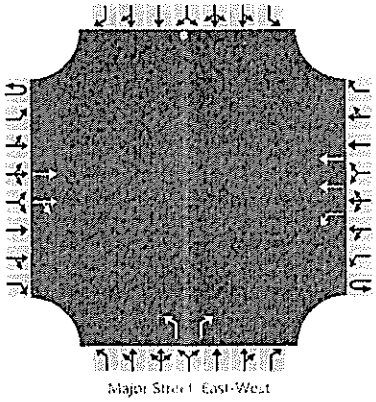
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM 2025 Base + Project
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			637	242		129	453			64		231				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						157				78		282				
Capacity						646				84		489				
v/c Ratio						0.24				0.93		0.58				
95% Queue Length						0.9				5.1		3.6				
Control Delay (s/veh)						12.4				168.3		21.9				
Level of Service (LOS)						B				F		C				
Approach Delay (s/veh)					2.7				53.6							
Approach LOS					A				F							

HCS 2010 Two-Way Stop Control Summary Report

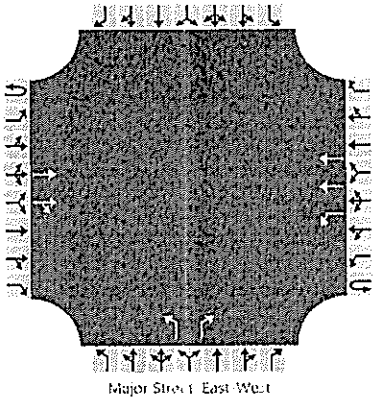
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM 2025 Base + Project
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			637	242		129	453			64		231				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						143				71		257				
Capacity						702				108		526				
v/c Ratio						0.20				0.66		0.49				
95% Queue Length						0.8				3.3		2.7				
Control Delay (s/veh)						11.4				87.2		18.2				
Level of Service (LOS)						B				F		C				
Approach Delay (s/veh)					2.5				33.2							
Approach LOS					A				D							

HCS 2010 Two-Way Stop Control Summary Report

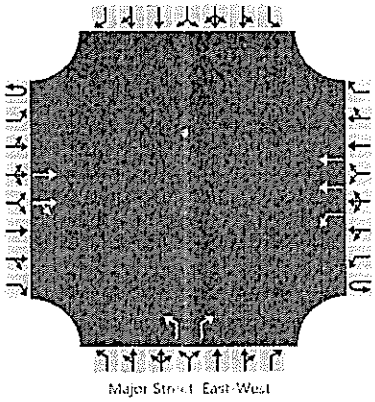
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	PM 2025 Base + Project
Intersection Orientation	East-West
Project Description	

Site Information

Intersection	Mt. Rose & Edmonton
Jurisdiction	NDOT
East/West Street	Mt. Rose Highway
North/South Street	Edmonton Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		1	0	1		0	0	0
Configuration			T	TR		L	T			L		R				
Volume (veh/h)			732	28		184	689			20		101				
Percent Heavy Vehicles						2				2		2				
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)						200				22		110				
Capacity						801				74		588				
v/c Ratio						0.25				0.30		0.19				
95% Queue Length						1.0				1.1		0.7				
Control Delay (s/veh)						11.0				72.8		12.5				
Level of Service (LOS)						B				F		B				
Approach Delay (s/veh)					2.3				22.6							
Approach LOS					A				C							

HCS 2010 Two-Way Stop Control Summary Report

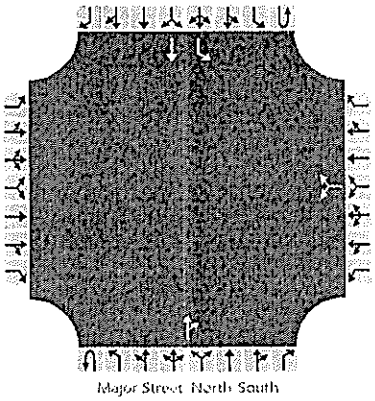
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM Existing
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						9		37			179	52		298	9	
Percent Heavy Vehicles						2		2						2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)							56							363		
Capacity							981							1281		
v/c Ratio							0.06							0.28		
95% Queue Length							0.2							1.2		
Control Delay (s/veh)							8.9							8.9		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)					8.9								8.7			
Approach LOS					A								A			

HCS 2010 Two-Way Stop Control Summary Report

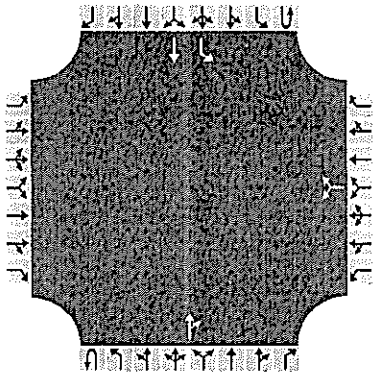
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM Existing
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						9		37			179	52		298	9	
Percent Heavy Vehicles						2		2						2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)							51							331		
Capacity							1009							1307		
v/c Ratio							0.05							0.25		
95% Queue Length							0.2							1.0		
Control Delay (s/veh)							8.8							8.7		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)					8.8								8.4			
Approach LOS					A								A			

HCS 2010 Two-Way Stop Control Summary Report

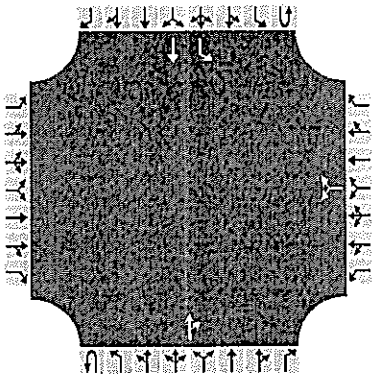
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	PM Existing
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						14		7			72	4		18	122	
Percent Heavy Vehicles						2		2						2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)							23							20		
Capacity							1113							1514		
v/c Ratio							0.02							0.01		
95% Queue Length							0.1							0.0		
Control Delay (s/veh)							8.3							7.4		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)					8.3								1.0			
Approach LOS					A								A			

HCS 2010 Two-Way Stop Control Summary Report

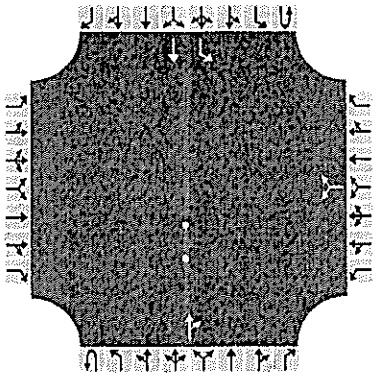
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM 2025 Base
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						10		43			207	60		346	10	
Percent Heavy Vehicles						2		2						2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)							64							422		
Capacity							775							1234		
v/c Ratio							0.08							0.34		
95% Queue Length							0.3							1.5		
Control Delay (s/veh)							10.1							9.4		
Level of Service (LOS)							B							A		
Approach Delay (s/veh)					10.1								9.2			
Approach LOS					B								A			

HCS 2010 Two-Way Stop Control Summary Report

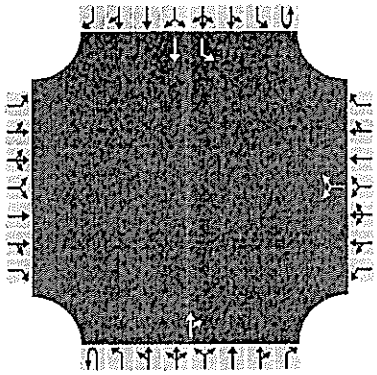
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM 2025 Base
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						10		43			207	60		346	10	
Percent Heavy Vehicles						2		2						2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)							59							384		
Capacity							950							1263		
v/c Ratio							0.06							0.30		
95% Queue Length							0.2							1.3		
Control Delay (s/veh)							9.0							9.1		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)					9.0								8.8			
Approach LOS					A								A			

HCS 2010 Two-Way Stop Control Summary Report

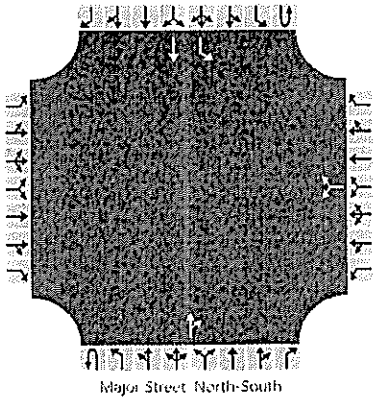
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	PM 2025 Base
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	1	1	0
Configuration							LR					TR		L	T	
Volume (veh/h)						16		8			83	5		21	141	
Percent Heavy Vehicles						2		2						2		
Proportion Time Blocked																
Right Turn Channelized		No				No				No				No		
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)							26							23		
Capacity							1052							1498		
v/c Ratio							0.02							0.02		
95% Queue Length							0.1							0.0		
Control Delay (s/veh)							8.5							7.4		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)					8.5								1.0			
Approach LOS					A								A			

HCS 2010 Two-Way Stop Control Summary Report

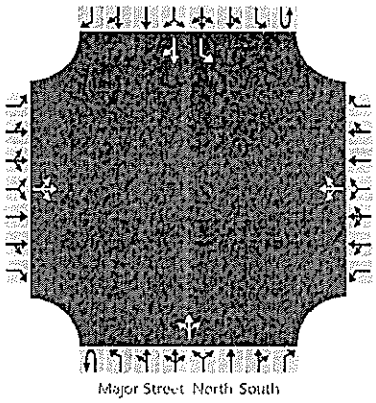
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM Existing + Project
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		45	8	0		9	3	37		0	179	52		298	9	15
Percent Heavy Vehicles		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			65				60							363		
Capacity			157				671			1583				1281		
v/c Ratio			0.41				0.09							0.28		
95% Queue Length			1.8				0.3							1.2		
Control Delay (s/veh)			43.1				10.9			7.3				8.9		
Level of Service (LOS)			E				B			A				A		
Approach Delay (s/veh)	43.1				10.9								8.3			
Approach LOS	E				B								A			

HCS 2010 Two-Way Stop Control Summary Report

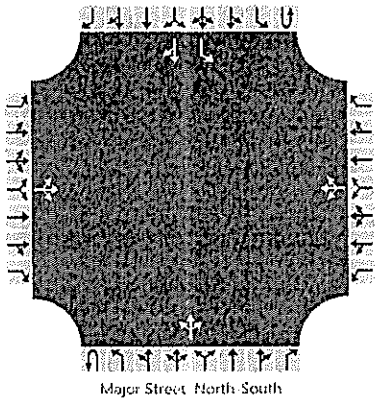
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM Existing + Project
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		45	8	0		9	3	37		0	179	52		298	9	15
Percent Heavy Vehicles		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			59				54							331		
Capacity			189				826			1586				1307		
v/c Ratio			0.31				0.07							0.25		
95% Queue Length			1.3				0.2							1.0		
Control Delay (s/veh)			32.6				9.7			7.3				8.7		
Level of Service (LOS)			D				A			A				A		
Approach Delay (s/veh)	32.6				9.7								8.0			
Approach LOS	D				A								A			

HCS 2010 Two-Way Stop Control Summary Report

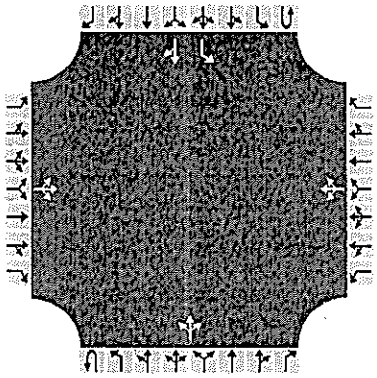
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	PM Existing + Project
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		30	5	0		14	9	7		0	72	4		18	122	50
Percent Heavy Vehicles		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			38				33							20		
Capacity			639				863			1386				1514		
v/c Ratio			0.06				0.04							0.01		
95% Queue Length			0.2				0.1							0.0		
Control Delay (s/veh)			11.0				9.3			7.6				7.4		
Level of Service (LOS)			B				A			A				A		
Approach Delay (s/veh)	11.0				9.3								0.7			
Approach LOS	B				A								A			

HCS 2010 Two-Way Stop Control Summary Report

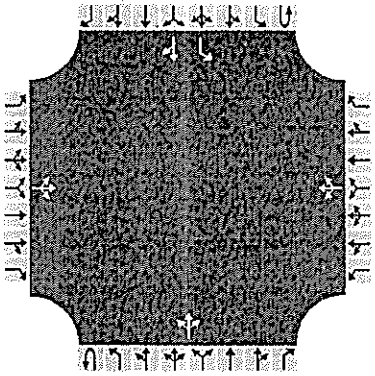
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM 2025 Base + Project
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.82
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		45	8	0		10	3	43		0	207	60		346	10	15
Percent Heavy Vehicles		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			65				68							422		
Capacity			113				517			1582				1234		
v/c Ratio			0.57				0.13							0.34		
95% Queue Length			2.8				0.5							1.5		
Control Delay (s/veh)			73.0				13.0			7.3				9.4		
Level of Service (LOS)			F				B			A				A		
Approach Delay (s/veh)	73.0				13.0								8.8			
Approach LOS	F				B								A			

HCS 2010 Two-Way Stop Control Summary Report

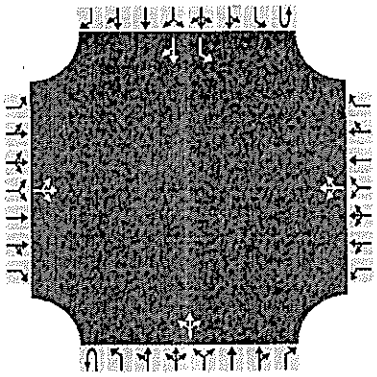
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	AM 2025 Base + Project
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.90
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		45	8	0		10	3	43		0	207	60		346	10	15
Percent Heavy Vehicles		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			59				62							384		
Capacity			141				665			1584				1263		
v/c Ratio			0.42				0.09							0.30		
95% Queue Length			1.8				0.3							1.3		
Control Delay (s/veh)			47.8				11.0			7.3				9.1		
Level of Service (LOS)			E				B			A				A		
Approach Delay (s/veh)	47.8				11.0								8.5			
Approach LOS	E				B								A			

HCS 2010 Two-Way Stop Control Summary Report

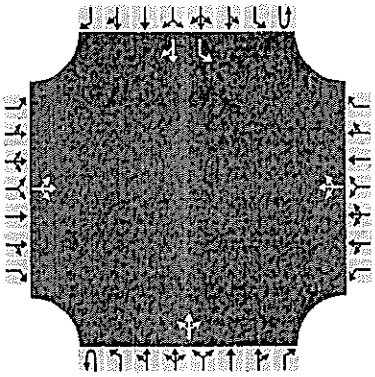
General Information

Analyst	MSH
Agency/Co.	Solaegui Engineers
Date Performed	1/6/2016
Analysis Year	2016
Time Analyzed	PM 2025 Base + Project
Intersection Orientation	North-South
Project Description	

Site Information

Intersection	Edmonton & Butch Cassidy
Jurisdiction	Washoe County
East/West Street	Butch Cassidy Drive
North/South Street	Edmonton Drive
Peak Hour Factor	0.92
Analysis Time Period (hrs)	0.25

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	1	0		0	1	0	0	0	1	0	0	1	1	0
Configuration			LTR				LTR				LTR			L		TR
Volume (veh/h)		30	5	0		16	9	8		0	83	5		21	141	50
Percent Heavy Vehicles		2	2	2		2	2	2		2				2		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)			38				36							23		
Capacity			601				830			1363				1498		
v/c Ratio			0.06				0.04							0.02		
95% Queue Length			0.2				0.1							0.0		
Control Delay (s/veh)			11.4				9.5			7.6				7.4		
Level of Service (LOS)			B				A			A				A		
Approach Delay (s/veh)	11.4				9.5								0.7			
Approach LOS	B				A								A			

COLINA ROSA
TENTATIVE SUBDIVISION MAP
94 SINGLE FAMILY RESIDENTIAL LOTS

PRELIMINARY HYDROLOGY REPORT

PREPARED FOR:
TOWNE DEVELOPMENT OF SACRAMENTO, Inc

01/15/16

PREPARED BY

TEC

CIVIL
ENGINEERING
CONSULTANTS

JOB #: KLS.011
DATE: 1/13/2016

Table of Contents

1. Introduction

1.1. Site Description

The proposed Colina Rosa Subdivision is a 94-lot development project proposed in the Washoe County Unincorporated area of southern Reno. The proposed 20.14-acre project is bounded on the north side by Mt. Rose Highway, and on the east by Edmonton Drive (APN's 049-402-02 and 049-402-07). The project is located in the SW ¼ of Section 30, Township 18-N, Range 20-E in Washoe County, Nevada. The location of the project is depicted in figure-1 (vicinity map). The project site consists of two moderately vegetated sage brush vacant lots that have no structures / buildings on site. The project site slopes from the west to the east at approximately a 6% grade and tends to slope to the south at a grade of just under 3%. New storm drain infrastructure is proposed to be included with the project and will tie into the existing Washoe County storm drain system to convey runoff.

2. Procedures

This preliminary report is being written in accordance with the *Washoe County Public Works Design Manual* standards, to determine the drainage requirements of the proposed Colina Rosa Subdivision. A final drainage report is to be completed with the construction documents, submitted for review and approved prior to the recordation of any final subdivision map associated with this project.

2.1. Methodology

Due to the limited size of the contributing runoff areas, the Rational Method was utilized in determining the existing and proposed peak runoff rates. The Rational Method formula is:

$$Q = C * i * A$$

Where:
Q = Peak runoff flow (*cubic feet per second (cfs)*)
C = Runoff coefficient
I = Rainfall intensity (*inches/hour*)
A = area (*acres*)
A copy of C-values used for calculations is provided in the Appendix.

2.2. Hydraulic Analyses

Due to the preliminary nature of this study and report (no final design or sizing for infrastructure) a hydraulic analysis is not incorporated. A final drainage report is to be completed with the construction documents, submitted for review and approved prior to the recordation of any final subdivision map associated with this project

2.3. Time of Concentration

The time of concentration (t_c) from the site for both the existing and proposed storm water conditions was calculated by determining the greatest travel time for the runoff to flow through the site.

2.4. Flood Zones

The proposed Colina Rosa development is located entirely within FEMA FIRM Map 32031C3245G, and the project lies within the Unshaded Zone X designation, indicating that the property is not within any 100 year floodplain. A copy of the FIRM Panel is provided in the Appendix.

3. Existing Runoff Conditions

3.1. Existing Storm Drain System

There are no available storm drain systems or infrastructure upstream (westerly) of the proposed development site. A 15" Washoe County stormdrain is stubbed to the south east corner of the proposed development. The project proposes discharge into this existing system.

3.2. Adjacent Runoff Areas

All offsite flows contributing to the proposed development are derived from an undeveloped, naturally vegetated, publicly owned hillside to the west. Flows from this basin are of the overland sheet flow variety, and are to be captured on the west edge of the proposed development and conveyed around or through the project.

3.2.1. Basin to the North

Mt. Rose Hwy and the roadside drainage swales along the highway act as a barrier to any offsite drainage that might otherwise drain toward the subject site.

3.2.2. Basin to the East

The proposed development site will drain/discharge in an easterly direction. An existing paved roadway (Edmonton Dr) including curb and gutter exists directly to the east of the project which incorporates an existing 15" storm drain pipe that has been stubbed for our use and will convey flows away from the proposed development and towards larger regional systems. Edmonton Drive as well as the existing storm drain system are public facilities.

3.2.3. Basin to the South

The area to the south of the proposed project is down gradient and consists of existing residential development, which convey storm waters easterly to the existing public storm drainage systems.

3.2.4. Runoff from the West

The area to the west of the proposed project will contribute runoff flows to the proposed Colina Rosa storm drain system. The flows from this area will be captured within an open channel along the westerly boundary of the site and will convey existing storm waters. These storm waters will be split by a highpoint in both existing grade and the proposed open channel, with approximately half the storm water flowing in a northerly direction, while the other half will convey around the site to the south. This area(s) are labelled "OFF-1" and "OFF-2" in Figure 3. The area of this basin consists of an undeveloped, naturally vegetated hillside.

3.3. Onsite Runoff

Pre-development runoff areas and patterns are detailed in Figure 3. The runoff generally flows from the west boundary of the project in a southeasterly direction. The project site has historically been a vacant naturally vegetated lot, the site has not been previously graded. Areas north and south of the property have facilities in place that route drainage away from the project.

The existing peak runoff rates generated from the project and the adjacent contributing runoff area are approximately 4.74-cfs and 30.83-cfs for 5-year and 100-year storm events respectively.

4. Proposed Runoff Conditions

4.1. Proposed Runoff Areas

The proposed runoff boundaries, as well as catch basins and storm drain mains, are detailed in Figure 2. Runoff areas for the site are all included into one sub-areas, although with final design each cul-de-sac street would likely be calculated as a contributing area individually. Because of the preliminary nature of the analysis and report, the developed area was not further subdivided into areas by differences in the point of discharge, as well as differences in on-site or off-site area, or differences in C-value. The off-site area is labelled OFF-1 and runoff from proposed development as sub-areas PRO-1, will be collected by the proposed storm drain system of the development, discharged into detention ponds along Butch Cassidy and/or within proposed open space north of the cul-de-sacs, and then discharge into their natural pattern or to the existing Washoe County storm drain system.

As indicated in Table 1, the proposed runoff areas will generate 4.04-cfs and 9.66-cfs of peak runoff for the 5-year and 100-year storms, respectively.

TABLE 1
COLINA ROSA TENT. MAP - HYDROLOGY REPORT
EXISTING RUNOFF AREAS

AREA #	RUNOFF COEFFICIENT (c) *5 YEAR*	RUNOFF COEFFICIENT (c) *100 YEAR*	RAINFALL INTENSITY *(i)*		AREA *(A)*	RATE OF PEAK RUNOFF *(Q)=ciA*	
	(UNITLESS)	(UNITLESS)	*(INCHES/HR)*		*(ACRES)*	*(FT^3/SEC)*	
			5-YEAR	100-YEAR		5-YEAR	100-YEAR
EX-OFF1	0.20	0.50	0.70	1.82	13.74	1.92	12.50
EX-1	0.20	0.50	0.70	1.82	20.14	2.82	18.33
				TOTAL =	**33.88**	**4.74**	**30.83**

C=0.20 & 0.50 (RANGELAND Q5 & Q100)
COLINA ROSA TENT. MAP - HYDROLOGY REPORT
TIME OF CONCENTRATION = 45 MINUTES

4.2. Proposed Storm Drain System

The proposed project will uses a combination of open channels, infiltration, swales, detention ponds, and Type 3 and Type 4R catch basins to capture, convey and mitigate post flow increases over historical flow rates. The proposed drainage system will be fully designed and sized with the final production of the civil improvement plans and construction documents, will include a final hydrologic and hydraulic analysis that will be reviewed and approved by Washoe County prior to the recordation of any final subdivision map.

As indicated in Table 2, the proposed runoff areas will generate 8.97-cfs and 36.33-cfs of peak runoff for the 5-year and 100-year storms, respectively.

TABLE 2
COLINA ROSA TENT. MAP - HYDROLOGY REPORT
PROPOSED RUNOFF AREAS

AREA #	RUNOFF COEFFICIENT (c) *5 YEAR*	RUNOFF COEFFICIENT (c) *100 YEAR*	RAINFALL INTENSITY *(i)*		AREA *(A)*	RATE OF PEAK RUNOFF *(Q)=ciA*	
	(UNITLESS)	(UNITLESS)	*(INCHES/HR)*		*(ACRES)*	*(FT^3/SEC)*	
			5-YEAR	100-YEAR		5-YEAR	100-YEAR
PRO-OFF 1	0.20	0.50	0.70	1.82	8.87	1.24	8.07
PRO-OFF2	0.20	0.50	0.70	1.82	4.87	0.68	4.43
PRO 1	0.50	0.65	0.70	1.82	20.14	7.05	23.83
				TOTAL =	**33.88**	**8.97**	**36.33**

C=0.50 & 0.65 (1/4 ACRE RESIDENTIAL Q5 & Q100)
C=0.20 & 0.50 (RANGELAND Q5 & Q100)
TIME OF CONCENTRATION = 45 MINUTES

5. Discussion/ Conclusions

The Colina Rosa subdivision is a proposed 94-lot single-family home development encompassing approximately 20.14 acres in Washoe County, Nevada. The development has been designed to adequately drain, and the storm drain system has been designed to convey the runoff generated from the project.

Off-site runoff will flow to a proposed open channel that will convey runoff away from the project site to existing drainage facilities. On-site runoff through the project will continue to flow southeast through the project and will be restricted by proposed detention ponds, and infiltration.

The proposed improvements will provide more than the required detention and restriction of peak flows from 5-year and 100-year storm events. The proposed release rates of detained water will also be below pre development flow conditions. Overall drainage patterns are not expected to change as a result of the project. The proposed project design conforms to existing county and state regulations.

6. References

- *Washoe County Public Works Design Manual, Section 2 (Storm Runoff)* dated January, 2009
- *Truckee Meadows Regional Drainage Manual* dated April, 2009

APPENDIX

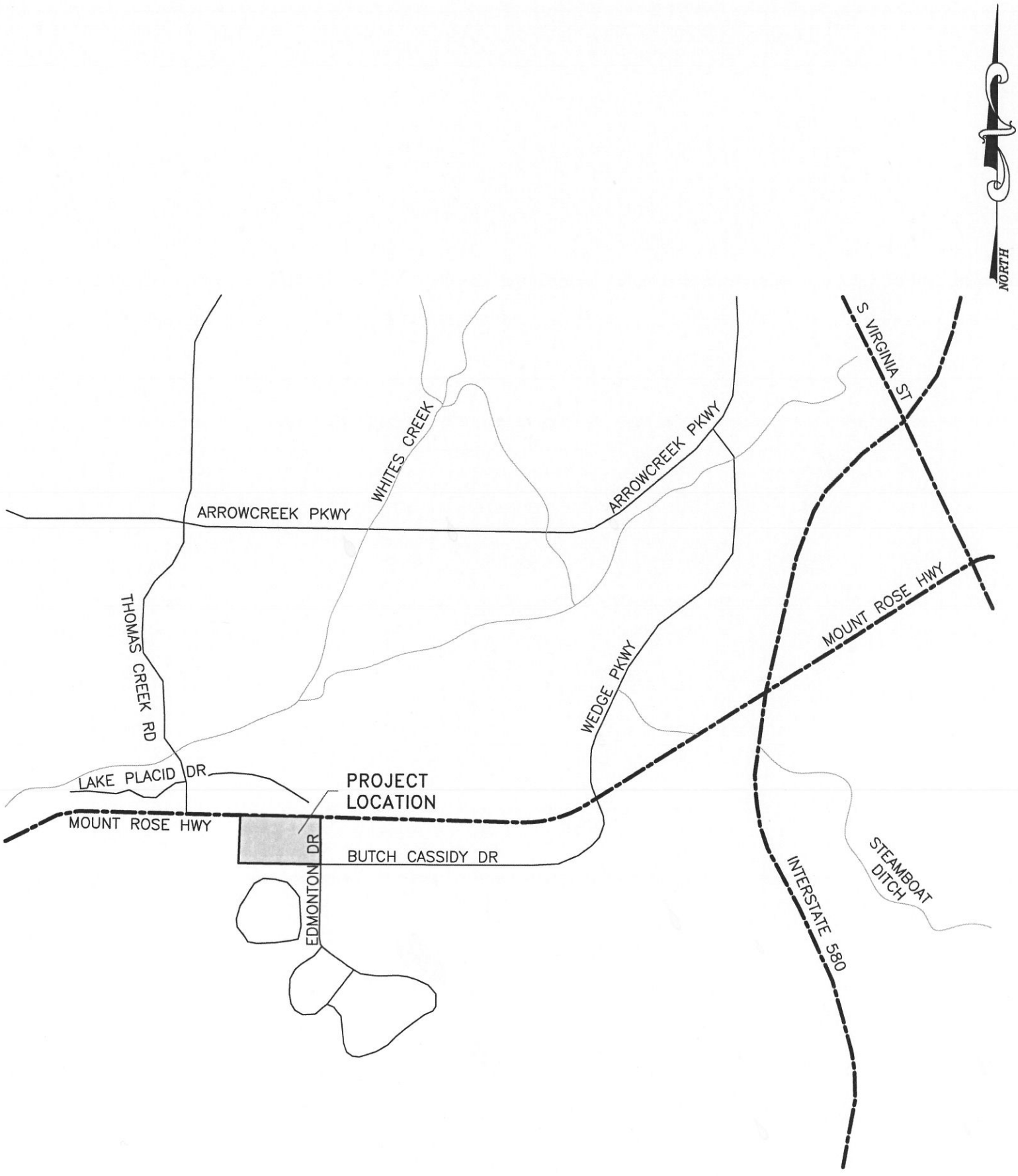


FIGURE 1
VICINITY MAP

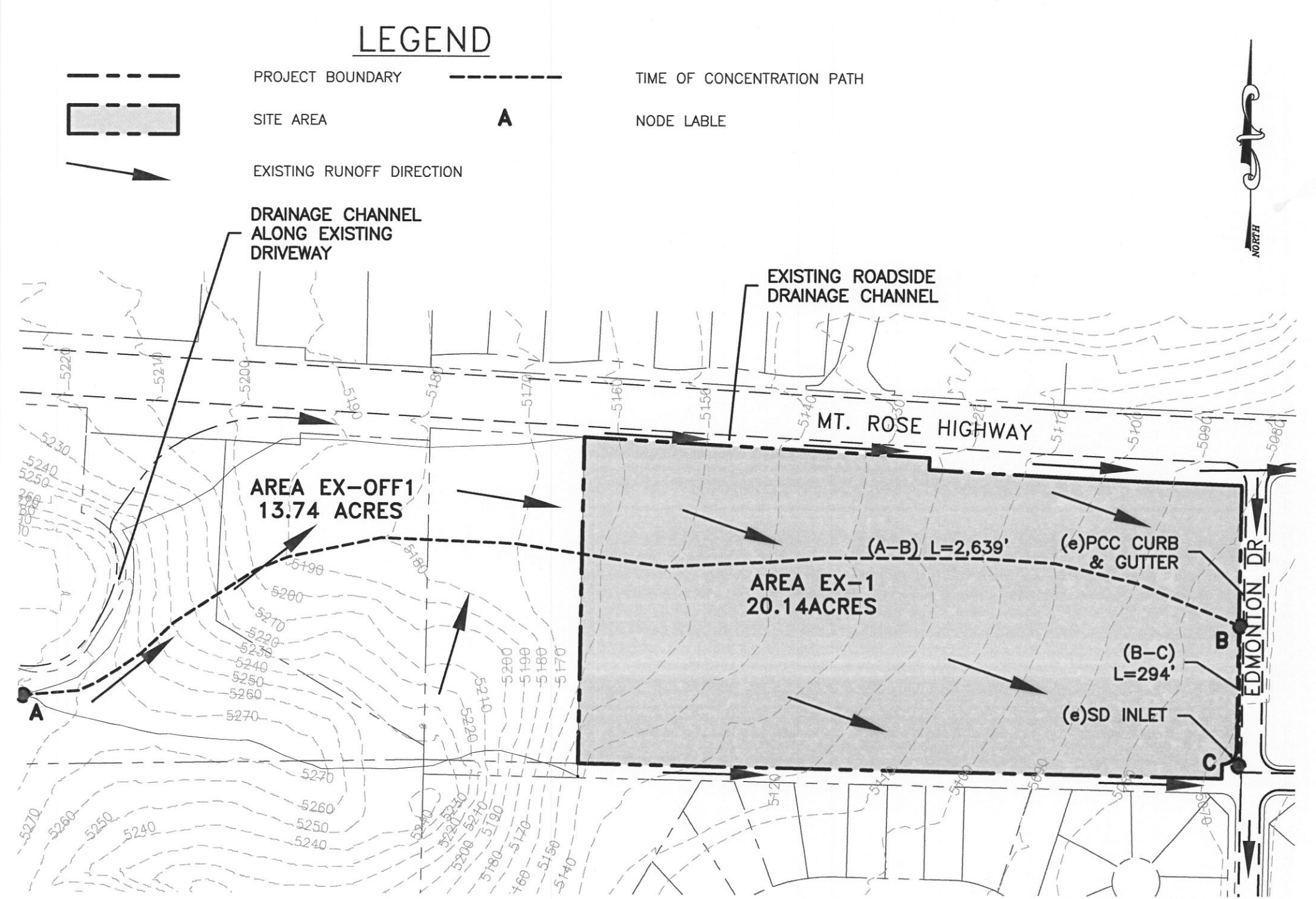


FIGURE 2

EXISTING RUNOFF CONDITIONS

LEGEND

PROJECT BOUNDARY

POTENTIAL DETENTION AREA

RUNOFF DIRECTION

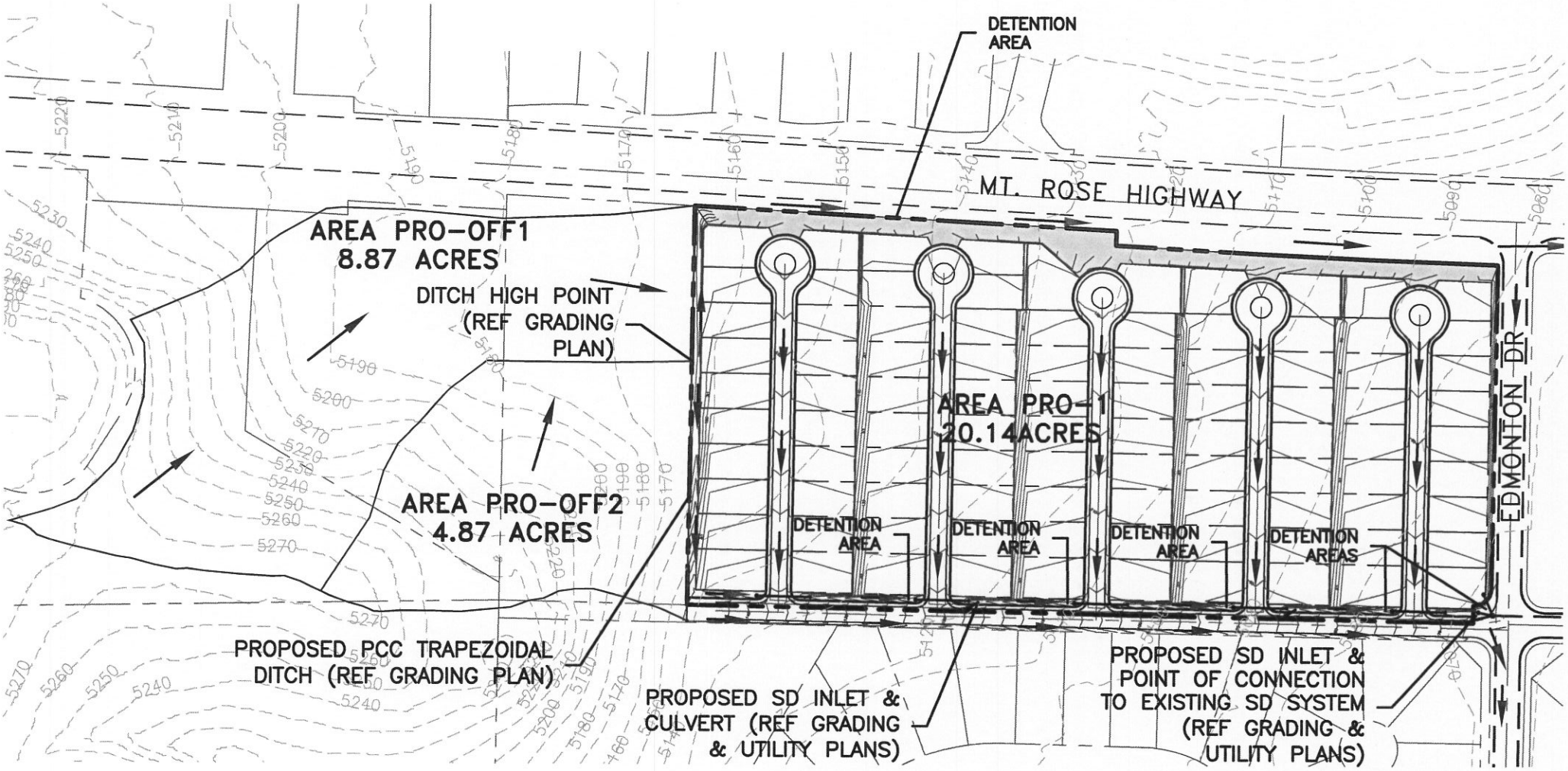


FIGURE 3

PROPOSED RUNOFF CONDITIONS

RATIONAL FORMULA METHOD
RUNOFF COEFFICIENTS

Land Use or Surface Characteristics	Aver. % Impervious Area	Runoff Coefficients 5-Year (C_5)	Runoff Coefficients 100-Year (C_{100})
Business/Commercial:			
Downtown Areas	85	.82	.85
Neighborhood Areas	70	.65	.80
Residential:			
(Average Lot Size)			
⅛ Acre or Less (Multi-Unit)	65	.60	.78
¼ Acre	38	.50	.65
⅓ Acre	30	.45	.60
½ Acre	25	.40	.55
1 Acre	20	.35	.50
Industrial:	72	.68	.82
Open Space:			
(Lawns, Parks, Golf Courses)	5	.05	.30
Undeveloped Areas:			
Range	0	.20	.50
Forest	0	.05	.30
Streets/Roads:			
Paved	100	.88	.93
Gravel	20	.25	.50
Drives/Walks:	95	.87	.90
Roofs:	90	.85	.87

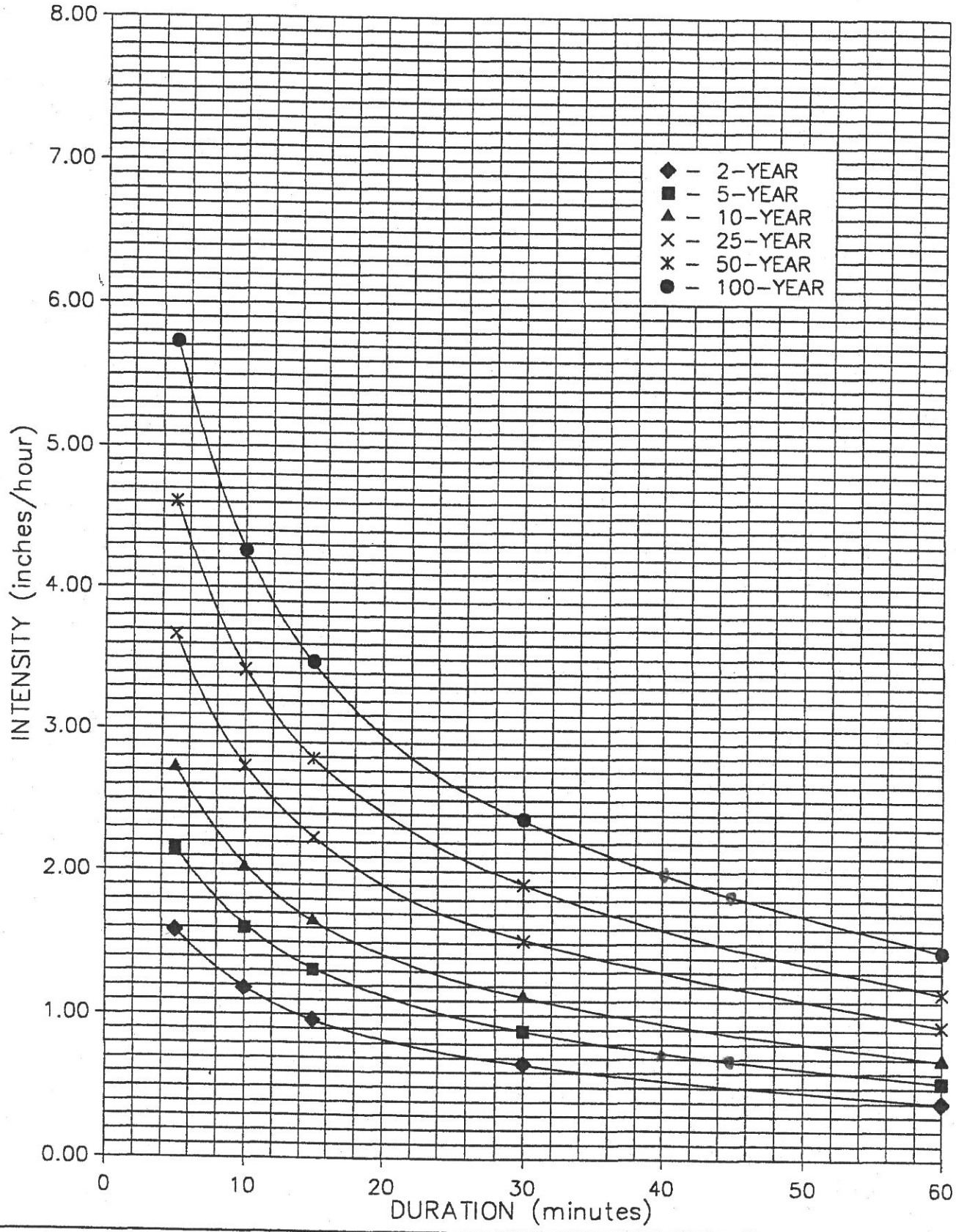
Notes:

1. Composite runoff coefficients shown for Residential, Industrial, and Business/Commercial Areas assume irrigated grass landscaping for all previous areas. For development with landscaping other than irrigated grass, the designer must develop project specific composite runoff coefficients from the surface characteristics presented in this table.

WASHOE COUNTY
HYDROLOGIC CRITERIA AND DRAINAGE DESIGN MANUAL

Figure 7

ZONE I TIME–INTENSITY–FREQUENCY CURVES



VERSION: December 2, 1996	REFERENCE:	FIGURE 605
WRC ENGINEERING, INC.		

F:\PROGRAMS\HYDRO\washoe\figures\187805.dwg Wed Mar 11 15:47:20 1998

TIME-INTENSITY-FREQUENCY VALUES FOR ZONE I AND ZONE II

DURATION (minutes)	PRECIPITATION INTENSITY FOR ZONE I (IN./HOUR) RECURRENCE INTERVAL					
	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
5	1.58	2.15	2.72	3.67	4.61	5.73
10	1.18	1.60	2.02	2.73	3.42	4.26
15	0.96	1.31	1.65	2.23	2.79	3.48
30	0.66	0.89	1.13	1.52	1.91	2.37
60	0.40	0.54	0.69	0.93	1.16	1.45

DURATION (minutes)	PRECIPITATION INTENSITY FOR ZONE II (IN./HOUR) RECURRENCE INTERVAL					
	2-YEAR	5-YEAR	10-YEAR	25-YEAR	50-YEAR	100-YEAR
5	1.98	2.69	3.41	4.59	5.76	7.17
10	1.47	2.00	2.53	3.41	4.28	5.32
15	1.20	1.63	2.06	2.78	3.49	4.34
30	0.82	1.12	1.41	1.90	2.39	2.97
60	0.50	0.68	0.86	1.16	1.46	1.81

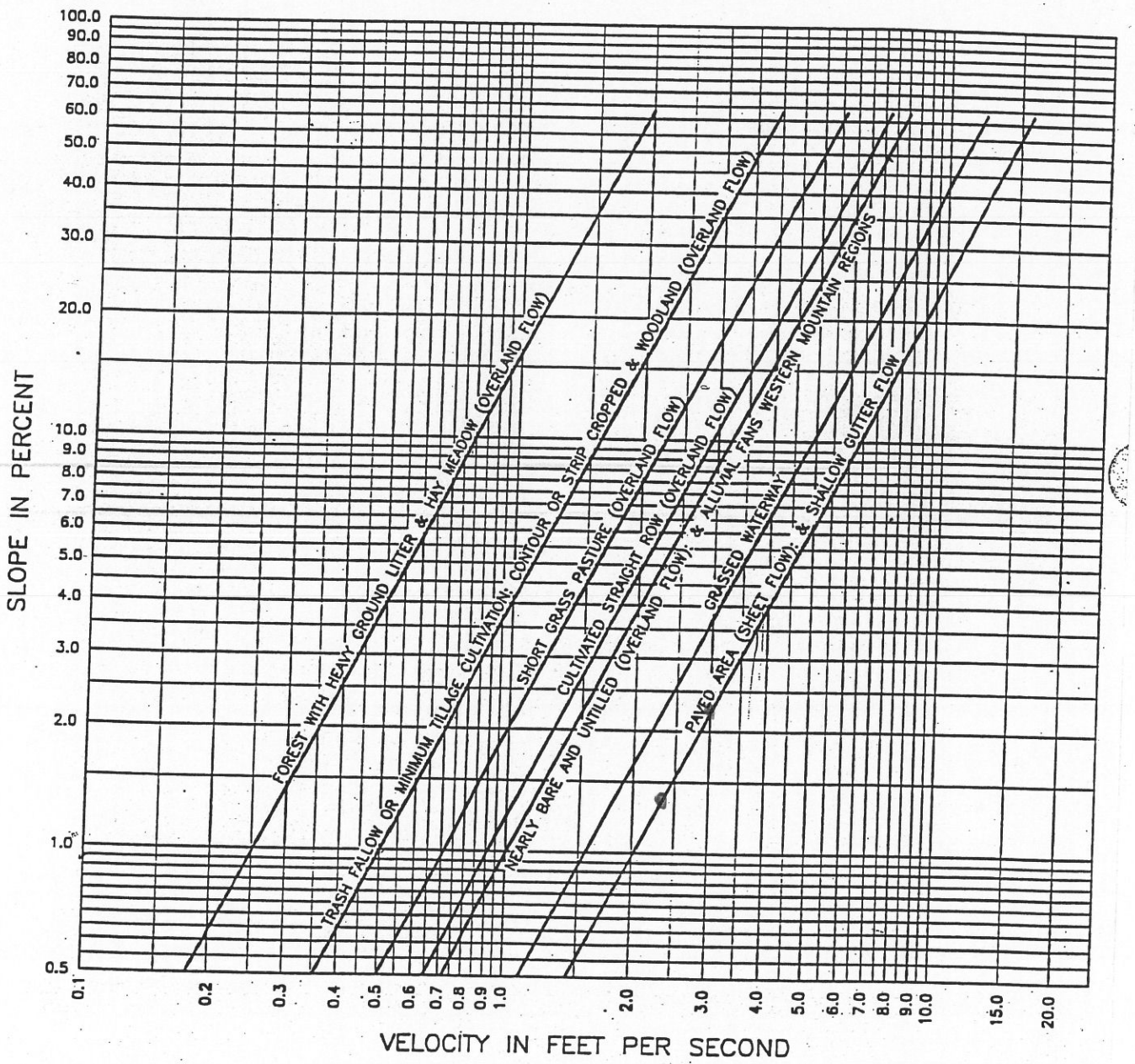
Figure 9

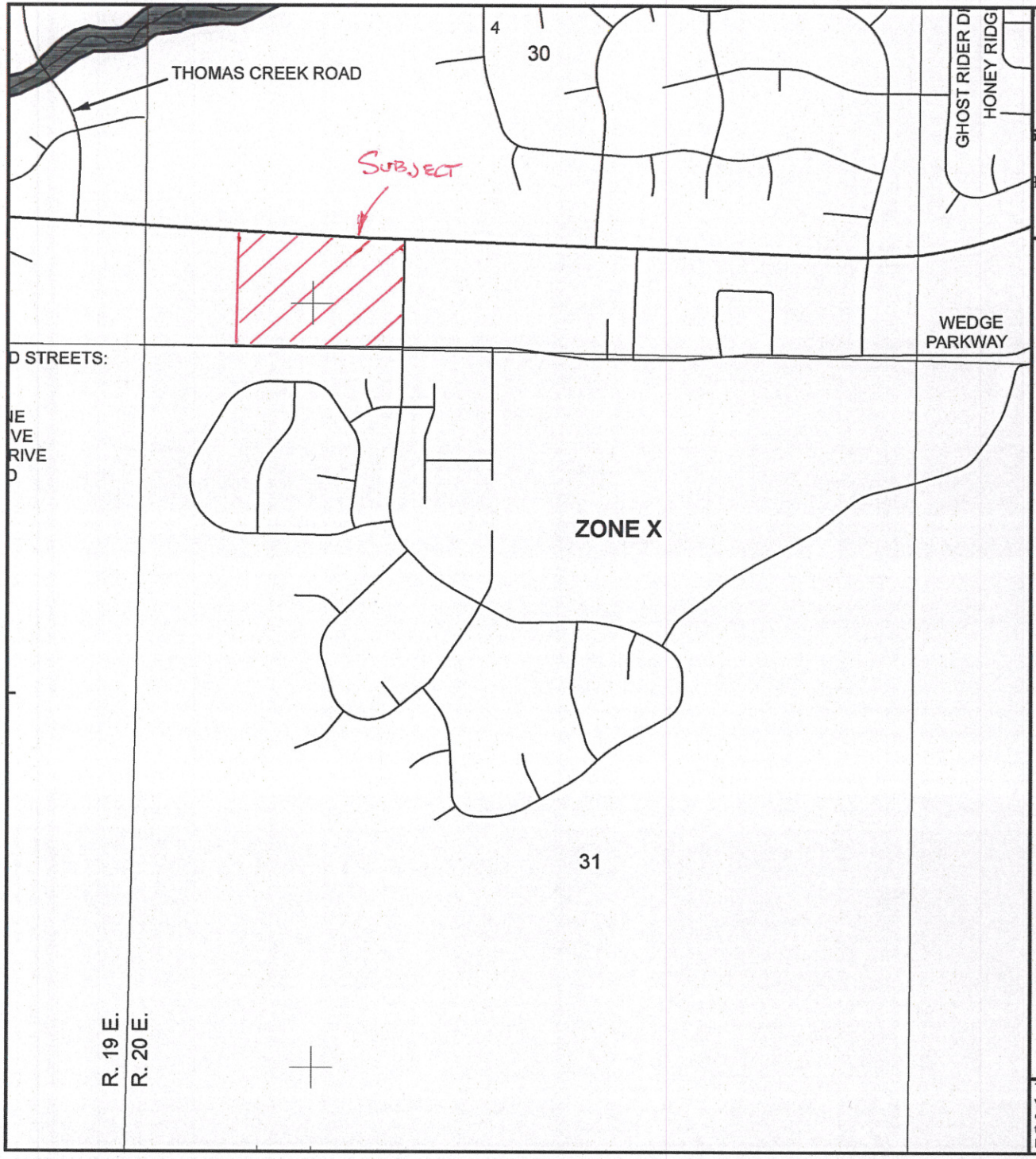
REGIONAL GROWTH FACTORS

(non-dimensional)

Storm Duration (Hours)	Return Period					
	2-Yr.	5-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
1	1.0	1.36	1.72	2.32	2.91	3.62
6	1.0	1.30	1.52	1.81	2.04	2.26
24	1.0	1.28	1.50	1.79	2.01	2.22

TRAVEL TIME VELOCITY





tional Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 3245G

FIRM

FLOOD INSURANCE RATE MAP

WASHOE COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 3245 OF 3475
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RENO, CITY OF	320020	3245	G
WASHOE COUNTY	320019	3245	G

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
32031C3245G

MAP REVISED
MARCH 16, 2009

Federal Emergency Management Agency

PRELIMINARY SANITARY SEWER REPORT

TO SUPPORT THE

COLINA ROSA TENTATIVE MAP

PREPARED FOR:

TOWNE DEVELOPMENT OF SACRAMENTO, INC.
11060 WHITE ROCK ROAD, SUITE 150
RANCHO CORDOVA, CA 95670

PREPARED BY:

TEC
CIVIL
ENGINEERING
CONSULTANTS

JOB #: KLS.011
DATE: 1/15/2016

TABLE OF CONTENTS

1. Introduction

This preliminary sanitary sewer report is to support the tentative map for the proposed Colina Rosa Subdivision (CRS). The CRS is proposed to be a 94-lot subdivision located at the southwest corner of the intersection of Mount Rose Highway (SR 431) and Edmonton Drive. The project is comprised of 2-existing parcels (Assessor Parcel Numbers (APNs) 049-402-02 and 049-402-07) totaling ±19.13-acres. The project is located in Tonwship 18 North, Range 18 East in Section 30. The location of the project is presented in Figure 1 (Vicinity Map).

2. Methodology

Sanitary sewerage flows were estimated utilizing the design criteria in Chapter 2 (Gravity Sewer Collection Design Standards) of the Washoe County Department of Water Resources, Engineering Design Standards. Average flows for a residence (DU) was estimated at 270-gallons/day. Commercial zoned properties were assumed to generate an average daily flow of 780-gallons/day/acre. A peaking factor of 3 was utilized to estimate peak flows. Although the majority of the commercial zoned property is currently vacant, build out of these areas was assumed for this report.

The high school was assumed to generate a peak sewage flow of 3,200-gallons/acre/day. The Manning's equation was utilized with a roughness coefficient (*n*) of 0.012 for the PVC pipes to determine the capacities of the sanitary sewer mains.

3. Existing Sanitary Sewer System

3.1. Existing Infrastructure

The project will connect to the existing 8-inch diameter sanitary sewer stub that extends west from the intersection of Edmonton Drive and Butch Cassidy Drive. The existing sanitary sewer system will convey sewage from this point to the existing 15-inch diameter sanitary sewer trunk main located on the north side of Mount Rose Highway in Sundance Drive. The approximate alignment of the existing sanitary sewer system that will convey sewage from the proposed Colina Rosa Subdivision to the existing 15-inch diameter trunk main is presented in Figure 2. All of the existing sanitary sewer mains indicated are 8-inch in diameter unless noted otherwise.

3.1. Existing Capacity

The Washoe County recorded As Built Plans for the existing sanitary sewer mains were reviewed between the proposed point of connection in Edmonton Drive to the existing 15-inch diameter trunk main located in Sundance Drive to locate any potential conveyance issues. Two locations in Bozeman Drive and De Spain Lane were identified as two areas that might have potential conveyance issues. The existing 10-inch diameter sanitary sewer main in Bozeman Drive was built at a 0.004-ft/ft (0.4%) slope. The existing 8-inch diameter sanitary sewer main in De Spain Lane was constructed at 0.0125-ft/ft (1.25%). The 10-inch diameter sanitary sewer main in

Bozeman Drive and the 8-inch diameter sanitary sewer main in De Spain Lane have ½ full conveyance capacities of 0.485-MGD and 0.4729-MGD respectively.

4. Proposed Sanitary Sewer System

4.1. Sanitary Sewer Mains and Laterals

The proposed sanitary sewer system will be comprised of 8-inch diameter SDR 35 PVC with slopes mostly ranging between 3% to ±7%. Each house will utilize a 4-inch diameter sanitary sewer lateral constructed at a minimum slope of 2%. All of the proposed sanitary sewer mains will be publicly owned and maintained by the Washoe County Department of Water Resources. The proposed sanitary sewer system will convey sewage southerly along the 5-proposed cul-de-sacs to the proposed sanitary sewer main to be built along the southern boundary of the site. Sewage from the 5-proposed cul-de-sac will be conveyed easterly in this main to the existing sanitary sewer manhole located at the intersection of Edmonton and Butch Cassidy Drive.

4.1. Sanitary Sewer Demands

Sanitary sewer demands were estimated utilizing the criteria listed in Section 2 of this report. The 8-inch diameter sanitary sewer main in De Spain Lane will convey sewage from approximately 499-DUs, 17.6-acres of commercial zoned property and the 66.85-acre Galena High School. The following calculations were utilized in estimating the peak sewage to be generated from the existing and proposed properties:

499-EXISTING AND PROPOSED DUS
(499-DUs)*(270-gallons per day per capita)*(3)=404,190-gpd (0.404-MGD)

17.6-ACRES COMMERCIAL PROPERTY
(17.6-acres)*(780-gallons per day per acre)*(3)=41,184-gpd (0.041-MGD)

66.85-ACRES PUBLIC FACILITY
(66.85-acres)*(3,200-gallons per day per acre)=213,920-gpd (0.214-MGD)

TOTAL PEAK DEMAND=±0.659-MGD

As summarized above the existing and proposed peak demand to be placed on the existing 8-inch diameter sanitary sewer main is estimated at 0.659-MGD. As previously discussed, the flattest pipe (1.25%) in De Spain Lane has a ½ full conveyance capacity of approximately 0.473-MGD. If the estimated peak flow was to occur in this pipe; the pipe would be approximately 62% full during peak flow conditions. This sanitary sewer main has an estimated conveyance capacity of approximately 0.946-MGD flowing full.

The existing 10-inch diameter sanitary sewer main in Bozeman previously discussed is upstream of the existing commercial areas, some of the DUs and the Galena High School. An estimated

431-DUs are conveyed in this sanitary sewer main which generates 404,190-gpd (0.404-MGD) of sewage which is less than the ½ full capacity estimated for this main (0.485-MGD).

5. Discussion/ Conclusions

Colina Rosa Subdivision will add 94-homes to the existing sanitary sewer system. These additional sewage flows will be conveyed by from Edmonton Drive through the existing sanitary sewer system to the existing 15-inch diameter trunk main located in Sundance Drive. The currently vacant commercial areas were assumed developed for a more conservative estimate of peak flows. The peak flows to be generated by the homes, commercial areas and the high school were assumed to occur simultaneously although it is anticipated that peak flows from these different source types would occur at completely different times.

With the conservative assumptions listed above, the only sanitary sewer main existing or proposed estimated to flow over ½ full is the one located in De Spain Lane. However, this existing sanitary sewer main would only be approximately 62% full with a remaining capacity to convey an additional ±0.29-MGD. Therefore, no adverse effects are anticipated to the existing sanitary sewer system with the development of this project.

REFERENCES

- *Washoe County Department of Water Resources, Engineering Design Standards, Section 2 (Gravity Sewer Collection Design Standards)* dated May, 2010

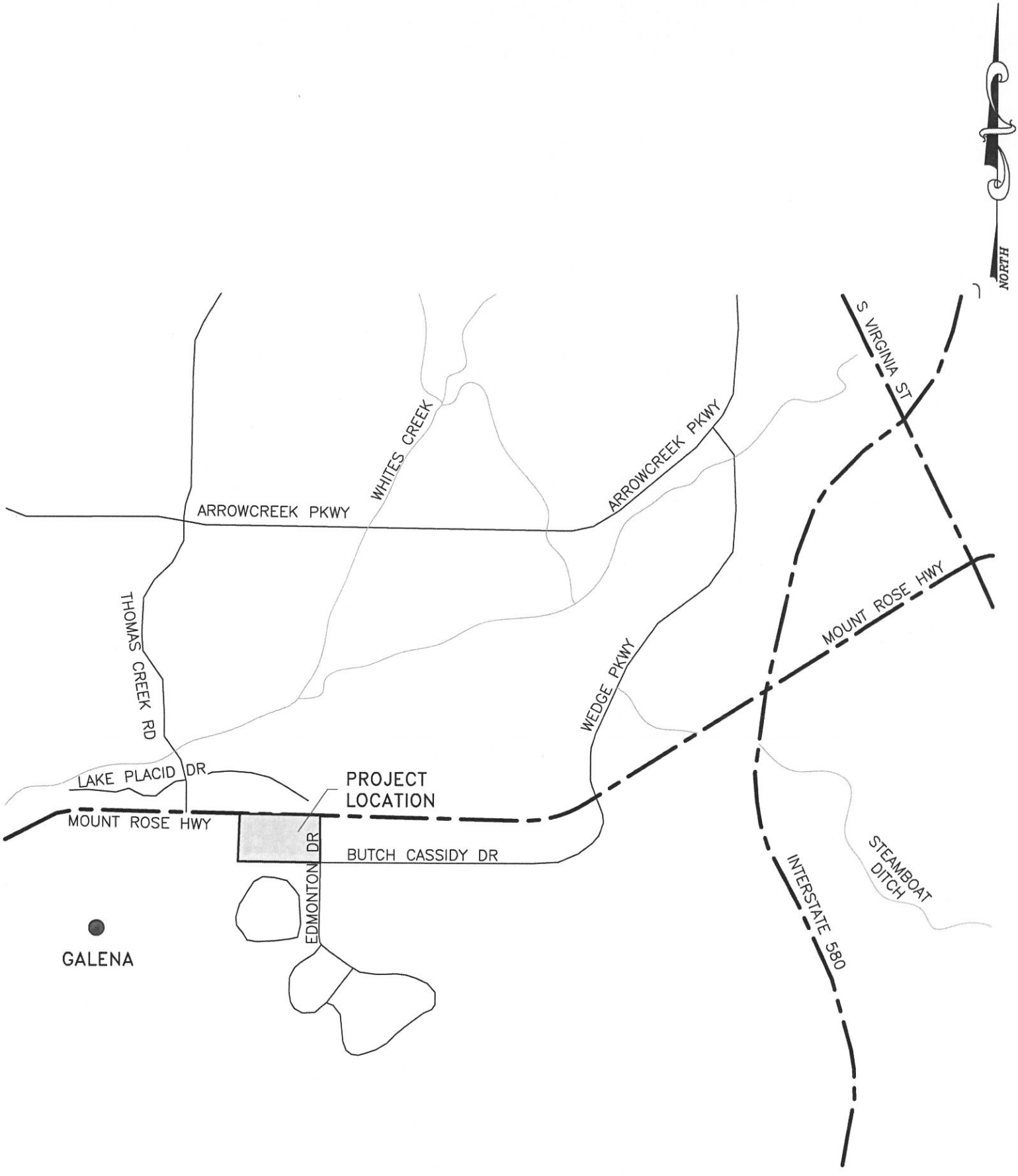


FIGURE 1
VICINITY MAP

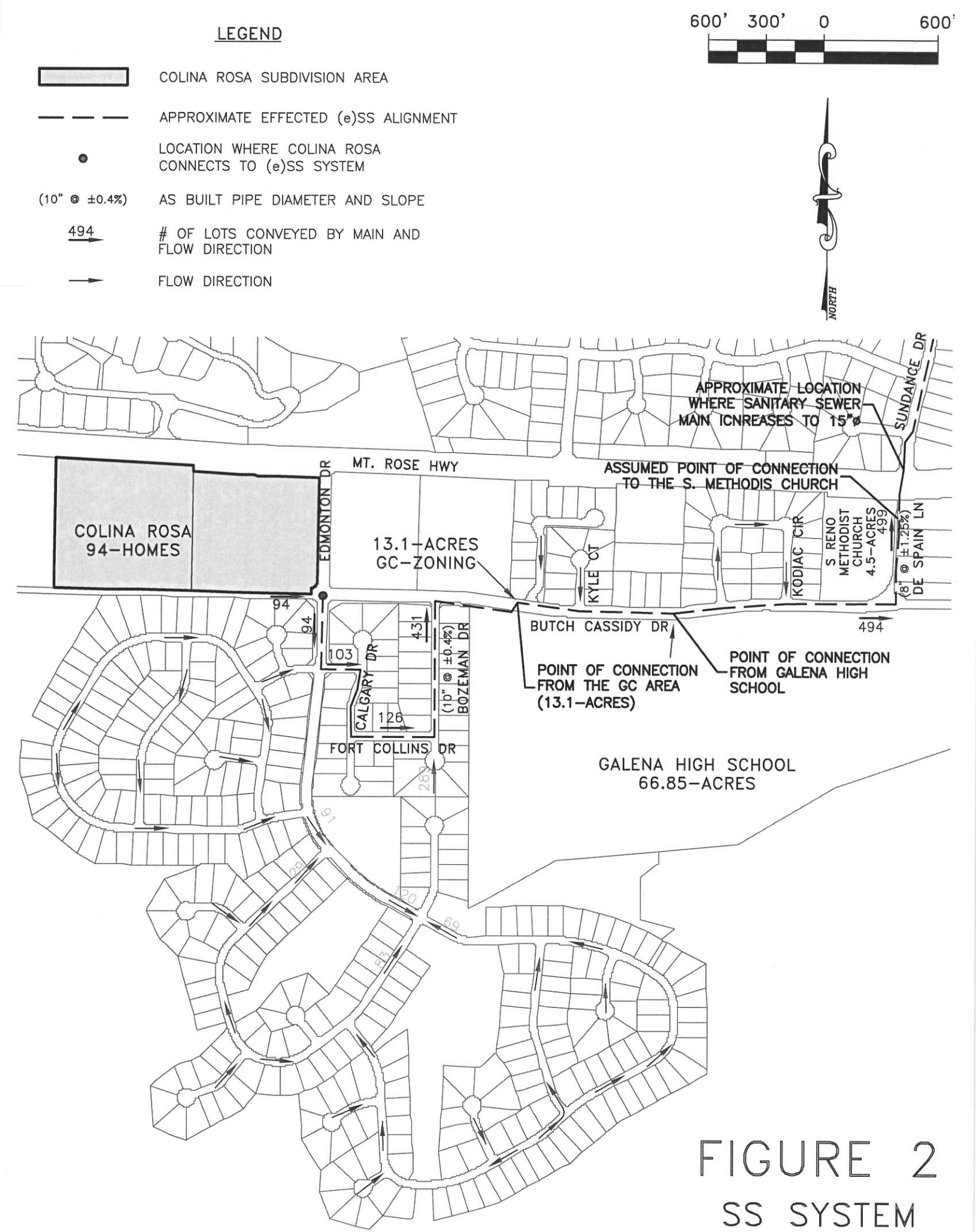


FIGURE 2

SS SYSTEM

Axion
GEOTECHNICAL
Geotechnical Engineering & Construction Testing Services
681 Edison Way, Reno, NV 89502

GEOTECHNICAL FEASIBILITY STUDY

PROPOSED

COLINA ROSA RESIDENTIAL DEVELOPMENT

Washoe County Assessor's Office Parcel Numbers 049-402-02 and -07

Mt. Rose Highway Area

WASHOE COUNTY, NEVADA

Prepared for:

TEC Civil Engineering Consultants
9480 Double Diamond Parkway, Suite 200
Reno, Nevada 89521

Attention: Jason Gilles, President

January 11, 2016

Project No. 16.142.02-G

Axion
GEOTECHNICAL
Geotechnical Engineering & Construction Testing Services
681 Edison Way, Reno, NV 89502

January 11, 2016
Project No. 16.142.02-G

TEC Civil Engineering Consultants
9480 Double Diamond Parkway, Suite 200
Reno, Nevada 89521

Attn: Jason Gilles, President

Re: Geotechnical Feasibility Study, Proposed Colina Rosa Residential Development, Washoe County Assessor's Office Parcel Numbers 049-402-02 and -07, Mt. Rose Highway area of Washoe County, Nevada

Dear Mr. Gilles:

Axion Geotechnical is pleased to present results of a geotechnical feasibility study our firm conducted at the property. Based on results of our study, experience in the area, and understanding of proposed development, we conclude that, from a preliminary geotechnical standpoint, the property is suitable for single-family residential development. The primary geotechnical concerns are the potential presence of **over-size aggregate**, **bedrock**, and **expansive clay**, and **steepness of slope**.

We appreciate having been selected to prepare this study and trust results fulfill your needs. If you or your design consultants have questions, please do not hesitate to contact us at (775) 771-2388.

Respectfully,

AXION GEOTECHNICAL, LLC

Chris D. Betts

Chris D. Betts, P.E.
President

TABLE OF CONTENTS

Axion Geotechnical, LLC
681 Edison Way
Reno, Nevada 89502
(775) 771-2388

I INTRODUCTION

Axion Geotechnical is pleased to present results of a geotechnical feasibility study our firm conducted for the proposed Colina Rosa residential development. The 20.13-acre combined parcels are Washoe County Assessor's Office Parcel Numbers 049-402-02 and -07 (Property) and are at the southwest corner of Mt. Rose Highway (State Route 431) and Edmonton Drive. Conceptual plans are not available at this time; however, we understand development will include construction of individual lots for single-family residences serviced by community water, sewer and storm drain systems. The structures will have one to two levels, will be wood-framed, and supported with shallow conventional spread foundations. Dedicated service streets will be surfaced with asphaltic concrete.

We have not received information concerning anticipated foundation loads; however, we anticipate maximum wall loads will be on the order of 1.5 kips per foot (dead plus live plus snow load), and that maximum column loads will be less than five kips (dead plus live plus snow load). For frost protection, perimeter foundations will bottom at least 24 inches below lowest adjacent exterior ground surface. Structural design will follow criteria outlined in the 2012 *International Residential Code*.

We have not received civil design plans; however, we anticipate earthwork necessary to create proposed grades and for proper site drainage will result in cuts and fills from two to five feet. New slopes will be constructed at final inclinations of two horizontal to one vertical (2H:1V) or flatter. Site retaining walls are anticipated. Depth of utility trenches should be less than eight feet. We assume underground utilities in proposed structural areas will be abandoned or relocated. Earthwork will be performed in accordance with the 2012 *International Building Code,* and the 2012 *Standard Specifications for Public Works Construction* (Regional Transportation Commission).

The purpose of our work was to perform a site reconnaissance and review available literature and maps to provide opinions and discussions concerning the geotechnical suitability of the Property for its intended use. Once design parameters, such as building locations, finish floor elevations, foundation loads and proposed grading are known; a design-level geotechnical investigation report with detailed information of the subsurface soil conditions and recommendations for design and construction must be performed.

This report is preliminary and geotechnical in nature and not intended to identify other potential site constraints such as environmental hazards, wetlands determinations or the potential presence of buried utilities. Opinions and discussions included in this report are specific to development at the Property and are not intended for off-site development.

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II SITE AND SOIL CONDITIONS

The Property is undeveloped and vacant. Review of images available on Google Earth reveals the Property has been undeveloped and vacant dating back to 1994, the oldest image available. The Property is bordered by undeveloped hillside to west, single-family residences to the south, Mt. Rose Highway to the north and Edmonton Drive to the east. The Property is approximately three to five feet higher in elevation than adjacent development, grades gently to moderately downward from the northwest to the southeast, and is covered by dense sagebrush and weeds. Boulders, some up to 10 feet in diameter, are present, a billboard is at the northeast corner, and electrical panels/boxes are at the southeast corner. A jeep trail cross along the southern boundary in an east-west direction.

View of Property on Google Earth


View of Property from east to west at Edmonton Drive

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Based on the United States Geological Survey 7.5-Minute topographic map of the Mt. Rose Quadrangle, the site is in the SW ¼ of Section 30, Township 18 North, Range 20 East, and elevation is between about 5,000 and 5,100 feet relative to mean sea level.

According to sheet 27 of the *Soil Survey of Washoe County, Nevada, South Part*, the Property is predominantly underlain by Leviathan extremely stony sandy loam, 2 to 8 percent slopes (# 559); however, a small amount of Old Camp stony sandy loam, 15 to 30 percent slopes (#930) is mapped at the southwestern corner.

Soil Map

These soil survey units are described as follows:

> Leviathan extremely stony sandy loam, 2 to 8 percent slopes (# 559): This very deep, well-drained soil is on terraces. It formed in alluvium from mixed rock sources. Elevation is 4,800 to 6,000 feet. Typically, the surface layer is grayish brown extremely stony sandy loam about 11 inches thick. The subsoil to a depth of 60 inches is brown very gravelly sandy clay loam. Permeability is moderately slow. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is slight. Limitations for shallow excavations are moderate due to large stones. Limitations for dwellings with or without basements are moderate due to shrink-swell. Limitations for local roads and streets are moderate due to frost action and shrink-swell. Limitations for septic tank absorption fields are severe due to slow percolation rates. The shrink-swell potential is low to moderate. The frequency of flooding is none. Depth to high water table is greater than 6.0 feet. Depth to bedrock is

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greater than 60 inches. The potential frost action is moderate. The risk of corrosion to steel is moderate, and to concrete it is low. The main limitations associated with use of this unit for urban development, as described by the soil survey, are the moderate shrink-swell potential associated with high clay content, moderately slowly permeable subsoil, and susceptibility to frost heaving.

Old Camp stony sandy loam, 15 to 30 percent slopes (#930): This shallow, well-drained soil is on uplands. It formed in residuum derived dominantly from volcanic rocks. Elevation is 4,500 to 6,000 feet. Typically, 1 to 3 percent of the surface is covered with stones. The surface layer is pale brown stony sandy loam about 7 inches thick. The subsoil is brown very cobbly clay loam about 10 inches thick. Hard andesite bedrock is at a depth of 17 inches. Depth to hard bedrock ranges from 10 to 20 inches. Permeability is moderately slow. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is slight. Limitations for shallow excavations are severe due to depth to rock, presence of large stones, and slope. Limitations for dwellings with or without basements are severe due to slope, depth to rock, and large stones. Limitations for local roads and streets are severe due to slope, depth to rock, and large stones. Limitations for septic tank absorption fields are severe due to slope, depth to rock, and large stones. The shrink-swell potential is low to moderate. The frequency of flooding is none. Depth to high water table is greater than 6.0 feet. Depth to bedrock is 10 to 20 inches. Hardness of bedrock is hard. The potential frost action is moderate. The risk of corrosion to steel is high, and to concrete it is low. The main limitations to use of this soil for urban development, as defined by the soil survey, are the steepness of slopes, presence of stone, and the shallowness of soil over bedrock.

According to geologic mapping by H. F. Bonham and David K. Rogers, 1983, materials underlying the site consist predominantly of Pleistocene-age Tahoe outwash (Qtm) and a small amount of Miocene-age Kate Peak Formation (Tkf). These units are described as follows:

Quaternary-age Tahoe Outwash-Mount Rose Fan Complex (Qtm): Glacial outwash stream deposits of volcanic and granitic composition; light yellowish- to orange-brown; sandy large cobble to boulder gravel containing characteristically fresh granitic lag gravel. There is a strongly developed 3 feet thick soil profile; a dark yellowish-brown, prismatic argillic B-horizon; typically no siliceous or calcic duripan development; and granitic boulders are partly to thoroughly decomposed where buried in soil. Deposits locally are only thin veneers; some undifferentiated areas.

Miocene-age Kate Peak Formation (Tkf): Horblende-pyroxene andesite and dacite flows with minor breccia and volcanic conglomerate.

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III GEOLOGIC AND SEISMIC CONSIDERATIONS

To evaluate potential geological hazards at the Property, our study included a site reconnaissance and review of available literature and maps.

A. Geology and Faulting

The Property is in the western portion of the Truckee Meadows, a structural basin surrounded by Peavine Mountain, Steamboat Hills, the Virginia Range and the Sierra Nevada to the north, south, east and west, respectively. The basin is transitional between the Basin and Range physiographic province to the east and the Sierra Nevada to the West. The geologic structure of the area is characterized by high-angle extensional normal faults trending in a north-northeast direction. The Truckee Meadows is a down-dropped graben with neighboring horsts to the east and west.

According to mapping by Gail Cordy Szecsody (*Mt. Rose NE Quadrangle Earthquake Hazards Map,* Nevada Bureau of Mines and Geology, dated 1983), no faults cross the Property. According to the Unites States Geological Survey (USGS) Earthquake Hazards Program (Quaternary Faults in Google Earth), no faults cross the site. The database indicates that the nearest Holocene to latest Pleistocene fault (younger than 15,000 years old) is located approximately 0.6 miles west of the Property.

Based on the Nevada Seismological Laboratory website the nearest principal Quaternary-age fault is the Mt. Rose fault zone. The Nevada Seismological Laboratory indicates an earthquake of magnitude 7.1 is possible along this fault zone (*Reno/Carson Fault Information*, updated January 31, 2003).

B. Liquefaction

Liquefaction, a loss of soil shear strength, is a phenomenon associated with loose saturated granular deposits subjected to strong earthquake shaking. Liquefaction can result in unacceptable movement of foundations. Although a detailed assessment should be considered during a design-level geotechnical investigation, the anticipated shallow-depth to bedrock suggests the Property is not susceptible to liquefaction.

C. Slope Stability

Based on the anticipate stable nature of the underlying materials and our anticipation that slopes will be shallow and constructed at final inclinations of two horizontal to one vertical (2H:1V) or flatter, that earth retaining walls are proposed, we do not believe rock falls or landslides will impact the Property.

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D. Radon

Radon, a colorless, odorless, radioactive gas derived from the natural decay of uranium, is found in nearly all rocks and soils. The Environmental Protection Agency (EPA) suggests that remedial action be taken to reduce radon in any structure with average indoor radon of 4.0 picocuries per liter (pCi/L) or more. Based on *Radon in Nevada* (Rigby *et al.*, Nevada Bureau of Mines and Geology, Bulletin 108, 1994), the Property, as well as much of northern Nevada, is in an area where average indoor radon concentrations could exceed 4.0 (pCi/L).

E. Flooding

The Federal Emergency Management Agency flood map (FEMA-Map 32031C3245G, revise date of March 16, 2009) shows the Property in Flood Hazard Zones X unshaded. According to FEMA, these are areas determined to be outside the 0.2% annual chance floodplain.

IV OPINIONS AND DISCUSSIONS

Based on results of our study, experience in the area, and understanding of proposed development, we conclude that, from a preliminary geotechnical standpoint, the Property is suitable for single-family residential development. The primary geotechnical concerns are the potential presence of **over-size aggregate**, **bedrock**, and **expansive clay**, and **steepness of slope**.

The Property is potentially underlain by over-size aggregate such as gravel, cobbles and boulders. Consideration should also be given to the presence of over-size aggregate which will be generated during earthwork operations, and the subsequent reduction of material available for reuse as fill. Screening of over-size aggregate will be required. Over-size aggregate could require off-hauling or that fill material be imported to balance earthwork quantities to attain grades. If over-size aggregate is proposed for use as fill, large equipment will be needed to properly place and compact rock fills. Compaction approval during the placement of rock fills can only be achieved based on visual performance specifications established by the Geotechnical Engineer, which will increase on-site inspection time and increase cost of inspection services. The removal of large cobbles or boulders will result in undercutting of excavation sidewalls and resulting trench widths will be increased. If over-size aggregate is placed near foundations, footings may need to be formed.

Oversize aggregate will affect difficulty of grading and trenching associated with cobbles and boulders. A leveling course could be required to provide a smooth finished surface. Although we believe that, overall, the underlying materials can be excavated with a Caterpillar 336 excavator and Caterpillar D8N Dozer or equivalent equipment and that blasting will not be necessary, as is inherent with over-size aggregate, areas of resistant material will be encountered which will require use of special equipment such as a hydraulic rock hammer.

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Bedrock could be encountered near the southwest corner of the Property. Consideration should be given to the difficulty of grading and trenching associated with bedrock. Although we do not believe that blasting will be necessary for excavations limited to the upper 10 feet, as is inherent with bedrock, localized areas of resistant material may be encountered which will require the use of special equipment such as a hydraulic rock hammer.

Clay soils can exhibit a potential for expansion. Expansive soils are subject to substantial volume changes (shrink and swell) with changes in moisture content. Changes in moisture content can occur as a result of seasonal variations in precipitation, landscape irrigation, broken or leaking water pipes and sewer lines, and poor site drainage. These volume changes can cause differential movements (settlement or heave) of foundations, slabs-on-grade, exterior flatwork such as walkways, stoops and patios, and pavement sections.

The typical method to reduce potential movement is to remove (over-excavate) the expansive material to a sufficient depth and replace it with approved compacted fill, thereby reducing the thickness of the expansive layer, providing surcharge, and maintaining moisture at a near constant level. In conjunction with over-excavation and filling, moisture conditioning of the exposed materials to a slightly over optimum moisture content will be needed during construction.

In addition to their expansive characteristics, expansive materials also exhibit a lower Resistance Value and Modulus of Subgrade Reaction (k) than granular material. To reduce the thickness of aggregate base and to minimize future maintenance in slab-on-grade, exterior flatwork and pavement areas, portions of these soils would require removal and replacement with approved compacted fill subbase.

Clay soils also inhibit achieving uniform moisture content and impede compaction efforts. Consideration should be given to time constraints associated with scarification, moisture conditioning, drying and compacting clay soils. During periods of inclement weather, water may also become perched on clay soil, resulting in a saturated condition for prolonged periods and creating additional limitations on equipment mobility. Consideration should be given to the necessity for maintaining moisture to prevent wind erosion and for controlling dust during earthwork operations.

As moderate relief exists across the Property, consideration should be given to increased earthwork which will be needed to attain level pads, for site access and for proper site drainage. Sloping terrain can lead to differential settlement as transition zones will occur where the structure is supported on a combination of cut native soil and compacted fill material. The creation of slope set-backs will reduce the amount of property available for development.

Studies regarding the presence of radon gas suggest the Property, as well as much of northern Nevada, is in an area which could exceed the action levels established by the Environmental Protection Agency. Determinations regarding the potential presence of radon gas should be considered prior to site development.

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The soil survey suggests that slow percolation rates, susceptibility to frost heaving, and corrosion potential for uncoated steel or metal may be an additional constraints associated with the native soils. Based on our understanding that the Property will be serviced by community water, sewer and storm drain systems, we do not believe slow percolation rates will impact the site. Consideration, however, should be given to performing infiltration tests if retention basins are proposed. Based on our anticipation that footings, slabs, exterior flatwork and pavement sections will be supported on approved compact granular material; that foundations will bottom below the design frost depth; and that proper site drainage will be provided, we do not believe frost heave will adversely impact site development. Based on our experience in the area, we believe that adequate corrosion mitigation can be attained through use of properly prepared and placed Type II portland cement concrete, and by maintaining a minimum three-inch concrete cover where reinforcing steel or other metal is in close proximity to native soils.

Moderate vegetation is present across the Property. Consideration should be given to the increased construction costs associated with clearing and stripping of these materials, and associated material volume loss.

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681 Edison Way
Reno, Nevada 89502
(775) 771-2388

V REFERENCES

American Concrete Institute, *Building Code Requirements for Reinforced Concrete* (ACI 318-11), dated 2012.

Bonham, H. F. Jr. and Rogers, David K. *Mt. Rose NE Quadrangle Geologic Map*. Reno: Nevada Bureau of Mines & Geology, University of Nevada, Reno, 1983.

Federal Emergency Management Agency, U.S> Department of Homeland Security, *FEMA's Flood Map Service Center* (https://msc.fema.gov/portal).

International Code Council *2012 International Residential and Building Codes,* Whittier: International Code Council, Inc., 2012.

Lieberman, P. *Accelerated Corrosion Tests for Buried Metal Structures*. Pipeline and Gas Journal, October, 1996.

Regional Transportation Commission of Washoe County. *Standard Specification for Public Works Construction.* Reno: Regional Transportation Commission of Washoe County, 2012.

Rigby, James G., Jonathan G. Price, Lindsay G. Christensen, Daphne D. La Pointe, Alan R. Ramelli, Mario O. Desilets, Ronald H. Hess, and Stanley R. Marshall. *Radon in Nevada*. Reno: Nevada Bureau of Mines & Geology, Bulletin 108, University of Nevada, Reno, 1994.

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United States Department of Agriculture, Soil Conservation Service. *Soil Survey of Washoe County, Nevada, South Part*. Washington: U.S. Government Printing Office, 1980.

United States Department of the Interior Geological Survey. *Mount Rose NE Quadrangle*. 7.5-minute series map (topographic). 1:24,000. Denver: USGS, 1994.

Axion Geotechnical, LLC
681 Edison Way
Reno, Nevada 89502
(775) 771-2388

VI DISTRIBUTION

Unbound original, two bound wet-stamped copies and one .pdf to:

TEC Civil Engineering Consultants
9480 Double Diamond Parkway, Suite 200
Reno, Nevada 89521
Attention: Jason Gilles, President
Telephone: (775) 352-7800
Facsimile: (775) 352-7929

Appendix B – Plan Sets

Appendix B - Plan Sets:

Civil Plan and Landscape Plan Sets (6 sheets)

1: Preliminary Site Plan

2: Preliminary Grading Plans

3: Preliminary Utility Plan

4: Cross Sections

Landscape Architecture Plan Set (2 sheets)

5: Preliminary Landscape Plan

6:: Details & Notes

COLINA ROSA TENTATIVE MAP

APPLICANT

TOWNE DEVELOPMENT OF SACRAMENTO, INC
11060 WHITE ROCK ROAD, SUITE 150
RANCHO CORDOVA, CA 95670

ENGINEER

TEC CIVIL ENGINEERING CONSULTANTS
9480 DOUBLE DIAMOND PARKWAY, SUITE 200
RENO, NEVADA 89521

SHEET INDEX

PROJECT DATA

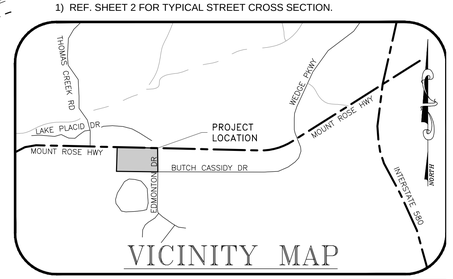
TOTAL NUMBER OF LOTS	94
LOT AREA	14.75 ACRES
RIGHT-OF-WAY/ COMMON AREA	3.64 ACRES
OPEN SPACE	1.75 ACRES
TOTAL SITE AREA	20.14 ACRES
SMALLEST LOT SIZE	5,261 S.F.
LARGEST LOT SIZE	8,680 S.F.
AVERAGE LOT SIZE	6,830 S.F.

UTILITY DATA

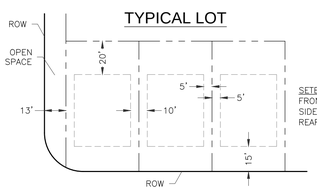
CABLE	CHARTER COMMUNICATIONS
ELECTRIC	NV ENERGY
GAS	NV ENERGY
SANITARY SEWER	WASHOE COUNTY
	WASTEWATER PLANT
SOLID WASTE	WASTE MANAGEMENT
TELEPHONE	AT&T
WATER ..... TRUCKEE MEADOWS WATER AUTHORITY	

NOTE:

1) REF. SHEET 2 FOR TYPICAL STREET CROSS SECTION.



TYPICAL LOT



SETBACKS:
FRONT YARD=15'
SIDE YARD=5'
REAR YARD=20'

LEGEND

- PROPERTY BOUNDARY
- A.C. PAVEMENT AREA
- CONCRETE AREA
- PROPOSED LOT LINE
- SETBACK LINE
- 13 / 6,019 SF — PROPOSED LOT NUMBER & LOT AREA

BASIS OF BEARINGS

"OFFICIAL PLAT OF GALENA TERRACE – UNIT 1", RECORDED ON JUNE 23, 1995 AS SUBDIVISION TRACT MAP 3156, FILE No. 1903073, OFFICIAL RECORDS OF WASHOE COUNTY

ENGINEER'S STATEMENT

THESE FIGURES (FIGURE 1 OF 6 THROUGH FIGURE 4 OF 6) HAVE BEEN PREPARED IN ACCORDANCE WITH ACCEPTED ENGINEERING PROCEDURES AND GUIDELINES, AND WILL BE IN SUBSTANTIAL COMPLIANCE WITH APPLICABLE STATUTES, COUNTY ORDINANCES, AND COMMUNITY DEVELOPMENT CODES WITH FINAL DESIGN.

JASON A. GILLES, P.E. P.E. #16019

50' 25' 0 50' 100'

TENTATIVE MAP
PRELIMINARY SITE PLAN
SHEET 1 of 6

DATE: 1/15/15
SCALE: 1"=50'
JOB #: KLS.011

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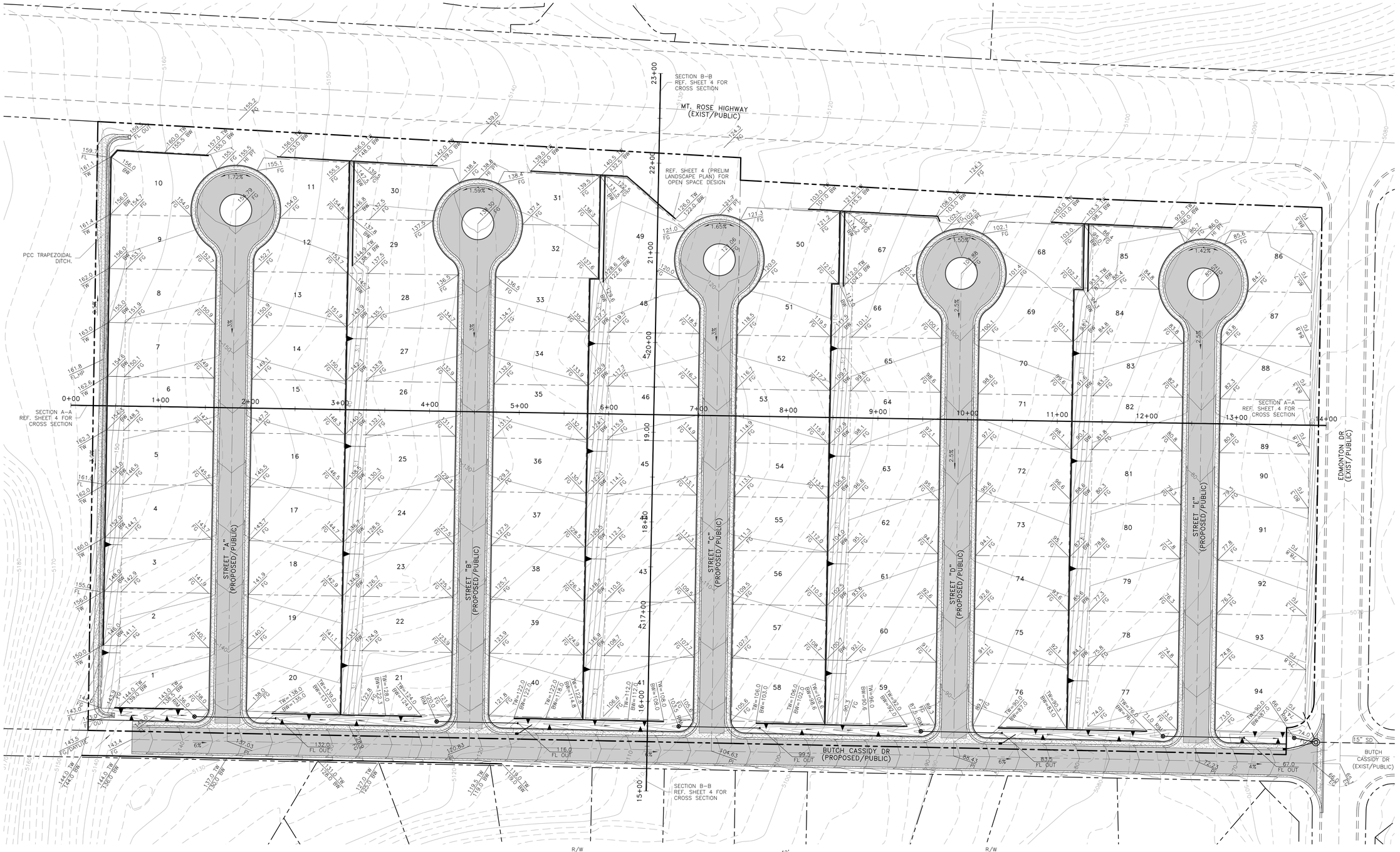
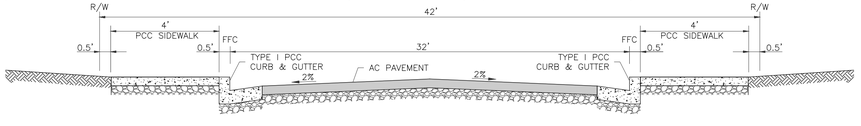
9480 DOUBLE DIAMOND PARKWAY, STE 200
RENO, NEVADA 89521
PH (775) 352-7900 • FAX (775) 352-7909

COLINA ROSA TENTATIVE MAP





STREET SECTIONS

N.T.S.

LEGEND

- PROPERTY BOUNDARY
- A.C. PAVEMENT AREA
- CONCRETE AREA
- 15" SD — STORM DRAIN MAIN DIRECTION w/ DIAMETER (DASHED IF EXISTING)
- EXISTING STORM DRAIN MANHOLE
- PROPOSED TYPE 4R CATCH BASIN
- PROPOSED LOT LINE
- PROPOSED RIGHT OF WAY LINE
- 50 — LOT NUMBER
- GRADE BREAK
- DIRECTION OF FLOW LINE
- RETAINING WALL
- SLOPE INDICATOR
- 80.3 FG — APPROXIMATE FINISH GRADE
- 110.4 PI — APPROXIMATE ELEVATION AT POINT OF INTERSECTION
- 95.6 GB — APPROXIMATE ELEVATION AT GRADE BREAK
- 100.9 (e)TW — APPROXIMATE ELEVATION AT TOP OF WALL
- 94.3 BW — APPROXIMATE ELEVATION AT BOTTOM OF WALL
- (e) — EXISTING

NOTE:

1) ADD 5,000 TO ALL SPOT ELEVATIONS

50' 25' 0 50' 100'

TENTATIVE MAP
PRELIMINARY GRADING PLAN
SHEET 2 of 6

DATE: 1/15/15
SCALE: 1"=50'
JOB #: KLS.011

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COLINA ROSA TENTATIVE MAP

MT. ROSE HIGHWAY
(EXIST/PUBLIC)
CONNECT TO (e)HIGH PRESSURE WATER MAIN
STREET "A" (PROPOSED/PUBLIC)
STREET "B" (PROPOSED/PUBLIC)
STREET "C" (PROPOSED/PUBLIC)
STREET "D" (PROPOSED/PUBLIC)
STREET "E" (PROPOSED/PUBLIC)
HIGHER PRESSURE 8"ø WATER MAIN
LOWER PRESSURE 8"ø WATER MAIN "E" STREET ONLY
PROPOSED PRS
BUTCH CASSIDY DR (PROPOSED/PUBLIC)
BUTCH CASSIDY DR (EXIST/PUBLIC)
EDMONTON DR (EXIST/PUBLIC)
PCC TRAPEZOIDAL DITCH OUTLET (REF SHEET 2)
SD INLET RIM=136.0
SD CULVERT
FLARED END SECTION IE=132.0
SD INLET RIM=120.0
FLARED END SECTION IE=116.0
SD INLET RIM=103.5
FLARED END SECTION IE=99.5
SD INLET RIM=87.5
FLARED END SECTION IE=83.5
SD INLET RIM=71.0
FLARED END SECTION IE=67.0
TYPE 4R CATCH BASIN TO CONNECT TO (e)SDMH
(e)SD INLET AND 15"ø LATERALS (TO BE REMOVED)
SD INLET & 18"ø SD LATERAL TO CONNECT TO (e)SDMH
8"ø SS STUB
8"ø WATER STUB, FLUSH & AIR RELEASE VALVE ASSEMBLIES
TYPE 4R CATCH BASIN TO DISCHARGE TO PROPOSED DRAINAGE SWALE
CONNECT TO (e)8"ø SS STUB
CONNECT TO (e)8"ø W MAIN (HIGH PRESSURE)
CONNECT TO (e)8"ø W MAIN (LOW PRESSURE)
(e)PRS
NORTH
50' 25' 0 50'
LEGEND
PROPERTY BOUNDARY
A.C. PAVEMENT AREA
CONCRETE AREA
STORM DRAIN MAIN DIRECTION w/ DIAMETER (DASHED IF EXISTING)
SANITARY SEWER MAIN DIRECTION w/ DIAMETER (DASHED IF EXISTING)
HIGHER PRESSURE ZONE WATER MAIN AND DIAMETER (DASHED IF EXISTING)
LOWER PRESSURE ZONE WATER MAIN AND DIAMETER (DASHED IF EXISTING)
PRESSURE REDUCING STATION (PRS) (HOLLOW IF EXISTING)
MANHOLE (HOLLOW IF EXISTING)
PROPOSED TYPE 4R CATCH BASIN
PROPOSED LOT LINE
PROPOSED RIGHT OF WAY LINE
FLOW LINE TO SD INLETS
50 LOT NUMBER
(e) EXISTING

NOTE:

1) ALL PROPOSED SANITARY SEWER MAINS TO BE OWNED AND MAINTAINED BY WASHOE COUNTY
2) ALL PROPOSED WATER MAINS TO BE OWNED AND MAINTAINED BY TMWA
3) ALL PROPOSED STORM DRAIN FACILITIES WITHIN THE RIGHT OF WAY TO OWNED AND MAINTAINED BY WASHOE COUNTY

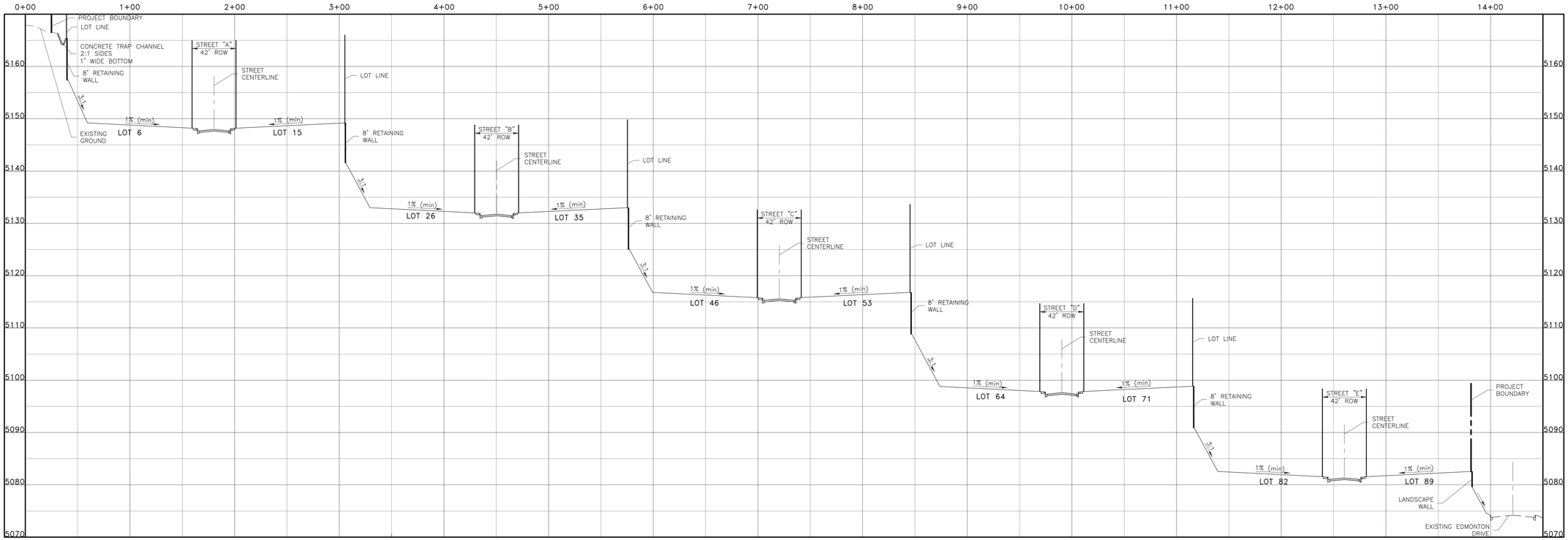
50' 25' 0 50' 100'

TENTATIVE MAP
PRELIMINARY UTILITY PLAN
SHEET 3 of 6

DATE: 1/15/15
SCALE: 1"=50'
JOB #: KLS.011

TEC CIVIL ENGINEERING CONSULTANTS

COLINA ROSA TENTATIVE MAP



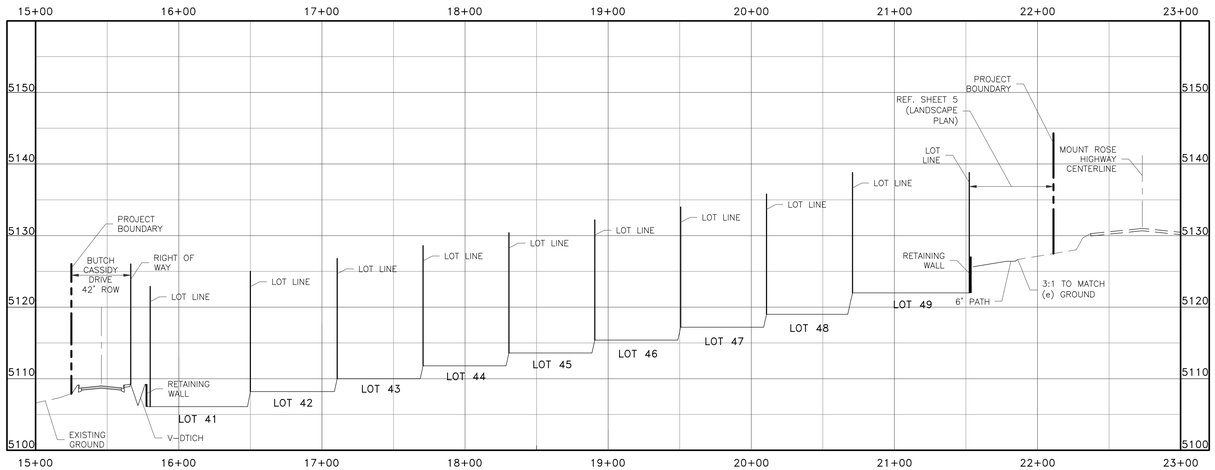
HORIZONTAL SCALE

1"=50'

VERTICAL SCALE

1"=10'

CROSS SECTION A-A



HORIZONTAL SCALE

1"=50'

VERTICAL SCALE

1"=10'

CROSS SECTION B-B

NOTES:

1) ALL STREETS WITHIN THE TENTATIVE MAP ARE PROPOSED PUBLIC.
2) REFERENCE THE GRADING PLAN FOR CROSS SECTION LOCATIONS.

TENTATIVE MAP
PRELIMINARY CROSS SECTIONS
SHEET 4 of 6

DATE: 1/15/15
SCALE:
JOB #: KLS.011

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COLINA ROSA TENTATIVE MAP

50' 25' 0 50'

RESEED AREA BETWEEN ROW LINE AND PATHWAY

INFORMAL TREE/SHRUB GROUPINGS W/ ROCK MULCH BACK OF PATH

BERM/PLANTING

MT. ROSE HIGHWAY (EXIST/PUBLIC)

RESEED THIS AREA–SEE SEEDING NOTES SHEET L2

30' SETBACK

SHEET L2

10' WIDE GRAVEL ACCESS FOR WATERLINE

6' WIDE AC PATH (MEANDERING)

EX. BILLBOARD

HIGHWAY

SLOPE – 10–12 FT WIDTH 3:1 W/ FENCE AT TOP

GRADE CHANGE FROM LOTS TO PATH – ADD BOULDERS

12" BERMING WITH ROCK MULCH, TYP.

EVERGREEN AND DECIDUOUS MIX UPRIGHT FORM – MEDIUM TO TALL SHRUBS. ROCK MULCH (NATIVE) – ADD BOULDERS FROM ON SITE SCREENED MATERIAL.

STREET A (PROPOSED/PUBLIC)

STREET B (PROPOSED/PUBLIC)

STREET C (PROPOSED/PUBLIC)

STREET D (PROPOSED/PUBLIC)

STREET E (PROPOSED/PUBLIC)

EDMONTON DR (EXIST/PUBLIC)

TYPICAL WALL– SEE CIVIL PLANS

SEE ENTRY SIGNAGE DETAIL – SHEET L2

BUTCH CASSIDY EXTENSION (PROPOSED/PUBLIC)

BUTCH CASSIDY DR (EXIST/PUBLIC)

EVERGREEN TREES WITH SHRUBS TO SCREEN HEADLIGHTS

LANDSCAPE LEGEND

- Deciduous Trees – 1" and 2" caliper size
- Evergreen Trees – 5' and 7' tall
- Accent Trees – 1" and 2" caliper size
- Upright Street Trees – 2" caliper size
- Shrubs – 1 gal and 5 gal size
- Rock Cobble Mulch

Note: See plant list on sheet L2

FENCE LEGEND

- Wood Fence with Pilasters
- x Solid Wood Fencing
- 3 Rail Split Cedar

50' 25' 0 50' 100'

TENTATIVE MAP
PRELIMINARY LANDSCAPE PLAN
SHEET 5 of 6

LUMOS & ASSOCIATES

DATE: 1/14/16
SCALE: 1"=50'
JOB #: KLS.011

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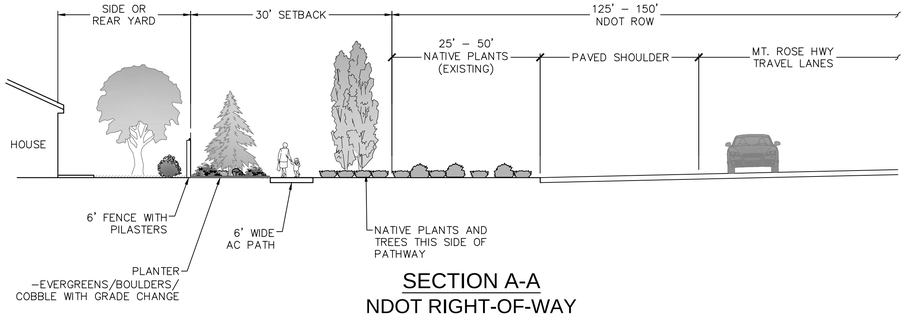
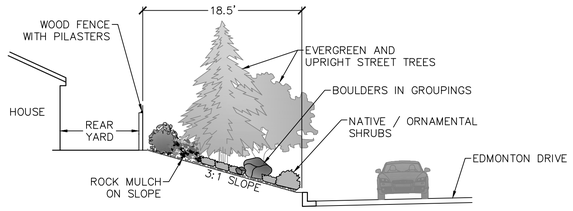
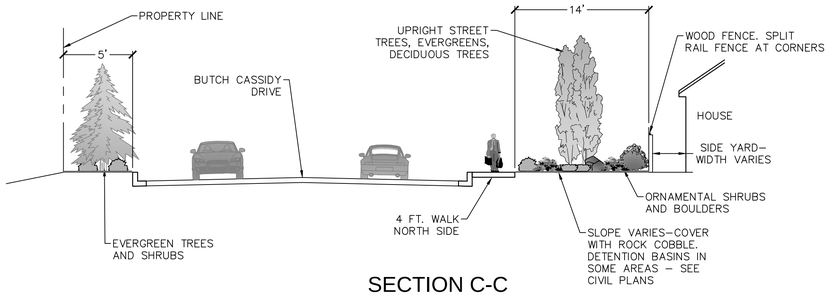
COLINA ROSA TENTATIVE MAP



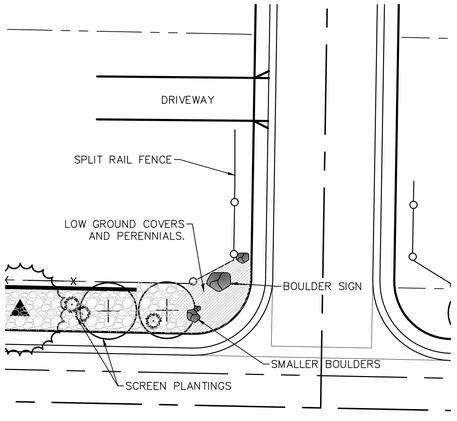
SECTION A-A
NDOT RIGHT-OF-WAY
SCALE: NTS



SECTION B-B
EDMONTON DRIVE
SCALE: NTS



SECTION C-C
BUTCH CASSIDY DRIVE
SCALE: NTS



ENTRY ENLARGEMENT

Colina Rosa Plant List

Screen plantings at the Mt. Rose Highway, Edmonton Drive and Butch Cassidy Drive, with drip irrigation

Trees

1. Pinus nigra – Austrian Pine
2. Pinus jeffreyi – Jeffrey Pine
3. Pinus sylvestri s– Scotch Pine
4. Malus sp. – Crabapple
5. Prunus virginiana – Purple Chokecherry

Shrubs

1. Caragana sp. – Peashrub
2. Buddleia alternifolia - Butterfly Bush
3. Rhus typhina – Staghorn Sumac
4. Perovskia atriplicifolia – Russian Sage
5. Caryopteris clandonensis – Bluebeard
6. Artemesia tridentata v. vaseyana - Mountain Big Sage

Interior common open space plants, with drip irrigation

Trees

1. Pinus flexilis 'Vanderwolf' – Vanderwolf Pine
2. Acer rubrum – Red Maple
3. Koelreuteria paniculata – Golden Rain Tree
4. Calocedrus decurrens – Incense Cedar

Shrubs

1. Forestiera neomexicana - New Mexico Privet
2. Forsythia intermedia – Forsythia
3. Panicum virgatum – Switch Grass
4. Viburnum dentatum – Arrowood
5. Yucca filamentosa – Adam's Needle
6. Lavendula angustifolia – Lavender
7. Ribes aureum – Golden Current
8. Symphoricarpos albus - Snowberry

Common area plantings at disturbed areas around the project perimeter edges, without drip irrigation. An emphasis is placed on plants for erosion control and lower flammability risk.

Plants will be seeded in these areas will a drill seeder and hydroseeded in the less rocky areas.

Botanical Name	Common Name/Variety
Achillea millefolium	Yarrow
Achnatherum occidentalis	Western needlegrass
Artemisia tridentata ssp vaseyana	Mtn. sagebrush
Bromus carintaus	California brome
Elymus elymoides	Blue wildrye 'Stanislaus'
Elymus trachycaulus	Slender wheatgrass, 'Pryor'
Ericameria nauseosa	Rubber rabbitbrush
Poa secunda	Sandberg bluegrass 'Sherman'
Purshia tridentata	Bitterbrush

All dead plants and branches to be removed from these areas and the cheatgrass eliminated before the seeding completed in the late fall. Disturbed areas to be loosened and left in a rough condition. Cleared brush and topsoil from the home lots to be re-used for re-vegetation of the disturbed open spaces.

Washoe County Landscape Compliance and Applicability

Water Conservation compliance with Section 110.412.20

1. The design proposes no lawn and the use of water conserving plant material.
2. Plants to be grouped in hydrozones for water use.
3. Mulches to be used include screened on-site rock or imported rock types for slopes.
4. Soil amendments to be included into the plant pits in final design with soil testing.

Residential Use types compliance with Section 110.412.35

1. At the perimeter of the subdivision a minimum of 1 tree per 50 lineal feet is shown on the plan for arterials and collector streets.

Planting Standards compliance with Section 110.412.60

1. Climate adapted plants are shown in the planting legend.
2. Plants are compatible with the surrounding area – native plants are proposed to be extended into the site at the Mt. Rose Hwy, since they exist out to the edge of the right of way, south side of the highway. Planting types along both Edmonton and Butch Cassidy Drives are similar to those existing near the site, which include both native and ornamental types with evergreen accents.
3. Planting water use zones are compatible with the upland type plants in the area.
4. Evergreen trees proposed to be one-half 7 ft. tall and the remainder 5 ft. tall.
5. Deciduous trees proposed to be one-half 2" caliper and the remainder 1" caliper sizes.
6. Shrubs proposed to be a mixture of sizes between #1 and #5, depending on plant type, growth rate and availability.
7. Irrigation will be automatic, with main lines, valves and controllers for common area landscape.
8. Common area landscape maintenance to be the responsibility of the HOA.

Compliance with Article 204 – Forest Area Section 110.204.05.c

1. Setback – A setback of 30 ft. is shown along the north side of the site, adjacent to the Mt. Rose Highway. The proposed fence with pilasters is 6 ft. tall at the edge of the setback.
2. The setback area is landscaped per the plan and section A-A. Landscaping to be similar to that on the north side of the Mt. Rose Hwy.

ENTRY SIGN ON BOULDER

3-RAIL SPLIT CEDAR FENCING.
3.5 FT. TALL AT ENTRY AREAS

FENCING BETWEEN LOTS
AND SIDE YARDS

FENCING BETWEEN LOTS
ON NORTH/SOUTH SLOPES

FENCING WITH PILASTERS
ALONG MT. ROSE HWY

LUMOS & ASSOCIATES

DATE: 1/14/16
SCALE: 1"=50'
JOB #: KLS.011

TEC CIVIL ENGINEERING CONSULTANTS