Golden Mesa South

Tentative Map
Application

Prepared For:

Moonlight Hills Estates, LLC
5390 Bellazza Court
Reno, NV 89519

Prepared By:

Axion Engineering
Civil Engineering • Land Development

681 Edison Way
Reno, NV 89502
775-771-5554

August, 2017

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Project Requests

This project request is for a **Tentative Map Application** for:

A) 32 Single Family Residential lots on 35.85 acres.

Golden Mesa South is located north of Golden Valley Road and east off Estates Drive on one parcel. The project site is accessed from Estates Drive which connects to Golden Valley Road. The project's site parcel number is APN 552-100-01, as shown in Figure 1 (below).

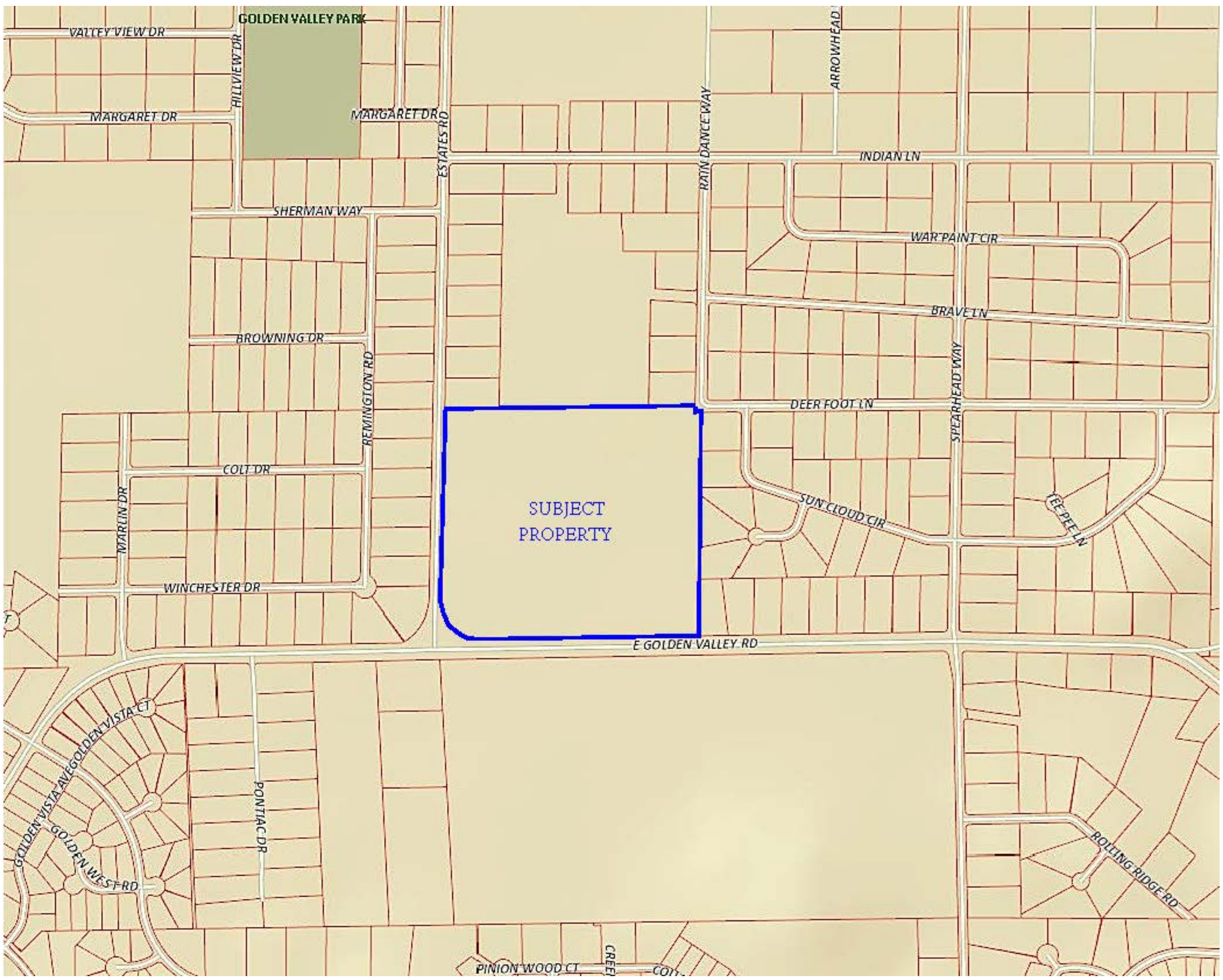

Figure 1 – Vicinity Map

Project History

R&K Homes requested and obtained approval for a Tentative Map, case number TM05-017 to develop a 59-lot single family common open space development on 55.37 acres. (APN 552-100-01 and 552-092-20). This submittal was subsequent to a Comprehensive Plan Amendment (CP04-011) that re-designated the parcels from LDS and GR to a mix of LDS and MDS. The previous request was for a common open space development with a minimum lot size of 0.50 acres. The common open space development allowed for reduced lot sizes while maintaining maximum allowed density. TM05-017 was approved on November 1st, 2005. The entitlement has since expired.

Project Description

The proposed project is for a 32 unit single family residential development with lot sizes ranging from 35,000 square feet to 47,285 square feet. The average lot size is 36,843 square feet. The project will include 5.02 acres of open space, 3.57 acres of public right of way, and 27.20 acres of residential lots.

Proposed net density is 1.18 dwelling units per acre and the proposed gross density is 0.89 dwelling units per acre. The proposed layout is shown below:

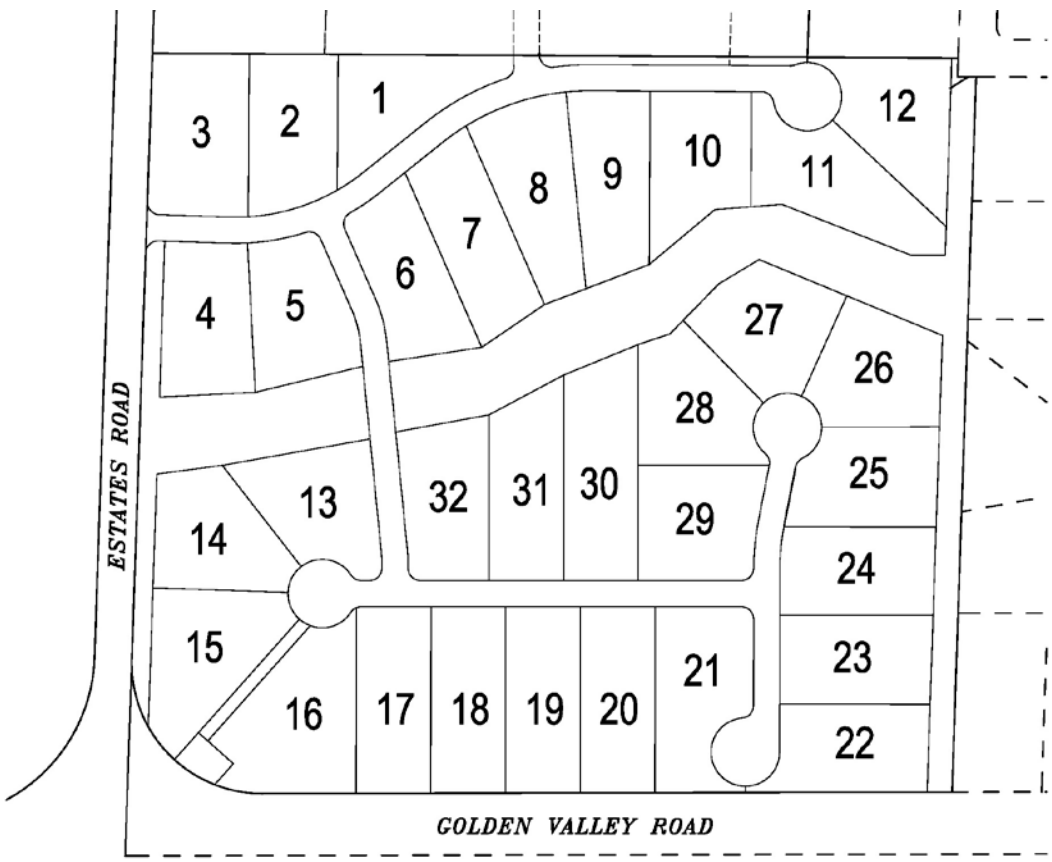

Figure 2 – Site Plan

Tentative Map Findings

When considering a Tentative Subdivision Map, the Washoe County development code requires that the Planning Commission determine if the proposal is in compliance with the required findings. The considered findings are as follows:

1) Plan Consistency – Determine that the proposed map is consistent with the Comprehensive Plan and the North Valleys Area Plan.

   Response: The proposed map is in conformance with all of the goals and policies of the North Valleys Area Plan. Proposed densities and subdivision design meet Plan requirements. There are no specific plans associated with this request.

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

   Response: The subdivision design complies with the policies of the North Valleys Area Plan and all the elements of the Washoe County Master Plan.

3) Type of Development – Determine that the project site is physically suited for the type of development proposed.

   Response: The proposed subdivision is located in an area with residential subdivisions to the east, west and north. Property to the south contains Golden Valley Road and further south is North Valleys High School. The proposed project is a suitable fit.

4) Availability of Service – That the subdivision will meet the requirements of article 702, Adequate Public Facilities Management System.

   Response: Adequate facilities exist to accommodate the proposed development. Any determined deficiencies and/or required infrastructure to connect to existing facilities will be borne by the developer.

5) Fish or Wildlife – Determine 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.

   Response: There are no identified endangered plants or wildlife on the subject property.

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

   Response: The proposed subdivision is similar to other residential subdivisions in the surrounding area and the design is not likely to cause significant health problems.

7) Easements – Determine 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.

Response: The design of the subdivision considers all existing easements and will perpetuate access to existing residences if applicable.

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

Response: The proposed subdivision provides necessary access to surrounding, adjacent lands. Access points will be perpetuated and/or provided via new public roads.

9) Dedications – Determine that any land or improvements to be dedicated to Washoe County is consistent with the Master Plan.

Response: All lands to be dedicated to Washoe County are consistent with the Master Plan.

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

Response: Adequate opportunities shall be provided for future passive or natural heating or cooling to the extent feasible.

APPENDIX "A"

DEVELOPMENT APPLICATION

Axion
ENGINEERING
Civil Engineering • Land Development

Washoe County Development Application

Your entire application is a public record. If you have a concern about releasing personal information, please contact Planning and Development staff at 775.328.3600.

Project Information	**Staff Assigned Case No.:** ______________
Project Name: Golden Mesa South	
Project Description: 32 lot single family residential subdivision	
Project Address: East of Estates Road, North Golden Valley Road	
Project Area (acres or square feet): 35.85 acres	
Project Location (with point of reference to major cross streets **AND** area locator): Golden Valley. The parcel is north of Golden Valley Road & east of Estates Drive.	

Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No(s):	Parcel Acreage:
552-100-01	35.846		

Section(s)/Township/Range: Section 11 T. 20 E, R. 19 E.

Indicate any previous Washoe County approvals associated with this application:
Case No.(s). CP04-011, TM05-015, SW05-016, WSUP16-0002

Applicant Information (attach additional sheets if necessary)

Property Owner:		**Professional Consultant:**	
Name: Moonlight Hills Estates, LLC		Name: Axion Engineering	
Address: 5390 Bellazza Court		Address: 681 Edison Way	
Reno, NV	Zip: 89519	Reno, NV	Zip: 89503
Phone:	Fax:	Phone: 775-771-5554	Fax: 775-856-3951
Email:		Email: gary@axionengineering.net	
Cell:	Other:	Cell:	Other:
Contact Person: Richard Nevis		Contact Person: Gary Guzelis	
Applicant/Developer:		**Other Persons to be Contacted:**	
Name: Same		Name: Mark Herrmann	
Address:		Address: P.O. Box 8817	
	Zip:	Reno, NV	Zip: 89511
Phone:	Fax:	Phone:	Fax:
Email:		Email: mvonherrman@sbcglobal.net	
Cell:	Other:	Cell: 775-720-8973	Other:
Contact Person:		Contact Person:	

For Office Use Only

Date Received:	Initial:	Planning Area:
County Commission District:		Master Plan Designation(s):
CAB(s):		Regulatory Zoning(s):

Property Owner Affidavit

Applicant Name: Moonlight Hills Estates, LLC

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, Moonlight Hills Estates, LLC,
(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): 552-100-01

Printed Name Richard A. Revis

Signed [signature]

Address 5390 Bellazza Ct

Reno, NV 89519

Subscribed and sworn to before me this 11 day of September, 2017.

[signature]

Notary Public in and for said county and state

My commission expires: May 8, 2021

(Notary Stamp)

SAMANTHA EMERICK
Notary Public, State of Nevada
Appointment No. 13-10939-2
My Appt. Expires May 8, 2021

*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

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)?

The 35.85 acre property is located east of Estates Road and north Golden Valley Road.

A legal description for the property is included in the Preliminary Title Report which is part of this application.

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

Golden Mesa South

3. Density and lot design:

a. Acreage of project site	35.85 acres
b. Total number of lots	32
c. Dwelling units per acre	0.89
d. Minimum and maximum area of proposed lots	35,000 - 47,285
e. Minimum width of proposed lots	120 feet
f. Average lot size	36,843 square feet

4. Utilities:

a. Sewer Service	Washoe County Utilities
b. Electrical Service	NV Energy
c. Telephone Service	AT&T
d. LPG or Natural Gas Service	NV Energy
e. Solid Waste Disposal Service	Waste Management of Nevada
f. Cable Television Service	Charter
g. Water Service	TMWA

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

a. Acreage of common open space:

5.02 acres

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

None

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

35,000 sf min; 47,285 sf max.

d. Average lot size:

36,843 square feet

e. Proposed yard setbacks if different from standard:

Proposed setbacks shall conform to zoning requirements

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

N/A

g. Identify all proposed non-residential uses:

None

h. Improvements proposed for the common open space:

Open space improvements will included detention pond facilities/drainage channels and landscaping. The ponds will be maintained by a proposed maintenance association.

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

None

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

No trails are proposed with this development. Street side sidewalks will be constructed throughout the project.

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

Not applicable.

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

Fencing is anticipated to follow typical single family residential guidelines and Washoe County code.

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

A maintenance association will be created to take care of the common open space. Fees will be supported by homeowner dues.

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 Engineering website at http://www.washoecounty.us/pubworks/engineering.htm). If so, how is access to those features provided?

No

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? Reno

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?

A Special Use Permit is required for a sewage lift station. The Special Use Permit has been approved. (WSUP16-0002)

10. Has an archeological survey been reviewed and approved by SHPO on the property? If yes, what were the findings?

An archaeological survey has not been performed on the subject property.

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

a. Permit #		acre-feet per year	
b. Certificate #		acre-feet per year	
c. Surface Claim #		acre-feet per year	
d. Other #		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 and dedicated prior to final map recordation.

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

Energy conservation is typically improved by use of energy efficient building materials including windows, doors, insulation and structure wraps per current ICC's IECC energy codes. Energy efficient appliances and water efficient faucets, shower heads and toilets will be used.

Large lot sizes are conducive for ground water recharge.

13. Is the subject property in an area identified by Planning and 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 property is not identified by Washoe County Community Services Department as containing rare or endangered plants/animals, critical breeding habitat or migratory routes.

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

Not applicable.

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 proposed development is located adjacent to residential homes. The design of the project complies with applicable policies.

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?

No

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?

No, there are no plan modifiers for this area.

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

At this time phasing is unknown and will depend on the developer. Phasing will be determined at the improvement plan preparation stage and discussed with Washoe County. It is anticipated that the project would be constructed in one phase.

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?

96,695 CY

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?

Earthwork is designed to be balance between the Golden Mesa North and Golden Mesa South projects. Approximately 33,000 cubic yards of import is needed from the Golden Mesa North project.

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?

Disturbed areas are likely visible from all directions. Erosion control of disturbed areas will established per Best Management practices. Cut and fill slopes will be revegetated with approved seed mixes.

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?

Slopes not to exceed 3:1 are proposed for cut and fill slopes. Slopes will be revegetated with an approved seed mix.

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?

No berms are proposed.

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?

No retaining walls are proposed.

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

Tree removal is not anticipated.

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?

The revegetation seed blend will be a native/naturalized blend applied at rate of 31 pounds per acre. A wood fiber mulch will be included in the hydroseed slurry.

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

Temporary irrigation will be provided through connection to installed water meters.

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

No

Request to Reserve New Street Name(s)

The Applicant is responsible for all sign costs.

Applicant Information

Name: Moonlight Hills Estates, LLC

Address: 5390 Bellazza Court

Reno, NV 89502

Phone : 775-771-5554 Fax: 775-856-3951

☐ Private Citizen ☑ Agency/Organization

Street Name Requests

(No more than 14 letters or 15 if there is an "i" in the name. Attach extra sheet if necessary.)

Moonstone	
Crandell	Lupine
Wadi	Thunder Butte
Basl	Lightening Ridge
Catclaw	Pinewish
De Grazia	Shimmer
Chert Butte	Trovas
Golden Barrel	Baniff

If final recordation has not occurred within one (1) year, it is necessary to submit a written request for extension to the coordinator prior to the expiration date of the original approval request.

Location

Project Name: Golden Mesa South

☐ Reno ☐ Sparks ☑ Washoe County

Parcel Numbers: 552-100-01

☑ Subdivision ☐ Parcelization ☐ Private Street

Please attach maps, petitions and supplementary information.

Approved: ______________________ Date: ____________

Regional Street Naming Coordinator

☐ Except where noted

Denied: ______________________ Date: ____________

Regional Street Naming Coordinator

Washoe County **CSD Engineering and Capital Projects Division**

Post Office Box 11130 - 1001 E. Ninth Street

Reno, NV 89520-0027

Phone: (775) 328-3667 - Fax: (775) 328-6133 Email: streetnames@washoecounty.us

PROPERTY TAX INFORMATION

Axion ENGINEERING
Civil Engineering • Land Development

WASHOE COUNTY TREASURER

PO BOX 30039
RENO, NV 89520-3039
775-328-2510

Received By:	smartell	**Receipt Number:**	U17.9472
Location:	Treasurer's Office	**Receipt Year:**	2017
Session:	SMartell-0-09132017	**Date Received:**	09/13/2017

PAYMENT RECEIPT

Type	Description	Balance	Net Tax	Interest	Fees Penalties	Current Due	Current Paid	Balance Remaining
Real	Bill Number: 2017122053 Bill Year: 2017 PIN: 55210001 Primary Owner: MOONLIGHT HILLS ESTATES LLC Property Addr: E GOLDEN VALLEY RD Property Desc: Section 11 Township 20 Range 19 SubdivisionName _UNSPECIFIED	2,319.51	1,148.28	0.00	22.97	1,171.25	597.11	1,722.40
	Totals:	2,319.51	1,148.28	0.00	22.97	1,171.25	597.11	1,722.40

Tender Information:		Charge Summary:	
Check #7/1134	597.11	Real	1,171.25
Total Tendered	597.11	Total Charges	1,171.25

WASHOE COUNTY TREASURER PO BOX 30039 RENO, NV 89520-3039

By Whom Paid:

MOONLIGHT HILLS ESTATES LLC
5390 BELLAZZA CT
RENO NV 89519

PAID
SEP 12 2017
W. C. T. O. 27

BALANCE REMAINING	1,722.40
CHARGES	1,171.25
PAID	597.11
CHANGE	0.00

ASSESSOR'S MAP

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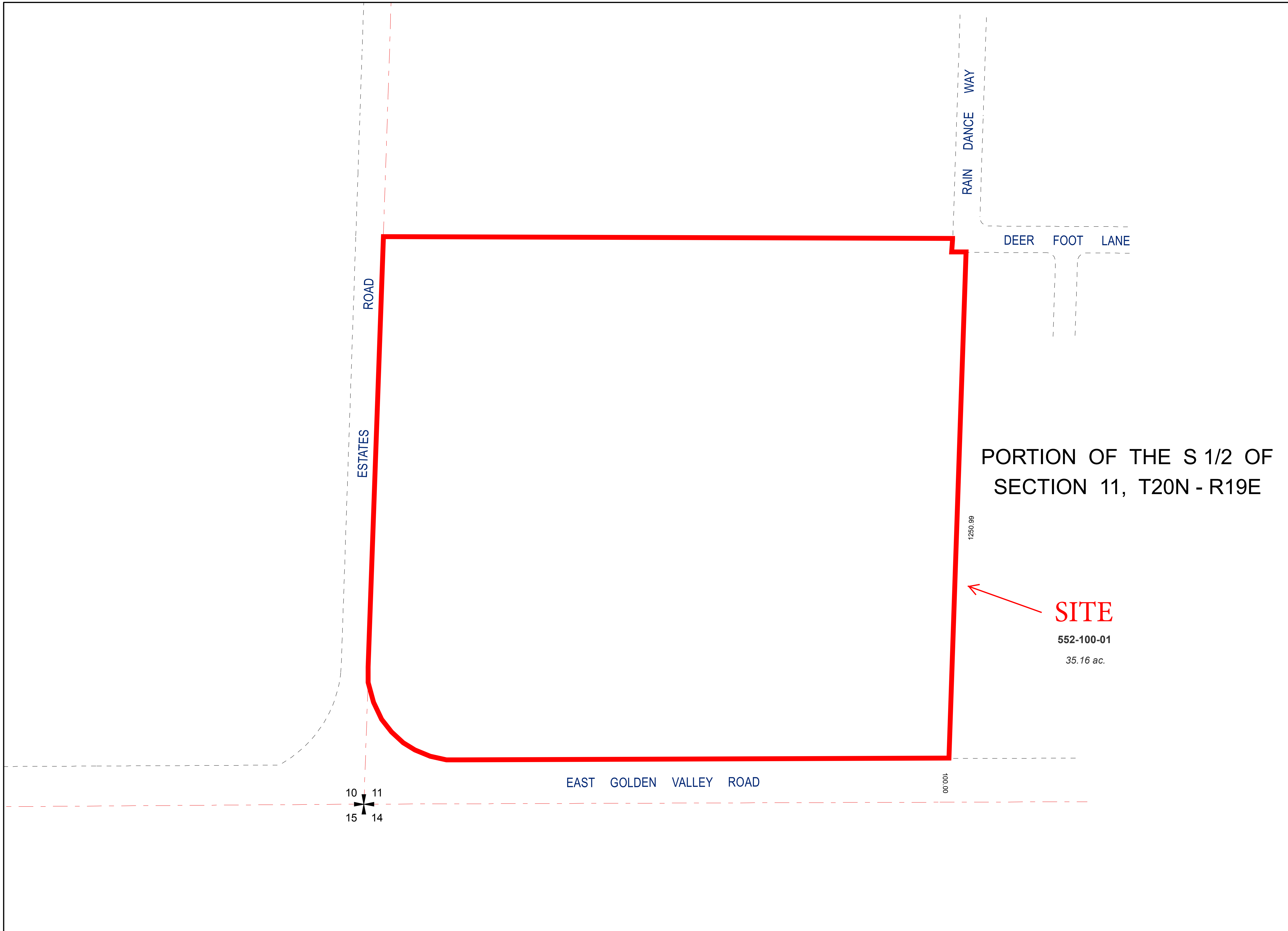


Assessor's Map Number

552-10

STATE OF NEVADA

WASHOE COUNTY

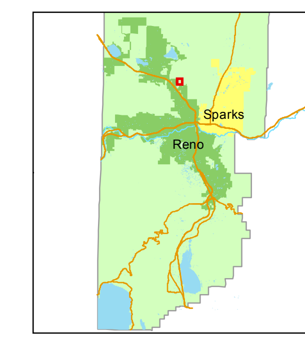
ASSESSOR'S OFFICE

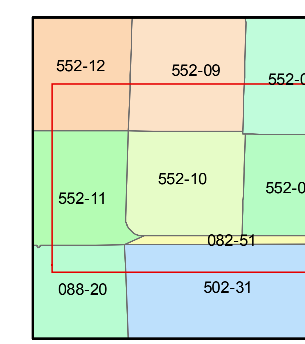
Michael E. Clark, Assessor

1001 East Ninth Street
Building D
Reno, Nevada 89512
(775) 328-2231

Feet
0 50 100 150 200

1 inch = 200 feet





created by: *JMO 05/10/2016*

last updated:

area previously shown on map(s)

88-15

NOTE: This map was prepared for the use of the Washoe County Assessor for assessment and illustrative purposes only. It does not represent a survey of the premises. No liability is assumed as to the sufficiency or accuracy of the data delineated hereon.

Assessor's Map Number

552-10

STATE OF NEVADA

WASHOE COUNTY

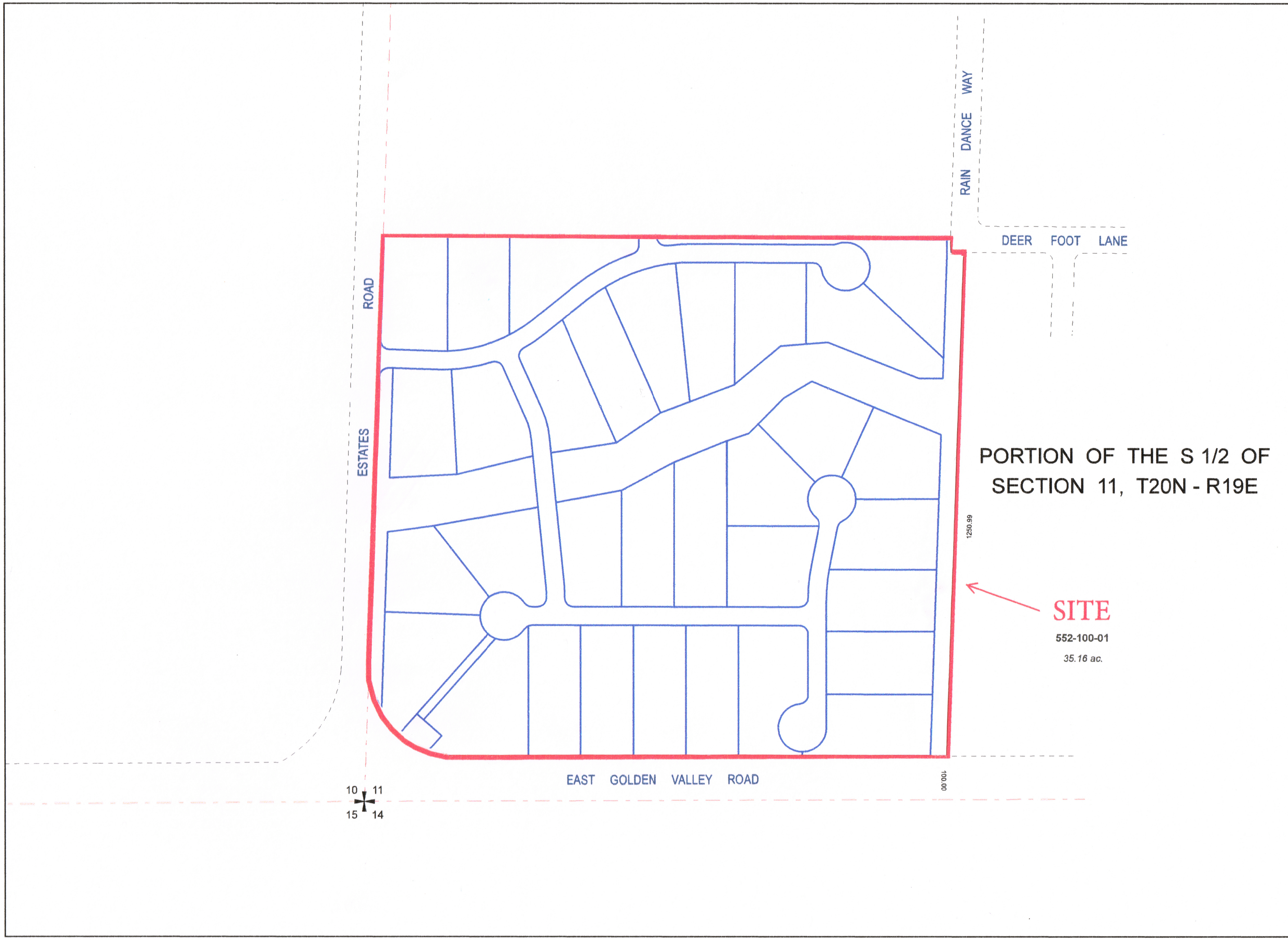
ASSESSOR'S OFFICE

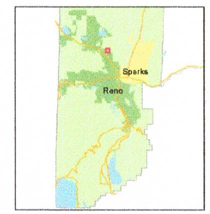
Michael E. Clark, Assessor

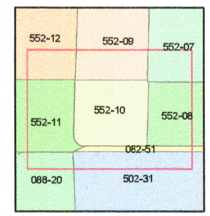
1001 East Ninth Street
Building D
Reno, Nevada 89512
(775) 328-2231

Feet
0 50 100 150 200

1 inch = 200 feet







created by: *JMO 05/10/2016*

last updated:

area previously shown on map(s)

88-15

APPENDIX "B"

REPORTS and PLAN SETS

Axion
ENGINEERING
Civil Engineering • Land Development

TMWA DISCOVERY
and
WATER SERVICE ACKNOWLEDGEMENT

TRUCKEE MEADOWS WATER AUTHORITY
www.tmwa.com

Quality. Delivered.

1355 Capital Blvd. • P.O. Box 30013 • Reno, NV 89520-3013
P 775.834.8080 • F 775.834.8003

TO:	Karen Meyer	**DATE:**	July 6, 2016
THRU:	Scott Estes SJE		
FROM:	Brooke Long BL		

RE: Golden Valley Mesa Annexation/Discovery, TMWA WO# 16-4979

SUMMARY:

The Applicant has proposed a development consisting of 148 single family residential units on approximately 154.9 acres. TMWA can provide water service to the project, however, the project lies outside TMWA's service territory and will require annexation prior to a water service agreement. As part of this discovery, the off-site facility improvements have been identified. The cost opinion of the major off-site improvements for the project is $3,094,173.

Review of conceptual site plans or tentative maps by TMWA and/or agents of TMWA shall not constitute an application for service, nor implies a commitment by TMWA 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 TMWA 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, TMWA and/or agents of TMWA 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 TMWA prior to water being delivered to the Project.

PURPOSE:

The purpose of this Discovery is to identify a planning level water service plan and an opinion of cost for the off-site facilities required to serve the proposed development in Lemmon Valley, Nevada.

ASSUMPTIONS:

1. The applicant shall be responsible for all application, review, inspection, storage, treatment, permits, easements, and other fees pertinent to the Project as adopted by the TMWA at the time of execution of a water service agreement.
2. The cost opinions contained herein do not include new business fees, cost of water rights and related fees, or contribution to the water meter retrofit fund.
3. Demand calculations, and fees based on demands, are estimates; actual fees will be determined at the time of application for service.
4. Project pressure criteria are:
    a. Maximum day pressure of at least 45 pounds per square inch (psi) at the ground surface elevation at the service connection with tank level at top of fire storage,
    b. Peak hour pressure of at least 40 psi at building pad elevation with tank level at top of emergency storage,
    c. Maximum day plus fire flow pressure of at least 20 psi at center of street elevation with tank level at bottom of fire storage, and
    d. TMWA does not calculate pressures for multi-story buildings. Confirmation that pressure will be adequate for upper stories is the responsibility of the Applicant.
5. Elevations used for this discovery were derived from existing site topographic information (not a grading plan).
6. Facility requirements for the Project are based on the assumed elevations, maximum day demand, and fire flow requirements. Changes in these parameters may affect the facility requirements.
7. Easements, permits and all pertinent Agency approvals are obtained for the design and construction of the water infrastructure necessary to serve the proposed Project.
8. All cost opinions are preliminary and subject to change. The costs presented in this study are planning level estimates based on the information available. Actual costs will be determined at the time of application for service. Cost opinions do not include on-site improvements made by the applicant.
9. This discovery is based on the current status of TMWA's system. Future development may alter the conclusions of this discovery. Capacity in TMWA's system is available on a first-come, first-served basis, and commitment to provide service is not established until a contract for service is executed and all fees are paid.
10. No water demands were included for the open space areas, public facilities or parks.

11. Project maximum day demands are calculated using the following equations:

Single-Family Units: Domestic *Maximum* Day Usage

$Y = 0.009*\sqrt{x}$

Y = *maximum* day demand in gpm
x = lot size in square feet

Add irrigation for common areas as needed

Multi-Family Units: Domestic *Maximum* Day Usage

0.15 gpm per unit

Add irrigation for common areas as needed

Commercial/Industrial: Domestic *Maximum* Day Usage

Multiply water rights demand (in acre-feet) by 1.17

Add irrigation for common areas as needed

Potable Irrigation: *Maximum* Day Usage

Multiply water rights demand (in acre-feet) by 0.38

Note: TMWA plans to reevaluate the above maximum day demand equations for all customer usage types within the next 12 months, as part of a Water Facility Plan Update.

DISCUSSION:

The proposed Project is located in Golden Valley, NV and consists of 148 single family residential units with an average lot size of 38,000 square feet, on approximately 154.9 acres (see Figure 1).

Table 1. Project Parcel APNs and Acreage.

APN	ACREAGE
552-050-01	99.5
552-092-19	20.2
552-100-01	35.2
Total	**154.9**

The project can be served from TMWA's North Virginia water system. However, the project is not located within the Truckee Meadows Water Authority's (TMWA) retail service territory and will require annexation by TMWA.

Demands:

Applying TMWA's current maximum day demand formula, the demand for an average lot size of 38,000 ft^2 lot is 1.7 gpm. The total estimated project maximum day demand for the proposed 148 lots is 251.6 gpm.

Supply Capacity

TMWA's system currently has the available capacity to supply the Project's estimated max day demand.

Storage Capacity

TMWA's distribution system currently has adequate storage to accommodate the Project.

Tank Supply	Max Day Demand	Operating Storage (15% of MDD)	Emergency Storage (1 ADD)	Total Storage (gallons)
Raleigh Heights	251.6	54,346	138,814	193,159

Project Pressures:

Service pressures will range from 49 psi to115 psi. Where pressures exceed 80 psi, TMWA will require that all service connections have privately owned pressure regulators.

- Service elevations from 5090 to 5240.
- Project supply from the Raleigh Heights pressure zone.

Off-Site Improvements

Off-site improvements to serve the project for both developments are detailed below.

The project can be supplied from the existing 12" main in Golden Valley Rd. Planned off-site improvements are as follows:

- Two hot taps to the 12" main in Golden Valley Rd (see Figure 1 for locations).
- 4,850 LF of 8" pipe in Estates Rd from Golden Valley Rd to Hillview Dr.
- 500 LF connecting the north and south areas.

Dead Ends and Looping:

Nevada Administrative Code section 445A.6712 requires systems to be designed, to the extent possible, to eliminate dead ends. As planned, looping is achieved.

Project Fire Flows

Project Fire flow is assumed to be 1,500 gpm for a duration of 2 hours while maintaining a minimum residual service pressure of 20 psi.

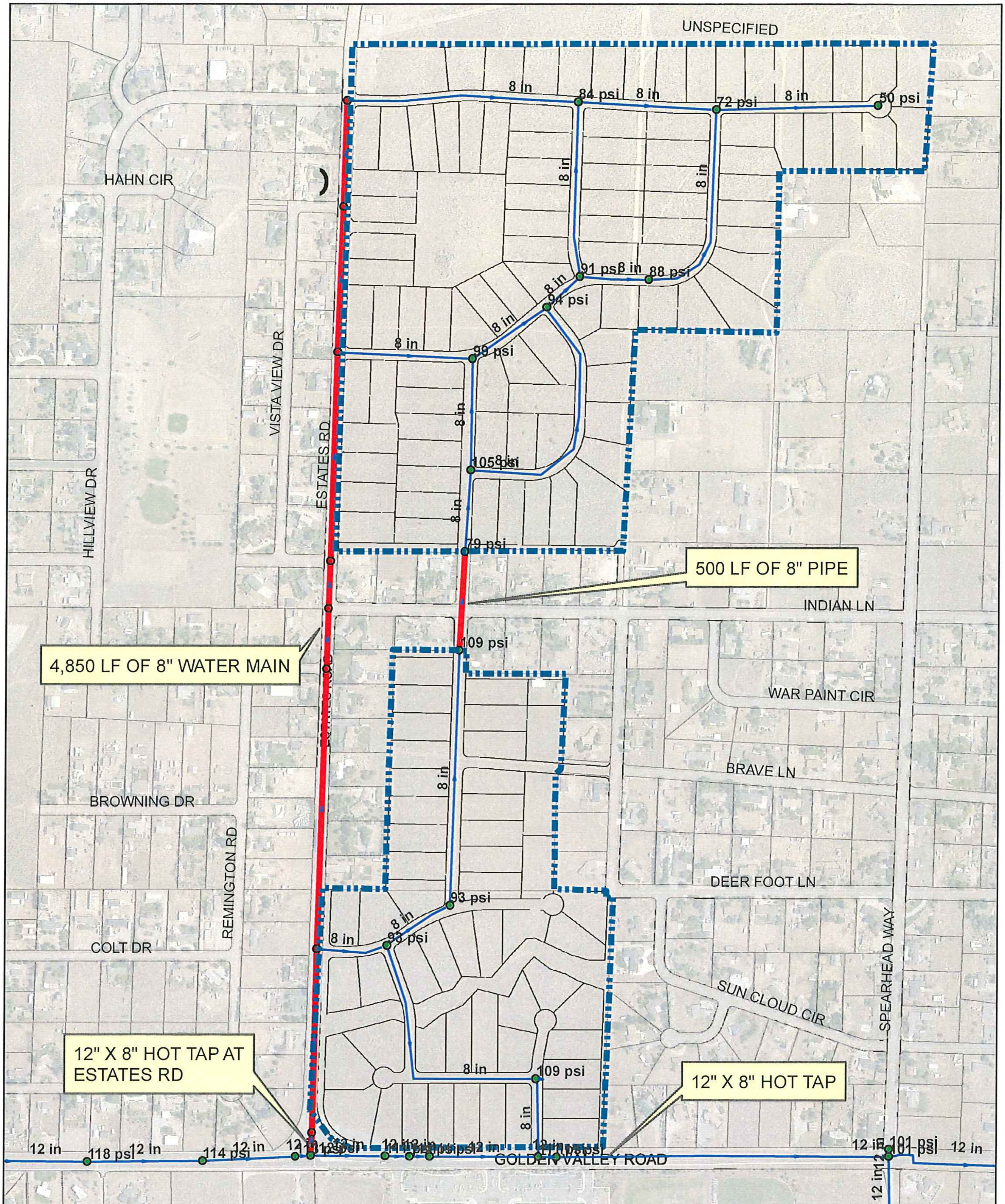
Major Water System Improvements and Cost Opinion

The major water system improvements to serve the project and a planning level cost opinion are listed in Table 2 and shown in Figure 1.

Table 2. Major Water System Improvements and Associated Costs

Description	Quantity	Unit	Unit Cost	Total Cost
Area 8 Facility Charge	251.6	MDD, gpm	$4,142	$1,042,127
Area 8 Storage Charge	251.6	MDD, gpm	$772	$194,235
Area 8 Supply and Treatment Charge	251.6	MDD, gpm	$4,163	$1,047,411
			subtotal	**$2,283,773**
Hot Tap	2	L.S.	$20,000	$40,000
8" main in Estates	4850	L.S.	$144	$698,400
8" main connecting the N and S Properties	500	L.F.	$144	$72,000
			subtotal	**$810,400**
			Total	**$3,094,173**

MDD = Maximum Day Demand, L.F. = Linear Feet, L.S. = Lump Sum



TRUCKEE MEADOWS WATER AUTHORITY *Quality. Delivered.*	**WATER FACILITY PLAN** **16-4979 GOLDEN VALLEY MESA** **ANNEXATION/DISCOVERY**	DATE JULY 2016 MAP BY: BEL MODEL: NV-STD_NAC 2016-02 SCALE: 1 inch = 600 feet

NORTH

NAD 83 NEVADA STATE PLANE WEST FEET

1355 Capital Blvd. ● P.O. Box 30013 ● Reno, NV 89520-3013
P 775.834.8080 ● F 775.834.8003

Date: May 17, 2016

To: Karen Meyer

From: David Nelson DN

RE: 16-4979, Golden Valley Mesa North and South, +/- 148 SFR Lots (APN 552-050-01, 552-092-19 & 552-100-01)

The New Business/Water Resource team will answer the following assumptions on each new discovery:

- Is the property within Truckee Meadows Water Authority's water service territory?
- Does the property have Truckee River water rights appurtenant to the property, groundwater or resource credits associated with the property?
  - If yes, what is the status of the water right: Agricultural or Municipal and Domestic use?
- Estimated water demand for residential and or commercial projects.
- Any special conditions, or issues, that are a concern to TMWA or the customer.

The following information is provided to complete the Discovery as requested:

- These subject parcels (APN 552-050-01, 552-092-19 & 552-100-01) are within Truckee Meadows Water Authority's (TMWA's) service territory. An annexation is not required.

- There are no resource credits or Truckee River decreed water rights appurtenant to this property. The developer will be required to follow TMWA's current rules, specifically Rule 7, and pay all fees for water rights needed in order to obtain a will serve commitment letter.

- Based on the information provided by the applicant this project "Golden Valley Mesa North and South, +/- 148 SFR Lots" is estimated to require a domestic demand of **106.56 acre feet (AF)**. Landscaping plans were not provided to TMWA; therefore, a demand could not be determined. Please see the attached demand calculation sheet for the **estimated** demand and water resource fees. Once final plans are submitted a more accurate demand will be calculated. *Note: Water rights held or banked by the applicant must be dedicated to a project before any rule 7 water rights are purchased from TMWA. TMWA resources are first come, first serve and are limited. If applicant dedicates surface water for this project additional fees and dedications will apply.*

- Any existing right of ways and public easements would need to be reviewed, and if needed the property owner will need to grant TMWA the proper easements and/or land dedications to provide water service to the subject properties. Property owner will be required, at its sole expense, to provide TMWA with a current preliminary title report for all subject properties. Owner will represent and warrant such property offered for dedication or easements to TMWA shall be free and clear of all liens and encumbrances. Owner is solely responsible for obtaining all appropriate permits, licenses, construction easements, subordination agreements, consents from lenders, and other necessary rights from all necessary parties to dedicate property or easements with title acceptable to TMWA.

TRUCKEE MEADOWS WATER AUTHORITY

WATER RIGHTS AND METER FUND CONTRIBUTION
CALCULATION WORKSHEET FOR MULTI-TENANT/COMMERCIAL APPLICATIONS

					Demand (Acre Feet)		
1	Existing demand (current usage) at Service Property				**0.00**		
2	No. of Lots: Average 35,000sf	**148**	x .72 AF per Lot	106.56			
3	Retail floor space:		x 0.0004 per sq.ft.	0.00			
4	Fixture units:		x 15x 365x 3.07/ 1 mil	0.00			
5	Landscaping: Turf		sq ft x 3.41/ 43,560	TBD			
6	Drip			TBD			
7	Other calculated demand			TBD			
8	New or additional demand at Service Property (lines 2+3+4+5+6)				**106.56**		
9	**Total Demand at Service Property (lines 1+8)**				**106.56**		
10	Less: Prior demand commitments at service property			**0.00**			
11	Less: Other resource credits			**0.00**			
12	**Total Credits (lines 10+11)**				**0.00**		
13	Subtotal: Required resource dedication/commitment (lines 9-12)				**106.56**		
14	Factor amount (0.11 x Line 13)				TBD		
15	Return flow required ([1-2.5/duty] x Line 13)				TBD		
16	**TOTAL RESOURCES REQUIRED (lines 13+14+15)**				**106.56**		
17	Price of Water Rights per AF	$7,500				$	799,200
18	Will Serve Commitment Letter Preparation Fee ($100 per letter)					$	100
19	Due Diligence Fee ($150.00 per parcel)					$	0
20	Document Preparation Fees ($100.00 per document)					$	0
21	Meter Contribution ($1,830 x 106.56 acre feet of demand)					$	TBD
22	**TOTAL FEES DUE (lines 17+18+19+20+21)**					**$**	**799,300**

Project: Golden Valley Mesa North and South, +/- 148 SFR Lots, Discovery

Applicant: Moonlight Hills Estates, LLC: Richard Nevis **Quote date:** 5/17/2016

Phone: Mark Herrmann, 720-8973 **Tech contact:** David 834-8021

APN: 552-050-01, 552-092-19, & 552-100-01 **Project No:** 16-4979

Remarks: **Fees quotes are valid only within 15 calendar days of Quote Date.**

The 106.56 acre feet may result in the assessment of facility fees pursuant to TMWA's Rules and Rates.

Estimate shows purchase/dedication of ground water, additional fees and dedication will apply if surface water is brought into TMWA. Resources are first come, first serve and are limited.

Truckee Meadows Water Authority

P.O. Box 30013

Reno, NV 89520

Phone: 775-834-8080

TRUCKEE MEADOWS WATER AUTHORITY

Quality. Delivered.

Print Date: 7/8/2016

ENGINEERING AND RESOURCES RECIEPT

Agent: Karen Meyer

Customer: Moonlight Hills Estates, LLC

5390 Bellazza Ct. Reno, NV. 89519 Attn: Richard Nevis

, NV 89519

Project Info:

Project Number:	Name:	Project Sub Type:
16-4979	Golden Valley Mesa_Moonlight_ANNEX/DISC	Annexation

DESCRIPTION	ACCOUNT	RATE	QUANTITY	FEE AMOUNT	TENDER	PAID AMOUNT
Annexation	4900	1,500.00		$780.00	Check	$780.00
		Check/Ref #:	**CK# 1079**			**$780.00**

Remaining portion of Annexation fee

TOTAL PAID TMWA: **$780.00**

PLL Payment Receipt Number(s): 913

MOONLIGHT HILLS ESTATES, LLC
5390 BELLAZA CT
RENO, NV 89519

27-289/778
1040

1079

DATE 6-10-16

PAY TO THE ORDER OF TMWA $ 780.00

seven Hundred Eighty no/100 DOLLARS

Security Features Included. Details on Back.

© DELUXE WALLET OR DUPLICATE

MutualofOmahaBank

Telephone Banking 866-351-5646

MEMO Dis connect prop Zone

APN: 552-050-01, 552-100-01

<u>When Recorded, Return to:</u>
Truckee Meadows Water Authority
Attn: Amanda Duncan, ARWP, Land Agent
P O Box 30013
Reno, NV 89520-3013
TMWA WO: 16-4979

RETAIL WATER SERVICE AREA ANNEXATION AGREEMENT

THIS RETAIL WATER SERVICE AREA ANNEXATION AGREEMENT ("<u>Annexation Agreement</u>"), entered into this ______ day of ________________, 20__ ("<u>Effective Date</u>"), by and between **TRUCKEE MEADOWS WATER AUTHORITY** (the "<u>Authority</u>"), a Joint Powers Authority entity created pursuant to a cooperative agreement among the cities of Reno, Nevada, Sparks, Nevada and Washoe County, Nevada pursuant to N.R.S. Chapter 277, and **MOONLIGHT HILLS ESTATES, LLC,** a Nevada limited liability company, (referred to as "<u>Developer</u>" or "<u>Owner</u>" in this Agreement and exhibits attached hereto, and together with Authority collectively hereinafter referred to as "<u>Parties</u>");

WITNESSETH:

WHEREAS, Owner owns certain real property more particularly described on Exhibit "A" and depicted in Exhibit "A-1" attached hereto incorporated herein by this reference ("<u>Property</u>", or "<u>Owner's Project</u>"), located outside of Authority's current retail water service area.

WHEREAS, Owner desires the Authority to expand its retail water service area to provide water service to the Property.

WHEREAS, on December 31, 2014, Authority acquired the water utility system of the Washoe County Department of Water Resources and the South Truckee Meadows General Improvement District, and as a result, new customers may be eligible to annex into the Authority service area based upon their proximity to existing Authority facilities, availability of water resources, or cost-effectiveness.

WHEREAS, based upon these criteria, Authority has determined it is appropriate that Authority provide service to Owner and accordingly, Owner's property may be annexed into Authority's retain water service area.

WHEREAS, the expansion of Authority's retail water service area may require dedication of certain real property or water system facility improvements to facilitate the efficient management and operation of Authority's system to include the Property in its retail water service area.

WHEREAS, Authority is willing to expand its retail water service area to include water service to the Property and Owner agrees to the expansion of Authority's retail water service area upon the terms and conditions set forth in this Agreement, subject to and on the express condition that Owner fully and completely perform the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual covenants and conditions herein contained, the Parties agree as follows:

1. Expansion of Water Service Area. Authority agrees to expand its retail water service area as set forth in Exhibits "A" and "A-1" attached hereto to provide water service for the Property; provided, however, that such expansion of the Authority's retail water service area is specifically conditioned upon execution of this Agreement by Owner and the Authority, and the complete and satisfactory performance of the terms and conditions in Section 2 herein by Owner and its permitted successors and assigns, to the extent applicable.

2. Conditions to Annexation. The following conditions must be satisfied within the time frames stipulated below or this Agreement shall automatically terminate, and the Property shall be deemed de-annexed from the Authority retail service area.

2.1 Construction/Dedication of Facility Improvements. The Authority has determined that additions, improvements and/or modifications to its Water System Facilities are required to expand its retail water service area to include the Property. Owner is responsible for all costs related to, and except as otherwise provided herein, shall install and construct the off-site additions, improvements and modifications to the Authority's Water System Facilities as delineated in Exhibit "B" attached hereto and incorporated herein by this reference. Owner shall submit a complete Application for New or Modified Water Service and enter a Water Service Agreement with Authority for the completion of the foregoing Water Facilities (or portions thereof, for phased development) no later than twenty-four (24) months from the Effective Date of this Annexation Agreement, or this Agreement shall automatically terminate, and the Property shall be deemed de-annexed from the Authority retail service area. For phased development, Owner shall continue to submit complete Applications for New or Modified Water Service and enter into Water Service Agreements for subsequent phases no later than twenty-four months from the Effective Date of the previous Water Service Agreement, or this Annexation Agreement shall automatically terminate and portions of the Property not actively receiving water service from Authority shall be deemed de-annexed from the Authority retail service area. Authority shall have no obligation to provide water service to any portion of the Property until required water system facilities are completed to the satisfaction of Authority. Upon completion of the facilities listed in Exhibit B, Owner shall dedicate the facilities to Authority pursuant to the terms of this Annexation Agreement and Authority's Rules, and Authority will own all capacity in the system including any excess capacity.

2.2 Dedication of Real Property. The Authority has determined that the dedication of certain real property in fee, or certain easements, rights of way or other interests in real property, is required to expand its retail water service area to include the Property. Owner shall, prior to the start of construction of any facilities required under this Annexation Agreement, grant and convey to Authority, all necessary easements, conveyances, deeds, rights-of-way, or other rights required by this Annexation Agreement. Such property shall be conveyed free and clear of all liens and encumbrances, and Owner shall obtain and provide Authority prior to dedication, at Owner's expense, a preliminary title report for any property offered for dedication showing all matters of record affecting such property. Owner is solely responsible for obtaining all appropriate permits, licenses, construction easements, subordination agreements, consents from lenders, and other necessary rights from all necessary parties to dedicate property with title acceptable to Authority. If any portion of the property required for dedication is located on property other than that owned by Owner, Owner shall be responsible for obtaining, at no cost to Authority, any necessary interests therein from such owners for conveyance to Authority free and clear of all liens and encumbrances. Owner may not apply for, nor shall Authority shall have any obligation to issue or enter, a Water Service Agreement for service to any portion of the Property until such real property required hereunder is granted to Authority in such form, location, scope and condition of title satisfactory to Authority. Furthermore, unless such real property is granted to Authority no later than twenty-four (24) months from the Effective Date of this Annexation Agreement, this Annexation Agreement shall automatically terminate, and the Property shall be deemed de-annexed from the Authority retail service area. In the event Owner has not conveyed the real property within the 24-month period, Owner may submit a written request for, and Authority in its sole discretion may grant, an extension up to one-year if Owner can show reasonable justification to Authority why the real property was not transferred.

3. Conditions of Water Service. Owner acknowledges and agrees that this Annexation Agreement merely addresses conditions required for the expansion of Authority's retail water service area, and that Owner must independently comply with all applicable requirements in Authority's Rules before the Authority has any obligation to provide water service to the Property, including without limitation (i) submitting and receiving approval from the Authority of appropriate applications for service; (ii) dedicating sufficient Water Resources to the Authority and receiving a Will Serve Commitment for service to the Property; (iii) in addition to any dedication requirements in Section 2 of this Annexation Agreement, dedicating appropriate easements and other real property required for service; (iv) in addition to any dedication requirements in Section 2 of this Annexation Agreement, installing, constructing and dedicating subdivision or on-site water system facility additions, improvements or modifications or further additions, improvements, extensions or

modifications to Authority's Water System Facilities as necessary to provide the requested new service(s) or modification of service(s) to the Property; and (v) satisfying such other terms and conditions pursuant to the Authority's Rules and any requirements of any local governmental entity with jurisdiction over the Property as necessary to obtain a Will-Serve Commitment letter from the Authority for the delivery of water to the Property. Owner shall submit such applications and execute such other documents required by Authority's Rules and procedures prior to being eligible for the delivery of water to the Property. All such conditions, dedications, additions, improvements, extensions and modifications shall be made in accordance with the Authority's Rules and regulations in effect at the time Authority and Owner enter into any agreement or agreements for the specific dedication, additions, improvements or modifications required to provide water service to the Property.

4. General Terms

4.1 Owner acknowledges and agrees that it is entering this Annexation Agreement voluntarily, that the expansion of Authority's service area is specifically conditioned on Owner's performance of all terms and conditions contained herein, and that if any of the provisions of this Annexation Agreement are deemed unenforceable or if Owner fails to perform any of its obligations hereunder, Authority is under no obligation to expand its service area to include any portion of the Property for which the Authority has not previously entered an agreement to provide water service. Nothing in this paragraph shall be construed to grant Owner a right, and Owner specifically waives any right, if any exists, to dispute any of the terms and conditions of this Annexation Agreement under Rule 8 in Authority's Rules, as such may be amended from time to time. Upon annexation of the Property, the Parties acknowledge and agree that both are bound by the terms and conditions of the rules and regulations adopted by Authority, as the rules and regulations may be amended from time to time, and as such rules may exist at the time service is applied for or requested for the Property or certain phases of the Property.

4.2. Any written notices or communications required hereunder shall be served by placing such notices in the U.S. Mail, postage prepaid, properly addressed to the following:

To: Authority

Truckee Meadows Water Authority
Attn. General Manager
P.O. Box 30013
Reno, NV 89520-3013

To: Owner

Attn: Richard Nevis
Moonlight Hills Estates, LLC
5390 Bellazza Court
Reno, NV 89519

4.3. This Annexation Agreement shall inure to and be binding upon the parties, their respective successors and assigns.

4.4. This Annexation Agreement shall not be modified except in writing, signed by all parties.

4.5. This Annexation Agreement represents the entire agreement between the Parties related to the expansion of the Authority's retail water service area and supersedes all prior representations and agreements whether written or oral with respect to the covenants and conditions provided herein; provided, however, that the obligations set forth in this Annexation Agreement shall be in addition to, and do not supersede or replace, any obligations that may be imposed upon Owner under Authority's Rules.

4.6 This Annexation Agreement and terms and conditions herein shall run with the land and be binding upon and inure to the benefit and burden of the parties to the agreement and their heirs, successors and assigns and any future owners of the Property.

4.7 Neither this Annexation Agreement nor any of the terms set forth herein shall be effective or binding on Authority until this Annexation Agreement is executed by Authority, and the Authority will be under no obligation to execute this Annexation Agreement if not executed and returned by Owners to the Authority by January 15, 2017.

IN WITNESS WHEREOF, the Parties hereto have executed this Annexation Agreement effective as of the Effective Date first written above.

TRUCKEE MEADOWS WATER AUTHORITY, a Joint Powers Authority

By:__________________________
Mark Foree, General Manager

MOONLIGHT HILLS ESTATES, LLC, A Nevada limited liability company

By: __________________________

Name:________________________

Title: ________________________

NOTARY PAGE FOLLOWS

STATE OF NEVADA)
) ss
COUNTY OF WASHOE)

This instrument was acknowledged before me on ________________________, 20__, by Mark Foree as General Manager, of the **TRUCKEE MEADOWS WATER AUTHORITY**, on behalf of said Joint Powers Authority therein named.

____
NOTARY PUBLIC

STATE OF ______________)
) ss
COUNTY OF ____________)

This instrument was acknowledged before me on _____________________, 20__, by _________________________________, as _____________________________________, of **MOONLIGHT HILLS ESTATES, LLC** on behalf of said Nevada limited liability company therein named.

____
NOTARY PUBLIC

EXHIBIT "A"

All that real property situate in the County of Washoe, State of Nevada, described as follows:

PARCEL 1:

ALL THAT PORTION OF THE NORTHWEST QUARTER (NW1/4) OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.& M., DESCRIBED AS FOLLOWS:

THE NORTHWEST QUARTER (NW ¼) OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.& M.

EXCEPTING THEREFROM THE SOUTHEAST QUARTER (SE ¼) THEREOF.

EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PARCEL:

A PORTION OF THE EAST HALF (E ½) OF THE NORTHEAST QUARTER (NE 1/40 OF THE NORTHWEST QUARTER (NW ¼) OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.&M., WASHOE COUNTY, NEVADA, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTH QUARTER CORNER OF SAID SECTION 11; THENCE SOUTH 01°02'02" WEST 575.07 FEET ALONG THE CENTER LINE OF SAID SECTION; THENCE SOUTH 89°08'30" WEST 345.12 FEET ALONG THE SOUTHERLY LINE OF THE NORTH HALF (N ½) OF THE SOUTH HALF (S ½) OF THE SOUTH HALF (S ½) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHWEST QUARTER (NW ¼) OF SAID SECTION 11, THE POINT OF BEGINNING; THENCE CONTINUING SOUTH 89°08'30" WEST 316.30 FEET ALONG SAID LINE TO THE WESTERLY LINE OF THE EAST HALF (E ½) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHWEST QUARTER (NW ¼) OF SAID SECTION 11; THENCE SOUTH 01°02'52" WEST ALONG SAID LINE 155.13 FEET; THENCE NORTH 89°25'22" EAST 316.25 FEET; THENCE NORTH 01°02'52" EAST 156.68 FEET TO THE POINT OF BEGINNING.

FURTHER EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PARCEL:

THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHWEST QUARTER (NW ¼) AND THE SOUTH HALF (S ½) OF THE SOUTH HALF (S ½) OF THE SOUTH HALF (S ½) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHWEST QUARTER (NW ¼) OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.&M.

FURTHER EXCEPTING THEREFROM ANY PORTION LYING WITH THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF SAID NORTHWEST QUARTER (NW ¼) OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.&M.

FURTHER EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PARCEL:

COMMENCE AT THE WEST QUARTER CORNER OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.& M., WASHOE COUNTY, NEVADA, AND PROCEED NORTH 89°55'22" EAST 612.41 FEET ALONG THE CENTERLINE OF SAID SECTION; THENCE NORTH 1°05'22" EAST 286.25 FEET; THENCE NORTH 89°55'22" EAST 171.01 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE NORTH 89°55'22" EAST 170.00 FEET; THENCE SOUTH 1°03'42" WEST 256.25 FEET OT A POINT ON THE NORTH LINE OF INDIAN LANE (60.00 FEET WIDE); THENCE ALONG SAID NORTH LINE SOUTH 89°55'22" WEST 170.00 FEET; THENCE NORTH 1°03'42" EAST 256.25 FEET TO THE POINT OF BEGINNING.

FURTHER EXCEPTING THEREFROM:

COMMENCING AT THE WEST QUARTER CORNER OF SAID SECTION 11 AND PROCEEDING THENCE NORTH 89°55'22" EAST ALONG THE CENTERLINE OF SAID SECTION 11, A DISTANCE OF 612.41 FEET; THENCE NORTH 01°05'22" EAST 50.41 FEET TO POINT OF BEGINNING, SAID POINT BEING ON THE EAST LINE OF A PROPOSED 60.00 FOOT WIDE ROADWAY; THENCE NORTH 01°55'22" EAST 235.84 FEET ALONG SAID EAST LINE; THENCE NORTH 89°55'22" EAST 171.01 FEET; THENCE SOUTH 01°03'42" WEST 256.25 FEET TO A POINT ON THE NORTH LINE OF INDIAN LANE (60.00 FEET WIDE); THENCE ALONG SAID NORTH LINE SOUTH 89°55'22" WEST 150.58 FEET TO BEGINNING OF A 20.00 FEET RADIUS CURVE TO THE RIGHT; THENCE ALONG SAID CURVE THROUGH AN ANGLE OF 91°10'00", AND AN ARC LENGTH OF 31.82 FEET TO THE POINT OF BEGINNING.

FURTHER EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PARCEL:

COMMENCING AT THE WEST QUARTER CORNER OF SAID SECTION 11; THENCE NORTH 01°05'22" EAST 50.41 FEET ALONG THE WEST LINE OF SAID SECTION 11 TO THE POINT OF BEGINNING; THENCE CONTINUING NORTH 01°05'22" EAST 216.19 FEET; THENCE NORTH 89°55'22" EAST 184.13 FEET; THENCE SOUTH 01°05'22" WEST 236.60 FEET TO A POINT ON THE NORTH LINE OF INDIAN LANE (60.00 FEET WIDE); THENCE ALONG SAID NORTH LINE SOUTH 89°55'22" WEST 163.72 FEET TO THE BEGINNING OF A 20.00 FEET RADIUS CURVE TO THE RIGHT; THENCE ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 91°10'00", AND AN ARC LENGTH OF 31.82 FEET TO THE POINT OF BEGINNING.

FURTHER EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PARCEL:

COMMENCING AT THE WEST QUARTER CORNER OF SAID SECTION 11; THENCE NORTH 89°55'22" EAST 612.41 FEET ALONG THE CENTERLINE OF SAID SECTION 11; THENCE NORTH 01°05'22" EAST 286.25 FEET; THENCE NORTH 89°55'22" EAST 511.01 FEET TO THE POINT OF BEGINNING; THENCE CONTINUING NORTH 89°55'22" EAST 170.00 FEET TO A POINT ON THE WEST LINE OF RAIN DANCE WAY EXTENDED; THENCE ALONG SAID WEST LINE SOUTH 01°03'42" WEST 236.65 FEET TO THE BEGINNING OF A 20.00 FEET RADIUS CURVE TO THE RIGHT; THENCE ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 88°51'40" FOR AN ARC LENGTH OF 31.02 FEET TO A POINT ON THE NORTH LINE OF INDIAN LANE (60.00 FEET WIDE); THENCE ALONG SAID NORTH LINE SOUTH 89°55'22" WEST 150.40 FEET; THENCE NORTH 01°03'42" EAST 256.25 FEET TO THE POINT OF BEGINNING.

FURTHER EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PARCEL:

COMMENCING AT THE WEST QUARTER CORNER OF SAID SECTION 11; THENCE NORTH 89°55'22" EAST 612.41 FEET ALONG THE CENTERLINE OF SAID SECTION 11; THENCE NORTH 01°05'22" EAST 286.25 FEET THENCE NORTH 89°55'22" EAST 341.01 FEET TO THE POINT OF BEGINNING; THENCE CONTINUING NORTH 89°55'22" EAST 170.00 FEET; THENCE SOUTH 01°03'42" WEST 256.25 FEET TO THE POINT ON THE NORTH LINE OF INDIAN LANE (60.00 FEET WIDE); THENCE ALONG SAID NORTH LINE SOUTH 89°55'22" WEST 170.00 FEET; THENCE NORTH 01°03'42" EAST 256.25 FEET TO THE POINT OF BEGINNING.

FURTHER EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PARCEL:

COMMENCE AT THE WEST QUARTER CORNER OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.&M., WASHOE COUNTY, NEVADA, AND PROCEED NORTH 1°05'22" EAST 266.60 FEET ALONG THE WEST LINE OF SAID SECTION 11; THENCE NORTH 89°55'22" EAST 184.13 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE NORTH 89°55'22" EAST 184.13 FEET; THENCE SOUTH 105'22" WEST 236.60 FEET TO A POINT ON THE NORTH LINE OF INDIAN LANE (60.00 FEET WIDE); THENCE SOUTH 89°55'22" WEST 184.13 FEET ALONG SAID LINE; THENCE NORTH 1°05'22" EAST 236.60 FET TO THE POINT OF BEGINNING.

FURTHER EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PARCEL:

COMMENCE AT THE WEST QUARTER CORNER OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.&M., WASHOE COUNTY, NEVADA, AND PROCEED NORTH 1°05'22" EAST 266.60 FEET ALONG THE WEST LINE OF SAID

SECTION 11; THENCE NORTH 89°55'22" EAST 368.26 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE NORTH 89°55'22" EAST 184.14 FEET TO A POINT ON THE WEST LINE OF A PROPOSED 60.00 FEET WIDE ROADWAY; THENCE SOUTH 1°05'22" WEST 217.00 FEET ALONG THE SAID WEST LINE TO THE BEGINNING OF A 20.00 FEET RADIUS CURVE TO THE RIGHT; THENCE ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 88°50'00" AND AN ARC LENGTH OF 31.01 FEET TO A POINT ON THE NORTH LINE OF INDIAN LANE (60.00 FEET WIDE); THENCE ALONG SAID NORTH LINE SOUTH 89°55'22" WEST 164.54 FEET; THENCE NORTH 1°05'22" EAST 236.60 FEET TO THE POINT OF BEGINNING. EXCEPTING THEREFROM ANY PORTION THEREOF CONVEYED TO THE COUNTY OF WASHOE, STATE OF NEVADA, FOR ROAD AND INCIDENTAL PURPOSES.

PARCEL 1A:

AN EASEMENT 25.00 FEET IN WIDTH FOR ROADWAY AND UTILITY PURPOSES, SAID EASEMENT BEING THE WEST 25.0 FEET OF THE SOUTHEAST QUARTER (SE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHWEST QUARTER (NW ¼) AND THE SOUTH HALF (S ½) OF THE SOUTH HALF (S ½) OF THE SOUTH HALF (S ½) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHEAST QUARTER (NE ¼) OF THE NORTHWEST QUARTER (NW ¼) OF SAID SECTION 11, AS RECORDED APRIL 28, 1978 IN BOOK 1233, PAGE 442 AS INSTRUMENT NO. 528857 AND RECORDED JULY 2, 1996 IN BOOK 4613, PAGE 716 AS INSTRUMENT NO. 2009093 OF OFFICIAL RECORDS WASHOE COUNTY, NEVADA.

PARCEL 1B:

A NON-EXCLUSIVE EASEMENT FOR ROAD AND UTILITY PURPOSES 60 FEET IN WIDTH, THE CENTERLINE OF WHICH IS THE EAST LINE OF THE NORTHWEST QUARTER (NW ¼) OF SAID SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.D.B.&M, RECORDED JULY 2, 1996 IN BOOK 4613, PAGE 716 AS INSTRUMENT NO. 2009093, OF OFFICIAL RECORDS WASHOE COUNTY, NEVADA.

NOTE: THE ABOVE METES AND BOUNDS DESCRIPTION APPEARED PREVIOUSLY IN THAT CERTAIN DOCUMENT RECORDED JULY 2, 1996 IN BOOK 4613, PAGE 716 AS INSTRUMENT NO. 2009093, OF OFFICIAL RECORDS WASHOE COUNTY, NEVADA.

APN: 552-050-01

[Legal Description was referenced from that certain GRANT BARGAIN and SALE DEED, recorded as Document No. 4339670 on March 31, 2014, in the office of the County Recorder of Washoe County, State of Nevada.]

All that real property situate in the County of Washoe, State of Nevada, described as follows:

THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 11, TOWNSHIP 20 NORTH, RANGE 19 EAST, M.B.D.& M.

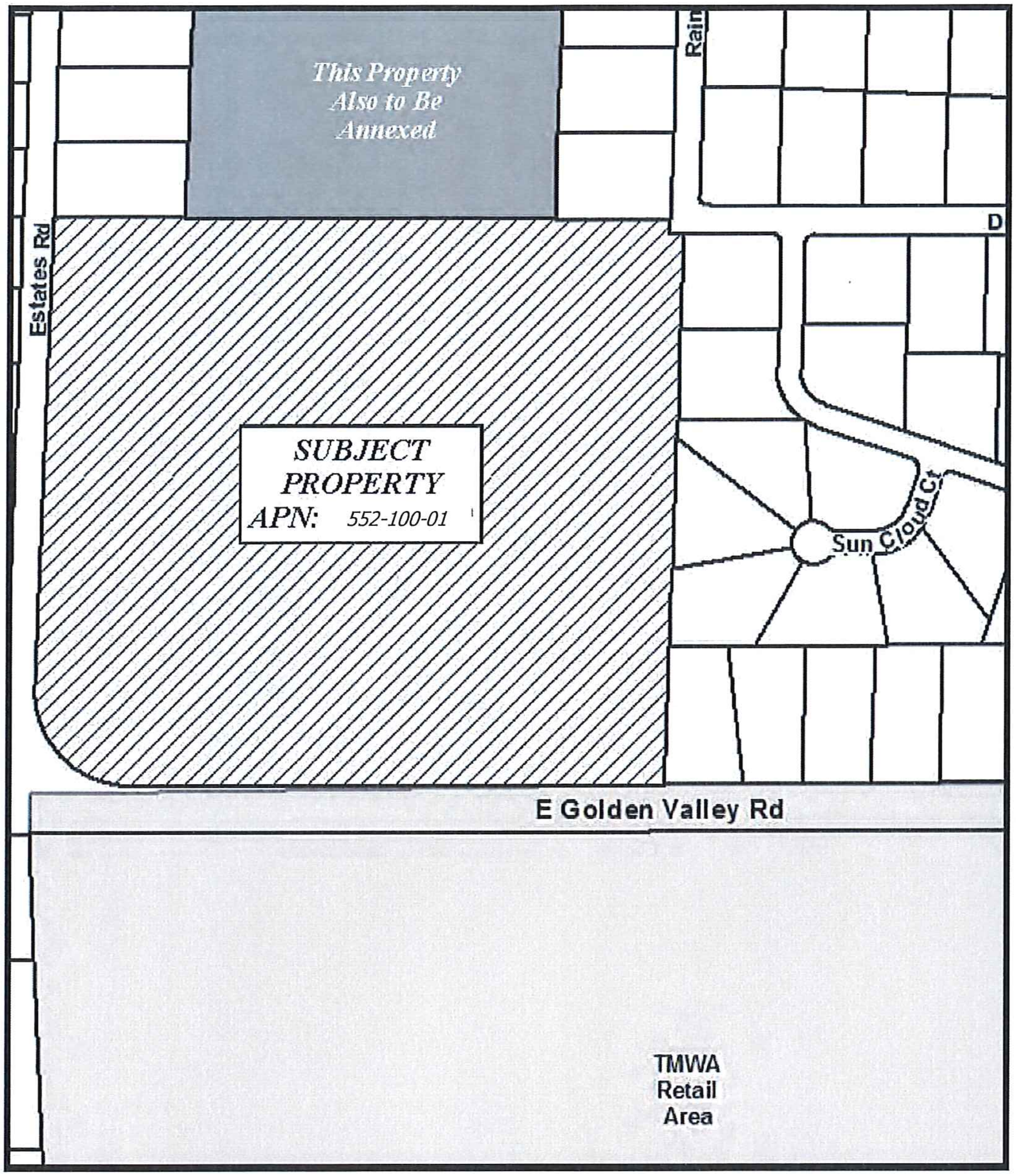
EXCEPTING THEREFROM THOSE PORTIONS THAT MAY LIE WITHIN THE FOLLOWING STREETS; RAIN DANCE WAY, DEER FOOT LANE, GOLDEN VALLEY ROAD AND ESTATES ROAD, AS IT MAY NOW EXIST.

NOTE; THE ABOVE SECTIONAL DESCRIPTION APPEARED PREVIOUSLY IN THAT CERTAIN DOCUMENT RECORDED JANUARY 13, 1997, IN BOOK 4764, PAGE 0132, AS INSTRUMENT NO. 2063449.

APN: 552-100-01

[Legal Description was referenced from that certain GRANT BARGAIN and SALE DEED, recorded as Document No. 4339697 on March 31, 2014, in the office of the County Recorder of Washoe County, State of Nevada.]

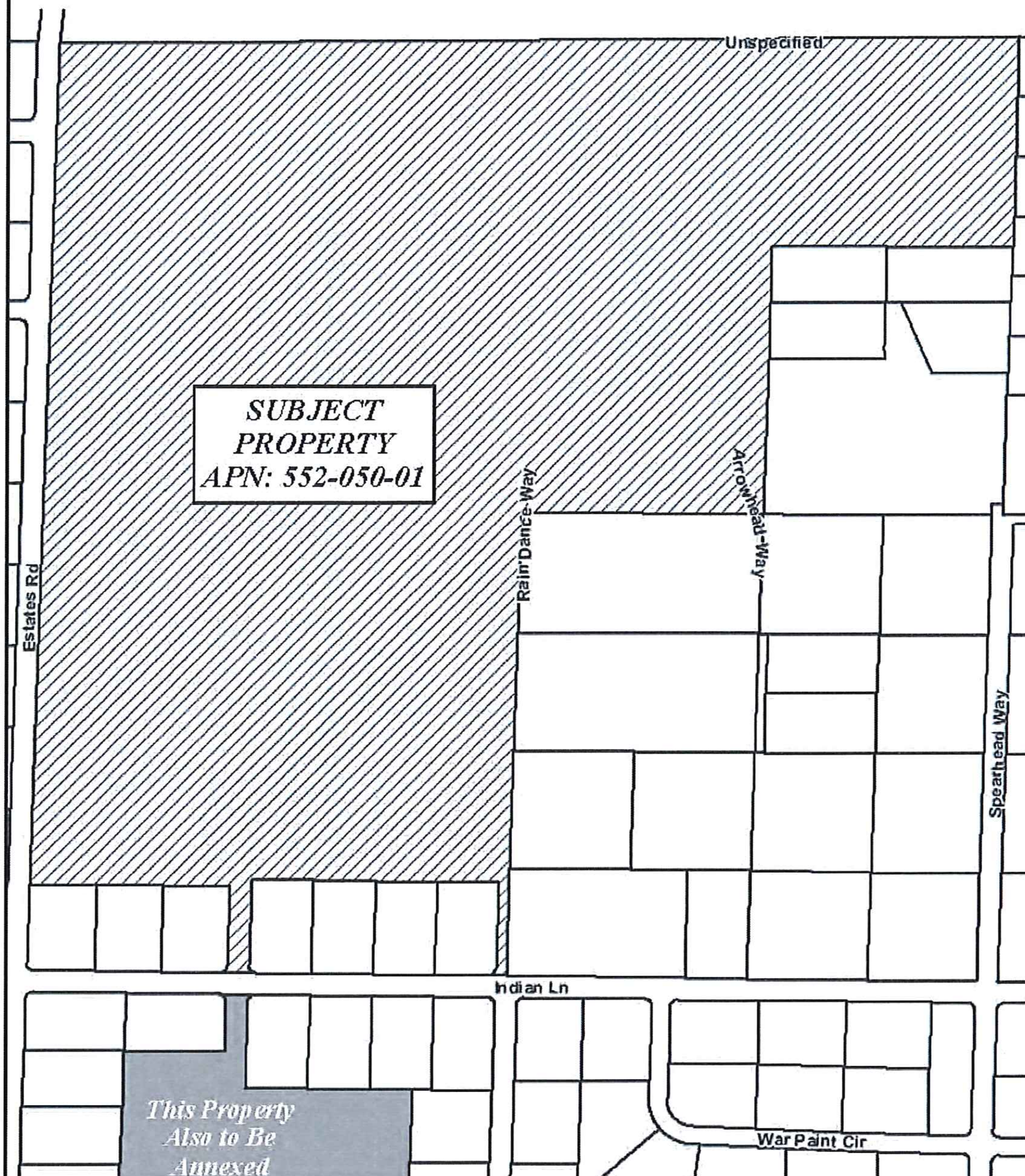
EXHIBIT A-1



TRUCKEE MEADOWS WATER AUTHORITY
www.tmwa.com

**ANNEXATION EXHIBIT MAP A-1
(1 of 2) FOR
MOONLIGHT HILLS ESTATES, LLC
APN: 552-100-01**

EXHIBIT A-1



TRUCKEE MEADOWS WATER AUTHORITY
www.tmwa.com

ANNEXATION EXHIBIT MAP A-1
(2 of 2) FOR
MOONLIGHT HILLS ESTATES, LLC
APN: 552-050-01

EXHIBIT B

GOLDEN VALLEY MESA
SUMMARY OF OFFSITE FACILITY REQUIREMENTS AND APPROXIMATE COSTS TO BE PAID BY DEVELOPER

Estimated Major Water Facility Costs

Description	Quantity	Unit	Unit Cost	Total Cost
Area 8 Facility Charge	251.6	MDD, gpm	$4,142	$1,042,127
Area 8 Storage Charge	251.6	MDD, gpm	$772	$194,235
Area 8 Supply and Treatment Charge	251.6	MDD, gpm	$4,163	$1,047,411
			subtotal	**$2,283,773**
Hot Tap	2	L.S.	$20,000	$40,000
8" main in Estates	4850	L.S.	$144	$698,400
8" main connecting the N and S Properties	500	L.F.	$144	$72,000
			subtotal	**$810,400**
			Total	**$3,094,173**

Notes:

1. Water System Facility Charges are determined based on the maximum day demand (MDD) of the development. The above MDD is estimated and will be determined at the time final development plans are submitted with a formal application for water service. All facility requirements listed above are preliminary and are subject to change during the final planning and design process.
2. Review of conceptual plans or tentative maps by TMWA does not constitute an application for service, nor implies a commitment by TMWA 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 TMWA 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, TMWA 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 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 TMWA prior to water delivery to the Project.

TRUCKEE MEADOWS WATER
AUTHORITY
Quality. Delivered.

December 12, 2016

Mr. Richard Nevis
5390 Bellazza Ct
Reno, NV 89519

RE: **Golden Mesa North**
Acknowledgement of Water Service
TMWA Work Order 16-5294

Dear Mr. Nevis:

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 834-8104 at your convenience if you have any questions.

Sincerely,
Truckee Meadows Water Authority

Brooke Long, P.E.
Senior Engineer

TRAFFIC STUDY

Axion ENGINEERING
Civil Engineering • Land Development

TRAFFIC IMPACT STUDY

FOR

GOLDEN MESA

June 27, 2016

PREPARED BY:

TRAFFIC WORKS LLC

PROFESSIONAL ENGINEER-STATE OF NEVADA
LOREN
EDWARD
CHILSON
Exp: 12·31·16
CIVIL
No. 15619

6·27·16

TRAFFIC WORKS, LLC
5482 Longley Lane, Suite B, Reno, NV 89511
775.322.4300
www.Traffic-Works.com

YOUR QUESTIONS ANSWERED QUICKLY

Why did you perform this study?

This Traffic Impact Study evaluates the potential traffic impacts associated with construction of the proposed Golden Mesa residential development.

What does the project consist of?

The proposed project consists of up to 158 single-family housing units.

How much traffic will the project generate?

The proposed project is anticipated to generate a total of 1,600 daily trips, 120 AM peak hour trips, and 159 PM peak hour trips.

Are there any traffic impacts?

The Golden Valley Road/North Hills Boulevard intersection and the southbound left-turn movement at the Golden Valley Road/Estates Road intersection currently operate below policy LOS standards (at LOS "E" or "F"). The additional project traffic worsens traffic operations at these locations causing increased delay compared to conditions without the project.

Are any traffic related improvements proposed?

The following two improvements are recommend to mitigate current deficiencies and project impacts:

- Golden Valley Road/N. Hills Boulevard – Optimize traffic signal timings.
- Golden Valley Road/Estates Road – Provide a receiving lane on Golden Valley Road enabling two-stage left-turn movements for southbound left-turning vehicles.

These improvements will accommodate 10-year horizon traffic volumes and the project traffic while maintaining policy LOS standards. No other mitigations are proposed at any other study intersections since the analysis showed the anticipated project traffic does not cause any other significant impacts. The project's contribution of Regional Road Impact Fees will mitigate the minor project effects on the overall roadway network.

LIST OF FIGURES

1. Study Area
2. Existing Traffic Volumes
3. Site Plan
4. Trip Assignment
5. Plus Project Traffic Volumes
6. 10-Year Horizon Baseline Volumes
7. 10-Year Horizon Plus Project Volumes

LIST OF APPENDICES

A. Existing Conditions LOS Calculations
B. Plus Project Conditions LOS Calculations
C. Demand Model Outputs
D. 10-Year Horizon Baseline Conditions LOS Calculations
E. 10-Year Horizon Plus Project Conditions LOS Calculations

INTRODUCTION

This report presents the findings of a Traffic Impact Study completed to assess the potential traffic impacts on local intersections associated with construction of the Golden Mesa residential project. This traffic impact study has been prepared to document existing traffic conditions, quantify traffic volumes generated by the proposed project, identify potential impacts, document findings, and make recommendations to mitigate impacts, if any are found.

Study Area and Evaluated Scenarios

The project site is located east of Estates Road and north of Golden Valley Road in Washoe County, NV. The study intersections were identified based on scoping conversations with Washoe County staff. The project site location and the study intersections are shown in **Figure 1**. The following intersections are included in this study:

- Golden Valley Road/North Hills Boulevard
- Golden Valley Road/Estates Road
- Estates Road/Indian Lane
- Estates Road/Access 1
- Estates Road/Access 2
- Indian Lane/Access 3
- Estates Road/Access 4
- Golden Valley Road/Access 5

This study includes analysis of the both the weekday AM and PM peak hours as these are the periods of time in which peak traffic is anticipated to occur. The evaluated development scenarios are:

- Existing Conditions (no project)
- Existing Plus Project Conditions
- 10 year horizon Baseline Conditions (including growth per Washoe County's travel demand model)
- 10 year horizon Plus Project Conditions

Analysis Methodology

Level of service (LOS) is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades "A" through "F" with "A" representing optimum conditions and "F" representing breakdown or over capacity flows. The complete methodology is established in the Highway Capacity Manual (HCM), 2010, published by the Transportation Research Board. **Table 1** presents the delay thresholds for each level of service grade at un-signalized and signalized intersections.

Table 1: Level of Service Definition for Intersections

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

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

Level of service calculations were performed for the study intersections using the Synchro 9 software suite, with analysis and results reported in accordance with HCM 2010 methodology.

Level of Service Policy

The 2035 Regional Transportation Plan (2035 RTP) establishes level of service criteria for regional roadway facilities within Washoe County, the City of Reno, and the City of Sparks. The current Level of Service policy is:

- "All regional roadway facilities projected to carry less than 27,000 ADT at the latest RTP horizon – LOS D or better."
- "All regional roadway facilities projected to carry 27,000 ADT or more at the latest RTP horizon – LOS E or better."
- "All intersections shall be designed to provide a level of service consistent with maintaining the policy level of service of the intersecting roadways".

According to the Nevada Department of Transportation's 2014 Annual Average Daily Traffic (AADT) data and Washoe County RTC's 2035 travel demand model data, the average daily volumes on the study roadways are anticipated to be less than 27,000 ADT. Hence, the level of service threshold specific to the study roadways and intersections is LOS "D".

EXISTING TRANSPORTATION FACILITIES

Roadway Facilities

A brief description of the key roadways in the study area is provided below:

Golden Valley Road within the study area is a four-lane roadway with two lanes in each direction and turn lanes at major intersections. It is classified as a "Medium Access Control Arterial" in the 2035 RTP. The posted speed limit is 40 mph in the study area.

Estates Road and Indian Lane are two-lane roadways with one lane in each direction. They are local roadways not classified in the 2035 RTP.

North Hills Boulevard is a three-lane roadway serving local commercial centers with one lane in each direction and a two-way left turn lane.

Alternate Travel Modes

There are currently sidewalks along the south side of Golden Valley Road throughout the study area. Sidewalks are also present on the north side of Golden Valley Road west of Estates Road, on the north side of North Hills Boulevard, and on the south side of North Hills Boulevard west of Golden Valley Road. Dedicated bike lanes exist in both directions on Golden Valley Road and North Hills Boulevard.

The Regional Transportation Commission (RTC) operates public transit service on Golden Valley Road and North Hills Boulevard (Route 7) as shown in Exhibit 1. While public transit is not operated on roadways immediately adjacent to the project site, Route 7 is within reasonable cycling distance from the project.

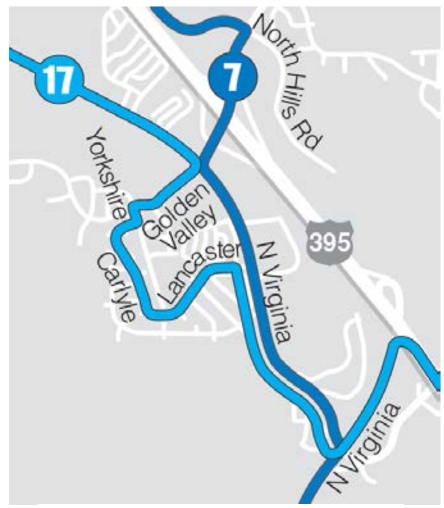


Exhibit 1. RTC Transit Routes

EXISTING CONDITIONS

Traffic Volumes

Existing traffic volumes were determined by conducting new video counts at the study intersections. The counts were conducted on an average mid-week day on May 17th, 2016 with schools in session. The existing AM and PM peak hour intersection traffic volumes in **Figure 2,** attached.

Intersection Level of Service

Level of service calculations were performed using the existing traffic volumes, lane configurations, and traffic controls. Current signal timing plans for the Golden Valley Road/North Hills Boulevard intersection was requested and obtained from the City of Reno and was incorporated into the model. The results are presented in **Table 2** and the calculation sheets are provided in **Appendix A**, attached.

Table 2: Existing Conditions Intersection Level of Service Summary

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/North Hills Blvd	Signal	D	46.8	**E**	**60.2**
Golden Valley Rd/Estates Rd	TWSC				
Southbound Approach		C	17.8	B	11.57
Southbound Left		**E**	**47.86**	C	22.03
Southbound Right		B	13.04	B	10.1
Estates Rd/Indian Ln	TWSC				
Westbound Approach		A	9.16	A	9.11
Westbound Left		A	9.2	A	9.11
Westbound Right		A	8.62	A	8.76

As shown in **Table 2**, the Golden Valley Road/North Hills Boulevard intersection is operating at LOS "C" and LOS "E" during the existing AM and PM peak hours respectively. The southbound left-turn movement at the Golden Valley Road/Estates Road intersection is operating at LOS "E" during the AM peak hour. The overall intersection and all other movements at this intersection operate at acceptable levels of service. All movements at the Estates Road/Indian Lane intersection operate at acceptable levels of service during both the AM and PM peak hours.

PROJECT GENERATED TRAFFIC

Project Description

The project site is generally located in the northeast quadrant of the Golden Valley Road/Estates Road intersection as shown in **Figure 1**. The proposed project consists of up to 158 single-family housing units. The site plan is shown in **Figure 3**.

Trip Generation

Trip generation rates for Golden Mesa were obtained from the Trip Generation Manual, 9th Edition, published by the Institute of Transportation Engineers. **Table 3** provides the Daily, AM peak hour, and PM peak hour trip generation calculation details for the proposed project.

Table 3: Trip Generation Estimates

ITE Land Use	Size	Daily	AM Peak			PM Peak		
			Total	In	Out	Total	In	Out
210 - Single-Family Detached Housing	158 Dwelling Units	1,600	120	30	90	159	100	59

As shown in **Table 3**, the proposed project is anticipated to generate up to 1,600 daily trips, 120 AM peak hour trips, and 159 PM peak hour trips.

Project Access

Access to the project site will be provided via multiple access points located on Estates Road, Indian Lane, and Golden Valley Road. All the access points are shown in the site plan in **Figure 3**. The access on Golden Valley Road (Access 5) is proposed as Right-In/Right-Out access only with STOP control on the driveway. All other access points will be full access stop-controlled driveways.

Trip Distribution and Assignment

Traffic generated by the project was distributed to the road network based on the location of the project site, the relative location of major activity centers, and access connection points to roadway network.

The following trip distribution percentages were used for distributing the project traffic:

- 80% to/from the west (accessing US 395)
- 10% to/from the north via North Hills Boulevard
- 10% to/from the east via Golden Valley Road

Project generated trips were assigned to the adjacent roadway system based on the distributions outlined above. The project trip assignment is shown on **Figure 4**, attached.

EXISTING PLUS PROJECT CONDITIONS

Traffic Volumes

Plus project traffic volumes were developed by adding the project generated trips (**Figure 4**) to the existing traffic volumes (**Figure 2**) and are shown on **Figure 5**, attached. The "Plus Project" condition Peak Hour Factors (PHF) and travel patterns were assumed to remain the same as were observed under existing conditions.

Intersection Level of Service Analysis

Table 9 presents the level of service analysis summary for the "Plus Project" scenario assuming the existing intersection configurations. Detailed calculation sheets are provided in **Appendix B**, attached.

As shown in **Table 9**, under the Plus Project conditions, the Golden Valley Road/North Hills Boulevard intersection continues to operate at acceptable LOS during the AM peak hour and continues to operate at LOS "E" during the PM peak hour. It should be noted that this intersection operates at LOS "E" even under existing conditions (without the addition of project traffic).

Table 9: Plus Project Intersection Level of Service Summary

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/North Hills Blvd	Signal	D	46.79	**E**	**58.36**
Golden Valley Rd/Estates Rd	TWSC				
Southbound Approach		C	22.46	B	13.22
Southbound Left		**F**	**70.8**	D	33.01
Southbound Right		C	15.26	B	10.46
Estates Rd/Indian Ln	TWSC				
Westbound Approach		A	9.84	A	9.7
Westbound Left		A	9.88	A	9.7
Westbound Right		A	8.96	A	9.16
Golden Valley Rd/Access 5	TWSC	B	11.62	A	9.82
Estates Rd/Access 4	TWSC				
Westbound Approach		B	10.39	B	10.34
Westbound Left		B	10.39	B	10.34
Westbound Right		A	8.9	A	9.45
Indian Ln/Access 3	TWSC				
Southbound Approach		A	8.59	A	8.44
Northbound Approach		A	9.17	A	9.15
Estates Rd/Access 2	TWSC				
Westbound Approach		A	9.2	A	9.22
Westbound Left		A	9.22	A	9.22
Westbound Right		A	8.57	A	8.8
Estates Rd/Access 1	TWSC				
Westbound Approach		A	9.01	A	9.02
Westbound Left		A	9.01	A	9.02
Westbound Right		A	8.5	A	8.68

During the AM peak hour, the southbound left-turn movement at the Golden Valley Road/Estates Road intersection deteriorates from LOS "E" under existing conditions to LOS "F" under Plus Project conditions. However, it should be noted that the overall southbound approach operates at LOS "C" during the same peak hour. It should also be noted that during the AM peak hour, the southbound left-turn volume is only 23 vehicles, which equates to less than one vehicle every two minutes. The intersection operates at acceptable LOS during the PM peak hour.

All other study intersections and approaches operate acceptably under Plus Project conditions, during both the AM and PM peak hours.

10-YEAR HORIZON BASELINE CONDITIONS

Traffic Volumes

Traffic volumes in the study area are anticipated to increase in the future as more development occurs in the North Valleys region. Traffic growth rates were obtained from Washoe County RTC's travel demand model. The latest iteration of the travel demand model, which included all the development incorporated in the North Valleys Region Multi-Modal Transportation Study (including this project) was used to determine future growth rates. The growth rates were then applied to the existing AM and PM peak hour traffic volumes to obtain future peak hour traffic volumes. The 10-Year horizon baseline peak hour traffic volumes are shown in **Figure 6**.

Growth rates were calculated based on the traffic volume increases at multiple points along Golden Valley Road. Other roadways in the study area, being minor roads, were not included in the RTC's travel demand model. Hence, a uniform growth rate obtained from the Golden Valley Road volume increase was applied to all the study intersections. The travel demand model outputs are attached in **Appendix C**. The growth rate calculations are shown in **Table 10**.

Table 10: Growth Rate Calculations

Golden Valley Road				
2015	3,800	6,775	9,723	15,509
2025	4,867	7,806	11,459	16,091
Difference	1,067	1,031	1,736	582
10 Years % Change	28%	15%	18%	4%
Annual Growth Rate	2.8%	1.5%	1.8%	0.4%
Adjusted 10 year Growth Factor	1.3	1.2	1.2	1.0
Average Growth Factor	**1.16**			

10-Year Baseline traffic volumes were calculated by applying the growth rate factor of 1.16 from **Table 10** to existing volumes.

Intersection Level of Service Analysis

Table 11 presents the level of service analysis summary for the "10-Year Horizon Baseline" scenario assuming the existing intersection configurations. Detailed calculation sheets are provided in **Appendix D**, attached.

Table 11: 10-Year Horizon Baseline Level of Service Summary

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/N Hills Blvd	Signal	D	49.58	**F**	**88.9**
Golden Valley Rd/Estates Rd	TWSC				
Southbound Approach		C	19.83	B	12.57
Southbound Left		**F**	**59.19**	C	27.56
Southbound Right		B	13.73	B	10.39
Estates Rd/Indian Ln	TWSC				
Westbound Approach		A	9.19	A	9.19
Westbound Left		A	9.23	A	9.19
Westbound Right		A	8.63	A	8.82

As shown in **Table 11**, the Golden Valley Road/North Hills Boulevard intersection and the southbound left-turn movement at the Golden Valley Road/Estates Road intersection operate at LOS "F" in the 10-year background conditions. All other intersections and movements operate at acceptable LOS conditions.

10-YEAR HORIZON PLUS PROJECT CONDITIONS

Traffic Volumes

10 year Horizon Plus Project traffic volumes were developed by adding the project generated trips (**Figure 4**) to the 10-Year Horizon Baseline traffic volumes (**Figure 6**) and are shown on **Figure 7**, attached.

Intersection Level of Service Analysis

Table 12 presents the level of service analysis summary for the "10-Year Horizon Plus Project" scenario. Detailed calculation sheets are provided in **Appendix E**, attached.

As shown in **Table 12**, with the addition of project traffic, the Golden Valley Road/North Hills Boulevard intersection and the southbound left-turn movement at Golden Valley Road/Estates Road intersection operate at LOS "F", with a slight increase in delay compared to 10-year horizon baseline conditions. It should be noted that these two intersections operate at LOS "F" in the 10-Year Horizon Background conditions (without addition of the project traffic). All other intersections and movements operate at acceptable levels of service.

Table 12: 10-Year Horizon Plus Project Intersection Level of Service Summary

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/N Hills Blvd	Signal	D	36.1	**F**	**>100**
Golden Valley Rd/Estates Rd	TWSC				
Southbound Approach		D	25.69	B	14.87
Southbound Left		**F**	**90.49**	**E**	**43.59**
Southbound Right		C	16.13	B	10.89
Estates Rd/Indian Ln	TWSC				
Westbound Approach		A	9.94	A	9.75
Westbound Left		A	9.98	A	9.75
Westbound Right		A	9.02	A	9.2
Golden Valley Rd/Access 5	TWSC	B	11.93	B	10.11
Estates Rd/Access 4	TWSC				
Westbound Approach		B	10.41	B	10.55
Westbound Left		B	10.41	B	10.55
Westbound Right		A	8.89	A	9.57
Indian Ln/Access 3	TWSC				
Southbound Approach		A	8.61	A	8.46
Northbound Approach		A	9.22	A	9.18
Estates Rd/Access 2	TWSC				
Westbound Approach		A	9.26	A	9.25
Westbound Left		A	9.26	A	9.25
Westbound Right		A	8.57	A	8.82
Estates Rd/Access 1	TWSC				
Westbound Approach		A	9.05	A	9.06
Westbound Left		A	9.05	A	9.06
Westbound Right		A	8.51	A	8.71

POTENTIAL MITIGATION MEASURES

Golden Valley Road/North Hills Boulevard

The Golden Valley Road/North Hills Boulevard intersection currently operates at LOS”E” during the PM peak hour even without addition of the project traffic. This intersection would continue to operate at LOS “E” with the addition of project traffic. It operates at LOS “F” during the 10-Year Horizon conditions. Operations at this intersection can be improved by optimizing the traffic signal timings. **Table 13** shows the LOS results with optimized signal timing.

Table 13: Golden Valley Rd/N. Hills Blvd Mitigated LOS Summary

Intersection	Scenario	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/N Hills Blvd	Existing	D	46.8	E	60.2
	Existing Plus Project	D	46.79	E	58.36
	Existing Plus Prj Mitigated	C	33.36	D	44.67
	10-Year Baseline	D	49.58	F	88.9
	10-Yr Plus Project	D	49.68	F	85.97
	10-Yr Plus Prj Mitigated	C	33.72	E	63.93

As shown in **Table 13**, during the Existing Plus Project PM peak hour conditions, optimizing signal timings would improve the level of service from LOS “E” to LOS “D”. During the 10-year plus project conditions, optimizing signal timings would mitigate the project impacts and the intersection would operate at better than 10-year baseline (without the project) conditions. During the AM peak hour, the intersection would operate at acceptable LOS conditions with the project, both under existing and 10-year plus project conditions. Optimizing the signal timings would further improve traffic operations during the AM peak hour. Hence, optimizing the signal timings would mitigate the impacts of the project for both the existing and 10-year horizon conditions.

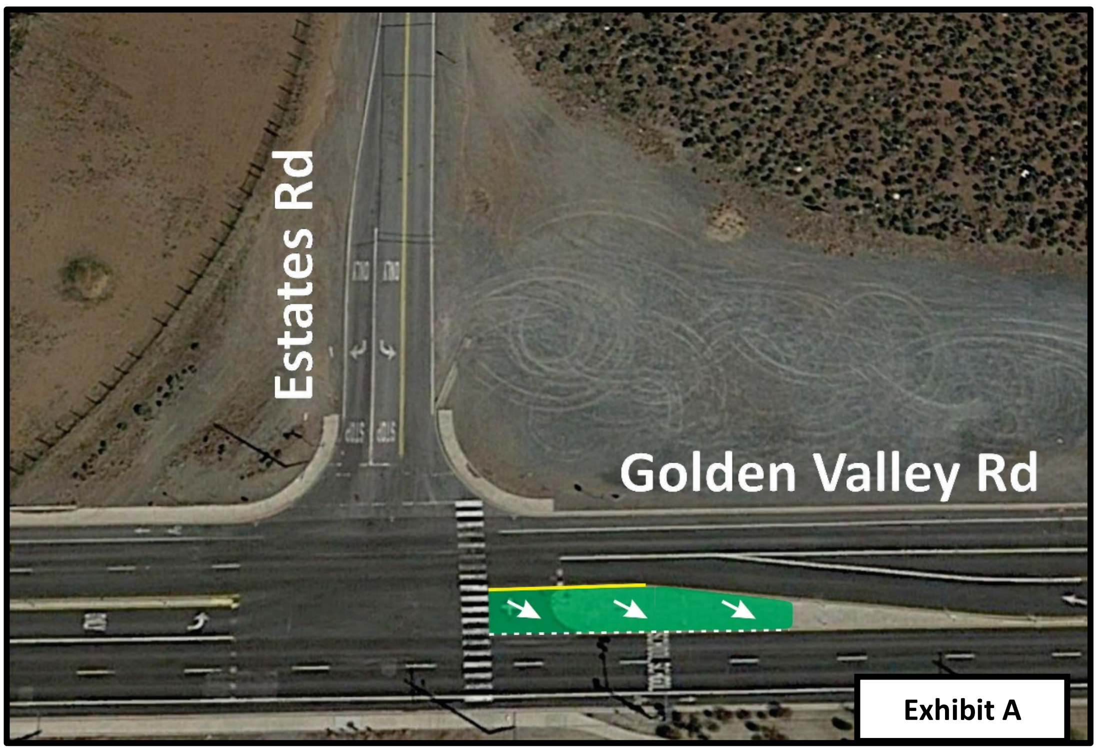
Golden Valley Road/Estates Road

The Golden Valley Road/Estates Road intersection is a two-way stop controlled intersection. The overall intersection LOS at a two-way stop control intersection is defined by the LOS of the worst approach/movement, which is typically a STOP-controlled movement. The southbound left-turn movement at this intersection currently operates at LOS “E” under existing AM peak hour conditions (without any project traffic). With the addition of project traffic, the southbound left-turn movement would deteriorate to LOS “F”. All the other movements at this intersection operate at acceptable LOS conditions in the existing PM peak hour conditions (without and with project traffic).

In the 10-year horizon AM peak hour conditions, the southbound left-turn movement is expected to operate at LOS “F” with or without the project. During the 10-year horizon PM peak hour conditions, adding the project traffic would worsen the southbound left-turn level of service to LOS “E” (with project) from LOS "C" (without project). However, it should be noted that the overall southbound approach (combination of southbound left and right turn movements) operates at acceptable LOS conditions during both the existing and 10-year horizon conditions, even with the addition of project traffic.

It is important to recognize that LOS "F" conditions for only the left-turn movement from a side-street, during the peak hour, do not necessarily indicate an intersection failure or need for mitigation. Context of the volumes and intersection location are important in these cases. The subject southbound left-turn volume is only 14 vehicles per hour and there are other locations (i.e. Spearhead Way/Golden Valley Road intersection) where the desired traffic movement can more easily be made. This condition (side-street LOS "F" for a left-turn movement) commonly exists throughout the urban area and is acceptable in most cases so long as the project does not add significant traffic to the LOS "F" movement. Golden Mesa is expected to add about 9 peak hour trips to the southbound left-turn movement which is a small amount.

If mitigation were to be required, to most logical solution would be providing a two-stage left-turn receiving lane for southbound left-turning vehicles as shown in **Exhibit A**.



Providing a storage lane for two-stage left-turns would significantly reduce the delay on the Estates Road approach. **Table 14** summarizes the LOS results. As shown in **Table 14**, with a staging lane in place, all the southbound movements are anticipated to operate at acceptable LOS conditions during both the existing and 10-year horizon plus project conditions.

Table 14: Golden Valley Rd/Estates Rd Mitigated LOS Summary

Intersection		AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/Estates Rd					
Southbound Approach	Existing	C	17.8	B	11.57
Southbound Left		E	47.86	C	22.03
Southbound Right		B	13.04	B	10.1
Southbound Approach	Existing Plus Project	C	22.46	B	13.22
Southbound Left		F	70.8	D	33.01
Southbound Right		C	15.26	B	10.46
Southbound Approach	Existing Plus Prj Mitigated	C	16.69	B	11.67
Southbound Left		D	26.29	C	20.38
Southbound Right		C	15.26	B	10.46
Southbound Approach	10-Year Baseline	C	19.83	B	12.57
Southbound Left		F	59.19	C	27.56
Southbound Right		B	13.73	B	10.39
Southbound Approach	10-Yr Plus Project	D	25.69	B	14.87
Southbound Left		F	90.49	E	43.59
Southbound Right		C	16.13	B	10.89
Southbound Approach	10-Yr Plus Prj Mitigated	C	17.75	B	12.42
Southbound Left		D	28.76	C	23.48
Southbound Right		C	16.13	B	10.89

CONCLUSIONS & RECOMMENDATIONS

The following is a list of our key findings and recommendations to best manage the traffic generated by the proposed project:

Project Trips: The proposed project is anticipated to generate a total of 1,600 daily trips, 120 AM peak hour trips, and 159 PM peak hour trips.

Project Access: Access to the project site will be provided via multiple access points located on Estates Road, Indian Lane, and Golden Valley Road. The access on Golden Valley Road (Access 5) will be Right-In/Right-Out access only with STOP control on the driveway. All other access points will be full access STOP-controlled driveways.

Existing Level of Service: The Golden Valley Road/North Hills Boulevard intersection operates LOS "F" during the PM peak hour. The southbound left-turn movement at the Golden Valley Road/Estates Road intersection operates at LOS "E" during the AM peak hour. All other movements and intersections operate at acceptable level of service during both the AM and PM peak hours.

Plus Project Level of Service: With the addition of the project traffic, the Golden Valley Road/North Hills Boulevard intersection continues to operate at LOS "F" during the PM peak hour. The southbound left-turn movement at Golden Valley Road/Estates Road intersection would worsen from LOS "E" in existing conditions to LOS "F" during the AM peak hour, with the addition of project traffic. All other intersections and movements operate at acceptable LOS conditions.

10-Year Horizon Baseline Level of Service: 10-Year Horizon Baseline traffic volumes were calculated by applying the growth rates obtained from Washoe County RTC's travel demand model. The Golden Valley Road/North Hills Boulevard intersection and the southbound left-turn movement at the Golden Valley Road/Estates Road intersection operate at LOS "F". All other intersections and movements operate at acceptable LOS conditions.

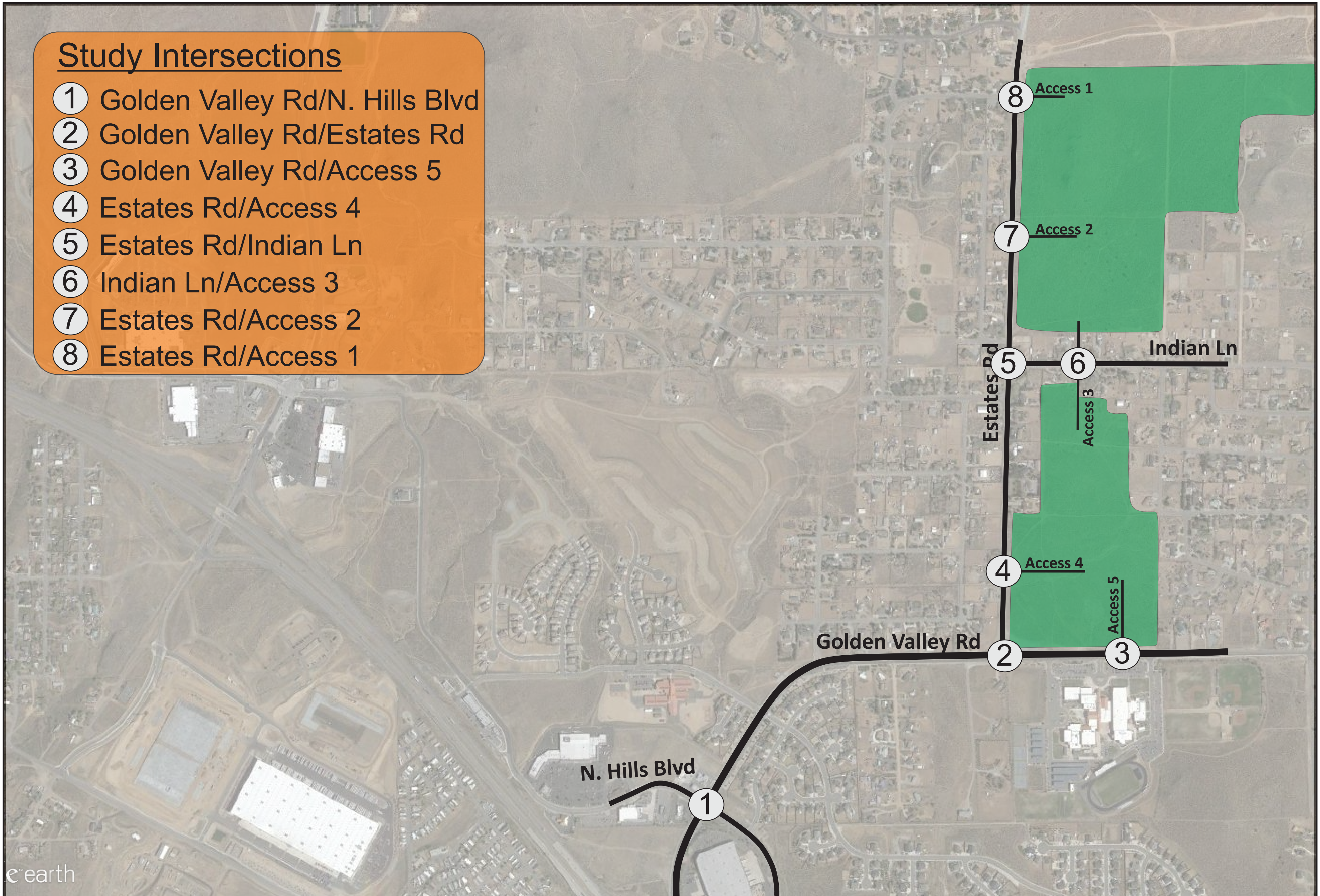
10-Year Horizon Plus Project Level of Service: With the addition of project traffic, the Golden Valley Road/North Hills Boulevard intersection and the southbound left-turn movement at Golden Valley Road/Estates Road intersection will operate at LOS "E/F", with a slight increase in delay compared to 10-year horizon baseline conditions. All other intersections and movements operate at acceptable level of service.

Mitigation Measures: The following improvements are recommend to mitigate the project impacts:

- Golden Valley Road/North Hills Boulevard – Optimize traffic signal timings.
- Golden Valley Road/Estates Road – Consider a two-stage left-turn receiving lane for southbound left-turning vehicles, as shown below

These mitigations can accommodate 10-year horizon traffic volumes while maintaining policy LOS standards. No other mitigations are proposed at any other study intersections since the analysis showed that the anticipated project traffic does not cause any other significant impacts requiring mitigation.

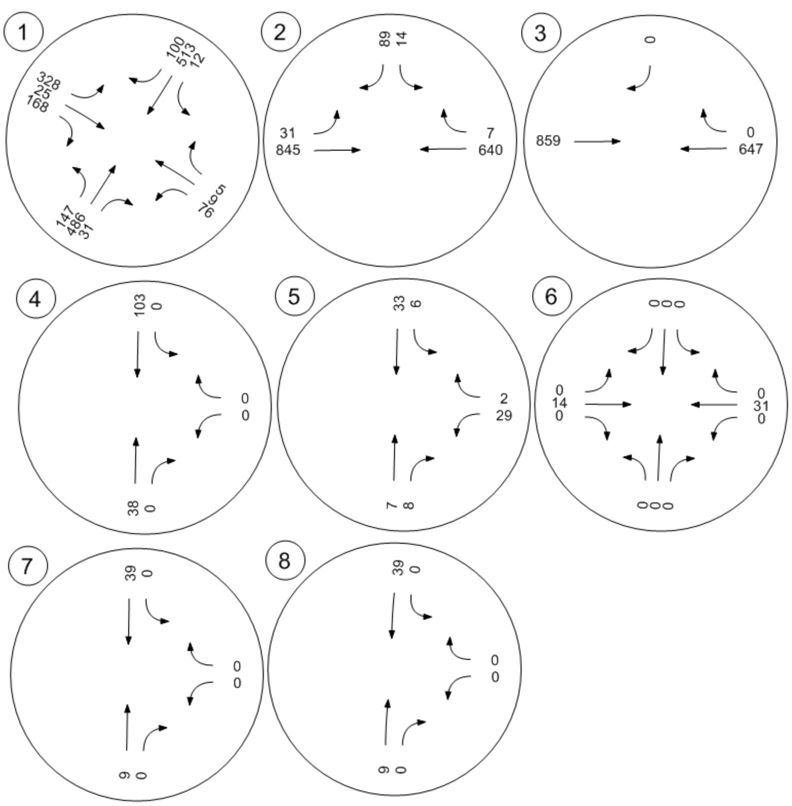
Regional Road Impact Fees: The project's contribution of standard Regional Road Impact Fees in the amount of approximately $609,000 will mitigate any other minor project effects on the overall roadway network.



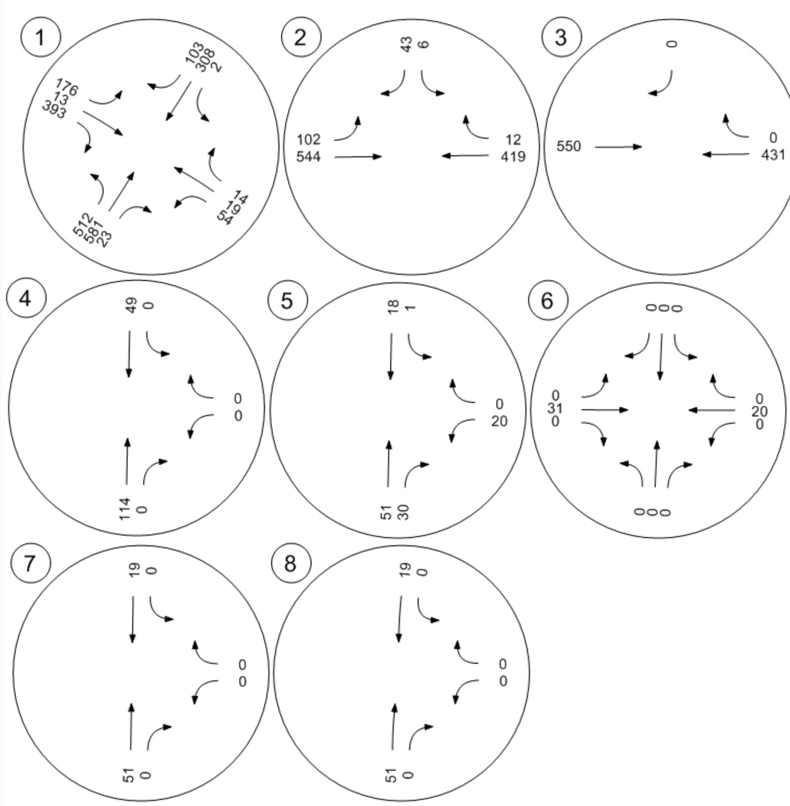
NO SCALE

- Golden Mesa Project

Figure 1
Golden Mesa
Traffic Impact Study
Study Area



AM Peak



PM Peak

NO SCALE

Figure 2

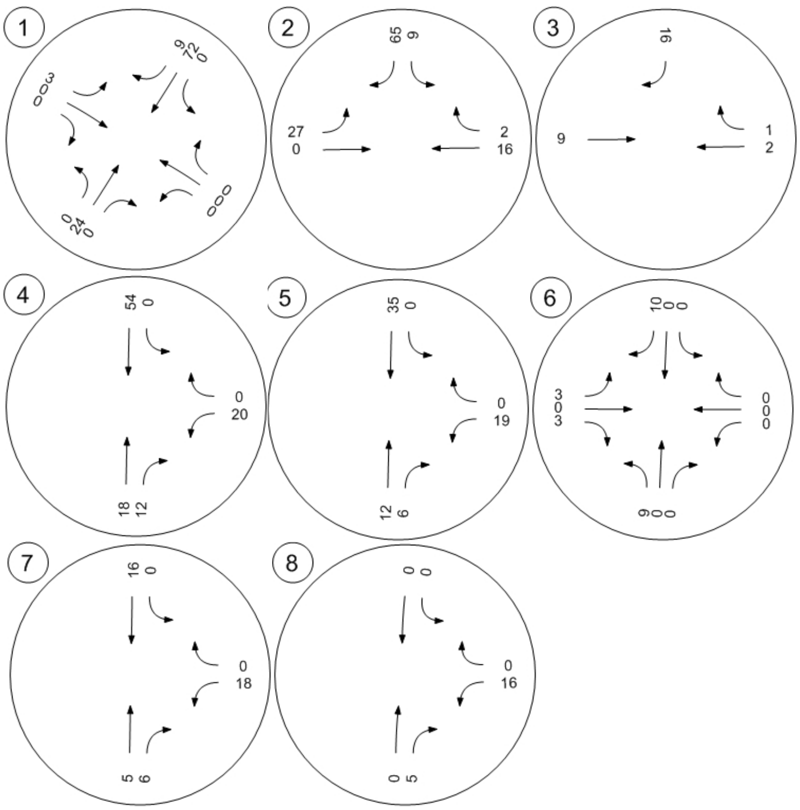
Golden Mesa
Traffic Impact Study
Existing Traffic Volumes

TRAFFIC WORKS LLC

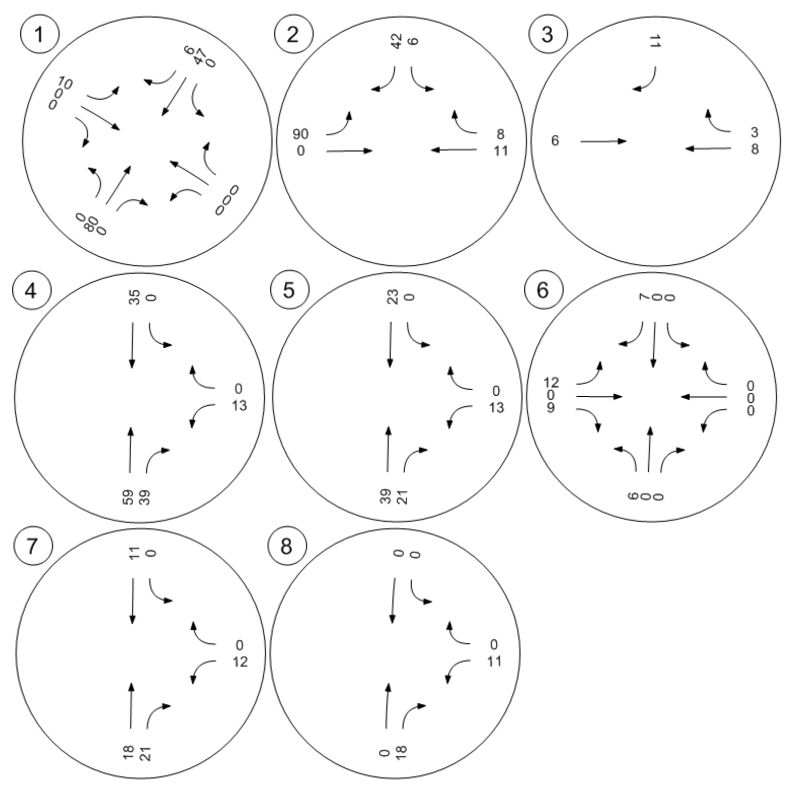
NO SCALE

Figure 3

Golden Mesa
Traffic Impact Study
Site Plan



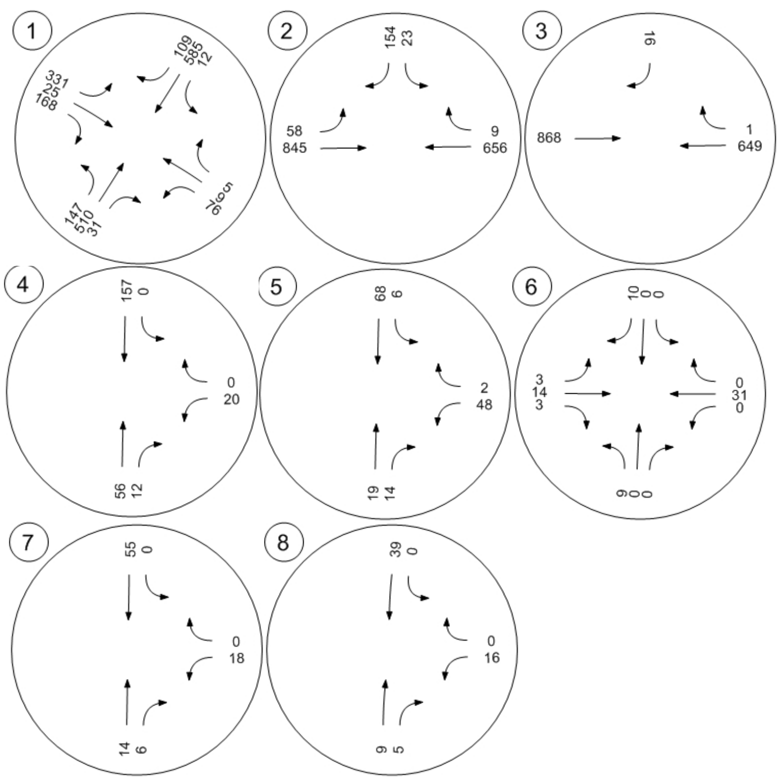
AM Peak



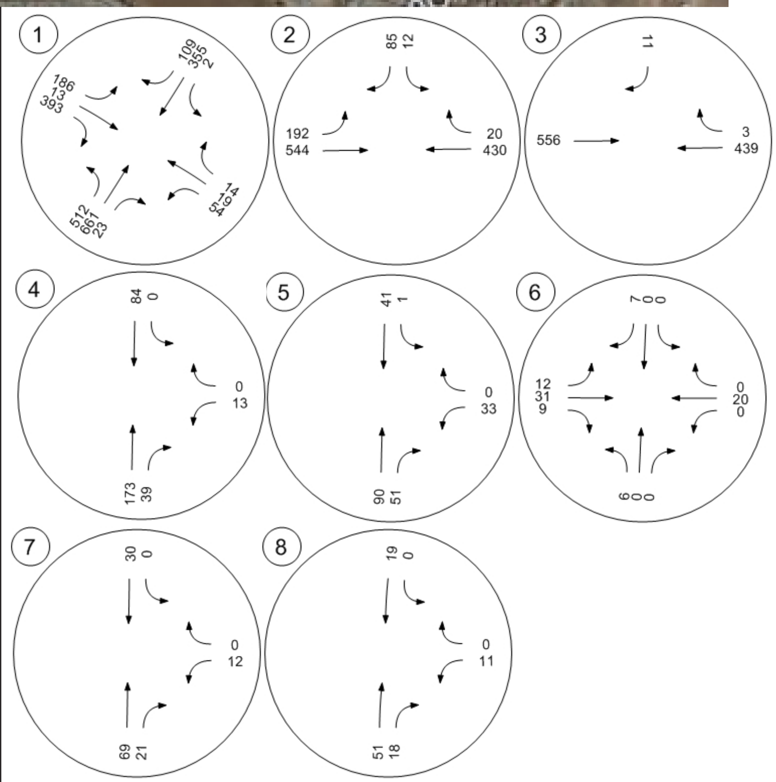
PM Peak

Figure 4

Golden Mesa
Traffic Impact Study
Trip Assignment



AM Peak

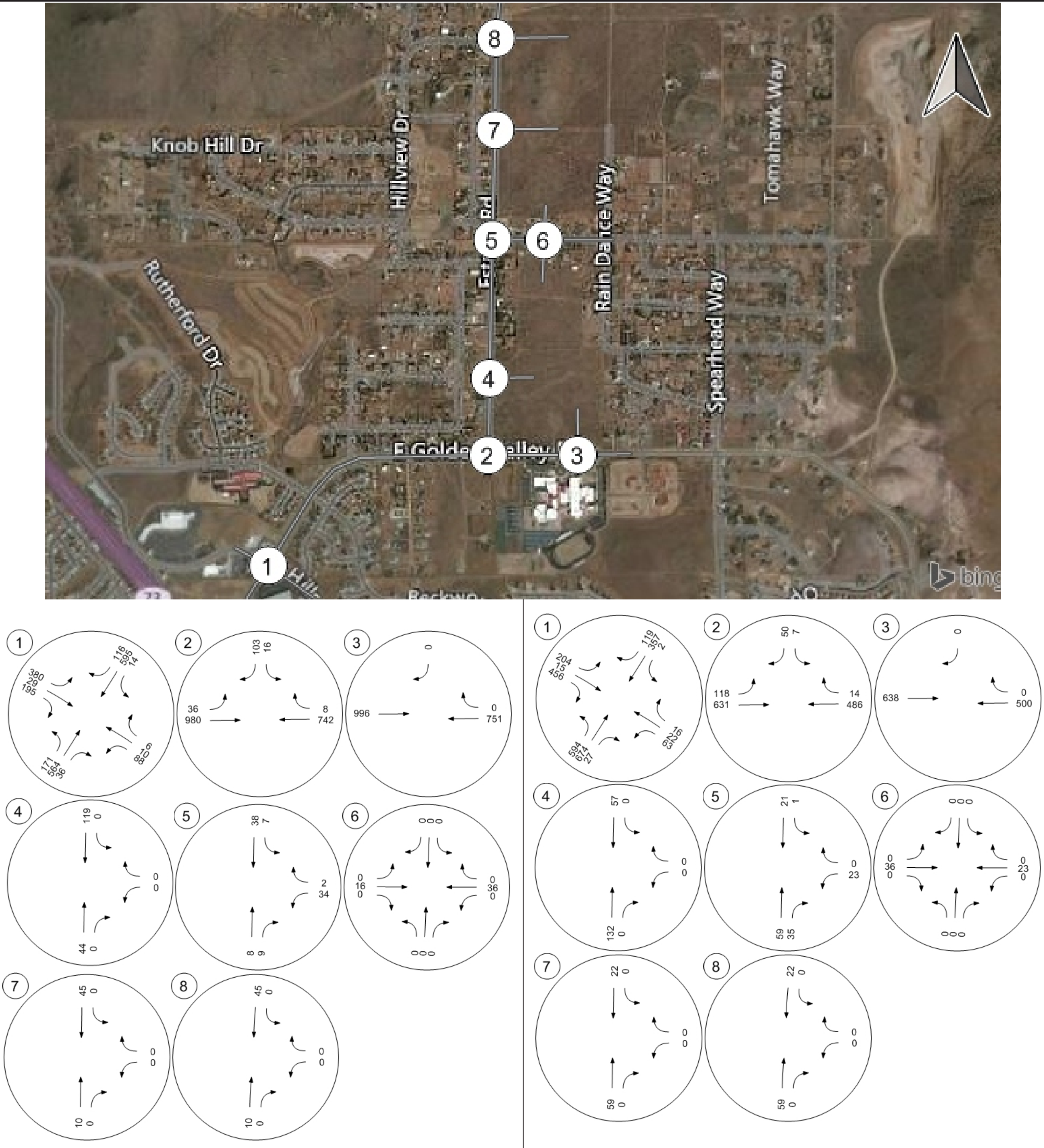


PM Peak

TRAFFIC WORKS LLC

Figure 5

Golden Mesa
Traffic Impact Study
Plus Project Traffic Volumes

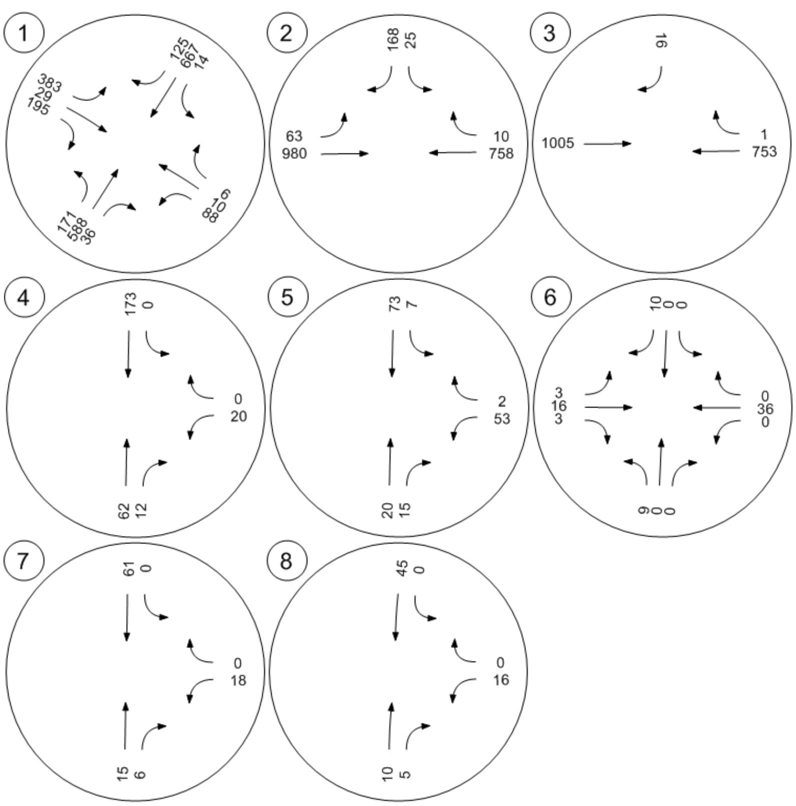


AM Peak

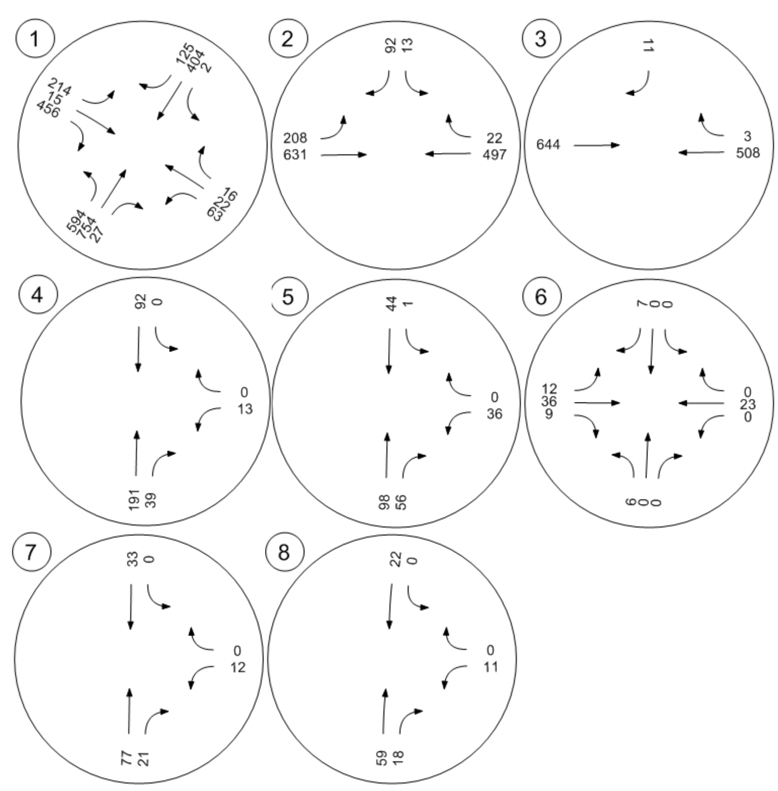
PM Peak

Figure 6

Golden Mesa
Traffic Impact Study
10-Year Horizon Baseline Volumes



AM Peak



PM Peak

Figure 7

Golden Mesa
Traffic Impact Study
10-Year Horizon Plus Project Volumes

Appendix A

Existing Conditions LOS Calculations

Intersection Level Of Service Report
Intersection 1: Golden Valley Rd/N Hills Blvd

Control Type:	Signalized	Delay (sec / veh):	46.8
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.678

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	150.00	100.00	100.00	125.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Base Volume Input [veh/h]	147	486	31	12	513	100	76	9	5	328	25	168
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	147	486	31	12	513	100	76	9	5	328	25	168
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	152	10	4	160	31	24	3	2	103	8	53
Total Analysis Volume [veh/h]	184	608	39	15	641	125	95	11	6	410	31	210
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Generated with PTV VISTRO
Version 4.00-03

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	114
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	5	10	0	0	6	0	0	6	0
Maximum Green [s]	35	35	0	35	35	0	0	30	0	0	30	0
Amber [s]	4.0	4.5	0.0	4.0	4.5	0.0	0.0	4.0	0.0	0.0	4.0	0.0
All red [s]	0.5	1.0	0.0	0.5	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0
Split [s]	40	40	0	40	40	0	0	34	0	0	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	21	0	0	13	0	0	21	0	0	21	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.5	3.5	0.0	2.5	3.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C
L, Total Lost Time per Cycle [s]	4.50	5.50	5.50	4.50	5.50	5.50	4.50	4.50	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.50	3.50	3.50	2.50	3.50	3.50	2.50	2.50	2.50	2.50
g_i, Effective Green Time [s]	15	68	68	2	55	55	30	30	30	30
g / C, Green / Cycle	0.13	0.60	0.60	0.02	0.48	0.48	0.26	0.26	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.12	0.19	0.20	0.01	0.23	0.24	0.09	0.01	0.33	0.17
s, saturation flow rate [veh/h]	1597	1676	1641	1597	1676	1583	1021	1578	1251	1453
c, Capacity [veh/h]	213	1000	979	28	806	760	159	408	355	376
d1, Uniform Delay [s]	48.36	11.54	11.54	55.52	20.10	20.12	51.59	31.66	46.07	37.54
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.50	0.18
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.89	0.87	0.89	14.48	2.12	2.25	3.55	0.04	97.04	3.01
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.86	0.33	0.33	0.53	0.49	0.49	0.60	0.04	1.16	0.64
d, Delay for Lane Group [s/veh]	58.25	12.41	12.43	70.00	22.22	22.37	55.15	31.70	143.11	40.55
Lane Group LOS	E	B	B	E	C	C	E	C	F	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh]	5.69	4.25	4.17	0.54	7.45	7.08	2.86	0.36	19.78	6.26
50th-Percentile Queue Length [ft]	142.32	106.36	104.31	13.54	186.25	177.01	71.51	8.96	494.53	156.56
95th-Percentile Queue Length [veh]	9.61	7.64	7.51	0.97	11.93	11.44	5.15	0.65	29.36	10.37
95th-Percentile Queue Length [ft]	240.15	190.93	187.75	24.37	298.15	286.10	128.71	16.13	733.97	259.16

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	58.25	12.42	12.43	70.00	22.28	22.37	55.15	31.70	31.70	143.11	40.55	40.55
Movement LOS	E	B	B	E	C	C	E	C	C	F	D	D
d_A, Approach Delay [s/veh]	22.57			23.21			51.59			105.15		
Approach LOS	C			C			D			F		
d_I, Intersection Delay [s/veh]	46.78											
Intersection LOS	D											
Intersection V/C	0.678											

Sequence

Ring 1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Golden Valley Rd/Estates Rd

Control Type:	Two-way stop	Delay (sec / veh):	47.9
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.185

Intersection Setup

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	0
Pocket Length [ft]	100.00	100.00	180.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	14	89	31	845	640	7
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	89	31	845	640	7
Peak Hour Factor	0.7400	0.7400	0.7400	0.7400	0.7400	0.7400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	30	10	285	216	2
Total Analysis Volume [veh/h]	19	120	42	1142	865	9
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.19	0.21	0.05	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	47.86	13.04	9.96	0.00	0.00	0.00
Movement LOS	E	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.64	0.79	0.17	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	16.05	19.84	4.33	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	17.80		0.35		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	1.32					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 5: Estates Rd/Indian Ln

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.051

Intersection Setup

Name	Estates Rd		Estates Rd		Indian Ln	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Indian Ln	
Base Volume Input [veh/h]	7	8	6	33	29	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	8	6	33	29	2
Peak Hour Factor	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	3	2	13	12	1
Total Analysis Volume [veh/h]	11	13	10	52	46	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.05	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.28	0.00	9.20	8.62
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.12	0.12	0.17	0.17
95th-Percentile Queue Length [ft]	0.00	0.00	3.04	3.04	4.24	4.24
d_A, Approach Delay [s/veh]	0.00		1.17		9.16	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.87					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 1: Golden Valley Rd/N Hills Blvd

Control Type:	Signalized	Delay (sec / veh):	60.2
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.748

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	150.00	100.00	100.00	125.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Base Volume Input [veh/h]	512	581	23	2	308	103	54	19	14	176	13	393
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	512	581	23	2	308	103	54	19	14	176	13	393
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	131	148	6	1	79	26	14	5	4	45	3	100
Total Analysis Volume [veh/h]	522	593	23	2	314	105	55	19	14	180	13	401
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	114
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	5	10	0	0	6	0	0	6	0
Maximum Green [s]	35	35	0	35	35	0	0	30	0	0	30	0
Amber [s]	4.0	4.5	0.0	4.0	4.5	0.0	0.0	4.0	0.0	0.0	4.0	0.0
All red [s]	0.5	1.0	0.0	0.5	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0
Split [s]	40	40	0	40	40	0	0	34	0	0	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	21	0	0	13	0	0	21	0	0	21	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.5	3.5	0.0	2.5	3.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C
L, Total Lost Time per Cycle [s]	4.50	5.50	5.50	4.50	5.50	5.50	4.50	4.50	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.50	3.50	3.50	2.50	3.50	3.50	2.50	2.50	2.50	2.50
g_i, Effective Green Time [s]	36	70	70	0	35	35	30	30	30	30
g / C, Green / Cycle	0.31	0.61	0.61	0.00	0.30	0.30	0.26	0.26	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.33	0.18	0.18	0.00	0.13	0.13	0.06	0.02	0.15	0.29
s, saturation flow rate [veh/h]	1597	1676	1655	1597	1676	1536	871	1560	1233	1432
c, Capacity [veh/h]	497	1023	1009	6	507	465	63	404	341	370
d1, Uniform Delay [s]	39.25	10.63	10.63	56.63	31.82	31.95	57.00	31.99	40.06	42.25
k, delay calibration	0.48	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.12	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	53.47	0.76	0.77	27.18	2.60	2.97	27.85	0.09	1.45	82.47
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.05	0.30	0.30	0.32	0.43	0.44	0.87	0.08	0.53	1.12
d, Delay for Lane Group [s/veh]	92.72	11.39	11.40	83.81	34.41	34.92	84.85	32.08	41.51	124.72
Lane Group LOS	F	B	B	F	C	C	F	C	D	F
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	21.05	3.81	3.76	0.10	5.12	4.88	2.07	0.70	4.70	18.78
50th-Percentile Queue Length [ft]	526.18	95.19	94.06	2.61	128.03	122.00	51.81	17.59	117.51	469.44
95th-Percentile Queue Length [veh]	29.49	6.85	6.77	0.19	8.83	8.50	3.73	1.27	8.26	27.58
95th-Percentile Queue Length [ft]	737.24	171.34	169.31	4.70	220.81	212.57	93.25	31.67	206.40	689.60

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	92.72	11.40	11.40	83.81	34.57	34.92	84.85	32.08	32.08	41.51	124.72	124.72
Movement LOS	F	B	B	F	C	C	F	C	C	D	F	F
d_A, Approach Delay [s/veh]	48.70			34.89			65.06			99.50		
Approach LOS	D			C			E			F		
d_I, Intersection Delay [s/veh]	60.21											
Intersection LOS	E											
Intersection V/C	0.748											

Sequence

Ring 1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Golden Valley Rd/Estates Rd

Control Type:	Two-way stop	Delay (sec / veh):	22.0
Analysis Method:	HCM 2010	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.032

Intersection Setup

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	0
Pocket Length [ft]	100.00	100.00	180.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	6	43	102	544	419	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	43	102	544	419	12
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	12	28	149	115	3
Total Analysis Volume [veh/h]	7	47	112	598	460	13
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.03	0.06	0.10	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	22.03	10.01	8.70	0.00	0.00	0.00
Movement LOS	C	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.10	0.20	0.34	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	2.47	4.90	8.61	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	11.57		1.37		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.29					
Intersection LOS	C					

Intersection Level Of Service Report
Intersection 5: Estates Rd/Indian Ln

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.026

Intersection Setup

Name	Estates Rd		Estates Rd		Indian Ln	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Indian Ln	
Base Volume Input [veh/h]	51	30	1	18	20	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	51	30	1	18	20	0
Peak Hour Factor	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	9	0	5	6	0
Total Analysis Volume [veh/h]	59	35	1	21	23	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.40	0.00	9.11	8.76
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.04	0.04	0.08	0.08
95th-Percentile Queue Length [ft]	0.00	0.00	1.12	1.12	1.97	1.97
d_A, Approach Delay [s/veh]	0.00		0.34		9.11	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.56					
Intersection LOS	A					

Appendix B

Plus Project Conditions LOS Calculations

Intersection Level Of Service Report
Intersection 1: Golden Valley Rd/N Hills Blvd

Control Type:	Signalized	Delay (sec / veh):	46.8
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.712

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	150.00	100.00	100.00	125.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Base Volume Input [veh/h]	147	486	31	12	513	100	76	9	5	328	25	168
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	24	0	0	72	9	0	0	0	3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	147	510	31	12	585	109	76	9	5	331	25	168
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	46	159	10	4	183	34	24	3	2	103	8	53
Total Analysis Volume [veh/h]	184	638	39	15	731	136	95	11	6	414	31	210
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	114
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	5	10	0	0	6	0	0	6	0
Maximum Green [s]	35	35	0	35	35	0	0	30	0	0	30	0
Amber [s]	4.0	4.5	0.0	4.0	4.5	0.0	0.0	4.0	0.0	0.0	4.0	0.0
All red [s]	0.5	1.0	0.0	0.5	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0
Split [s]	40	40	0	40	40	0	0	34	0	0	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	21	0	0	13	0	0	21	0	0	21	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.5	3.5	0.0	2.5	3.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C
L, Total Lost Time per Cycle [s]	4.50	5.50	5.50	4.50	5.50	5.50	4.50	4.50	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.50	3.50	3.50	2.50	3.50	3.50	2.50	2.50	2.50	2.50
g_i, Effective Green Time [s]	15	68	68	2	55	55	30	30	30	30
g / C, Green / Cycle	0.13	0.60	0.60	0.02	0.48	0.48	0.26	0.26	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.12	0.20	0.20	0.01	0.27	0.27	0.09	0.01	0.33	0.17
s, saturation flow rate [veh/h]	1597	1676	1643	1597	1676	1586	1021	1578	1251	1453
c, Capacity [veh/h]	213	1000	980	28	806	762	159	408	355	376
d1, Uniform Delay [s]	48.36	11.67	11.67	55.52	20.95	20.95	51.59	31.66	46.07	37.54
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.50	0.18
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.89	0.93	0.95	14.48	2.73	2.88	3.55	0.04	101.24	3.01
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.86	0.34	0.34	0.53	0.55	0.55	0.60	0.04	1.17	0.64
d, Delay for Lane Group [s/veh]	58.25	12.60	12.62	70.00	23.68	23.84	55.15	31.70	147.31	40.55
Lane Group LOS	E	B	B	E	C	C	E	C	F	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh]	5.69	4.50	4.42	0.54	8.84	8.40	2.86	0.36	20.20	6.26
50th-Percentile Queue Length [ft]	142.32	112.57	110.48	13.54	220.92	209.97	71.51	8.96	504.88	156.56
95th-Percentile Queue Length [veh]	9.61	7.98	7.87	0.97	13.71	13.15	5.15	0.65	30.04	10.37
95th-Percentile Queue Length [ft]	240.15	199.58	196.66	24.37	342.80	328.79	128.71	16.13	750.98	259.16

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	58.25	12.61	12.62	70.00	23.74	23.84	55.15	31.70	31.70	147.31	40.55	40.55
Movement LOS	E	B	B	E	C	C	E	C	C	F	D	D
d_A, Approach Delay [s/veh]	22.37			24.54			51.59			108.03		
Approach LOS	C			C			D			F		
d_I, Intersection Delay [s/veh]	46.79											
Intersection LOS	D											
Intersection V/C	0.712											

Sequence

Ring 1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Golden Valley Rd/Estates Rd

Control Type:	Two-way stop	Delay (sec / veh):	70.8
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.368

Intersection Setup

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	0
Pocket Length [ft]	100.00	100.00	180.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	14	89	31	845	640	7
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	65	27	0	16	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	23	154	58	845	656	9
Peak Hour Factor	0.7400	0.7400	0.7400	0.7400	0.7400	0.7400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	52	20	285	222	3
Total Analysis Volume [veh/h]	31	208	78	1142	886	12
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.37	0.37	0.10	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	70.80	15.26	10.34	0.00	0.00	0.00
Movement LOS	F	C	B	A	A	A
95th-Percentile Queue Length [veh]	1.44	1.72	0.35	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	35.94	42.97	8.65	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	22.46		0.66		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	2.62					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 3: Golden Valley Rd/Access 5

Control Type:	Two-way stop	Delay (sec / veh):	11.6
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.039

Intersection Setup

Name	Access 5		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Access 5		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	0	0	0	859	647	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	16	0	9	2	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	16	0	868	649	1
Peak Hour Factor	1.0000	0.7400	1.0000	0.7400	0.7400	0.7400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	5	0	293	219	0
Total Analysis Volume [veh/h]	0	22	0	1173	877	1
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.04	0.00	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	11.62	0.00	0.00	0.00	0.00
Movement LOS		B		A	A	A
95th-Percentile Queue Length [veh]	0.00	0.12	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	3.03	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	11.62		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.12					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 4: Estates Rd/Access 4

Control Type:	Two-way stop	Delay (sec / veh):	10.4
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.039

Intersection Setup

Name	Estates Rd		Estates Rd		Access 4	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access 4	
Base Volume Input [veh/h]	38	0	0	103	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	18	12	0	54	20	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	56	12	0	157	20	0
Peak Hour Factor	0.7400	0.7400	0.7400	0.7400	0.7400	0.7400
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	4	0	53	7	0
Total Analysis Volume [veh/h]	76	16	0	212	27	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.40	0.00	10.39	8.90
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.12	0.12
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	3.03	3.03
d_A, Approach Delay [s/veh]	0.00		0.00		10.39	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.85					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 5: Estates Rd/Indian Ln

Control Type:	Two-way stop	Delay (sec / veh):	9.9
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.093

Intersection Setup

Name	Estates Rd		Estates Rd		Indian Ln	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Indian Ln	
Base Volume Input [veh/h]	7	8	6	33	29	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	6	0	35	19	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	19	14	6	68	48	2
Peak Hour Factor	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	6	2	27	19	1
Total Analysis Volume [veh/h]	30	22	10	108	76	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.09	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.33	0.00	9.88	8.96
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.25	0.25	0.32	0.32
95th-Percentile Queue Length [ft]	0.00	0.00	6.15	6.15	7.95	7.95
d_A, Approach Delay [s/veh]	0.00		0.62		9.84	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.42					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 6: Indian Ln/Access 3

Control Type:	Two-way stop	Delay (sec / veh):	9.5
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Access 3			Access 3			Indian Ln			Indian Ln		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Access 3			Access 3			Indian Ln			Indian Ln		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	14	0	0	31	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	0	0	0	0	10	3	0	3	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	0	0	0	0	10	3	14	3	0	31	0
Peak Hour Factor	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	0	0	0	0	4	1	6	1	0	12	0
Total Analysis Volume [veh/h]	14	0	0	0	0	16	5	22	5	0	49	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.17	9.54	8.49	9.05	9.55	8.59	7.32	0.00	0.00	7.27	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	1.22	1.22	1.22	1.20	1.20	1.20	1.57	1.57	1.57	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.17			8.59			1.14			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	2.72											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 7: Estates Rd/Access 2

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.033

Intersection Setup

Name	Estates Rd		Estates Rd		Access 2	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access 2	
Base Volume Input [veh/h]	9	0	0	39	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	5	6	0	16	18	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	14	6	0	55	18	0
Peak Hour Factor	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	2	0	22	7	0
Total Analysis Volume [veh/h]	22	10	0	87	29	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.28	0.00	9.22	8.57
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.10	0.10
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.55	2.55
d_A, Approach Delay [s/veh]	0.00		0.00		9.22	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.81					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 8: Estates Road/Access 1

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.027

Intersection Setup

Name	Estates Rd		Estates Rd		Access1	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access1	
Base Volume Input [veh/h]	9	0	0	39	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	5	0	0	16	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	5	0	39	16	0
Peak Hour Factor	0.6300	0.6300	0.6300	0.6300	0.6300	0.6300
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	2	0	15	6	0
Total Analysis Volume [veh/h]	14	8	0	62	25	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.26	0.00	9.01	8.50
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.08	0.08
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.09	2.09
d_A, Approach Delay [s/veh]	0.00		0.00		9.01	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	2.07					
Intersection LOS	A					

Intersection Level Of Service Report

Intersection 1: Golden Valley Rd/N Hills Blvd

Control Type:	Signalized	Delay (sec / veh):	58.4
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.765

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	150.00	100.00	100.00	125.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Base Volume Input [veh/h]	512	581	23	2	308	103	54	19	14	176	13	393
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	80	0	0	47	6	0	0	0	10	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	512	661	23	2	355	109	54	19	14	186	13	393
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	131	169	6	1	91	28	14	5	4	47	3	100
Total Analysis Volume [veh/h]	522	674	23	2	362	111	55	19	14	190	13	401
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	114
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	5	10	0	0	6	0	0	6	0
Maximum Green [s]	35	35	0	35	35	0	0	30	0	0	30	0
Amber [s]	4.0	4.5	0.0	4.0	4.5	0.0	0.0	4.0	0.0	0.0	4.0	0.0
All red [s]	0.5	1.0	0.0	0.5	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0
Split [s]	40	40	0	40	40	0	0	34	0	0	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	21	0	0	13	0	0	21	0	0	21	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.5	3.5	0.0	2.5	3.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C
L, Total Lost Time per Cycle [s]	4.50	5.50	5.50	4.50	5.50	5.50	4.50	4.50	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.50	3.50	3.50	2.50	3.50	3.50	2.50	2.50	2.50	2.50
g_i, Effective Green Time [s]	36	70	70	0	35	35	30	30	30	30
g / C, Green / Cycle	0.31	0.61	0.61	0.00	0.30	0.30	0.26	0.26	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.33	0.21	0.21	0.00	0.15	0.15	0.06	0.02	0.15	0.29
s, saturation flow rate [veh/h]	1597	1676	1657	1597	1676	1545	871	1560	1233	1432
c, Capacity [veh/h]	497	1023	1011	6	507	467	63	404	341	370
d1, Uniform Delay [s]	39.25	10.95	10.95	56.63	32.44	32.55	57.00	31.99	40.45	42.25
k, delay calibration	0.48	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.15	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	53.47	0.91	0.93	27.18	3.24	3.65	27.85	0.09	1.93	82.47
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.05	0.34	0.34	0.32	0.48	0.49	0.87	0.08	0.56	1.12
d, Delay for Lane Group [s/veh]	92.72	11.87	11.88	83.81	35.67	36.20	84.85	32.08	42.37	124.72
Lane Group LOS	F	B	B	F	D	D	F	C	D	F
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	21.05	4.44	4.40	0.10	5.93	5.64	2.07	0.70	5.05	18.78
50th-Percentile Queue Length [ft]	526.18	111.06	109.96	2.61	148.28	141.07	51.81	17.59	126.13	469.44
95th-Percentile Queue Length [veh]	29.49	7.90	7.84	0.19	9.93	9.54	3.73	1.27	8.73	27.58
95th-Percentile Queue Length [ft]	737.24	197.48	195.94	4.70	248.14	238.47	93.25	31.67	218.22	689.60

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	92.72	11.87	11.88	83.81	35.84	36.20	84.85	32.08	32.08	42.37	124.72	124.72
Movement LOS	F	B	B	F	D	D	F	C	C	D	F	F
d_A, Approach Delay [s/veh]	46.49			36.13			65.06			98.81		
Approach LOS	D			D			E			F		
d_I, Intersection Delay [s/veh]	58.36											
Intersection LOS	E											
Intersection V/C	0.765											

Sequence

Ring 1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Golden Valley Rd/Estates Rd

Control Type:	Two-way stop	Delay (sec / veh):	33.0
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.092

Intersection Setup

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	0
Pocket Length [ft]	100.00	100.00	180.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	6	43	102	544	419	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	42	90	0	11	8
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	12	85	192	544	430	20
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	23	53	149	118	5
Total Analysis Volume [veh/h]	13	93	211	598	473	22
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.12	0.20	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	33.01	10.46	9.21	0.00	0.00	0.00
Movement LOS	D	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.30	0.42	0.74	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	7.45	10.52	18.40	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	13.22		2.40		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	2.37					
Intersection LOS	D					

Intersection Level Of Service Report
Intersection 3: Golden Valley Rd/Access 5

Control Type:	Two-way stop	Delay (sec / veh):	9.8
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name	Access 5		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Access 5		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	0	0	0	550	431	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	11	0	6	8	3
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	11	0	556	439	3
Peak Hour Factor	1.0000	0.9100	1.0000	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	3	0	153	121	1
Total Analysis Volume [veh/h]	0	12	0	611	482	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.02	0.00	0.01	0.00	0.00
d_M, Delay for Movement [s/veh]	0.00	9.82	0.00	0.00	0.00	0.00
Movement LOS		A		A	A	A
95th-Percentile Queue Length [veh]	0.00	0.05	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	1.21	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.82		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.11					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 4: Estates Rd/Access 4

Control Type:	Two-way stop	Delay (sec / veh):	10.3
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.020

Intersection Setup

Name	Estates Rd		Estates Rd		Access 4	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access 4	
Base Volume Input [veh/h]	114	0	0	49	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	59	39	0	35	13	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	173	39	0	84	13	0
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	48	11	0	23	4	0
Total Analysis Volume [veh/h]	190	43	0	92	14	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.70	0.00	10.34	9.45
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.06	0.06
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.56	1.56
d_A, Approach Delay [s/veh]	0.00		0.00		10.34	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.43					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 5: Estates Rd/Indian Ln

Control Type:	Two-way stop	Delay (sec / veh):	9.7
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.047

Intersection Setup

Name	Estates Rd		Estates Rd		Indian Ln	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Indian Ln	
Base Volume Input [veh/h]	51	30	1	18	20	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	39	21	0	23	13	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	90	51	1	41	33	0
Peak Hour Factor	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	26	15	0	12	10	0
Total Analysis Volume [veh/h]	105	59	1	48	38	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.05	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.55	0.00	9.70	9.16
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.11	0.11	0.15	0.15
95th-Percentile Queue Length [ft]	0.00	0.00	2.69	2.69	3.71	3.71
d_A, Approach Delay [s/veh]	0.00		0.15		9.70	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.50					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 6: Indian Ln/Access 3

Control Type:	Two-way stop	Delay (sec / veh):	9.6
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Access 3			Access 3			Indian Ln			Indian Ln		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	╋			╋			╋			╋		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Access 3			Access 3			Indian Ln			Indian Ln		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	31	0	0	20	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	0	0	0	7	12	0	9	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	0	0	0	0	7	12	31	9	0	20	0
Peak Hour Factor	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	0	0	0	2	3	9	3	0	6	0
Total Analysis Volume [veh/h]	7	0	0	0	0	8	14	36	10	0	23	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.15	9.59	8.53	9.09	9.61	8.44	7.28	0.00	0.00	7.31	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.61	0.61	0.61	0.57	0.57	0.57	2.94	2.94	2.94	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.15			8.44			1.70			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	2.38											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 7: Estates Rd/Access 2

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name	Estates Rd		Estates Rd		Access 2	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access 2	
Base Volume Input [veh/h]	51	0	0	19	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	18	21	0	11	12	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	69	21	0	30	12	0
Peak Hour Factor	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	6	0	9	3	0
Total Analysis Volume [veh/h]	80	24	0	35	14	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.22	8.80
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.05	0.05
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.23	1.23
d_A, Approach Delay [s/veh]	0.00		0.00		9.22	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.84					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 8: Estates Road/Access 1

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.014

Intersection Setup

Name	Estates Rd		Estates Rd		Access1	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access1	
Base Volume Input [veh/h]	51	0	0	19	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	18	0	0	11	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	51	18	0	19	11	0
Peak Hour Factor	0.8600	0.8600	0.8600	0.8600	0.8600	0.8600
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	5	0	6	3	0
Total Analysis Volume [veh/h]	59	21	0	22	13	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

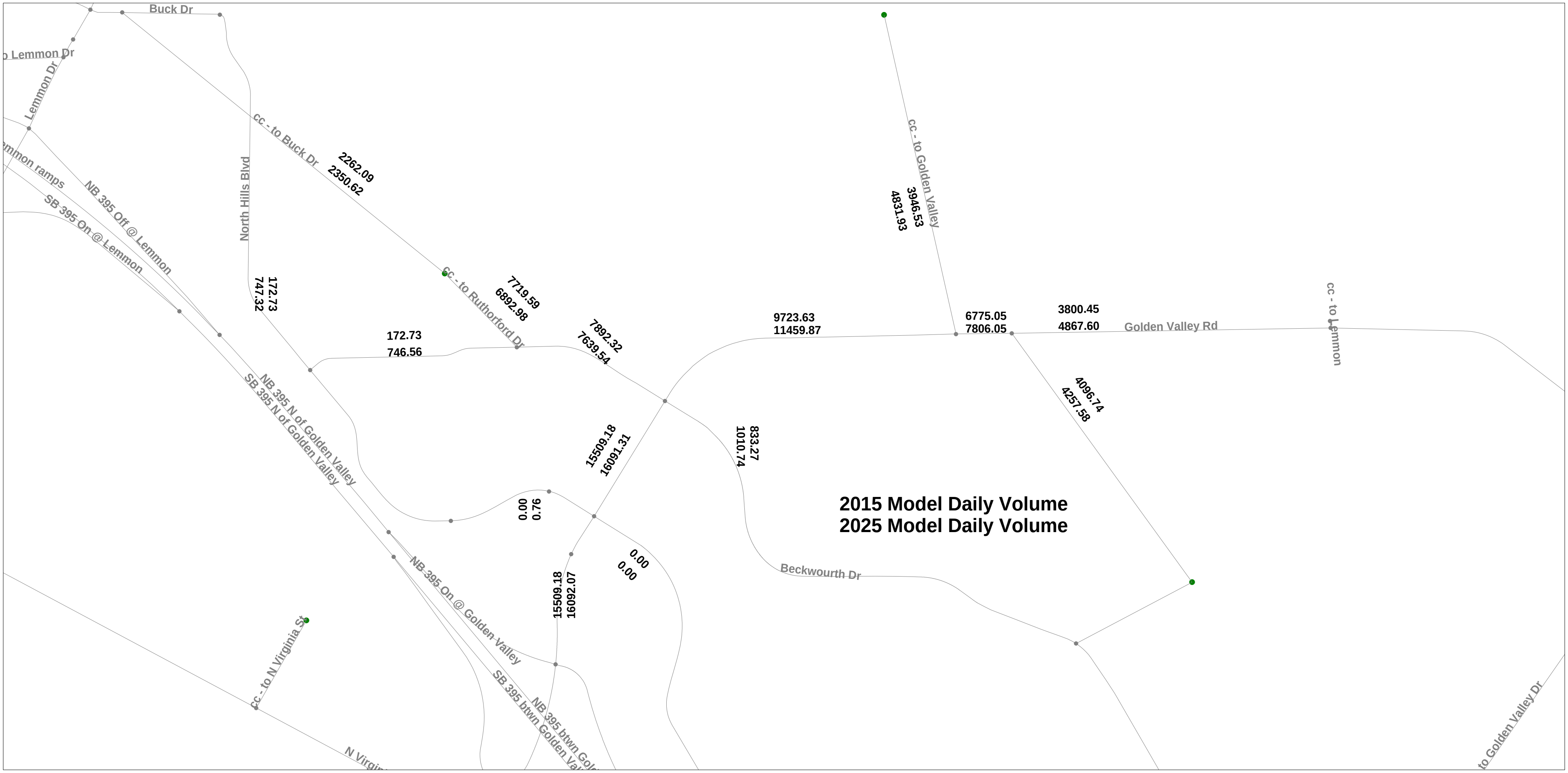
Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.37	0.00	9.02	8.68
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.04	0.04
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.09	1.09
d_A, Approach Delay [s/veh]	0.00		0.00		9.02	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.02					
Intersection LOS	A					

Appendix C

Demand Model Outputs



2015 Model Daily Volume
2025 Model Daily Volume
Buck Dr
Lemmon Dr
North Hills Blvd
cc - to Buck Dr
2262.09
2350.62
cc - to Golden Valley
3946.53
4831.93
NB 395 Off @ Lemmon
SB 395 On @ Lemmon
172.73
747.32
cc - to Ruthorford Dr
7719.59
6892.98
172.73
746.56
7892.32
7639.54
9723.63
11459.87
6775.05
7806.05
3800.45
4867.60
Golden Valley Rd
cc - to Lemmon
4096.74
4257.58
NB 395 N of Golden Valley
SB 395 N of Golden Valley
15509.18
16091.31
833.27
1010.74
0.00
0.76
0.00
0.00
Beckwourth Dr
NB 395 On @ Golden Valley
15509.18
16092.07
cc - to N Virginia St
SB 395 btwn Golden Valley
to Golden Valley Dr

Appendix D

10-Year Horizon Baseline Conditions LOS Calculations

Intersection Level Of Service Report
Intersection 1: Golden Valley Rd/N Hills Blvd

Control Type:	Signalized	Delay (sec / veh):	49.6
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.699

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	150.00	100.00	100.00	125.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Base Volume Input [veh/h]	147	486	31	12	513	100	76	9	5	328	25	168
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	171	564	36	14	595	116	88	10	6	380	29	195
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	48	157	10	4	165	32	24	3	2	106	8	54
Total Analysis Volume [veh/h]	190	627	40	16	661	129	98	11	7	422	32	217
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	114
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	5	10	0	0	6	0	0	6	0
Maximum Green [s]	35	35	0	35	35	0	0	30	0	0	30	0
Amber [s]	4.0	4.5	0.0	4.0	4.5	0.0	0.0	4.0	0.0	0.0	4.0	0.0
All red [s]	0.5	1.0	0.0	0.5	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0
Split [s]	40	40	0	40	40	0	0	34	0	0	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	21	0	0	13	0	0	21	0	0	21	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.5	3.5	0.0	2.5	3.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C
L, Total Lost Time per Cycle [s]	4.50	5.50	5.50	4.50	5.50	5.50	4.50	4.50	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.50	3.50	3.50	2.50	3.50	3.50	2.50	2.50	2.50	2.50
g_i, Effective Green Time [s]	16	68	68	2	54	54	30	30	30	30
g / C, Green / Cycle	0.14	0.60	0.60	0.02	0.48	0.48	0.26	0.26	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.12	0.20	0.20	0.01	0.24	0.24	0.10	0.01	0.34	0.17
s, saturation flow rate [veh/h]	1597	1676	1641	1597	1676	1583	1014	1569	1250	1453
c, Capacity [veh/h]	219	998	977	30	799	754	152	406	354	376
d1, Uniform Delay [s]	48.14	11.68	11.68	55.46	20.60	20.61	52.43	31.68	46.11	37.79
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.50	0.19
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.87	0.92	0.94	14.35	2.30	2.45	4.47	0.04	111.05	3.57
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.87	0.34	0.34	0.54	0.51	0.51	0.64	0.04	1.19	0.66
d, Delay for Lane Group [s/veh]	58.01	12.59	12.61	69.81	22.90	23.06	56.90	31.72	157.16	41.36
Lane Group LOS	E	B	B	E	C	C	E	C	F	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh]	5.87	4.43	4.35	0.57	7.84	7.45	3.01	0.38	21.11	6.56
50th-Percentile Queue Length [ft]	146.78	110.82	108.67	14.36	196.09	186.24	75.24	9.50	527.68	163.99
95th-Percentile Queue Length [veh]	9.84	7.89	7.77	1.03	12.44	11.93	5.42	0.68	31.56	10.76
95th-Percentile Queue Length [ft]	246.12	197.14	194.16	25.84	310.92	298.15	135.43	17.10	788.88	268.99

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	58.01	12.60	12.61	69.81	22.96	23.06	56.90	31.72	31.72	157.16	41.36	41.36
Movement LOS	E	B	B	E	C	C	E	C	C	F	D	D
d_A, Approach Delay [s/veh]	22.67			23.91			53.00			114.19		
Approach LOS	C			C			D			F		
d_I, Intersection Delay [s/veh]	49.58											
Intersection LOS	D											
Intersection V/C	0.699											

Sequence

Ring 1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Golden Valley Rd/Estates Rd

Control Type:	Two-way stop	Delay (sec / veh):	59.2
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.233

Intersection Setup

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	0
Pocket Length [ft]	100.00	100.00	180.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	14	89	31	845	640	7
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	16	103	36	980	742	8
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	32	11	306	232	3
Total Analysis Volume [veh/h]	20	129	45	1225	928	10
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.24	0.06	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	59.19	13.73	10.28	0.00	0.00	0.00
Movement LOS	F	B	B	A	A	A
95th-Percentile Queue Length [veh]	0.83	0.92	0.20	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	20.68	23.08	4.94	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	19.83		0.36		0.00	
Approach LOS	C		A		A	
d_I, Intersection Delay [s/veh]	1.45					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 5: Estates Rd/Indian Ln

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.054

Intersection Setup

Name	Estates Rd		Estates Rd		Indian Ln	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Indian Ln	
Base Volume Input [veh/h]	7	8	6	33	29	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	9	7	38	34	2
Peak Hour Factor	0.7000	0.7000	0.7000	0.7000	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	3	3	14	12	1
Total Analysis Volume [veh/h]	11	13	10	54	49	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.05	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.28	0.00	9.23	8.63
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.13	0.13	0.18	0.18
95th-Percentile Queue Length [ft]	0.00	0.00	3.14	3.14	4.53	4.53
d_A, Approach Delay [s/veh]	0.00		1.14		9.19	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.93					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 1: Golden Valley Rd/N Hills Blvd

Control Type:	Signalized	Delay (sec / veh):	88.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.867

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	150.00	100.00	100.00	125.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Base Volume Input [veh/h]	512	581	23	2	308	103	54	19	14	176	13	393
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	594	674	27	2	357	119	63	22	16	204	15	456
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	152	172	7	1	91	30	16	6	4	52	4	116
Total Analysis Volume [veh/h]	606	688	28	2	364	121	64	22	16	208	15	465
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	114
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	5	10	0	0	6	0	0	6	0
Maximum Green [s]	35	35	0	35	35	0	0	30	0	0	30	0
Amber [s]	4.0	4.5	0.0	4.0	4.5	0.0	0.0	4.0	0.0	0.0	4.0	0.0
All red [s]	0.5	1.0	0.0	0.5	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0
Split [s]	40	40	0	40	40	0	0	34	0	0	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	21	0	0	13	0	0	21	0	0	21	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.5	3.5	0.0	2.5	3.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C
L, Total Lost Time per Cycle [s]	4.50	5.50	5.50	4.50	5.50	5.50	4.50	4.50	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.50	3.50	3.50	2.50	3.50	3.50	2.50	2.50	2.50	2.50
g_i, Effective Green Time [s]	36	70	70	0	35	35	30	30	30	30
g / C, Green / Cycle	0.31	0.61	0.61	0.00	0.30	0.30	0.26	0.26	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.38	0.21	0.22	0.00	0.15	0.15	0.08	0.02	0.17	0.34
s, saturation flow rate [veh/h]	1597	1676	1654	1597	1676	1537	820	1561	1228	1432
c, Capacity [veh/h]	497	1023	1009	6	507	465	63	404	337	370
d1, Uniform Delay [s]	39.25	11.03	11.04	56.63	32.59	32.71	57.00	32.10	41.46	42.25
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.19	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	115.64	0.95	0.97	27.18	3.41	3.87	56.07	0.10	3.21	151.69
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.22	0.35	0.35	0.32	0.49	0.50	1.01	0.09	0.62	1.30
d, Delay for Lane Group [s/veh]	154.89	11.99	12.01	83.81	36.00	36.58	113.07	32.20	44.67	193.94
Lane Group LOS	F	B	B	F	D	D	F	C	D	F
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	29.63	4.60	4.55	0.10	6.14	5.81	2.80	0.81	5.74	25.90
50th-Percentile Queue Length [ft]	740.84	115.05	113.82	2.61	153.38	145.32	70.04	20.33	143.55	647.53
95th-Percentile Queue Length [veh]	43.39	8.12	8.05	0.19	10.20	9.77	5.04	1.46	9.67	39.25
95th-Percentile Queue Length [ft]	1084.76	203.00	201.31	4.70	254.93	244.16	126.07	36.59	241.79	981.19

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	154.89	12.00	12.01	83.81	36.18	36.58	113.07	32.20	32.20	44.67	193.94	193.94
Movement LOS	F	B	B	F	D	D	F	C	C	D	F	F
d_A, Approach Delay [s/veh]	77.50			36.48			82.94			148.81		
Approach LOS	E			D			F			F		
d_I, Intersection Delay [s/veh]	88.90											
Intersection LOS	F											
Intersection V/C	0.867											

Sequence

Ring 1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Golden Valley Rd/Estates Rd

Control Type:	Two-way stop	Delay (sec / veh):	27.6
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.048

Intersection Setup

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	0
Pocket Length [ft]	100.00	100.00	180.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	6	43	102	544	419	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	7	50	118	631	486	14
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	14	32	173	134	4
Total Analysis Volume [veh/h]	8	55	130	693	534	15
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.05	0.08	0.13	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	27.56	10.39	9.06	0.00	0.00	0.00
Movement LOS	D	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.15	0.25	0.44	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	3.73	6.16	10.95	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.57		1.43		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.37					
Intersection LOS	D					

Intersection Level Of Service Report
Intersection 5: Estates Rd/Indian Ln

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.029

Intersection Setup

Name	Estates Rd		Estates Rd		Indian Ln	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Indian Ln	
Base Volume Input [veh/h]	51	30	1	18	20	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	35	1	21	23	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	10	0	6	6	0
Total Analysis Volume [veh/h]	66	39	1	23	26	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.42	0.00	9.19	8.82
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.05	0.05	0.09	0.09
95th-Percentile Queue Length [ft]	0.00	0.00	1.23	1.23	2.27	2.27
d_A, Approach Delay [s/veh]	0.00		0.31		9.19	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.59					
Intersection LOS	A					

Appendix E

10-Year Horizon Plus Project Conditions LOS Calculations

Intersection Level Of Service Report
Intersection 1: Golden Valley Rd/N Hills Blvd

Control Type:	Signalized	Delay (sec / veh):	49.7
Analysis Method:	HCM 2010	Level Of Service:	D
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.730

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	150.00	100.00	100.00	125.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Base Volume Input [veh/h]	147	486	31	12	513	100	76	9	5	328	25	168
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	24	0	0	72	9	0	0	0	3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	171	588	36	14	667	125	88	10	6	383	29	195
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	48	163	10	4	185	35	24	3	2	106	8	54
Total Analysis Volume [veh/h]	190	653	40	16	741	139	98	11	7	426	32	217
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	114
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	5	10	0	0	6	0	0	6	0
Maximum Green [s]	35	35	0	35	35	0	0	30	0	0	30	0
Amber [s]	4.0	4.5	0.0	4.0	4.5	0.0	0.0	4.0	0.0	0.0	4.0	0.0
All red [s]	0.5	1.0	0.0	0.5	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0
Split [s]	40	40	0	40	40	0	0	34	0	0	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	21	0	0	13	0	0	21	0	0	21	0
I1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
I2, Clearance Lost Time [s]	2.5	3.5	0.0	2.5	3.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C
L, Total Lost Time per Cycle [s]	4.50	5.50	5.50	4.50	5.50	5.50	4.50	4.50	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.50	3.50	3.50	2.50	3.50	3.50	2.50	2.50	2.50	2.50
g_i, Effective Green Time [s]	16	68	68	2	54	54	30	30	30	30
g / C, Green / Cycle	0.14	0.60	0.60	0.02	0.48	0.48	0.26	0.26	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.12	0.21	0.21	0.01	0.27	0.27	0.10	0.01	0.34	0.17
s, saturation flow rate [veh/h]	1597	1676	1643	1597	1676	1586	1014	1569	1250	1453
c, Capacity [veh/h]	219	998	978	30	799	756	152	406	354	376
d1, Uniform Delay [s]	48.14	11.79	11.79	55.46	21.38	21.38	52.43	31.68	46.11	37.79
k, delay calibration	0.11	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.50	0.19
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	9.87	0.97	0.99	14.35	2.89	3.06	4.47	0.04	115.43	3.57
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	0.87	0.35	0.35	0.54	0.57	0.57	0.64	0.04	1.20	0.66
d, Delay for Lane Group [s/veh]	58.01	12.76	12.78	69.81	24.27	24.44	56.90	31.72	161.53	41.36
Lane Group LOS	E	B	B	E	C	C	E	C	F	D
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	Yes	No
50th-Percentile Queue Length [veh]	5.87	4.65	4.56	0.57	9.12	8.66	3.01	0.38	21.54	6.56
50th-Percentile Queue Length [ft]	146.78	116.30	114.11	14.36	227.89	216.50	75.24	9.50	538.44	163.99
95th-Percentile Queue Length [veh]	9.84	8.19	8.07	1.03	14.07	13.49	5.42	0.68	32.26	10.76
95th-Percentile Queue Length [ft]	246.12	204.73	201.71	25.84	351.68	337.15	135.43	17.10	806.58	268.99

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	58.01	12.77	12.78	69.81	24.34	24.44	56.90	31.72	31.72	161.53	41.36	41.36
Movement LOS	E	B	B	E	C	C	E	C	C	F	D	D
d_A, Approach Delay [s/veh]	22.50			25.16			53.00			117.20		
Approach LOS	C			C			D			F		
d_I, Intersection Delay [s/veh]	49.68											
Intersection LOS	D											
Intersection V/C	0.730											

Sequence

Ring 1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Golden Valley Rd/Estates Rd

Control Type:	Two-way stop	Delay (sec / veh):	90.5
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.437

Intersection Setup

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	0
Pocket Length [ft]	100.00	100.00	180.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	14	89	31	845	640	7
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	65	27	0	16	2
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	25	168	63	980	758	10
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	53	20	306	237	3
Total Analysis Volume [veh/h]	31	210	79	1225	948	13
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.44	0.40	0.11	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	90.49	16.13	10.69	0.00	0.00	0.00
Movement LOS	F	C	B	A	A	A
95th-Percentile Queue Length [veh]	1.73	1.87	0.37	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	43.27	46.80	9.32	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	25.69		0.65		0.00	
Approach LOS	D		A		A	
d_I, Intersection Delay [s/veh]	2.81					
Intersection LOS	F					

Intersection Level Of Service Report
Intersection 3: Golden Valley Rd/Access 5

Control Type:	Two-way stop	Delay (sec / veh):	11.9
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name	Access 5		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Access 5		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	0	0	0	859	647	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.16	1.00	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	16	0	9	2	1
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	16	0	1005	753	1
Peak Hour Factor	1.0000	0.8000	1.0000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	5	0	314	235	0
Total Analysis Volume [veh/h]	0	20	0	1256	941	1
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.04	0.00	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	11.93	0.00	0.00	0.00	0.00
Movement LOS		B		A	A	A
95th-Percentile Queue Length [veh]	0.00	0.12	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	2.88	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	11.93		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.11					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 4: Estates Rd/Access 4

Control Type:	Two-way stop	Delay (sec / veh):	10.4
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Estates Rd		Estates Rd		Access 4	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access 4	
Base Volume Input [veh/h]	38	0	0	103	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	18	12	0	54	20	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	62	12	0	173	20	0
Peak Hour Factor	0.8000	0.8000	0.8000	0.8000	0.8000	0.8000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	4	0	54	6	0
Total Analysis Volume [veh/h]	78	15	0	216	25	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.04	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.40	0.00	10.41	8.89
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.11	0.11
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.82	2.82
d_A, Approach Delay [s/veh]	0.00		0.00		10.41	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.78					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 5: Estates Rd/Indian Ln

Control Type:	Two-way stop	Delay (sec / veh):	10.0
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.102

Intersection Setup

Name	Estates Rd		Estates Rd		Indian Ln	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Indian Ln	
Base Volume Input [veh/h]	7	8	6	33	29	2
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	12	6	0	35	19	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	15	7	73	53	2
Peak Hour Factor	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	8	6	3	28	20	1
Total Analysis Volume [veh/h]	31	23	11	112	82	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.01	0.00	0.10	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.34	0.00	9.98	9.02
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.26	0.26	0.35	0.35
95th-Percentile Queue Length [ft]	0.00	0.00	6.45	6.45	8.72	8.72
d_A, Approach Delay [s/veh]	0.00		0.66		9.94	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.53					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 6: Indian Ln/Access 3

Control Type:	Two-way stop	Delay (sec / veh):	9.6
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Access 3			Access 3			Indian Ln			Indian Ln		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Access 3			Access 3			Indian Ln			Indian Ln		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	14	0	0	31	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	9	0	0	0	0	10	3	0	3	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	0	0	0	0	10	3	16	3	0	36	0
Peak Hour Factor	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	3	0	0	0	0	4	1	6	1	0	14	0
Total Analysis Volume [veh/h]	14	0	0	0	0	15	5	25	5	0	55	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.22	9.60	8.50	9.10	9.60	8.61	7.33	0.00	0.00	7.27	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.07	0.07	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	1.23	1.23	1.23	1.13	1.13	1.13	1.73	1.73	1.73	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.22			8.61			1.05			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	2.48											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 7: Estates Rd/Access 2

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.032

Intersection Setup

Name	Estates Rd		Estates Rd		Access 2	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access 2	
Base Volume Input [veh/h]	9	0	0	39	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	5	6	0	16	18	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	15	6	0	61	18	0
Peak Hour Factor	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	2	0	23	7	0
Total Analysis Volume [veh/h]	23	9	0	94	28	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.28	0.00	9.26	8.57
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.10	0.10
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.48	2.48
d_A, Approach Delay [s/veh]	0.00		0.00		9.26	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.68					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 8: Estates Road/Access 1

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.027

Intersection Setup

Name	Estates Rd		Estates Rd		Access1	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access1	
Base Volume Input [veh/h]	9	0	0	39	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	5	0	0	16	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	10	5	0	45	16	0
Peak Hour Factor	0.6500	0.6500	0.6500	0.6500	0.6500	0.6500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	2	0	17	6	0
Total Analysis Volume [veh/h]	15	8	0	69	25	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.03	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.26	0.00	9.05	8.51
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.08	0.08
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	2.11	2.11
d_A, Approach Delay [s/veh]	0.00		0.00		9.05	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.93					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 1: Golden Valley Rd/N Hills Blvd

Control Type:	Signalized	Delay (sec / veh):	86.0
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.884

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	1	0	0	1	0	0	1	0	0
Pocket Length [ft]	150.00	100.00	100.00	100.00	100.00	100.00	150.00	100.00	100.00	125.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			N Hills Blvd			N Hills Blvd		
Base Volume Input [veh/h]	512	581	23	2	308	103	54	19	14	176	13	393
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	80	0	0	47	6	0	0	0	10	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Right-Turn on Red Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	594	754	27	2	404	125	63	22	16	214	15	456
Peak Hour Factor	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	152	192	7	1	103	32	16	6	4	55	4	116
Total Analysis Volume [veh/h]	606	769	28	2	412	128	64	22	16	218	15	465
Presence of On-Street Parking	No		No	No		No	No		No	No		No
On-Street Parking Maneuver Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Local Bus Stopping Rate [/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian Volume [ped/h]	0			0			0			0		
Bicycle Volume [bicycles/h]	0			0			0			0		

Intersection Settings

Located in CBD	Yes
Signal Coordination Group	-
Cycle Length [s]	114
Coordination Type	Time of Day Pattern Coordinated
Actuation Type	Semi-actuated
Offset [s]	0.0
Offset Reference	LeadGreen
Permissive Mode	SingleBand
Lost time [s]	0.00

Phasing & Timing

Control Type	Protecte	Permiss	Permiss	Protecte	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss	Permiss
Signal group	3	8	0	7	4	0	0	2	0	0	6	0
Auxiliary Signal Groups												
Lead / Lag	Lead	-	-	Lead	-	-	-	-	-	-	-	-
Minimum Green [s]	4	10	0	5	10	0	0	6	0	0	6	0
Maximum Green [s]	35	35	0	35	35	0	0	30	0	0	30	0
Amber [s]	4.0	4.5	0.0	4.0	4.5	0.0	0.0	4.0	0.0	0.0	4.0	0.0
All red [s]	0.5	1.0	0.0	0.5	1.0	0.0	0.0	0.5	0.0	0.0	0.5	0.0
Split [s]	40	40	0	40	40	0	0	34	0	0	34	0
Vehicle Extension [s]	3.0	3.0	0.0	3.0	3.0	0.0	0.0	3.0	0.0	0.0	3.0	0.0
Walk [s]	0	7	0	0	7	0	0	7	0	0	7	0
Pedestrian Clearance [s]	0	21	0	0	13	0	0	21	0	0	21	0
l1, Start-Up Lost Time [s]	2.0	2.0	0.0	2.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0
l2, Clearance Lost Time [s]	2.5	3.5	0.0	2.5	3.5	0.0	0.0	2.5	0.0	0.0	2.5	0.0
Minimum Recall	No	No		No	No			No			No	
Maximum Recall	No	No		No	No			No			No	
Pedestrian Recall	No	No		No	No			No			No	
Detector Location [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector Length [ft]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Exclusive Pedestrian Phase

Pedestrian Signal Group	0
Pedestrian Walk [s]	0
Pedestrian Clearance [s]	0

Lane Group Calculations

Lane Group	L	C	C	L	C	C	L	C	L	C
L, Total Lost Time per Cycle [s]	4.50	5.50	5.50	4.50	5.50	5.50	4.50	4.50	4.50	4.50
l1_p, Permitted Start-Up Lost Time [s]	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.00	0.00
l2, Clearance Lost Time [s]	2.50	3.50	3.50	2.50	3.50	3.50	2.50	2.50	2.50	2.50
g_i, Effective Green Time [s]	36	70	70	0	35	35	30	30	30	30
g / C, Green / Cycle	0.31	0.61	0.61	0.00	0.30	0.30	0.26	0.26	0.26	0.26
(v / s)_i Volume / Saturation Flow Rate	0.38	0.24	0.24	0.00	0.17	0.17	0.08	0.02	0.18	0.34
s, saturation flow rate [veh/h]	1597	1676	1656	1597	1676	1543	820	1561	1228	1432
c, Capacity [veh/h]	497	1023	1010	6	507	467	63	404	337	370
d1, Uniform Delay [s]	39.25	11.38	11.39	56.63	33.26	33.36	57.00	32.10	41.87	42.25
k, delay calibration	0.50	0.50	0.50	0.11	0.50	0.50	0.11	0.11	0.21	0.50
I, Upstream Filtering Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
d2, Incremental Delay [s]	115.64	1.13	1.15	27.18	4.25	4.77	56.07	0.10	4.06	151.69
d3, Initial Queue Delay [s]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rp, platoon ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF, progression factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Lane Group Results

X, volume / capacity	1.22	0.39	0.39	0.32	0.55	0.56	1.01	0.09	0.65	1.30
d, Delay for Lane Group [s/veh]	154.89	12.51	12.54	83.81	37.50	38.13	113.07	32.20	45.93	193.94
Lane Group LOS	F	B	B	F	D	D	F	C	D	F
Critical Lane Group	Yes	No	No	No	No	Yes	No	No	No	Yes
50th-Percentile Queue Length [veh]	29.63	5.29	5.24	0.10	7.03	6.65	2.80	0.81	6.14	25.90
50th-Percentile Queue Length [ft]	740.84	132.22	131.11	2.61	175.67	166.19	70.04	20.33	153.49	647.53
95th-Percentile Queue Length [veh]	43.39	9.06	9.00	0.19	11.37	10.88	5.04	1.46	10.20	39.25
95th-Percentile Queue Length [ft]	1084.76	226.51	225.01	4.70	284.36	271.90	126.07	36.59	255.08	981.19

Movement, Approach, & Intersection Results

d_M, Delay for Movement [s/veh]	154.89	12.52	12.54	83.81	37.71	38.13	113.07	32.20	32.20	45.93	193.94	193.94
Movement LOS	F	B	B	F	D	D	F	C	C	D	F	F
d_A, Approach Delay [s/veh]	74.02			37.98			82.94			147.71		
Approach LOS	E			D			F			F		
d_I, Intersection Delay [s/veh]	85.97											
Intersection LOS	F											
Intersection V/C	0.884											

Sequence

Ring 1	2	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 2	6	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ring 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Intersection Level Of Service Report
Intersection 2: Golden Valley Rd/Estates Rd

Control Type:	Two-way stop	Delay (sec / veh):	43.6
Analysis Method:	HCM 2010	Level Of Service:	E
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.131

Intersection Setup

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	1	1	0	0	0
Pocket Length [ft]	100.00	100.00	180.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		Yes	

Volumes

Name	Estates Rd		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	6	43	102	544	419	12
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	42	90	0	11	8
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	13	92	208	631	497	22
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	25	57	173	137	6
Total Analysis Volume [veh/h]	14	101	229	693	546	24
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.13	0.14	0.23	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	43.59	10.89	9.67	0.00	0.00	0.00
Movement LOS	E	B	A	A	A	A
95th-Percentile Queue Length [veh]	0.43	0.49	0.88	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	10.87	12.32	22.12	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	14.87		2.40		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	2.44					
Intersection LOS	E					

Intersection Level Of Service Report
Intersection 3: Golden Valley Rd/Access 5

Control Type:	Two-way stop	Delay (sec / veh):	10.1
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.017

Intersection Setup

Name	Access 5		Golden Valley Rd		Golden Valley Rd	
Approach	Southbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Left	Thru	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Access 5		Golden Valley Rd		Golden Valley Rd	
Base Volume Input [veh/h]	0	0	0	550	431	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.16	1.00	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	11	0	6	8	3
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	11	0	644	508	3
Peak Hour Factor	1.0000	0.9100	1.0000	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	3	0	177	140	1
Total Analysis Volume [veh/h]	0	12	0	708	558	3
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.02	0.00	0.01	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	10.11	0.00	0.00	0.00	0.00
Movement LOS		B		A	A	A
95th-Percentile Queue Length [veh]	0.00	0.05	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.00	1.28	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.11		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.09					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 4: Estates Rd/Access 4

Control Type:	Two-way stop	Delay (sec / veh):	10.6
Analysis Method:	HCM 2010	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.021

Intersection Setup

Name	Estates Rd		Estates Rd		Access 4	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access 4	
Base Volume Input [veh/h]	114	0	0	49	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	59	39	0	35	13	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	191	39	0	92	13	0
Peak Hour Factor	0.9100	0.9100	0.9100	0.9100	0.9100	0.9100
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	52	11	0	25	4	0
Total Analysis Volume [veh/h]	210	43	0	101	14	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.74	0.00	10.55	9.57
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.06	0.06
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.62	1.62
d_A, Approach Delay [s/veh]	0.00		0.00		10.55	
Approach LOS	A		A		B	
d_I, Intersection Delay [s/veh]	0.40					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 5: Estates Rd/Indian Ln

Control Type:	Two-way stop	Delay (sec / veh):	9.8
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.050

Intersection Setup

Name	Estates Rd		Estates Rd		Indian Ln	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Indian Ln	
Base Volume Input [veh/h]	51	30	1	18	20	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	39	21	0	23	13	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	98	56	1	44	36	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	27	16	0	12	10	0
Total Analysis Volume [veh/h]	109	62	1	49	40	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.05	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.56	0.00	9.75	9.20
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.11	0.11	0.16	0.16
95th-Percentile Queue Length [ft]	0.00	0.00	2.76	2.76	3.95	3.95
d_A, Approach Delay [s/veh]	0.00		0.15		9.75	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.52					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 6: Indian Ln/Access 3

Control Type:	Two-way stop	Delay (sec / veh):	9.6
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.000

Intersection Setup

Name	Access 3			Access 3			Indian Ln			Indian Ln		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration	+			+			+			+		
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Access 3			Access 3			Indian Ln			Indian Ln		
Base Volume Input [veh/h]	0	0	0	0	0	0	0	31	0	0	20	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	6	0	0	0	0	7	12	0	9	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	6	0	0	0	0	7	12	36	9	0	23	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	2	0	0	0	0	2	3	10	3	0	6	0
Total Analysis Volume [veh/h]	7	0	0	0	0	8	13	40	10	0	26	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane	No	No		
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.18	9.61	8.55	9.12	9.63	8.46	7.29	0.00	0.00	7.31	0.00	0.00
Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.02	0.02	0.02	0.02	0.02	0.02	0.12	0.12	0.12	0.00	0.00	0.00
95th-Percentile Queue Length [ft]	0.61	0.61	0.61	0.58	0.58	0.58	3.10	3.10	3.10	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.18			8.46			1.50			0.00		
Approach LOS	A			A			A			A		
d_I, Intersection Delay [s/veh]	2.18											
Intersection LOS	A											

Intersection Level Of Service Report
Intersection 7: Estates Rd/Access 2

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.015

Intersection Setup

Name	Estates Rd		Estates Rd		Access 2	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access 2	
Base Volume Input [veh/h]	51	0	0	19	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	18	21	0	11	12	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	77	21	0	33	12	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	6	0	9	3	0
Total Analysis Volume [veh/h]	86	23	0	37	13	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.02	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.43	0.00	9.25	8.82
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.05	0.05
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.15	1.15
d_A, Approach Delay [s/veh]	0.00		0.00		9.25	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.76					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 8: Estates Road/Access 1

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 2010	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.013

Intersection Setup

Name	Estates Rd		Estates Rd		Access1	
Approach	Northbound		Southbound		Westbound	
Lane Configuration						
Turning Movement	Thru	Right	Left	Thru	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	0	0	0
Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Estates Rd		Estates Rd		Access1	
Base Volume Input [veh/h]	51	0	0	19	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.16	1.16	1.16	1.16	1.16	1.16
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	18	0	0	11	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	18	0	22	11	0
Peak Hour Factor	0.9000	0.9000	0.9000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	16	5	0	6	3	0
Total Analysis Volume [veh/h]	66	20	0	24	12	0
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			No
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.00	0.00	0.00	0.01	0.00
d_M, Delay for Movement [s/veh]	0.00	0.00	7.38	0.00	9.06	8.71
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh]	0.00	0.00	0.00	0.00	0.04	0.04
95th-Percentile Queue Length [ft]	0.00	0.00	0.00	0.00	1.01	1.01
d_A, Approach Delay [s/veh]	0.00		0.00		9.06	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.89					
Intersection LOS	A					

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Jae Pullen, P.E., PTOE
District II Engineering Manager
Nevada Department of Transportation
310 Galletti Way
Sparks, Nevada 89431

Golden Mesa – Supplemental Traffic Analysis

Following the completion of the Traffic Impact Study for Golden Mesa dated June 27, 2016, additional analysis was performed in response to NDOT District II review comments and as required by the Tentative Map Conditions of Approval. Two additional study intersections are included in this supplemental analysis. The following intersections were analyzed:

- Golden Valley Road/US 395 NB Ramps
- Golden Valley Road/US 395 SB Ramps

This report serves as a supplemental traffic analysis to the original "*Traffic Impact Study for Golden Mesa*" dated June 27, 2016 and provides additional traffic analysis for these two intersections.

Please refer to the original traffic impact study for methodology, traffic volumes, trip generation and distribution, project impacts, and mitigations at other study intersections on Golden Valley Road.

Land Uses

The proposed project, land uses, quantities, and their locations are unchanged. Please refer to the "*Traffic Impact Study for Golden Mesa*" dated June 27, 2016.

Level of Service Policy

The Nevada Department of Transportation (NDOT) Traffic Impact Study Requirements publication states "Level of Service "C" will be the design objective for capacity and under no circumstances will less than Level of Service "D" be accepted for site and non-site traffic."

Hence, we have used LOS "D" as the criteria for this analysis.

Existing Conditions Traffic Volumes

Existing traffic volumes at both additional study intersections were obtained by collecting new turning movement counts at the study intersections. The counts were conducted on an average mid-week day in May 2017, with schools in session. The existing lane configurations and intersection controls are shown in **Figure 1**. The existing AM and PM peak hour intersection traffic volumes are shown in **Figure 2**.

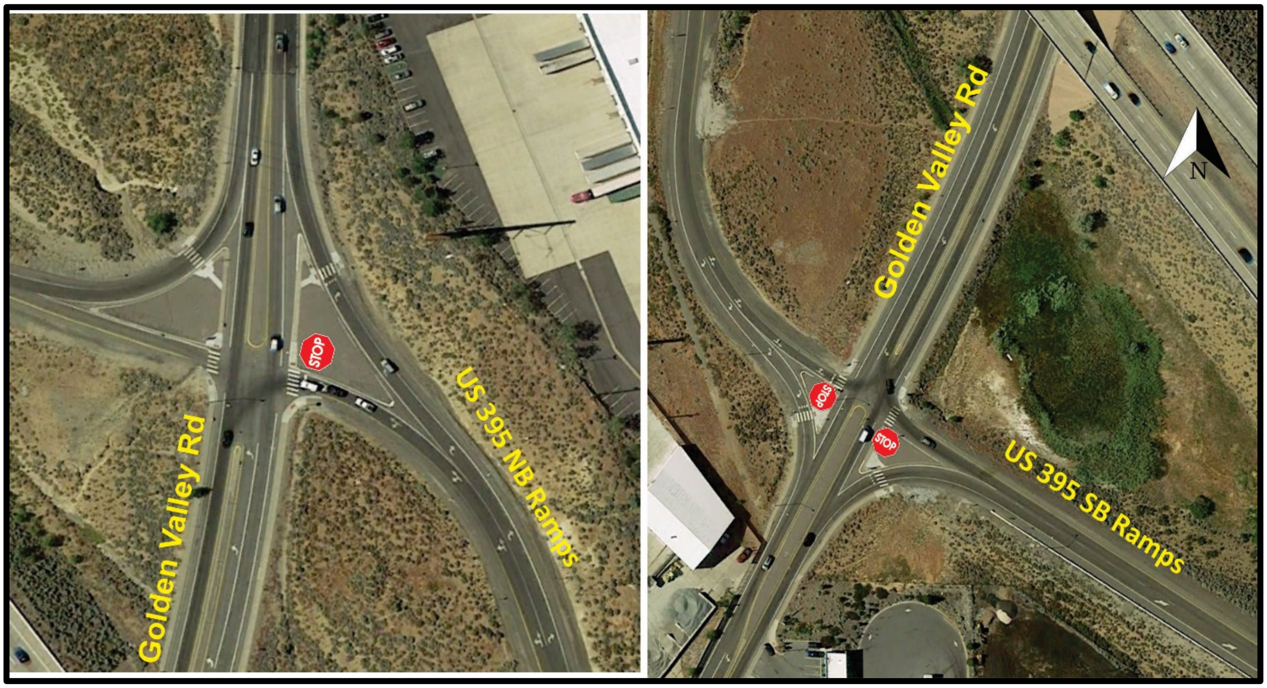

Figure 1. Existing Lane Configurations

US 395, although being a north-south freeway, travels east-west at the Golden Valley Road interchange. For the purposes of this report, the US 395 Ramps are considered eastbound/westbound approaches and the Golden Valley Road approaches are considered northbound/southbound approaches.

Existing Intersection Level of Service Analysis

Level of service (LOS) calculations were performed using the existing traffic volumes, lane configurations, and traffic controls. **Table 1** summarizes the existing conditions LOS at the two study intersections. Detailed calculation sheets are provided in **Appendix A**, attached.

As shown in **Table 1**, both ramp intersections operate at unacceptable conditions during the existing AM and PM peak hours. The westbound approach at the Golden Valley Road/US 395 NB Ramps intersection operates at LOS "F" during both the AM and PM peak hours. The eastbound approach at the Golden Valley Road /US 395 SB Ramps intersection operates at LOS "F" and LOS "E" during the AM and PM peak hours, respectively.

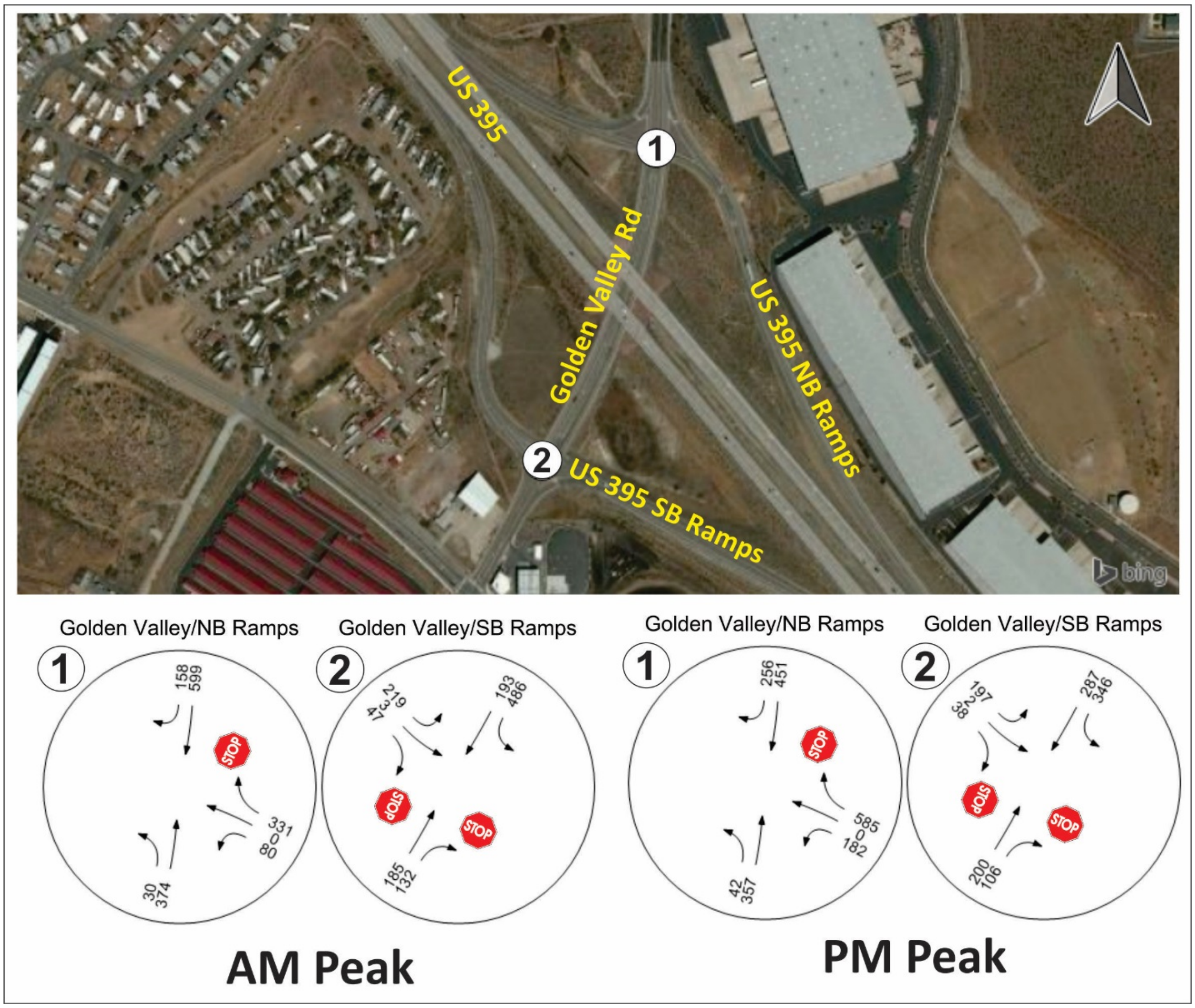

Figure 2. Existing Peak Hour Traffic Volumes

Table 1: Existing Conditions Intersection Level of Service Summary

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/US 395 NB Ramps	TWSC				
Westbound Approach		F	59.98	F	92.75
Westbound Left		F	59.98	F	92.75
Golden Valley Rd/US 395 SB Ramps	TWSC				
Eastbound Approach		F	83.62	E	44.09
Eastbound Left		F	98.85	F	50.38
Eastbound Right		B	11.17	B	11.61
Northbound Approach		C	23.15	C	18.83

Trip Generation

Table 2 provides the Daily, AM peak hour, and PM peak hour trip generation calculation details for the proposed project.

Table 2: Trip Generation Estimates

ITE Land Use	Size	Daily	AM Peak			PM Peak		
			Total	In	Out	Total	In	Out
210 - Single-Family Detached Housing	158 Dwelling Units	1,600	120	30	90	159	100	59

As shown in **Table 2**, the proposed project is anticipated to generate up to 1,600 daily trips, 120 AM peak hour trips, and 159 PM peak hour trips. These trip generation estimates are the same as presented in the original Traffic Impact Study.

Trip Distribution and Assignment

80% of the project trips were assigned to US 395 in the original Traffic Impact Study. Of that 80%, 70% of the project traffic is assigned to/from the south via US 395 and 10% is assigned to/from the north via US 395. The project trips at the two study intersections are shown in **Figure 3**.

Project Access

The number and location of access points remain unchanged. Please refer to the *Traffic Impact Study for Golden Mesa*" dated June 27, 2016.

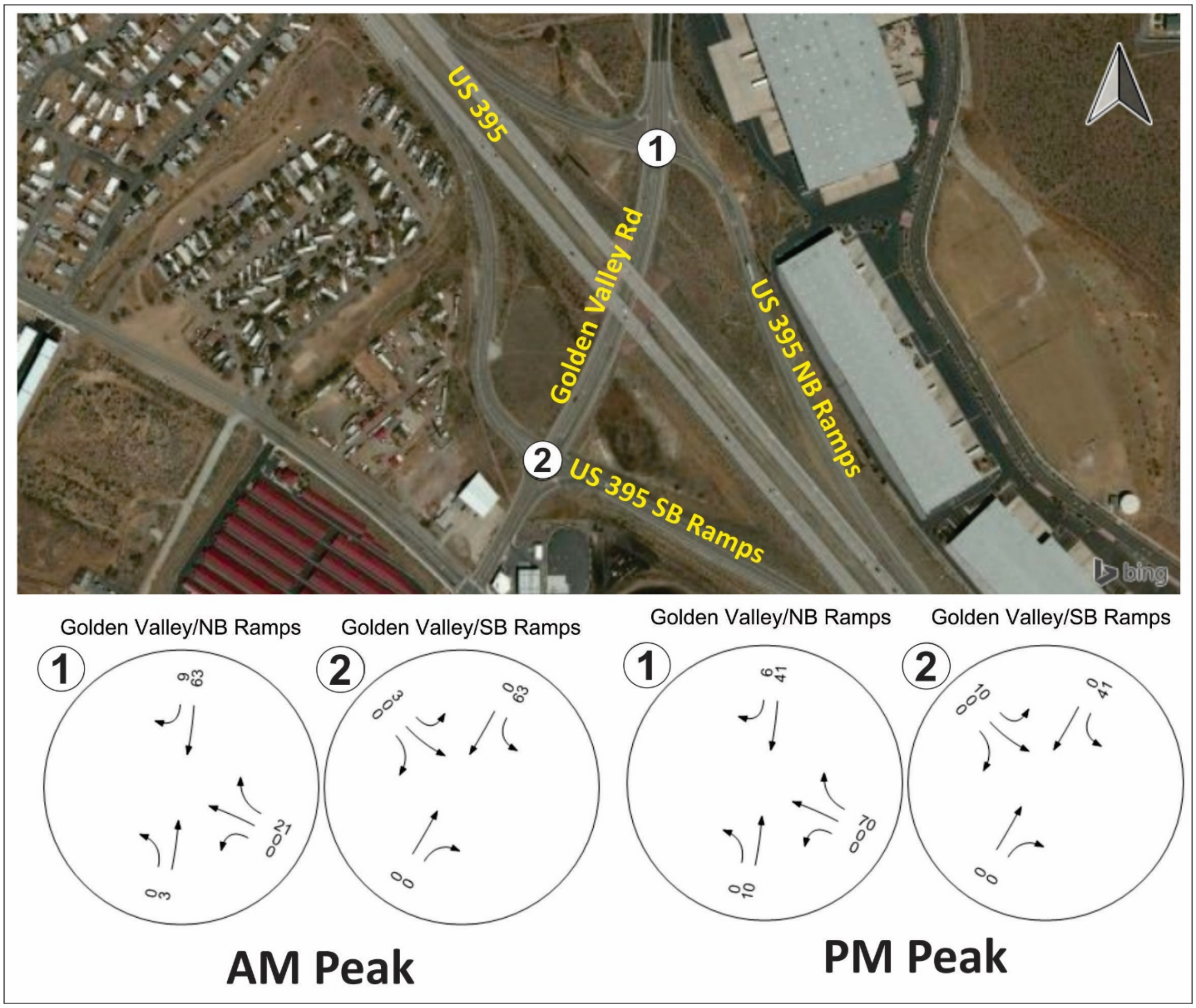

Figure 3. Trip Assignment

Existing Plus Project Intersection Level of Service Analysis

Existing Plus Project volumes were obtained by adding the project generated trips to the existing traffic volumes and are shown in **Figure 4**. The "Plus Project" condition Peak Hour Factors (PHF) and travel patterns were assumed to remain the same as were observed under existing conditions.

Table 3 presents the level of service analysis summary for the "Plus Project" scenario assuming the existing intersection configurations. Detailed calculation sheets are provided in **Appendix B**, attached. As shown in **Table 3**, both the study intersections operate at LOS "F" during the peak hours. However, it should be noted that these two intersections operate at unacceptable LOS conditions even under existing conditions (without the project).

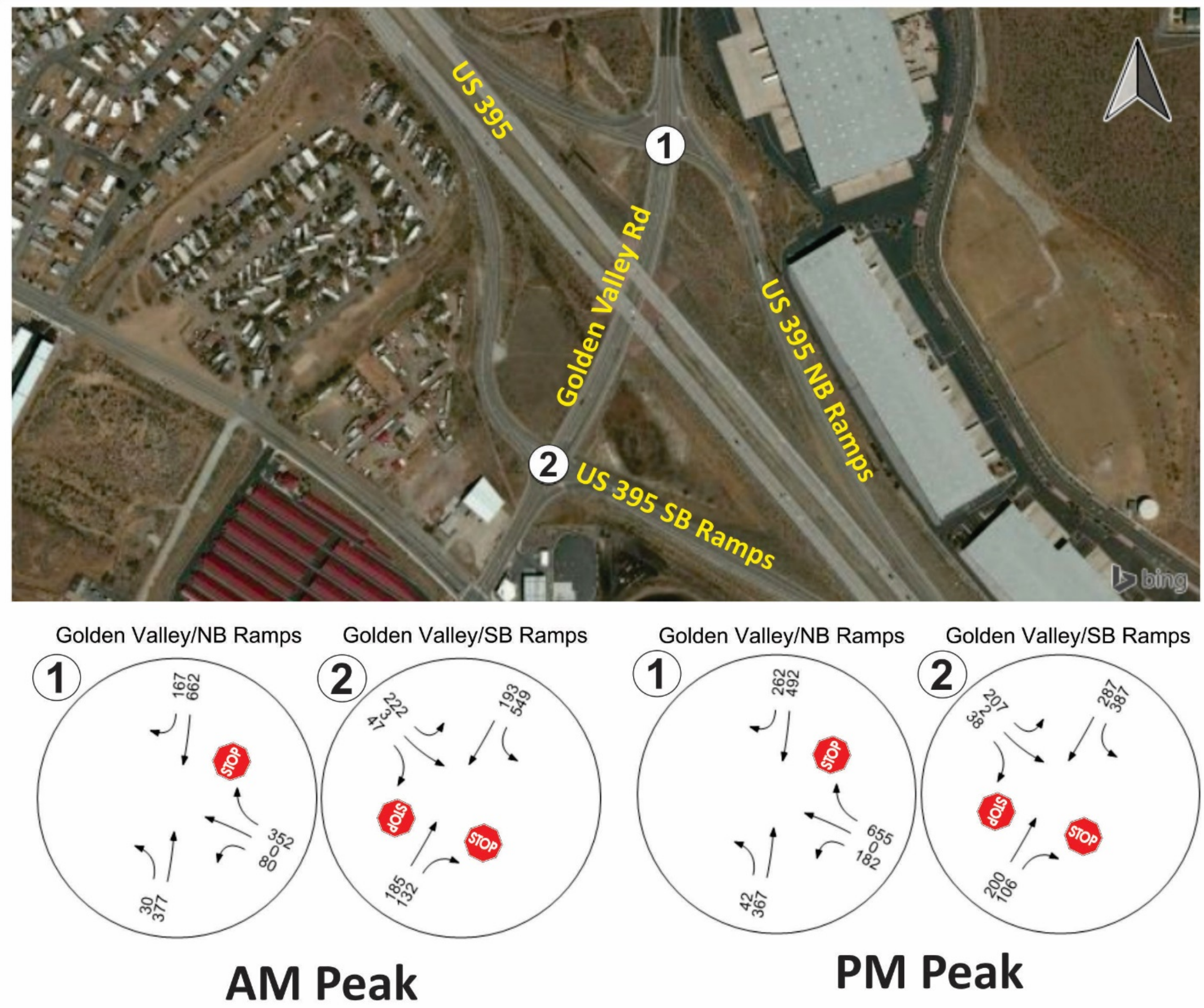

Figure 4. Plus Project Traffic Volumes

Table 3: Plus Project Intersection Level of Service Summary

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/US 395 NB Ramps	TWSC				
Westbound Approach		F	76.73	F	119.39
Westbound Left		F	76.73	F	119.39
Golden Valley Rd/US 395 SB Ramps	TWSC				
Eastbound Approach		F	120.13	F	58.64
Eastbound Left		F	142.73	F	67.24
Eastbound Right		B	12.06	B	11.82
Northbound Approach		D	26.83	C	20.31

20-Year Horizon Traffic Volumes

Traffic volumes in the study area are anticipated to increase in the future as development continues in the North Valleys region. Traffic growth rates were obtained from the Washoe County RTC's travel demand model. The latest iteration of the travel demand model was used to determine future growth rates.

Growth rates were calculated based on the traffic volume increases at multiple points along Golden Valley Road and on the ramp approaches. A uniform growth factor of 1.4 (40% increase) was used to estimate 20-Year Horizon baseline peak hour traffic volumes. The 20-Year Horizon baseline peak hour traffic volumes are shown in **Figure 5** and **g**rowth rate calculations are shown in **Table 4**.

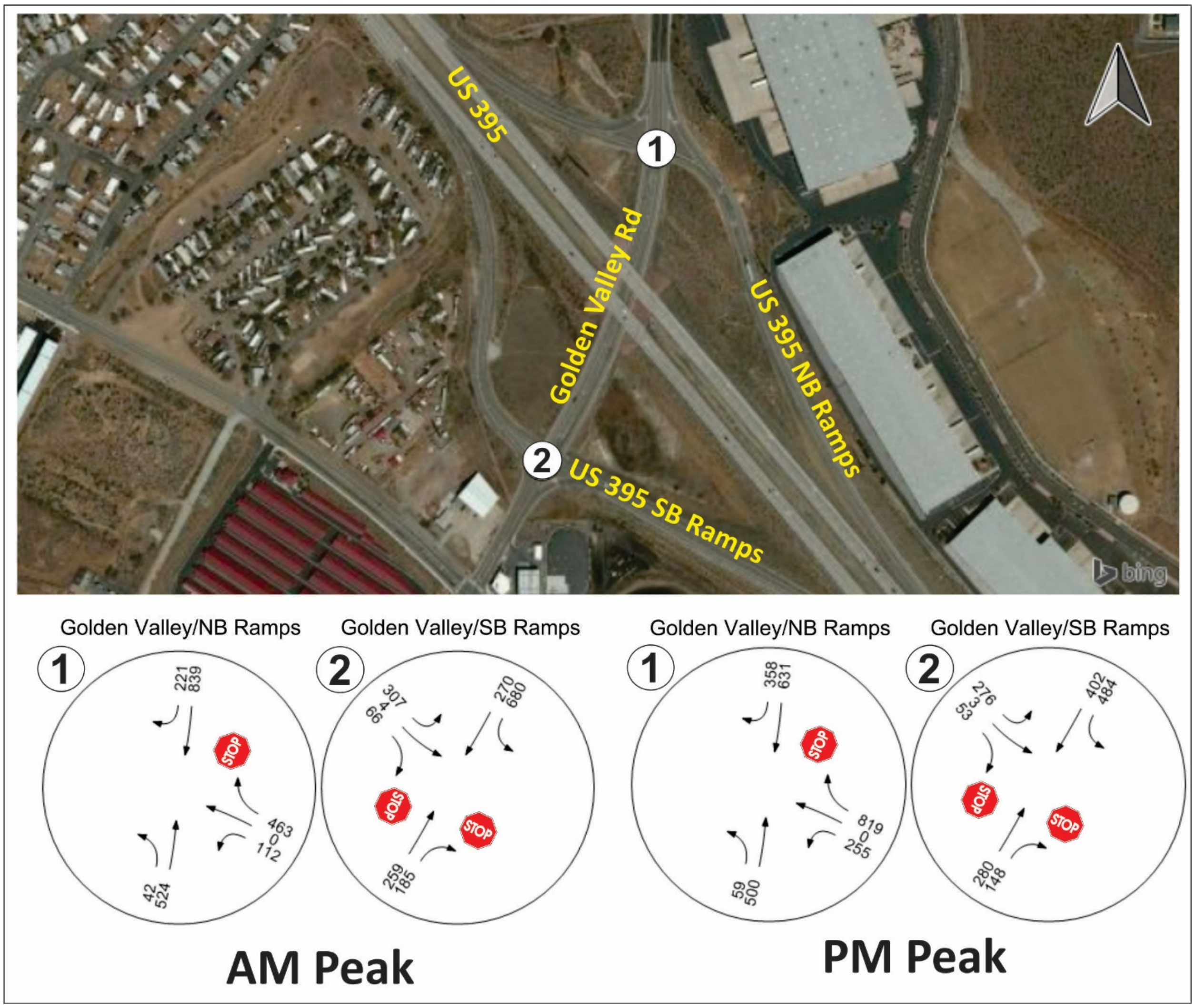

Figure 5. 20-Year Horizon Baseline Traffic Volumes

Table 4: Growth Rate Calculations

	GV N/O Ramps	GV b/w Ramps	GV S/O Ramps	NB Off Ramp	NB On Ramp	SB Off Ramp	SB On Ramp
2020 Model	15,614	11,847	9,314	8,747	4,541	4,285	7,916
2040 Model	18,770	16,282	14,972	12,094	3,333	2,583	11,528
Difference	3,156	4,435	5,658	3,347	-1,208	-1,702	3,612
20 Years % Change	20%	37%	61%	38%	-27%	-40%	46%
20 Years Growth Rate	1.0%	1.9%	3.0%	1.9%	-1.3%	-2.0%	2.3%
20 years Growth Factor	1.20	1.37	1.61	1.38	0.73	0.60	1.46

20-Year Horizon Level of Service Analysis

Table 5 presents the level of service analysis summary for the "20-Year Horizon Baseline" scenario assuming the existing intersection configurations. Detailed calculation sheets are provided in **Appendix C**, attached.

Table 5: 20-Year Horizon Baseline Level of Service Summary

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/US 395 NB Ramps	TWSC				
Westbound Approach		F	>180	F	>180
Westbound Left		F	>180	F	>180
Golden Valley Rd/US 395 SB Ramps	TWSC				
Eastbound Approach		F	>180	F	>180
Eastbound Left		F	>180	F	>180
Eastbound Right		B	14.32	B	14.02
Northbound Approach		F	93.44	E	48.11

As shown in **Table 5**, both the study intersections will operate at deep LOS "F" with excessive delay during both the AM and PM peak hours.

20-Year Horizon Plus Project Level of Service Analysis

20-Year Plus Project volumes were obtained by adding the project generated trips to the 20-Year Baseline traffic volumes and are shown in **Figure 6**.

Table 6 presents the level of service analysis summary for the "20-Year Plus Project" scenario assuming the existing intersection configurations. Detailed calculation sheets are provided in **Appendix D**, attached. As shown in **Table 6**, both study intersections operate at LOS "F" under 20-Year Horizon Plus Project conditions. Note that these two intersections operate at deep LOF "F" even without the project.

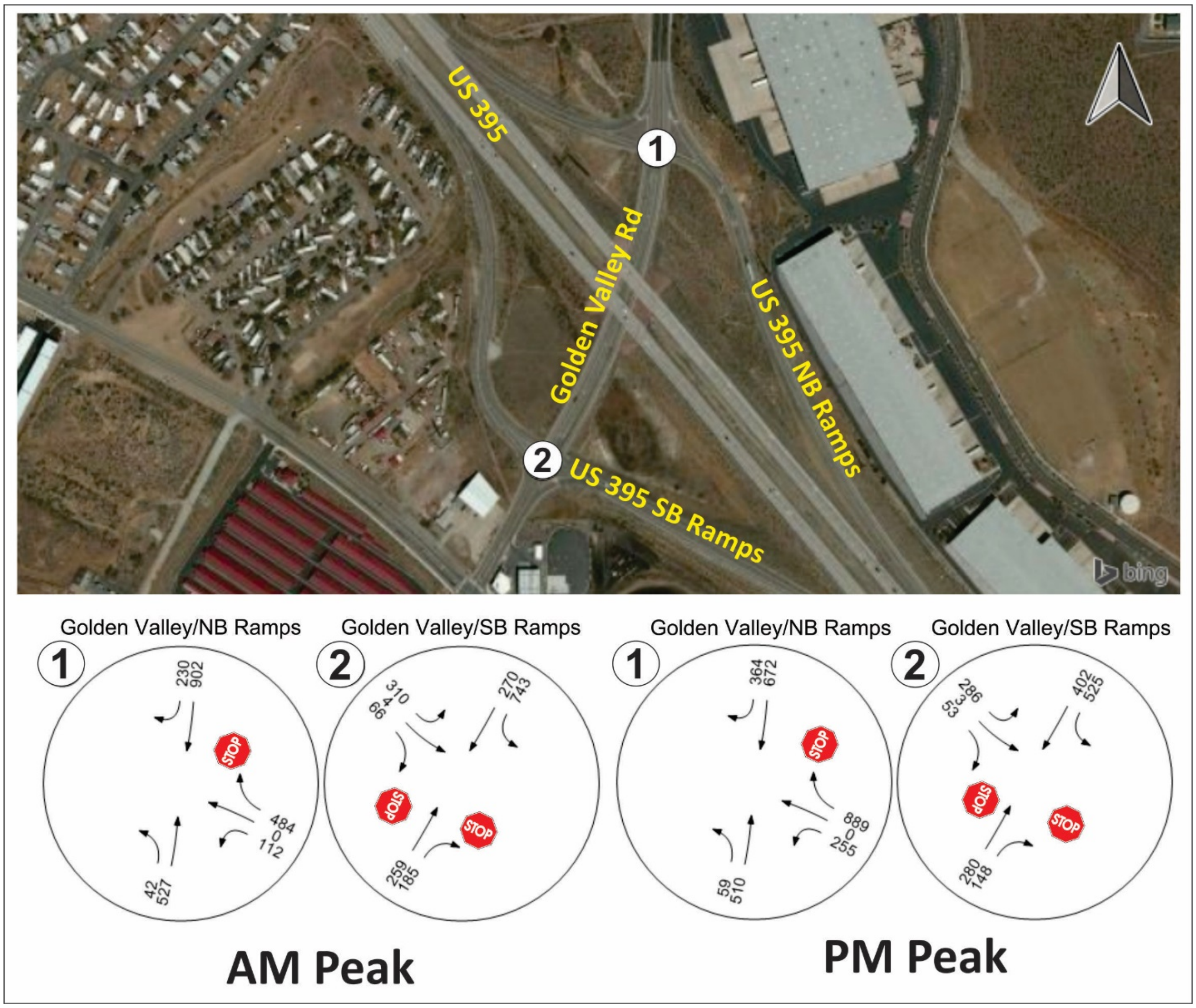

Figure 6. 20-Year Plus Project Traffic Volumes

Table 6: 20-Year Plus Project Level of Service Summary

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/US 395 NB Ramps	TWSC				
Westbound Approach		F	>180	F	>180
Westbound Left		F	>180	F	>180
Golden Valley Rd/US 395 SB Ramps	TWSC				
Eastbound Approach		F	>180	F	>180
Eastbound Left		F	>180	F	>180
Eastbound Right		B	14.84	B	14.32
Northbound Approach		F	126.99	F	57.53

Crash Analysis

Crash data was requested and obtained from NDOT for the most recent five years (October 2011- October 2016) at both study intersections. **Table 7** and **Table 8** show the summary of crash data at the Golden Valley Road/ US 395 NB Ramps and Golden Valley Road/ US 395 SB Ramps intersections respectively. 15 crashes were reported at each intersection between October 2011 and October 2016.

Table 7: 5-Year Crash Data Summary @ Golden Valley Road/US 395 NB Ramps

Crash Type	Number	PDO	Injury	Fatality
Angle	6	3	3	0
Rear-End	4	3	1	0
Non-Collision	4	3	1	0
Side Swipe	1	0	1	0
TOTAL	15			

Table 8: 5-Year Crash Data Summary @ Golden Valley Road/US 395 NB Ramps

Crash Type	Number	PDO	Injury	Fatality
Angle	10	3	7	0
Rear-End	3	2	1	0
Head-On	1	1	0	0
Non-Collision	1	1	0	0
TOTAL	15			

Based on the data obtained, of the 15 reported crashes at the Golden Valley Road/ US 395 NB Ramps intersection, 2 were reported in 2012, 3 were reported in 2013, 6 were reported in 2014, 2 were reported in 2015, and 2 were reported in 2016. A majority of the crashes were angle crashes (40% of all the crashes), followed by rear-end crashes (27%), non-collision crashes (27%), and sideswipe crashes (6%). No casualties were reported.

Of the 15 reported crashes at the Golden Valley Road/ US 395 SB Ramps intersection, 2 were reported in 2011, 2 were reported in 2012, 1 was reported in 2013, 2 were reported in 2014, 6 were reported in 2015, and 2 were reported in 2016. The majority of crashes were angle collisions (67% of all the crashes), followed by rear-end crashes (20%), head-on crashes (12.5%), and non-collision crashes (12.5%). No casualties were reported. Neither location meets the criteria of a high-crash location.

Potential Improvements

It should be noted that both ramp intersections operate at unacceptable levels of service during the existing and 20-year horizon baseline conditions (without the addition of the project). Hence, improvements should be planned at these two intersections irrespective of this project, or any other new development that accesses the Golden Valley interchange. The following two potential improvements were tested with existing lane configurations to assist in future planning:

- Installing a traffic signal at both the ramp intersections
- Constructing a single-lane roundabout at both ramp intersections

Any new improvements constructed at these intersections should ideally provide acceptable traffic operations for at least 20 years. Hence, these two improvement options were tested with the 20-Year Horizon peak hour traffic volumes. **Table 9** and **Table 10** show the level of service summary with either signals or roundabouts constructed for 20-Year with and without project conditions.

Table 9: 20-Year Horizon Baseline Level of Service Summary with Signals or Roundabouts

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/US 395 NB Ramps	Signal	B	11.53	B	15.97
Golden Valley Rd/US 395 SB Ramps	Signal	E	61.4	B	15.55
Golden Valley Rd/US 395 NB Ramps	Roundabout	D	26.29	B	14.49
Golden Valley Rd/US 395 SB Ramps	Roundabout	E	36.28	C	21.59

Table 10: 20-Year Horizon Plus Project Level of Service Summary with Signals or Roundabouts

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/US 395 NB Ramps	Signal	B	12.51	B	16.8
Golden Valley Rd/US 395 SB Ramps	Signal	F	88.3	C	22.93
Golden Valley Rd/US 395 NB Ramps	Roundabout	E	36.6	C	16.57
Golden Valley Rd/US 395 SB Ramps	Roundabout	E	48.5	D	25.14

As shown in **Table 9**, neither signalization of existing intersections nor one-lane roundabouts would be anticipated to provide acceptable level of service in the 20-year horizon, irrespective of the project. The Golden Valley Road/ US 395 SB Ramps intersection is anticipated to operate at LOS "E" conditions in the 20-Year Horizon Baseline conditions (without the project) with a signal or a roundabout. However, the Golden Valley Road/ US 395 NB Ramps intersection is anticipated to function at acceptable LOS with a signal or roundabout. However, it is not recommended to change the intersection control to a signal or a roundabout at only one of the ramp intersections. A holistic approach that will provide acceptable traffic operations at both the ramp intersections should be followed when recommending improvements at freeway interchanges. With only 158 residential units proposed, long-term improvement of the interchange is well beyond the scope or responsibility of this project. Hence, it is recommended that NDOT perform an interchange study to determine appropriate measures (addition of lanes, interchange reconfiguration etc) for improving long-term traffic operations at these two intersections.

Since neither of the tested improvements work for a 20-year horizon, we performed an analysis for the 10-year horizon with and without the project to determine if installing traffic signals with the existing lane configurations at the ramp intersections would provide acceptable level of service conditions for a 10 year timeframe. **Table 11** and **Table 12** show the level of service summary with signals constructed for the 10-Year horizon with and without the project traffic.

Table 11: 10-Year Horizon Baseline Level of Service Summary with Signals

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/US 395 NB Ramps	Signal	A	9.56	B	14.22
Golden Valley Rd/US 395 SB Ramps	Signal	C	27.75	B	14.7

Table 12: 10-Year Horizon Plus Project Level of Service Summary with Signals

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay	LOS	Delay
Golden Valley Rd/US 395 NB Ramps	Signal	A	9.98	B	14.24
Golden Valley Rd/US 395 SB Ramps	Signal	D	37.82	B	15.95

As shown in **Table 11** and **Table 12**, preliminary analysis shows that installing traffic signals at both ramp intersections would provide acceptable level of service conditions over a 10-Year horizon. If NDOT and other local agencies (Washoe County/RTC) decide to install signals at the Golden Valley Road ramp intersections, the Regional Road Impact Fee from this project, and other potential projects that access the Golden Valley Interchange could potentially be pooled together towards a signalization project. However, we recommend performing a full signal-warrant study before installing signals.

Conclusions

Following is a list of key findings and conclusions:

- The Golden Valley Road/ US 395 NB Ramps and Golden Valley Road/ US 395 SB Ramps intersections operate at LOS "F" under existing and 20-year horizon baseline conditions (without the project).
- Both ramp terminal intersections are anticipated to continue to operate at LOS "F" with the addition of the project traffic.
- It is recommended that NDOT perform an interchange study to determine appropriate long-term improvements that would provide acceptable traffic operations at both ramp intersections.
- Preliminary analysis shows installing traffic signals would provide acceptable level of service conditions for a 10-year timeframe should NDOT and the local agencies wish to pursue such a project.
- The project will contribution standard Regional Road Impact Fees (RRIF) in the amount of approximately $609,000 to mitigate the project's impacts on the overall roadway network.

Please do not hesitate to contact us at (775) 322-4300 with any questions.

Sincerely,
TRAFFIC WORKS, LLC

PROFESSIONAL ENGINEER - STATE OF NEVADA
LOREN
EDWARD
CHILSON
Exp: 12-31-18
CIVIL
No. 15619
6.5.17

Loren E. Chilson, PE
Principal

Appendix A

Existing Conditions LOS Calculations

Intersection Level Of Service Report
Intersection 9: Golden Valley/NB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	60.0
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.598

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	0	0	0	0	0	1
Pocket Length [ft]	190.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	200.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Base Volume Input [veh/h]	30	374	0	0	599	158	0	0	0	80	0	331
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	30	374	0	0	599	158	0	0	0	80	0	331
Peak Hour Factor	0.9000	0.9000	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	1.0000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Total 15-Minute Volume [veh/h]	8	104	0	0	166	44	0	0	0	22	0	0
Total Analysis Volume [veh/h]	33	416	0	0	666	176	0	0	0	89	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance				No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.60	0.00	0.00
d_M, Delay for Movement [s/veh]	9.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.98	54.57	10.65
Movement LOS	A	A			A	A				F	F	B
95th-Percentile Queue Length [veh]	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.14	3.14	0.00
95th-Percentile Queue Length [ft]	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	78.60	78.60	0.00
d_A, Approach Delay [s/veh]	0.66			0.00			0.00			59.98		
Approach LOS	A			A			A			F		
d_I, Intersection Delay [s/veh]	4.08											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 10: Golden Valley/SB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	98.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.979

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	450.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	170.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Base Volume Input [veh/h]	0	185	132	486	193	0	0	0	0	219	3	47
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	185	132	486	193	0	0	0	0	219	3	47
Peak Hour Factor	1.0000	0.9200	0.9200	0.9200	0.9200	1.0000	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	50	0	132	52	0	0	0	0	60	1	13
Total Analysis Volume [veh/h]	0	201	0	528	210	0	0	0	0	238	3	51
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Free	Free	Stop
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.51	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.98	0.01	0.09
d_M, Delay for Movement [s/veh]	0.00	23.15	21.59	0.00	0.00	0.00	0.00	0.00	0.00	98.85	97.73	11.71
Movement LOS		C	C	A	A					F	F	B
95th-Percentile Queue Length [veh]	0.00	2.78	2.78	0.00	0.00	0.00	0.00	0.00	0.00	9.36	9.36	0.28
95th-Percentile Queue Length [ft]	0.00	69.57	69.57	0.00	0.00	0.00	0.00	0.00	0.00	234.01	234.01	7.10
d_A, Approach Delay [s/veh]	23.15			0.00			0.00			83.62		
Approach LOS	C			A			A			F		
d_I, Intersection Delay [s/veh]	23.61											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: Golden Valley/NB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	92.7
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.921

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	0	0	0	0	0	1
Pocket Length [ft]	190.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	200.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Base Volume Input [veh/h]	42	357	0	0	451	256	0	0	0	182	0	585
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	42	357	0	0	451	256	0	0	0	182	0	585
Peak Hour Factor	0.9800	0.9800	1.0000	1.0000	0.9800	0.9800	1.0000	1.0000	1.0000	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Total 15-Minute Volume [veh/h]	11	91	0	0	115	65	0	0	0	46	0	0
Total Analysis Volume [veh/h]	43	364	0	0	460	261	0	0	0	186	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance				No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00	0.00
d_M, Delay for Movement [s/veh]	8.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	92.75	88.57	10.29
Movement LOS	A	A			A	A				F	F	B
95th-Percentile Queue Length [veh]	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.41	7.41	0.00
95th-Percentile Queue Length [ft]	3.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	185.27	185.27	0.00
d_A, Approach Delay [s/veh]	0.89			0.00			0.00			92.75		
Approach LOS	A			A			A			F		
d_I, Intersection Delay [s/veh]	13.40											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 10: Golden Valley/SB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	50.4
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.753

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	450.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	170.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Base Volume Input [veh/h]	0	200	106	346	287	0	0	0	0	197	2	38
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	200	106	346	287	0	0	0	0	197	2	38
Peak Hour Factor	1.0000	0.9600	0.9600	0.9600	0.9600	1.0000	1.0000	1.0000	1.0000	0.9600	0.9600	0.9600
Other Adjustment Factor	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	52	0	90	75	0	0	0	0	51	1	10
Total Analysis Volume [veh/h]	0	208	0	360	299	0	0	0	0	205	2	40
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Free	Free	Stop
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.01	0.07
d_M, Delay for Movement [s/veh]	0.00	18.83	17.50	0.00	0.00	0.00	0.00	0.00	0.00	50.38	49.57	11.61
Movement LOS		C	C	A	A					F	E	B
95th-Percentile Queue Length [veh]	0.00	2.26	2.26	0.00	0.00	0.00	0.00	0.00	0.00	5.62	5.62	0.22
95th-Percentile Queue Length [ft]	0.00	56.59	56.59	0.00	0.00	0.00	0.00	0.00	0.00	140.50	140.50	5.49
d_A, Approach Delay [s/veh]	18.83			0.00			0.00			44.09		
Approach LOS	C			A			A			E		
d_I, Intersection Delay [s/veh]	13.29											
Intersection LOS	F											

Appendix B

Plus Project Conditions LOS Calculations

Intersection Level Of Service Report
Intersection 9: Golden Valley/NB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	76.7
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.678

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	0	0	0	0	0	1
Pocket Length [ft]	190.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	200.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Base Volume Input [veh/h]	30	374	0	0	599	158	0	0	0	80	0	331
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	0	63	9	0	0	0	0	0	21
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	30	377	0	0	662	167	0	0	0	80	0	352
Peak Hour Factor	0.9000	0.9000	1.0000	1.0000	0.9000	0.9000	1.0000	1.0000	1.0000	0.9000	0.9000	0.9000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Total 15-Minute Volume [veh/h]	8	105	0	0	184	46	0	0	0	22	0	0
Total Analysis Volume [veh/h]	33	419	0	0	736	186	0	0	0	89	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance				No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.68	0.00	0.00
d_M, Delay for Movement [s/veh]	9.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	76.73	70.11	10.68
Movement LOS	A	A			A	A				F	F	B
95th-Percentile Queue Length [veh]	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.71	3.71	0.00
95th-Percentile Queue Length [ft]	2.96	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	92.82	92.82	0.00
d_A, Approach Delay [s/veh]	0.68			0.00			0.00			76.73		
Approach LOS	A			A			A			F		
d_I, Intersection Delay [s/veh]	4.88											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 10: Golden Valley/SB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	142.7
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.105

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	450.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	170.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Base Volume Input [veh/h]	0	185	132	486	193	0	0	0	0	219	3	47
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	63	0	0	0	0	0	3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	185	132	549	193	0	0	0	0	222	3	47
Peak Hour Factor	1.0000	0.9200	0.9200	0.9200	0.9200	1.0000	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	50	0	149	52	0	0	0	0	60	1	13
Total Analysis Volume [veh/h]	0	201	0	597	210	0	0	0	0	241	3	51
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Free	Free	Stop
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.56	0.00	0.01	0.00	0.00	0.00	0.00	0.00	1.10	0.01	0.09
d_M, Delay for Movement [s/veh]	0.00	26.83	25.11	0.00	0.00	0.00	0.00	0.00	0.00	142.73	141.27	12.06
Movement LOS		D	D	A	A					F	F	B
95th-Percentile Queue Length [veh]	0.00	3.25	3.25	0.00	0.00	0.00	0.00	0.00	0.00	11.30	11.30	0.30
95th-Percentile Queue Length [ft]	0.00	81.16	81.16	0.00	0.00	0.00	0.00	0.00	0.00	282.54	282.54	7.46
d_A, Approach Delay [s/veh]	26.83			0.00			0.00			120.13		
Approach LOS	D			A			A			F		
d_I, Intersection Delay [s/veh]	31.34											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: Golden Valley/NB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	119.4
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.005

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	0	0	0	0	0	1
Pocket Length [ft]	190.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	200.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Base Volume Input [veh/h]	42	357	0	0	451	256	0	0	0	182	0	585
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	10	0	0	41	6	0	0	0	0	0	70
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	42	367	0	0	492	262	0	0	0	182	0	655
Peak Hour Factor	0.9800	0.9800	1.0000	1.0000	0.9800	0.9800	1.0000	1.0000	1.0000	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Total 15-Minute Volume [veh/h]	11	94	0	0	126	67	0	0	0	46	0	0
Total Analysis Volume [veh/h]	43	374	0	0	502	267	0	0	0	186	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance				No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.01	0.00	0.00
d_M, Delay for Movement [s/veh]	8.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	119.39	114.60	10.36
Movement LOS	A	A			A	A				F	F	B
95th-Percentile Queue Length [veh]	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.41	8.41	0.00
95th-Percentile Queue Length [ft]	3.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	210.26	210.26	0.00
d_A, Approach Delay [s/veh]	0.88			0.00			0.00			119.39		
Approach LOS	A			A			A			F		
d_I, Intersection Delay [s/veh]	16.45											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 10: Golden Valley/SB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	67.2
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.848

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	450.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	170.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Base Volume Input [veh/h]	0	200	106	346	287	0	0	0	0	197	2	38
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	41	0	0	0	0	0	10	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	200	106	387	287	0	0	0	0	207	2	38
Peak Hour Factor	1.0000	0.9600	0.9600	0.9600	0.9600	1.0000	1.0000	1.0000	1.0000	0.9600	0.9600	0.9600
Other Adjustment Factor	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	52	0	101	75	0	0	0	0	54	1	10
Total Analysis Volume [veh/h]	0	208	0	403	299	0	0	0	0	216	2	40
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Free	Free	Stop
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.85	0.01	0.07
d_M, Delay for Movement [s/veh]	0.00	20.31	18.90	0.00	0.00	0.00	0.00	0.00	0.00	67.24	66.25	11.82
Movement LOS		C	C	A	A					F	F	B
95th-Percentile Queue Length [veh]	0.00	2.48	2.48	0.00	0.00	0.00	0.00	0.00	0.00	7.03	7.03	0.23
95th-Percentile Queue Length [ft]	0.00	61.95	61.95	0.00	0.00	0.00	0.00	0.00	0.00	175.74	175.74	5.66
d_A, Approach Delay [s/veh]	20.31			0.00			0.00			58.64		
Approach LOS	C			A			A			F		
d_I, Intersection Delay [s/veh]	16.57											
Intersection LOS	F											

Appendix C

20-Year Horizon Baseline Conditions LOS Calculations

Intersection Level Of Service Report
Intersection 9: Golden Valley/NB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	485.1
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.743

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	0	0	0	0	0	1
Pocket Length [ft]	190.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	200.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Base Volume Input [veh/h]	30	374	0	0	599	158	0	0	0	80	0	331
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.40	1.40	1.00	1.00	1.40	1.40	1.00	1.00	1.00	1.40	1.40	1.40
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	42	524	0	0	839	221	0	0	0	112	0	463
Peak Hour Factor	0.9200	0.9200	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Total 15-Minute Volume [veh/h]	11	142	0	0	228	60	0	0	0	30	0	0
Total Analysis Volume [veh/h]	46	570	0	0	912	240	0	0	0	122	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance				No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.74	0.00	0.00
d_M, Delay for Movement [s/veh]	10.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	485.06	468.51	11.91
Movement LOS	B	A			A	A				F	F	B
95th-Percentile Queue Length [veh]	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.76	10.76	0.00
95th-Percentile Queue Length [ft]	4.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	268.89	268.89	0.00
d_A, Approach Delay [s/veh]	0.76			0.00			0.00			485.06		
Approach LOS	A			A			A			F		
d_I, Intersection Delay [s/veh]	31.56											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 10: Golden Valley/SB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	753.7
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.486

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	450.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	170.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Base Volume Input [veh/h]	0	185	132	486	193	0	0	0	0	219	3	47
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.40	1.40	1.40	1.40	1.00	1.00	1.00	1.00	1.40	1.40	1.40
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	259	185	680	270	0	0	0	0	307	4	66
Peak Hour Factor	1.0000	0.9200	0.9200	0.9200	0.9200	1.0000	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	70	0	185	73	0	0	0	0	83	1	18
Total Analysis Volume [veh/h]	0	282	0	739	293	0	0	0	0	334	4	72
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Free	Free	Stop
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	1.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	2.49	0.03	0.16
d_M, Delay for Movement [s/veh]	0.00	93.44	91.23	0.00	0.00	0.00	0.00	0.00	0.00	753.66	749.77	14.32
Movement LOS		F	F	A	A					F	F	B
95th-Percentile Queue Length [veh]	0.00	10.28	10.28	0.00	0.00	0.00	0.00	0.00	0.00	29.69	29.69	0.55
95th-Percentile Queue Length [ft]	0.00	256.91	256.91	0.00	0.00	0.00	0.00	0.00	0.00	742.34	742.34	13.83
d_A, Approach Delay [s/veh]	93.44			0.00			0.00			623.79		
Approach LOS	F			A			A			F		
d_I, Intersection Delay [s/veh]	163.63											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: Golden Valley/NB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	786.6
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.539

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	0	0	0	0	0	1
Pocket Length [ft]	190.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	200.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Base Volume Input [veh/h]	42	357	0	0	451	256	0	0	0	182	0	585
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.40	1.40	1.00	1.00	1.40	1.40	1.00	1.00	1.00	1.40	1.40	1.40
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	500	0	0	631	358	0	0	0	255	0	819
Peak Hour Factor	0.9800	0.9800	1.0000	1.0000	0.9800	0.9800	1.0000	1.0000	1.0000	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Total 15-Minute Volume [veh/h]	15	128	0	0	161	91	0	0	0	65	0	0
Total Analysis Volume [veh/h]	60	510	0	0	644	365	0	0	0	260	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance				No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.06	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	2.54	0.00	0.00
d_M, Delay for Movement [s/veh]	9.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	786.62	774.48	11.39
Movement LOS	A	A			A	A				F	F	B
95th-Percentile Queue Length [veh]	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	23.80	23.80	0.00
95th-Percentile Queue Length [ft]	5.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	594.95	594.95	0.00
d_A, Approach Delay [s/veh]	0.96			0.00			0.00			786.62		
Approach LOS	A			A			A			F		
d_I, Intersection Delay [s/veh]	111.51											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 10: Golden Valley/SB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	452.7
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.828

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	450.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	170.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Base Volume Input [veh/h]	0	200	106	346	287	0	0	0	0	197	2	38
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.40	1.40	1.40	1.40	1.00	1.00	1.00	1.00	1.40	1.40	1.40
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	280	148	484	402	0	0	0	0	276	3	53
Peak Hour Factor	1.0000	0.9600	0.9600	0.9600	0.9600	1.0000	1.0000	1.0000	1.0000	0.9600	0.9600	0.9600
Other Adjustment Factor	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	73	0	126	105	0	0	0	0	72	1	14
Total Analysis Volume [veh/h]	0	292	0	504	419	0	0	0	0	288	3	55
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Free	Free	Stop
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.82	0.00	0.01	0.00	0.00	0.00	0.00	0.00	1.83	0.02	0.12
d_M, Delay for Movement [s/veh]	0.00	48.11	46.37	0.00	0.00	0.00	0.00	0.00	0.00	452.69	449.78	14.02
Movement LOS		E	E	A	A					F	F	B
95th-Percentile Queue Length [veh]	0.00	7.22	7.22	0.00	0.00	0.00	0.00	0.00	0.00	21.69	21.69	0.41
95th-Percentile Queue Length [ft]	0.00	180.50	180.50	0.00	0.00	0.00	0.00	0.00	0.00	542.26	542.26	10.25
d_A, Approach Delay [s/veh]	48.11			0.00			0.00			382.94		
Approach LOS	E			A			A			F		
d_I, Intersection Delay [s/veh]	93.88											
Intersection LOS	F											

Appendix D

20-Year Horizon Plus Project Conditions LOS Calculations

Intersection Level Of Service Report
Intersection 9: Golden Valley/NB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	600.1
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.978

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	0	0	0	0	0	1
Pocket Length [ft]	190.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	200.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Base Volume Input [veh/h]	30	374	0	0	599	158	0	0	0	80	0	331
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.40	1.40	1.00	1.00	1.40	1.40	1.00	1.00	1.00	1.40	1.40	1.40
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	3	0	0	63	9	0	0	0	0	0	21
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	42	527	0	0	902	230	0	0	0	112	0	484
Peak Hour Factor	0.9200	0.9200	1.0000	1.0000	0.9200	0.9200	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Total 15-Minute Volume [veh/h]	11	143	0	0	245	63	0	0	0	30	0	0
Total Analysis Volume [veh/h]	46	573	0	0	980	250	0	0	0	122	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance				No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.98	0.00	0.00
d_M, Delay for Movement [s/veh]	10.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	600.11	580.47	11.94
Movement LOS	B	A			A	A				F	F	B
95th-Percentile Queue Length [veh]	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.51	11.51	0.00
95th-Percentile Queue Length [ft]	5.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	287.82	287.82	0.00
d_A, Approach Delay [s/veh]	0.78			0.00			0.00			600.11		
Approach LOS	A			A			A			F		
d_I, Intersection Delay [s/veh]	37.39											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 10: Golden Valley/SB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	901.8
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.801

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	450.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	170.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Base Volume Input [veh/h]	0	185	132	486	193	0	0	0	0	219	3	47
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.40	1.40	1.40	1.40	1.00	1.00	1.00	1.00	1.40	1.40	1.40
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	63	0	0	0	0	0	3	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	259	185	743	270	0	0	0	0	310	4	66
Peak Hour Factor	1.0000	0.9200	0.9200	0.9200	0.9200	1.0000	1.0000	1.0000	1.0000	0.9200	0.9200	0.9200
Other Adjustment Factor	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	70	0	202	73	0	0	0	0	84	1	18
Total Analysis Volume [veh/h]	0	282	0	808	293	0	0	0	0	337	4	72
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Free	Free	Stop
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	1.10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	2.80	0.03	0.16
d_M, Delay for Movement [s/veh]	0.00	126.99	124.56	0.00	0.00	0.00	0.00	0.00	0.00	901.82	897.11	14.84
Movement LOS		F	F	A	A					F	F	B
95th-Percentile Queue Length [veh]	0.00	11.97	11.97	0.00	0.00	0.00	0.00	0.00	0.00	31.60	31.60	0.58
95th-Percentile Queue Length [ft]	0.00	299.21	299.21	0.00	0.00	0.00	0.00	0.00	0.00	790.10	790.10	14.59
d_A, Approach Delay [s/veh]	126.99			0.00			0.00			747.15		
Approach LOS	F			A			A			F		
d_I, Intersection Delay [s/veh]	191.75											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 9: Golden Valley/NB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	900.0
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.779

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Approach	Northbound			Southbound			Eastbound			Northwestbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	1	0	0	0	0	0	0	0	0	0	0	1
Pocket Length [ft]	190.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	200.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 NB Ramps			US 395 NB Ramps		
Base Volume Input [veh/h]	42	357	0	0	451	256	0	0	0	182	0	585
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.40	1.40	1.00	1.00	1.40	1.40	1.00	1.00	1.00	1.40	1.40	1.40
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	10	0	0	41	6	0	0	0	0	0	70
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	510	0	0	672	364	0	0	0	255	0	889
Peak Hour Factor	0.9800	0.9800	1.0000	1.0000	0.9800	0.9800	1.0000	1.0000	1.0000	0.9800	0.9800	0.9800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
Total 15-Minute Volume [veh/h]	15	130	0	0	171	93	0	0	0	65	0	0
Total Analysis Volume [veh/h]	60	520	0	0	686	371	0	0	0	260	0	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Free	Free	Stop	Stop
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance				No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	2.78	0.00	0.00
d_M, Delay for Movement [s/veh]	9.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	899.98	886.29	11.47
Movement LOS	A	A			A	A				F	F	B
95th-Percentile Queue Length [veh]	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.74	24.74	0.00
95th-Percentile Queue Length [ft]	5.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	618.59	618.59	0.00
d_A, Approach Delay [s/veh]	0.96			0.00			0.00			899.98		
Approach LOS	A			A			A			F		
d_I, Intersection Delay [s/veh]	123.64											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 10: Golden Valley/SB Ramps

Control Type:	Two-way stop	Delay (sec / veh):	542.9
Analysis Method:	HCM 2010	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	2.026

Intersection Setup

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Approach	Northeastbound			Southwestbound			Northwestbound			Southeastbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Pocket	0	0	0	1	0	0	0	0	0	0	0	1
Pocket Length [ft]	100.00	100.00	100.00	450.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	170.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	Yes			Yes			Yes			Yes		

Volumes

Name	Golden Valley Rd			Golden Valley Rd			US 395 SB Ramps			US 395 SB Ramps		
Base Volume Input [veh/h]	0	200	106	346	287	0	0	0	0	197	2	38
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Growth Rate	1.00	1.40	1.40	1.40	1.40	1.00	1.00	1.00	1.00	1.40	1.40	1.40
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	41	0	0	0	0	0	10	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	0	280	148	525	402	0	0	0	0	286	3	53
Peak Hour Factor	1.0000	0.9600	0.9600	0.9600	0.9600	1.0000	1.0000	1.0000	1.0000	0.9600	0.9600	0.9600
Other Adjustment Factor	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	0	73	0	137	105	0	0	0	0	74	1	14
Total Analysis Volume [veh/h]	0	292	0	547	419	0	0	0	0	298	3	55
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Free	Free	Stop
Flared Lane	No			
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No			No
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.00	0.87	0.00	0.01	0.00	0.00	0.00	0.00	0.00	2.03	0.02	0.12
d_M, Delay for Movement [s/veh]	0.00	57.53	55.68	0.00	0.00	0.00	0.00	0.00	0.00	542.87	539.56	14.32
Movement LOS		F	F	A	A					F	F	B
95th-Percentile Queue Length [veh]	0.00	8.08	8.08	0.00	0.00	0.00	0.00	0.00	0.00	23.93	23.93	0.42
95th-Percentile Queue Length [ft]	0.00	202.07	202.07	0.00	0.00	0.00	0.00	0.00	0.00	598.26	598.26	10.59
d_A, Approach Delay [s/veh]	57.53			0.00			0.00			461.19		
Approach LOS	F			A			A			F		
d_I, Intersection Delay [s/veh]	112.13											
Intersection LOS	F											

PRELIMINARY HYDROLOGY REPORT

Axion
ENGINEERING
Civil Engineering • Land Development

HYDROLOGY MASTER PLAN FOR
GOLDEN MESA PROJECT
GOLDEN VALLEY
WASHOE COUNTY, NEVADA

Prepared for:

Moonlight Hills Estates, LLC
5390 Belazza Court
Reno, NV 89519

Prepared by:

DEW Hydrology
10180 Grizzly Hill Court
Reno, NV 89521

PROFESSIONAL ENGINEER-STATE OF NEVADA
DAVID E. WESTHOFF
Exp: 6-30-18
CIVIL
No. 17501

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1.0 INTRODUCTION

1.1 BACKGROUND

This report presents the results of a Hydrology Master Plan investigation for the proposed Golden Mesa project. The project is in Golden Valley, about 4 miles north of Reno (Figure 1). The project is in Section 11, T20N, R19E. It is east of Estates Road and north of East Golden Valley Road. The project consists of 3 parcels, APN 552-100-01 (southern), 552-050-01 (northern), and 552-092-20 (central). The study was conducted to determine flow rates at key sites in Golden Valley, evaluate the impacts of the proposed development and determine the size of proposed detention/retention basins.

1.2 DESCRIPTION OF GOLDEN VALLEY AND EXISTING DRAINAGE PATTERN

Golden Valley is located north of Reno and is in both the Washoe County and City of Reno spheres of influence. Development is proposed for 3 parcels within Washoe County's jurisdiction. The principal drainage feature of the area is Golden Valley Wash which flows east to west through the southern parcel. This parcel is the point at which storm runoff from the area east of Estates Road (about 2 square miles) collects before passing westward through culverts under Estates Road. The channel then turns northward toward Swan Lake. Estates Road and the west boundary of North Valleys High School form the west boundary of the study area, while the natural topographic divides form the north, east and south boundaries (Figure 2A).

The watershed affecting the development is roughly divided into 2 parts at the east-west boundary between the southern parcel (APN 552-100-01) and the central parcel (552-092-20), just north of East Golden Valley Road. The northern part of the drainage area affecting the project slopes southwest at a slope of about 3% in the flatter areas with slopes of up to 50% in the steeper hills. Offsite flows reach the project area from BLM land to the north and from developed areas to the east. This runoff flows southwestward generally towards the intersection of Estates Road and Golden Valley Road. In undeveloped areas the vegetation consists of sagebrush and grasses. Developed areas consist of large residential parcels typically 1 acre in size. These developed areas have numerous small drainage channels alongside streets that flow either north-south or east-west. The channels have small culverts under driveways that limit the channel's capacity. During significant storm events the capacity of these culverts is likely exceeded and shallow flow across lots and streets could occur. Watersheds in this area have the prefix GMN on Figure 2A.

The southern part is more densely developed with lots typically 0.25 acres in size. The land slopes generally southward at 10% or more, although developments have modified the slopes. Undeveloped areas are vegetated with sagebrush and grasses. The southern watershed contains North Valleys High School (NVHS), the Northridge, Northstar Ranch and Golden Highlands developments. On Figure 2A, Northstar Ranch watersheds have the prefix NR, Northridge has the prefix RDG, Golden Highlands has GH and the high school is NVHS. These developments and the high school have detention basins designed to mitigate their impacts on flow rates. Northstar has 3 (Northridge uses one of these to mitigate its impacts), Golden Highlands has 2 and NVHS has 1 pond. The drainage system of North Valley High School appears to have been designed to control the runoff from the areas south and east of the school. Its drainage system collects runoff from Golden Valley Highlands development, routes it through the NVHS detention basin and discharges it across and under Golden Valley Road to GMS-4, the southern parcel in the project (Parcel APN 552-100-01). Runoff from the far eastern portion of the watershed, including Northstar Ranch, is intercepted by a 42-inch culvert at the northeast corner of the NVHS campus (near the intersection of Spearhead and East Golden Valley Road) and routed west to the NVHS detention basin then to GMS-4. Because the NVHS drainage system was designed using lower rainfall values than are now recommended, the culvert near Spearhead and the detention basin may be undersized based on the current rainfall values. Runoff probably overtops East Golden Valley road at these locations. The runoff overtopping near the 42-inch culvert flows northwestward across East Golden Valley Road and flows generally westward along the road to Estates Road. The runoff spilling from the NVHS detention basin flows northward onto Golden Valley Road. Calculations indicate the the road has the capacity to intercept this stormwater and convey it west to storm drains about 500 feet west of Estates Road. Calculations for these two sites are shown in Appendix D. GMS-4 is the collecting point for runoff from all parts of the study area. The runoff then passes under Estates Road and turns north to Swan Lake. The culverts under Estates (18-inch and 36-inch RCPs) have limited capacity and during the 100 year event stormwater overtops Estates and re-enters a channel on the west side of Estates Road.

1.3 Proposed Project and Drainage

1.3.1 Northern Watersheds The parcels are planned to be developed with relatively large (30,000 sq. ft.) residential lots. Two detention/retention basins will be constructed to mitigate the impacts of development. One (DB-A) will be at the northwest corner of GMN-9 (the northern parcel) and the second (DB-B) will be near the south west corner of GMN-9. Runoff from the BLM land (watersheds GMN-5A and 5B) will be collected in an open channel and routed westward into DB-A.-The outflow from DB-A will be routed south in an open channel adjacent to Estates Road and discharged into DB-B. Runoff from offsite watersheds GMN-6 and -8 will be routed through GMN-9, combined with runoff from GMN-9, and also discharged into DB-B. DB-B will discharge into a piped system that will convey the flow through GMN-11 (the central parcel) and collect the runoff from GMN-11 and discharge into an engineered open channel on GMS-4 (southern parcel).

Storm runoff from further to the north and east, watersheds GMN-4 and -7, plus runoff from areas adjacent to Indian Lane, GMN-2 and -10, are modeled as reaching the intersection of Indian Lane and Estates Road. This is a simplification, as the runoff from these areas likely travel as sheet flow and will reach Estates Road over a wide area, not a point. However, we believe that this gives a realistic estimate of how much water will reach Estates Road from these areas, although it all may not reach Estates at Indian Lane.

Runoff from GMN-1 and -3 will combine at the northeast corner of GMS-4. It will be conveyed a short distance south to the proposed channel across GMS-4. GMS-3 runoff will collected in an open channel along the east boundary of GMS-4 and also conveyed to the proposed channel.

1.3.2 Southern Watersheds In the southern watersheds, improvements are planned for only GMS-4. Large lots similar to those planned for the other 2 parcels are proposed. Drainage improvements include an engineered channel to route flows from east to west through GMS-4.. A channel is also planned along the east boundary of GMS-4. This channel will collect runoff from GMN-1 and -3 and GMS-3 as described in section 1.3.1. It will also collect the stormwater crossing Golden Valley Road near the east ;boundary of NVHS. All of these flows will be conveyed to the east-west channel through GMS-4. This channel will have a 30 foot bottom width, 4:1 side slopes, and is capable of carrying the current effective FEMA flow rate of 960 cfs. The runoff from the NVHS outlet culverts will be piped from Golden Valley Road to the channel and discharge to it near Estates Road. This channel will also collect the flow from the piped system from Pond B. This flow will enter the channel upstream of Estates Drive. Figure 2B shows the proposed conditions drainage pattern.

1.4 FEMA Floodplains

The parcels are located on Flood Insurance Rate Map (FIRM) panel 32031C3027G (Figure 4). The north parcel is in Zone X (unshaded), outside the 100-year floodplain. The southern and central parcels are in Zone X and Zone AE, in the 100 year floodplain with flood elevations determined. The flood elevations range from 5092 to 5104 feet, 1988 datum. The effective FEMA 100-year flow rate in this area is 969 cfs in Golden Valley Wash. A Letter of Map Revision is currently being reviewed by FEMA. When approved, it will reduce the width of the FEMA floodplain (Figure 5).

2.0 PREVIOUS STUDIES

Nolte and Associates, Washoe County, Nevada, Flood Insurance Study Hydrologic Analysis – Final Project # SD0338 HO, 1998. This study calculated the flow rates and defined the flood plain that is the current effective flood plain shown on the Flood Insurance Rate Map (FIRM) for the subject parcels. Nolte used regression equations developed by the U.S. Geological Survey to calculate the flow rates at different locations within Golden Valley. For the upstream section of Golden Valley Wash, the 100 year (or 1% chance) flow rate is 136 cubic feet per second (cfs). At Spearhead Way, the flow rate increases to 969 cfs. This is the flow rate through the Golden Mesa south parcel. Downstream of the parcel, at Browning Way, the flow rate increases to 1,904 cfs. These flow rates were used in a hydraulic model along with channel cross sections to determine the floodplain for Golden Valley Wash.

Stantec, Stead Drainage Master Plan, August, 2000. Stead and surrounding areas are part of the North Valleys, as is Golden Valley. Stead is near Swan Lake (also known as Lemmon Lake), which is the terminus of Golden Valley Wash. Swan Lake is a closed basin which means that discharge from the lake is by evaporation or infiltration only. Stantec's study was done to provide information on flow rates and runoff volumes for the region for existing and future conditions. They developed a hydrologic model (HEC-1) for this purpose. In their model, the subject parcel and the area draining to it are included in a single watershed, labeled GV-1. This watershed also included additional area that doesn't discharge onto these parcels. The area of GV-1 is 3.13 square miles. In their model, the runoff rate from GV-1 was 497 cfs under existing conditions.

North Valleys Flood Control Hydrologic Analysis and Mitigation Options, Quad Knopf, March 30, 2007. This study was conducted to determine the regulatory water surface elevations in Swan Lake and another playa, Silver Lake, should be. They adopted the Stantec model with a few modifications. Watershed GV-1 has the same area in this model as in Stantec's, but the runoff coefficients, or runoff Curve Numbers (CN), were modified. Quad Knopf subcontracted a consultant to provide more precise information for calculating the curve numbers. In general, the curve numbers are lower than in Stantec's model, but include a percent impervious area that partially offsets the lower CN. This study did not include a 100-year, 24-hour storm event, so it provides helpful information (CN) but does not have model results to compare to other studies.

Hydrology Master Plan Tobler South Property, Nimbus Engineers, April, 2005. This report is a detailed hydrology report on the subject parcel, APN 552-100-01. This study analyzed the hydrology of this parcel and the area draining to it using a HEC-1 hydrologic model. It divided the drainage area into 11 watersheds in order to provide more detailed information of the flow rates at different locations. It calculated a 100 year flow rate of 287 cfs at the southwest corner of the project site. This is at the corner of Estates Road and Golden Valley Road. Currently, the water ponds here and then flows over Estates Road. In the proposed conditions model, it included 2 detention basins to mitigate the impacts of developing the parcel.

Hydrology Master Plan Golden Mesa North Project Revised, Quad Knopf, October, 2006. This report is a detailed hydrology report a parcel north of the Golden Mesa South property. It revises the area modeled in the Nimbus report on Tobler South slightly to provide more detail on the northern parcel. It divides the total watershed area of 2.25 square miles into 14 watersheds. The model for this project calculated a 100-year, 24-hour flow rate of 358 cfs at the southwest corner of the southern parcel, at Estates Drive and Golden Valley Road. The reason for the increase in the flow rate is that the Tobler South report used a rainfall value of 2.664 inches while the Golden Mesa North report used 4.07 inches. Hence, this report in essence supersedes the Tobler South report.

Marlin and Lemmon Channels Floodplain Analysis & Improvement Alternatives Final Report, Manhard, Feb., 2010. Manhard conducted a hydrologic and hydraulic analysis to evaluate means of mitigating the flood problems in Golden and Lemmon Valley. They used the EPA's SWMM hydrologic model to evaluate flow rates and the Corps of Engineers' HEC-RAS model to do hydraulic analysis. It appears that both GMN 9 and GMN 11 are in Manhard's Subbasin 14 which also includes additional area. The 100 year flow from Subbasin 14 is 91 cfs.

Master Drainage Study for Northstar Ranch Phases 1-4, Wood Rodgers, Nov. 22, 2005. This report analyzed the hydrology for the Northstar Ranch located at the southeast portion of the Golden Valley watershed. Four detention basins were included in the study to mitigate the impacts of the project.

Drainage Report for North Valleys High School, Odyssey Engineers, Nov. 1999. This report designed the drainage plan of the North Valleys High School (NVHS) and included a detention basin in their analysis. In the NVHS plan, much or all of the flow reaching Spearhead Drive is intercepted and routed west through the school property and into the detention basin. The basin discharges through a culvert under Golden Valley Road to Parcel 552-100-01.

Application for Letter of Map Revision Golden Mesa South Project Washoe County, Nevada, DEW Hydrology, June 8, 2017. When approved, this LOMR application will reduce the floodplain width of Golden Valley Wash through the southern parcel (GMS-4). This study uses the effective FEMA flow, 969 cfs, but uses newer and more detailed topographic data to reduce the floodplain width.

3.0 HYDROLOGIC ANALYSIS

3.1 Methodology

The U.S Army Corps of Engineers HEC-1 (v. 4.1R) computer program was used in this analysis. This program incorporates watershed area, time of concentration, curve number and precipitation data to compute peak flow rates and runoff volumes. These parameters and the values used in the model are discussed below. Procedures described in the Truckee Meadows Regional Drainage Manual (Manual) were followed in this analysis. A summary of the parameters is shown in Tables 1A, 1B, and 2.

Models were developed for the 100-year and 5-year events for existing and proposed conditions. The models are presented in Appendix C. In addition to maintaining peak flow rates at or below existing rates, the runoff volume must also be controlled. The increase in the 100-year, 10-day storm volume must be retained on site. The 10-day storm models are also in appendix C.

3.2 Rainfall Depth and Distribution

Rainfall data was obtained from National Weather Service Website http://dipper.nws.noaa.gov/hdsc/pfds/sa/nv_pfds.html.. For this study, the the 100-year, 24-hour value of 3.97 inches was used in the northern portion and 3.87 in the southern portion of the watershed. The 5-year, 24-hour precipitation depth is 2.19 inches in the north and 2.14 inches in the south. A balanced storm distribution was used in this study.

3.3 Watershed Delineation

The Golden Mesa watershed boundaries are based on existing topography as well as subdivision grading, roads, ditches and other man-made features. The watershed affecting the proposed project area was divided into 25 sub-watersheds (Figure 2).

3.4 Runoff Curve Number

To calculate the runoff curve number (CN), the soil types within each sub-watershed were identified by hydrologic soil groups. Soils have been classified by the U.S. National Resource Conservation Service (NRCS) into 4 hydrologic soil groups: A, B, C, and D. Infiltration rates decrease from soil groups A through D. Group A soils have a rapid infiltration rate and include very porous soils such as sands. Groups B and C have intermediate infiltration rates. Group D soils have a very slow infiltration rate which results in a larger percentage of the rainfall contributing to runoff. The hydrologic soil groups were obtained from the NRCS web soil survey found at http://websoilsurvey.nrcs.usda.gov/app. The soils map (Figure 3) shows that soils affecting the project fall mostly into soil groups C and D, with some A.

Relative soil moisture content is described in the NRCS methodology by the term "antecedent moisture condition" or AMC. Three different relative conditions are describe by the NRCS, AMC I, II and III. AMC I is an extremely dry condition and infiltration rates for the soil are near their maximum. AMC III is a saturated condition with limited infiltration and AMC II is an average condition. As prescribed in the Truckee Meadows Regional Drainage Manual (Manual), AMC II was used in this analysis. Vegetation also is a factor in evaluating curve number. An investigation of the site showed that the vegetation type in the study area is sagebrush and cheatgrass in fair condition. The developed areas around Golden Mesa North are developed with a typical lot size of 1 acre. Golden Mesa North will have 30,000 square foot lots.

Curve numbers were based on the characteristics described above and Table 702 of the Manual. Curve number calculations are shown in Appendix B.

3.5 Watershed Lag Time

Watershed time of concentration is the time it takes for water to reach the watershed outlet from the most hydraulic distant point in the watershed. The watershed lag time is used for the SCS methodology in the HEC-1 program. Using the SCS methodology, the lag time (TLAG) is equal to 0.6 times the time of concentration (T_c), or TLAG = $0.6 \times T_c$.

Table 703 and Figure 701 from the Regional Drainage Manual were used to calculate time of concentration for most watersheds. Calculations are presented in Appendix B.

3.6 Hydrograph Routing

Channel and overland flow routing were performed with the Muskingum-Cunge method. This method takes into account channel characteristics such as shape, slope, length and roughness.

3.7 Summary of Existing Conditions

Tables 1A and 1B show the watershed parameters under existing conditions.

TABLE 1A. WATERSHED PARAMETERS, GOLDEN MESA NORTH WATERSHEDS				
WATERSHED	AREA, ACRES	AREA, SQ. MI.	CURVE NO.	LAG TIME, HR
GMN1	64.67	0.104	75	0.27
GMN2	25.67	0.040	79	0.29
GMN3	178.13	0.278	64	0.42
GMN4	149.18	0.233	64	0.36
GMN5A	44.46	0.069	74	0.24
GMN5B	49.07	0.077	64	0.23
GMN6	7.93	0.012	77	0.2
GMN7	40.02	0.063	54	0.21
GMN8	17.4	0.027	54	0.12
GMN9	97.45	0.152	65	0.31
GMN10	6.67	0.01	79	0.05
GMN11	18.5	0.029	70	0.19
GMN12	7.6	0.01	79	0.11

TABLE 1B. WATERSHED PARAMETERS, GOLDEN MESA SOUTH WATERSHEDS				
WATERSHED	AREA, ACRES	AREA, SQ. MI.	CURVE NO.	LAG TIME, HR
GMS-1	46.79	0.073	75	0.26
GMS-2	90.7	0.142	77	0.33
GMS-3	128.09	0.20	63	0.34
GMS-4	34.64	0.054	70	0.19
NR-1	40.26	0.063	87	0.18
NR-2	15.96	0.025	68	0.16
RDG-1	26	0.041	78	0.16
GH-1	5.7	0.009	85	0.12
GH-2	22.54	0.035	78	0.17
GH-3	32.28	0.050	78	0.21
GH-4	17.39	0.027	79	0.17
GH-5	62.39	0.097	80	0.2
NVHS	74.5	0.116	89	0.18

3.8 Proposed Conditions

Proposed conditions improvements are detailed in Section 1.3 and summarized below. The sub-watersheds proposed for development are GMN-9 (North), GMN-11 (Central) and GMS-4 (South). The proposed conditions parameters for these are shown in Table 2.

TABLE 2. WATERSHED PARAMETERS, PROPOSED CONDITIONS				
WATERSHED	AREA, ACRES	AREA, SQ. MI.	CURVE NO.	LAG TIME, HR
GMN-9	97.45	0.152	76	0.32
GMN-11	18.50	0.029	80	0.17
GMS-4	34.64	0.054	80	0.18

To mitigate the impacts of developing these sub-watersheds, 2 detention basins are planned for the project (Figure 2B). Pond A is at the northwest corner of GMN-9, near Estates Road. Pond B is near the southwest corner of GMN-9. In addition, an engineered channel will be constructed through the southern parcel, GMS-4. This channel will flow from east to west collecting runoff from the east, north and south. It will end at the Estates Drive culverts. The channelized area upstream of the Estates Road culverts will be designed for use in detention/retention. The detention basins were first sized to mitigate the impacts of the project on peak flow rates, then modified to retain the increase in runoff volume as described in Section 3.10.

3.9 24-Hour Storm Results

Seven key design points (DP) were established to compare flow rates for existing and proposed conditions. These are shown on Figures 2A and 2B and are described below.

DP-1 is at the northwest corner of GMN-9 and is the flow from offsite watershed GMN-5B under existing conditions and the outflow from Pond A under proposed conditions. This is the flow reaching Estates Road at the northern boundary of the project.

DP-2 is near the southwest corner of GMN-9 and is the flow rate that exits the northern portion of the project to Estates Road under existing conditions. Under proposed conditions, this is the flow leaving Pond B and is piped southward to the southern parcel.

DP-3 is at the intersection of Indian Lane and Estates Drive. This is the flow that travels south adjacent to Estates Drive.

DP-4 is at the southern boundary of GMN-11 and is the flow rate leaving the central parcel.

DP-5 is at the point where the channel along Estates Drive enters the south parcel.

DP-6 is at the inlets to the culverts under Estates Drive and is the total flow from all watersheds, both north and south.

DP-7 is on the west side of Estates Drive, at the outlet of the Estates Drive culverts. This is the flow leaving the Golden Mesa Project and continuing to Swan Lake.

Table 4 shows the flow rates under existing and proposed conditions from the 24-hour event models.

TABLE 3. Results From 24-Hour Storm Events, Flow Rates in cfs

Design Point	5-Year Storm		100-Year Storm	
	Existing	Proposed	Existing	Proposed
DP-1	1	2	31	11
DP-2	3	7	63	55
DP-3	12	8	142	38
DP-4	2	8	19	33
DP-5	19	10	230	95
DP-6	57	63	620	538
DP-7	57	60	594	538

3.10 10-Day Storm Analysis

The ten day storm depth of 8.91 inches was used to determine the volume increase from the 3 parcels proposed for development. The results are shown in Table 4.

TABLE 4. RUNOFF VOLUMES FROM 10-DAY STORM IN ACRE-FEET			
SUB-WATERSHED	EXISTING COND.	PROPOSED COND.	INCREASE
GMN-9 (North)	22.6	31.5	8.9
GMN-11 (Central)	5.1	6.7	1.6
GMS-4 (South)	9.4	12.4	3.0

Table 4 shows that 13.5 acre-feet must be retained onsite to mitigate the impact on runoff volume. Percolation tests were conducted at the sites of proposed retention/detention basins to determine if they were suitable for retention and estimate the amount of time it would take to infiltrate the stored water. At Detention Basins A and B the percolation rates were 1 in/hour. Two tests were run on the south parcel. Near the Estates Road culverts the rate was 2.25 in/hour and a test near the east property boundary the rate was 0.75 in/hour. Storing water to a depth of 4.5 feet in Ponds A and B will account for the necessary storage. Since 4.5 ft = 54 inches, the water would percolate in 54 hours, within the 72 hour limit.

4.0 SEDIMENTATION ANALYSIS

4.1 Sedimentation

A sedimentation study was conducted for the onsite watersheds and the offsite watersheds north and east of the Golden Mesa project. The area south of Golden Valley Road is almost entirely developed and the area drains into detention basins south of the Road, so we do not believe that significant amounts of sediment will reach Golden Mesa from that area. The Modified Universal Soil Loss Equation (MUSLE) as described in section 1305.3.4 of the Manual was used. Nine locations where sediment could enter the project site were identified and analysis conducted for them. The peak flow rates and flow volumes needed in the analysis were obtained from HEC-1 analysis of the 100-year, 50-year, 25-year, 10-year and 2-year storm events. Basic soils information was obtained from the National Resources Conservation Service (NRCS) website. The soil erodibility factor, K, ranges from 0.1 to 0.32. The average annual water yield, 15 mm or 0.05 feet, was estimated from Plate 3A of Surface Water Hydrology (Wolman and Riggs, 1990). The sediment calculations are shown in Appendix E. The 9 locations and the average annual sediment yield and the yield during the 100-year event are shown in Table 6.

TABLE 5. Results From Sedimentation Analysis, Volumes in Cubic Yards			
Point	Source of Sediment	100-year Volume	Ave. Annual Volume
5B	GMN-5B	3.5	0.66
5A	GMN-5A	5.8	1.5
6	GMN-6	0.7	0.5
9	GMN-9	2.9	1.1
10+12	GMN-10+GMN-12	0.75	0.3
4+7+2	GMN-4+GMN-7+GMN2	5.6	2.7
3+1	GMN-3+GMN-1	16.5	7.8
11	GMN-11	1.5	0.4
10+12	GMN10+12	0.75	0.3

The calculations and models are shown in Appendix E. The maximum volume of sediment at any location during a 24-hour storm is 16.5 cubic yards. This is equal to 445.5 cubic feet. If this entire volume came during a 3-minute period of the storm, the peak flow would be increased by only 2.5 cfs. All channels and detention/retention basins have adequate capacity to handle this increase. The detention/retention basins also have the capacity to contain the 3 year volumes. For example, 5B and 5A enter into Pond A. Their combined total of sediment over 3 years is 27.9 cubic yards. This is equal to 753.3 cubic feet or 0.02 acre-feet and this pond is designed to store at least 3.8 acre-feet. Therefore a regular inspection program consisting of inspecting the facilities annually and after significant events, and performing routine maintenance should keep the facilities functioning properly.

5.0 HYDRAULIC ANALYSIS

5.1 South Parcel Channel

A channel is proposed to convey water from east to west across the southern parcel. It will originate at the east parcel boundary and terminate at Estates Road, discharging to the existing 18-inch and 36-inch culverts under Estates Road. The channel will have a 30-inch base and have 4:1 side slopes. Two drop structures and one road crossing are planned for this channel. A HEC-RAS model was prepared to evaluate the capacity of the channel. This model is presented in Appendix F. The model results show that this channel can convey any expected flows, even the current FEMA flow rate of 960 cfs with adequate freeboard.

6.0 FINDINGS

The findings of this study are:

- Stormwater from the watershed impacting the Golden Mesa project currently collects on GMS-4 in the northeast corner of the intersection of East Golden Valley Road and Estates Road. It then flows westward under Estates Road. In extreme events, it may overtop Estates Road. The stormwater eventually reaches Swan Lake.
- The development of 3 parcels for the Golden Mesa Project will increase the peak runoff rates and volumes from the parcels.
- The impacts on the regional flow rate will be mitigated by two planned detention/retention basins and channels.
- The 5-year flow rate leaving the project site will increase by 3 cfs.
- 5-year and 100-year flow rates in the channel adjacent to Estates Road will be reduced.
- The 100-year flow rate leaving the site will be reduced by 56 cfs.
- The increase in stormwater volume can be retained on site through the use of detention/retention basins. Percolation tests indicate that the stored water will infiltrate within the required 72 hours.
- The proposed facilities are designed to function even with the estimated sediment load.
- The project as proposed can be constructed without increasing the flood hazard to adjacent or downstream residents.

7.0 REFERENCES

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Quad Knopf, Hydrology Master Plan Golden Mesa North Project Revised, October, 2006.

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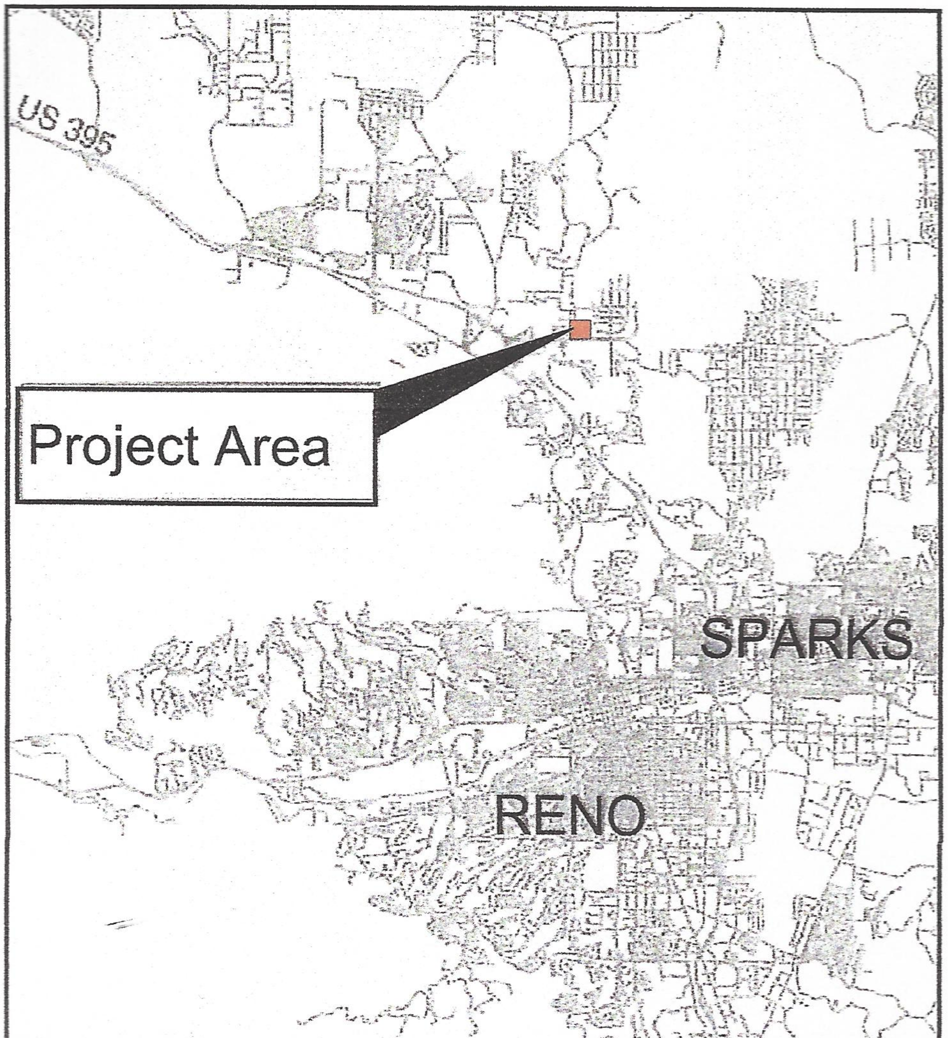
Washoe County, City of Reno, City of Sparks, Truckee Meadows Regional Drainage Manual, April, 2009.

Wood Rodgers, Master Drainage Study for Northstar Ranch Phases 1-4, Nov. 22, 2005

APPENDIX A

FIGURES



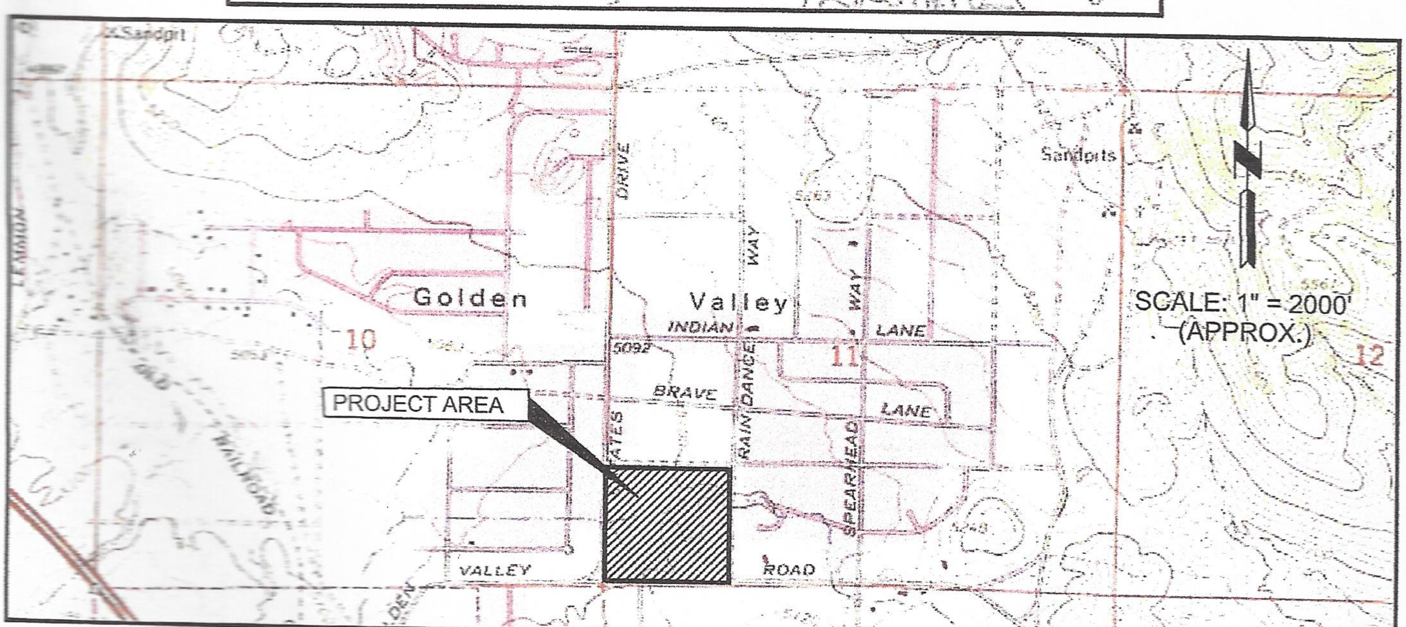
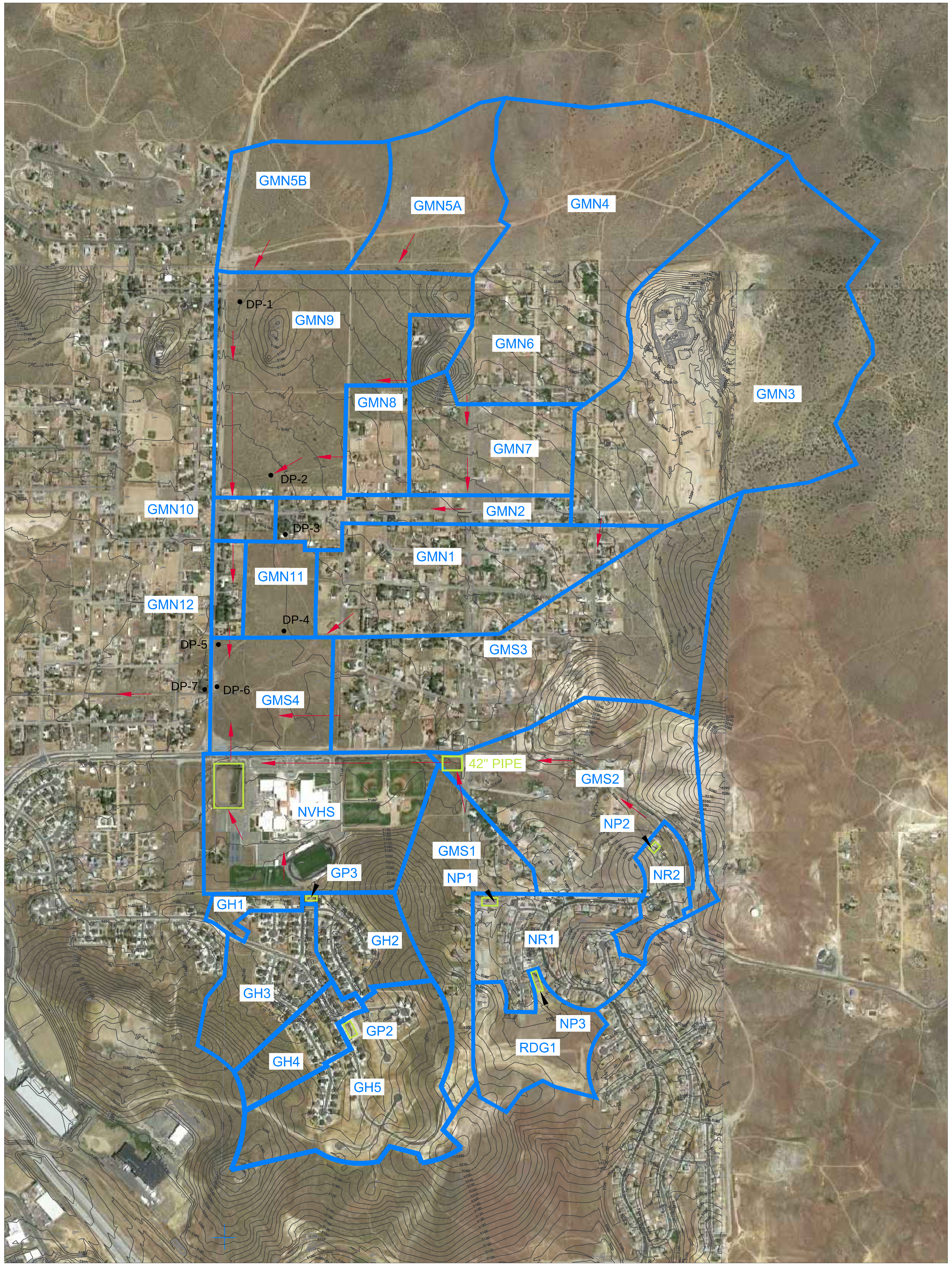


FIGURE 1
Vicinity Map
Golden Mesa South
Washoe County, Nevada
July, 2016

DEW Hydrology
10180 Grizzly Hill Court
Reno, Nevada 89521
Phone: (775) 815-2293



LEGEND

Project Boundary

GV2 Subbasin Boundary & Label

Proposed Open Channel

Proposed Pipeline

Existing Detention Basin

Proposed Detention Basin

Flow Direction

● DP-1 Design Point

0 300' 600' 1200'

PRELIMINARY
NOT FOR CONSTRUCTION
FOR REVIEW SEPT□11□201□

DEW Hydrology

10180 Grizzly Hill Court
Reno, nevada 89521
Phone: (775) 815-2293

NEVADA

H□dr□□□□□□□r□M□□E□□□□□□□□d□□□□

GOLDEN MESA MASTER PLAN

□ASHOE □OUNT□

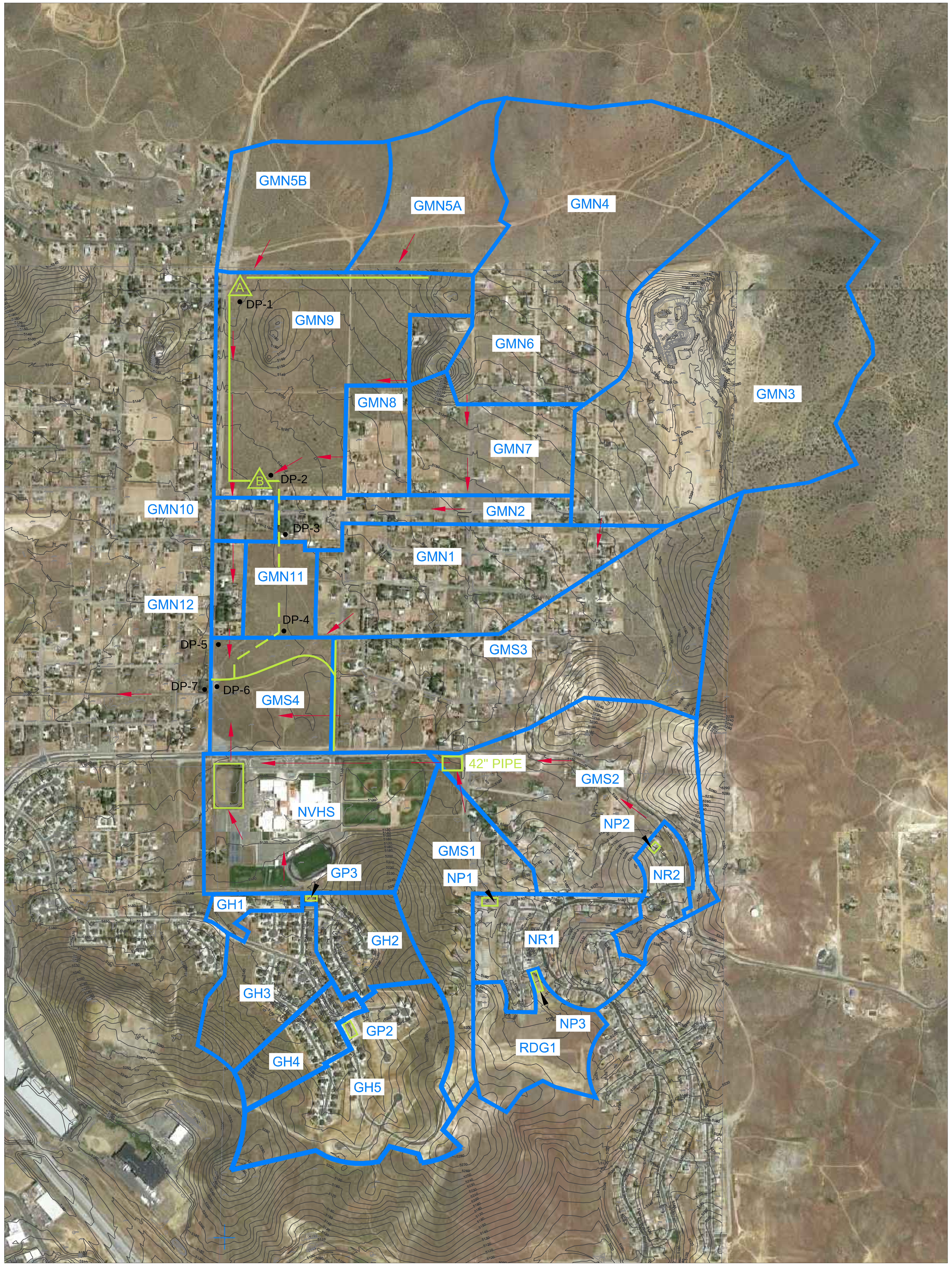
RENO

SHEET REVISIONS		
NO□	DES□RIPTION□DATE	B□

□OB NO□	
DESIGNED	D□□□
DRA□N	S□R□M□
□HE□□ED	
DATE	

FIGURE 2A

O□ SHEETS



LEGEND

Project Boundary

GV2 Subbasin Boundary & Label

Proposed Open Channel

Proposed Pipeline

Existing Detention Basin

Proposed Detention Basin

Flow Direction

DP-1 Design Point

0 300' 600' 1200'

PRELIMINARY NOT FOR CONSTRUCTION

DEW Hydrology
10180 Grizzly Hill Court
Reno, nevada 89521
Phone: (775) 815-2293

GOLDEN MESA MASTER PLAN

RENO WASHOE COUNTY NEVADA

SHEET REVISIONS

NO.	DESCRIPTION	DATE	BY

JOB NO.

DESIGNED

DRAWN

CHECKED

DATE

FIGURE 2B

OF SHEETS

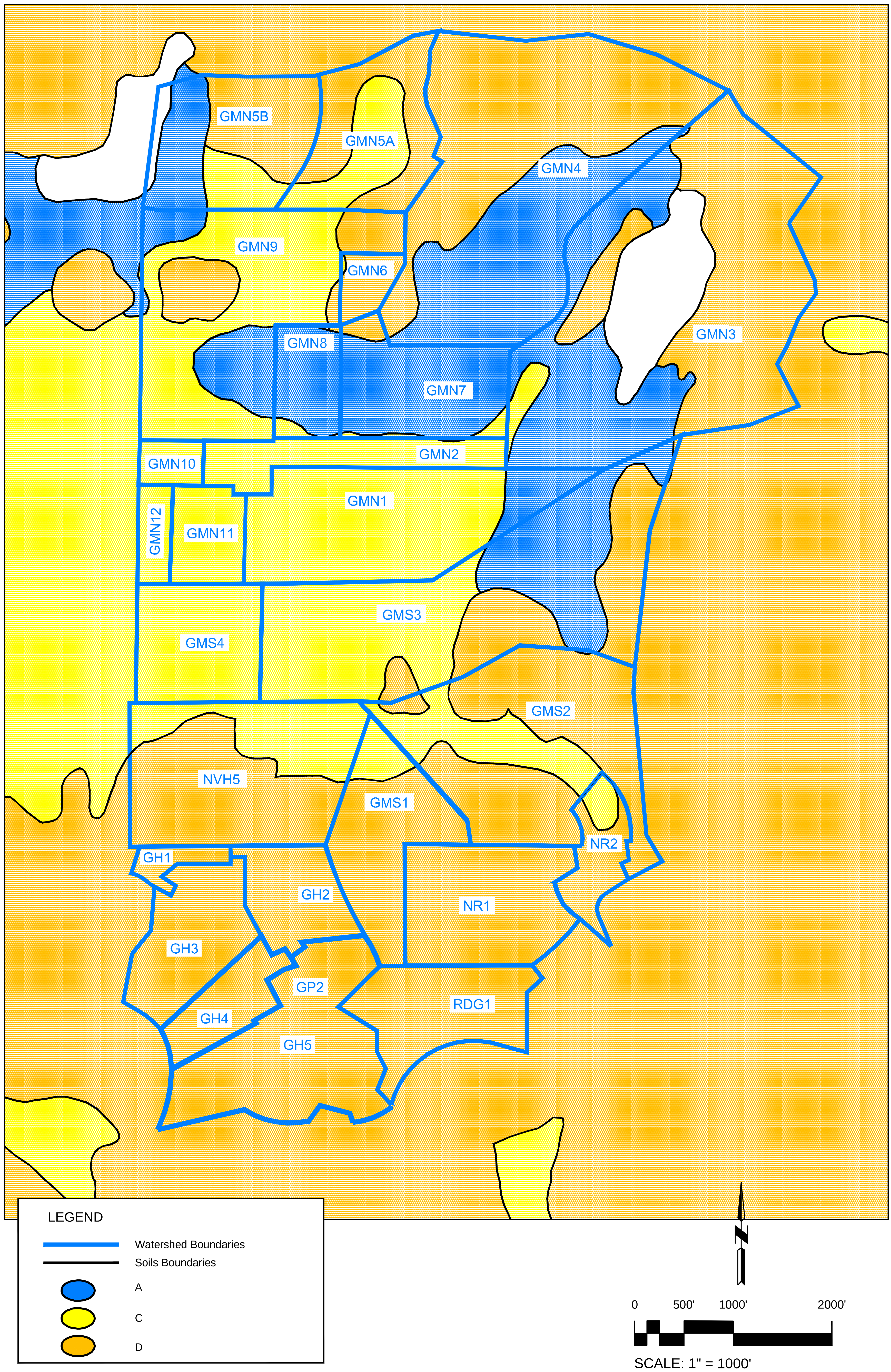


FIGURE 3
Soils Map
Golden Mesa Master Plan
Reno, Nevada
September 7, 2017

DEW Hydrology
10180 Grizzly Hill Court
Reno, Nevada 89521
Phone: (775) 815-2293

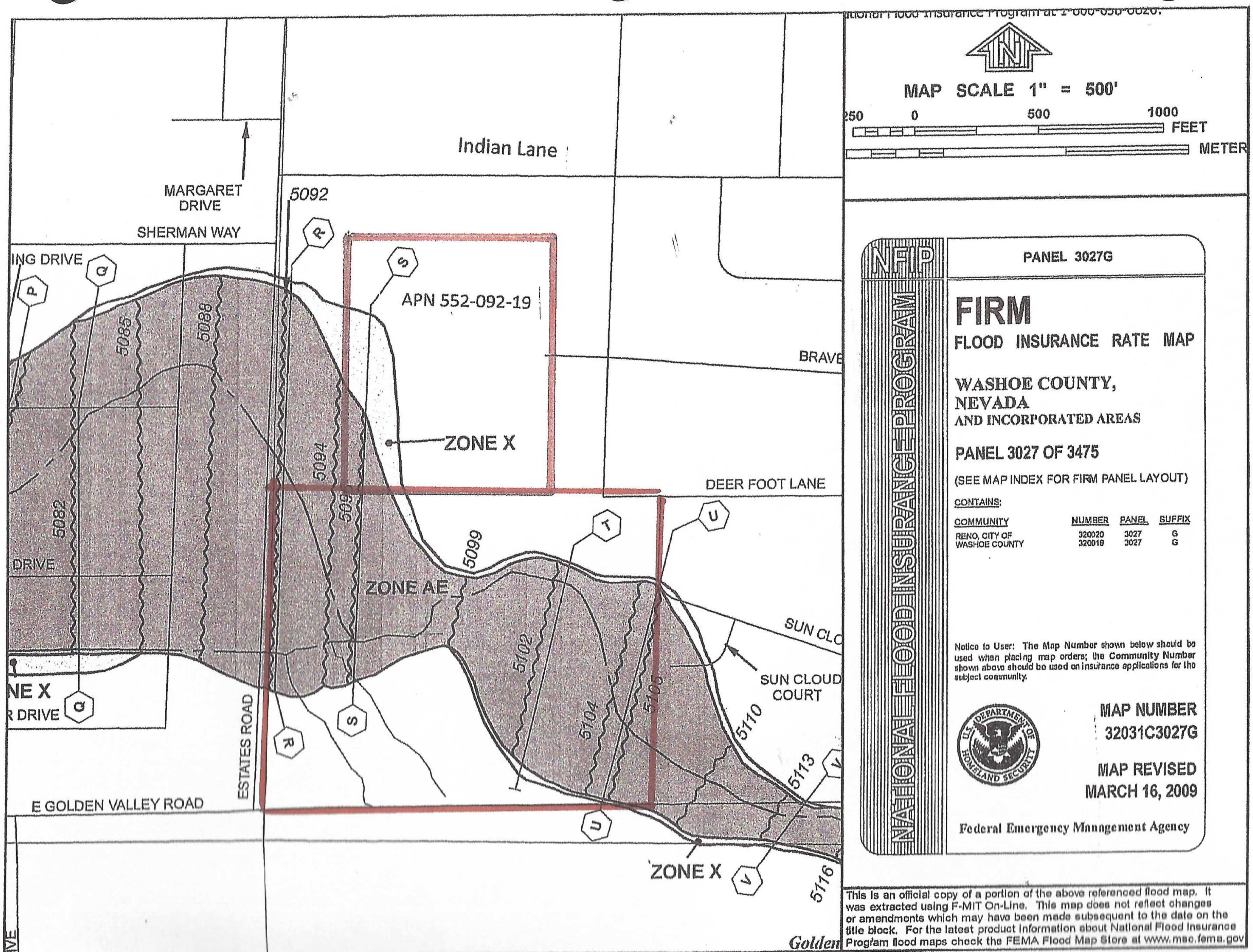
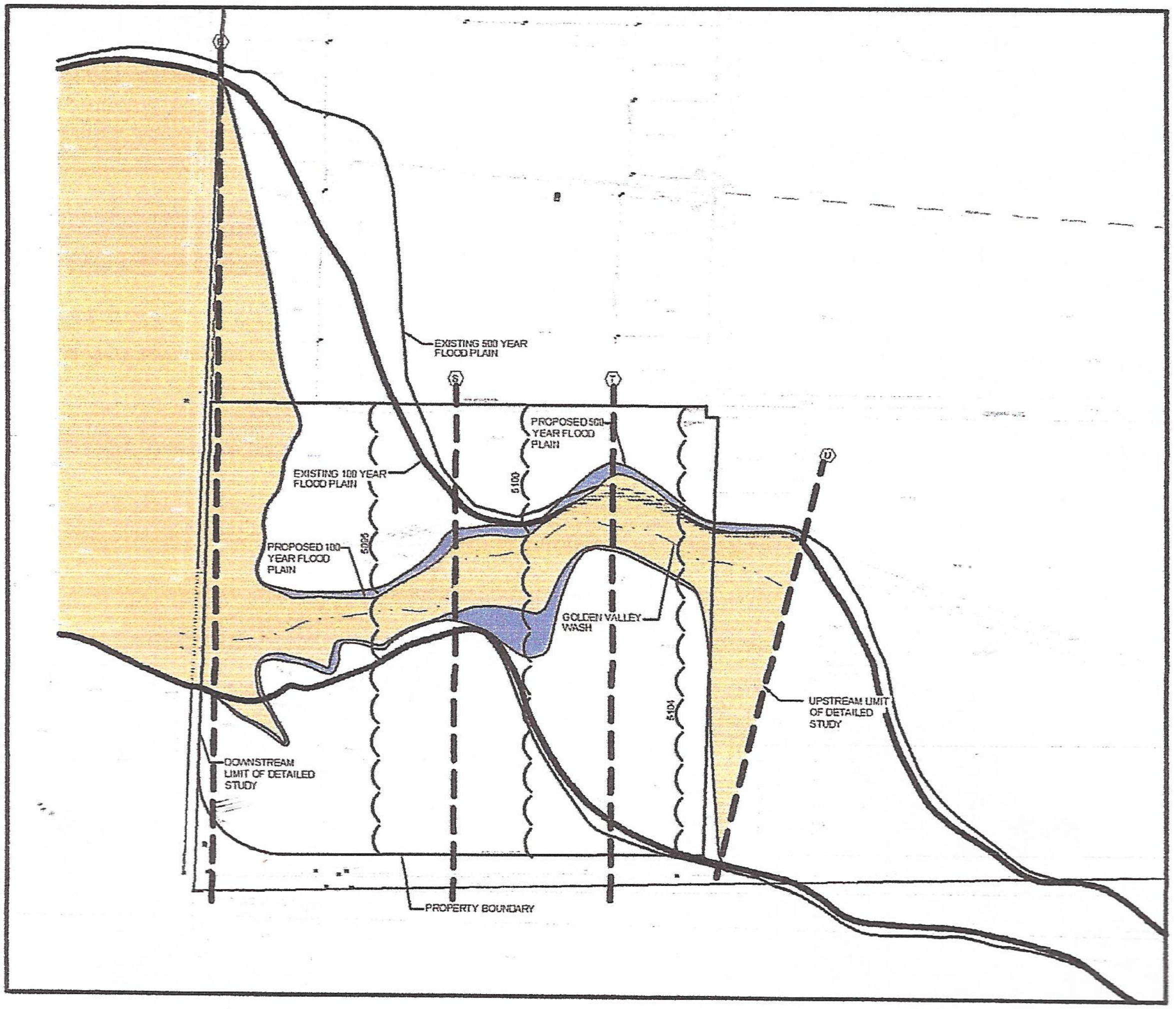

MAP SCALE 1" = 500'
250 0 500 1000
FEET
METER
Indian Lane
MARGARET DRIVE
SHERMAN WAY
5092
APN 552-092-19
ZONE X
BRAVE
DEER FOOT LANE
ZONE AE
5082
5085
5088
5094
5099
5102
5104
5105
5110
5113
5116
SUN CLOUD COURT
ESTATES ROAD
E GOLDEN VALLEY ROAD
ZONE X
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 3027G
FIRM
FLOOD INSURANCE RATE MAP
WASHOE COUNTY, NEVADA
AND INCORPORATED AREAS
PANEL 3027 OF 3475
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
RENO, CITY OF 320020 3027 G
WASHOE COUNTY 320019 3027 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 32031C3027G
MAP REVISED MARCH 16, 2009
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FIGURE 4



ANNOTATED FIRM MAP

SCALE: 1"=500'

SCALE: 1" = 500'

ELEVATION DATUM: 1988 NGVD

NEVADA STATE PLANE COORDINATE

FIGURE 5
Annotated Firm Map
Golden Mesa South LOMR
Reno, Nevada
February 7, 2017

ANNOTATED FIRM MAP

DEW Hydrology
10180 Grizzly Hill Court
Reno, Nevada 89521
Phone: (775) 815-2293

APPENDIX B

SUPPORTING CALCULATIONS

NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.6079°, Longitude: -119.8263°
Elevation: 5101.59 ft**
* source: ESRI Maps
** source: USGS

9-5-17

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

North

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.102 (0.086-0.117)	0.126 (0.107-0.147)	0.168 (0.144-0.198)	0.209 (0.178-0.248)	0.278 (0.231-0.334)	0.343 (0.276-0.417)	0.421 (0.328-0.520)	0.516 (0.387-0.652)	0.672 (0.475-0.879)	0.817 (0.553-1.09)
10-min	0.154 (0.131-0.177)	0.192 (0.163-0.224)	0.256 (0.219-0.302)	0.318 (0.271-0.377)	0.423 (0.351-0.508)	0.522 (0.421-0.635)	0.640 (0.500-0.792)	0.785 (0.589-0.992)	1.02 (0.724-1.34)	1.24 (0.842-1.67)
15-min	0.192 (0.162-0.220)	0.238 (0.202-0.277)	0.318 (0.271-0.374)	0.395 (0.336-0.468)	0.525 (0.436-0.630)	0.647 (0.521-0.787)	0.793 (0.619-0.981)	0.973 (0.729-1.23)	1.27 (0.897-1.66)	1.54 (1.04-2.07)
30-min	0.258 (0.218-0.296)	0.321 (0.272-0.374)	0.428 (0.365-0.504)	0.532 (0.452-0.630)	0.707 (0.587-0.849)	0.871 (0.702-1.06)	1.07 (0.834-1.32)	1.31 (0.982-1.66)	1.71 (1.21-2.23)	2.08 (1.41-2.78)
60-min	0.320 (0.270-0.367)	0.397 (0.337-0.462)	0.530 (0.452-0.624)	0.658 (0.560-0.779)	0.875 (0.727-1.05)	1.08 (0.869-1.31)	1.32 (1.03-1.64)	1.62 (1.22-2.05)	2.11 (1.50-2.76)	2.57 (1.74-3.44)
2-hr	0.424 (0.376-0.484)	0.526 (0.469-0.603)	0.673 (0.593-0.774)	0.803 (0.698-0.923)	1.00 (0.850-1.16)	1.19 (0.979-1.39)	1.40 (1.13-1.66)	1.68 (1.30-2.07)	2.19 (1.62-2.79)	2.69 (1.91-3.48)
3-hr	0.516 (0.463-0.582)	0.641 (0.580-0.726)	0.800 (0.719-0.905)	0.931 (0.828-1.06)	1.12 (0.977-1.27)	1.28 (1.10-1.48)	1.48 (1.25-1.73)	1.76 (1.45-2.09)	2.25 (1.80-2.82)	2.71 (2.11-3.51)
6-hr	0.753 (0.680-0.841)	0.941 (0.848-1.05)	1.16 (1.04-1.30)	1.33 (1.18-1.49)	1.54 (1.36-1.74)	1.70 (1.48-1.94)	1.87 (1.61-2.15)	2.07 (1.75-2.41)	2.47 (2.05-2.92)	2.89 (2.36-3.55)
12-hr	1.03 (0.927-1.15)	1.29 (1.16-1.44)	1.62 (1.45-1.81)	1.88 (1.67-2.10)	2.21 (1.95-2.50)	2.47 (2.15-2.81)	2.74 (2.35-3.15)	3.00 (2.53-3.50)	3.36 (2.76-3.99)	3.66 (2.94-4.41)
24-hr	1.36 (1.23-1.53)	1.71 (1.54-1.92)	2.17 (1.95-2.43)	2.55 (2.28-2.85)	3.07 (2.73-3.44)	3.49 (3.08-3.92)	3.93 (3.44-4.44)	4.39 (3.80-4.99)	5.02 (4.27-5.76)	5.53 (4.63-6.41)
2-day	1.67 (1.49-1.90)	2.11 (1.88-2.40)	2.72 (2.41-3.09)	3.22 (2.84-3.65)	3.93 (3.44-4.47)	4.50 (3.91-5.15)	5.11 (4.38-5.89)	5.76 (4.88-6.69)	6.68 (5.54-7.87)	7.42 (6.05-8.87)
3-day	1.83 (1.62-2.08)	2.32 (2.06-2.64)	3.02 (2.68-3.44)	3.61 (3.18-4.11)	4.44 (3.87-5.07)	5.12 (4.43-5.87)	5.86 (5.00-6.76)	6.64 (5.59-7.72)	7.76 (6.39-9.15)	8.68 (7.02-10.4)
4-day	1.98 (1.75-2.26)	2.53 (2.23-2.88)	3.33 (2.94-3.80)	3.99 (3.51-4.56)	4.95 (4.31-5.67)	5.74 (4.95-6.59)	6.60 (5.61-7.63)	7.52 (6.30-8.75)	8.85 (7.24-10.4)	9.94 (8.00-11.9)
7-day	2.35 (2.06-2.72)	3.01 (2.63-3.49)	4.02 (3.50-4.65)	4.83 (4.19-5.60)	6.00 (5.15-6.97)	6.95 (5.91-8.11)	7.98 (6.72-9.38)	9.07 (7.54-10.7)	10.6 (8.65-12.8)	11.9 (9.55-14.5)
10-day	2.67 (2.33-3.08)	3.43 (3.00-3.96)	4.58 (3.99-5.29)	5.50 (4.78-6.35)	6.78 (5.84-7.86)	7.81 (6.67-9.08)	8.91 (7.53-10.4)	10.1 (8.39-11.9)	11.7 (9.56-13.9)	13.0 (10.5-15.6)
20-day	3.45 (3.03-3.97)	4.44 (3.89-5.11)	5.90 (5.16-6.79)	7.03 (6.13-8.09)	8.57 (7.42-9.87)	9.76 (8.40-11.3)	11.0 (9.38-12.8)	12.3 (10.4-14.4)	14.1 (11.7-16.8)	15.5 (12.7-18.6)
30-day	4.12 (3.61-4.75)	5.30 (4.66-6.13)	7.04 (6.16-8.13)	8.38 (7.31-9.66)	10.2 (8.84-11.8)	11.6 (9.99-13.4)	13.1 (11.1-15.2)	14.6 (12.3-17.1)	16.6 (13.9-19.7)	18.3 (15.0-21.8)
45-day	4.98 (4.36-5.64)	6.42 (5.63-7.28)	8.50 (7.44-9.63)	10.1 (8.78-11.4)	12.1 (10.5-13.8)	13.7 (11.8-15.6)	15.3 (13.1-17.6)	16.9 (14.4-19.5)	19.2 (16.1-22.3)	20.9 (17.3-24.5)
60-day	5.73 (4.99-6.51)	7.43 (6.48-8.44)	9.83 (8.56-11.2)	11.6 (10.0-13.1)	13.8 (11.9-15.7)	15.4 (13.2-17.6)	17.0 (14.5-19.5)	18.6 (15.8-21.4)	20.7 (17.4-24.0)	22.2 (18.5-26.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.6077°, Longitude: -119.8174°
Elevation: 5125.64 ft**
* source: ESRI Maps
** source: USGS

9-5-17

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

South

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.101 (0.086-0.116)	0.125 (0.106-0.146)	0.167 (0.143-0.197)	0.208 (0.177-0.246)	0.277 (0.230-0.332)	0.341 (0.275-0.415)	0.418 (0.327-0.518)	0.513 (0.385-0.649)	0.668 (0.473-0.874)	0.812 (0.550-1.09)
10-min	0.153 (0.130-0.177)	0.191 (0.162-0.223)	0.255 (0.217-0.300)	0.317 (0.270-0.375)	0.421 (0.350-0.506)	0.519 (0.419-0.632)	0.637 (0.497-0.788)	0.781 (0.585-0.987)	1.02 (0.720-1.33)	1.24 (0.837-1.66)
15-min	0.191 (0.161-0.219)	0.237 (0.201-0.276)	0.316 (0.270-0.372)	0.393 (0.334-0.465)	0.522 (0.434-0.627)	0.643 (0.519-0.783)	0.789 (0.616-0.976)	0.968 (0.726-1.22)	1.26 (0.892-1.65)	1.53 (1.04-2.06)
30-min	0.257 (0.217-0.295)	0.319 (0.270-0.371)	0.425 (0.363-0.501)	0.529 (0.450-0.626)	0.703 (0.584-0.844)	0.866 (0.698-1.06)	1.06 (0.830-1.32)	1.30 (0.977-1.65)	1.70 (1.20-2.22)	2.07 (1.40-2.77)
60-min	0.318 (0.269-0.365)	0.395 (0.334-0.460)	0.527 (0.449-0.621)	0.655 (0.557-0.775)	0.870 (0.723-1.05)	1.07 (0.865-1.31)	1.32 (1.03-1.63)	1.61 (1.21-2.04)	2.10 (1.49-2.75)	2.56 (1.73-3.43)
2-hr	0.420 (0.373-0.481)	0.521 (0.465-0.599)	0.668 (0.588-0.768)	0.797 (0.692-0.916)	0.997 (0.843-1.16)	1.18 (0.972-1.38)	1.39 (1.12-1.65)	1.66 (1.29-2.06)	2.19 (1.61-2.78)	2.67 (1.89-3.46)
3-hr	0.512 (0.460-0.578)	0.637 (0.575-0.721)	0.795 (0.714-0.899)	0.924 (0.822-1.05)	1.11 (0.970-1.26)	1.27 (1.09-1.47)	1.47 (1.24-1.72)	1.75 (1.44-2.07)	2.23 (1.78-2.81)	2.69 (2.09-3.49)
6-hr	0.746 (0.673-0.834)	0.932 (0.840-1.04)	1.15 (1.03-1.29)	1.31 (1.17-1.48)	1.53 (1.35-1.73)	1.69 (1.47-1.92)	1.85 (1.59-2.13)	2.06 (1.74-2.39)	2.45 (2.03-2.90)	2.86 (2.33-3.53)
12-hr	1.02 (0.915-1.14)	1.27 (1.15-1.43)	1.60 (1.43-1.79)	1.85 (1.65-2.07)	2.19 (1.93-2.47)	2.45 (2.13-2.78)	2.71 (2.32-3.12)	2.97 (2.50-3.46)	3.32 (2.72-3.94)	3.61 (2.91-4.36)
24-hr	1.34 (1.21-1.51)	1.68 (1.52-1.89)	2.14 (1.92-2.40)	2.51 (2.25-2.81)	3.03 (2.69-3.39)	3.44 (3.03-3.86)	3.87 (3.38-4.37)	4.32 (3.74-4.91)	4.95 (4.21-5.68)	5.45 (4.56-6.31)
2-day	1.64 (1.46-1.86)	2.08 (1.85-2.36)	2.68 (2.37-3.03)	3.16 (2.80-3.59)	3.86 (3.38-4.39)	4.43 (3.84-5.06)	5.02 (4.31-5.78)	5.66 (4.80-6.57)	6.56 (5.44-7.72)	7.29 (5.94-8.70)
3-day	1.80 (1.59-2.04)	2.28 (2.02-2.59)	2.97 (2.63-3.38)	3.54 (3.12-4.03)	4.36 (3.80-4.97)	5.02 (4.34-5.75)	5.74 (4.90-6.62)	6.51 (5.48-7.55)	7.60 (6.27-8.95)	8.50 (6.89-10.1)
4-day	1.95 (1.73-2.22)	2.48 (2.19-2.83)	3.27 (2.88-3.72)	3.92 (3.44-4.47)	4.85 (4.23-5.55)	5.62 (4.85-6.45)	6.46 (5.50-7.45)	7.36 (6.17-8.54)	8.65 (7.09-10.2)	9.72 (7.83-11.6)
7-day	2.31 (2.02-2.67)	2.96 (2.58-3.43)	3.94 (3.43-4.56)	4.73 (4.11-5.49)	5.87 (5.05-6.82)	6.80 (5.79-7.93)	7.80 (6.57-9.16)	8.86 (7.37-10.5)	10.4 (8.47-12.4)	11.6 (9.34-14.1)
10-day	2.62 (2.29-3.02)	3.37 (2.94-3.88)	4.49 (3.91-5.18)	5.38 (4.68-6.21)	6.63 (5.71-7.68)	7.64 (6.52-8.87)	8.71 (7.36-10.2)	9.82 (8.21-11.6)	11.4 (9.34-13.6)	12.7 (10.2-15.2)
20-day	3.38 (2.97-3.89)	4.34 (3.81-5.01)	5.76 (5.04-6.63)	6.87 (5.99-7.90)	8.36 (7.24-9.63)	9.53 (8.20-11.0)	10.7 (9.16-12.5)	12.0 (10.1-14.1)	13.8 (11.4-16.3)	15.1 (12.4-18.1)
30-day	4.03 (3.53-4.64)	5.18 (4.55-5.98)	6.87 (6.01-7.92)	8.17 (7.13-9.41)	9.94 (8.62-11.5)	11.3 (9.74-13.1)	12.7 (10.9-14.8)	14.2 (12.0-16.6)	16.2 (13.5-19.2)	17.8 (14.7-21.2)
45-day	4.86 (4.27-5.51)	6.27 (5.50-7.11)	8.29 (7.26-9.39)	9.80 (8.56-11.1)	11.8 (10.3-13.4)	13.4 (11.6-15.3)	14.9 (12.8-17.1)	16.5 (14.1-19.0)	18.7 (15.7-21.8)	20.4 (16.9-23.9)
60-day	5.60 (4.88-6.36)	7.25 (6.33-8.24)	9.58 (8.34-10.9)	11.3 (9.79-12.8)	13.4 (11.6-15.3)	15.0 (12.9-17.1)	16.6 (14.2-19.0)	18.1 (15.4-20.8)	20.1 (16.9-23.4)	21.7 (18.1-25.3)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Mesa
SUBBASIN: GMN-1
AREA, AC.: 75.84
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	1 acre lots	9.14	0.121	51	6.1	
C	1 acre lots	66.74	0.880	79	69.5	
			0.000		0.0	
			0.000		0.0	
		75.88	1.001			
			FINAL CN VALUE:		**75.7**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-2
AREA, AC.: 20.47
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	1-acre lots	0.00	0.000	51	0.0	
C	1-acre lots	20.47	1.000	79	79.0	
D	1-acre lots	0.00	0.000	84	0.0	
			0.000		0.0	
			0.000		0.0	
		20.47	1.000			
			FINAL CN VALUE:		**79.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-3
AREA, AC.: 178.13
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	Brush/fair cond.	52.13	0.293	35	10.2	
C	Brush/fair cond.	10.30	0.058	70	4.0	
D	Brush/fair cond.	86.80	0.487	77	37.5	
None	Brush/fair cond.	28.90	0.162	77	12.5	
			0.000		0.0	
			0.000		0.0	
		178.13	1.000			
			FINAL CN VALUE:		**64.3**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Mesa
SUBBASIN: GMN-4
AREA, AC.: 149.18
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	1 acre lots	29.35	0.197	51	10.0	
D	1 acre lots	9.85	0.066	84	5.5	
A	Brush/fair	29.65	0.199	35	7.0	
D	Brush/fair	80.15	0.537	77	41.4	
			0.000			
		149.00	0.999			

FINAL CN VALUE: **63.9**

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-5A
AREA, AC.: 44.5
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	Brush/fair	0.00	0.000	35	0.0	
C	Brush/fair	17.90	0.402	70	28.2	
D	Brush/fair	26.60	0.598	77	46.0	
		0.00	0.000	77	0.0	
			0.000		0.0	
		44.50	1.000			

FINAL CN VALUE: **74.2**

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-6
AREA, AC.: 7.93
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	Brush/fair	0.00	0.000	35	0.0	
C	Brush/fair	0.21	0.026	70	1.9	
D	Brush/fair	7.71	0.972	77	74.9	
			0.000		0.0	
		7.92	0.999			

FINAL CN VALUE: **76.7**

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Mesa
SUBBASIN: GMN-7
AREA, AC.: 40.02
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	1 acre lots	35.60	0.890	51	45.4	
C	1 acre lots	4.42	0.110	79	8.7	
			0.000		0.0	
			0.000		0.0	
		40.02	1.000			
		FINAL CN VALUE:			**54.1**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-8
AREA, AC.: 17.4
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	1-acre lots	15.79	0.907	51	46.3	
C	1-acre lots	1.43	0.082	79	6.5	
D	1-acre lots	0.18	0.010	84	0.9	
			0.000		0.0	
			0.000		0.0	
		17.40	1.000			
		FINAL CN VALUE:			**53.6**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-9 Existing conditions
AREA, AC.: 97.45
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	Brush/fair	18.62	0.191	35	6.7	
C	Brush/fair	60.74	0.623	70	43.6	
D	Brush/fair	18.09	0.186	77	14.3	
			0.000		0.0	
			0.000		0.0	
		97.45	1.000			
		FINAL CN VALUE:			**64.6**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Mesa
SUBBASIN: GMN-10
AREA, AC.: 3.87
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	1 acre lots	0.00	0.000	51	0.0	
C	1 acre lots	3.87	1.000	79	79.0	
			0.000		0.0	
			0.000		0.0	
		3.87	1.000			

FINAL CN VALUE: **79.0**

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

SUBBASIN: GMN-11 Existing conditions
AREA, AC.: 34.05
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	Brush/fair	0.00	0.000	51	0.0	
C	Brush/fair	18.56	0.545	70	38.2	
D	Brush/fair	0.00	0.000	84	0.0	
			0.000		0.0	
			0.000		0.0	
		18.56	0.545			

FINAL CN VALUE: **38.2**

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-12
AREA, AC.: 7.6
CALCULATED BY: DEW

HSG	LAND USE CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
C	1 acre lots	7.60	1.000	79	79.0	
		0.00	0.000	70	0.0	
		0.00	0.000	77	0.0	
		0.00	0.000	77	0.0	
			0.000		0.0	
			0.000		0.0	
		7.60	1.000			

FINAL CN VALUE: **79.0**

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Mesa
SUBBASIN: GMN-9 Proposed conditions
AREA, AC.: 97.45
CALCULATED BY: DEW

HSG	LAND USE : CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	.75 acre lot:	18.62	0.191	53	10.1	
C	.75 acre lot:	60.74	0.623	80	49.9	
D	.75 acre lot:	18.09	0.186	85	15.8	
			0.000		0.0	
		97.45	1.000			
		FINAL CN VALUE:			**75.8**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-11 Proposed conditions
AREA, AC.: 18.56
CALCULATED BY: DEW

HSG	LAND USE : CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	.75 acre lot:	0.00	0.000	53	0.0	
C	.75 acre lot:	18.56	1.000	80	80.0	
D	.75 acre lot:	0.00	0.000	85	0.0	
			0.000		0.0	
			0.000		0.0	
		18.56	1.000			
		FINAL CN VALUE:			**80.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Golden Mesa
SUBBASIN: GMN-5B Existing conditions
AREA, AC.: 49.07
CALCULATED BY: DEW

HSG	LAND USE : CONDITIO	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	Brush/fair	14.00	0.285	35	10.0	
C	Brush/fair	9.48	0.193	70	13.5	
D	Brush/fair	22.68	0.462	77	35.6	
None		2.90	0.059	77	4.6	Bare rock
			0.000		0.0	
		49.06	1.000			
		FINAL CN VALUE:			**63.6**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Valley **CALCULATED BY:**
SUBBASIN: GMS-1
TOTAL AREA: 46.79 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
C	8.4	0.180	Sage w/grass und/ fair	63	11.3	
D	13.6	0.291	0.5 acre lots	85	24.7	
D	6.7	0.143	1 acre lots	84	12.0	
D	18	0.385	Sage w/grass und/ fair	70	26.9	
		0.000			0.0	
	46.7	0.998				
			FINAL CN VALUE:		**75.0**	

PROJECT: Golden Valley **CALCULATED BY: DEW**
SUBBASIN: GMS-2
TOTAL AREA: 90.1 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
C	8.86	0.098	Sage w/grass und. /fair	63	6.2	
D	25.85	0.287	Sage w/grass und. /fair	70	20.1	
C	13.2	0.147	1 acre lots	79	11.6	
D	42.19	0.468	1 acre lots	84	39.3	
		0.000			0.0	
	90.1	1.000				
			FINAL CN VALUE:		**77.2**	

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Valley **CALCULATED BY:** DEW
SUBBASIN: GMS-3
TOTAL AREA: 133.49 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
A	22.43	0.168	Sage w/grass und/ fair	50	8.4	Est., not in table
A	12.9	0.097	1 acre lots	51	4.9	
C	19.51	0.146	Sage w/grass und/ fair	63	9.2	
C	10.75	0.081	0.5 acre lots	80	6.4	
C	10.32	0.077	1 acre lots	79	6.1	
D	57.38	0.430	Sage w/grass und/ fair	70	30.1	
		0.000			0.0	
	133.29	0.999				
			FINAL CN VALUE:		**65.2**	

PROJECT: Golden Valley **CALCULATED BY: DEW**
SUBBASIN: GMS-4 **UNDEVELOPED**
TOTAL AREA: 34.64 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
C	34.64	1.000	Brush,weed,grass/Fair	70	70.0	
		0.000		70	0.0	
		0.000		79	0.0	
		0.000		84	0.0	
		0.000			0.0	
	34.64	1.000				

FINAL CN VALUE: **70.0**

PROJECT: Golden Valley **CALCULATED BY: DEW**
SUBBASIN: GMS-4 **DEVELOPED**
TOTAL AREA: 34.64 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
C	27.64	0.798	.75 acre lots	80	63.8	
C	7	0.202	Open space (channel)	79	16.0	
		0.000		79	0.0	
		0.000		84	0.0	
		0.000			0.0	
	34.64	1.000				

FINAL CN VALUE: **79.8**

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Valley **CALCULATED BY:** DEW
SUBBASIN: GH-1
TOTAL AREA: 5.7 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
D	4.85	0.851	0.25 acre lots	87	74.0	
D	0.85	0.149	Sage w/grass und/ fair	70	10.4	
		0.000			0.0	
		0.000			0.0	
		0.000			0.0	
	5.7	1.000				

FINAL CN VALUE: **84.5**

PROJECT: Golden Valley **CALCULATED BY:** DEW
SUBBASIN: GH-2
TOTAL AREA: 22.54 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
D	10.8	0.479	0.25 ac lots	87	41.7	
D	11.74	0.521	Sage w/ grass und./fair	70	36.5	
		0.000			0.0	
		0.000			0.0	
	22.54	1.000				

FINAL CN VALUE: **78.1**

PROJECT: Golden Valley **CALCULATED BY:** DEW
SUBBASIN: GH-3
TOTAL AREA: 32.28 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
D	15.91	0.493	0.25 acre lots	87	42.9	
D	16.37	0.507	sage w/ grass und/ fair	70	35.5	
		0.000			0.0	
		0.000			0.0	
	32.28	1.000				

FINAL CN VALUE: **78.4**

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Golden Valley **CALCULATED BY:** DEW
SUBBASIN: GH-4
TOTAL AREA: 17.39 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
D	8.64	0.497	0.25 acre lots	87	43.2	
D	8.82	0.507	sage w/ grass und/ fair	70	35.5	
		0.000			0.0	
		0.000			0.0	
	17.46	1.004				
			FINAL CN VALUE:		**78.7**	

PROJECT: Golden Valley **CALCULATED BY:** DEW
SUBBASIN: GH-5
TOTAL AREA: 62.39 ACRES 62.39

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
D	35.5	0.569	0.25 acre lots	87	49.5	
D	26.89	0.431	Sage w/grass und/ fair	70	30.2	
		0.000			0.0	
		0.000			0.0	
		0.000			0.0	
	62.39	1.000				
			FINAL CN VALUE:		**79.7**	

PROJECT: Golden Valley **CALCULATED BY:** DEW
SUBBASIN:
TOTAL AREA: 1 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
	0.5	0.500		0	0.0	
	0.5	0.500		0	0.0	
		0.000			0.0	
		0.000			0.0	
	1	1.000				
			FINAL CN VALUE:		**0.0**	

CURVE NUMBER CALCULATION WORKSHEET

SUBBASIN: NR-1
TOTAL AREA: 40.26 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
D	40.26	1.000	.25 acre lots	87	87.0	
		0.000			0.0	
	40.26	1.000				
			FINAL CN VALUE:		**87.0**	

PROJECT: Golden Mesa South **CALCULATED BY: DEW**
SUBBASIN: NR-2
TOTAL AREA: 15.6 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
C	3.28	0.210	Sage w/ grass und/fair	63	13.2	
D	12.36	0.792	sage w/ grass und/ fair	70	55.5	
		0.000			0.0	
	15.64	1.003				
			FINAL CN VALUE:		**68.7**	

SUBBASIN: RDG-1
TOTAL AREA: 26 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
D	26	1.000	.25 acre lots	87	87.0	
		0.000			0.0	
	26	1.000				
			FINAL CN VALUE:		**87.0**	

PROJECT: Golden Mesa South **CALCULATED BY: DEW**
SUBBASIN: NVHS
TOTAL AREA: 74.5 ACRES

HSG	AREA, ACRES	FRACTION OF AREA	LAND USE & CONDITION	CN	WTD. CN	REMARKS
C	26.74	0.359	SCHOOL	86	30.9	Est impervious area
D	47.76	0.641	SCHOOL	90	57.7	at 50%, CN estimated
	0	0.000			0.0	from table based on
		0.000			0.0	that.
	74.5	1.000				
			FINAL CN VALUE:		**88.6**	

TIME OF CONCENTRATION CALCULATIONS

PROJECT: Golden Mesa (south watersheds)

SUB-BASIN DATA			INITIAL/OVERLAND TIME			TRAVEL TIME, t_t					URANIZED BASINS CHECK		FINAL
					t_i	L,	S,	Vel,	TRAVEL TIME,	t_c	TOTAL	t_c	t_c
NAME	CN	R	L, FT	S, %	TIME, t_i	ft	%	ft/sec	tt , min	t_i+t_t	LENGTH, FT		min
GH-1	84.5	0.73	418	7.7	7.03	673	1.2	2.25	4.99	12.01	1091	16.06	12.01
GH-2	78.1	0.64	470	2.8	12.75	783	1	2	6.53	19.28	1253	16.96	16.96
GH-3	78.4	0.64	313	5.1	8.47	418	2.4	2	3.48	11.95	731	14.06	
GH-3 cont		####	0		0.00	1260	2.1	2.9	10.72	22.67	1991	21.06	21.06
GH-4	78.5	0.65	500	2.8	13.00	63	3.2	1.8	0.58	13.59	563	13.13	
GH-4 cont		####			#VALUE!	626	1	2	5.22	18.80	1189	16.61	16.61
GH-5	79.7	0.66	500	2.8	12.55	261	3	1.8	2.42	14.97	761	14.23	
GH-5 cont		-0.39			#DIV/0!	992	0.7	1.74	9.50	24.47	1753	19.74	19.74
NVHS	89	0.78	677	19.8	5.51	1636	0.6	1.55	17.59	23.10	2313	22.85	18
GMS-1	75	0.6	0	1	0.00	2797	3.6	1.8	25.90	25.90	2797	25.54	26
GMS-2	77	0.63	240	2.5	9.76	4260	3.6	3	23.67	33.43	4500	35.00	33
GMS-3	65	0.47	100	2	9.05	4181	2.5	2.4	29.03	38.08	4281	33.78	34
GMS-4*	63	0.44	494	1.6	22.56	1140	0.7	0.8	23.75	46.31	1634	19.08	19
NR-1	78	0.64	170	1.2	10.17	1094	2.6	1.8	10.13	20.30	1264	17.02	17
NR-2	83	0.71	300	4.3	7.60	2797	3.6	2.7	17.27	24.86	3097	27.21	24
RDG-1	78	0.64	303	5.28	8.33	1204	7.3	2.6	7.72	16.05	1507	18.37	16
		-0.39							#DIV/0!	#DIV/0!	0	10.00	
GMS-4**	80	0.67	234	1	11.95	1170	1	1.5	13.00	24.95	1404	17.80	18

t_i = ((1.8)(1.1-R))(L^.5/S^.33)

R= (.0132*CN)-0.39

Velocity for travel time calculations from Fig. 701 in TMRDM

Urbanized basins check: t_c = (L/180)+10

* Undeveloped conditions

**Developed conditions

LAG TIMES FOR WATERSHEDS WITH SLOPES GREATER THAN 10%

Watershed*	Watercourse Length (L), miles	Length to Centroid (L_c), miles	Upper Elev., ft	Lower Elev., ft	Elevation Change, ft	Average Slope (S), ft/mi	Roughness (Kn)	Lag Time (TLAG)hours	Urban Watershed Chec k (TLAG)hours
GMN-3	0.78	0.44	5760	5180	580	744	0.08	0.42	0.55
GMN-4	0.71	0.34	5840	5180	660	930	0.08	0.36	0.51
GMN-5A	0.45	0.23	5638	5180	458	1018	0.07	0.23	0.39
GMN-5B	0.41	0.23	5560	5160	400	976	0.07	0.23	0.37
GMN-6	0.21	0.11	5292	5262	30	143	0.07	0.20	0.27
	0.10	0.06	5280	5200	80	800	0.07	0.09	0.22

$TLAG = 22.1(K_n)((L^*(L_c/S^{.5}))^{.33}$

Equation 710 in Truckee Meadows Regional Drainage Manual

TIME OF CONCENTRATION CALCULATIONS

PROJECT:

SUB-BASIN DATA			INITIAL/OVERLAND TIME			TRAVEL TIME, t_t					URANIZED BASINS CHECK		FINAL
					t_i	L,	S,	Vel,	TRAVEL TIME,	t_c	TOTAL	t_c	t_c
NAME	CN	R	L, FT	S, %	TIME, t_i	ft	%	ft/sec	tt , min	t_i+t_t	LENGTH, FT		min
RDG 1	78	0.64	303	5.28	8.330287	1204	7.3	2.6	7.71794872	16.04824	1507	18.37222	16
RDG 2*	78	0.64	160	0.3	15.59616	1706	12.5	1.4	20.3095238	35.90569	1866	20.36667	*
NR-1	87	0.76	227	15.85	3.722148	727	0.55	1.1	11.0151515	14.7373	954	15.3	
NR-1 cont	0	-0.39			#DIV/0!	986	5.1	4.8	3.42361111	18.16091	1940	20.77778	18
		-0.39			#DIV/0!				#DIV/0!				
									#DIV/0!				
Proposed cond.		-0.39			#DIV/0!				#DIV/0!				
RDG-1	87	0.76	300	10	4.981395	2520	3.6	3.9	10.7692308	15.75063	2820	25.66667	11
		-0.39			#DIV/0!								
		-0.39			#VALUE!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								
		-0.39			#DIV/0!								

t_i = ((1.8)(1.1-R))(L^.5/S^.33)   R= (.0132*CN)-0.39   Velocity for travel time calculations from Fig. 701 in TMRDM

Urbanized basins check: t_c = (L/180)+10

APPENDIX C

HEC-1 MODELS

5-YEAR EXISTING CONDITIONS

```
1*****************************************                                  ***************************************
 *                                       *                                  *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                  *  U.S. ARMY CORPS OF ENGINEERS       *
 *       JUN 1998 AND FEB 2010           *                                  *  HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1R                *                                  *       609 SECOND STREET             *
 *      RGMHEC2000 WWW.HEC-1.COM         *                                  *    DAVIS, CALIFORNIA 95616          *
 *  RUN DATE   11SEP17  TIME  16:35:00   *                                  *       (916) 756-1104                *
 *                                       *                                  *                                     *
*****************************************                                  ***************************************



                          X      X  XXXXXXX   XXXXX           X
                          X      X  X        X     X         XX
                          X      X  X        X                X
                          XXXXXXX   XXXX     X        XXXXX   X
                          X      X  X        X                X
                          X      X  X        X     X          X
                          X      X  XXXXXXX   XXXXX          XXX


     THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

     THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
     THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
     NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
     DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL    LOSS RATE:GREEN AND AMPT INFILTRATION
     KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```

```
1                                          HEC-1 INPUT                                              PAGE  1

 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

             *DDIAGRAM
   1         ID  ====================================================================
   2         ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA SOUTH
   3         ID
   4         ID        EXISTING CONDITIONS MODEL
   5         ID       MODEL NAME GM-5E.DAT
   6         ID  5 YR24 HR PRECIP
   7         ID  DATE:SEPT 2017 ********************************************
   8         ID    *********************************************************************
   9         ID
  10         ID
             *      ***********************************************************************
  11         IT     1                   2880
  12         IN     15
  13         IO      5
  14         JR    PREC       1
             *   **********************************************************************
             *   **********************************************************************
             *   **********************************************************************
             *    JD CARDS WILL BE REPLACED WITH A JR CARD TO CORRECT THIS PR  OBLEM.
             *    USERS OF THIS MODEL SHOULD CAREFULLY SELECT AN APPROPRIATE DARF FOR    EACH
             *    CONCENTRATION POINTS. IT SHOULD BE NOTED THAT WHEN FLOW IS COMBINED    WITH
             *    DIVERSION FLOWS, CALCULATED COMBINED TOTAL AREA MAY NOT BE APPROPRI    ATE
             *    TO BE USED IN SELECTING DARF.
             *   **********************************************************************
             *   **********************************************************************
             *        DARF          AREA (SQ.     MI.)
             *        1.00              0 -  2
             *        0.99            2.1 -  8
             *        0.98            8.1 - 16
             *        0.97           16.1 - 29
             *        0.96           29.1 - 43
             *        0.95           43.1 - 63
             *        0.94           63.1 - 98
             *   **********************************************************************
  15         JR    PREC     1.0    0.99
             *   **********************************************************************

  16         KK    GMN5B    RUNOFF FROM WATERSHED GMN5B
  17         BA    .077
  18         PH      1        0    .167    .316    .527    .668    .795    1.15     1.6    2.19
  19         LS                64
  20         UD    0.23

  21         KK  ROUT-1        ROUTE GMN5B T OUTLET OF    GMN-9
  22         RD    2300     .019    0.07          TRAP        4        3

  23         KK    GMN5A    RUNOFF FROM WATERSHED GMN5A
  24         BA    .069
  25         LS                74
  26         UD     .24
```

```
1                                          HEC-1 INPUT                                              PAGE  2

 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  27         KK  ROUT-1ROUTE GMN5A  TO OUTLET OF GMN-9
  28         RD    2300    .019     .07           TRAP        4        3

  29         KK     CP-1        COMBINE GMN5A & GMN5B   AT SE CORNER OF GMN-9
  30         HC       2

  31         KK     GMN6 RUNOFF FROM GMN6
  32         BA    .012
  33         LS                77
  34         UD     .09

  35         KK     GMN8RUNOFF FROM GMN 8
```

```
BA    .027
LS              54
UD     .12

KK    CP-2        COMBINE GMN5, GMN6, & GMN8
HC       2

KK    GMN9        RUNOFF FROM GMN9 UNDEVELOPED
BA    .152
LS              65
UD    0.31

KK    CP-3COMBINE FLOWS AT SW CORN OF GMN9
KM   FLOW EXITING PROJECT SITE
HC       2

KK   GMN10        RUNOFF FROM GMN10
BA     .01
LS              79
UD     .05

KK    CP-4COMBINE RUNOFF FROM PROJECT SITE W/ GMN10
HC       3

KK    GMN4        RUNOFF FROM GMN4
BA    .233
LS              64
UD     .36

KK  ROUT-3        ROUTE GMN4 ACROSS GMN7
RD     960    .008    0.07            TRAP       2       3

KK    GMN7        RUNOFF FROM GMN7
BA    .063
LS              54
UD     .21
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK    CP-5
HC       2

KK  ROUT-4        ROUTE FLOW THRU GMN2
RD    1800    .004     .05            TRAP       2       1

KK    GMN2        RUNOFF FROM GMN2
BA    .042
LS              79
UD     .29

KK    CP-6
HC       2

KK    CP-7        TOTAL FLOW AT INDIAN LANE & ESTATES ROAD
HC       2

KK  GMN-12
BA     .01
LS              79
UD     .11

KK   CP-7B        TOTAL FLOW IN ESTATES ROAD CHANNEL
HC       2

KK   GMN11        RUNOFF FROM GMN11
BA    .029
LS              70
UD     .19

KK   CP-10        COMBINE ALL FLOWS AT BNDRY OF SOUTH PARCEL
HC       2

KK    NR-2
KM  B2WOOD RODGERS MODEL OF NORTHSTAR    RANCH
KM  USE RAINFALL FOR SOUTH PART OF GOLDEN VALLEY
PH       1       0    .167    .318    .527    .668    .795    1.15     1.6    2.14
BA    .025
LS              68
UD     .16

KK    NP-2
KM  POND2FROM NORTHSTAR MODEL
RS       1    FLOW       0       0
SA    0.06    0.09    0.11    0.18
SE      56      58      59      60
SQ       0  4.63165.979368 6.99488
SE      56      58      59      60
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK      B2RCNAME POND2
KM       0       0     0.0       0      22
RN     B2R

KK   GMS-2        FORMERLY WATERSHED D IN NVHS MODEL BY ODYSSEY
KM    WATERSHED D      MODIFIED DUE TO NORTHSTAR RANCH
BA    .142
LS              77
UD     .33

KK   NRCP1        COMBINE WATERSHEDS D AND NR1
HC       2
```

```
KK   RDG-1
KM  B3SHED B3 FROM NORTHSTAR MODEL
BA     .04
LS              78
UD     .16

KK    NP-3
KM  POND3DETENTION POND 3FROM NORTHSTAR RANCH STUDY
RS       1    FLOW     0.0      0.0
SA   0.149  0.2974   0.338    0.378    0.428    0.478
SE      67      68      69       70       71       72
SQ     0.0  0.5287 6.94466  9.127010.8801843.77214
SE      67      68      39       70       71       72

KK    NR-1
KM  B1FROM NORTHSTAR MODEL
BA    .063
LS              87
UD     .18

KK   POND1CNAME B1R
KM  COMBINE B3 AND B1 AT POND 1
HC       2

KK    NP-1
KM  POND 1
RS       1    FLOW     0.0      0.0
SA  0.1449  0.3968   0.501   0.6159
SE      36      38      40       42
SQ     0.0 3.6571526.1869282.85167
SE      36      38      40       42

KK    GMS1
KM   FORMERLYPART OF BASIN C IN NVHS STUDY BY ODYSSEY
BA    .073
LS              75
UD     .26
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK   NRCP2COMBINE  NRCP1, C, AND NP1       AT INLET PIPE TO NVHS DET BASIN
HC       3

KK   42-IN           PONDING AREA AT INLET TO 42" PIPE TO NVHS DET BASIN
RS       1    STOR       0
SA       0   0.255   2.207   3.296
SE    5112    5114    5116    5118
SQ       0       9      20      40     260     673    1130
SE    5112    5113    5114    5115    5116    5117    5118

KK   DV-42           DIVERT FLOW OVERTOPPING E. GOLDEN VALLEY DR
DT    OFLO
DI       0      40     260     673    1130
DQ       0       0     200     598    1040

KK  ROUTE2  ROUTE FLOW TO HIGH SCHOOL DETENTION BASIN
RD    2320   0.006   0.025            TRAP       4       3

KK     GH5           START GOLDEN HIGHLANDS MODEL      RUNOFF FROM GH5
BA    .097
LS              80
UD     .18

KK     GP2POND GP2 ON GOLDEN HIGHLANDS
KM  OUTLET IS 30-INCH RCP
RS       1    STOR       0
SA    .042    .326    .381    .438     0.5
SE    5152    5154    5156    5158    5160
SQ       0       7      10      16      29      37      45      50      56      60
SE    5152 5153.25  5153.5    5154    5155    5156    5157    5158    5159    5160

KK     GH4
BA    .027
LS              79
UD     .17

KK     GH3
BA    .052
LS            78.4
UD     .21

KK     GH2
BA    .035
LS              78
UD     .17

KK    GCP1COMBINE FLOWS AT POND G3
HC       4
```



```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK     GP3           GOLDEN HIGHLANDS POND 3
KM  OUTLET IS 36-INCH RCP
RS       1    STOR       0
SA    .287    .355    .432    .575
SE    5128    5130    5132    5133
SQ       0       5      18      35      45      60      70
SE    5128    5129    5130    5131    5132    5133    5134

KK     GH1
BA    .008
```

```
 192        LS          84.5
 193        UD     .12

 194        KK   GHCP2
 195        HC       2

 196        KK  ROUTE1ROUTE THROUGH NVHS TO HIGH SCHOOL DET POND
 197        RD    2100  0.0013   0.025             TRAP       4       3

 198        KK    NVHS
 199        BA    .116
 200        LS              89
 201        UD     .18

 202        KK   HS+GHCOMBINE FLOW FROM GOLDEN HIGHLANDS & HIGH SCHOOL
 203        HC       2

 204        KK    PNT1INFLOW TO SCHOOL DETENTION BASIN
 205        HC       2

 206        KK  DETSCHDETENTION BASIN AT NORTH VALLEY HIGH SCHOOL
 207        KM  ASSUME OVVERTOPPING OCCURS OVER A 20 FOOTWIDTH OFNORTH BANK OF BASIN
 208        RS       1    STOR       0
 209        SA       0  0.7163  2.0073  2.4015  2.5210  2.6358     2.7    2.71    2.71    2.71
 210        SE   93.59      95      96      97      98      99     100     101     102     103
 211        SQ       0     2.2       5      13    26.8    43.5   103.5   211.5
 212        SE   93.59      95      96      97      98      99     100     101

 213        KK   TOGMS          DIVERT FLOW OVERTOPPING E. GOLDEN VALLEY DRIVE
 214        KM  DIVERT FLOW THAT FLOWS WEST ON GOLDEN VALLEY DR.
 215        DT  DV-GVD
 216        DI       0      39      56      94   158.5     208   356.5
 217        DQ       0       0      19      54      99     153     281

 218        KK  ESTATE
 219        KM  COMBINE GM NORTH FLOWS W/ FLOW FROM NVHSPOND AT PONDING AREA @ ESTATES &
 220        KM  EAST GOLDEN VALLEY ROAD
 221        HC       2
1                                      HEC-1 INPUT                                         PAGE  7

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 222        KK    GMN3          RUNOFF FROM GMN3
 223        BA    .268
 224        LS              64
 225        UD     .42

 226        KK    GMN1          RUNOFF FROM GMN1
 227        BA    .104
 228        LS              76
 229        UD     .27

 230        KK    CP-8          COMBINE GMN3 & 1AT WEST BNDRY OF GMN11
 231        HC       2

 232        KK   GMS-3
 233        BA    0.21
 234        LS              65
 235        UD     .34

 236        KK  RCAL-1          RECALL FLOW OVERTOPPING E. GOLDEN VALLEY DRIVE
 237        DR    OFLO

 238        KK  3+OFLO COMBINE CP-8 & GMS3 W/ FLO OVERTOPPING E. GOLDEN VALLEY ROAD
 239        HC       2

 240        KK  GMS4-E          TOTAL FLOW AT E. BNDRY OF GMS-4
 241        HC       2

 242        KK   GMS-4RUNOFF FROM APN 552-100-01
 243        BA    .054
 244        LS              70
 245        UD     .19

 246        KK  GMS3+4          COMBINE GMS-3 AND GMS-4
 247        HC       2

 248        KK    TOTL          COMBINE ONSITE +OFFSITE FLOWS AT ESTATES RD PONDING AREA
 249        HC       2

 250        KK  DB-ESTDETENTION NEAR   ESTATESRD AND GOLDEN VALLEY RD INTERSECTION
 251        KM   USE EXISTING OUTLETS ANDNATURAL TOPO FOR DET BASIN   18" & 36" RCB OUTLETS
 252        KM  MINIMUM ROAD ELEV 5091.2 FT.  WEIR FLOW STARTS AT 5091.2 FT
 253        RS       1    STOR       0
 254        SA       0    .005     .25   5.401  14.262  24.066
 255        SE    5087    5088    5090    5092    5094    5096
 256        SQ       0    11.5      28      47      66      78     239   10570
 257        SE    5087    5087    5088    5089    5090    5091    5092    5093
 258        ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  16        GMN5B
              V
              V
  21        ROUT-1
              .
              .
  23          .          GMN5A
              .            V
              .            V
```

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   27          .      ROUT-1
               .           .
               .           .
   29       CP-1............
               .
               .
   31          .        GMN6
               .           .
               .           .
   35          .           .        GMN8
               .           .           .
               .           .           .
   39          .        CP-2............
               .           .
               .           .
   41          .           .        GMN9
               .           .           .
               .           .           .
   45          .        CP-3............
               .           .
               .           .
   48          .           .       GMN10
               .           .           .
               .           .           .
   52       CP-4........................
               .
               .
   54          .        GMN4
               .           V
               .           V
   58          .      ROUT-3
               .           .
               .           .
   60          .           .        GMN7
               .           .           .
               .           .           .
   64          .        CP-5............
               .           V
               .           V
   66          .      ROUT-4
               .           .
               .           .
   68          .           .        GMN2
               .           .           .
               .           .           .
   72          .        CP-6............
               .           .
               .           .
   74       CP-7............
               .
               .
   76          .      GMN-12
               .           .
               .           .
   80      CP-7B............
               .
               .
   82          .       GMN11
               .           .
               .           .
   86      CP-10............
               .
               .
   88          .        NR-2
               .           V
               .           V
   95          .        NP-2
               .           V
               .           V
  102          .         B2R
               .           .
               .           .
  105          .           .       GMS-2
               .           .           .
               .           .           .
  110          .       NRCP1............
               .           .
               .           .
  112          .           .       RDG-1
               .           .           V
               .           .           V
  117          .           .        NP-3
               .           .           .
               .           .           .
  124          .           .           .        NR-1
               .           .           .           .
               .           .           .           .
  129          .           .       POND1............
               .           .           V
               .           .           V
  132          .           .        NP-1
               .           .           .
               .           .           .
  139          .           .           .        GMS1
               .           .           .           .
               .           .           .           .
  144          .       NRCP2........................
               .           V
               .           V
  146          .       42-IN
               .           .
               .           .
  153          .           .------->    OFLO
  152          .       DV-42
               .           V
               .           V
```

```
 156            .        ROUTE2
                .           .
                .           .
 158            .           .       GH5
                .           .        V
                .           .        V
 162            .           .       GP2
                .           .        .
                .           .        .
 169            .           .        .        GH4
                .           .        .         .
                .           .        .         .
 173            .           .        .         .        GH3
                .           .        .         .         .
                .           .        .         .         .
 177            .           .        .         .         .        GH2
                .           .        .         .         .         .
                .           .        .         .         .         .
 181            .           .      GCP1.............................
                .           .        V
                .           .        V
 183            .           .       GP3
                .           .        .
                .           .        .
 190            .           .        .        GH1
                .           .        .         .
                .           .        .         .
 194            .           .     GHCP2...........
                .           .        V
                .           .        V
 196            .           .    ROUTE1
                .           .        .
                .           .        .
 198            .           .        .        NVHS
                .           .        .         .
                .           .        .         .
 202            .           .     HS+GH...........
                .           .        .
                .           .        .
 204            .         PNT1...........
                .           V
                .           V
 206            .        DETSCH
                .           .
                .           .
 215            .           .------->  DV-GVD
 213            .         TOGMS
                .           .
                .           .
 218       ESTATE............
                .
                .
 222            .         GMN3
                .           .
                .           .
 226            .           .       GMN1
                .           .        .
                .           .        .
 230            .         CP-8...........
                .           .
                .           .
 232            .           .      GMS-3
                .           .        .
                .           .        .
 237            .           .        .        .<-------    OFLO
 236            .           .        .     RCAL-1
                .           .        .         .
                .           .        .         .
 238            .           .     3+OFLO...........
                .           .        .
                .           .        .
 240            .        GMS4-E...........
                .           .
                .           .
 242            .           .      GMS-4
                .           .        .
                .           .        .
 246            .        GMS3+4...........
                .           .
                .           .
 248         TOTL............
               V
               V
 250        DB-EST
```

```
(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                         *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *
*        JUN 1998 AND FEB 2010            *
*            VERSION 4.1R                 *
*      RGMHEC2000 WWW.HEC-1.COM           *
* RUN DATE   11SEP17  TIME  16:35:00      *
*                                         *
*******************************************
```

```
*****************************************
*                                       *
*     U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET             *
*      DAVIS, CALIFORNIA 95616          *
*          (916) 756-1104               *
*                                       *
*****************************************
```

```
MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA SOUTH

      EXISTING CONDITIONS MODEL
     MODEL NAME GM-5E.DAT
5 YR24 HR PRECIP
```

```
DATE:SEPT 2017 ********************************************
  **********************************************************************

*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

  13 IO         OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     2    0  ENDING DATE
                     NDTIME       0919  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .02 HOURS
                      TOTAL TIME BASE   33.32 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

     JP         MULTI-PLAN OPTION
                      NPLAN          1  NUMBER OF PLANS

     JR         MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   1.00       .99

VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667         24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667         24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667         24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667         24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667         24.00000
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VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667         24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667         24.00000
1

              PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                                 FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                                 TIME TO PEAK IN HOURS


                                                               RATIOS APPLIED TO PRECIPITATION
OPERATION       STATION     AREA    PLAN               RATIO 1  RATIO 2
                                                          1.00      .99

HYDROGRAPH AT
+                GMN5B       .077     1    FLOW            .87      .82
                                           TIME          12.43    14.93
```

ROUTED TO						
+	ROUT-1	.077	1	FLOW	1.10	1.07
				TIME	12.87	12.90
HYDROGRAPH AT						
+	GMN5A	.069	1	FLOW	8.28	8.00
				TIME	12.28	12.28
ROUTED TO						
+	ROUT-1	.069	1	FLOW	8.22	7.95
				TIME	12.55	12.55
2 COMBINED AT						
+	CP-1	.146	1	FLOW	8.22	7.95
				TIME	12.55	12.55
HYDROGRAPH AT						
+	GMN6	.012	1	FLOW	3.14	3.06
				TIME	12.12	12.12
HYDROGRAPH AT						
+	GMN8	.027	1	FLOW	.07	.07
				TIME	23.73	23.98
2 COMBINED AT						
+	CP-2	.039	1	FLOW	3.14	3.06
				TIME	12.12	12.12
HYDROGRAPH AT						
+	GMN9	.152	1	FLOW	2.28	2.07
				TIME	12.52	12.52
2 COMBINED AT						
+	CP-3	.191	1	FLOW	3.27	3.16
				TIME	12.12	12.12
HYDROGRAPH AT						
+	GMN10	.010	1	FLOW	3.72	3.62
				TIME	12.07	12.07
3 COMBINED AT						
+	CP-4	.347	1	FLOW	11.53	11.03
				TIME	12.53	12.55
HYDROGRAPH AT						
+	GMN4	.233	1	FLOW	2.58	2.48
				TIME	15.05	15.07
ROUTED TO						
+	ROUT-3	.233	1	FLOW	2.58	2.48
				TIME	15.20	15.20
HYDROGRAPH AT						
+	GMN7	.063	1	FLOW	.17	.17
				TIME	23.98	23.88
2 COMBINED AT						
+	CP-5	.296	1	FLOW	2.58	2.48
				TIME	15.20	15.20
ROUTED TO						
+	ROUT-4	.296	1	FLOW	2.57	2.47
				TIME	15.50	15.50
HYDROGRAPH AT						
+	GMN2	.042	1	FLOW	7.58	7.40
				TIME	12.33	12.33
2 COMBINED AT						
+	CP-6	.338	1	FLOW	7.58	7.40
				TIME	12.33	12.33
2 COMBINED AT						
+	CP-7	.685	1	FLOW	17.07	16.39
				TIME	12.50	12.50
HYDROGRAPH AT						
+	GMN-12	.010	1	FLOW	2.92	2.85
				TIME	12.13	12.13
2 COMBINED AT						
+	CP-7B	.695	1	FLOW	17.71	17.01
				TIME	12.50	12.50
HYDROGRAPH AT						
+	GMN11	.029	1	FLOW	2.16	2.05
				TIME	12.25	12.25
2 COMBINED AT						
+	CP-10	.724	1	FLOW	18.90	18.14
				TIME	12.48	12.50
HYDROGRAPH AT						
+	NR-2	.025	1	FLOW	1.15	1.07
				TIME	12.23	12.25
ROUTED TO						
+	NP-2	.025	1	FLOW	.58	.54
				TIME	12.52	12.52
			** PEAK STAGES IN FEET **			
			1	STAGE	56.25	56.23
				TIME	12.53	12.53
ROUTED TO						
+	B2R	.025	1	FLOW	.58	.54

				TIME	12.52	12.52
HYDROGRAPH AT						
+	GMS-2	.142	1	FLOW	18.98	18.45
				TIME	12.38	12.38
2 COMBINED AT						
+	NRCP1	.167	1	FLOW	19.50	18.93
				TIME	12.38	12.38
HYDROGRAPH AT						
+	RDG-1	.040	1	FLOW	8.74	8.51
				TIME	12.20	12.20
ROUTED TO						
+	NP-3	.040	1	FLOW	8.92	8.92
				TIME	.02	.02
			** PEAK STAGES IN FEET **			
			1	STAGE	67.00	67.00
				TIME	.00	.00
HYDROGRAPH AT						
+	NR-1	.063	1	FLOW	26.17	25.72
				TIME	12.20	12.20
2 COMBINED AT						
+	POND1	.103	1	FLOW	35.09	34.63
				TIME	12.20	12.20
ROUTED TO						
+	NP-1	.103	1	FLOW	21.65	21.42
				TIME	12.43	12.43
			** PEAK STAGES IN FEET **			
			1	STAGE	39.60	39.58
				TIME	12.43	12.43
HYDROGRAPH AT						
+	GMS1	.073	1	FLOW	9.00	8.72
				TIME	12.32	12.32
3 COMBINED AT						
+	NRCP2	.343	1	FLOW	49.52	48.46
				TIME	12.37	12.37
ROUTED TO						
+	42-IN	.343	1	FLOW	37.82	37.12
				TIME	12.63	12.63
			** PEAK STAGES IN FEET **			
			1	STAGE	5114.89	5114.86
				TIME	12.63	12.63
DIVERSION TO						
+	OFLO	.343	1	FLOW	.00	.00
				TIME	.00	.00
HYDROGRAPH AT						
+	DV-42	.343	1	FLOW	37.82	37.12
				TIME	12.63	12.63
ROUTED TO						
+	ROUTE2	.343	1	FLOW	37.77	37.07
				TIME	12.75	12.77
HYDROGRAPH AT						
+	GH5	.097	1	FLOW	23.97	23.41
				TIME	12.22	12.22
ROUTED TO						
+	GP2	.097	1	FLOW	15.36	15.02
				TIME	12.37	12.37
			** PEAK STAGES IN FEET **			
			1	STAGE	5153.95	5153.92
				TIME	12.37	12.37
HYDROGRAPH AT						
+	GH4	.027	1	FLOW	6.29	6.14
				TIME	12.20	12.20
HYDROGRAPH AT						
+	GH3	.052	1	FLOW	10.30	10.03
				TIME	12.25	12.25
HYDROGRAPH AT						
+	GH2	.035	1	FLOW	7.43	7.23
				TIME	12.20	12.20
4 COMBINED AT						
+	GCP1	.211	1	FLOW	36.58	35.70
				TIME	12.25	12.25
ROUTED TO						
+	GP3	.211	1	FLOW	23.91	23.23
				TIME	12.50	12.52
			** PEAK STAGES IN FEET **			
			1	STAGE	5130.35	5130.31
				TIME	12.50	12.52
HYDROGRAPH AT						
+	GH1	.008	1	FLOW	3.38	3.31
				TIME	12.15	12.15

2 COMBINED AT						
+	GHCP2	.219	1	FLOW	24.65	23.94
				TIME	12.50	12.50
ROUTED TO						
+	ROUTE1	.219	1	FLOW	23.43	22.76
				TIME	12.75	12.75
HYDROGRAPH AT						
+	NVHS	.116	1	FLOW	54.60	53.74
				TIME	12.20	12.20
2 COMBINED AT						
+	HS+GH	.335	1	FLOW	57.75	56.72
				TIME	12.20	12.20
2 COMBINED AT						
+	PNT1	.678	1	FLOW	73.94	72.64
				TIME	12.22	12.22
ROUTED TO						
+	DETSCH	.678	1	FLOW	39.29	38.55
				TIME	13.95	13.97
			** PEAK STAGES IN FEET **			
			1	STAGE	98.75	98.70
				TIME	13.95	13.97
DIVERSION TO						
+	DV-GVD	.678	1	FLOW	.33	.00
				TIME	13.95	.00
HYDROGRAPH AT						
+	TOGMS	.678	1	FLOW	39.00	38.55
				TIME	13.67	13.97
2 COMBINED AT						
+	ESTATE	1.402	1	FLOW	49.22	48.18
				TIME	14.37	14.30
HYDROGRAPH AT						
+	GMN3	.268	1	FLOW	2.82	2.71
				TIME	15.08	15.10
HYDROGRAPH AT						
+	GMN1	.104	1	FLOW	14.07	13.64
				TIME	12.32	12.32
2 COMBINED AT						
+	CP-8	.372	1	FLOW	14.59	14.07
				TIME	12.33	12.33
HYDROGRAPH AT						
+	GMS-3	.210	1	FLOW	2.54	2.42
				TIME	12.58	15.00
HYDROGRAPH AT						
+	RCAL-1	.000	1	FLOW	.00	.00
				TIME	.00	.00
2 COMBINED AT						
+	3+OFLO	.210	1	FLOW	2.54	2.42
				TIME	12.58	15.00
2 COMBINED AT						
+	GMS4-E	.582	1	FLOW	16.12	15.38
				TIME	12.35	12.35
HYDROGRAPH AT						
+	GMS-4	.054	1	FLOW	3.67	3.48
				TIME	12.25	12.27
2 COMBINED AT						
+	GMS3+4	.636	1	FLOW	19.33	18.45
				TIME	12.33	12.33
2 COMBINED AT						
+	TOTL	2.038	1	FLOW	58.74	57.38
				TIME	14.37	14.33
ROUTED TO						
+	DB-EST	2.038	1	FLOW	58.67	57.34
				TIME	14.47	14.43
			** PEAK STAGES IN FEET **			
			1	STAGE	5089.61	5089.54
				TIME	14.45	14.43

100-YEAR EXISTING CONDITIONS

```
1*****************************************                                     ***************************************
 *                                       *                                     *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                     *   U.S. ARMY CORPS OF ENGINEERS      *
 *        JUN 1998 AND FEB 2010          *                                     *   HYDROLOGIC ENGINEERING CENTER     *
 *          VERSION 4.1R                 *                                     *        609 SECOND STREET            *
 *      RGMHEC2000 WWW.HEC-1.COM         *                                     *     DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   11SEP17  TIME  16:28:37   *                                     *         (916) 756-1104              *
 *                                       *                                     *                                     *
*****************************************                                     ***************************************



                              X     X  XXXXXXX   XXXXX           X
                              X     X  X        X     X         XX
                              X     X  X        X                X
                              XXXXXXX  XXXX     X        XXXXX   X
                              X     X  X        X                X
                              X     X  X        X     X          X
                              X     X  XXXXXXX   XXXXX          XXX



        THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

        THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
        THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
        NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
        DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
        KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                           HEC-1 INPUT                                                    PAGE  1

        LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                    *DDIAGRAM
          1         ID  ======================================================================
          2         ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA SOUTH
          3         ID
          4         ID        EXISTING CONDITIONS MODEL
          5         ID       MODEL NAME GM1E.DAT
          6         ID  100 YR24 HR PRECIP    WITH UPDATED AREAS
          7         ID  DATE:JUNE 2016 ********************************************
          8         ID    ***********************************************************************
          9         ID
         10         ID
                    *     ***********************************************************************
         11         IT       1                 2880
         12         IN      15
         13         IO       5
         14         JR    PREC       1
                    *  *************************************************************************
                    *  *************************************************************************
                    *  *************************************************************************
                    *   JD CARDS WILL BE REPLACED WITH A JR CARD TO CORRECT THIS PR  OBLEM.
                    *   USERS OF THIS MODEL SHOULD CAREFULLY SELECT AN APPROPRIATE DARF FOR    EACH
                    *   CONCENTRATION POINTS. IT SHOULD BE NOTED THAT WHEN FLOW IS COMBINED    WITH
                    *   DIVERSION FLOWS, CALCULATED COMBINED TOTAL AREA MAY NOT BE APPROPRI     ATE
                    *   TO BE USED IN SELECTING DARF.
                    *  *************************************************************************
                    *  *************************************************************************
                    *        DARF          AREA (SQ.     MI.)
                    *        1.00             0 -  2
                    *        0.99           2.1 -  8
                    *        0.98           8.1 - 16
                    *        0.97          16.1 - 29
                    *        0.96          29.1 - 43
                    *        0.95          43.1 - 63
                    *        0.94          63.1 - 98
                    *  *************************************************************************
         15         JR    PREC     1.0    0.99
                    *  *************************************************************************

         16         KK   GMN5B     RUNOFF FROM WATERSHED GMN5B
         17         BA    .077
         18         PH       1       0    .423    .797    1.33    1.40    1.49    1.88    2.75    3.97
         19         LS              64
         20         UD    0.23

         21         KK  ROUT-1        ROUTE GMN5B T OUTLET OF    GMN-9
         22         RD    2300    .019    0.07            TRAP       4       3

         23         KK   GMN5A     RUNOFF FROM WATERSHED GMN5A
         24         BA    .069
         25         LS              74
         26         UD     .24
1                                           HEC-1 INPUT                                                    PAGE  2

        LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         27         KK  ROUT-1ROUTE GMN5A  TO OUTLET OF GMN-9
         28         RD    2300    .019     .07            TRAP       4       3

         29         KK    CP-1        COMBINE GMN5A & GMN5B   AT SE CORNER OF GMN-9
         30         HC       2

         31         KK    GMN6 RUNOFF FROM GMN6
         32         BA    .012
         33         LS              77
         34         UD     .09

         35         KK    GMN8RUNOFF FROM GMN 8
```

```
  36         BA    .027
  37         LS                 54
  38         UD     .12

  39         KK    CP-2        COMBINE GMN5, GMN6, & GMN8
  40         HC       2

  41         KK    GMN9        RUNOFF FROM GMN9 UNDEVELOPED
  42         BA    .152
  43         LS                 65
  44         UD    0.31

  45         KK    CP-3COMBINE FLOWS AT SW CORN OF GMN9
  46         KM   FLOW EXITING PROJECT SITE
  47         HC       2

  48         KK   GMN10        RUNOFF FROM GMN10
  49         BA     .01
  50         LS                 79
  51         UD     .05

  52         KK    CP-4COMBINE RUNOFF FROM PROJECT SITE W/ GMN10
  53         HC       3

  54         KK    GMN4        RUNOFF FROM GMN4
  55         BA    .233
  56         LS                 64
  57         UD     .36

  58         KK  ROUT-3        ROUTE GMN4 ACROSS GMN7
  59         RD     960    .008    0.07            TRAP       2       3

  60         KK    GMN7        RUNOFF FROM GMN7
  61         BA    .063
  62         LS                 54
  63         UD     .21
1                                       HEC-1 INPUT                                        PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  64         KK    CP-5
  65         HC       2

  66         KK  ROUT-4        ROUTE FLOW THRU GMN2
  67         RD    1800    .004     .05            TRAP       2     . 1

  68         KK    GMN2        RUNOFF FROM GMN2
  69         BA    .042
  70         LS                 79
  71         UD     .29

  72         KK    CP-6
  73         HC       2

  74         KK    CP-7        TOTAL FLOW AT INDIAN LANE & ESTATES ROAD
  75         HC       2

  76         KK  GMN-12
  77         BA     .01
  78         LS                 79
  79         UD     .11

  80         KK   CP-7B        TOTAL FLOW IN ESTATES ROAD CHANNEL
  81         HC       2

  82         KK   GMN11        RUNOFF FROM GMN11
  83         BA    .029
  84         LS                 70
  85         UD     .19

  86         KK   CP-10        COMBINE ALL FLOWS AT BNDRY OF SOUTH PARCEL
  87         HC       2

  88         KK    NR-2
  89         KM  B2WOOD RODGERS MODEL OF NORTHSTAR    RANCH
  90         KM  USE RAINFALL FOR SOUTH PART OF GOLDEN VALLEY
  91         PH       1       0    .418    .789    1.32    1.39    1.47    1.85    2.71    3.87
  92         BA    .025
  93         LS                 68
  94         UD     .16

  95         KK    NP-2
  96         KM  POND2FROM NORTHSTAR MODEL
  97         RS       1    FLOW       0       0
  98         SA    0.06    0.09    0.11    0.18
  99         SE      56      58      59      60
 100         SQ       0 4.63165.979368 6.99488
 101         SE      56      58      59      60
1                                       HEC-1 INPUT                                        PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 102         KK     B2RCNAME POND2
 103         KM       0       0     0.0       0      22
 104         RN     B2R

 105         KK   GMS-2        FORMERLY WATERSHED D IN NVHS MODEL BY ODYSSEY
 106         KM     WATERSHED D     MODIFIED DUE TO NORTHSTAR RANCH
 107         BA    .142
 108         LS                 77
 109         UD     .33

 110         KK   NRCP1        COMBINE WATERSHEDS D AND NR1
 111         HC       2
```

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KK   RDG-1
KM  B3SHED B3 FROM NORTHSTAR MODEL
BA    .04
LS              78
UD     .16

KK    NP-3
KM  POND3DETENTION POND 3FROM NORTHSTAR RANCH STUDY
RS       1    FLOW     0.0     0.0
SA   0.149  0.2974   0.338   0.378   0.428   0.478
SE      67      68      69      70      71      72
SQ     0.0  0.5287 6.94466 9.127010.8801843.77214
SE      67      68      39      70      71      72

KK     B3R  CNAME POND 3
RD    1400    0.05    0.03            CIRC     2.0     3.0

KK    NR-1
KM  B1FROM NORTHSTAR MODEL
BA    .063
LS              87
UD     .18

KK   POND1CNAME B1R
KM  COMBINE B3 AND B1 AT POND 1
HC       2

KK    NP-1
KM  POND 1
RS       1    FLOW     0.0     0.0
SA  0.1449  0.3968   0.501  0.6159
SE      36      38      40      42
SQ     0.0 3.6571526.1869282.85167
SE      36      38      40      42

KK    GMS1
KM   FORMERLYPART OF BASIN C IN NVHS STUDY BY ODYSSEY
BA    .073
LS              75
UD     .26
```

1 HEC-1 INPUT PAGE 5

```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK   NRCP2COMBINE  NRCP1, C, AND NP1       AT INLET PIPE TO NVHS DET BASIN
HC       3

KK   42-IN        PONDING AREA AT INLET TO 42" PIPE TO NVHS DET BASIN
RS       1    STOR       0
SA       0   0.255   2.207   3.296
SE    5112    5114    5116    5118
SQ       0       9      20      40     260     673    1130
SE    5112    5113    5114    5115    5116    5117    5118

KK   DV-42        DIVERT FLOW OVERTOPPING E. GOLDEN VALLEY DR
DT    OFLO
DI       0      40     260     673    1130
DQ       0       0     200     598    1040

KK  ROUTE2  ROUTE FLOW TO HIGH SCHOOL DETENTION BASIN
RD    2320   0.006   0.025            TRAP       4       3

KK     GH5        START GOLDEN HIGHLANDS MODEL      RUNOFF FROM GH5
BA    .097
LS              80
UD     .18

KK     GP2POND GP2 ON GOLDEN HIGHLANDS
KM  OUTLET IS 30-INCH RCP
RS       1    STOR       0
SA    .042    .326    .381    .438     0.5
SE    5152    5154    5156    5158    5160
SQ       0       7      10      16      29      37      45      50      56      60
SE    5152 5153.25  5153.5    5154    5155    5156    5157    5158    5159    5160

KK     GH4
BA    .027
LS              79
UD     .17

KK     GH3
BA    .052
LS            78.4
UD     .21

KK     GH2
BA    .035
LS              78
UD     .17

KK    GCP1COMBINE FLOWS AT POND G3
HC       4
```

1 HEC-1 INPUT PAGE 6

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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK     GP3        GOLDEN HIGHLANDS POND 3
KM  OUTLET IS 36-INCH RCP
RS       1    STOR       0
SA    .287    .355    .432    .575
SE    5128    5130    5132    5133
SQ       0       5      18      35      45      60      70
SE    5128    5129    5130    5131    5132    5133    5134
```

```
 192          KK     GH1
 193          BA    .008
 194          LS              84.5
 195          UD     .12

 196          KK    GHCP2
 197          HC       2

 198          KK  ROUTE1ROUTE THROUGH NVHS TO HIGH SCHOOL DET POND
 199          RD     2100  0.0013   0.025             TRAP       4       3

 200          KK     NVHS
 201          BA    .116
 202          LS              89
 203          UD     .18

 204          KK   HS+GHCOMBINE FLOW FROM GOLDEN HIGHLANDS & HIGH SCHOOL
 205          HC       2

 206          KK    PNT1INFLOW TO SCHOOL DETENTION BASIN
 207          HC       2

 208          KK  DETSCHDETENTION BASIN AT NORTH VALLEY HIGH SCHOOL
 209          KM  ASSUME OVVERTOPPING OCCURS OVER A 20 FOOTWIDTH OFNORTH BANK OF BASIN
 210          RS       1    STOR       0
 211          SA       0  0.7163  2.0073  2.4015  2.5210  2.6358     2.7    2.71    2.71    2.71
 212          SE   93.59      95      96      97      98      99     100     101     102     103
 213          SQ       0     2.2       5      13    26.8    43.5   103.5   211.5
 214          SE   93.59      95      96      97      98      99     100     101

 215          KK    TOGMS        DIVERT FLOW OVERTOPPING E. GOLDEN VALLEY DRIVE
 216          KM  DIVERT FLOW THAT FLOWS WEST ON GOLDEN VALLEY DR.
 217          DT  DV-GVD
 218          DI       0      39      56      94   158.5     208   356.5
 219          DQ       0       0      19      54      99     153     281

 220          KK  ESTATE
 221          KM  COMBINE GM NORTH FLOWS W/ FLOW FROM NVHSPOND AT PONDING AREA @ ESTATES &
 222          KM  EAST GOLDEN VALLEY ROAD
 223          HC       2
1                                       HEC-1 INPUT                                           PAGE  7

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 224          KK    GMN3        RUNOFF FROM GMN3
 225          BA    .268
 226          LS              64
 227          UD     .42

 228          KK    GMN1        RUNOFF FROM GMN1
 229          BA    .104
 230          LS              76
 231          UD     .27

 232          KK    CP-8        COMBINE GMN3 & 1AT WEST BNDRY OF GMN11
 233          HC       2

 234          KK   GMS-3
 235          BA    0.21
 236          LS              65
 237          UD     .34

 238          KK  RCAL-1        RECALL FLOW OVERTOPPING E. GOLDEN VALLEY DRIVE
 239          DR    OFLO

 240          KK  3+OFLO COMBINE CP-8 & GMS3 W/ FLO OVERTOPPING E. GOLDEN VALLEY ROAD
 241          HC       2

 242          KK  GMS4-E        TOTAL FLOW AT E. BNDRY OF GMS-4
 243          HC       2

 244          KK   GMS-4RUNOFF FROM APN 552-100-01
 245          BA    .054
 246          LS              70
 247          UD     .19

 248          KK  GMS3+4        COMBINE GMS-3 AND GMS-4
 249          HC       2

 250          KK    TOTL        COMBINE ONSITE +OFFSITE FLOWS AT ESTATES RD PONDING AREA
 251          HC       2

 252          KK  DB-ESTDETENTION NEAR   ESTATESRD AND GOLDEN VALLEY RD INTERSECTION
 253          KM   USE EXISTING OUTLETS ANDNATURAL TOPO FOR DET BASIN   18" & 36" RCB OUTLETS
 254          KM  MINIMUM ROAD ELEV 5091.2 FT.  WEIR FLOW STARTS AT 5091.2 FT
 255          RS       1    STOR       0
 256          SA       0    .005     .25   5.401  14.262  24.066
 257          SE    5087    5088    5090    5092    5094    5096
 258          SQ       0    11.5      28      47      66      78     239   10570
 259          SE    5087    5087    5088    5089    5090    5091    5092    5093
 260          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  16      GMN5B
              V
              V
  21      ROUT-1
              .
              .
```

```
  23        .     GMN5A
            .         V
            .         V
  27        .    ROUT-1
            .         .
            .         .
  29    CP-1...........
            .
            .
  31        .      GMN6
            .         .
            .         .
  35        .         .          GMN8
            .         .             .
            .         .             .
  39        .      CP-2.............
            .         .
            .         .
  41        .         .          GMN9
            .         .             .
            .         .             .
  45        .      CP-3.............
            .         .
            .         .
  48        .         .         GMN10
            .         .             .
            .         .             .
  52    CP-4........................
            .
            .
  54        .      GMN4
            .         V
            .         V
  58        .    ROUT-3
            .         .
            .         .
  60        .         .          GMN7
            .         .             .
            .         .             .
  64        .      CP-5.............
            .         V
            .         V
  66        .    ROUT-4
            .         .
            .         .
  68        .         .          GMN2
            .         .             .
            .         .             .
  72        .      CP-6.............
            .         .
            .         .
  74    CP-7...........
            .
            .
  76        .    GMN-12
            .         .
            .         .
  80   CP-7B...........
            .
            .
  82        .    GMN11
            .         .
            .         .
  86   CP-10...........
            .
            .
  88        .      NR-2
            .         V
            .         V
  95        .      NP-2
            .         V
            .         V
 102        .       B2R
            .         .
            .         .
 105        .         .         GMS-2
            .         .             .
            .         .             .
 110        .    NRCP1..............
            .         .
            .         .
 112        .         .         RDG-1
            .         .             V
            .         .             V
 117        .         .          NP-3
            .         .             V
            .         .             V
 124        .         .           B3R
            .         .             .
            .         .             .
 126        .         .             .          NR-1
            .         .             .             .
            .         .             .             .
 131        .         .         POND1.............
            .         .             V
            .         .             V
 134        .         .          NP-1
            .         .             .
            .         .             .
 141        .         .             .          GMS1
            .         .             .             .
            .         .             .             .
 146        .    NRCP2....................................
            .         V
            .         V
 148        .     42-IN
```

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               .           .
               .           .
155            .           .------->    OFLO
154            .       DV-42
               .           V
               .           V
158            .      ROUTE2
               .           .
               .           .
160            .           .       GH5
               .           .           V
               .           .           V
164            .           .       GP2
               .           .           .
               .           .           .
171            .           .           .           GH4
               .           .           .           .
               .           .           .           .
175            .           .           .           .          GH3
               .           .           .           .           .
               .           .           .           .           .
179            .           .           .           .           .          GH2
               .           .           .           .           .           .
               .           .           .           .           .           .
183            .           .        GCP1.......................................
               .           .           V
               .           .           V
185            .           .         GP3
               .           .           .
               .           .           .
192            .           .           .          GH1
               .           .           .           .
               .           .           .           .
196            .           .       GHCP2............
               .           .           V
               .           .           V
198            .           .      ROUTE1
               .           .           .
               .           .           .
200            .           .           .          NVHS
               .           .           .           .
               .           .           .           .
204            .           .       HS+GH............
               .           .           .
               .           .           .
206            .        PNT1............
               .           V
               .           V
208            .      DETSCH
               .           .
               .           .
217            .           .------->  DV-GVD
215            .       TOGMS
               .           .
               .           .
220        ESTATE............
               .
               .
224            .        GMN3
               .           .
               .           .
228            .           .        GMN1
               .           .           .
               .           .           .
232            .        CP-8............
               .           .
               .           .
234            .           .       GMS-3
               .           .           .
               .           .           .
239            .           .           .          .<-------     OFLO
238            .           .           .     RCAL-1
               .           .           .           .
               .           .           .           .
240            .           .     3+OFLO............
               .           .           .
               .           .           .
242            .      GMS4-E............
               .           .
               .           .
244            .           .       GMS-4
               .           .           .
               .           .           .
248            .      GMS3+4............
               .           .
               .           .
250          TOTL............
               V
               V
252        DB-EST
```

```
 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *        JUN 1998 AND FEB 2010          *
 *            VERSION 4.1R               *
 *       RGMHEC2000 WWW.HEC-1.COM        *
 *  RUN DATE   11SEP17  TIME  16:28:37   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*     DAVIS, CALIFORNIA 95616           *
*        (916) 756-1104                 *
*                                       *
*****************************************
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```
===================================================================
MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA SOUTH

      EXISTING CONDITIONS MODEL
     MODEL NAME GM1E.DAT
100 YR24 HR PRECIP    WITH UPDATED AREAS
DATE:JUNE 2016 *******************************************
  *****************************************************************


*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

  13 IO         OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     2    0  ENDING DATE
                     NDTIME       0919  ENDING TIME
                      ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL     .02 HOURS
                       TOTAL TIME BASE   33.32 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT

     JP         MULTI-PLAN OPTION
                     NPLAN          1  NUMBER OF PLANS

     JR         MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                  1.00       .99

VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000
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VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000
WARNING --- ROUTED OUTFLOW (     71.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     72.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     73.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     74.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     75.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     76.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     76.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     77.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     78.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     78.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (     76.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     76.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     75.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     74.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     74.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     73.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     73.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     72.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     71.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     71.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (     70.) IS GREATER THAN MAXIMUM OUTFLOW (     70.) IN STORAGE-OUTFLOW TABLE
VALUE EXCEEDS TABLE IN LOGLOG         .01667         .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG         .01667         .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG         .01667         .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG         .01667         .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG         .01667         .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG         .01667         .01667        24.00000
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .99
HYDROGRAPH AT +	GMN5B	.077	1	FLOW	30.89	30.02
				TIME	12.28	12.28
ROUTED TO +	ROUT-1	.077	1	FLOW	30.63	29.77
				TIME	12.47	12.47
HYDROGRAPH AT +	GMN5A	.069	1	FLOW	50.46	49.48
				TIME	12.28	12.28
ROUTED TO +	ROUT-1	.069	1	FLOW	50.13	49.14
				TIME	12.43	12.43
2 COMBINED AT +	CP-1	.146	1	FLOW	80.50	78.65
				TIME	12.45	12.45
HYDROGRAPH AT +	GMN6	.012	1	FLOW	15.92	15.64
				TIME	12.12	12.12
HYDROGRAPH AT +	GMN8	.027	1	FLOW	4.38	4.13
				TIME	12.20	12.20
2 COMBINED AT +	CP-2	.039	1	FLOW	19.05	18.52
				TIME	12.13	12.13
HYDROGRAPH AT +	GMN9	.152	1	FLOW	55.43	53.93
				TIME	12.37	12.37
2 COMBINED AT +	CP-3	.191	1	FLOW	62.66	60.96
				TIME	12.35	12.35
HYDROGRAPH AT +	GMN10	.010	1	FLOW	17.13	16.84
				TIME	12.07	12.07
3 COMBINED AT +	CP-4	.347	1	FLOW	141.80	138.21
				TIME	12.42	12.42
HYDROGRAPH AT +	GMN4	.233	1	FLOW	71.75	69.72
				TIME	12.43	12.43
ROUTED TO +	ROUT-3	.233	1	FLOW	71.16	69.14
				TIME	12.52	12.52
HYDROGRAPH AT +	GMN7	.063	1	FLOW	7.91	7.47
				TIME	12.32	12.32
2 COMBINED AT +	CP-5	.296	1	FLOW	76.79	74.50

				TIME	12.50	12.50
ROUTED TO						
+	ROUT-4	.296	1	FLOW	74.09	71.89
				TIME	12.65	12.65
HYDROGRAPH AT						
+	GMN2	.042	1	FLOW	34.70	34.11
				TIME	12.33	12.33
2 COMBINED AT						
+	CP-6	.338	1	FLOW	92.24	89.57
				TIME	12.60	12.60
2 COMBINED AT						
+	CP-7	.685	1	FLOW	217.84	211.77
				TIME	12.48	12.48
HYDROGRAPH AT						
+	GMN-12	.010	1	FLOW	13.42	13.19
				TIME	12.13	12.13
2 COMBINED AT						
+	CP-7B	.695	1	FLOW	220.66	214.56
				TIME	12.48	12.48
HYDROGRAPH AT						
+	GMN11	.029	1	FLOW	19.36	18.93
				TIME	12.23	12.23
2 COMBINED AT						
+	CP-10	.724	1	FLOW	230.19	223.76
				TIME	12.47	12.47
HYDROGRAPH AT						
+	NR-2	.025	1	FLOW	15.38	15.01
				TIME	12.20	12.20
ROUTED TO						
+	NP-2	.025	1	FLOW	6.13	6.07
				TIME	12.47	12.47
			** PEAK STAGES IN FEET **			
			1	STAGE	59.15	59.09
				TIME	12.47	12.47
ROUTED TO						
+	B2R	.025	1	FLOW	6.13	6.07
				TIME	12.47	12.47
HYDROGRAPH AT						
+	GMS-2	.142	1	FLOW	96.53	94.77
				TIME	12.37	12.37
2 COMBINED AT						
+	NRCP1	.167	1	FLOW	102.57	100.76
				TIME	12.37	12.37
HYDROGRAPH AT						
+	RDG-1	.040	1	FLOW	42.29	41.54
				TIME	12.18	12.18
ROUTED TO						
+	NP-3	.040	1	FLOW	9.11	9.10
				TIME	12.60	12.60
			** PEAK STAGES IN FEET **			
			1	STAGE	69.74	69.68
				TIME	12.60	12.60
ROUTED TO						
+	B3R	.040	1	FLOW	12.06	12.06
				TIME	.08	.08
HYDROGRAPH AT						
+	NR-1	.063	1	FLOW	89.00	87.78
				TIME	12.20	12.20
2 COMBINED AT						
+	POND1	.103	1	FLOW	97.99	96.77
				TIME	12.20	12.20
ROUTED TO						
+	NP-1	.103	1	FLOW	63.85	63.00
				TIME	12.37	12.37
			** PEAK STAGES IN FEET **			
			1	STAGE	41.33	41.30
				TIME	12.37	12.37
HYDROGRAPH AT						
+	GMS1	.073	1	FLOW	51.89	50.89
				TIME	12.30	12.30
3 COMBINED AT						
+	NRCP2	.343	1	FLOW	215.88	212.24
				TIME	12.35	12.35
ROUTED TO						
+	42-IN	.343	1	FLOW	201.19	197.76
				TIME	12.43	12.43
			** PEAK STAGES IN FEET **			
			1	STAGE	5115.73	5115.72
				TIME	12.43	12.43

DIVERSION TO							
+	OFLO	.343	1	FLOW	146.54	143.42
				TIME	12.43	12.43
HYDROGRAPH AT						
+	DV-42	.343	1	FLOW	54.65	54.34
				TIME	12.43	12.43
ROUTED TO						
+	ROUTE2	.343	1	FLOW	54.57	54.26
				TIME	12.55	12.55
HYDROGRAPH AT						
+	GH5	.097	1	FLOW	105.33	103.57
				TIME	12.20	12.20
ROUTED TO						
+	GP2	.097	1	FLOW	48.61	48.17
				TIME	12.45	12.45
			** PEAK STAGES IN FEET **			
			1	STAGE	5157.72	5157.63
				TIME	12.45	12.45
HYDROGRAPH AT						
+	GH4	.027	1	FLOW	28.96	28.46
				TIME	12.20	12.20
HYDROGRAPH AT						
+	GH3	.052	1	FLOW	48.71	47.86
				TIME	12.23	12.23
HYDROGRAPH AT						
+	GH2	.035	1	FLOW	35.92	35.29
				TIME	12.20	12.20
4 COMBINED AT						
+	GCP1	.211	1	FLOW	152.29	149.87
				TIME	12.23	12.23
ROUTED TO						
+	GP3	.211	1	FLOW	79.33	78.46
				TIME	12.60	12.60
			** PEAK STAGES IN FEET **			
			1	STAGE	5134.93	5134.85
				TIME	12.60	12.60
HYDROGRAPH AT						
+	GH1	.008	1	FLOW	12.47	12.28
				TIME	12.13	12.13
2 COMBINED AT						
+	GHCP2	.219	1	FLOW	81.34	80.45
				TIME	12.55	12.55
ROUTED TO						
+	ROUTE1	.219	1	FLOW	80.11	79.22
				TIME	12.72	12.72
HYDROGRAPH AT						
+	NVHS	.116	1	FLOW	174.48	172.23
				TIME	12.20	12.20
2 COMBINED AT						
+	HS+GH	.335	1	FLOW	202.51	199.52
				TIME	12.23	12.23
2 COMBINED AT						
+	PNT1	.678	1	FLOW	240.17	236.82
				TIME	12.25	12.25
ROUTED TO						
+	DETSCH	.678	1	FLOW	145.74	143.18
				TIME	12.78	12.78
			** PEAK STAGES IN FEET **			
			1	STAGE	100.39	100.37
				TIME	12.78	12.78
DIVERSION TO						
+	DV-GVD	.678	1	FLOW	90.10	88.31
				TIME	12.78	12.78
HYDROGRAPH AT						
+	TOGMS	.678	1	FLOW	55.64	54.87
				TIME	12.78	12.78
2 COMBINED AT						
+	ESTATE	1.402	1	FLOW	275.51	267.93
				TIME	12.48	12.48
HYDROGRAPH AT						
+	GMN3	.268	1	FLOW	70.73	68.67
				TIME	12.50	12.50
HYDROGRAPH AT						
+	GMN1	.104	1	FLOW	75.89	74.47
				TIME	12.30	12.32
2 COMBINED AT						
+	CP-8	.372	1	FLOW	134.46	131.19
				TIME	12.38	12.38
HYDROGRAPH AT						
+	GMS-3	.210	1	FLOW	68.59	66.69

				TIME	12.42	12.42
HYDROGRAPH AT						
+	RCAL-1	.000	1	FLOW	146.54	143.42
				TIME	12.43	12.43
2 COMBINED AT						
+	3+OFLO	.210	1	FLOW	214.79	209.80
				TIME	12.43	12.43
2 COMBINED AT						
+	GMS4-E	.582	1	FLOW	347.47	339.20
				TIME	12.42	12.42
HYDROGRAPH AT						
+	GMS-4	.054	1	FLOW	34.57	33.79
				TIME	12.23	12.23
2 COMBINED AT						
+	GMS3+4	.636	1	FLOW	368.58	359.80
				TIME	12.40	12.40
2 COMBINED AT						
+	TOTL	2.038	1	FLOW	635.74	619.72
				TIME	12.43	12.43
ROUTED TO						
+	DB-EST	2.038	1	FLOW	635.34	619.41
				TIME	12.45	12.45
			** PEAK STAGES IN FEET **			
			1	STAGE	5092.04	5092.04
				TIME	12.45	12.42

5-YEAR PROPOSED CONDITIONS

```
1****************************************                          ****************************************
 *                                      *                          *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                          *   U.S. ARMY CORPS OF ENGINEERS       *
 *       JUN 1998 AND FEB 2010          *                          *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1R               *                          *         609 SECOND STREET            *
 *     RGMHEC2000 WWW.HEC-1.COM         *                          *     DAVIS, CALIFORNIA 95616          *
 * RUN DATE   12SEP17  TIME  07:46:34   *                          *         (916) 756-1104               *
 *                                      *                          *                                      *
****************************************                          ****************************************


                    X     X  XXXXXXX   XXXXX          X
                    X     X  X        X     X        XX
                    X     X  X        X               X
                    XXXXXXX  XXXX     X        XXXXX  X
                    X     X  X        X               X
                    X     X  X        X     X         X
                    X     X  XXXXXXX   XXXXX         XXX


 THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
```



```
 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

               *DDIAGRAM
   1           ID  ======================================================================
   2           ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA SOUTH
   3           ID         ENLARGED POND B TO 2 ACRES
   4           ID         PROPOSED CONDITIONS MODEL
   5           ID        MODEL NAME GM-5P.DAT
   6           ID  5 YR 24 HR PRECIP
   7           ID  DATE:EPT 2017*********************************************
   8           ID    ***********************************************************************
   9           ID
  10           ID
               *      ***********************************************************************
  11           IT       1               2880
  12           IN      15
  13           IO       5
  14           JR    PREC       1
               *   **************************************************************************
               *   **************************************************************************
               *        DARF         AREA (SQ.    MI.)
               *        1.00            0 -  2
               *        0.99          2.1 -  8
               *        0.98          8.1 - 16
               *        0.97         16.1 - 29
               *        0.96         29.1 - 43
               *        0.95         43.1 - 63
               *        0.94         63.1 - 98
               *   **************************************************************************
  15           JR    PREC     1.0    0.99    0.98    0.97
               *   **************************************************************************

  16           KK    GMN4        RUNOFF FROM GMN4
  17           BA    .233
  18           PH       1       0    .167    .316    .527    .668    .795    1.15     1.6    2.19
  19           LS              64
  20           UD     .36

  21           KK  ROUT-3        ROUTE GMN4 ACROSS GMN7
  22           RD     960    .008    0.07            TRAP       2       3

  23           KK    GMN7        RUNOFF FROM GMN7
  24           BA    .063
  25           LS              54
  26           UD     .21

  27           KK   CP-N1
  28           HC       2

  29           KK  ROUT-4        ROUTE FLOW THRU GMN2
  30           RD    1800    .004     .05            TRAP       2       1
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  31           KK    GMN2        RUNOFF FROM GMN2
  32           BA    .042
  33           LS              79
  34           UD     .29

  35           KK   GMN10        RUNOFF FROM GMN10
  36           BA     .01
  37           LS              79
  38           UD     .05

  39           KK   CP-N2
  40           HC       2

  41           KK   CP-N3        TOTAL FLOW AT INDIAN LANE & ESTATES ROAD
```

```
HC       2

KK  GMN-12
BA     .01
LS              79
UD     .11

KK   CP-N4
KM  TOTAL FLOW ALONGESTATES ENTERING GMS-4
HC       2

KK   GMN5A    RUNOFF FROM WATERSHED GMN5A
BA    .069
LS              74
UD     .24

KK   GMN5B    RUNOFF FROM WATERSHED GMN5B
BA    .077
LS              64
UD    0.23

KK   CP-N5         FLOW INTO POND A
HC       2

KK    DP-A         DET. POND A AT NW CORNER OF GMN9
KM  OUTLET IS ONE 24" RCP
RS       1    STOR       0
SA       2       2       2       2       2       2       2       2       2       2
SQ       0       0       2       4       8      12      16      20      23      26
SE    -4.5       0      .5     1.0     1.5       2     2.5       3     3.5       4

KK   RTE-1         ROUTE DP-A TO SW CORNER OF GMN-9
RD    2300    .019     .07            TRAP       4       3

KK    GMN6 RUNOFF FROM GMN6
BA    .012
LS              77
UD     .09
```



```
KK    GMN8RUNOFF FROM GMN 8
BA    .027
LS              54
UD     .12

KK   CP-N6         COMBINE GMN5A, GN6, & GMN8
HC       2

KK    GMN9         RUNOFF FROM GMN9 UNDEVELOPED
BA    .152
LS              76
UD    0.32

KK   CP-N7COMBINE FLOWS AT SW CORN OF GMN9
KM   FLOW EXITING PROJECT SITE
HC       2

KK   CP-N8         ADD FLOW FROM POND A    TOTAL FLOW TO POND DP-B
HC       2

KK    DP-B         DET. POND AT SW CORNER OF GMN9
KM  OUTLET IS ONE 36" RCP & 1-18" RCP
RS       1    STOR       0
SA       1       1       1       1       1       1       1       1       1       1
SE    -4.5       0       1     1.5       2     2.5     3.0     3.5       4       5
SQ       0       0     9.5      28      48      65      77      92
SE    -4.5       0       1       2       3       4       5       6

KK   GMN11         RUNOFF FROM GMN11
BA    .029
LS              80
UD     .17

KK   CP-N9         COMBINE FLOW FROM POND  DP-B & GMN-11 @ S. BNDRYOF GMN11
HC       2

KK   DIV-N         DIVERT FLOW FROM  CP-N9 TO BE RECALLED LATER
DT   DET-C
DI       0     100     500    1000
DQ       0     100     500    1000

KK    NR-2
KM  B2WOOD RODGERS MODEL OF NORTHSTAR    RANCH
KM  USE RAINFALL FOR SOUTH PART OF GOLDEN VALLEY
PH       1       0    .167    .318    .527    .668    .795    1.15     1.6    2.14
BA    .025
LS              68
UD     .16
```



```
KK    NP-2
KM  POND2FROM NORTHSTAR MODEL
RS       1    FLOW       0       0
SA    0.06    0.09    0.11    0.18
SE      56      58      59      60
SQ       0 4.63165.979368 6.99488
SE      56      58      59      60

KK     B2RCNAME POND2
KM       0       0     0.0       0      22
```

```
 120           RN     B2R

 121           KK   GMS-2        FORMERLY WATERSHED D IN NVHS MODEL BY ODYSSEY
 122           KM     WATERSHED D      MODIFIED DUE TO NORTHSTAR RANCH
 123           BA    .142
 124           LS              77
 125           UD     .33

 126           KK   NRCP1        COMBINE WATERSHEDS D AND NR1
 127           HC       2

 128           KK   RDG-1
 129           KM  B3SHED B3 FROM NORTHSTAR MODEL
 130           BA     .04
 131           LS              78
 132           UD     .16

 133           KK     NP-3
 134           KM  POND3DETENTION POND 3FROM NORTHSTAR RANCH STUDY
 135           RS       1    FLOW     0.0     0.0
 136           SA   0.149  0.2974   0.338   0.378   0.428   0.478
 137           SE      67      68      69      70      71      72
 138           SQ     0.0  0.5287 6.94466  9.127010.8801843.77214
 139           SE      67      68      39      70      71      72

 140           KK     NR-1
 141           KM  B1FROM NORTHSTAR MODEL
 142           BA    .063
 143           LS              87
 144           UD     .18

 145           KK   POND1CNAME B1R
 146           KM  COMBINE B3 AND B1 AT POND 1
 147           HC       2

 148           KK     NP-1
 149           KM  POND 1
 150           RS       1    FLOW     0.0     0.0
 151           SA  0.1449  0.3968   0.501  0.6159
 152           SE      36      38      40      42
 153           SQ     0.0 3.6571526.1869282.85167
 154           SE      36      38      40      42
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 155           KK     GMS1
 156           KM   FORMERLYPART OF BASIN C IN NVHS STUDY BY ODYSSEY
 157           BA    .073
 158           LS              75
 159           UD     .26

 160           KK   NRCP2COMBINE  NRCP1, C, AND NP1       AT INLET PIPE TO NVHS DET BASIN
 161           HC       3

 162           KK   42-IN        PONDING AREA AT INLET TO 42" PIPE TO NVHS DET BASIN
 163           RS       1    STOR       0
 164           SA       0   0.255   2.207   3.296
 165           SE    5112    5114    5116    5118
 166           SQ       0       9      20      40     260     673    1130
 167           SE    5112    5113    5114    5115    5116    5117    5118

 168           KK   DV-42        DIVERT FLOW OVERTOPPING E. GOLDEN VALLEY DRIVE
 169           DT    OFLO
 170           DI       0      40     260     673    1130
 171           DQ       0       0     200     598    1040

 172           KK  ROUTE2  ROUTE FLOW TO HIGH SCHOOL DETENTION BASIN
 173           RD    2320   0.006   0.025            TRAP       4       3

 174           KK     GH5        START GOLDEN HIGHLANDS MODEL     RUNOFF FROM GH5
 175           BA    .097
 176           LS              80
 177           UD     .18

 178           KK     GP2POND GP2 ON GOLDEN HIGHLANDS
 179           KM  OUTLET IS 30-INCH RCP
 180           RS       1    STOR       0
 181           SA    .042    .326    .381    .438     0.5
 182           SE    5152    5154    5156    5158    5160
 183           SQ       0       7      10      16      29      37      45      50      56      60
 184           SE    5152 5153.25  5153.5    5154    5155    5156    5157    5158    5159    5160

 185           KK     GH4
 186           BA    .027
 187           LS              79
 188           UD     .17

 189           KK     GH3
 190           BA    .052
 191           LS            78.4
 192           UD     .21

 193           KK     GH2
 194           BA    .035
 195           LS              78
 196           UD     .17
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 197           KK     GCP1COMBINE FLOWS AT POND G3
 198           HC       4
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 199     KK     GP3        GOLDEN HIGHLANDS POND 3
 200     KM  OUTLET IS 36-INCH RCP
 201     RS       1     STOR        0
 202     SA    .287     .355     .432     .575
 203     SE    5128     5130     5132     5133
 204     SQ       0        5       18       35       45       60       70
 205     SE    5128     5129     5130     5131     5132     5133     5134

 206     KK     GH1
 207     BA    .008
 208     LS             84.5
 209     UD     .12

 210     KK   GHCP2
 211     HC       2

 212     KK  ROUTE1ROUTE THROUGH NVHS TO HIGH SCHOOL DET POND
 213     RD    2100  0.0013   0.025              TRAP        4        3

 214     KK    NVHS
 215     BA    .116
 216     LS               89
 217     UD     .18

 218     KK   HS+GHCOMBINE FLOW FROM GOLDEN HIGHLANDS & HIGH SCHOOL
 219     HC       2

 220     KK    PNT1INFLOW TO SCHOOL DETENTION BASIN
 221     HC       2

 222     KK  DETSCHDETENTION BASIN AT NORTH VALLEY HIGH SCHOOL
 223     KM  12" RCP @ ELEV 93.59 & 36" RCP @ ELEV 96.25
 224     KM  ASSUME OVERTOPPING OCCURS OVER A 20 FOOTWIDTH OFNORTH BANK OF BASIN
 225     RS       1     STOR        0
 226     SA       0   0.7163   2.0073   2.4015   2.5210   2.6358      2.7     2.71     2.71     2.71
 227     SE   93.59       95       96       97       98       99      100      101      102      103
 228     SQ       0      2.2        5       13     26.8     43.5    103.5    211.5
 229     SE   93.59       95       96       97       98       99      100      101

 230     KK   TOGMS        DIVERT FLOW OVERTOPPING E. GOLDEN VALLEY DRIVE
 231     KM  DIVERT FLOW THAT FLOWS WEST ON GOLDEN VALLEY DR.
 232     DT  DV-GVD
 233     DI       0       39       56       94    158.5      208    356.5
 234     DQ       0        0       19       54       99      153      281

 235     KK  ESTATECOMBINE GM NORTH FLOWS AT ESTATES ROAD PONDING AREA
 236     HC       2
1                                       HEC-1 INPUT                                                   PAGE  7

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 237     KK    GMN3        RUNOFF FROM GMN3
 238     BA    .278
 239     LS               64
 240     UD     .42

 241     KK    GMN1        RUNOFF FROM GMN1
 242     BA    .104
 243     LS               76
 244     UD     .27

 245     KK  CP-N10        COMBINE GMN3 & 1AT NE CORNER OF GMS-4
 246     HC       2

 247     KK   GMS-3
 248     BA      .2
 249     LS               65
 250     UD     .34

 251     KK  RCAL-1        RECALL OVERFLOW FROM 42" PIPE
 252     DR    OFLO

 253     KK  CP-N11
 254     KM  GMS-3 + OVERFLOW FROM 42" PIPE
 255     HC       2

 256     KK  CP-N12
 257     KM  COMBINE GMN-3, GMN-1, OFLO, AND GMS-3, TOTAL FLOW @ E. BDRY OF GMS-4
 258     HC       2

 259     KK   RCL-2        RECALL FLOW FROM DET POND C
 260     DR   DET-C

 261     KK   GMS-4RUNOFF FROM APN 552-100-01       DEVELOPED CONDITIONS
 262     BA    .054
 263     LS               80
 264     UD     .18

 265     KK  CP-N13        COMBINE GMS-3 AND FLOW  FROM POND B
 266     HC       2

 267     KK  CP-N14        TOTAL FLOW AT MIDDLE OF   GMS-4
 268     KM  NOT INCLUDING FLOW FROM HIGH SCHOOL OR ALONG ESTATES RD
 269     HC       2

 270     KK  CP-N15        COMBINE ONSITE +OFFSITE FLOWS FROM EAST & SOUTH
 271     KM  AT ESTATES ROAD POND AREA
 272     HC       2

 273     KK   TOTAL        COMBINE ALL FLOW AT ESTATES PONDING AREA
 274     HC       2
1                                       HEC-1 INPUT                                                   PAGE  8

LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

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          275           KK  DB-ESTDETENTION NEAR   ESTATESRD AND GOLDEN VALLEY RD INTERSECTION
          276           KM   USE EXISTING OUTLETS  AND STORAGE IN PROPOSED CHANNEL & OVERFLOW AREA
          277           KM  MINIMUM ROAD ELEV 5091.2 FT
          278           RS       1    STOR       0
          279           SA     .17     .34     .42     .62     .66
          280           SE    5087    5088    5090    5092    5094
          281           SQ       0    11.5      28      47      66      78     239     643
          282           SE    5087    5088    5089    5090    5091  5091.5    5092 5092.15
          283           ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   16        GMN4
                V
                V
   21      ROUT-3
                .
                .
   23           .       GMN7
                .          .
                .          .
   27        CP-N1............
                V
                V
   29      ROUT-4
                .
                .
   31           .       GMN2
                .          .
                .          .
   35           .          .       GMN10
                .          .           .
                .          .           .
   39           .      CP-N2............
                .          .
                .          .
   41        CP-N3............
                .
                .
   43           .     GMN-12
                .          .
                .          .
   47        CP-N4............
                .
                .
   50           .      GMN5A
                .          .
                .          .
   54           .          .       GMN5B
                .          .           .
                .          .           .
   58           .      CP-N5............
                .          V
                .          V
   60           .       DP-A
                .          V
                .          V
   66           .      RTE-1
                .          .
                .          .
   68           .          .        GMN6
                .          .           .
                .          .           .
   72           .          .           .        GMN8
                .          .           .           .
                .          .           .           .
   76           .          .       CP-N6............
                .          .           .
                .          .           .
   78           .          .           .        GMN9
                .          .           .           .
                .          .           .           .
   82           .          .       CP-N7............
                .          .           .
                .          .           .
   85           .      CP-N8............
                .          V
                .          V
   87           .       DP-B
                .          .
                .          .
   94           .          .       GMN11
                .          .           .
                .          .           .
   98           .      CP-N9............
                .          .
                .          .
  101           .          .------->   DET-C
  100           .      DIV-N
                .          .
                .          .
  104           .          .        NR-2
                .          .           V
                .          .           V
  111           .          .        NP-2
                .          .           V
                .          .           V
  118           .          .         B2R
                .          .           .
                .          .           .
  121           .          .           .       GMS-2
```

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              .           .           .           .
              .           .           .           .
126           .           .       NRCP1............
              .           .           .
              .           .           .
128           .           .           .       RDG-1
              .           .           .           V
              .           .           .           V
133           .           .           .        NP-3
              .           .           .           .
              .           .           .           .
140           .           .           .           .        NR-1
              .           .           .           .           .
              .           .           .           .           .
145           .           .           .       POND1............
              .           .           .           V
              .           .           .           V
148           .           .           .        NP-1
              .           .           .           .
              .           .           .           .
155           .           .           .           .        GMS1
              .           .           .           .           .
              .           .           .           .           .
160           .           .       NRCP2........................
              .           .           V
              .           .           V
162           .           .       42-IN
              .           .           .
              .           .           .
169           .           .           .------->    OFLO
168           .           .       DV-42
              .           .           V
              .           .           V
172           .           .      ROUTE2
              .           .           .
              .           .           .
174           .           .           .         GH5
              .           .           .           V
              .           .           .           V
178           .           .           .         GP2
              .           .           .           .
              .           .           .           .
185           .           .           .           .         GH4
              .           .           .           .           .
              .           .           .           .           .
189           .           .           .           .           .         GH3
              .           .           .           .           .           .
              .           .           .           .           .           .
193           .           .           .           .           .           .         GH2
              .           .           .           .           .           .           .
              .           .           .           .           .           .           .
197           .           .           .        GCP1....................................
              .           .           .           V
              .           .           .           V
199           .           .           .         GP3
              .           .           .           .
              .           .           .           .
206           .           .           .           .         GH1
              .           .           .           .           .
              .           .           .           .           .
210           .           .           .       GHCP2............
              .           .           .           V
              .           .           .           V
212           .           .           .      ROUTE1
              .           .           .           .
              .           .           .           .
214           .           .           .           .        NVHS
              .           .           .           .           .
              .           .           .           .           .
218           .           .           .       HS+GH............
              .           .           .           .
              .           .           .           .
220           .           .        PNT1............
              .           .           V
              .           .           V
222           .           .      DETSCH
              .           .           .
              .           .           .
232           .           .           .------->  DV-GVD
230           .           .       TOGMS
              .           .           .
              .           .           .
235           .      ESTATE............
              .           .
              .           .
237           .           .        GMN3
              .           .           .
              .           .           .
241           .           .           .        GMN1
              .           .           .           .
              .           .           .           .
245           .           .      CP-N10............
              .           .           .
              .           .           .
247           .           .           .       GMS-3
              .           .           .           .
              .           .           .           .
252           .           .           .           .           .<-------    OFLO
251           .           .           .           .      RCAL-1
              .           .           .           .           .
              .           .           .           .           .
253           .           .           .      CP-N11............
              .           .           .           .
              .           .           .           .
256           .           .      CP-N12............
              .           .           .
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260          .           .           .           .<-------    DET-C
  259          .           .           .          RCL-2
               .           .           .            .
               .           .           .            .
  261          .           .           .            .          GMS-4
               .           .           .            .            .
               .           .           .            .            .
  265          .           .           .        CP-N13............
               .           .           .            .
               .           .           .            .
  267          .           .        CP-N14............
               .           .           .
               .           .           .
  270          .        CP-N15............
               .           .
               .           .
  273        TOTAL............
               V
               V
  275       DB-EST

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                         *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *
*        JUN 1998 AND FEB 2010            *
*           VERSION 4.1R                  *
*       RGMHEC2000 WWW.HEC-1.COM          *
* RUN DATE   12SEP17  TIME  07:46:34      *
*                                         *
*****************************************

*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*         609 SECOND STREET             *
*      DAVIS, CALIFORNIA 95616          *
*          (916) 756-1104               *
*                                       *
*****************************************


         ========================================================================
         MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA SOUTH
               ENLARGED POND B TO 2 ACRES
               PROPOSED CONDITIONS MODEL
              MODEL NAME GM-5P.DAT
         5 YR 24 HR PRECIP
         DATE:EPT 2017*********************************************
           ***********************************************************************


*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

  13 IO         OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT         HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME        0919  ENDING TIME
                      ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .02 HOURS
                       TOTAL TIME BASE   33.32 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT

     JP         MULTI-PLAN OPTION
                      NPLAN           1  NUMBER OF PLANS

     JR         MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   1.00      .99       .98       .97

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667        24.00000
VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667        24.00000
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VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667        24.00000
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VALUE EXCEEDS TABLE IN LOGLOG	.01667	.01667	24.00000
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VALUE EXCEEDS TABLE IN LOGLOG	.01667	.01667	24.00000

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .99	RATIO 3 .98	RATIO 4 .97
HYDROGRAPH AT +	GMN4	.233	1	FLOW	2.58	2.48	2.38	2.28
				TIME	15.05	15.07	15.03	15.07
ROUTED TO +	ROUT-3	.233	1	FLOW	2.58	2.48	2.38	2.28
				TIME	15.20	15.20	15.22	15.23
HYDROGRAPH AT +	GMN7	.063	1	FLOW	.17	.17	.16	.15
				TIME	23.98	23.88	24.00	23.88
2 COMBINED AT +	CP-N1	.296	1	FLOW	2.58	2.48	2.38	2.28
				TIME	15.20	15.20	15.22	15.23
ROUTED TO +	ROUT-4	.296	1	FLOW	2.57	2.47	2.37	2.28
				TIME	15.50	15.50	15.52	15.53
HYDROGRAPH AT +	GMN2	.042	1	FLOW	7.58	7.40	7.21	7.03
				TIME	12.33	12.33	12.33	12.33
HYDROGRAPH AT +	GMN10	.010	1	FLOW	3.72	3.62	3.53	3.44
				TIME	12.07	12.07	12.07	12.07
2 COMBINED AT +	CP-N2	.052	1	FLOW	8.37	8.17	7.97	7.77
				TIME	12.30	12.30	12.32	12.32
2 COMBINED AT +	CP-N3	.348	1	FLOW	8.37	8.17	7.97	7.77
				TIME	12.30	12.30	12.32	12.32
HYDROGRAPH AT +	GMN-12	.010	1	FLOW	2.92	2.85	2.77	2.70
				TIME	12.13	12.13	12.13	12.13
2 COMBINED AT +	CP-N4	.358	1	FLOW	9.92	9.68	9.44	9.20
				TIME	12.27	12.27	12.27	12.27
HYDROGRAPH AT +	GMN5A	.069	1	FLOW	8.28	8.00	7.73	7.46
				TIME	12.28	12.28	12.30	12.30
HYDROGRAPH AT +	GMN5B	.077	1	FLOW	.87	.82	.79	.76
				TIME	12.43	14.93	14.95	14.97
2 COMBINED AT +	CP-N5	.146	1	FLOW	8.92	8.55	8.18	7.83
				TIME	12.30	12.30	12.30	12.30
ROUTED TO +	DP-A	.146	1	FLOW	2.23	2.18	2.14	2.10
				TIME	15.75	15.83	15.68	15.63
			** PEAK STAGES IN FEET **					
			1	STAGE	.56	.55	.54	.53
				TIME	15.92	15.85	15.77	15.67
ROUTED TO +	RTE-1	.146	1	FLOW	2.23	2.18	2.14	2.10
				TIME	16.13	15.97	16.07	16.02

HYDROGRAPH AT								
+	GMN6	.012	1	FLOW	3.14	3.06	2.97	2.89
				TIME	12.12	12.12	12.12	12.12
HYDROGRAPH AT								
+	GMN8	.027	1	FLOW	.07	.07	.07	.06
				TIME	23.73	23.98	23.77	23.75
2 COMBINED AT								
+	CP-N6	.039	1	FLOW	3.14	3.06	2.97	2.89
				TIME	12.12	12.12	12.12	12.12
HYDROGRAPH AT								
+	GMN9	.152	1	FLOW	19.41	18.84	18.28	17.73
				TIME	12.37	12.37	12.38	12.38
2 COMBINED AT								
+	CP-N7	.191	1	FLOW	20.32	19.73	19.15	18.57
				TIME	12.37	12.37	12.37	12.37
2 COMBINED AT								
+	CP-N8	.337	1	FLOW	20.36	19.76	19.17	18.59
				TIME	12.37	12.37	12.37	12.37
ROUTED TO								
+	DP-B	.337	1	FLOW	6.87	6.70	6.54	6.37
				TIME	15.22	15.22	15.27	15.25
			** PEAK STAGES IN FEET **					
			1	STAGE	.72	.71	.69	.67
				TIME	15.23	15.25	15.27	15.30
HYDROGRAPH AT								
+	GMN11	.029	1	FLOW	7.59	7.41	7.23	7.06
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT								
+	CP-N9	.366	1	FLOW	9.34	9.09	8.84	8.59
				TIME	12.22	12.22	12.22	12.22
DIVERSION TO								
+	DET-C	.366	1	FLOW	9.34	9.09	8.84	8.59
				TIME	12.22	12.22	12.22	12.22
HYDROGRAPH AT								
+	DIV-N	.366	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
HYDROGRAPH AT								
+	NR-2	.025	1	FLOW	1.15	1.07	1.00	.92
				TIME	12.23	12.25	12.25	12.25
ROUTED TO								
+	NP-2	.025	1	FLOW	.58	.54	.50	.47
				TIME	12.52	12.52	12.53	12.53
			** PEAK STAGES IN FEET **					
			1	STAGE	56.25	56.23	56.22	56.20
				TIME	12.53	12.53	12.55	12.57
ROUTED TO								
+	B2R	.025	1	FLOW	.58	.54	.50	.47
				TIME	12.52	12.52	12.53	12.53
HYDROGRAPH AT								
+	GMS-2	.142	1	FLOW	18.98	18.45	17.92	17.39
				TIME	12.38	12.38	12.38	12.38
2 COMBINED AT								
+	NRCP1	.167	1	FLOW	19.50	18.93	18.37	17.81
				TIME	12.38	12.38	12.38	12.38
HYDROGRAPH AT								
+	RDG-1	.040	1	FLOW	8.74	8.51	8.29	8.06
				TIME	12.20	12.20	12.20	12.20
ROUTED TO								
+	NP-3	.040	1	FLOW	8.92	8.92	8.92	8.92
				TIME	.02	.02	.02	.02
			** PEAK STAGES IN FEET **					
			1	STAGE	67.00	67.00	67.00	67.00
				TIME	.00	.00	.00	.00
HYDROGRAPH AT								
+	NR-1	.063	1	FLOW	26.17	25.72	25.27	24.81
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT								
+	POND1	.103	1	FLOW	35.09	34.63	34.18	33.73
				TIME	12.20	12.20	12.20	12.20
ROUTED TO								
+	NP-1	.103	1	FLOW	21.65	21.42	21.20	20.98
				TIME	12.43	12.43	12.43	12.43
			** PEAK STAGES IN FEET **					
			1	STAGE	39.60	39.58	39.56	39.54
				TIME	12.43	12.43	12.43	12.43
HYDROGRAPH AT								
+	GMS1	.073	1	FLOW	9.00	8.72	8.43	8.15
				TIME	12.32	12.32	12.32	12.32
3 COMBINED AT								
+	NRCP2	.343	1	FLOW	49.52	48.46	47.41	46.36

				TIME	12.37	12.37	12.37	12.37
ROUTED TO								
+	42-IN	.343	1	FLOW	37.82	37.12	36.42	35.72
				TIME	12.63	12.63	12.63	12.63
			** PEAK STAGES IN FEET **					
			1	STAGE	5114.89	5114.86	5114.82	5114.79
				TIME	12.63	12.63	12.63	12.63
DIVERSION TO								
+	OFLO	.343	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
HYDROGRAPH AT								
+	DV-42	.343	1	FLOW	37.82	37.12	36.42	35.72
				TIME	12.63	12.63	12.63	12.63
ROUTED TO								
+	ROUTE2	.343	1	FLOW	37.77	37.07	36.37	35.68
				TIME	12.75	12.77	12.77	12.77
HYDROGRAPH AT								
+	GH5	.097	1	FLOW	23.97	23.41	22.84	22.28
				TIME	12.22	12.22	12.22	12.22
ROUTED TO								
+	GP2	.097	1	FLOW	15.36	15.02	14.68	14.34
				TIME	12.37	12.37	12.37	12.37
			** PEAK STAGES IN FEET **					
			1	STAGE	5153.95	5153.92	5153.89	5153.86
				TIME	12.37	12.37	12.37	12.37
HYDROGRAPH AT								
+	GH4	.027	1	FLOW	6.29	6.14	5.98	5.82
				TIME	12.20	12.20	12.20	12.20
HYDROGRAPH AT								
+	GH3	.052	1	FLOW	10.30	10.03	9.77	9.51
				TIME	12.25	12.25	12.25	12.25
HYDROGRAPH AT								
+	GH2	.035	1	FLOW	7.43	7.23	7.04	6.85
				TIME	12.20	12.20	12.20	12.20
4 COMBINED AT								
+	GCP1	.211	1	FLOW	36.58	35.70	34.82	33.95
				TIME	12.25	12.25	12.25	12.25
ROUTED TO								
+	GP3	.211	1	FLOW	23.91	23.23	22.54	21.86
				TIME	12.50	12.52	12.52	12.52
			** PEAK STAGES IN FEET **					
			1	STAGE	5130.35	5130.31	5130.27	5130.23
				TIME	12.50	12.52	12.52	12.52
HYDROGRAPH AT								
+	GH1	.008	1	FLOW	3.38	3.31	3.25	3.18
				TIME	12.15	12.15	12.15	12.15
2 COMBINED AT								
+	GHCP2	.219	1	FLOW	24.65	23.94	23.24	22.53
				TIME	12.50	12.50	12.50	12.50
ROUTED TO								
+	ROUTE1	.219	1	FLOW	23.43	22.76	22.09	21.43
				TIME	12.75	12.75	12.77	12.77
HYDROGRAPH AT								
+	NVHS	.116	1	FLOW	54.60	53.74	52.87	52.00
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT								
+	HS+GH	.335	1	FLOW	57.75	56.72	55.71	54.69
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT								
+	PNT1	.678	1	FLOW	73.94	72.64	71.35	70.07
				TIME	12.22	12.22	12.22	12.22
ROUTED TO								
+	DETSCH	.678	1	FLOW	39.29	38.55	37.82	37.09
				TIME	13.95	13.97	13.98	14.00
			** PEAK STAGES IN FEET **					
			1	STAGE	98.75	98.70	98.66	98.62
				TIME	13.95	13.97	14.00	14.02
DIVERSION TO								
+	DV-GVD	.678	1	FLOW	.33	.00	.00	.00
				TIME	13.95	.00	.00	.00
HYDROGRAPH AT								
+	TOGMS	.678	1	FLOW	39.00	38.55	37.82	37.09
				TIME	13.67	13.97	13.98	14.00
2 COMBINED AT								
+	ESTATE	1.044	1	FLOW	39.00	38.55	37.82	37.09
				TIME	13.67	13.97	13.98	14.00
HYDROGRAPH AT								
+	GMN3	.278	1	FLOW	2.93	2.81	2.70	2.58
				TIME	15.08	15.10	15.12	15.13

HYDROGRAPH AT								
+	GMN1	.104	1	FLOW	14.07	13.64	13.23	12.81
				TIME	12.32	12.32	12.32	12.32
2 COMBINED AT								
+	CP-N10	.382	1	FLOW	14.61	14.08	13.57	13.08
				TIME	12.33	12.33	12.33	12.33
HYDROGRAPH AT								
+	GMS-3	.200	1	FLOW	2.42	2.30	2.22	2.13
				TIME	12.58	14.98	15.00	15.02
HYDROGRAPH AT								
+	RCAL-1	.000	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
2 COMBINED AT								
+	CP-N11	.200	1	FLOW	2.42	2.30	2.22	2.13
				TIME	12.58	14.98	15.00	15.02
2 COMBINED AT								
+	CP-N12	.582	1	FLOW	16.07	15.33	14.63	13.96
				TIME	12.35	12.35	12.35	12.35
HYDROGRAPH AT								
+	RCL-2	.000	1	FLOW	9.34	9.09	8.84	8.59
				TIME	12.22	12.22	12.22	12.22
HYDROGRAPH AT								
+	GMS-4	.054	1	FLOW	13.35	13.04	12.72	12.41
				TIME	12.22	12.22	12.22	12.22
2 COMBINED AT								
+	CP-N13	.054	1	FLOW	22.69	22.13	21.56	21.00
				TIME	12.22	12.22	12.22	12.22
2 COMBINED AT								
+	CP-N14	.636	1	FLOW	36.10	34.98	33.88	32.81
				TIME	12.25	12.25	12.25	12.25
2 COMBINED AT								
+	CP-N15	1.680	1	FLOW	57.38	56.26	55.00	53.75
				TIME	14.35	14.15	14.17	14.20
2 COMBINED AT								
+	TOTAL	2.038	1	FLOW	64.73	63.01	61.33	59.69
				TIME	12.28	12.28	12.28	12.28
ROUTED TO								
+	DB-EST	2.038	1	FLOW	61.61	60.28	58.89	57.51
				TIME	14.63	14.62	14.65	14.68
			** PEAK STAGES IN FEET **					
			1	STAGE	5090.77	5090.70	5090.63	5090.55
				TIME	14.60	14.58	14.63	14.65

100-YEAR PROPOSED CONDITIONS

1P

```
ID        PROPOSED CONDITIONS MODEL
ID       MODEL NAME GM1P.DAT
ID  100 YR 24 HR PRECIP
ID  DATE:SEP 2017 *********************************************
ID    ***********************************************************************
ID
ID
*       ***********************************************************************
IT      1                 2880
IN     15
IO      5
JR    PREC        1
*   ***********************************************************************
*   ***********************************************************************
*       DARF          AREA (SQ.     MI.)
*       1.00             0 -  2
*       0.99           2.1 -  8
*       0.98           8.1 - 16
*       0.97          16.1 - 29
*       0.96          29.1 - 43
*       0.95          43.1 - 63
*       0.94          63.1 - 98
*   ***********************************************************************
JR    PREC     1.0    0.99    0.98    0.97
*   ***********************************************************************

KK    GMN4        RUNOFF FROM GMN4
BA    .233
PH       1       0    .423    .797    1.33     1.4    1.49    1.88    2.75    3.97
LS              64
UD     .36

KK  ROUT-3        ROUTE GMN4 ACROSS GMN7
RD     960    .008    0.07            TRAP       2       3

KK    GMN7        RUNOFF FROM GMN7
BA    .063
LS              54
UD     .21

KK   CP-N1
HC       2

KK  ROUT-4        ROUTE FLOW THRU GMN2
RD    1800    .004     .05            TRAP       2       1
```



```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK    GMN2        RUNOFF FROM GMN2
BA    .042
LS              79
UD     .29

KK   GMN10        RUNOFF FROM GMN10
BA     .01
LS              79
UD     .05

KK   CP-N2
HC       2

KK   CP-N3        TOTAL FLOW AT INDIAN LANE & ESTATES ROAD
HC       2

KK  GMN-12
BA     .01
LS              79
UD     .11

KK   CP-N4
KM  TOTAL FLOW ALONGESTATES ENTERING GMS-4
HC       2

KK   GMN5A    RUNOFF FROM WATERSHED GMN5A
BA    .069
LS              74
UD     .24

KK   GMN5B    RUNOFF FROM WATERSHED GMN5B
BA    .077
LS              64
UD    0.23

KK   CP-N5        FLOW INTO POND A
HC       2

KK    DP-A        DET. POND A AT NW CORNER OF GMN9
KM  OUTLET IS ONE 24" RCP
RS       1    STOR       0
SA       2       2       2       2       2       2       2       2       2       2
SQ       0       0       2       4       8      12      16      20      23      26
SE    -4.5       0      .5     1.0     1.5       2     2.5       3     3.5       4

KK   RTE-1        ROUTE DP-A TO SW CORNER OF GMN-9
RD    2300    .019     .07            TRAP       4       3

KK    GMN6 RUNOFF FROM GMN6
BA    .012
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          LS              77
          UD      .09
```

1

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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          KK     GMN8RUNOFF FROM GMN 8
          BA     .027
          LS              54
          UD      .12

          KK    CP-N6          COMBINE GMN5A, GN6, & GMN8
          HC        2

          KK     GMN9          RUNOFF FROM GMN9 UNDEVELOPED
          BA     .152
          LS               76
          UD     0.32

          KK    CP-N7COMBINE FLOWS AT SW CORN OF GMN9
          KM    FLOW EXITING PROJECT SITE
          HC        2

          KK    CP-N8          ADD FLOW FROM POND A     TOTAL FLOW TO POND DP-B
          HC        2

          KK     DP-B          DET. POND AT SW CORNER OF GMN9
          KM    OUTLET IS ONE 36" RCP & 1-18" RCP
          RS        1     STOR       0
          SA        1        1       1       1       1       1       1       1       1       1
          SE     -4.5        0       1     1.5       2     2.5     3.0     3.5       4       5
          SQ        0        0     9.5      28      48      65      77      92
          SE     -4.5        0       1       2       3       4       5       6

          KK    GMN11          RUNOFF FROM GMN11
          BA     .029
          LS               80
          UD      .17

          KK    CP-N9          COMBINE FLOW FROM POND  DP-B & GMN-11 @ S. BNDRYOF GMN11
          HC        2

          KK    DIV-N          DIVERT FLOW FROM  CP-N9 TO BE RECALLED LATER
          DT    DET-C
          DI        0      100     500    1000
          DQ        0      100     500    1000

          KK     NR-2
          KM    B2WOOD RODGERS MODEL OF NORTHSTAR    RANCH
          KM    USE RAINFALL FOR SOUTH PART OF GOLDEN VALLEY
          PH        1        0    .418    .789    1.32    1.39    1.47    1.85    2.71    3.87
          BA     .025
          LS               68
          UD      .16
```



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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          KK     NP-2
          KM    POND2FROM NORTHSTAR MODEL
          RS        1     FLOW       0       0
          SA     0.06     0.09    0.11    0.18
          SE       56       58      59      60
          SQ        0  4.63165.979368 6.99488
          SE       56       58      59      60

          KK     B2RCNAME POND2
          KM        0        0     0.0       0      22
          RN      B2R

          KK    GMS-2          FORMERLY WATERSHED D IN NVHS MODEL BY ODYSSEY
          KM      WATERSHED D       MODIFIED DUE TO NORTHSTAR RANCH
          BA     .142
          LS               77
          UD      .33

          KK    NRCP1          COMBINE WATERSHEDS D AND NR1
          HC        2

          KK    RDG-1
          KM    B3SHED B3 FROM NORTHSTAR MODEL
          BA      .04
          LS               78
          UD      .16

          KK     NP-3
          KM    POND3DETENTION POND 3FROM NORTHSTAR RANCH STUDY
          RS        1     FLOW     0.0     0.0
          SA    0.149   0.2974   0.338   0.378   0.428   0.478
          SE       67       68      69      70      71      72
          SQ      0.0   0.5287 6.94466  9.127010.8801843.77214
          SE       67       68      39      70      71      72

          KK     NR-1
          KM    B1FROM NORTHSTAR MODEL
          BA     .063
          LS               87
          UD      .18
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 145          KK   POND1CNAME B1R
 146          KM  COMBINE B3 AND B1 AT POND 1
 147          HC       2

 148          KK    NP-1
 149          KM  POND 1
 150          RS       1    FLOW     0.0     0.0
 151          SA  0.1449  0.3968   0.501  0.6159
 152          SE      36      38      40      42
 153          SQ     0.0 3.6571526.1869282.85167
 154          SE      36      38      40      42
1                                       HEC-1 INPUT                                            PAGE  5

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 155          KK    GMS1
 156          KM   FORMERLYPART OF BASIN C IN NVHS STUDY BY ODYSSEY
 157          BA    .073
 158          LS              75
 159          UD     .26

 160          KK   NRCP2COMBINE  NRCP1, C, AND NP1       AT INLET PIPE TO NVHS DET BASIN
 161          HC       3

 162          KK   42-IN         PONDING AREA AT INLET TO 42" PIPE TO NVHS DET BASIN
 163          RS       1    STOR       0
 164          SA       0   0.255   2.207   3.296
 165          SE    5112    5114    5116    5118
 166          SQ       0       9      20      40     260     673    1130
 167          SE    5112    5113    5114    5115    5116    5117    5118

 168          KK   DV-42         DIVERT FLOW OVERTOPPING E. GOLDEN VALLEY DRIVE
 169          DT    OFLO
 170          DI       0      40     260     673    1130
 171          DQ       0       0     200     598    1040

 172          KK  ROUTE2  ROUTE FLOW TO HIGH SCHOOL DETENTION BASIN
 173          RD    2320   0.006   0.025            TRAP       4       3

 174          KK     GH5         START GOLDEN HIGHLANDS MODEL      RUNOFF FROM GH5
 175          BA    .097
 176          LS              80
 177          UD     .18

 178          KK     GP2POND GP2 ON GOLDEN HIGHLANDS
 179          KM  OUTLET IS 30-INCH RCP
 180          RS       1    STOR       0
 181          SA    .042    .326    .381    .438     0.5
 182          SE    5152    5154    5156    5158    5160
 183          SQ       0       7      10      16      29      37      45      50      56      60
 184          SE    5152 5153.25  5153.5    5154    5155    5156    5157    5158    5159    5160

 185          KK     GH4
 186          BA    .027
 187          LS              79
 188          UD     .17

 189          KK     GH3
 190          BA    .052
 191          LS            78.4
 192          UD     .21

 193          KK     GH2
 194          BA    .035
 195          LS              78
 196          UD     .17
1                                       HEC-1 INPUT                                            PAGE  6

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 197          KK    GCP1COMBINE FLOWS AT POND G3
 198          HC       4

 199          KK     GP3         GOLDEN HIGHLANDS POND 3
 200          KM  OUTLET IS 36-INCH RCP
 201          RS       1    STOR       0
 202          SA    .287    .355    .432    .575
 203          SE    5128    5130    5132    5133
 204          SQ       0       5      18      35      45      60      70
 205          SE    5128    5129    5130    5131    5132    5133    5134

 206          KK     GH1
 207          BA    .008
 208          LS            84.5
 209          UD     .12

 210          KK   GHCP2
 211          HC       2

 212          KK  ROUTE1ROUTE THROUGH NVHS TO HIGH SCHOOL DET POND
 213          RD    2100  0.0013   0.025            TRAP       4       3

 214          KK    NVHS
 215          BA    .116
 216          LS              89
 217          UD     .18

 218          KK   HS+GHCOMBINE FLOW FROM GOLDEN HIGHLANDS & HIGH SCHOOL
 219          HC       2
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 220          KK    PNT1INFLOW TO SCHOOL DETENTION BASIN
 221          HC       2

 222          KK  DETSCHDETENTION BASIN AT NORTH VALLEY HIGH SCHOOL
 223          KM  12" RCP @ ELEV 93.59 & 36" RCP @ ELEV 96.25
 224          KM  ASSUME OVERTOPPING OCCURS OVER A 20 FOOTWIDTH OFNORTH BANK OF BASIN
 225          RS       1    STOR       0
 226          SA       0  0.7163  2.0073  2.4015  2.5210  2.6358     2.7    2.71    2.71    2.71
 227          SE   93.59      95      96      97      98      99     100     101     102     103
 228          SQ       0     2.2       5      13    26.8    43.5   103.5   211.5
 229          SE   93.59      95      96      97      98      99     100     101

 230          KK   TOGMS        DIVERT FLOW OVERTOPPING E. GOLDEN VALLEY DRIVE
 231          KM  DIVERT FLOW THAT FLOWS WEST ON GOLDEN VALLEY DR.
 232          DT  DV-GVD
 233          DI       0      39      56      94   158.5     208   356.5
 234          DQ       0       0      19      54      99     153     281

 235          KK  ESTATECOMBINE GM NORTH FLOWS AT ESTATES ROAD PONDING AREA
 236          HC       2
1                                         HEC-1 INPUT                                          PAGE  7

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 237          KK    GMN3        RUNOFF FROM GMN3
 238          BA    .278
 239          LS              64
 240          UD     .42

 241          KK    GMN1        RUNOFF FROM GMN1
 242          BA    .104
 243          LS              76
 244          UD     .27

 245          KK  CP-N10        COMBINE GMN3 & 1AT NE CORNER OF GMS-4
 246          HC       2

 247          KK   GMS-3
 248          BA      .2
 249          LS              65
 250          UD     .34

 251          KK  RCAL-1        RECALL OVERFLOW FROM 42" PIPE
 252          DR    OFLO

 253          KK  CP-N11
 254          KM  GMS-3 + OVERFLOW FROM 42" PIPE
 255          HC       2

 256          KK  CP-N12
 257          KM  COMBINE GMN-3, GMN-1, OFLO, AND GMS-3, TOTAL FLOW @ E. BDRY OF GMS-4
 258          HC       2

 259          KK   RCL-2        RECALL FLOW FROM DET POND C
 260          DR   DET-C

 261          KK   GMS-4RUNOFF FROM APN 552-100-01       DEVELOPED CONDITIONS
 262          BA    .054
 263          LS              80
 264          UD     .18

 265          KK  CP-N13        COMBINE GMS-3 AND FLOW  FROM POND B
 266          HC       2

 267          KK  CP-N14        TOTAL FLOW AT MIDDLE OF   GMS-4
 268          KM  NOT INCLUDING FLOW FROM HIGH SCHOOL OR ALONG ESTATES RD
 269          HC       2

 270          KK  CP-N15        COMBINE ONSITE +OFFSITE FLOWS FROM EAST & SOUTH
 271          KM  AT ESTATES ROAD POND AREA
 272          HC       2

 273          KK   TOTAL        COMBINE ALL FLOW AT ESTATES PONDING AREA
 274          HC       2
1                                         HEC-1 INPUT                                          PAGE  8

 LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 275          KK  DB-ESTDETENTION NEAR   ESTATESRD AND GOLDEN VALLEY RD INTERSECTION
 276          KM   USE EXISTING OUTLETS  AND STORAGE IN PROPOSED CHANNEL & OVERFLOW AREA
 277          KM  MINIMUM ROAD ELEV 5091.2 FT
 278          RS       1    STOR       0
 279          SA     .17     .34     .42     .62     .66
 280          SE    5087    5088    5090    5092    5094
 281          SQ       0    11.5      28      47      66      78     239     643
 282          SE    5087    5088    5089    5090    5091  5091.5    5092 5092.15
 283          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

 NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  16       GMN4
              V
              V
  21      ROUT-3
```

```
                 .
 23              .          GMN7
                 .             .
                 .             .
 27          CP-N1.............
                 V
                 V
 29         ROUT-4
                 .
                 .
 31              .          GMN2
                 .             .
                 .             .
 35              .             .         GMN10
                 .             .             .
                 .             .             .
 39              .         CP-N2.............
                 .             .
                 .             .
 41          CP-N3.............
                 .
                 .
 43              .        GMN-12
                 .             .
                 .             .
 47          CP-N4.............
                 .
                 .
 50              .         GMN5A
                 .             .
                 .             .
 54              .             .         GMN5B
                 .             .             .
                 .             .             .
 58              .         CP-N5.............
                 .             V
                 .             V
 60              .          DP-A
                 .             V
                 .             V
 66              .         RTE-1
                 .             .
                 .             .
 68              .             .          GMN6
                 .             .             .
                 .             .             .
 72              .             .             .          GMN8
                 .             .             .             .
                 .             .             .             .
 76              .             .         CP-N6.............
                 .             .             .
                 .             .             .
 78              .             .             .          GMN9
                 .             .             .             .
                 .             .             .             .
                 .             .         CP-N7.............
                 .             .             .
                 .             .             .
 85              .         CP-N8.............
                 .             V
                 .             V
 87              .          DP-B
                 .             .
                 .             .
 94              .             .         GMN11
                 .             .             .
                 .             .             .
 98              .         CP-N9.............
                 .             .
                 .             .
101              .             .------->   DET-C
100              .         DIV-N
                 .             .
                 .             .
104              .             .          NR-2
                 .             .             V
                 .             .             V
111              .             .          NP-2
                 .             .             V
                 .             .             V
118              .             .           B2R
                 .             .             .
                 .             .             .
121              .             .             .         GMS-2
                 .             .             .             .
                 .             .             .             .
126              .             .        NRCP1.............
                 .             .             .
                 .             .             .
128              .             .             .         RDG-1
                 .             .             .             V
                 .             .             .             V
133              .             .             .          NP-3
                 .             .             .             .
                 .             .             .             .
140              .             .             .             .          NR-1
                 .             .             .             .             .
                 .             .             .             .             .
145              .             .             .         POND1.............
                 .             .             .             V
```

```
                 .         .          .         V
      148        .         .          .       NP-1
                 .         .          .         .
      155        .         .          .         .         GMS1
                 .         .          .         .           .
      160        .         .      NRCP2.......................
                 .         .          V
                 .         .          V
      162        .         .      42-IN
                 .         .          .
      169        .         .          .------->    OFLO
      168        .         .      DV-42
                 .         .          V
                 .         .          V
      172        .         .     ROUTE2
                 .         .          .
      174        .         .          .       GH5
                 .         .          .         V
                 .         .          .         V
      178        .         .          .       GP2
                 .         .          .         .
      185        .         .          .         .        GH4
                 .         .          .         .          .
      189        .         .          .         .          .         GH3
                 .         .          .         .          .           .
      193        .         .          .         .          .           .         GH2
                 .         .          .         .          .           .           .
      197        .         .          .     GCP1...................................
                 .         .          .         V
                 .         .          .         V
      199        .         .          .       GP3
                 .         .          .         .
      206        .         .          .         .        GH1
                 .         .          .         .          .
      210        .         .          .    GHCP2............
                 .         .          .         V
                 .         .          .         V
      212        .         .          .   ROUTE1
                 .         .          .         .
      214        .         .          .         .       NVHS
                 .         .          .         .          .
      218        .         .          .    HS+GH............
                 .         .          .         .
      220        .         .      PNT1............
                 .         .          V
                 .         .          V
      222        .         .     DETSCH
                 .         .          .
      232        .         .          .------->  DV-GVD
      230        .         .      TOGMS
                 .         .          .
      235        .    ESTATE............
                 .         .
      237        .         .      GMN3
                 .         .          .
      241        .         .          .       GMN1
                 .         .          .         .
      245        .         .     CP-N10............
                 .         .          .
      247        .         .          .      GMS-3
                 .         .          .         .
      252        .         .          .         .          .<-------    OFLO
      251        .         .          .         .    RCAL-1
                 .         .          .         .          .
      253        .         .          .    CP-N11............
                 .         .          .         .
      256        .         .     CP-N12............
                 .         .          .
      260        .         .          .         .<-------   DET-C
      259        .         .          .     RCL-2
                 .         .          .         .
      261        .         .          .         .      GMS-4
                 .         .          .         .          .
      265        .         .          .    CP-N13............
                 .         .          .         .
```

```
 267           .        .      CP-N14............
               .        .                       .
               .        .                       .
 270           .     CP-N15...........
               .        .
               .        .
 273      TOTAL............
             V
             V
 275      DB-EST

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *        JUN 1998 AND FEB 2010          *
 *           VERSION 4.1R                *
 *      RGMHEC2000 WWW.HEC-1.COM         *
 *  RUN DATE   11SEP17  TIME  16:24:56   *
 *                                       *
 *****************************************

                                          ***************************************
                                          *                                     *
                                          *   U.S. ARMY CORPS OF ENGINEERS      *
                                          *   HYDROLOGIC ENGINEERING CENTER     *
                                          *        609 SECOND STREET            *
                                          *     DAVIS, CALIFORNIA 95616         *
                                          *         (916) 756-1104              *
                                          *                                     *
                                          ***************************************


                    ======================================================================
                    MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA SOUTH
                          ENLARGED POND B TO 2 ACRES
                          PROPOSED CONDITIONS MODEL
                         MODEL NAME GM1P.DAT
                    100 YR 24 HR PRECIP
                    DATE:SEP 2017 *********************************************
                      ***********************************************************************


 *** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

   13 IO        OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT        HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                      IDATE     1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     2    0  ENDING DATE
                     NDTIME       0919  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL      .02 HOURS
                      TOTAL TIME BASE    33.32 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT

     JP         MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

     JR         MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   1.00       .99       .98       .97
VALUE EXCEEDS TABLE IN LOGLOG           .01667        .01667        24.00000
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VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000
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PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIO 1 1.00	RATIO 2 .99	RATIO 3 .98	RATIO 4 .97
HYDROGRAPH AT +	GMN4	.233	1	FLOW	71.75	69.72	67.70	65.70
				TIME	12.43	12.43	12.43	12.43
ROUTED TO +	ROUT-3	.233	1	FLOW	71.16	69.14	67.14	65.16
				TIME	12.52	12.52	12.52	12.52
HYDROGRAPH AT +	GMN7	.063	1	FLOW	7.91	7.47	7.04	6.63
				TIME	12.32	12.32	12.32	12.32
2 COMBINED AT +	CP-N1	.296	1	FLOW	76.79	74.50	72.24	70.02
				TIME	12.50	12.50	12.52	12.52
ROUTED TO +	ROUT-4	.296	1	FLOW	74.09	71.89	69.70	67.52
				TIME	12.65	12.65	12.65	12.65
HYDROGRAPH AT +	GMN2	.042	1	FLOW	34.70	34.11	33.53	32.94
				TIME	12.33	12.33	12.33	12.33
HYDROGRAPH AT +	GMN10	.010	1	FLOW	17.13	16.84	16.55	16.26
				TIME	12.07	12.07	12.07	12.07
2 COMBINED AT +	CP-N2	.052	1	FLOW	38.24	37.59	36.95	36.30
				TIME	12.30	12.30	12.30	12.30
2 COMBINED AT +	CP-N3	.348	1	FLOW	92.92	90.24	87.58	84.92
				TIME	12.60	12.60	12.60	12.60
HYDROGRAPH AT +	GMN-12	.010	1	FLOW	13.42	13.19	12.97	12.74
				TIME	12.13	12.13	12.13	12.13
2 COMBINED AT +	CP-N4	.358	1	FLOW	94.82	92.05	89.30	86.56
				TIME	12.58	12.58	12.58	12.58
[illegible]GRAPH AT +	GMN5A	.069	1	FLOW	50.46	49.48	48.49	47.51
				TIME	12.28	12.28	12.28	12.28
HYDROGRAPH AT +	GMN5B	.077	1	FLOW	30.89	30.02	29.15	28.29
				TIME	12.28	12.28	12.28	12.28
2 COMBINED AT +	CP-N5	.146	1	FLOW	81.35	79.49	77.64	75.80
				TIME	12.28	12.28	12.28	12.28
ROUTED TO +	DP-A	.146	1	FLOW	11.02	10.73	10.44	10.15
				TIME	12.87	12.87	12.87	12.87
			** PEAK STAGES IN FEET **					
			1	STAGE	1.88	1.84	1.80	1.77
				TIME	12.87	12.87	12.87	12.87
ROUTED TO +	RTE-1	.146	1	FLOW	11.01	10.72	10.44	10.15
				TIME	13.10	13.10	13.12	13.12
HYDROGRAPH AT +	GMN6	.012	1	FLOW	15.92	15.64	15.36	15.07
				TIME	12.12	12.12	12.12	12.12
HYDROGRAPH AT +	GMN8	.027	1	FLOW	4.38	4.13	3.89	3.65
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT +	CP-N6	.039	1	FLOW	19.05	18.52	18.00	17.48
				TIME	12.13	12.13	12.13	12.13
HYDROGRAPH AT +	GMN9	.152	1	FLOW	103.61	101.70	99.79	97.89
				TIME	12.37	12.37	12.37	12.37
2 COMBINED AT +	CP-N7	.191	1	FLOW	110.99	108.87	106.76	104.66
				TIME	12.35	12.35	12.35	12.35
2 COMBINED AT +	CP-N8	.337	1	FLOW	112.82	110.61	108.41	106.22
				TIME	12.35	12.35	12.35	12.35

ROUTED TO								
+	DP-B	.337	1	FLOW	55.07	53.87	52.68	51.51
				TIME	12.73	12.73	12.73	12.73
			** PEAK STAGES IN FEET **					
			1	STAGE	3.42	3.35	3.28	3.21
				TIME	12.73	12.73	12.73	12.73
HYDROGRAPH AT								
+	GMN11	.029	1	FLOW	33.34	32.79	32.24	31.70
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT								
+	CP-N9	.366	1	FLOW	60.88	59.59	58.31	57.03
				TIME	12.60	12.60	12.60	12.60
DIVERSION TO								
+	DET-C	.366	1	FLOW	60.88	59.59	58.31	57.03
				TIME	12.60	12.60	12.60	12.60
HYDROGRAPH AT								
+	DIV-N	.366	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
HYDROGRAPH AT								
+	NR-2	.025	1	FLOW	15.38	15.01	14.63	14.27
				TIME	12.20	12.20	12.20	12.20
ROUTED TO								
+	NP-2	.025	1	FLOW	6.13	6.07	6.01	5.94
				TIME	12.47	12.47	12.47	12.47
			** PEAK STAGES IN FEET **					
			1	STAGE	59.15	59.09	59.03	58.97
				TIME	12.47	12.47	12.47	12.47
ROUTED TO								
+	B2R	.025	1	FLOW	6.13	6.07	6.01	5.94
				TIME	12.47	12.47	12.47	12.47
HYDROGRAPH AT								
+	GMS-2	.142	1	FLOW	96.53	94.77	93.01	91.26
				TIME	12.37	12.37	12.37	12.37
2 COMBINED AT								
+	NRCP1	.167	1	FLOW	102.57	100.76	98.92	97.07
				TIME	12.37	12.37	12.37	12.37
HYDROGRAPH AT								
+	RDG-1	.040	1	FLOW	42.29	41.54	40.79	40.05
				TIME	12.18	12.18	12.18	12.18
ROUTED TO								
+	NP-3	.040	1	FLOW	9.11	9.10	9.10	9.10
				TIME	12.60	12.60	12.55	12.57
			** PEAK STAGES IN FEET **					
			1	STAGE	69.74	69.68	69.61	69.55
				TIME	12.60	12.60	12.60	12.60
HYDROGRAPH AT								
+	NR-1	.063	1	FLOW	89.00	87.78	86.56	85.34
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT								
+	POND1	.103	1	FLOW	98.02	96.80	95.57	94.35
				TIME	12.20	12.20	12.20	12.20
ROUTED TO								
+	NP-1	.103	1	FLOW	63.86	63.02	62.17	61.32
				TIME	12.37	12.37	12.37	12.37
			** PEAK STAGES IN FEET **					
			1	STAGE	41.33	41.30	41.27	41.24
				TIME	12.37	12.37	12.37	12.37
HYDROGRAPH AT								
+	GMS1	.073	1	FLOW	51.89	50.89	49.90	48.90
				TIME	12.30	12.30	12.30	12.30
3 COMBINED AT								
+	NRCP2	.343	1	FLOW	215.89	212.26	208.60	204.96
				TIME	12.35	12.35	12.35	12.35
ROUTED TO								
+	42-IN	.343	1	FLOW	201.21	197.78	194.37	190.97
				TIME	12.43	12.43	12.45	12.45
			** PEAK STAGES IN FEET **					
			1	STAGE	5115.73	5115.72	5115.70	5115.69
				TIME	12.43	12.43	12.43	12.43
DIVERSION TO								
+	OFLO	.343	1	FLOW	146.55	143.43	140.34	137.24
				TIME	12.43	12.43	12.45	12.45
HYDROGRAPH AT								
+	DV-42	.343	1	FLOW	54.66	54.34	54.03	53.72
				TIME	12.43	12.43	12.45	12.45

ROUTED TO								
+	ROUTE2	.343	1	FLOW	54.57	54.26	53.95	53.64
				TIME	12.55	12.55	12.55	12.55
HYDROGRAPH AT								
+	GH5	.097	1	FLOW	105.33	103.57	101.81	100.05
				TIME	12.20	12.20	12.20	12.20
ROUTED TO								
+	GP2	.097	1	FLOW	48.61	48.17	47.72	47.29
				TIME	12.45	12.45	12.45	12.43
			** PEAK STAGES IN FEET **					
			1	STAGE	5157.72	5157.63	5157.54	5157.46
				TIME	12.45	12.45	12.45	12.43
HYDROGRAPH AT								
+	GH4	.027	1	FLOW	28.96	28.46	27.96	27.47
				TIME	12.20	12.20	12.20	12.20
HYDROGRAPH AT								
+	GH3	.052	1	FLOW	48.71	47.86	47.01	46.16
				TIME	12.23	12.23	12.23	12.23
HYDROGRAPH AT								
+	GH2	.035	1	FLOW	35.92	35.29	34.65	34.02
				TIME	12.20	12.20	12.20	12.20
4 COMBINED AT								
+	GCP1	.211	1	FLOW	152.29	149.87	147.47	145.07
				TIME	12.23	12.23	12.23	12.23
ROUTED TO								
+	GP3	.211	1	FLOW	79.33	78.46	77.59	76.72
				TIME	12.60	12.60	12.60	12.60
			** PEAK STAGES IN FEET **					
			1	STAGE	5134.93	5134.85	5134.76	5134.67
				TIME	12.60	12.60	12.60	12.60
HYDROGRAPH AT								
+	GH1	.008	1	FLOW	12.47	12.28	12.10	11.92
				TIME	12.13	12.13	12.13	12.13
2 COMBINED AT								
+	GHCP2	.219	1	FLOW	81.34	80.45	79.56	78.67
				TIME	12.55	12.55	12.55	12.55
ROUTED TO								
+	ROUTE1	.219	1	FLOW	80.11	79.22	78.34	77.46
				TIME	12.72	12.72	12.72	12.72
HYDROGRAPH AT								
+	NVHS	.116	1	FLOW	174.48	172.23	169.97	167.71
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT								
+	HS+GH	.335	1	FLOW	202.51	199.52	196.53	193.53
				TIME	12.23	12.23	12.23	12.23
2 COMBINED AT								
+	PNT1	.678	1	FLOW	240.17	236.82	233.46	230.07
				TIME	12.25	12.25	12.25	12.25
ROUTED TO								
+	DETSCH	.678	1	FLOW	145.75	143.19	140.63	138.07
				TIME	12.78	12.78	12.80	12.82
			** PEAK STAGES IN FEET **					
			1	STAGE	100.39	100.37	100.34	100.32
				TIME	12.78	12.78	12.80	12.82
DIVERSION TO								
+	DV-GVD	.678	1	FLOW	90.11	88.32	86.53	84.75
				TIME	12.78	12.78	12.80	12.82
HYDROGRAPH AT								
+	TOGMS	.678	1	FLOW	55.65	54.87	54.10	53.32
				TIME	12.78	12.78	12.80	12.82
2 COMBINED AT								
+	ESTATE	1.044	1	FLOW	55.65	54.87	54.10	53.32
				TIME	12.78	12.78	12.80	12.82
HYDROGRAPH AT								
+	GMN3	.278	1	FLOW	73.36	71.22	69.10	66.99
				TIME	12.50	12.50	12.50	12.50
HYDROGRAPH AT								
+	GMN1	.104	1	FLOW	75.89	74.47	73.06	71.65
				TIME	12.30	12.32	12.32	12.32
2 COMBINED AT								
+	CP-N10	.382	1	FLOW	136.83	133.48	130.15	126.85
				TIME	12.38	12.38	12.38	12.38
HYDROGRAPH AT								
+	GMS-3	.200	1	FLOW	65.33	63.52	61.73	59.95
				TIME	12.42	12.42	12.42	12.42
HYDROGRAPH AT								

+	RCAL-1	.000	1	FLOW	146.55	143.43	140.34	137.24
				TIME	12.43	12.43	12.45	12.45
2 COMBINED AT								
+	CP-N11	.200	1	FLOW	211.56	206.66	201.77	196.89
				TIME	12.43	12.43	12.43	12.43
[illegible]MBINED AT								
+	CP-N12	.582	1	FLOW	346.72	338.46	330.24	322.04
				TIME	12.42	12.42	12.42	12.42
HYDROGRAPH AT								
+	RCL-2	.000	1	FLOW	60.88	59.59	58.31	57.03
				TIME	12.60	12.60	12.60	12.60
HYDROGRAPH AT								
+	GMS-4	.054	1	FLOW	58.66	57.67	56.69	55.72
				TIME	12.20	12.20	12.20	12.20
2 COMBINED AT								
+	CP-N13	.054	1	FLOW	106.38	104.09	101.81	99.54
				TIME	12.23	12.23	12.23	12.23
2 COMBINED AT								
+	CP-N14	.636	1	FLOW	433.44	423.18	412.94	402.74
				TIME	12.40	12.40	12.40	12.40
2 COMBINED AT								
+	CP-N15	1.680	1	FLOW	474.08	463.11	452.55	442.19
				TIME	12.42	12.42	12.40	12.42
2 COMBINED AT								
+	TOTAL	2.038	1	FLOW	552.04	538.15	524.45	510.79
				TIME	12.47	12.45	12.45	12.45
ROUTED TO								
+	DB-EST	2.038	1	FLOW	552.08	538.05	524.35	510.80
				TIME	12.47	12.45	12.47	12.47
			** PEAK STAGES IN FEET **					
			1	STAGE	5092.12	5092.11	5092.11	5092.10
				TIME	12.45	12.45	12.45	12.47

10-DAY MODEL

EXISTING AND PROPOSED CONDITIONS

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1*****************************************                                     ****************************************
 *                                       *                                     *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                     *   U.S. ARMY CORPS OF ENGINEERS       *
 *       JUN 1998 AND FEB 2010           *                                     *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1R                *                                     *        609 SECOND STREET             *
 *     RGMHEC2000 WWW.HEC-1.COM          *                                     *    DAVIS, CALIFORNIA 95616           *
 *  RUN DATE    11SEP17  TIME  16:37:59  *                                     *        (916) 756-1104                *
 *                                       *                                     *                                      *
*****************************************                                     ****************************************


                                   X     X  XXXXXXX   XXXXX          X
                                   X     X  X        X     X        XX
                                   X     X  X        X               X
                                   XXXXXXX  XXXX     X       XXXXX   X
                                   X     X  X        X               X
                                   X     X  X        X     X         X
                                   X     X  XXXXXXX   XXXXX         XXX



      THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

      THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
      THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
      NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
      DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
      KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                              HEC-1 INPUT                                                 PAGE  1

      LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                   *DDIAGRAM
         1         ID  ====================================================================
         2         ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTHAND SOUTH
         3         ID        PROPOSEDAND
         4         ID        EXISTING CONDITIONS MODEL
         5         ID        TO FIND 10 DAY RUNOFF VOLUMES
         6         ID       MODEL NAME GMN10.DAT
         7         ID  100 YR10 DAY PRECIPITATION
         8         ID  DATE:JUNE 2016 ********************************************
         9         ID    ***********************************************************************
        10         ID
        11         ID
                   *      ***********************************************************************
        12         IT       5                 2880
        13         IN      15
        14         IO       5
        15         JR    PREC        1
                   *   ***********************************************************************
                   *   ***********************************************************************
                   *   ***********************************************************************
                   *    JD CARDS WILL BE REPLACED WITH A JR CARD TO CORRECT THIS PR  OBLEM.
                   *    USERS OF THIS MODEL SHOULD CAREFULLY SELECT AN APPROPRIATE DARF FOR     EACH
                   *    CONCENTRATION POINTS. IT SHOULD BE NOTED THAT WHEN FLOW IS COMBINED     WITH
                   *    DIVERSION FLOWS, CALCULATED COMBINED TOTAL AREA MAY NOT BE APPROPRI     ATE
                   *    TO BE USED IN SELECTING DARF.
                   *   ***********************************************************************
                   *   ***********************************************************************
                   *        DARF          AREA (SQ.     MI.)
                   *        1.00              0 -  2
                   *        0.99            2.1 -  8
                   *        0.98            8.1 - 16
                   *        0.97           16.1 - 29
                   *        0.96           29.1 - 43
                   *        0.95           43.1 - 63
                   *        0.94           63.1 - 98
                   *   ***********************************************************************
        16         JR    PREC     1.0    0.99    0.98    0.97
                   *   ***********************************************************************
                   *   ***********************************************************************
                   *    BEGIN NIMBUS 90 MODEL - SP  R1.705
                   *    NO MODIFICATIONS M      ADE
                   *   ***********************************************************************

        17         KK    GMN9        RUNOFF FROM GMN9 UNDEVELOPED
        18         BA    .152
        19         PH       1       0    .421    .793    1.32    1.40    1.48    1.87    2.74    3.93
        20         PH    5.11    5.86    6.60    7.98    8.91
        21         LS              65
        22         UD     .31
1                                              HEC-1 INPUT                                                 PAGE  2

      LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

        23         KK  9X-VOL
        24         RS       1    STOR       0
        25         SA       1       1       1       1       1       1       1       1       1       1
        26         SE       0       1       2       3       4       5       6       7       8       9
        27         SQ       0       0       0       0       0       0       0       0       0       0
        28         SE       0       1       2       3       4       5       6       7       8       9

        29         KK   GMN11
```

```
          30          KM  GMN UNDEVELOPED
          31          BA    .029
          32          LS              70
          33          UD      .19

          34          KK  11XVOL
          35          RS       1    STOR     0
          36          SA       1       1     1     1     1     1     1     1     1     1
          37          SE       0       1     2     3     4     5     6     7     8     9
          38          SQ       0       0     0     0     0     0     0     0     0     0
          39          SE       0       1     2     3     4     5     6     7     8     9

          40          KK    GMN9        RUNOFF FROM GMN9   DEVELOPED
          41          BA    .152
          42          LS              76
          43          UD      .32

          44          KK  9P-VOL
          45          RS       1    STOR     0
          46          SA       1       1     1     1     1     1     1     1     1     1
          47          SE       0       1     2     3     4     5     6     7     8     9
          48          SQ       0       0     0     0     0     0     0     0     0     0
          49          SE       0       1     2     3     4     5     6     7     8     9

          50          KK    GMN11
          51          KM  GMN 11DEVELOPED
          52          BA    .029
          53          LS              80
          54          UD      .19

          55          KK  11PVOL
          56          RS       1    STOR     0
          57          SA       1       1     1     1     1     1     1     1     1     1
          58          SE       0       1     2     3     4     5     6     7     8     9
          59          SQ       0       0     0     0     0     0     0     0     0     0
          60          SE       0       1     2     3     4     5     6     7     8     9

          61          KK    GMS 4       GOLDEN MESA SOUTH  APN 552-100-01       UNDEVELOPED
          62          BA    .054
          63          LS              70
          64          UD      .19
1                                          HEC-1 INPUT                                        PAGE  3

        LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          65          KK  S4EVOL
          66          RS       1    STOR     0
          67          SA       1       1     1     1     1     1     1     1     1     1
          68          SE       0       1     2     3     4     5     6     7     8     9
          69          SQ       0       0     0     0     0     0     0     0     0     0
          70          SE       0       1     2     3     4     5     6     7     8     9

          71          KK    GMS 4       GOLDEN MESA SOUTH  APN 552-100-01        DEVELOPED
          72          BA    .054
          73          LS              80
          74          UD      .18

          75          KK  S4DVOL
          76          RS       1    STOR     0
          77          SA       1       1     1     1     1     1     1     1     1     1
          78          SE       0       1     2     3     4     5     6     7     8     9
          79          SQ       0       0     0     0     0     0     0     0     0     0
          80          SE       0       1     2     3     4     5     6     7     8     9
          81          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

  17        GMN9
               V
               V
  23       9X-VOL
               .
               .
  29           .       GMN11
               .           V
               .           V
  34           .       11XVOL
               .           .
               .           .
  40           .           .       GMN9
               .           .          V
               .           .          V
  44           .           .       9P-VOL
               .           .          .
               .           .          .
  50           .           .          .      GMN11
               .           .          .          V
               .           .          .          V
  55           .           .          .      11PVOL
               .           .          .          .
               .           .          .          .
  61           .           .          .          .      GMS 4
               .           .          .          .          V
               .           .          .          .          V
  65           .           .          .          .      S4EVOL
```

```
 71        .        .        .        .        .       GMS 4
           .        .        .        .        .           V
           .        .        .        .        .           V
 75        .        .        .        .        .       S4DVOL

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************                    *****************************************
*                                         *                    *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *                    *   U.S. ARMY CORPS OF ENGINEERS        *
*        JUN 1998 AND FEB 2010            *                    *   HYDROLOGIC ENGINEERING CENTER       *
*            VERSION 4.1R                 *                    *        609 SECOND STREET              *
*      RGMHEC2000 WWW.HEC-1.COM           *                    *      DAVIS, CALIFORNIA 95616          *
*  RUN DATE   11SEP17  TIME  16:37:59     *                    *          (916) 756-1104               *
*                                         *                    *                                       *
*******************************************                    *****************************************
```

```
MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTHAND SOUTH
      PROPOSEDAND
      EXISTING CONDITIONS MODEL
      TO FIND 10 DAY RUNOFF VOLUMES
     MODEL NAME GMN10.DAT
100 YR10 DAY PRECIPITATION
DATE:JUNE 2016 ********************************************
  **********************************************************************
```

```
*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

  14 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                      NMIN            5  MINUTES IN COMPUTATION INTERVAL
                      IDATE       1   0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE       7   0  ENDING DATE
                     NDTIME        2235  ENDING TIME
                      ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL      .08 HOURS
                      TOTAL TIME BASE   166.58 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT

     JP          MULTI-PLAN OPTION
                      NPLAN            1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                   1.00     .99     .98     .97
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .99	RATIO 3 .98	RATIO 4 .97
HYDROGRAPH AT +	GMN9	.152	1	FLOW	96.75	94.92	93.11	91.30
				TIME	83.58	83.58	83.58	83.58
ROUTED TO +	9X-VOL	.152	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	22.57	22.17	21.77	21.37
				TIME	166.58	166.58	166.58	166.58
HYDROGRAPH AT +	GMN11	.029	1	FLOW	28.52	28.05	27.57	27.10
				TIME	83.50	83.50	83.50	83.50
ROUTED TO +	11XVOL	.029	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00

** PEAK STAGES IN FEET **

			1	STAGE	5.07	4.99	4.90	4.82
				TIME	166.58	166.58	166.58	166.58
HYDROGRAPH AT								
+	GMN9	.152	1	FLOW	134.61	132.61	130.62	128.63
				TIME	83.58	83.58	83.58	83.58
ROUTED TO								
+	9P-VOL	.152	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	31.53	31.06	30.59	30.12
				TIME	166.58	166.58	166.58	166.58
HYDROGRAPH AT								
+	GMN11	.029	1	FLOW	37.32	36.81	36.31	35.80
				TIME	83.50	83.50	83.50	83.50
ROUTED TO								
+	11PVOL	.029	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	6.67	6.58	6.49	6.39
				TIME	166.58	166.58	166.58	166.58
HYDROGRAPH AT								
+	GMS 4	.054	1	FLOW	53.10	52.21	51.33	50.45
				TIME	83.50	83.50	83.50	83.50
ROUTED TO								
+	S4EVOL	.054	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	9.44	9.28	9.13	8.97
				TIME	166.58	166.58	166.58	166.58
HYDROGRAPH AT								
+	GMS 4	.054	1	FLOW	70.58	69.62	68.67	67.71
				TIME	83.50	83.50	83.50	83.50
ROUTED TO								
+	S4DVOL	.054	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	12.42	12.25	12.08	11.90
				TIME	166.58	166.58	166.58	166.58

*** NORMAL END OF HEC-1 ***

APPENDIX D

HYDRAULIC CALCULATIONS

ANALYSIS OF 42-INCH PIPE AND PONDING AREA EAST OF NVHS

Outlet consists of 42"pipe that goes to NVHS detention basin and
weir flow over Golden Valley Road towards Golden Mesa
Overflow modeled as a weir with 100 ft width and C=2.0
Weir Q=CLH^3/2

Elev,	Area, ac	Culvert Q	Weir Q	Total Q
5112	0	0	0	0
5113		9	0	9
5114	0.255	20	0	20
5115		40	0	40
5116	2.207	60	200	260
5117		75	598	673
5118	3.296	90	1040	1130

Note: Areas based on 2 ft topo contours

ANALYSIS OF NVHS OUTLET

Outlet consistsof a 12" RCP at elev. 94.09, a 36" RCP at elev. 95.9, and overtopping at elev 99
Overtopping modeled as a weir at elev. 99, 20 ft wide, C=3.0

Elev.	Area, Ac	12" Q	36" Q	Weir Q	Total Q
93.59	0	0	0	0	0
95	0.7163	2.2	0	0	2.2
96	2.0073	5	0	0	5
97	2.4015	7	6	0	13
98	2.521	7.8	19	0	26.8
99	2.6358	8.5	35	0	43.5
100	2.7	8.5	35	60	103.5
101	2.71	8.5	35	168	211.5

CULVERTS AT ESTATES ROAD EXISTING CONDITIONS
18" and 36" RCPs at elev. 5087, weir flow over Estates at 5092
Weir lengths based on survey of road, C=

Elev.	Area, Ac	18" Q	36" Q	Weir Q	Total Q
87	0	0	0	0	0
88	0.005	4	7.5	0	11.5
89		9	19	0	28
90	0.25	12	35	0	47
91		16	50	0	66
92	5.401	18	60	0	78
93		20	72	147	239
94	14.262	20	78	10472	10570

Capacity of Golden Valley Road

East Bound Lane

width = 21 ft

depth = 0,5 ft (ht of center curb)

slope: Δh = 2 ft L = 137,5 ft

S = 2/137,5 = ,0145

Roughness, n = ,013

Wetted Perimeter, P = 0.5 + 0.5 + 21 = 22 ft

Area, A = 0,5 (21,0) = 10,5 ft^2

Hyd. Radius, R = A/P = 10,5/22 = 0,48 ft

$R^{2/3}$ = $(.48)^{2/3}$ = 0,61

$S^{1/2}$ = $(.0145)^{1/2}$ = 0,12

$V = \frac{1.49}{n} R^{2/3} S^{1/2} = \frac{1.49}{.013} (.61)(.12) = 114.6 (.07)$

v = 8,0 ft/sec

Q = AV = (10,5) (8,0) = 84 cfs

West Bound Lane

width = 40 ft

depth = 0,5 ft

slope = ,0145

Roughness, n, = ,013

wetted Perimeter, P = 0,5 + 0,5 + 40 = 41 ft

Area, A = 0,5 (41) = 20,5 ft^2

Hyd Radius, R = A/P = 20,5/41 = 0,5

$R^{2/3}$ = $(.5)^{2/3}$ = 0,63

$S^{1/2}$ = 0,12

$V = \frac{1.49}{.013} (.63)(.12) = (114.6)(.0756)$

$V = 8.7$ ft/sec — critical flow

$Q = AV = (20.5)(8.7) = 178$ cfs

Total Q

$Q = 84 + 178 = \underline{262 \text{ cfs}}$

FLOW DIVERTED N ON ESTATES

Ave. width = 44 ft

APPENDIX E

SEDIMENTATION ANALYSIS

K FACTORS FOR GOLDEN MESA NORTH

BASIN	K	FRACTION OF AREA	K	FRACTION OF AREA	K	FRACTION OF AREA	K	FRACTION OF AREA	K	FRACTION OF AREA	K	FRACTION OF AREA	FINAL K VALUE
GMN 1+3	0	0.1	0.1	0	0.15	0	0.17	0.33	0.28	0.57	0.32	0	0.22
GMN2+4+7	0		0.1	0.275	0.15		0.17	0.535	0.28	0.098	0.32		0.15
GMN 5A	0		0.1	0.81	0.15		0.17	0.016	0.28	0.169	0.32		0.13
GMN5B	0	0.09	0.1	0.18	0.15		0.17	0.59	0.28	0.136	0.32		0.16
GMN 6	0		0.1	1	0.15		0.17		0.28		0.32		0.10
GMN 8	0		0.1	0.01	0.15		0.17	0.87	0.28	0.12	0.32		0.18
GMN 9	0		0.1	0.23	0.15		0.17	0.22	0.28	0.544	0.32		0.21
GMN10+12	0		0.1		0.15		0.17		0.28	1	0.32		0.28
GMN 11	0		0.1		0.15		0.17		0.28	1	0.32		0.28

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR GOLDEN MESA WATERSHED

GMN-9

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor

weighted K is		0.21	From NRCS webite
L=365 feet			
S=.03 ft/ft			
LS=	$(365)^{.5}(.0076+.53*.03+7.6*(.03)^2)$		Eq 1308 in Manual
LS=	19.1*(.0076+0.016+.007)=	0.58	
C=(.56)(.1)(.23)=		0.013	Figs 1305, 1306 and 1307 in Manual
P=		1	No tillage factors

Then KLSCP= 0.002

and

$Y=(95)*(.002)*(VQ)^{.56}$ $Y=.19*(VQ)^{.56}$

The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)

V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

HEC-1 ANALYSIS **GMN-9**

Return Pd yr	Q cfs	V, ac-ft	$(VQ)^{.56}$	Y tons
2	0.7	0.6	0.615	0.117
10	8.1	2.6	5.510	1.047
25	21.4	4.5	12.907	2.452
50	35.9	6.2	20.634	3.921
100	55.4	8.2	30.768	5.846
		22.1		

For GMN-9, the average water yield is (0.33 ft)*(97.45 acres)= 32.2 ac-ft

Average annual yield: Eq. 1313 in the Manual

Y=((32.2*(0.01*5.8)+(0.02*3.9)+(0.04*2.5)+(0.1*1.0)+(0.5*0.1)))/((0.01*8.2)+(0.02*6.2)+(0.04*4.5)+(0.1*2.6)+(0.5*0.6))

Y= 2.349 tons/year

Soil is decomposed granite (dg)

Density of dg is about 4,000 lb/cubic yard **or 2 tons/ cubic yard**

Therefore about 1.1 cubic yards of sediment are eroded per year

In the 100 year event about 2.9 cubic yards are eroded.

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR COLINA ROSA OFFSITE WATERSHED

GMN-11

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor

K:		0.28	From NRCS webite
L=287 feet			
S=.03 ft/ft			
LS=	$(287)^{.5}(.0076+.03*.53+7.6*(.03)^2)$		Eq 1308 in Manual
LS=	16.9*(.0076+0.016+.007)=	0.52	
C=(.56)(.1)(.23)=		0.013	Figs 1305, 1306 and 1307 in Manual
P=		1	No tillage factors

Then KLSCP= 0.002

and

$Y= (95)(0.002)((VQ)^{.56})=0.19(VQ)^{.56}$

The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)

V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

HEC-1 ANALYSIS **GMN 11**

Return Pd	Q	V,	$(VQ)^{.56}$	Y
yr	cfs	ac-ft		tons
2	0.6	0.4	0.450	0.085
10	8.2	1.4	3.923	0.745
25	16.3	2.2	7.423	1.410
50	24.6	2.9	10.911	2.073
100	35.4	3.7	15.333	2.913
		10.6		

For GMN 11, the average water yield is (0.33 ft)*(18.6 acres)= 6.1 ac-ft
Average annual yield: Eq. 1313 in the Manual
Y=((6.1*(.01*2.9)+(.02*2.1)+(.04*1.4)+(.1*0.7)+(.5*0.1)))/((.01*3.7)+(.02*2.9)+(.04*2.2)+(.1*1.4)+(.5*.4)) =
0.751 tons/year
Soil is decomposed granite (dg)
Density of dg is about 4,000 lb/cubic yard or 2 tons/ cubic yard
Therefore about 0.4cubic yards of sediment are eroded per year
In the 100 year event about 1.5 cubic yards are eroded.

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR GOLDN MESA OFFSITE WATERSHED

5B

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor
K: Soils are 930, 559, and 861

weighted K is		**0.16**	From NRCS webite
L=50 feet			
S=.18 ft/ft			
LS=	$(50)^{.5}(.0076+.53*.18+7.6*(.18)^2)$		Eq 1308 in Manual
LS=	2.469499723	**2.5**	
C=(.56)(.1)(.23)=		**0.013**	Figs 1305, 1306 and 1307 in Manual
P=		**1**	No tillage factors

Then KLSCP= 0.005
and
$Y=(95)*(.005)*(VQ)^{.56}$ $Y=0.48*(VQ)^{.56}$
The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)
V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

HEC-1 ANALYSIS 5B

Return Pd yr	Ppt depth inches	Q cfs	V, ac-ft	$(VQ)^{.56}$	Y tons
2		0.29	0.23	0.220	0.11
10		3.9	1.2	2.373	1.14
25		11.3	2.1	5.891	2.83
50		19.6	2.9	9.607	4.61
100		31	3.9	14.661	7.04
			10.33		

For 5B, the average water yield is (0.33 ft)*(49.07 acres)= 16.2 ac-ft

Average annual yield: Eq. 1313 in the Manual

Y=((16.2*(.01*7.04)+(.02*4.61)+(.04*2.83)+(.1*1.14)+(.5*.11)))/((.01*3.9)+(.02*2.9)+(.04*2.1)+(.1*1.2)+(.5*.23)) =

3.64 tons/year

Soil is decomposed granite (dg)

Density of dg is about 4,000 lb/cubic yard or 2 tons/ cubic yard

Therefore about 0.66 cubic yards of sediment are eroded per year

In the 100 year event about 3.5 cubic yards are eroded.

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR GOLDEN MESA OFFSITE WATERSHED

5A

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor

K:		**0.13**	From NRCS webite
L=50 feet			
S=.19 ft/ft			
LS=	$(50)^{.5}(.0076+.53*.19+7.6*(.19)^2)$		Eq 1308 in Manual
LS=	7.07*(.0076+0.106+.304)=	**2.95**	
C=(.56)(.1)(.23)=		**0.013**	Figs 1305, 1306 and 1307 in Manual
P=		**1**	No tillage factors

Then KLSCP= 0.005

and

$Y= (95)(0.005)((VQ)^{.56})=0.48(VQ)^{.56}$

The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)

V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

HEC-1 ANALYSIS 5A

Return Pd yr	Ppt depth inches	Q cfs	V, ac-ft	$(VQ)^{.56}$	Y tons
2		2.8	0.8	1.57	0.754
10		14.4	2.4	7.27	3.490
25		25.3	3.6	12.51	6.005
50		36.4	4.6	17.59	8.445
100		50.5	5.8	24.06	11.551
			17.2		

For 5A, the average water yield is (0.33 ft)*(44.46 acres)=14.7 ac-ft

Average annual yield: Eq. 1313 in the Manual

Y=((14.7*(.01*11.6)+(.02*8.45)+(.04*6.0)+(.1*3.49)+(.5*.75)))/((.01*5.8)+(.02*4.6)+(.04*3.6)+(.1*2.4)+(.5*.8)) =

Y= 3.04 TONS/YEAR

Soil is decomposed granite (dg)

Density of dg is about 4,000 lb/cubic yard or 2 tons/ cubic yard

Therefore about 1.5 cubic yards of sediment are eroded per year

In the 100 year event about 5.78 cubic yards are eroded.

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR GOLDEN MESA WATERSHED

GMN-6

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor

weighted K is		**0.1**	From NRCS webite
L=100 feet			
S=.15 ft/ft			
LS=	$(100)^{.5}(.0076+.53*.15+7.6*(.15)^2)$		Eq 1308 in Manual
LS=	10*(.0076+0.08+.17)=	**2.58**	
C=(.56)(.1)(.23)=		**0.013**	Figs 1305, 1306 and 1307 in Manual
P=		**1**	No tillage factors

Then KLSCP= 0.003
and

$Y=(95)*(.003)*(VQ)^{.56}$ $Y=.0285*(VQ)^{.56}$

The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)
V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

HEC-1 ANALYSIS GMN-6

Return Pd yr	Q cfs	V, ac-ft	$(VQ)^{.56}$	Y tons
2	1.4	0.2	0.490	0.140
10	5	0.5	1.670	0.476
25	8.4	0.7	2.697	0.769
50	11.7	0.9	3.737	1.065
100	15.9	1.1	4.965	1.415
		3.4		

For GMN-6, the average water yield is (0.33 ft)*(7.93 acres)= 2.6 ac-ft

Average annual yield: Eq. 1313 in the Manual

Y=((2.6*(.01*1.41)+(.02*1.07)+(.04*.77)+(.1*.48)+(.5*14)))/((.01*1.1)+(.02*0.9)+(.04*.7)+(.1*.5)+(.5*.2)) =

1.00 tons/year

Soil is decomposed granite (dg)

Density of dg is about 4,000 lb/cubic yard or 2 tons/ cubic yard

Therefore about 0.5 cubic yards of sediment are eroded per year

In the 100 year event about 0.7 cubic yards are eroded.

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR COLINA ROSA OFFSITE WATERSHED

GMN-8

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor

K:		**0.18**	From NRCS webite
L=65 feet			
S=.031 ft/ft			
LS=	$(65)^{.5}(.0076+.031*.53+7.6*(.031)^2)$		Eq 1308 in Manual
LS=	8.1*(.0076+0.116+.007)=	**1.05**	
C=(.56)(.1)(.23)=		**0.013**	Figs 1305, 1306 and 1307 in Manual
P=		**1**	No tillage factors

Then KLSCP= 0.002
and
$Y= (95)(0.002)((VQ)^{.56})=0.19(VQ)^{.56}$
The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)
V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

HEC-1 ANALYSIS 8

Return Pd yr	Q cfs	V, ac-ft	$(VQ)^{.56}$	Y tons
2	0	0	0.000	0.000
10	0.2	0.1	0.112	0.021
25	0.4	0.3	0.305	0.058
50	1.7	0.5	0.913	0.173
100	4.4	0.7	1.878	0.357
		1.6		

For GMN-8, the average water yield is (0.33 ft)*(17.4 acres)= 5.7 ac-ft

Average annual yield: Eq. 1313 in the Manual

Y=((5.7*(.01*.36)+(.02*.17)+(.04*0.06)+(.1*.021)+(.5*0)))/((.01*0.7)+(.02*.5)+(.04*.3)+(.1*.1)+(.5*0)) =

0.729 tons/year

Soil is decomposed granite (dg)

Density of dg is about 4,000 lb/cubic yard or 2 tons/ cubic yard

Therefore about 0.3 cubic yards of sediment are eroded per year

In the 100 year event about 0.2 cubic yards are eroded.

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR GOLDEN MESA WATERSHED

GMN-3+1

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor

weighted K is		0.22	From NRCS webite
L=100 feet			
S=.14 ft/ft			
LS=	$(100)^{.5}(.0076+.53*.14+7.6*(.14)^2)$		Eq 1308 in Manual
LS=	10*(.0076+0.07+.15)=	2.28	
C=(.56)(.1)(.23)=		0.013	Figs 1305, 1306 and 1307 in Manual
P=		1	No tillage factors

Then KLSCP= 0.007

and

$Y=(95)*(.007)*(VQ)^{.56}$ $Y=.67*(VQ)^{.56}$

The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)

V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

HEC-1 ANALYSIS **GMN-3+1**

Return Pd yr	Q cfs	V, ac-ft	$(VQ)^{.56}$	Y tons
2	1.2	0.9	1.044	0.700
10	7.1	5.3	7.626	5.109
25	21	9.2	19.062	12.771
50	37	13.3	32.177	21.559
100	59.1	17.9	49.395	33.095
		46.6		

For GMN3+1, the average water yield is (0.33ft)*(238.07 acres)= 78.6 ac-ft

Average annual yield: Eq. 1313 in the Manual

Y=((78.6*(0.01*33.1)+(0.02*21.6)+(0.04*12.8)+(0.1*5.11)+(0.5*0.7)))/((0.01*17.9)+(0.02*13.3)+(0.04*9.2)+(0.1*5.3)+(0.5*0.9))

Y= 15.513 tons/year

Soil is decomposed granite (dg)

Density of dg is about 4,000 lb/cubic yard **or 2 tons/ cubic yard**

Therefore about 7.8 cubic yards of sediment are eroded per year

In the 100 year event about 16.5 cubic yards are eroded.

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR GOLDEN MESA WATERSHEDS

GMN-2+4+7

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor

K:		0.15	From NRCS webite
L=400 feet			
S=.06 ft/ft			
LS=	$(400)^{.5}(.0076+.06*.53+7.6*(.06)^2)$		Eq 1308 in Manual
LS=	20*(.0076+0.032+.027)=	1.33	
C=(.56)(.1)(.23)=		0.013	Figs 1305, 1306 and 1307 in Manual
P=		1	No tillage factors

Then KLSCP= 0.003

and

$Y= (95)(0.003)((VQ)^{.56})=0.29(VQ)^{.56}$

The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)

V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

HEC-1 ANALYSIS **GMN 2+4+7**

Return Pd yr	Q cfs	V, ac-ft	$(VQ)^{.56}$	Y tons
2	1	0.8	0.883	0.256
10	5.7	4.7	6.305	1.828
25	15.2	8.1	14.811	4.295
50	27.8	11.8	25.640	7.436
100	44.2	15.9	39.284	11.392
		41.3		

For 2+4+7, the average water yield is (0.33 ft)*(214.9acres)= 70.9 ac-ft

Average annual yield: Eq. 1313 in the Manual

Y=((70.9*(.01*11.4)+(.02*7.4)+(.04*4.3)+(.1*1.8)+(.5*0.3)))/((.01*15.9)+(.02*11.8)+(.04*8.1)+(.1*4.7)+(.5*.8)) =

5.481 tons/year

Soil is decomposed granite (dg)

Density of dg is about 4,000 lb/cubic yard or 2 tons/ cubic yard

Therefore about 2.7 cubic yards of sediment are eroded per year

In the 100 year event about 5.6 cubic yards are eroded.

HEC-1 ANALYSIS GMN 10+12

Return Pd yr	Q cfs	V, ac-ft	$(VQ)^{.56}$	Y tons
2	2	0.6	1.107	0.210
10	7	0.9	2.803	0.533
25	12	1.4	4.855	0.922
50	16	1.7	6.359	1.208
100	21	2.1	8.335	1.584
		6.7		

For GMN 11, the average water yield is (0.33 ft)*(12.6 acres)= 4.2 ac-ft

Average annual yield: Eq. 1313 in the Manual

Y=((4.2*(.01*1.6)+(.02*1.2)+(.04*0.9)+(.1*0.5)+(.5*0.2)))/((.01*2.1)+(.02*1.7)+(.04*1.4)+(.1*0.9)+(.5*.6)) =

0.631 tons/year

Soil is decomposed granite (dg)

Density of dg is about 4,000 lb/cubic yard or 2 tons/ cubic yard

Therefore about 0.3 cubic yards of sediment are eroded per year

In the 100 year event about 0.75 cubic yards are eroded.

MODIFIED UNIVERSAL SOIL LOSS EQUATION FOR COLINA ROSA OFFSITE WATERSHED

GMN-10+12

$Y=95(VQ)^{.56}KLSCP$

Y= Sediment yield in tons for a given storm
V=runoff volume for storm in acre-feet
Q=Peak flow rate in cfs
K=soil erodibility factor
L=length factor
S=slope steepness factor
C=Cover factor
P=Support practice factor

K:		0.28	From NRCS webite
L=100 feet			
S=.012 ft/ft			
LS=	$(100)^{.5}(.0076+.012*.53+7.6*(.012)^2)$		Eq 1308 in Manual
LS=	10*(.0076+0.006+.001)=	0.15	
C=(.56)(.1)(.23)=		0.013	Figs 1305, 1306 and 1307 in Manual
P=		1	No tillage factors

Then KLSCP= 0.001

and

$Y= (95)(0.001)((VQ)^{.56})=0.095(VQ)^{.56}$

The average annual water yield is 100 mm or 0.33 ft (Wolman and Riggs, 1990)

V and Q will be determined for the 2, 10, 25, 50 and 100 year storms of 24 hour duration

```
1*****************************************                                    *****************************************
 *                                       *                                    *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                    *   U.S. ARMY CORPS OF ENGINEERS        *
 *        JUN 1998 AND FEB 2010          *                                    *   HYDROLOGIC ENGINEERING CENTER       *
 *             VERSION 4.1R              *                                    *        609 SECOND STREET              *
 *     RGMHEC2000 WWW.HEC-1.COM          *                                    *     DAVIS, CALIFORNIA 95616           *
 *  RUN DATE   10SEP17  TIME  19:41:10   *                                    *          (916) 756-1104               *
 *                                       *                                    *                                       *
 *****************************************                                    *****************************************


                              X     X  XXXXXXX   XXXXX           X
                              X     X  X        X     X         XX
                              X     X  X        X                X
                              XXXXXXX  XXXX     X        XXXXX   X
                              X     X  X        X                X
                              X     X  X        X     X          X
                              X     X  XXXXXXX   XXXXX          XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                        HEC-1 INPUT                                               PAGE  1

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                         *DDIAGRAM
             1           ID  ======================================================================
             2           ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH
             3           ID
             4           ID        EXISTING CONDITIONS MODEL
             5           ID        MODEL FOR USE IN CALCULATING SOIL LOSS
             6           ID       MODEL NAME GMN2S.DAT
             7           ID  2 YR24 HR PRECIP
             8           ID  DATE:MAR 2017  ********************************************
             9           ID    ***********************************************************************
            10           ID
            11           ID
                         *     ***********************************************************************
            12           IT      1                2880
            13           IN     15
            14           IO      5
            15           JR    PREC      1
                         *   *************************************************************************
                         *   *************************************************************************
                         *   *************************************************************************
                         *   *************************************************************************
                         *       DARF         AREA (SQ.     MI.)
                         *       1.00            0 -  2
                         *       0.99          2.1 -  8
                         *       0.98          8.1 - 16
                         *       0.97         16.1 - 29
                         *       0.96         29.1 - 43
                         *       0.95         43.1 - 63
                         *       0.94         63.1 - 98
                         *   *************************************************************************
            16           JR    PREC     1.0    0.99    0.98    0.97
                         *   *************************************************************************
                         *   *************************************************************************
                         *     BEGIN NIMBUS 90 MODEL - SP  R1.705
                         *     NO MODIFICATIONS M     ADE
                         *   *************************************************************************

            17           KK   GMN5B    RUNOFF FROM WATERSHED GMN5B
            18           BA    .077
            19           PH      1       0    .127    .239    .399    .526    .643    .943    1.29    1.72
            20           LS             64
            21           UD    0.23

            22           KK  5B-VOL
            23           RS      1    STOR       0
            24           SA      1       1       1       1       1       1       1
            25           SE      0       1       2       3       4       5       6
            26           SQ      0       0       0       0       0       0       0
            27           SE      0       1       2       3       4       5       6
1                                                        HEC-1 INPUT                                               PAGE  2

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


            28           KK   GMN5A    RUNOFF FROM WATERSHED GMN5A
            29           BA    .069
            30           LS             74
            31           UD     .24

            32           KK  5A-VOL
            33           RS      1    STOR       0
            34           SA      1       1       1       1       1       1       1
```

```
 35          SE       0       1       2       3       4       5       6
 36          SQ       0       0       0       0       0       0       0
 37          SE       0       1       2       3       4       5       6

 38          KK    GMN6 RUNOFF FROM GMN6
 39          BA    .012
 40          LS                  77
 41          UD     .09

 42          KK    6VOL
 43          RS       1    STOR       0
 44          SA       1       1       1       1       1       1       1
 45          SE       0       1       2       3       4       5       6
 46          SQ       0       0       0       0       0       0       0
 47          SE       0       1       2       3       4       5       6

 48          KK    GMN8RUNOFF FROM GMN 8
 49          BA    .027
 50          LS                  54
 51          UD     .12

 52          KK   8-VOL
 53          RS       1    STOR       0
 54          SA       1       1       1       1       1       1       1
 55          SE       0       1       2       3       4       5       6
 56          SQ       0       0       0       0       0       0       0
 57          SE       0       1       2       3       4       5       6

 58          KK    GMN9          RUNOFF FROM GMN9 UNDEVELOPED
 59          BA    .152
 60          LS                  65
 61          UD     .31

 62          KK   9-VOL
 63          RS       1    STOR       0
 64          SA       1       1       1       1       1       1       1
 65          SE       0       1       2       3       4       5       6
 66          SQ       0       0       0       0       0       0       0
 67          SE       0       1       2       3       4       5       6

 68          KK   10+12          RUNOFF FROM GMN1 0 +GMN 12
 69          BA     .02
 70          LS                  79
 71          UD     .18
1                                    HEC-1 INPUT                                        PAGE  3

     LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 72          KK  10+12V
 73          RS       1    STOR       0
 74          SA       1       1       1       1       1       1       1
 75          SE       0       1       2       3       4       5       6
 76          SQ       0       0       0       0       0       0       0
 77          SE       0       1       2       3       4       5       6

 78          KK   4+7+2          RUNOFF FROM GMN4+GMN7+GM2
 79          BA     .33
 80          LS                  63
 81          UD    1.01

 82          KK  472VOL
 83          RS       1    STOR       0
 84          SA       1       1       1       1       1       1       1
 85          SE       0       1       2       3       4       5       6
 86          SQ       0       0       0       0       0       0       0
 87          SE       0       1       2       3       4       5       6

 88          KK     3+1          RUNOFF FROM GMN3  + GMN1
 89          BA    .372
 90          LS                  63
 91          UD    0.82

 92          KK  3+1VOL
 93          RS       1    STOR       0
 94          SA       1       1       1       1       1       1       1
 95          SE       0       1       2       3       4       5       6
 96          SQ       0       0       0       0       0       0       0
 97          SE       0       1       2       3       4       5       6

 98          KK   GMN11          RUNOFF FROM GMN11
 99          KM  GMN UNDEVELOPED
100          BA    .053
101          LS                  70
102          UD     .19

103          KK  11-VOL
104          RS       1    STOR       0
105          SA       1       1       1       1       1       1       1
106          SE       0       1       2       3       4       5       6
107          SQ       0       0       0       0       0       0       0
108          SE       0       1       2       3       4       5       6
109
110
111          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
```

```
  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   17       GMN5B
                V
                V
   22      5B-VOL
                .
                .
   28           .       GMN5A
                .           V
                .           V
   32           .      5A-VOL
                .           .
                .           .
   38           .           .        GMN6
                .           .           V
                .           .           V
   42           .           .        6VOL
                .           .           .
                .           .           .
   48           .           .           .        GMN8
                .           .           .           V
                .           .           .           V
   52           .           .           .       8-VOL
                .           .           .           .
                .           .           .           .
   58           .           .           .           .        GMN9
                .           .           .           .           V
                .           .           .           .           V
   62           .           .           .           .       9-VOL
                .           .           .           .           .
                .           .           .           .           .
   68           .           .           .           .           .       10+12
                .           .           .           .           .           V
                .           .           .           .           .           V
   72           .           .           .           .           .      10+12V
                .           .           .           .           .           .
                .           .           .           .           .           .
   78           .           .           .           .           .           .       4+7+2
                .           .           .           .           .           .           V
                .           .           .           .           .           .           V
   82           .           .           .           .           .           .      472VOL
                .           .           .           .           .           .           .
                .           .           .           .           .           .           .
   88           .           .           .           .           .           .           .         3+1
                .           .           .           .           .           .           .           V
                .           .           .           .           .           .           .           V
   92           .           .           .           .           .           .           .      3+1VOL
                .           .           .           .           .           .           .           .
                .           .           .           .           .           .           .           .
   98           .           .           .           .           .           .           .           .       GMN11
                .           .           .           .           .           .           .           .           V
                .           .           .           .           .           .           .           .           V
  103           .           .           .           .           .           .           .           .      11-VOL

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*                                         *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *
*       JUN 1998 AND FEB 2010             *
*            VERSION 4.1R                 *
*      RGMHEC2000 WWW.HEC-1.COM           *
* RUN DATE   10SEP17   TIME   19:41:10    *
*                                         *
*******************************************

*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*      DAVIS, CALIFORNIA 95616          *
*          (916) 756-1104               *
*                                       *
*****************************************
```

```
======================================================================
MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH

      EXISTING CONDITIONS MODEL
      MODEL FOR USE IN CALCULATING SOIL LOSS
     MODEL NAME GMN2S.DAT
2 YR24 HR PRECIP
DATE:MAR 2017  *********************************************
  ************************************************************************
```

```
*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

  14 IO        OUTPUT CONTROL VARIABLES
                    IPRNT           5  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT        HYDROGRAPH TIME DATA
                     NMIN           1  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1    0  STARTING DATE
                    ITIME        0000  STARTING TIME
                       NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      2    0  ENDING DATE
                   NDTIME        0919  ENDING TIME
                    ICENT          19  CENTURY MARK

              COMPUTATION INTERVAL     .02 HOURS
                   TOTAL TIME BASE   33.32 HOURS
```

```
        ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

    JP          MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

    JR          MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                  1.00       .99       .98       .97

 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS
 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667         .01667        24.00000

 *** HEC-1 ERROR 1 *** INVALID CARD IDENTIFICATION CODE OR CARD OUT OF SEQUENCE
      CARD NO.  109

 *** HEC-1 ERROR 1 *** INVALID CARD IDENTIFICATION CODE OR CARD OUT OF SEQUENCE
      CARD NO.  110
1

           PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                            FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                            TIME TO PEAK IN HOURS


                                                              RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION      AREA    PLAN             RATIO 1  RATIO 2  RATIO 3  RATIO 4
                                                          1.00      .99      .98      .97

 HYDROGRAPH AT
+                 GMN5B       .077      1   FLOW           .29      .28      .27      .25
                                            TIME         17.98    17.93    18.02    17.95

 ROUTED TO
+                 5B-VOL      .077      1   FLOW           .00      .00      .00      .00
                                            TIME           .00      .00      .00      .00

                                        ** PEAK STAGES IN FEET **
                                        1   STAGE          .23      .22      .21      .20
                                            TIME         25.17    25.17    25.17    25.17

 HYDROGRAPH AT
+                 GMN5A       .069      1   FLOW          2.84     2.68     2.52     2.37
                                            TIME         12.32    12.32    12.33    12.33

 ROUTED TO
+                 5A-VOL      .069      1   FLOW           .00      .00      .00      .00
                                            TIME           .00      .00      .00      .00

                                        ** PEAK STAGES IN FEET **
                                        1   STAGE          .84      .82      .79      .77
                                            TIME         25.20    25.20    25.20    25.20

 HYDROGRAPH AT
+                 GMN6        .012      1   FLOW          1.40     1.35     1.29     1.24
                                            TIME         12.12    12.12    12.12    12.12

 ROUTED TO
+                 6VOL        .012      1   FLOW           .00      .00      .00      .00
                                            TIME           .00      .00      .00      .00

                                        ** PEAK STAGES IN FEET **
                                        1   STAGE          .20      .19      .19      .18
```

```
                                          TIME      24.47    24.47    24.47    24.47

HYDROGRAPH AT
+                 GMN8      .027    1   FLOW        .00      .00      .00      .00
                                        TIME      23.90      .00      .00      .00

ROUTED TO
+                8-VOL      .027    1   FLOW        .00      .00      .00      .00
                                        TIME        .00      .00      .00      .00

                                   ** PEAK STAGES IN FEET **
                                    1   STAGE       .00      .00      .00      .00
                                        TIME      24.63      .00      .00      .00

HYDROGRAPH AT
+                 GMN9      .152    1   FLOW        .70      .66      .62      .59
                                        TIME      15.12    15.15    15.15    17.98

ROUTED TO
+                9-VOL      .152    1   FLOW        .00      .00      .00      .00
                                        TIME        .00      .00      .00      .00

                                   ** PEAK STAGES IN FEET **
                                    1   STAGE       .56      .53      .50      .47
                                        TIME      25.53    25.55    25.53    25.55

HYDROGRAPH AT
+                10+12      .020    1   FLOW       2.30     2.23     2.16     2.09
                                        TIME      12.22    12.22    12.22    12.22

ROUTED TO
+               10+12V      .020    1   FLOW        .00      .00      .00      .00
                                        TIME        .00      .00      .00      .00

                                   ** PEAK STAGES IN FEET **
                                    1   STAGE       .39      .38      .37      .36
                                        TIME      24.90    24.90    24.90    24.90

HYDROGRAPH AT
+                4+7+2      .330    1   FLOW       1.03      .99      .95      .91
                                        TIME      23.60    23.70    23.80    24.02

ROUTED TO
+               472VOL      .330    1   FLOW        .00      .00      .00      .00
                                        TIME        .00      .00      .00      .00

                                   ** PEAK STAGES IN FEET **
                                    1   STAGE       .81      .76      .72      .67
                                        TIME      28.97    28.97    28.95    28.98

HYDROGRAPH AT
+                  3+1      .372    1   FLOW       1.16     1.11     1.07     1.03
                                        TIME      23.88    23.77    23.90    23.97

ROUTED TO
+               3+1VOL      .372    1   FLOW        .00      .00      .00      .00
                                        TIME        .00      .00      .00      .00

                                   ** PEAK STAGES IN FEET **
                                    1   STAGE       .92      .86      .81      .76
                                        TIME      28.07    28.07    28.07    28.07

HYDROGRAPH AT
+                GMN11      .053    1   FLOW        .63      .56      .52      .50
                                        TIME      12.35    12.35    14.90    15.00

ROUTED TO
+               11-VOL      .053    1   FLOW        .00      .00      .00      .00
                                        TIME        .00      .00      .00      .00

                                   ** PEAK STAGES IN FEET **
                                    1   STAGE       .41      .39      .38      .36
                                        TIME      24.97    24.97    24.97    24.97


***     2 ERROR(S) DETECTED BY HEC-1 ***
```

```
1*****************************************                    *****************************************
 *                                       *                    *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *   U.S. ARMY CORPS OF ENGINEERS        *
 *        JUN 1998 AND FEB 2010          *                    *   HYDROLOGIC ENGINEERING CENTER       *
 *          VERSION 4.1R                 *                    *         609 SECOND STREET             *
 *     RGMHEC2000 WWW.HEC-1.COM          *                    *      DAVIS, CALIFORNIA 95616          *
 * RUN DATE   10SEP17  TIME  19:40:09    *                    *          (916) 756-1104               *
 *                                       *                    *                                       *
 *****************************************                    *****************************************


                    X     X  XXXXXXX   XXXXX           X
                    X     X  X        X     X         XX
                    X     X  X        X                X
                    XXXXXXX  XXXX     X        XXXXX   X
                    X     X  X        X                X
                    X     X  X        X     X          X
                    X     X  XXXXXXX   XXXXX          XXX


 THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                      HEC-1 INPUT                                          PAGE  1

  LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

              *DDIAGRAM
    1         ID  ==================================================================
    2         ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH
    3         ID
    4         ID        EXISTING CONDITIONS MODEL
    5         ID        MODEL FOR USE IN CALCULATING SOIL LOSS
    6         ID       MODEL NAME GMN10S.DAT
    7         ID  10 YR24 HR PRECIP
    8         ID  DATE:MAR 2017  *********************************************
    9         ID    ***************************************************************************
   10         ID
   11         ID
              *      ***************************************************************************
   12         IT       1                 2880
   13         IN      15
   14         IO       5
   15         JR    PREC       1
              *  ******************************************************************************
              *  ******************************************************************************
              *  ******************************************************************************
              *  ******************************************************************************
              *       DARF         AREA (SQ.     MI.)
              *       1.00            0 -  2
              *       0.99          2.1 -  8
              *       0.98          8.1 - 16
              *       0.97         16.1 - 29
              *       0.96         29.1 - 43
              *       0.95         43.1 - 63
              *       0.94         63.1 - 98
              *  ******************************************************************************
   16         JR    PREC     1.0    0.99    0.98    0.97
              *  ******************************************************************************
              *  ******************************************************************************
              *    BEGIN NIMBUS 90 MODEL - SP  R1.705
              *    NO MODIFICATIONS M     ADE
              *  ******************************************************************************

   17         KK   GMN5B    RUNOFF FROM WATERSHED GMN5B
   18         BA    .077
   19         PH       1       0    .210    .397    .662    .804    .935    1.33    1.88    2.57
   20         LS              64
   21         UD    0.23

   22         KK  5B-VOL
   23         RS       1    STOR       0
   24         SA       1       1       1       1       1       1       1
   25         SE       0       1       2       3       4       5       6
   26         SQ       0       0       0       0       0       0       0
   27         SE       0       1       2       3       4       5       6
1                                      HEC-1 INPUT                                          PAGE  2

  LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   28         KK   GMN5A    RUNOFF FROM WATERSHED GMN5A
   29         BA    .069
   30         LS              74
   31         UD     .24
```

```
KK  5A-VOL
RS       1    STOR      0
SA       1       1      1      1      1      1      1
SE       0       1      2      3      4      5      6
SQ       0       0      0      0      0      0      0
SE       0       1      2      3      4      5      6

KK    GMN6 RUNOFF FROM GMN6
BA    .012
LS              77
UD     .09

KK    6VOL
RS       1    STOR      0
SA       1       1      1      1      1      1      1
SE       0       1      2      3      4      5      6
SQ       0       0      0      0      0      0      0
SE       0       1      2      3      4      5      6

KK    GMN8RUNOFF FROM GMN 8
BA    .027
LS              54
UD     .12

KK    8-VOL
RS       1    STOR      0
SA       1       1      1      1      1      1      1
SE       0       1      2      3      4      5      6
SQ       0       0      0      0      0      0      0
SE       0       1      2      3      4      5      6

KK    GMN9         RUNOFF FROM GMN9 UNDEVELOPED
BA    .152
LS              65
UD     .31

KK    9-VOL
RS       1    STOR      0
SA       1       1      1      1      1      1      1
SE       0       1      2      3      4      5      6
SQ       0       0      0      0      0      0      0
SE       0       1      2      3      4      5      6

KK    10+12        RUNOFF FROM GMN10+GMN 12
BA     .02
LS              79
UD     .18
```

1 HEC-1 INPUT PAGE 3

```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  10+12V
RS       1    STOR      0
SA       1       1      1      1      1      1      1
SE       0       1      2      3      4      5      6
SQ       0       0      0      0      0      0      0
SE       0       1      2      3      4      5      6

KK    4+7+2        RUNOFF FROM GMN4+GMN7+GM2
BA     .33
LS              63
UD    1.01

KK  472VOL
RS       1    STOR      0
SA       1       1      1      1      1      1      1
SE       0       1      2      3      4      5      6
SQ       0       0      0      0      0      0      0
SE       0       1      2      3      4      5      6

KK     3+1         RUNOFF FROM GMN3  + GMN1
BA    .372
LS              63
UD    0.82

KK  3+1VOL
RS       1    STOR      0
SA       1       1      1      1      1      1      1
SE       0       1      2      3      4      5      6
SQ       0       0      0      0      0      0      0
SE       0       1      2      3      4      5      6

KK    GMN11        RUNOFF FROM GMN11
KM  GMN UNDEVELOPED
BA    .053
LS              70
UD     .19

KK  11-VOL
RS       1    STOR      0
SA       1       1      1      1      1      1      1
SE       0       1      2      3      4      5      6
SQ       0       0      0      0      0      0      0
SE       0       1      2      3      4      5      6
```

```
         109          ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
          (V) ROUTING        (--->) DIVERSION OR PUMP FLOW
 NO.      (.) CONNECTOR      (<---) RETURN OF DIVERTED OR PUMPED FLOW

   17        GMN5B
                 V
                 V
   22       5B-VOL
                 .
                 .
   28            .      GMN5A
                 .          V
                 .          V
   32            .     5A-VOL
                 .          .
                 .          .
   38            .          .       GMN6
                 .          .          V
                 .          .          V
   42            .          .       6VOL
                 .          .          .
                 .          .          .
   48            .          .          .       GMN8
                 .          .          .          V
                 .          .          .          V
   52            .          .          .      8-VOL
                 .          .          .          .
                 .          .          .          .
   58            .          .          .          .       GMN9
                 .          .          .          .          V
                 .          .          .          .          V
   62            .          .          .          .      9-VOL
                 .          .          .          .          .
                 .          .          .          .          .
   68            .          .          .          .          .      10+12
                 .          .          .          .          .          V
                 .          .          .          .          .          V
   72            .          .          .          .          .     10+12V
                 .          .          .          .          .          .
                 .          .          .          .          .          .
   78            .          .          .          .          .          .      4+7+2
                 .          .          .          .          .          .          V
                 .          .          .          .          .          .          V
   82            .          .          .          .          .          .     472VOL
                 .          .          .          .          .          .          .
                 .          .          .          .          .          .          .
                 .          .          .          .          .          .          .        3+1
                 .          .          .          .          .          .          .          V
                 .          .          .          .          .          .          .          V
   92            .          .          .          .          .          .          .     3+1VOL
                 .          .          .          .          .          .          .          .
                 .          .          .          .          .          .          .          .
   98            .          .          .          .          .          .          .          .      GMN11
                 .          .          .          .          .          .          .          .          V
                 .          .          .          .          .          .          .          .          V
  103            .          .          .          .          .          .          .          .     11-VOL

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1****************************************                  ****************************************
*                                       *                  *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                  *   U.S. ARMY CORPS OF ENGINEERS       *
*        JUN 1998 AND FEB 2010          *                  *   HYDROLOGIC ENGINEERING CENTER      *
*            VERSION 4.1R               *                  *        609 SECOND STREET             *
*      RGMHEC2000 WWW.HEC-1.COM         *                  *     DAVIS, CALIFORNIA 95616          *
*  RUN DATE   10SEP17  TIME  19:40:09   *                  *         (916) 756-1104               *
*                                       *                  *                                      *
*****************************************                  ****************************************
```

```
                    MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH

                          EXISTING CONDITIONS MODEL
                          MODEL FOR USE IN CALCULATING SOIL LOSS
                         MODEL NAME GMN10S.DAT
                    10 YR24 HR PRECIP
                    DATE:MAR 2017  ********************************************
                      ************************************************************************


*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

   14 IO         OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

                 HYDROGRAPH TIME DATA
```

```
                    NMIN           1  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1    0  STARTING DATE
                   ITIME        0000  STARTING TIME
                      NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE      2    0  ENDING DATE
                  NDTIME        0919  ENDING TIME
                   ICENT          19  CENTURY MARK

             COMPUTATION INTERVAL     .02 HOURS
                  TOTAL TIME BASE   33.32 HOURS

         ENGLISH UNITS
              DRAINAGE AREA         SQUARE MILES
              PRECIPITATION DEPTH   INCHES
              LENGTH, ELEVATION     FEET
              FLOW                  CUBIC FEET PER SECOND
              STORAGE VOLUME        ACRE-FEET
              SURFACE AREA          ACRES
              TEMPERATURE           DEGREES FAHRENHEIT

     JP          MULTI-PLAN OPTION
                       NPLAN          1  NUMBER OF PLANS

     JR          MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   1.00       .99       .98       .97

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000

 VALUE EXCEEDS TABLE IN LOGLOG           .01667         .01667       24.00000
1

             PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                              FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                          TIME TO PEAK IN HOURS


                                                                RATIOS APPLIED TO PRECIPITATION
 OPERATION        STATION     AREA    PLAN                  RATIO 1  RATIO 2  RATIO 3  RATIO 4
                                                              1.00      .99      .98      .97

 HYDROGRAPH AT
 +                 GMN5B      .077     1     FLOW            3.85     3.60     3.36     3.12
                                             TIME           12.33    12.33    12.35    12.35

 ROUTED TO
 +                 5B-VOL     .077     1     FLOW             .00      .00      .00      .00
                                             TIME             .00      .00      .00      .00

                                       ** PEAK STAGES IN FEET **
                                       1     STAGE           1.21     1.17     1.14     1.10
                                             TIME           25.17    25.15    25.17    25.17

 HYDROGRAPH AT
 +                 GMN5A      .069     1     FLOW           14.39    14.00    13.60    13.22
                                             TIME           12.28    12.28    12.28    12.28

 ROUTED TO
 +                 5A-VOL     .069     1     FLOW             .00      .00      .00      .00
                                             TIME             .00      .00      .00      .00

                                       ** PEAK STAGES IN FEET **
                                       1     STAGE           2.38     2.33     2.28     2.22
                                             TIME           25.20    25.20    25.20    25.18

 HYDROGRAPH AT
 +                 GMN6       .012     1     FLOW            5.05     4.93     4.81     4.69
```

```
                                         TIME          12.12     12.12     12.12     12.12

 ROUTED TO
+                    6VOL      .012    1   FLOW          .00       .00       .00       .00
                                         TIME            .00       .00       .00       .00

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE         .50       .49       .48       .47
                                         TIME          24.47     24.47     24.47     24.47

 HYDROGRAPH AT
+                    GMN8      .027    1   FLOW          .15       .14       .14       .13
                                         TIME          17.93     18.00     23.70     23.58

 ROUTED TO
+                    8-VOL     .027    1   FLOW          .00       .00       .00       .00
                                         TIME            .00       .00       .00       .00

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE         .12       .11       .10       .10
                                         TIME          24.63     24.63     24.63     24.63

 HYDROGRAPH AT
+                    GMN9      .152    1   FLOW         8.07      7.61      7.16      6.73
                                         TIME          12.43     12.43     12.43     12.43

 ROUTED TO
+                    9-VOL     .152    1   FLOW          .00       .00       .00       .00
                                         TIME            .00       .00       .00       .00

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE        2.63      2.55      2.47      2.39
                                         TIME          25.55     25.55     25.53     25.55

 HYDROGRAPH AT
+                    10+12     .020    1   FLOW         7.21      7.06      6.90      6.75
                                         TIME          12.22     12.22     12.22     12.22

 ROUTED TO
+                    10+12V    .020    1   FLOW          .00       .00       .00       .00
                                         TIME            .00       .00       .00       .00

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE         .94       .93       .91       .89
                                         TIME          24.92     24.92     24.90     24.90

 HYDROGRAPH AT
+                    4+7+2     .330    1   FLOW         5.65      5.32      4.99      4.81
                                         TIME          13.45     13.47     13.48     15.42

 ROUTED TO
+                    472VOL    .330    1   FLOW          .00       .00       .00       .00
                                         TIME            .00       .00       .00       .00

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE        4.71      4.55      4.40      4.25
                                         TIME          28.95     28.95     28.95     28.95

 HYDROGRAPH AT
+                    3+1       .372    1   FLOW         7.13      6.69      6.26      5.85
                                         TIME          13.17     13.18     13.18     13.20

 ROUTED TO
+                    3+1VOL    .372    1   FLOW          .00       .00       .00       .00
                                         TIME            .00       .00       .00       .00

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE        5.31      5.13      4.96      4.79
                                         TIME          28.07     28.07     28.05     28.05

 HYDROGRAPH AT
+                    GMN11     .053    1   FLOW         8.24      7.95      7.66      7.37
                                         TIME          12.23     12.23     12.23     12.23

 ROUTED TO
+                    11-VOL    .053    1   FLOW          .00       .00       .00       .00
                                         TIME            .00       .00       .00       .00

                                       ** PEAK STAGES IN FEET **
                                       1   STAGE        1.38      1.35      1.31      1.28
                                         TIME          24.95     24.97     24.97     24.95


*** NORMAL END OF HEC-1 ***
```

```
1*****************************************                                   ****************************************
 *                                       *                                   *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                   *   U.S. ARMY CORPS OF ENGINEERS       *
 *       JUN 1998 AND FEB 2010           *                                   *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1R                *                                   *        609 SECOND STREET             *
 *     RGMHEC2000 WWW.HEC-1.COM          *                                   *     DAVIS, CALIFORNIA 95616          *
 *     DATE   10SEP17  TIME  19:39:17    *                                   *        (916) 756-1104                *
 *                                       *                                   *                                      *
 *****************************************                                   ****************************************


                    X     X  XXXXXXX   XXXXX          X
                    X     X  X        X     X        XX
                    X     X  X        X               X
                    XXXXXXX  XXXX     X       XXXXX   X
                    X     X  X        X               X
                    X     X  X        X     X         X
                    X     X  XXXXXXX   XXXXX         XXX


       THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

       THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
       THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
       NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
       DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
       KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                       HEC-1 INPUT                                                    PAGE  1

     LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                *DDIAGRAM
        1       ID  ==========================================================================
        2       ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH
        3       ID
        4       ID        EXISTING CONDITIONS MODEL
        5       ID        MODEL FOR USE IN CALCULATING SOIL LOSS
        6       ID       MODEL NAME GMN25S.DAT
        7       ID  25 YR24 HR PRECIP
        8       ID  DATE:MAR 2017  ********************************************
        9       ID    ***********************************************************************
       10       ID
       11       ID
                *     ***********************************************************************
       12       IT       1                   2880
       13       IN      15
       14       IO       5
       15       JR    PREC       1
                *   *************************************************************************
                *   *************************************************************************
                *   *************************************************************************
                *   *************************************************************************
                *       DARF          AREA (SQ.    MI.)
                *       1.00             0 -  2
                *       0.99           2.1 -  8
                *       0.98           8.1 - 16
                *       0.97          16.1 - 29
                *       0.96          29.1 - 43
                *       0.95          43.1 - 63
                *       0.94          63.1 - 98
                *   *************************************************************************
       16       JR    PREC     1.0    0.99    0.98    0.97
                *   *************************************************************************
                *   *************************************************************************
                *     BEGIN NIMBUS 90 MODEL - SP  R1.705
                *     NO MODIFICATIONS M     ADE
                *   *************************************************************************

       17       KK   GMN5B    RUNOFF FROM WATERSHED GMN5B
       18       BA    .077
       19       PH       1       0    .279    .527    .879    1.01    1.12    1.55    2.22     3.1
       20       LS              64
       21       UD    0.23

       22       KK  5B-VOL
       23       RS       1    STOR       0
       24       SA       1       1       1       1       1       1       1
       25       SE       0       1       2       3       4       5       6
       26       SQ       0       0       0       0       0       0       0
       27       SE       0       1       2       3       4       5       6
1                                       HEC-1 INPUT                                                    PAGE  2

     LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       28       KK   GMN5A    RUNOFF FROM WATERSHED GMN5A
       29       BA    .069
       30       LS              74
       31       UD     .24
```

```
KK  5A-VOL
RS     1    STOR      0
SA     1      1       1       1       1       1       1
SE     0      1       2       3       4       5       6
SQ     0      0       0       0       0       0       0
SE     0      1       2       3       4       5       6

KK    GMN6 RUNOFF FROM GMN6
BA    .012
LS              77
UD     .09

KK    6VOL
RS     1    STOR      0
SA     1      1       1       1       1       1       1
SE     0      1       2       3       4       5       6
SQ     0      0       0       0       0       0       0
SE     0      1       2       3       4       5       6

KK    GMN8RUNOFF FROM GMN 8
BA    .027
LS              54
UD     .12

KK   8-VOL
RS     1    STOR      0
SA     1      1       1       1       1       1       1
SE     0      1       2       3       4       5       6
SQ     0      0       0       0       0       0       0
SE     0      1       2       3       4       5       6

KK    GMN9         RUNOFF FROM GMN9 UNDEVELOPED
BA    .152
LS              65
UD     .31

KK   9-VOL
RS     1    STOR      0
SA     1      1       1       1       1       1       1
SE     0      1       2       3       4       5       6
SQ     0      0       0       0       0       0       0
SE     0      1       2       3       4       5       6

KK   10+12         RUNOFF FROM GMN10+ GMN12
BA     .02
LS              79
UD     .18
```

1


```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK  10+12V
RS     1    STOR      0
SA     1      1       1       1       1       1       1
SE     0      1       2       3       4       5       6
SQ     0      0       0       0       0       0       0
SE     0      1       2       3       4       5       6

KK   4+7+2         RUNOFF FROM GMN4+GMN7+GM2
BA     .33
LS              63
UD    1.01

KK  472VOL
RS     1    STOR      0
SA     1      1       1       1       1       1       1
SE     0      1       2       3       4       5       6
SQ     0      0       0       0       0       0       0
SE     0      1       2       3       4       5       6

KK     3+1         RUNOFF FROM GMN3  + GMN1
BA    .372
LS              63
UD    0.82

KK  3+1VOL
RS     1    STOR      0
SA     1      1       1       1       1       1       1
SE     0      1       2       3       4       5       6
SQ     0      0       0       0       0       0       0
SE     0      1       2       3       4       5       6

KK   GMN11         RUNOFF FROM GMN11
KM  GMN UNDEVELOPED
BA    .053
LS              70
UD     .19

KK  11-VOL
RS     1    STOR      0
SA     1      1       1       1       1       1       1
SE     0      1       2       3       4       5       6
SQ     0      0       0       0       0       0       0
SE     0      1       2       3       4       5       6
```

```
        109           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
            (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
 NO.
            (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   17           GMN5B
                    V
                    V
   22          5B-VOL
                    .
                    .
   28               .       GMN5A
                    .           V
                    .           V
   32               .      5A-VOL
                    .           .
                    .           .
   38               .           .        GMN6
                    .           .           V
                    .           .           V
   42               .           .        6VOL
                    .           .           .
                    .           .           .
   48               .           .           .        GMN8
                    .           .           .           V
                    .           .           .           V
   52               .           .           .       8-VOL
                    .           .           .           .
                    .           .           .           .
   58               .           .           .           .        GMN9
                    .           .           .           .           V
                    .           .           .           .           V
   62               .           .           .           .       9-VOL
                    .           .           .           .           .
                    .           .           .           .           .
   68               .           .           .           .           .       10+12
                    .           .           .           .           .           V
                    .           .           .           .           .           V
   72               .           .           .           .           .      10+12V
                    .           .           .           .           .           .
                    .           .           .           .           .           .
   78               .           .           .           .           .           .       4+7+2
                    .           .           .           .           .           .           V
                    .           .           .           .           .           .           V
   82               .           .           .           .           .           .      472VOL
                    .           .           .           .           .           .           .
                    .           .           .           .           .           .           .
                    .           .           .           .           .           .           .         3+1
                    .           .           .           .           .           .           .           V
                    .           .           .           .           .           .           .           V
   92               .           .           .           .           .           .           .      3+1VOL
                    .           .           .           .           .           .           .           .
                    .           .           .           .           .           .           .           .
   98               .           .           .           .           .           .           .           .       GMN11
                    .           .           .           .           .           .           .           .           V
                    .           .           .           .           .           .           .           .           V
  103               .           .           .           .           .           .           .           .      11-VOL

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *         JUN 1998 AND FEB 2010         *
 *             VERSION 4.1R              *
 *        RGMHEC2000 WWW.HEC-1.COM       *
 *  RUN DATE    10SEP17  TIME  19:39:17  *
 *                                       *
 *****************************************
```

```
***************************************
*                                     *
*   U.S. ARMY CORPS OF ENGINEERS      *
*   HYDROLOGIC ENGINEERING CENTER     *
*        609 SECOND STREET            *
*     DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104             *
*                                     *
***************************************
```

```
MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH

      EXISTING CONDITIONS MODEL
      MODEL FOR USE IN CALCULATING SOIL LOSS
     MODEL NAME GMN25S.DAT
25 YR24 HR PRECIP
DATE:MAR 2017  *********************************************
  ***********************************************************************
```

```
*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

  14 IO         OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH TIME DATA
```

```
              NMIN          1  MINUTES IN COMPUTATION INTERVAL
             IDATE      1   0  STARTING DATE
             ITIME       0000  STARTING TIME
                NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
            NDDATE      2   0  ENDING DATE
            NDTIME       0919  ENDING TIME
             ICENT         19  CENTURY MARK

      COMPUTATION INTERVAL     .02 HOURS
           TOTAL TIME BASE   33.32 HOURS

 ENGLISH UNITS
      DRAINAGE AREA          SQUARE MILES
      PRECIPITATION DEPTH    INCHES
      LENGTH, ELEVATION      FEET
      FLOW                   CUBIC FEET PER SECOND
      STORAGE VOLUME         ACRE-FEET
      SURFACE AREA           ACRES
      TEMPERATURE            DEGREES FAHRENHEIT

JP          MULTI-PLAN OPTION
                NPLAN           1  NUMBER OF PLANS

JR          MULTI-RATIO OPTION
               RATIOS OF PRECIPITATION
              1.00       .99       .98       .97

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS
VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000
1
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .99	RATIO 3 .98	RATIO 4 .97
HYDROGRAPH AT								
+	GMN5B	.077	1	FLOW	11.33	10.87	10.41	9.95
				TIME	12.30	12.30	12.30	12.30
ROUTED TO								
+	5B-VOL	.077	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	2.11	2.05	1.99	1.94
				TIME	25.17	25.17	25.17	25.15
HYDROGRAPH AT								
+	GMN5A	.069	1	FLOW	25.34	24.75	24.17	23.59
				TIME	12.28	12.28	12.28	12.28
ROUTED TO								
+	5A-VOL	.069	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	3.58	3.50	3.43	3.36
				TIME	25.20	25.20	25.20	25.20
HYDROGRAPH AT								
+	GMN6	.012	1	FLOW	8.39	8.22	8.05	7.87

				TIME	12.12	12.12	12.12	12.12
ROUTED TO								
+	6VOL	.012	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	.73	.72	.70	.69
				TIME	24.47	24.47	24.48	24.48
HYDROGRAPH AT								
+	GMN8	.027	1	FLOW	.37	.32	.30	.29
				TIME	12.35	12.37	17.82	17.90
ROUTED TO								
+	8-VOL	.027	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	.28	.27	.26	.25
				TIME	24.62	24.63	24.63	24.63
HYDROGRAPH AT								
+	GMN9	.152	1	FLOW	21.43	20.61	19.80	19.01
				TIME	12.38	12.38	12.38	12.38
ROUTED TO								
+	9-VOL	.152	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	4.48	4.36	4.24	4.13
				TIME	25.55	25.55	25.53	25.55
HYDROGRAPH AT								
+	10+12	.020	1	FLOW	11.62	11.40	11.17	10.95
				TIME	12.22	12.22	12.22	12.22
ROUTED TO								
+	10+12V	.020	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	1.35	1.32	1.30	1.27
				TIME	24.92	24.92	24.92	24.90
HYDROGRAPH AT								
+	4+7+2	.330	1	FLOW	15.87	15.18	14.51	13.85
				TIME	13.22	13.22	13.23	13.23
R[illegible] TO								
+	472VOL	.330	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	8.36	8.12	7.89	7.66
				TIME	28.95	28.95	28.95	28.95
HYDROGRAPH AT								
+	3+1	.372	1	FLOW	20.89	19.98	19.09	18.21
				TIME	13.00	13.00	13.02	13.02
ROUTED TO								
+	3+1VOL	.372	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	9.42	9.15	8.89	8.63
				TIME	28.02	28.03	28.05	28.03
HYDROGRAPH AT								
+	GMN11	.053	1	FLOW	16.28	15.84	15.39	14.95
				TIME	12.23	12.23	12.23	12.23
ROUTED TO								
+	11-VOL	.053	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	2.18	2.13	2.08	2.03
				TIME	24.97	24.97	24.97	24.95

*** NORMAL END OF HEC-1 ***

```
1*****************************************                                    *****************************************
 *                                       *                                    *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                    *   U.S. ARMY CORPS OF ENGINEERS        *
 *        JUN 1998 AND FEB 2010          *                                    *   HYDROLOGIC ENGINEERING CENTER       *
 *            VERSION 4.1R               *                                    *        609 SECOND STREET              *
 *       RGMHEC2000 WWW.HEC-1.COM        *                                    *     DAVIS, CALIFORNIA 95616           *
 * RUN DATE   10SEP17  TIME  19:37:46    *                                    *         (916) 756-1104                *
 *                                       *                                    *                                       *
 *****************************************                                    *****************************************


                         X     X  XXXXXXX   XXXXX           X
                         X     X  X        X     X         XX
                         X     X  X        X                X
                         XXXXXXX  XXXX     X        XXXXX   X
                         X     X  X        X                X
                         X     X  X        X     X          X
                         X     X  XXXXXXX   XXXXX          XXX


     THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

     THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
     THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
     NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
     DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
     KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                  HEC-1 INPUT                                             PAGE  1

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                   *DDIAGRAM
        1          ID  ==================================================================
        2          ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH
        3          ID
        4          ID        EXISTING CONDITIONS MODEL
        5          ID        MODEL FOR USE IN CALCULATING SOIL LOSS
        6          ID       MODEL NAME GMN10S.DAT
        7          ID  50 YR24 HR PRECIP
        8          ID  DATE:MAR 2017  ********************************************
        9          ID    ********************************************************************
       10          ID
       11          ID
                   *       ********************************************************************
       12          IT       1                  2880
       13          IN      15
       14          IO       5
       15          JR    PREC       1
                   *   ***********************************************************************
                   *   ***********************************************************************
                   *   ***********************************************************************
                   *   ***********************************************************************
                   *       DARF          AREA (SQ.      MI.)
                   *       1.00             0 -  2
                   *       0.99           2.1 -  8
                   *       0.98           8.1 - 16
                   *       0.97          16.1 - 29
                   *       0.96          29.1 - 43
                   *       0.95          43.1 - 63
                   *       0.94          63.1 - 98
                   *   ***********************************************************************
       16          JR    PREC     1.0    0.99    0.98    0.97
                   *   ***********************************************************************
                   *   ***********************************************************************
                   *     BEGIN NIMBUS 90 MODEL - SP  R1.705
                   *     NO MODIFICATIONS M      ADE
                   *   ***********************************************************************

       17          KK   GMN5B    RUNOFF FROM WATERSHED GMN5B
       18          BA    .077
       19          PH       1       0    .344     .65    1.08    1.19    1.29    1.71    2.49    3.52
       20          LS               64
       21          UD    0.23

       22          KK  5B-VOL
       23          RS       1    STOR       0
       24          SA       1       1       1       1       1       1       1
       25          SE       0       1       2       3       4       5       6
       26          SQ       0       0       0       0       0       0       0
       27          SE       0       1       2       3       4       5       6
1                                                  HEC-1 INPUT                                             PAGE  2

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       28          KK   GMN5A    RUNOFF FROM WATERSHED GMN5A
       29          BA    .069
       30          LS               74
       31          UD     .24

       32          KK  5A-VOL
       33          RS       1    STOR       0
       34          SA       1       1       1       1       1       1       1
```

```
     35          SE       0        1        2        3        4        5        6
     36          SQ       0        0        0        0        0        0        0
     37          SE       0        1        2        3        4        5        6

     38          KK     GMN6 RUNOFF FROM GMN6
     39          BA     .012
     40          LS                77
     41          UD       .09

     42          KK     6VOL
     43          RS       1      STOR       0
     44          SA       1        1        1        1        1        1        1
     45          SE       0        1        2        3        4        5        6
     46          SQ       0        0        0        0        0        0        0
     47          SE       0        1        2        3        4        5        6

     48          KK     GMN8RUNOFF FROM GMN 8
     49          BA     .027
     50          LS                54
     51          UD       .12

     52          KK   8-VOL
     53          RS       1      STOR       0
     54          SA       1        1        1        1        1        1        1
     55          SE       0        1        2        3        4        5        6
     56          SQ       0        0        0        0        0        0        0
     57          SE       0        1        2        3        4        5        6

     58          KK     GMN9          RUNOFF FROM GMN9 UNDEVELOPED
     59          BA     .152
     60          LS                65
     61          UD       .31

     62          KK   9-VOL
     63          RS       1      STOR       0
     64          SA       1        1        1        1        1        1        1
     65          SE       0        1        2        3        4        5        6
     66          SQ       0        0        0        0        0        0        0
     67          SE       0        1        2        3        4        5        6

     68          KK   10+12         RUNOFF FROM GMN10       + GMN-12
     69          BA      .02
     70          LS                79
     71          UD      .18
1                                      HEC-1 INPUT                                     PAGE  3

   LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


     72          KK  10+12V
     73          RS       1      STOR       0
     74          SA       1        1        1        1        1        1        1
     75          SE       0        1        2        3        4        5        6
     76          SQ       0        0        0        0        0        0        0
     77          SE       0        1        2        3        4        5        6

     78          KK    4+7+2        RUNOFF FROM GMN4+GMN7+GM2
     79          BA      .33
     80          LS                63
     81          UD     1.01

     82          KK  472VOL
     83          RS       1      STOR       0
     84          SA       1        1        1        1        1        1        1
     85          SE       0        1        2        3        4        5        6
     86          SQ       0        0        0        0        0        0        0
     87          SE       0        1        2        3        4        5        6

     88          KK     3+1         RUNOFF FROM GMN3  + GMN1
     89          BA     .372
     90          LS                63
     91          UD     0.82

     92          KK  3+1VOL
     93          RS       1      STOR       0
     94          SA       1        1        1        1        1        1        1
     95          SE       0        1        2        3        4        5        6
     96          SQ       0        0        0        0        0        0        0
     97          SE       0        1        2        3        4        5        6

     98          KK    GMN11        RUNOFF FROM GMN11
     99          KM  GMN UNDEVELOPED
    100          BA     .053
    101          LS                70
    102          UD      .19

    103          KK  11-VOL
    104          RS       1      STOR       0
    105          SA       1        1        1        1        1        1        1
    106          SE       0        1        2        3        4        5        6
    107          SQ       0        0        0        0        0        0        0
    108          SE       0        1        2        3        4        5        6
    109          ZZ
1
                  SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
```

```
  17        GMN5B
                V
                V
  22       5B-VOL
                .
                .
  28            .          GMN5A
                .              V
                .              V
  32            .          5A-VOL
                .              .
                .              .
  38            .              .          GMN6
                .              .             V
                .              .             V
  42            .              .          6VOL
                .              .             .
                .              .             .
  48            .              .             .          GMN8
                .              .             .             V
                .              .             .             V
  52            .              .             .          8-VOL
                .              .             .             .
                .              .             .             .
  58            .              .             .             .          GMN9
                .              .             .             .             V
                .              .             .             .             V
  62            .              .             .             .          9-VOL
                .              .             .             .             .
                .              .             .             .             .
  68            .              .             .             .             .          10+12
                .              .             .             .             .              V
                .              .             .             .             .              V
  72            .              .             .             .             .          10+12V
                .              .             .             .             .              .
                .              .             .             .             .              .
  78            .              .             .             .             .              .          4+7+2
                .              .             .             .             .              .              V
                .              .             .             .             .              .              V
  82            .              .             .             .             .              .          472VOL
                .              .             .             .             .              .              .
                .              .             .             .             .              .              .
  88            .              .             .             .             .              .              .          3+1
                .              .             .             .             .              .              .            V
                .              .             .             .             .              .              .            V
  92            .              .             .             .             .              .              .          3+1VOL
                .              .             .             .             .              .              .            .
                .              .             .             .             .              .              .            .
  98            .              .             .             .             .              .              .            .          GMN11
                .              .             .             .             .              .              .            .              V
                .              .             .             .             .              .              .            .              V
 103            .              .             .             .             .              .              .            .          11-VOL

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************                                            ****************************************
 *                                       *                                            *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                            *   U.S. ARMY CORPS OF ENGINEERS       *
 *        JUN 1998 AND FEB 2010          *                                            *   HYDROLOGIC ENGINEERING CENTER      *
 *             VERSION 4.1R              *                                            *         609 SECOND STREET            *
 *       RGMHEC2000 WWW.HEC-1.COM        *                                            *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   10SEP17   TIME   19:37:46 *                                            *          (916) 756-1104              *
 *                                       *                                            *                                      *
 *****************************************                                            ****************************************


                          MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH

                                EXISTING CONDITIONS MODEL
                                MODEL FOR USE IN CALCULATING SOIL LOSS
                               MODEL NAME GMN10S.DAT
                          50 YR24 HR PRECIP
                          DATE:MAR 2017  *********************************************
                            **********************************************************************


 *** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

   14 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN          1  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1    0  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      2    0  ENDING DATE
                       NDTIME       0919  ENDING TIME
                        ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL    .02 HOURS
                       TOTAL TIME BASE  33.32 HOURS

          ENGLISH UNITS
```

```
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT

     JP           MULTI-PLAN OPTION
                     NPLAN              1  NUMBER OF PLANS

     JR           MULTI-RATIO OPTION
                     RATIOS OF PRECIPITATION
                    1.00       .99       .98       .97

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

     *** WARNING ***   UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000

 VALUE EXCEEDS TABLE IN LOGLOG          .01667          .01667          24.00000
1

              PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
                              FLOWS IN CUBIC FEET PER SECOND,  AREA IN SQUARE MILES
                                              TIME TO PEAK IN HOURS

                                                               RATIOS APPLIED TO PRECIPITATION
 OPERATION       STATION     AREA    PLAN              RATIO 1  RATIO 2  RATIO 3  RATIO 4
                                                          1.00      .99      .98      .97

 HYDROGRAPH AT
 +                GMN5B       .077     1     FLOW        19.64    18.99    18.35    17.71
                                             TIME        12.28    12.28    12.28    12.28

 ROUTED TO
 +                5B-VOL      .077     1     FLOW          .00      .00      .00      .00
                                             TIME          .00      .00      .00      .00

                                       ** PEAK STAGES IN FEET **
                                       1     STAGE        2.94     2.86     2.79     2.72
                                             TIME        25.15    25.15    25.17    25.17

 HYDROGRAPH AT
 +                GMN5A       .069     1     FLOW        36.35    35.58    34.82    34.06
                                             TIME        12.28    12.28    12.28    12.28

 ROUTED TO
 +                5A-VOL      .069     1     FLOW          .00      .00      .00      .00
                                             TIME          .00      .00      .00      .00

                                       ** PEAK STAGES IN FEET **
                                       1     STAGE        4.61     4.52     4.43     4.35
                                             TIME        25.20    25.20    25.20    25.20

 HYDROGRAPH AT
 +                GMN6        .012     1     FLOW        11.71    11.49    11.27    11.05
                                             TIME        12.12    12.12    12.12    12.12

 ROUTED TO
 +                6VOL        .012     1     FLOW          .00      .00      .00      .00
                                             TIME          .00      .00      .00      .00

                                       ** PEAK STAGES IN FEET **
                                       1     STAGE         .93      .91      .89      .88
                                             TIME        24.47    24.47    24.47    24.47

 HYDROGRAPH AT
 +                GMN8        .027     1     FLOW         1.66     1.53     1.39     1.27
                                             TIME        12.23    12.23    12.23    12.25

 ROUTED TO
 +                8-VOL       .027     1     FLOW          .00      .00      .00      .00
```

				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	.46	.44	.43	.41
				TIME	24.62	24.62	24.62	24.62
HYDROGRAPH AT								
+	GMN9	.152	1	FLOW	35.92	34.81	33.71	32.61
				TIME	12.38	12.38	12.38	12.38
ROUTED TO								
+	9-VOL	.152	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	6.18	6.03	5.88	5.73
				TIME	25.55	25.55	25.53	25.53
HYDROGRAPH AT								
+	10+12	.020	1	FLOW	15.96	15.67	15.39	15.10
				TIME	12.20	12.20	12.20	12.20
ROUTED TO								
+	10+12V	.020	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	1.69	1.66	1.63	1.60
				TIME	24.90	24.90	24.90	24.90
HYDROGRAPH AT								
+	4+7+2	.330	1	FLOW	27.84	26.84	25.86	24.90
				TIME	13.15	13.17	13.17	13.17
ROUTED TO								
+	472VOL	.330	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	11.77	11.47	11.17	10.87
				TIME	28.93	28.93	28.95	28.93
HYDROGRAPH AT								
+	3+1	.372	1	FLOW	37.00	35.69	34.39	33.10
				TIME	12.95	12.95	12.95	12.97
ROUTED TO								
+	3+1VOL	.372	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	13.26	12.92	12.59	12.25
				TIME	28.03	28.03	28.03	28.03
HYDROGRAPH AT								
+	GMN11	.053	1	FLOW	24.57	23.97	23.38	22.79
				TIME	12.23	12.23	12.23	12.23
ROUTED TO								
+	11-VOL	.053	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	2.88	2.82	2.76	2.70
				TIME	24.95	24.95	24.95	24.97

*** NORMAL END OF HEC-1 ***

```
1*****************************************                              *****************************************
 *                                       *                              *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                              *   U.S. ARMY CORPS OF ENGINEERS        *
 *        JUN 1998 AND FEB 2010          *                              *   HYDROLOGIC ENGINEERING CENTER       *
 *            VERSION 4.1R               *                              *         609 SECOND STREET             *
 *      RGMHEC2000 WWW.HEC-1.COM         *                              *      DAVIS, CALIFORNIA 95616          *
 * RUN DATE   10SEP17  TIME  19:35:43    *                              *          (916) 756-1104               *
 *                                       *                              *                                       *
 *****************************************                              *****************************************


                          X     X  XXXXXXX   XXXXX           X
                          X     X  X        X     X         XX
                          X     X  X        X                X
                          XXXXXXX  XXXX     X       XXXXX    X
                          X     X  X        X                X
                          X     X  X        X     X          X
                          X     X  XXXXXXX   XXXXX          XXX


        THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

        THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
        THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
        NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
        DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
        KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                          HEC-1 INPUT                                                    PAGE  1

       LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                    *DDIAGRAM
         1          ID  ====================================================================
         2          ID  MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH
         3          ID
         4          ID        EXISTING CONDITIONS MODEL
         5          ID        MODEL FOR USE IN CALCULATING SOIL LOSS
         6          ID       MODEL NAME GMN100S.DAT
         7          ID  100 YR24 HR PRECIP
         8          ID  DATE:MAR 2017  *********************************************
         9          ID    *******************************************************************
        10          ID
        11          ID
                    *      *******************************************************************
        12          IT       1                 2880
        13          IN      15
        14          IO       5
        15          JR    PREC        1
                    *   *************************************************************************
                    *   *************************************************************************
                    *   *************************************************************************
                    *   *************************************************************************
                    *        DARF          AREA (SQ.      MI.)
                    *        1.00              0 -  2
                    *        0.99            2.1 -  8
                    *        0.98            8.1 - 16
                    *        0.97           16.1 - 29
                    *        0.96           29.1 - 43
                    *        0.95           43.1 - 63
                    *        0.94           63.1 - 98
                    *   *************************************************************************
        16          JR    PREC     1.0    0.99    0.98    0.97
                    *   *************************************************************************
                    *   *************************************************************************
                    *     BEGIN NIMBUS 90 MODEL - SP  R1.705
                    *     NO MODIFICATIONS M      ADE
                    *   *************************************************************************

        17          KK   GMN5B   RUNOFF FROM WATERSHED GMN5B
        18          BA    .077
        19          PH       1       0    .423    .797    1.33     1.4    1.49    1.88    2.75    3.97
        20          LS              64
        21          UD    0.23

        22          KK  5B-VOL
        23          RS       1    STOR       0
        24          SA       1       1       1       1       1       1       1
        25          SE       0       1       2       3       4       5       6
        26          SQ       0       0       0       0       0       0       0
        27          SE       0       1       2       3       4       5       6
1                                          HEC-1 INPUT                                                    PAGE  2

       LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


        28          KK   GMN5A   RUNOFF FROM WATERSHED GMN5A
        29          BA    .069
        30          LS              74
        31          UD     .24

        32          KK  5A-VOL
        33          RS       1    STOR       0
        34          SA       1       1       1       1       1       1       1
```

```
  35        SE      0      1      2      3      4      5      6
  36        SQ      0      0      0      0      0      0      0
  37        SE      0      1      2      3      4      5      6

  38        KK   GMN6 RUNOFF FROM GMN6
  39        BA   .012
  40        LS             77
  41        UD    .09

  42        KK   6VOL
  43        RS      1   STOR      0
  44        SA      1      1      1      1      1      1      1
  45        SE      0      1      2      3      4      5      6
  46        SQ      0      0      0      0      0      0      0
  47        SE      0      1      2      3      4      5      6

  48        KK   GMN8RUNOFF FROM GMN 8
  49        BA   .027
  50        LS             54
  51        UD    .12

  52        KK  8-VOL
  53        RS      1   STOR      0
  54        SA      1      1      1      1      1      1      1
  55        SE      0      1      2      3      4      5      6
  56        SQ      0      0      0      0      0      0      0
  57        SE      0      1      2      3      4      5      6

  58        KK   GMN9        RUNOFF FROM GMN9 UNDEVELOPED
  59        BA   .152
  60        LS             65
  61        UD    .31

  62        KK  9-VOL
  63        RS      1   STOR      0
  64        SA      1      1      1      1      1      1      1
  65        SE      0      1      2      3      4      5      6
  66        SQ      0      0      0      0      0      0      0
  67        SE      0      1      2      3      4      5      6

  68        KK  10+12        RUNOFF FROM GMN10+ GMN12
  69        BA    .02
  70        LS             79
  71        UD    .18
1                                 HEC-1 INPUT                                PAGE  3

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  72        KK  10+12V
  73        RS      1   STOR      0
  74        SA      1      1      1      1      1      1      1
  75        SE      0      1      2      3      4      5      6
  76        SQ      0      0      0      0      0      0      0
  77        SE      0      1      2      3      4      5      6

  78        KK   4+7+2       RUNOFF FROM GMN4+GMN7+GM2
  79        BA    .33
  80        LS             63
  81        UD   1.01

  82        KK  472VOL
  83        RS      1   STOR      0
  84        SA      1      1      1      1      1      1      1
  85        SE      0      1      2      3      4      5      6
  86        SQ      0      0      0      0      0      0      0
  87        SE      0      1      2      3      4      5      6

  88        KK    3+1        RUNOFF FROM GMN3  + GMN1
  89        BA   .372
  90        LS             63
  91        UD   0.82

  92        KK  3+1VOL
  93        RS      1   STOR      0
  94        SA      1      1      1      1      1      1      1
  95        SE      0      1      2      3      4      5      6
  96        SQ      0      0      0      0      0      0      0
  97        SE      0      1      2      3      4      5      6

  98        KK   GMN11       RUNOFF FROM GMN11
  99        KM  GMN UNDEVELOPED
 100        BA   .053
 101        LS             70
 102        UD    .19

 103        KK  11-VOL
 104        RS      1   STOR      0
 105        SA      1      1      1      1      1      1      1
 106        SE      0      1      2      3      4      5      6
 107        SQ      0      0      0      0      0      0      0
 108        SE      0      1      2      3      4      5      6
 109        ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
```

```
   17      GMN5B
               V
               V
   22     5B-VOL
               .
               .
   28          .     GMN5A
               .         V
               .         V
   32          .    5A-VOL
               .         .
               .         .
   38          .         .      GMN6
               .         .         V
               .         .         V
   42          .         .      6VOL
               .         .         .
               .         .         .
   48          .         .         .      GMN8
               .         .         .         V
               .         .         .         V
   52          .         .         .     8-VOL
               .         .         .         .
               .         .         .         .
   58          .         .         .         .      GMN9
               .         .         .         .         V
               .         .         .         .         V
   62          .         .         .         .     9-VOL
               .         .         .         .         .
               .         .         .         .         .
   68          .         .         .         .         .     10+12
               .         .         .         .         .         V
               .         .         .         .         .         V
   72          .         .         .         .         .    10+12V
               .         .         .         .         .         .
               .         .         .         .         .         .
   78          .         .         .         .         .         .     4+7+2
               .         .         .         .         .         .         V
               .         .         .         .         .         .         V
   82          .         .         .         .         .         .    472VOL
               .         .         .         .         .         .         .
               .         .         .         .         .         .         .
   88          .         .         .         .         .         .         .       3+1
               .         .         .         .         .         .         .         V
               .         .         .         .         .         .         .         V
   92          .         .         .         .         .         .         .    3+1VOL
               .         .         .         .         .         .         .         .
               .         .         .         .         .         .         .         .
   98          .         .         .         .         .         .         .         .     GMN11
               .         .         .         .         .         .         .         .         V
               .         .         .         .         .         .         .         .         V
  103          .         .         .         .         .         .         .         .    11-VOL

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************                                          *****************************************
 *                                       *                                          *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                          *   U.S. ARMY CORPS OF ENGINEERS        *
 *       JUN 1998 AND FEB 2010           *                                          *   HYDROLOGIC ENGINEERING CENTER       *
 *           VERSION 4.1R                *                                          *        609 SECOND STREET              *
 *      RGMHEC2000 WWW.HEC-1.COM         *                                          *     DAVIS, CALIFORNIA 95616           *
 *  RUN DATE   10SEP17  TIME  19:35:43   *                                          *        (916) 756-1104                 *
 *                                       *                                          *                                       *
 *****************************************                                          *****************************************
```

```
                        MODEL TO DETERMINE FLOW RATES FOR GOLDEN MESA NORTH

                              EXISTING CONDITIONS MODEL
                              MODEL FOR USE IN CALCULATING SOIL LOSS
                             MODEL NAME GMN100S.DAT
                        100 YR24 HR PRECIP
                        DATE:MAR 2017  *********************************************
                          ***********************************************************************

*** ERROR *** SPECIFIED START AND END DATES RESULT IN TOO MANY TIME PERIODS

  14 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN          1  MINUTES IN COMPUTATION INTERVAL
                      IDATE    1     0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE    2     0  ENDING DATE
                     NDTIME       0919  ENDING TIME
                      ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL    .02 HOURS
                      TOTAL TIME BASE  33.32 HOURS

        ENGLISH UNITS
```

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FEET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

JP MULTI-PLAN OPTION
NPLAN 1 NUMBER OF PLANS

JR MULTI-RATIO OPTION
RATIOS OF PRECIPITATION
1.00 .99 .98 .97

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

*** WARNING *** UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

*** WARNING *** UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

*** WARNING *** UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

*** WARNING *** UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

*** WARNING *** UNIT HYDROGRAPH TRUNCATED FROM 305 TO 300 INTERVALS

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

VALUE EXCEEDS TABLE IN LOGLOG .01667 .01667 24.00000

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .99	RATIO 3 .98	RATIO 4 .97
HYDROGRAPH AT								
+	GMN5B	.077	1	FLOW	30.89	30.02	29.15	28.29
				TIME	12.28	12.28	12.28	12.28
ROUTED TO								
+	5B-VOL	.077	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	3.92	3.83	3.74	3.65
				TIME	25.15	25.15	25.15	25.15
HYDROGRAPH AT								
+	GMN5A	.069	1	FLOW	50.46	49.48	48.49	47.51
				TIME	12.28	12.28	12.28	12.28
ROUTED TO								
+	5A-VOL	.069	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	5.79	5.69	5.58	5.47
				TIME	25.20	25.20	25.18	25.18
HYDROGRAPH AT								
+	GMN6	.012	1	FLOW	15.92	15.64	15.36	15.07
				TIME	12.12	12.12	12.12	12.12
ROUTED TO								
+	6VOL	.012	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	1.14	1.12	1.11	1.09
				TIME	24.47	24.47	24.47	24.47
HYDROGRAPH AT								
+	GMN8	.027	1	FLOW	4.38	4.13	3.89	3.65
				TIME	12.20	12.20	12.20	12.20
ROUTED TO								
+	8-VOL	.027	1	FLOW	.00	.00	.00	.00

				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	.69	.66	.64	.62
				TIME	24.63	24.63	24.62	24.62
HYDROGRAPH AT								
+	GMN9	.152	1	FLOW	55.43	53.93	52.44	50.96
				TIME	12.37	12.37	12.37	12.37
ROUTED TO								
+	9-VOL	.152	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	8.19	8.01	7.82	7.64
				TIME	25.55	25.55	25.55	25.53
HYDROGRAPH AT								
+	10+12	.020	1	FLOW	21.42	21.05	20.69	20.33
				TIME	12.20	12.20	12.20	12.20
ROUTED TO								
+	10+12V	.020	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	2.07	2.03	2.00	1.97
				TIME	24.90	24.92	24.92	24.92
HYDROGRAPH AT								
+	4+7+2	.330	1	FLOW	44.21	42.88	41.55	40.24
				TIME	13.13	13.13	13.13	13.13
ROUTED TO								
+	472VOL	.330	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	15.85	15.47	15.10	14.73
				TIME	28.93	28.93	28.93	28.93
HYDROGRAPH AT								
+	3+1	.372	1	FLOW	59.14	57.36	55.60	53.85
				TIME	12.93	12.93	12.93	12.93
ROUTED TO								
+	3+1VOL	.372	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	17.86	17.44	17.02	16.60
				TIME	28.03	28.02	28.03	28.05
HYDROGRAPH AT								
+	GMN11	.053	1	FLOW	35.37	34.59	33.81	33.03
				TIME	12.23	12.23	12.23	12.23
ROUTED TO								
+	11-VOL	.053	1	FLOW	.00	.00	.00	.00
				TIME	.00	.00	.00	.00
			** PEAK STAGES IN FEET **					
			1	STAGE	3.70	3.63	3.55	3.48
				TIME	24.97	24.97	24.97	24.97

*** NORMAL END OF HEC-1 ***

APPENDIX F

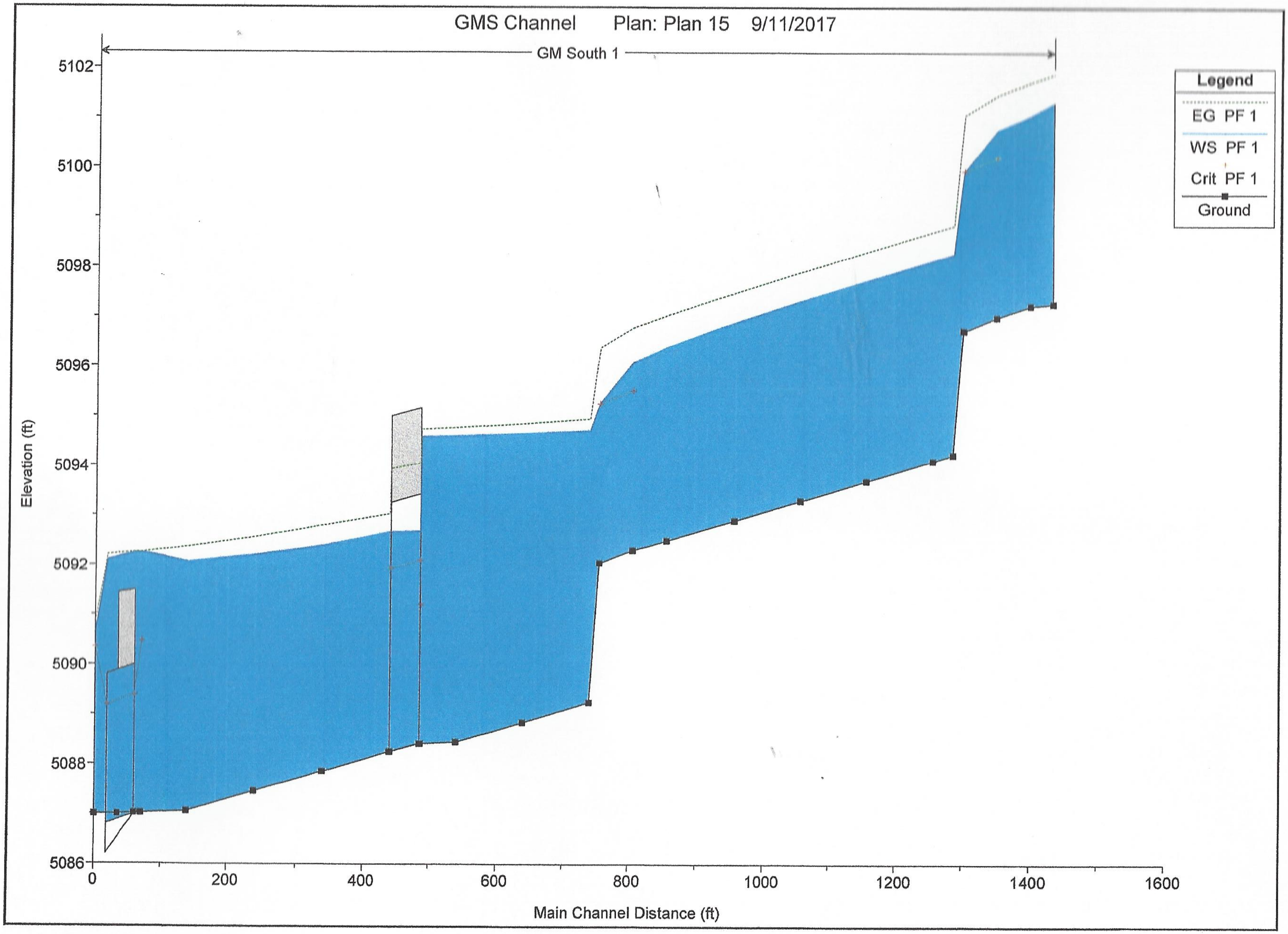
HYDRAULIC ANALYSIS

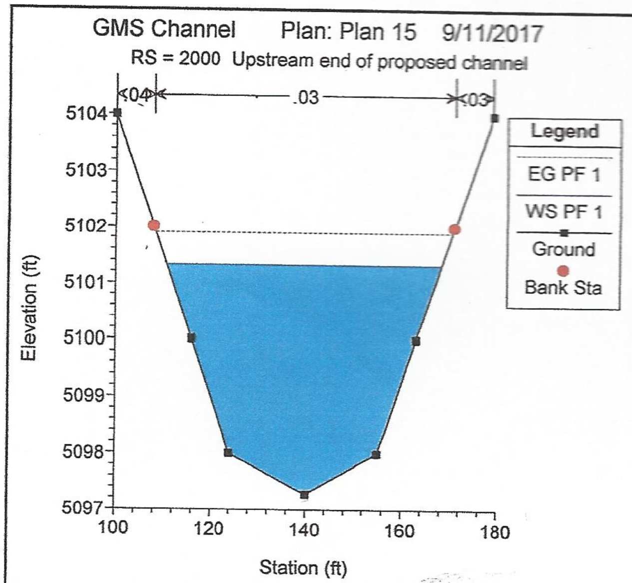
HEC-RAS Plan: Plan 12 River: GM South Reach: 1 Profile: PF 1

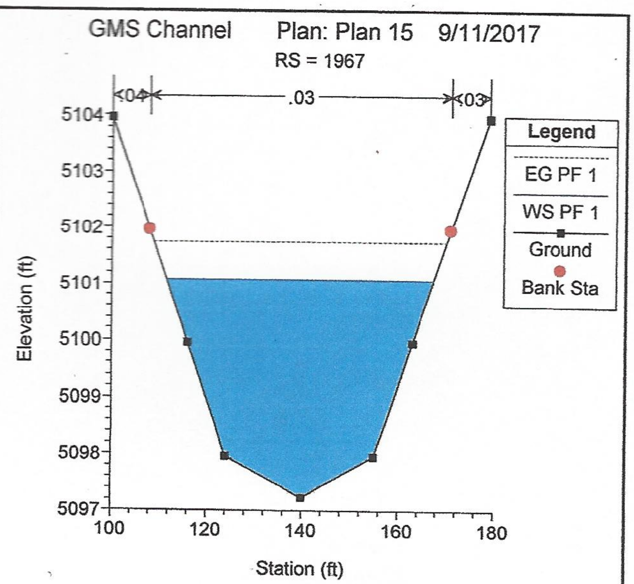
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	2000	PF 1	960.00	5097.27	5101.32		5101.89	0.003972	6.07	158.23	57.55	0.64
1	1967	PF 1	960.00	5097.23	5101.06		5101.73	0.004990	6.58	145.94	55.81	0.72
1	1917	PF 1	960.00	5097.00	5100.76	5100.21	5101.47	0.005390	6.76	142.01	55.25	0.74
1	1867	PF 1	960.00	5096.73	5099.94	5099.94	5101.07	0.010396	8.52	112.72	50.83	1.01
1	1852	PF 1	960.00	5094.23	5098.27		5098.84	0.004012	6.09	157.67	57.47	0.65
1	1822	PF 1	960.00	5094.11	5098.15		5098.72	0.004012	6.09	157.67	57.47	0.65
1	1722	PF 1	960.00	5093.71	5097.74		5098.32	0.004034	6.10	157.36	57.43	0.65
1	1622	PF 1	960.00	5093.31	5097.33		5097.91	0.004090	6.13	156.60	57.32	0.65
1	1522	PF 1	960.00	5092.91	5096.89		5097.49	0.004245	6.21	154.54	57.03	0.67
1	1422	PF 1	960.00	5092.51	5096.40		5097.04	0.004687	6.43	149.21	56.28	0.70
1	1372	PF 1	960.00	5092.31	5096.09	5095.52	5096.79	0.005298	6.72	142.87	55.37	0.74
1	1322	PF 1	960.00	5092.05	5095.26	5095.26	5096.39	0.010416	8.52	112.65	50.82	1.01
1	1307	PF 1	960.00	5089.25	5094.72		5094.95	0.001032	3.90	247.67	68.89	0.35
1	1207	PF 1	960.00	5088.85	5094.65		5094.85	0.000780	3.58	271.50	71.58	0.31
1	1107	PF 1	960.00	5088.45	5094.61		5094.77	0.000593	3.30	297.34	74.41	0.27
1	1052	PF 1	960.00	5088.42	5094.59	5091.21	5094.74	0.000483	3.09	316.70	74.46	0.25
1	1040		Culvert									
1	1007	PF 1	960.00	5088.26	5092.67		5093.04	0.002025	4.85	198.06	60.38	0.47
1	907	PF 1	960.00	5087.86	5092.40		5092.81	0.002482	5.13	187.08	61.41	0.52
1	807	PF 1	960.00	5087.46	5092.21		5092.57	0.002046	4.79	200.24	63.10	0.47
1	707	PF 1	960.00	5087.06	5092.07		5092.38	0.001581	4.44	216.71	65.15	0.42
1	637	PF 1	960.00	5087.02	5092.26	5090.48	5092.27	0.000091	0.85	1757.21	1648.46	0.10
1	620		Culvert									
1	597	PF 1	960.00	5087.00	5090.65	5090.35	5090.86	0.004000	4.07	288.93	330.72	0.59

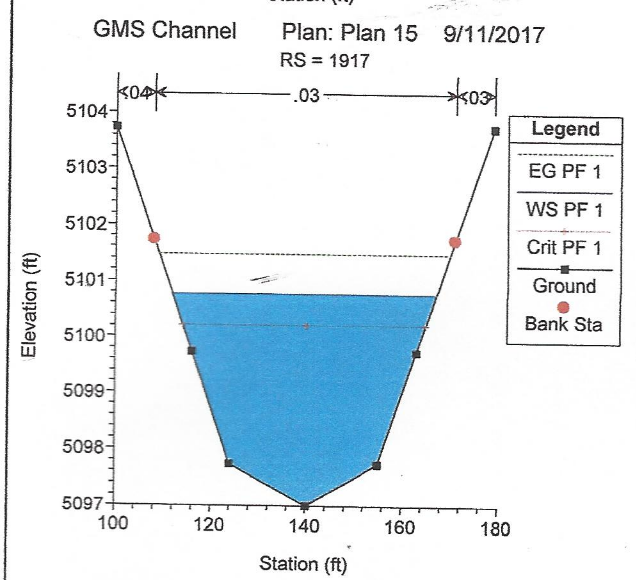
HEC-RAS Plan: Plan 12 River: GM South Reach: 1 Profile: PF 1

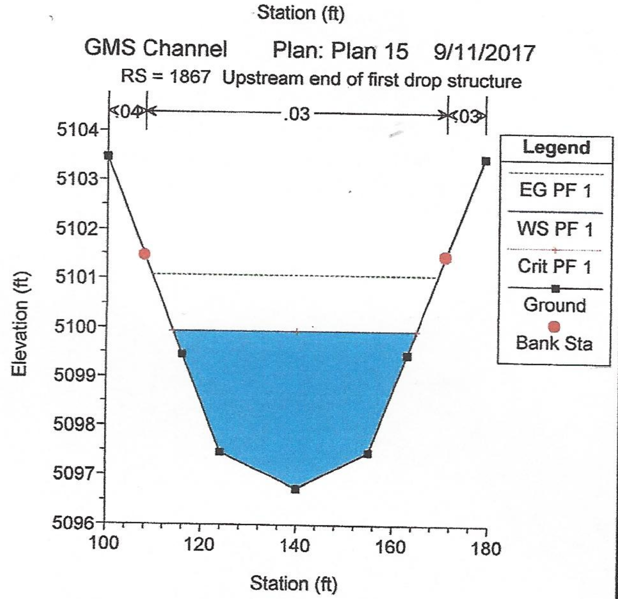
Reach	River Sta	Profile	E.G. US.	W.S. US.	E.G. IC	E.G. OC	Min El Weir Flow	Q Culv Group	Q Weir	Delta WS	Culv Vel US	Culv Vel DS
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(ft)	(ft/s)	(ft/s)
1	1040 Culvert #1	PF 1	5094.74	5094.59	5094.48	5094.74	5095.17	960.00		1.92	9.39	9.06
1	620 Culvert #1	PF 1	5092.27	5092.26	5091.36	5092.27	5091.70	54.41	893.23	1.61	7.70	7.70
1	620 Culvert #2	PF 1	5092.27	5092.26	5089.94	5092.28	5091.70	12.36	893.23	1.61	7.00	7.00

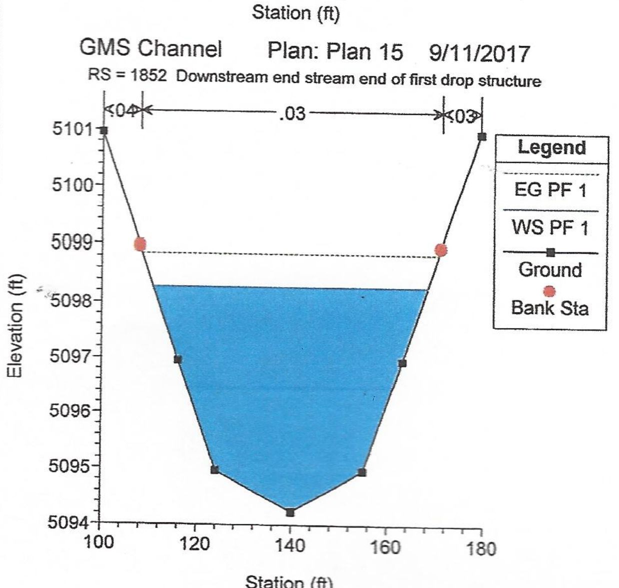

GMS Channel Plan: Plan 15 9/11/2017
GM South 1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Elevation (ft)
5102
5100
5098
5096
5094
5092
5090
5088
5086
0
200
400
600
800
1000
1200
1400
1600
Main Channel Distance (ft)

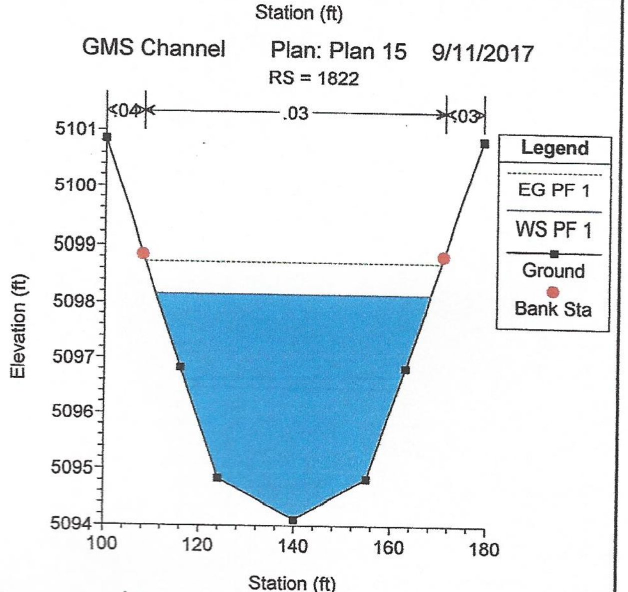

GMS Channel Plan: Plan 15 9/11/2017
RS = 2000 Upstream end of proposed channel
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

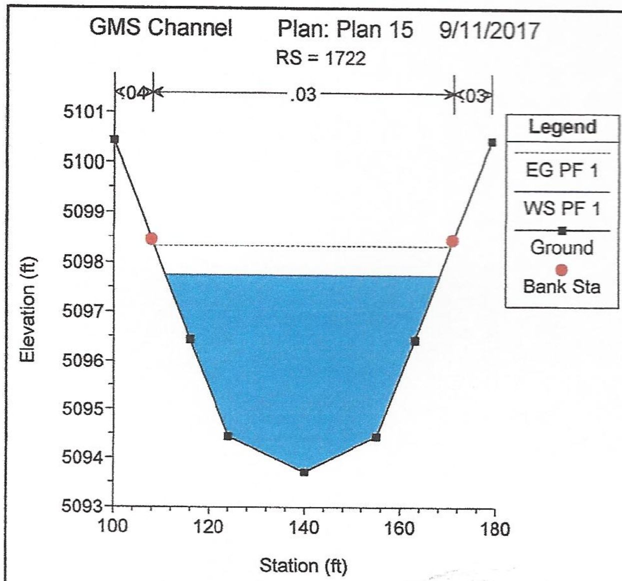

GMS Channel Plan: Plan 15 9/11/2017
RS = 1967
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

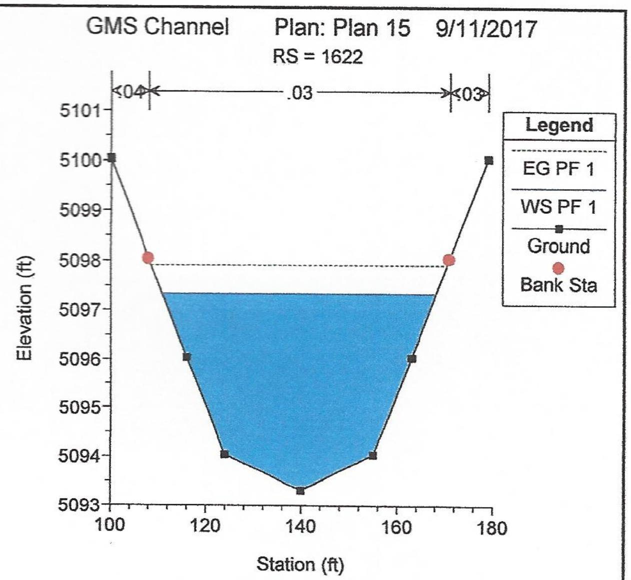

GMS Channel Plan: Plan 15 9/11/2017
RS = 1917
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

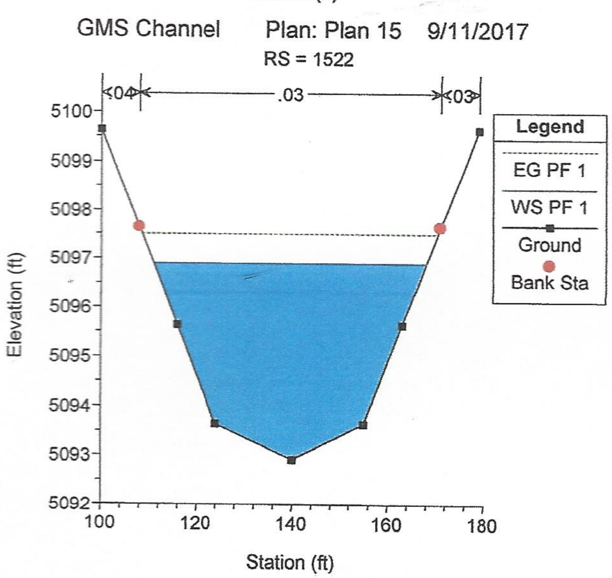

GMS Channel Plan: Plan 15 9/11/2017
RS = 1867 Upstream end of first drop structure
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

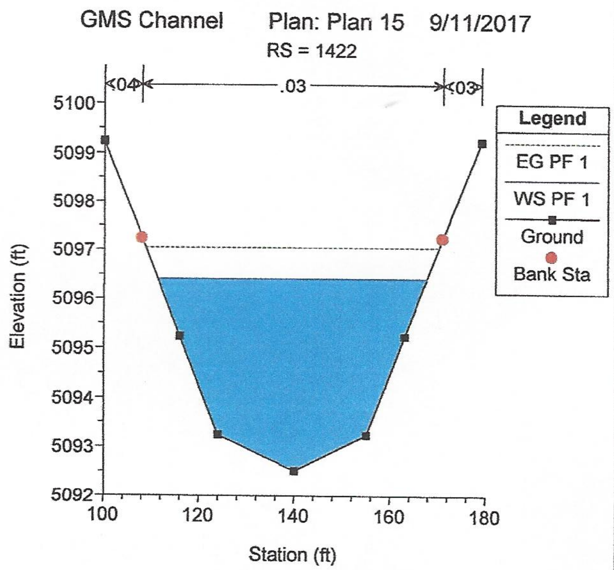

GMS Channel Plan: Plan 15 9/11/2017
RS = 1852 Downstream end stream end of first drop structure
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

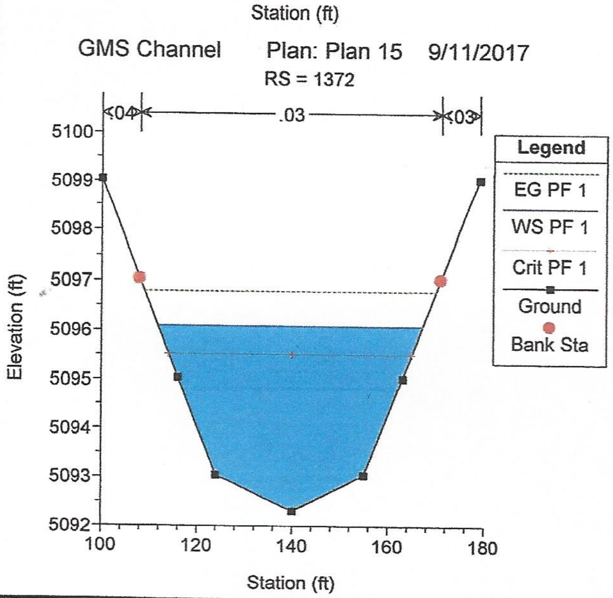

GMS Channel Plan: Plan 15 9/11/2017
RS = 1822
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

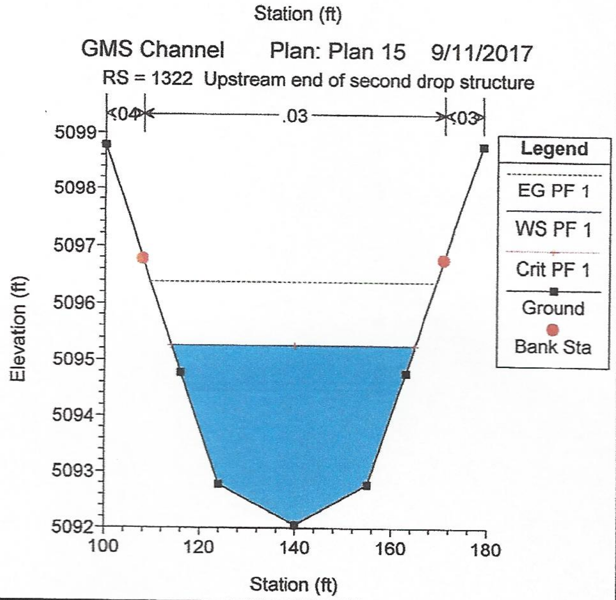

GMS Channel Plan: Plan 15 9/11/2017
RS = 1722
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

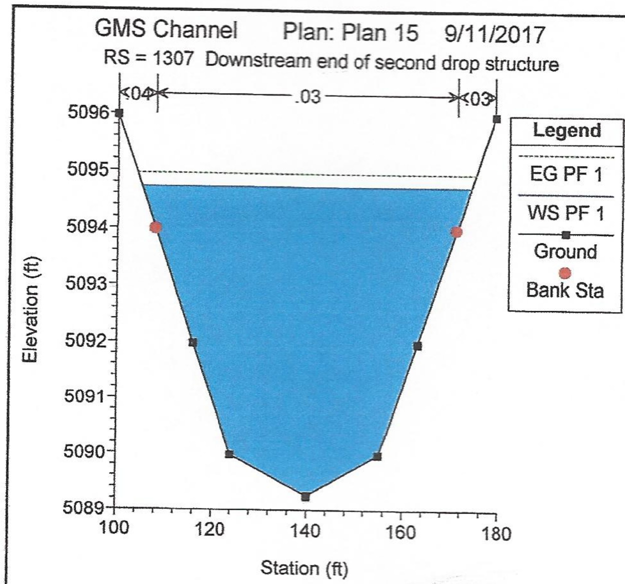

GMS Channel Plan: Plan 15 9/11/2017
RS = 1622
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

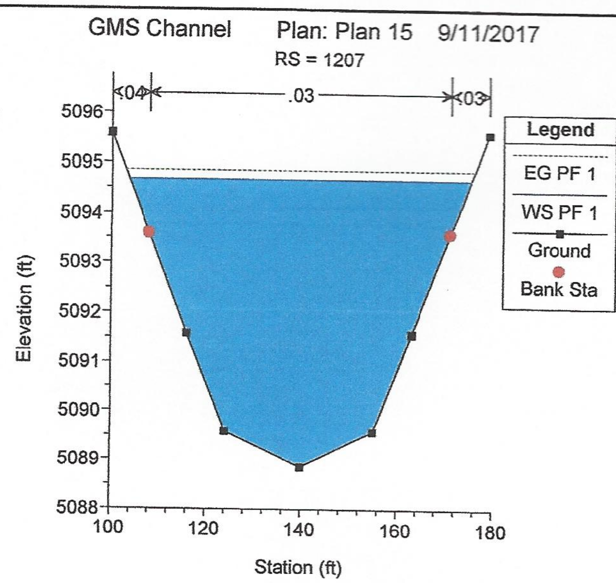

GMS Channel Plan: Plan 15 9/11/2017
RS = 1522
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

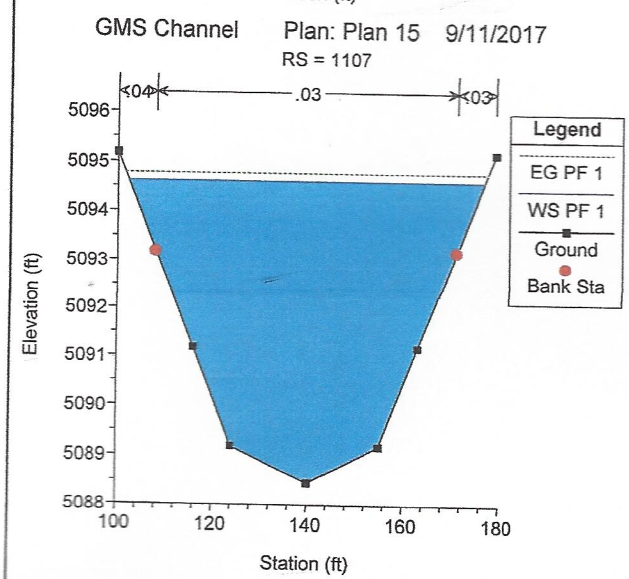

GMS Channel Plan: Plan 15 9/11/2017
RS = 1422
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

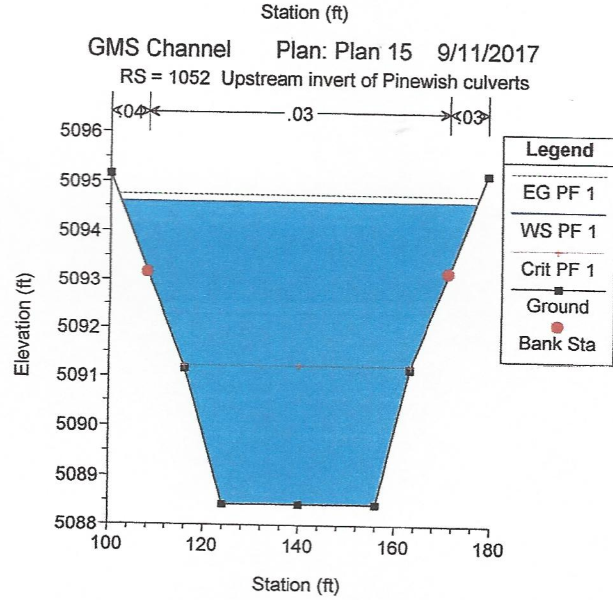

GMS Channel Plan: Plan 15 9/11/2017
RS = 1372
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

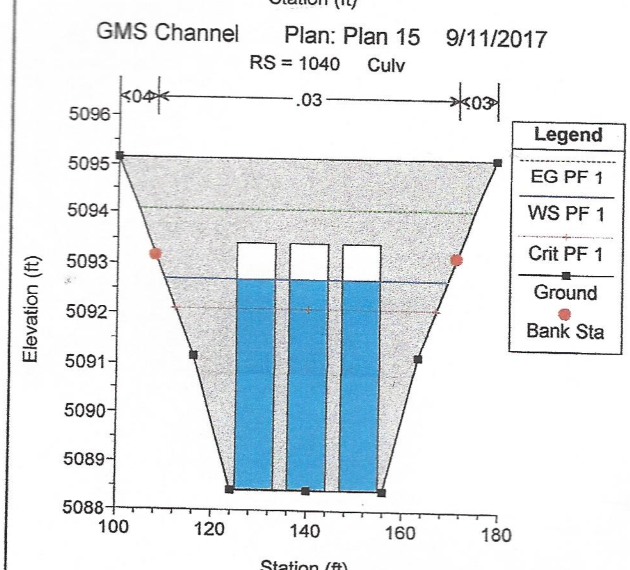

GMS Channel Plan: Plan 15 9/11/2017
RS = 1322 Upstream end of second drop structure
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

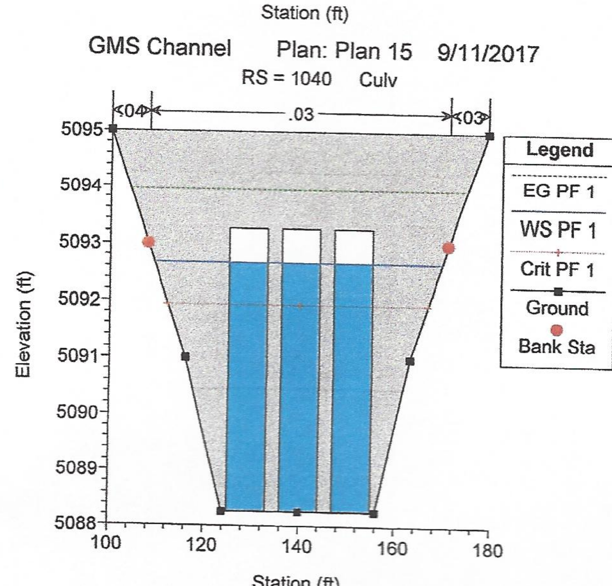

GMS Channel Plan: Plan 15 9/11/2017
RS = 1307 Downstream end of second drop structure
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

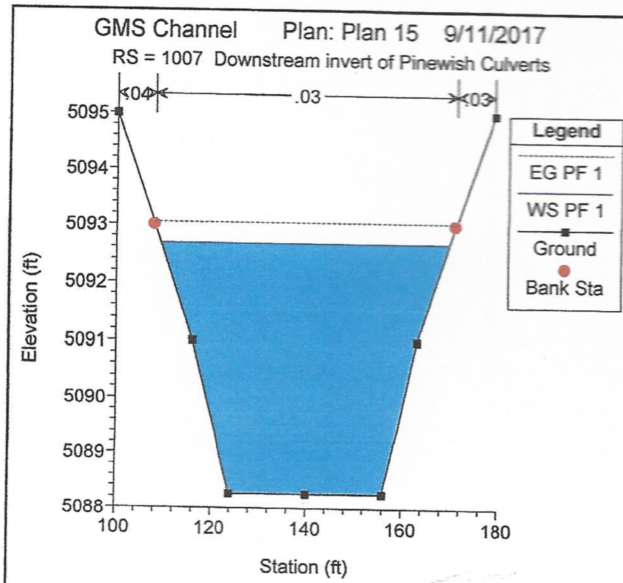

GMS Channel Plan: Plan 15 9/11/2017
RS = 1207
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

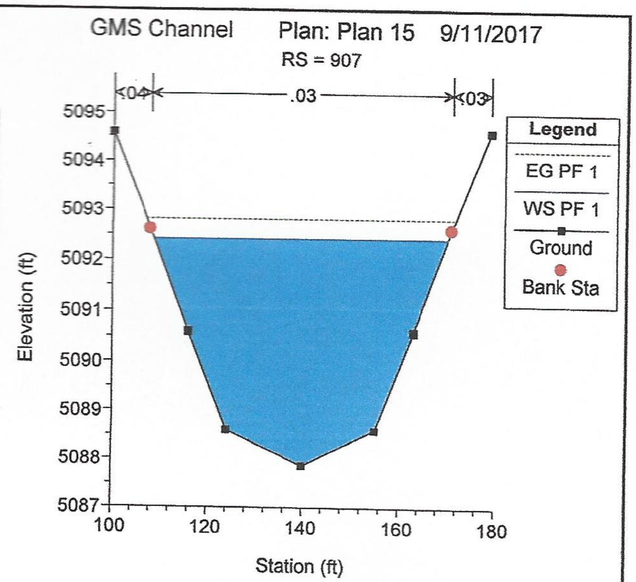

GMS Channel Plan: Plan 15 9/11/2017
RS = 1107
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

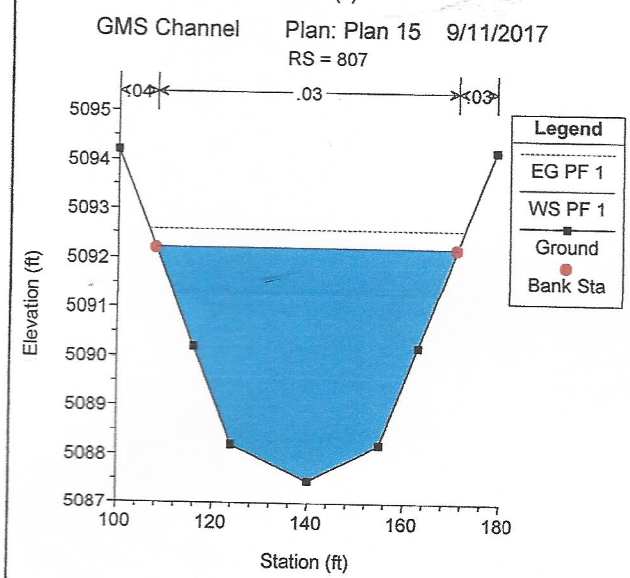

GMS Channel Plan: Plan 15 9/11/2017
RS = 1052 Upstream invert of Pinewish culverts
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

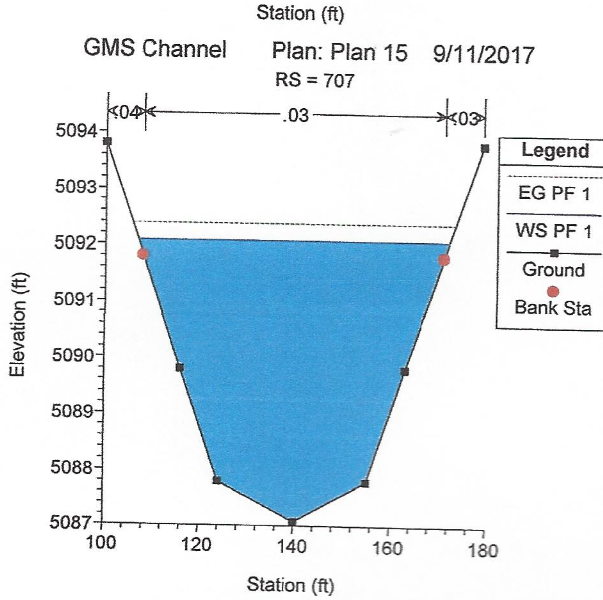

GMS Channel Plan: Plan 15 9/11/2017
RS = 1040 Culv
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

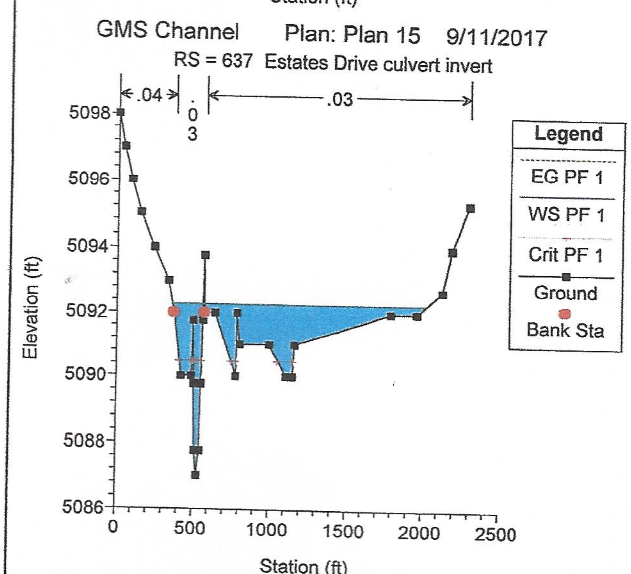

GMS Channel Plan: Plan 15 9/11/2017
RS = 1040 Culv
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

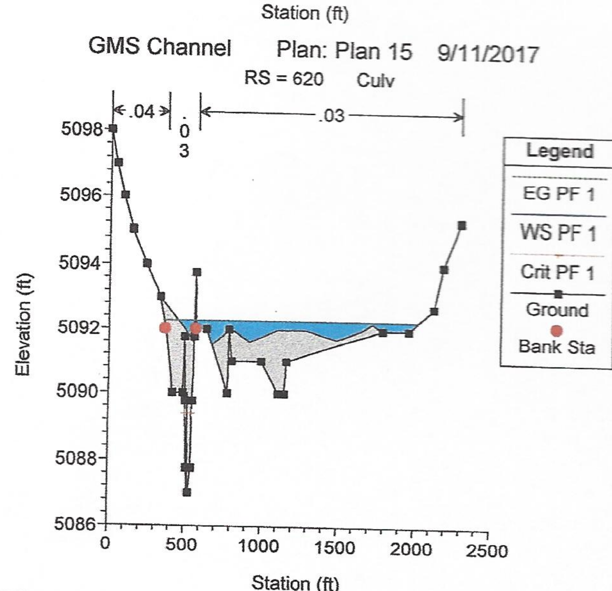

GMS Channel Plan: Plan 15 9/11/2017
RS = 1007 Downstream invert of Pinewish Culverts
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

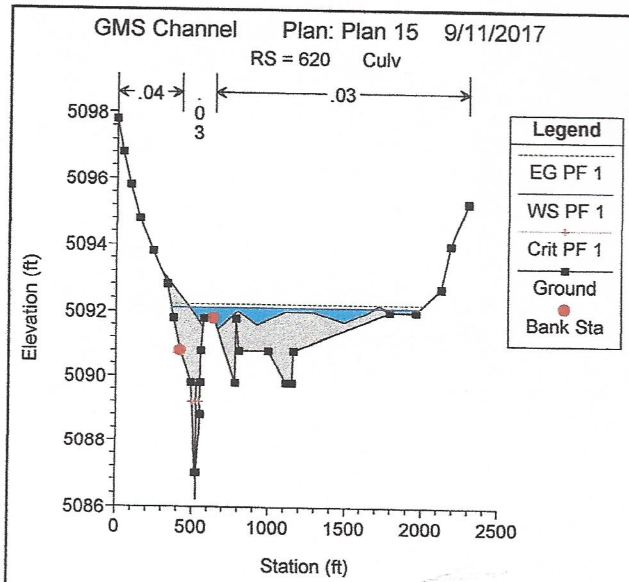

GMS Channel Plan: Plan 15 9/11/2017
RS = 907
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


GMS Channel Plan: Plan 15 9/11/2017
RS = 807
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

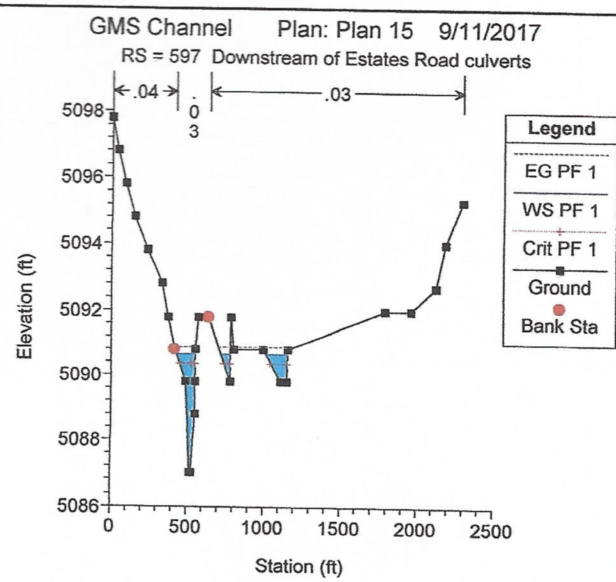

GMS Channel Plan: Plan 15 9/11/2017
RS = 707
.04
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


GMS Channel Plan: Plan 15 9/11/2017
RS = 637 Estates Drive culvert invert
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


GMS Channel Plan: Plan 15 9/11/2017
RS = 620 Culv
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)



GMS Channel Plan: Plan 15 9/11/2017
RS = 620 Culv
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5086
5088
5090
5092
5094
5096
5098
0
500
1000
1500
2000
2500



GMS Channel Plan: Plan 15 9/11/2017
RS = 597 Downstream of Estates Road culverts
.04
.03
.03
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
5086
5088
5090
5092
5094
5096
5098
0
500
1000
1500
2000
2500

PRELIMINARY SEWER REPORT

Axion
ENGINEERING
Civil Engineering • Land Development

Golden Mesa North
PRELIMINARY SEWERAGE REPORT
(COVERS GOLDEN MESA SOUTH)

INTRODUCTION

Golden Mesa North is a proposed 116-unit single family residential subdivision located in Golden Valley on two parcels. APN 552-050-01 is approximately 99.5 acres and is located east of Estates Drive approximately 2800 feet north of E. Golden Valley Road. APN 552-092-19 is located east of Estates Road, West of Rain Dance Way, South of Indian Lane approximately 1190 feet north of E. Golden Valley Road. (Reference Figure 1 Vicinity Map). The proposed development is surrounded by undeveloped land to the North, single family homes to the east and west and undeveloped land to the south. This report will summarize proposed sewage flows and improvements.

The site slopes down from the north to the south toward Golden Valley Road. Currently no existing sewer facilities are immediately available adjacent to the proposed development with the exception of the existing sewer main within Golden Valley Road.

Proposed peak design flow requirements were determined using 350gpd/unit with a peaking factor of 3.0. Resulting peak flow is therefore 121,800gpd for the 116 proposed residences. In addition to this determined flow the proposed flows based on a previous Tentative Map submitted to Washoe County for Golden Mesa South, the 35 acre parcel located directly south of Golden Mesa North, have been added in resulting in an additional flow of 61,950 gpd. This is based on the unit count of the previously submitted Tentative Map of 59 units (TM05-015). Flow calculations can be found below.

FLOW CALCULATIONS

Average peak flows were determined to be 96,390 gallons per day based on the following Washoe County Department of Water Resources (WCDWR) design requirements:

Average Flow = 350 gallons/day

Peaking Factor = 3.0

Zoning = Single Family Residential

Minimum Velocity = 2.5 feet/second

Peak Flow Calculation:

Q_P = (avg flow) (peaking factor) (# of dwelling units)

$$Q_P = (350)(3.0)(175) = 183{,}750 \text{ gpd}$$

It is anticipated that the minimum pipe slope on the proposed sewer mains will be 0.5% which yields a half full velocity of 2.65 fps meeting the County minimum half full velocity of 2.5 fps.

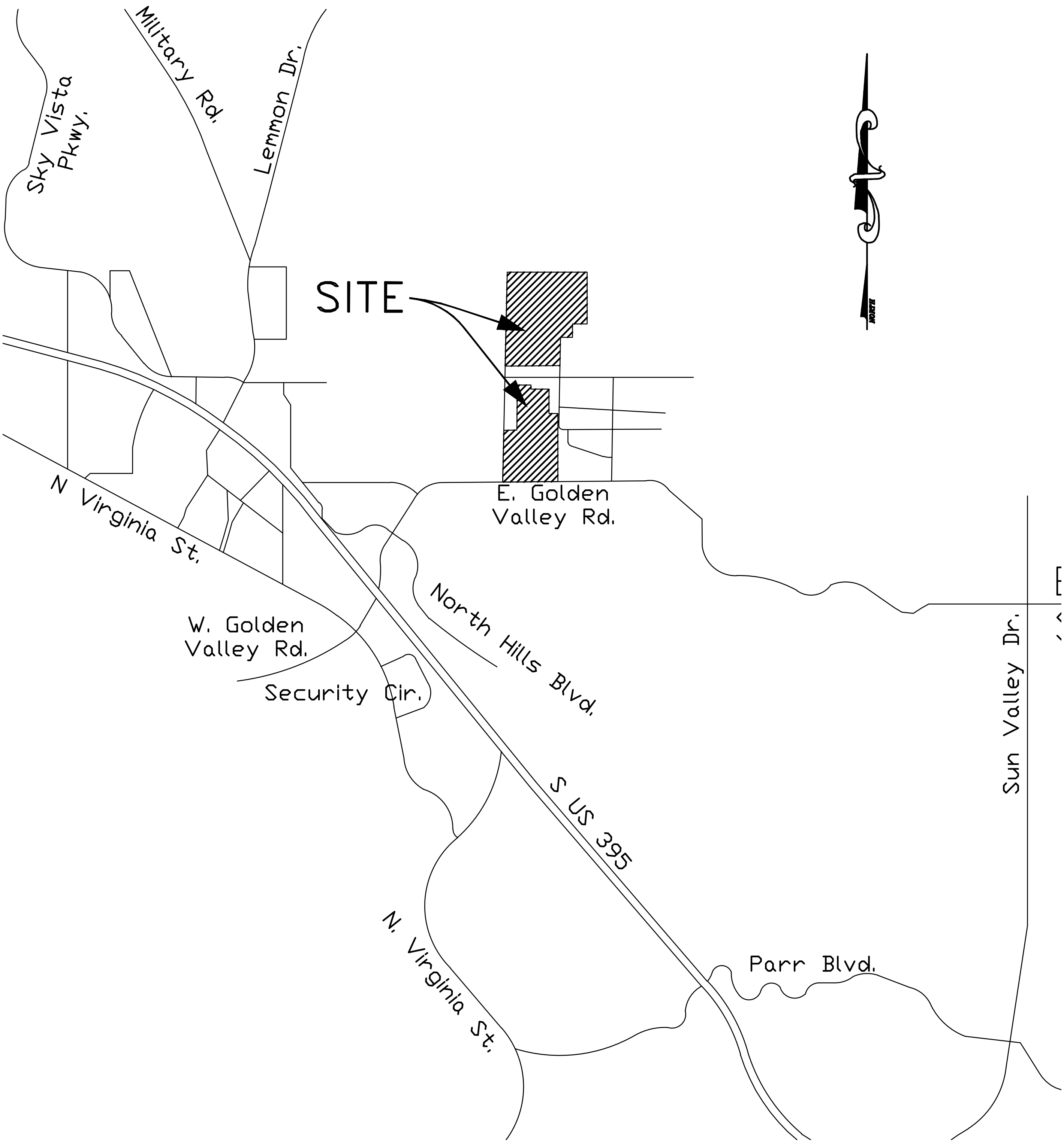
A sanitary sewage lift station will be required to get sewage into the existing sewer main in Golden Valley Road. The lift station will be located with the previously mentioned 35-acre parcel. (See Figure 2 – Sewer Map). Sewage flows, once leaving the lift station, will flow in the existing 12” sewer main in Golden Valley Road, westerly to the existing Golden Valley lift station owned and operated by the City of Reno. Attached to this report is the sewer summaries prepared by Summit Engineering as well as the preliminary design report provided to Washoe County DWR for the design of the previous lift station planned to be built with the prior Golden Mesa North Development.

GOLDEN MESA NORTH

SUBDIVISION

RENO NEVADA

SEPTEMBER 2016



VICINITY MAP

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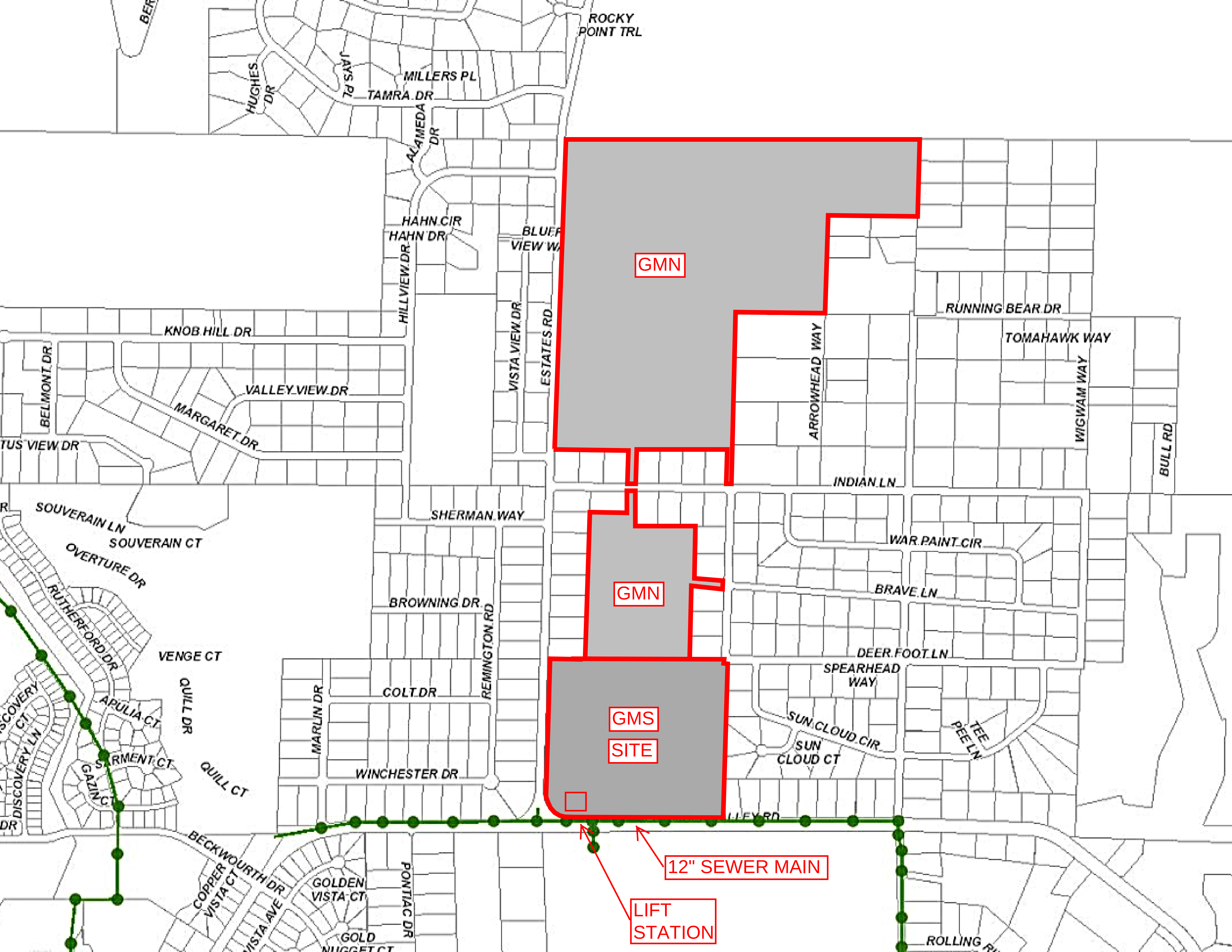
681 EDISON WAY – RENO, NEVADA 89502
PH 775-771-5554 / FX 775-856-3951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BELMONT DR
VALLEY VIEW DR
MARGARET DR
VISTA VIEW DR
ESTATES RD
RUNNING BEAR DR
TOMAHAWK WAY
ARROWHEAD WAY
WIGWAM WAY
BULL RD
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SHERMAN WAY
SOUVERAIN LN
SOUVERAIN CT
OVERTURE DR
RUTHERFORD DR
WAR PAINT CIR
BRAVE LN
BROWNING DR
REMINGTON RD
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MARLIN DR
APULIA CT
SARMENT CT
GAZIN CT
QUILL CT
WINCHESTER DR
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PEE LN
BECKWOURTH DR
COPPER
VISTA CT
VISTA AVE
GOLDEN
VISTA CT
GOLD
NUGGET CT
PONTIAC DR
ROLLING
DISCOVERY LN
TUS VIEW DR

SEWER SUMMARY FOR GOLDEN MESA NORTH

Golden Mesa North will consist of 94 single family homes. The sewer system will consist of 4 inch laterals connecting to 8 inch mains within the streets and sewer easements. Peak flows are calculated using 280 gpd/unit and a peaking factor of 3, resulting in 280 x 94 x 3 = 78,960 gpd or 0.12 cfs.

All flows are carried to a proposed lift station at the corner of Golden Valley Road and Estates Road. Minimum slope on the proposed sewer is 0.5%. The lift station pumps flows to an existing manhole at the intersection of Golden Valley Road and Estates Road. From this manhole an existing 12 inch sewer main carries the flows westerly along Golden Valley Road to the existing Golden Valley lift station owned by the City of Reno.

Capacity calculations were performed on the proposed and existing sewer system. Results show the system has capacity for the 94 units proposed with Golden Mesa North, the 59 units approved in Golden Mesa South, and other nearby units currently utilizing septic systems that may wish to tie to the system in the future.

PROFESSIONAL ENGINEER - STATE OF NEVADA
CLINTON G. THIESSE
Exp. 6-30-08
CIVIL
No. 6159

11/1/06

SEWER SUMMARY

Golden Mesa South will consist of 59 single family homes. The sewer system will consist of 4" laterals connecting to 8" mains within the streets and sewer easements. Peak flows are calculated using 350 gpd/unit and a peaking factor of 3, resulting in 350 x 59 x 3 = 61,950 gpd or 0.10 cfs.

All flows are carried to a proposed lift station at the southwest corner of the development. Minimum slope on the proposed sewer is 0.4%. The lift station pumps flows to an existing manhole at the intersection of Golden Valley Road and Estates Road. From this manhole an existing 12" sewer main carries the flows westerly along Golden Valley Road to the existing Golden Valley lift station owned by the City of Reno.

Capacity calculations were performed on the proposed and existing sewer system. Results show the system has capacity for the 59 units proposed with Golden Mesa South, the 96 units approved in Golden Mesa North, and other nearby units currently utilizing septic systems that may wish to tie to the system in the future.

GOLDEN MESA – SEWER LIFT STATION

RE: Design Report

Date: July 27, 2006

To: Susan Hood, Washoe County Utilities
Ken Hendrix, R&K Homes
Clint Thiesse, P.E. Summit Engineering

From: Gary K. Guzelis, P.E.

This Design Report is being submitted for your review, comment and approval. This Design Report relates to the engineering for the sewer lift station for the Golden Mesa Development.

Design requirements:

1. *Peak hour flow rate of 162,750 gallons per day (113 gpm) was used for sizing the pumps and wet well. The peak flow was determined by using 350 gallons per day contribution from each dwelling unit per capita and 3 capita per dwelling unit. City of Reno*

2. *Based on the above peak flow rate, two 2.7 HP Gorman-Rupp pumps have been selected. The pumps were selected to operate at approximately 180 gpm @ 21' of head. One pump alone will be capable of pumping the peak flow rate with the second pump being on standby. The particular pumps selected come with impellors at full trim and are not upgradeable. The selected pumps will be capable of delivering capacity for 91 additional homes. Future upgrades beyond the additional 91 homes would require pump replacement which is estimated at $2500.00 per pump in today's dollars.*

3. *The wet well will consist of a 60" diameter manhole modified to accept the duplex pumps, level sensors and piping. The depth of the wet well will be approximately 24'. The interior of the wet well will be epoxy coated to help protect against deterioration of the concrete. Transducers will be used for level sensing with a redundant high water alarm float for emergency.*

4. *Emergency storage is required by the County and was sized to contain 2 hours of peak design flow estimated at a volume of 13,500 gallons. Emergency storage will be accomplished using 15,000 gallon precast*

concrete storage tank. Surface storage is not recommended due to the limited space and close proximity to the adjoining residences.

5. *The force main will be 4"HDPE, inside diameter of 3.95" and a dimension ratio of 17. The force main is approximately 218' in length.*

6. *Back-up power will be required for the lift station and will be provided by a stand-by generator preliminarily sized at 50 KW. A 100 amp panel and 3 phase power will be required.*

7. *The site will need to be completely fenced to prevent unauthorized access to the lift station.*

8. *Pump cycle time @ peak flow with a 1.5' on to off level will be 7.2 minutes. (Reference attached supporting data).*

GEOTECHNICAL INVESTIGATION

Axion ENGINEERING
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Geotechnical Investigation
Moonlight Hills Estates
Washoe County, Nevada

Mr. Nevis
MOONLIGHT HILLS ESTATES, LLC
5390 Bellazza Court
Reno, Nevada 89519

Project No.: 3228.004
July 21, 2015

Blake D. Carter, PE
PE Number – 22331

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
5440 Reno Corporate Drive Tel: 775.823.4068
Reno, NV 89511 Fax: 775.823.4066

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EXECUTIVE SUMMARY

Presented herein are the results of Wood Rodgers' geotechnical exploration, laboratory testing, and associated geotechnical design recommendations for a proposed single-family residential development to be located in Washoe County, Nevada. The development will include two phases; the north and south parcels will be referred to as Phase 1 and Phase 2, respectively. The proposed home sites are anticipated to be half to one acre lots with wood-framed, raised foundation or slab-on-grade homes. Public improvements will include paved roads, underground utilities, and drainage features.

Phase 1 soils generally consist of a silty sand surface layer capping moderately cemented clayey sand of moderate plasticity. Shallow bedrock was encountered in the northwest quadrant and was relatively excavatable to the depths indicated on the test pit logs (Approximately four to ten feet). These soils should provide adequate structural support both in-situ and if placed as structural fill; and therefore, standard spread foundations have been recommended. No geologic hazards have been mapped or identified within immediate proximity to the project. Groundwater was not encountered in any of our explorations and is anticipated to lie at a depth that would not influence construction activities or foundation support.

Phase 2 soils mostly resemble the various blends of silty sands and moderately cemented clayey sands from Phase 1; however, near surface clayey sands encountered to a depth of approximately two feet exhibit high plasticity and meet standard definitions for expansive soil. Therefore, a selective grading program which includes removal of these clayey surface soils from structural zones and/or stabilization by means of moisture conditioning and compaction have been recommended to allow the use standard spread foundations. In addition, Phase 2 contains a mound of undocumented fill just south of the center of the parcel. The fill materials were encountered in test pit number 7 (TP-7) to a depth of about six feet, and included sand, gravel, concrete and asphalt debris. This existing fill material will have to be removed and reworked prior to constructing overlying improvements.

Structural pavement sections have been developed for both off-site and on-site improvements. The Washoe County minimum structural pavement sections have been presented based on the granular nature of native subgrade soils. However, traffic volumes may be higher than the minimum section would allow and the presented sections should be evaluated once anticipated traffic volumes have been quantified.

This report has been prepared in consideration of the applicable provisions set forth in the International Residential Code (2012 IRC) and the amendments and modifications adopted by Washoe County. Public improvements are to be construction to County standards, and per the requirements of the 2012 Standard Specifications for Public Works Construction (2012 SSPWC, Orange Book).

1.0 INTRODUCTION

Presented herein are the results of Wood Rodgers' geotechnical exploration, laboratory testing, and associated geotechnical design recommendations for the proposed Moonlight Hills Estates development to be located in Washoe County, Nevada. The assessments and recommendations presented in this geotechnical report have been framed, in part, around the surface and subsurface conditions identified by our exploration program which was developed to be consistent with locally accepted industry practices regarding exploratory methods and geotechnical investigations for similar type projects. The proposed structures, topography, grading design, soils, and bedrock are all unique and therefore the engineering judgment employed by those in responsible charge of geotechnical design considerations, as defined by the State of Nevada, is considered the established and accepted standard of care for evaluation and analyses associated with this report.

This report has been prepared in accordance with the applicable provisions set forth in the International Residential Code (IRC, 2012) and the amendments and modifications adopted by Washoe County. These documents establish the minimum level of structural integrity, life safety, fire safety and livability for inhabitants of dwelling units while considering affordability. Geotechnical considerations for public improvements have been formulated around the requirements of Washoe County's Public Works Design Guidelines and the Standard Specifications for Public Works Construction. Performance standards around which our primary recommendations have been framed are based solely upon the requirements of the referenced documents; supplementary recommendations have been formulated to allow the builder the opportunity to weigh the benefit of higher performance standards against costs to achieve. Any expectations of performance inconsistent with, outside the purview of, or exceeding the requirements of the referenced documents are subjective, a function of materials, design, workmanship, and ownership and unless specifically stipulated or quantified herein are considered in excess to the scope and design standards of this report.

The objectives of this study were to:

1. Explore, test, and assess general soil, bedrock, and ground water conditions pertaining to preliminary design and construction considerations for the residential units associated with the planned development.
2. Provide recommendations associated with the design and construction of the project, as related to the identified geotechnical conditions, the stipulated design levels, and performance standards established herein.

The area covered by this report is shown in Figure 1 and on Plate A-1 (Site Plan & Approximate Test Pit Locations) in Appendix A. Our study included field exploration, laboratory testing, and engineering analyses to identify the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report; and in consideration of the stated design levels and performance standards form the basis for all conclusions and recommendations.

2.0 PROJECT DESCRIPTION

The overall site is located in area known as Golden Valley, Washoe County, Nevada. The overall property encompasses an area of approximately 135 +/- acres, entirely contained in Section 11, Township 20N, Range 19E, M.D.M. As shown in Figure 1, the development is divided into two phases; Phase 1 to the north includes 100 acres and Phase 2 to the south including 35 acres. The overall site is bound by Estates Road to the west, East Golden Valley Road to the south, several residential properties to the east, and Bureau of Land Management land to the north. Many dirt trails exist across both phases and were used for site access.

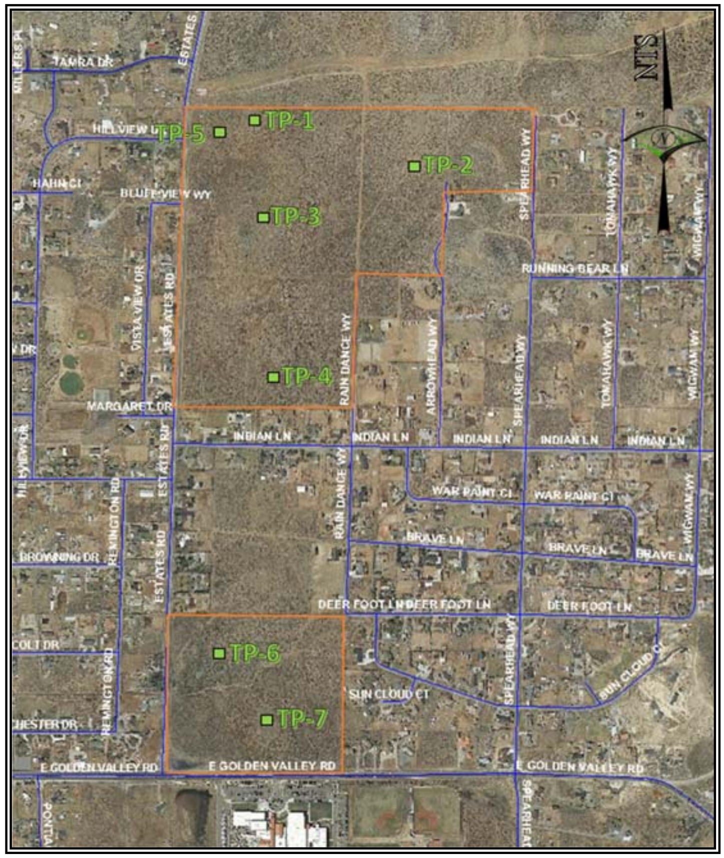

Figure 1 – Site Plan & Approximate Test Locations

It is our understanding that the proposed improvements consist of constructing half to one-acre home sites incorporating typical wood-framed, raised foundation or slab-on-grade homes, paved roads, underground utilities, and drainage features. Foundation loads have not been provided, but for the development of this report, are anticipated to be light to moderate (50 kips for column loads, 1 to 2 kips/foot for wall loads have been assumed).

The planning and engineering is currently in the conceptual phase; however, the development will be phased for a balance of cut and fills with little or no required import. Maximum cuts and fills are anticipated to be on the order of 10 feet. Depending on final grading, structures may be founded entirely in cut, entirely in fill, or in a cut/fill combination.

3.0 SITE CONDITIONS

3.1 Phase 1

Phase 1 consists of undeveloped land located along the southern foothills of the Hungry Mountain Range. Existing ground elevations across Phase 1 vary from approximately 5,105 feet in the southwest portion of the site to approximately 5,245 in the northeastern portion of the property, for a total relief of approximately 140 feet. The site exhibits an overall slope of approximately 3.5 percent to the south-southwest. A rock outcrop knob is present in the northwest quadrant. Drainage is accomplished by sheet flow to the southwest and a roadside ditch along Estates Drive. Vegetation consists of abundant sagebrush in excess of 3 feet in height and native grasses. Utilities were not encountered on-site, however an existing utility easement is present to the north of the property along Tamara Drive. This easement includes an underground gas main and overhead transmission lines. Several dirt trails traverse the site and were used by Wood Rodgers for site access.

3.2 Phase 2

Phase 2 is also composed of undeveloped land; however, the site offers a relatively flatter topography than Phase 1, is crossed by two small ephemeral creeks and presents a stockpile of undocumented fill soils in the south-central portion of the property. The northern creek was dry during our investigation, but appears to originate near the northeast quadrant of the property and flows toward the culvert near the midpoint of the western property boundary at Estates Drive. The other creek is a natural drainage fed from a storm drain culvert discharging onto the property about 420 feet east of Estates Drive. The two creeks meet near the inlet to the culvert crossing Estates Drive. The undocumented fill stockpile appears as a mound near the center of the property; however construction debris was encountered to a depth of six feet. Vegetation consists of sagebrush and native grasses. Underground utilities were not encountered.

4.0 FIELD EXPLORATION

The property was explored in May 2015 by excavating a series of seven test pits using a Deere 310SJ rubber-tire backhoe. The approximate locations of the test pits are shown on Plate A-1 – Site Plan and Approximate Exploration Locations. The maximum depth of test pit advance extended to 10 feet below the existing ground surface. Two percoloation tests were prepared in accordance with Washoe County Health Department standards within the northwest quadrant of Phase 1. Due to the soil-bedrock profile encountered within TP-1 and TP-5, the initial soak period did not percolate more than one inch in the first 30 mintues, therefore the test was discontinued.

Wood Rodgers' personnel examined and classified all soils in the field in general accordance with ASTM D 2488 (Description and Identification of Soils). Bulk samples for index testing were collected from the test pit trench walls at specific depths in various soil horizons, were placed in sealed plastic bags, and were returned to our Reno, Nevada laboratory for testing. Additional soil classifications, as well as verification of the field classifications, were subsequently performed in accordance with ASTM 2487 (Unified Soil Classification System [USCS]) upon completion of laboratory testing as described below in the Laboratory Testing section. Logs of the test pits are presented as Plate A-2a through Plate A-2f. A USCS chart has been included as Plate A-3 - Unified Soils Classification and Key to Soil Descriptions.

5.0 LABORATORY TESTING

All soil testing performed in the Wood Rodgers' laboratory is conducted in accordance with the standards and methods described in Volume 4.08 (Soil and Rock; Dimension Stone; Geosynthetics) of the ASTM Standards. Samples of significant soil types were analyzed to determine their in-situ moisture contents (ASTM D 2216), grain size distributions (ASTM D 6913), plasticity indices (ASTM D 4318), and R-value (ASTM D 2844). Results of laboratory testing are shown on Plate A-4a thru c – Summaries of Test Data. The test results were used to classify the soils according the USCS (ASTM D 2487) and to verify the field logs, which were then updated as appropriate. Classification in this manner provides an indication of the soil's mechanical behavior and can be correlated with published charts to evaluate bearing capacity, lateral earth pressures, and settlement potential.

Table 1 - Summary of Test Data

Test Hole	Depth (Ft.)	Moisture (%)	%Gravel (+ #4)*	% Sand (#4-#200)	%Fines (-#200)	Liquid Limit	Plasticity Index	USCS[1]
ASTM Standard		D2216	D6913			D4318		D2487
TP-1	0 - 1	6.8	2	79	18.5	NP	NP	SM
[2]TP-1	4 - 9	5.1	3	68	28.3	24	11	SC
[2]TP-3	2 - 8	2.5	42	45	12.8	24	10	SC
[2]TP-6	0.5 - 2	12.0	0	62	38.3	43	32	SC
TP-7	0 - 6	5.6	16	64	19.9	NP	NP	SM

[1] Since ASTM D2487 is limited by a maximum particle size of 3", the gradation test data presented is based on a maximum particle size of 3".
[2] Composite sample of subgrade material resulted in R-value of 44.

6.0 GEOLOGIC AND GENERAL SOIL AND GROUNDWATER CONDITIONS

Based on the Geologic Map of the Reno Area published by the Nevada Bureau of Mines and Geology (Figure 2), the site is mapped in an area of granitic alluvium (Qg) mainly consisting of weathered granitic sand and Granodiorite (Mzgd) which exhibits rock outcrops. The Golden Valley Pit is about 2,000 feet to the east of the northern project boundary; this Pit offers a commercial source for bedding sand and structural fill materials. The soil units encountered in our explorations are reasonably consistent with the mapped geologic deposits, and typically consisted of loose to medium dense sands locally capping a layer of moderately cemented clayey sands and weathered bedrock to the depth explored.

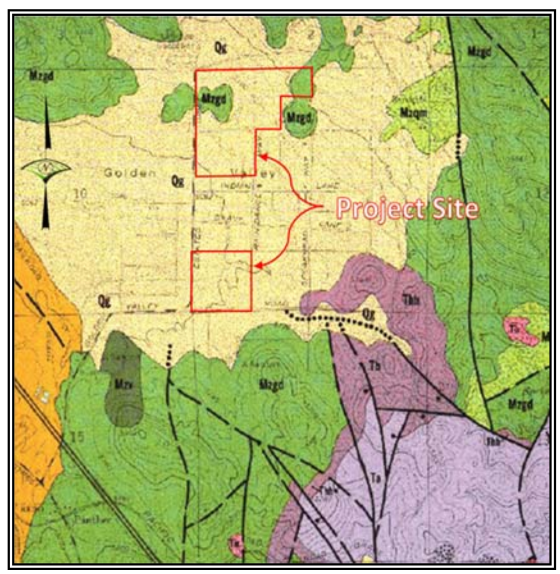

Figure 2 – Geologic Map of the Reno Area (NBMG, 1973)

Groundwater was not encountered in any of our explorations. Based on Nevada Division of Water Resources well data from 319 documented wells in the same Section, Township, and Range, an average groundwater depth near 90 feet was calculated.

7.0 DISCUSSION AND RECOMMENDATIONS

7.1 General Information

The following definitions characterize terms utilized in this report:

- Fine-grained soil possesses more than 40 percent by weight passing the number 200 sieve and exhibits a plasticity index lower than 15.
- Clay soil possesses more than 40 percent passing the number 200 sieve and exhibits a plasticity index greater than 15.
- Granular soil does not meeting the above criteria and has a maximum particle size less than 6-inches.

The recommendations provided herein, particularly under Site Preparation, Grading and Filling, Foundation Design, Site Drainage and Quality Control are intended to reduce risks of structural distress related to consolidation or expansion of native soils and/or structural fills. These recommendations, along with proper design and construction of the planned structure(s) and associated improvements, work together as a system to improve overall performance. If any aspect of this system is ignored or poorly implemented, the performance of the project will suffer. Any evaluation of the site for the presence of surface or subsurface hazardous substances is beyond the scope of this study. When suspected hazardous substances are encountered during routine geotechnical investigations, they are noted in the exploration logs and reported to the client. No such substances were identified during our exploration.

The exploratory test holes were advanced at the approximate locations shown on the exploration map. All excavations were backfilled upon completion of the field portion of our study. The backfill was compacted to the extent possible with the equipment on hand. However, the backfill was not compacted to the requirements presented herein under Grading and Filling. If structures, concrete flatwork, pavement, utilities or other improvements are to be located in the vicinity of any of the exploratory excavations, the backfill should be removed and re-compacted in accordance with the requirements contained in the soils report. Failure to properly compact backfill could result in excessive settlement of improvements located over test pits.

Structural areas referred to in this report include all areas of buildings, concrete slabs, asphalt pavements, as well as pads for any minor structures. All compaction requirements presented in this report are relative to ASTM D 1557[1].

[1] • Relative compaction refers to the ratio (percentage of the in-place density of a soil divided by the same soil's maximum dry density) as determined by the ASTM D 1557 laboratory test procedure. Optimum moisture content is the corresponding moisture content of the same soil at its maximum dry density.

7.2 Seismic Design Category

Per the 2012 International Residential Code amendments adopted by Washoe County, the residential buildings located on-site shall be assigned a seismic design category D_2.

7.3 Site Preparation

All vegetation should be stripped and grubbed from structural areas. A stripping depth of 0.3 to 0.5 feet is anticipated. Localized deeper areas may be required in areas of large brush. Some vegetation could be placed in non-structural fill areas at least 5 feet away from any structure footprint. Concentration of the vegetation must be avoided and the vegetation must be blended with a sufficient amount of soil since placing large concentrated layers of vegetation could lead to excessive settlement and subsequent surface depressions.

Surficial clayey soils present within the upper two to three feet of Phase 2 will exhibit considerable shrink-swell with changes in moisture content. Such soils are common, but sporadically distributed and must be identified during grading. Failure to recognize and properly mitigate expansive clayey soils will result in damage to improvements. Clayey soils should be separated from improvements by structural fill in order to decrease potential shrink-swell movements. The minimum separation is 2.0 feet for footings and floor slabs and 1.5 feet for asphalt pavements and exterior concrete. This separation may include aggregate base section, as applicable. The required separation may be achieved by any combination of site filling or over-excavation and replacement. Over-excavation may cease if clayey soils are penetrated and presence of granular soils

Clayey soils to be left in place and covered with fill must be scarified and moisture-conditioned to 2 to 4 percent over optimum for a minimum depth of 12-inches. This requirement is in lieu of additional over-excavation and is critical to structure performance. This moisture level will significantly decrease the magnitude of shrink-swell movements in the upper foot of clayey soils. The high moisture content must be maintained by periodic surface wetting, or other methods, until the surface is covered by at least one lift of fill.

All areas to receive structural fill or structural loading should be densified for a minimum depth of 8-inches to at least 90 percent relative compaction in accordance with ASTM D 1557. Prior to densification, soils should be moisture conditioned to plus or minus 3 percent of optimum. Higher moisture contents will be acceptable if the soil horizon is stable and density can be achieved in subsequent structural fill lifts. Scarification and moisture conditioning may be required to achieve the required soil moisture content recommendations.

7.4 Grading and Filling

Structural fill is defined as any material placed below structural elements, including; foundations, concrete slabs-on-grade, pavements, or any structure that derives support from the underlying soil. Granular and fine-grained soil generated on-site and free of vegetation, organic matter, and other deleterious material can be used as structural fill. If imported structural fill is required, it should be reasonably free of vegetation, organic matter, and other deleterious material and meet the requirements of Table 2.

Table 2 - Guideline Specification for Imported Structural Fill

Sieve Size (ASTM D6913)	Percent by Weight Passing
6 Inch	100
4 Inch	90 - 100
¾ Inch	70 - 100
No. 40	15 - 70
No. 200	5 - 30
Maximum Liquid Limit (ASTM D4318)	40
Maximum Plasticity Index	10

Adjustments to the recommended limits presented in Table 2 can be provided to allow the use of other granular, non-expansive material, including rock fills. Any such adjustments must be made and approved by the geotechnical engineer, in writing, prior to importing fill to the site. Rock fills must consist of a 12-inch-minus, well-graded soil, placed and compacted in maximum 15-inch thick lifts. A soil fill or 3-inch minus rock fill is normally used for the final 12 inches of pad fills to facilitate fine grading, foundation excavations, and utility trenching.

Structural fill should be placed in maximum 12-inch thick (loose) level lifts or layers, moisture conditioned to within 3 percent of optimum, and densified to at least 90 percent relative compaction. Higher moisture contents are acceptable if the soil lifts are stable and required relative compaction can be attained in the soil lift and subsequent soil lifts. Where structural fills exceed 5 feet in thickness the minimum compaction requirement shall be increased to 95 percent.

The maximum fill differential beneath a building pad shall be limited to 5 feet; over-excavation and replacement of in-situ soils or extending foundations may be necessary to meet this requirement. Field density testing shall be performed at a rate of 1 test per 1,000 cubic yards of material placed, or 1 test per lift of fill, as a quality control measure during placement and compaction of fill soils.

7.5 Trenching and Excavation

All trenching should be performed and stabilized in accordance with local, state, and OSHA standards. Bank stability is the responsibility of the contractor, who is present at the site, able to observe changes in ground conditions, and has control over personnel and equipment. Based on the results of our exploration, it is our opinion that the bulk of the site soils appear to be predominately Type C, although variations exist. Deeper excavations in Phase 1 may encounter stable rock.

7.6 Foundations

Standard spread foundations are recommended for use on this project. Provided the foundation support soils have been prepared in accordance with the recommendations of this report, the bearing pressures presented in Table 3 can be utilized for design.

Table 3 - Allowable Foundation Bearing Pressures

Loading Condition	Maximum Net Allowable Bearing Pressure (PSF)[1]
Dead Load Plus Full Time Live Load	2,000
Dead Load Plus Live Loads, Plus Transient Wind or Seismic Loads	2,750
[1] Net allowable bearing pressure is that pressure at the base of the footing in excess of the adjacent overburden pressure.	

For frost protection, footings should all be set at least twenty-four (24") inches below adjacent outside or unheated interior finish grades, as required by code. Footings not located within frost prone areas should be placed at least 12 inches below surrounding ground or slab level for confinement. Regardless of loading, individual pad foundations and continuous spread foundations should be at least 18 and 12 inches wide, respectively, or as required by code.

Before placing reinforcement steel for foundations, the foundation subgrade should be inspected. If loose, soft, wet, or disturbed soils are encountered at the foundation subgrade, these soils should be removed to expose suitable foundation soils, and the resulting over-excavation backfilled with compacted structural fill. The base of all excavations should be dry and free of loose materials at the time of concrete placement.

Total settlement for structures designed in accordance with the assumptions and recommendations presented in this report is anticipated to be on the order of ¾ inch, or less. Differential settlement between foundations with similar loads and sizes is anticipated to be ½ of the total settlement. If larger footings or heavier column loads are planned, bearing capacity recommendations and anticipated settlements should be updated accordingly.

7.7 Lateral Loads and Retaining Structures

Lateral loads, such as wind or seismic, may be resisted by passive soil pressure and friction on the bottom of the footing. The recommended coefficient of base friction is 0.42 and has been reduced by a factor of 1.5 on the ultimate soil strength. Lateral earth pressures imposed on retaining walls are dependent on the relative rigidity and movement of the structure, soil type, and moisture conditions behind the wall. Recommended lateral earth pressures are presented in Table 4 – Lateral Earth Pressures.

Table 4 - Lateral Earth Pressures

Condition	Active (psf/f)		Passive (psf/f)		At Rest
	Static	Pseudo-Static	Static	Pseudo-Static	
Level	40	60	350	275	60

The values presented in Table 4 assume wall backfill will be structural fill. Excessive pressures can be developed due to heavy compaction equipment during backfill placement. Therefore, all backfill behind any retaining structures should be screened to 6” minus and shall be compacted to not less than 90 percent if only supporting slabs-on-grade. Due care must be exercised during compaction to avoid build-up of excessive pressures. The values presented in Table 4 do not take into account hydrostatic pressures or seismic forces. French drains, a drainage backfill geotextile such as Mirafi 140 N, or a pre-manufactured drain system such as Tensar® DC1200 may be used if hydrostatic pressure buildup is possible.

7.8 Slope Stability and Erosion Control

Stability of cut and filled surfaces involves two separate aspects. The first concerns true slope stability related to mass wasting, landslides or the enmasse downward movement of soil or rock. Cut and fill slopes, with gradients of 2H:1V (horizontal to vertical) or flatter, are suitable for the project soils.

The second aspect of stability involves erosion potential and is dependent on numerous factors involving grain size distribution, cohesion, moisture content, slope angle and the velocity of the water or wind on the ground surface. Erosion protection should be in accordance with Washoe County *Public Works Design Standards*.

Temporary (during construction) and permanent (after construction) erosion control will be required for all disturbed areas. The contractor shall prevent dust from being generated during construction in compliance with all applicable city, county, state and federal regulations, and shall submit an acceptable dust control plan to Washoe County prior to starting site preparation or earthwork. The project specifications should include an indemnification by the contractor of the owner and engineer for any dust generation during the construction period. The owner will be responsible for mitigation of dust after his acceptance of the project.

7.9 Site Drainage

Adequate surface drainage must be constructed and maintained away from the structures. The permanent finish slopes away from the structure should be sufficient to allow water to drain away quickly from and prevent any ponding of water adjacent to the structure. All runoff should be collected within permanent drainage paths that can convey water off the property. A system of roof gutters and downspouts is recommended to collect roof drainage and direct it away from the foundations.

Foundation and stem wall backfill should be densified to at least 90 percent relative compaction. Compacting the backfill material decreases permeability and reduces the amount of irrigation and storm water available to enter under floor areas.

7.10 Concrete Slabs

A 6-inch minimum thickness of compacted (95% minimum per ASTM D1557) Type 2, Class B aggregate base course should underlie concrete slabs-on-grade. All dedicated and public easement improvements shall be constructed in accordance with the Standard Specifications for Public Works Construction. The decision to incorporate a moisture vapor retarder or barrier is a function of the overlying floor treatments and/or equipment and should be based on a case by case basis. However, in no instance should concrete be placed directly on the barrier without additional consideration to curing practices.

Western Nevada is a region with absorptive aggregates and exceptionally low relative humidity. As a consequence, concrete flatwork will shrink and curl in a manner which is not typical of other US regions. Proper sub-grade preparation and placement of reinforcement are imperative. Typical joint spacing, regionally, is on 10 to 12 foot centers. Cracking that occurs within the slab on grade will often reflect through overlying improvements even if adequate substrate preparation has occurred.

All concrete placement and curing shall be performed in accordance with procedures outlined by the American Concrete Institute. Special considerations should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcing should be provided to minimize any damage resulting from shrinkage.

7.11 Concrete Sulfate Exposure Level

The native soils presented sodium sulfate levels in the negligible category. Therefore, it is our opinion sulfate exposure is not applicable, Class S0 (ACI 318, Table 4.2.1), should govern when considering concrete requirements. Soil corrosivity laboratory test results are presented on Plate A-5 in Appendix A.

7.12 Asphaltic Concrete

The minimum structural pavement section for local streets within Washoe County consists of 3 inches of Type II asphaltic concrete with a sand seal (or Type 3 asphaltic concrete with a fog seal) overlying 6 inches of Type II, Class B aggregate base. Based on the granular nature of subgrade soils and our composite R-Value tests, the minimum structural section can be used for the streets within the development providing roadbed has been prepared as discussed in the Site Preparation portion of this report. Roadway improvements specific to major roads should be addressed separately and based on projected traffic data.

All roadway construction shall be in accordance with the approved plans and the Standard Specifications for Public Works Construction. We recommend Type 3 plantmix bituminous pavement be used in the surface lift of all pavement sections. The Contractor should submit a pavement mix design to the Owner, for approval, at least 5 working days prior to paving. When pavement is placed directly adjacent to concrete flatwork, the finish compacted grade of the pavement be at least ½ of an inch higher than the edge of adjacent concrete surface to allow adequate compaction of the pavement without damaging the concrete.

7.13 Asphalt Design Life

Maintenance is *mandator*y to long-term pavement performance. Maintenance refers to any activity performed on the pavement that is intended to preserve its original service life or load-carrying capacity. Examples of maintenance activities include patching, crack or joint sealing, and seal coats. If these maintenance activities are ignored or deferred, premature failure of the pavement *will occur*.

The cost associated with proper maintenance is generally much less than the cost for reconstruction due to the premature failure of the pavement. Therefore, since pavement quality is an integral consideration in the formulation of our design recommendations, we strongly recommend the owner/project manager implement a pavement management program.

Premature failure of asphaltic concrete frequently occurs adjacent to poorly graded ponding areas and/or landscape areas. Failures may occur due to excessive precipitation, irrigation and landscaping water infiltrating into the subgrade soils causing subgrade failure. As such, in areas where saturation of the subgrade soils beneath asphaltic pavement may occur, we strongly recommend the owner/project manager install a subdrain system to eliminate the potential for saturation of subgrade soils. The subdrain system should discharge into a permanent drainage area that will not impede drainage flow to cause the system to back-up and/or clog. Appropriate maintenance procedures should be implemented to ensure the subdrain system does not plug and allow for proper drainage of surface and subsurface water beneath paved areas. Subdrain location and configuration should be evaluated once final grading and landscaping plans have been prepared. If the ultimate traffic exceeds the anticipated levels, it may be necessary to reevaluate and overlay the pavement at some time in the future.

8.0 CONSTRUCTION OBSERVATION AND TESTING SERVICES

The recommendations presented in this report are based on the assumption that the contractors perform their work as required by the project documents and that owner/project manager provides sufficient field-testing and construction review during all phases of construction. Prior to construction, the owner/project manager should schedule a pre-job conference including, but not limited to, the owner, architect, civil engineer, the general contractor, earthwork and materials subcontractors, building official, and geotechnical engineer. It is the owner's/project manager responsibility to set-up this meeting and contact all responsible parties. The conference will allow parties to review the project plans, specifications, and recommendations presented in this report, and discuss applicable material quality and mix design requirements. All quality control reports should be submitted to the owner/project manager for review and distributed to the appropriate parties.

During construction, Wood Rodgers Incorporated should have the opportunity to provide sufficient on-site observation of site preparation and grading, over-excavation, fill placement, foundation installation, and paving. Compaction testing and continuous observation of fill placement should be performed while placing fill and backfill. These observations would allow us to document that the geotechnical conditions are as anticipated and that the contractor's work meets with the criteria in the approved plans and specifications. Verification of horizontal and vertical control must be provided by whoever was responsible for establishing those boundaries and constructing associated improvements.

9.0 STANDARD LIMITATION CLAUSE

This report has been prepared in accordance with generally accepted local geotechnical practices. The analyses and recommendations submitted are based upon field exploration performed and the conditions encountered as discussed in our report. This report does not reflect soils variations that may become evident during the construction period, at which time re-evaluation of the recommendations may be necessary. We recommend our firm be retained to perform construction observation in all phases of the project related to geotechnical factors to document compliance with our recommendations. The owner/project manager is responsible for distribution of this geotechnical report to all designers and contractors whose work is related to geotechnical factors.

It is the contractor’s responsibility for the grading and construction of the designed improvements. This responsibility includes the means, methods, techniques, sequence, and procedures of construction and safety of construction at the site. All construction shall conform to the requirements of the most recently adopted version of the Standard Specifications for Public Works Construction and the requirements of Washoe County. Failure to inspect the work shall not relieve the contractor from his obligation to perform sound and reliable work as described herein and as described in the Standard Specifications for Public Works Construction.

All plans and specifications should be reviewed by the design engineer responsible for this geotechnical report, to determine if they have been prepared in accordance with the recommendations contained in this report, prior to submitting to the building department for review. It is the owner's/project manager responsibility to provide the plans and specifications to the engineer.

This report has been prepared to provide information allowing the architect and engineer to design the project. The owner/project manager is responsible for distribution of this report to all designers and contractors whose work is affected by geotechnical aspects. In the event of changes in the design, location, or ownership of the project after presentation of this report, our recommendations should be reviewed and possibly modified by the geotechnical engineer. If the geotechnical engineer is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation or misapplication of our recommendations or their validity in the event changes have been made in the original design concept without our prior review. The engineer makes no other warranties, either expressed or implied, as to the professional advice provided under the terms of this agreement and included in this report.

This report was prepared by Wood Rodgers, Inc. for the benefit of Moonlight Hills Estates, LLC. The material in it reflects Wood Rodgers' best judgment in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Wood Rodgers' accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

10.0 REFERENCES

American Society of Civil Engineers (ASCE), 2013, *Minimum Design Loads for Buildings and Other Structures;* ASCE Standard ASCE/SEI 7-10.

American Concrete Institute (ACI), 2011, *Building Code Requirements for Structural Concrete and Commentary;* Volume ACI 318-11.

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Bowles, J. E., 1996, *Foundation Analysis and Design,* McGraw Hill. 5th Edition.

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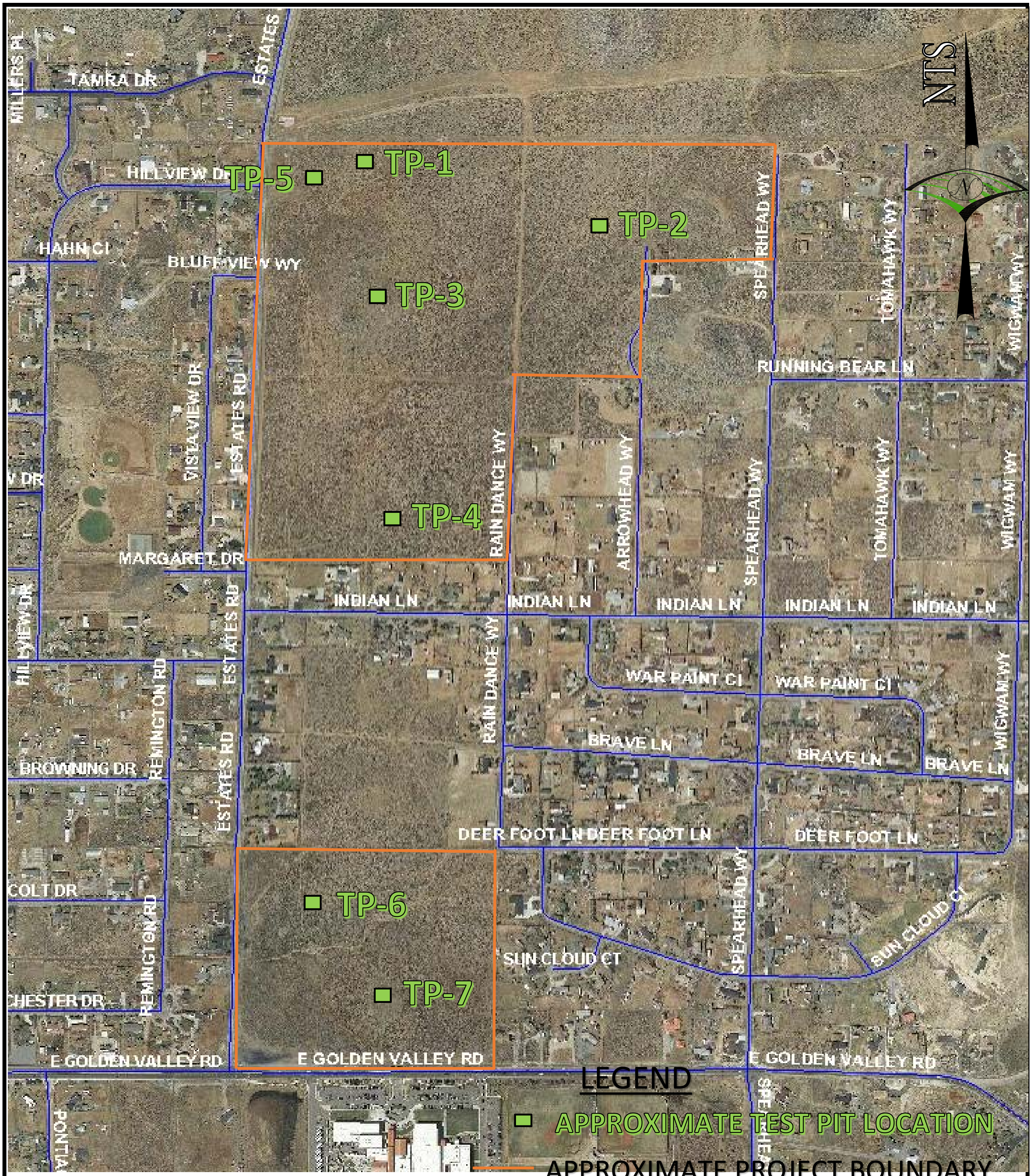
APPENDIX A



REFERENCE: CITY OF RENO GIS MAPSERVER, ACCESSED JUNE 2015.

WOOD RODGERS

5440 Reno Corporate Drive, Reno, NV 89511

Phone 775.823.4068 Fax 775.823.4066

SITE PLAN AND APPROXIMATE TEST LOCATIONS

Geotechnical Investigation

MOONLIGHT HILLS ESTATES
WASHOE COUNTY, NEVADA

Project No.: 3228.004

Date: 06/05/15

PLATE A-1

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-1

CLIENT Moonlight Hills Estates
PROJECT NAME Golden Valley Estates
PROJECT NUMBER 3228.004
PROJECT LOCATION Golden Valley Nevada
DATE STARTED 5/19/15 **COMPLETED** 5/19/15
GROUND ELEVATION Original **TEST PIT SIZE** 36 inches
EXCAVATION CONTRACTOR Versa Grade Construction
GROUND WATER LEVELS:
EXCAVATION METHOD Deere 310SJ
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Blake Carter **CHECKED BY** Blake Carter
AT END OF EXCAVATION --- No Free Water Encountered
NOTES: Percolation attempt at 4' BGS.
AFTER EXCAVATION --- No Free Water Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY SAND, (SM) loose, moist, dark brown	GB 1A					6.8	NP	NP	NP	18.5
		POORLY GRADED SAND TO SILTY SAND, (SP-SM) loose to medium dense, moist, yellow brown										
2.5												
		BEDROCK, very think-bedded, occasionally fractured, moderately hard, moderate strength, slightly weathered; Excavates as a moderately cemented Clayey Sand (SC), moist, light brown										
5.0												
		(Percolation test abandoned after <1 inch in 30 minutes during initial soak)	GB 1B					5.1	24	13	11	28.3
7.5												

Practical Refusal at 9.0 feet.

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-2

CLIENT Moonlight Hills Estates
PROJECT NAME Golden Valley Estates
PROJECT NUMBER 3228.004
PROJECT LOCATION Golden Valley Nevada
DATE STARTED 5/19/15 **COMPLETED** 5/19/15
GROUND ELEVATION Original **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Versa Grade Construction
GROUND WATER LEVELS:
EXCAVATION METHOD Deere 310SJ
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Blake Carter **CHECKED BY** Blake Carter
AT END OF EXCAVATION --- No Free Water Encountered
NOTES:
AFTER EXCAVATION --- No Free Water Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY SAND, (SM) loose, moist, dark brown										
		SILTY SAND, (SM) dense, moist, yellow brown, moderately cemented										
2.5												
5.0			GB 2A									
7.5												

Bottom of Test Pit at 9.0 Feet.

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-3

CLIENT Moonlight Hills Estates
PROJECT NAME Golden Valley Estates
PROJECT NUMBER 3228.004
PROJECT LOCATION Golden Valley Nevada
DATE STARTED 5/19/15 **COMPLETED** 5/19/15
GROUND ELEVATION Original **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Versa Grade Construction
GROUND WATER LEVELS:
EXCAVATION METHOD Deere 310SJ
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Blake Carter **CHECKED BY** Blake Carter
AT END OF EXCAVATION --- No Free Water Encountered
NOTES:
AFTER EXCAVATION --- No Free Water Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY SAND, (SM) loose, moist, dark brown										
		CLAYEY SAND, (SC) medium dense, moist, brown	GB 3A									
2.5		BEDROCK, thick-bedded, closely fractured, moderately hard, moderate strength, moderate to slightly weathered; excavates as a Clayey Sand (SC) with gravel, dense to very dense, dry, light brown with oranges and grays.										
5.0			GB 3B					2.5	24	14	10	12.8
7.5												

Practical Refusal at 8.0 feet.

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-4

CLIENT Moonlight Hills Estates
PROJECT NAME Golden Valley Estates
PROJECT NUMBER 3228.004
PROJECT LOCATION Golden Valley Nevada
DATE STARTED 5/19/15 **COMPLETED** 5/19/15
GROUND ELEVATION Original **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Versa Grade Construction
GROUND WATER LEVELS:
EXCAVATION METHOD Deere 310SJ
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Blake Carter **CHECKED BY** Blake Carter
AT END OF EXCAVATION --- No Free Water Encountered
NOTES:
AFTER EXCAVATION --- No Free Water Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY SAND, (SM) loose, moist, dark brown										
		CLAYEY SAND, (SC) dense, moist, yellow brown, moderately cemented										
2.5												
5.0			GB 4A									
7.5												
10.0												

Bottom of Test Pit at 10.0 Feet.

GEOTECH BH COLUMNS PLATE - GINT STD US LAB.GDT - 6/9/15 10:37 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\MOONLIGHT HILLS\GOLDEN VALLEY ESTATES.GPJ

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-5

CLIENT Moonlight Hills Estates
PROJECT NAME Golden Valley Estates
PROJECT NUMBER 3228.004
PROJECT LOCATION Golden Valley Nevada
DATE STARTED 5/19/15 **COMPLETED** 5/19/15
GROUND ELEVATION Original **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Versa Grade Construction
GROUND WATER LEVELS:
EXCAVATION METHOD Deere 310SJ
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Blake Carter **CHECKED BY** Blake Carter
AT END OF EXCAVATION --- No Free Water Encountered
NOTES:
AFTER EXCAVATION --- No Free Water Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY SAND, (SM) loose, moist, yellow brown										
		Medium dense	GB 5A									
2.5												
5.0		BEDROCK, thick-bedded, closely fractured, moderately hard, moderate strength, moderate to slightly weathered; excavates as a Clayey Sand (SC) with gravel, dense to very dense, dry, light brown with oranges and grays.										
7.5												
10.0												

Practical Refusal at 10.0 feet.

GEOTECH BH COLUMNS PLATE - GINT STD US LAB.GDT - 6/9/15 10:37 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\MOONLIGHT HILLS\GOLDEN VALLEY ESTATES.GPJ

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-6

CLIENT Moonlight Hills Estates
PROJECT NAME Golden Valley Estates
PROJECT NUMBER 3228.004
PROJECT LOCATION Golden Valley Nevada
DATE STARTED 5/19/15 **COMPLETED** 5/19/15
GROUND ELEVATION Original **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Versa Grade Construction
GROUND WATER LEVELS:
EXCAVATION METHOD Deere 310SJ
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Blake Carter **CHECKED BY** Blake Carter
AT END OF EXCAVATION --- No Free Water Encountered
NOTES:
AFTER EXCAVATION --- No Free Water Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		SILTY SAND, (SM) loose, moist, dark brown										
		CLAYEY SAND, (SC) medium dense, moist, brown	GB 6A					12.0	43	11	32	38.3
2.5		SILTY SAND, (SM) dense to very dense, dry, light brown										
5.0			GB 6B									
7.5												
10.0												

Bottom of Test Pit at 10.0 Feet.

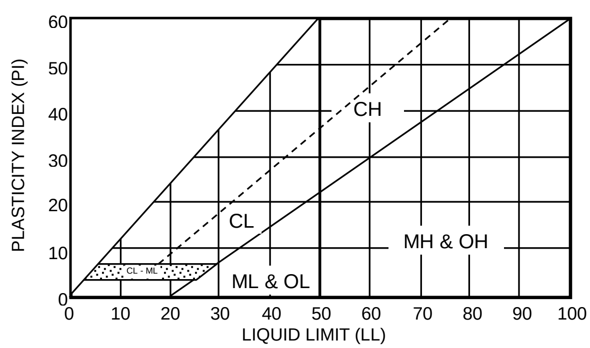
Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-7

CLIENT Moonlight Hills Estates
PROJECT NAME Golden Valley Estates
PROJECT NUMBER 3228.004
PROJECT LOCATION Golden Valley Nevada
DATE STARTED 5/19/15 **COMPLETED** 5/19/15
GROUND ELEVATION Original **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Versa Grade Construction
GROUND WATER LEVELS:
EXCAVATION METHOD Deere 310SJ
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Blake Carter **CHECKED BY** Blake Carter
AT END OF EXCAVATION --- No Free Water Encountered
NOTES:
AFTER EXCAVATION --- No Free Water Encountered

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		FILL - SILTY SAND WITH GRAVEL, (SM) medium dense, moist, brown, with asphalt particles up to 8-inch diameter and light debris. (Fill Mound with gravel, concrete and asphalt particles at surface)										
2.5			GB 7A					5.6	NP	NP	NP	19.9
5.0												
		CLAYEY SAND, (SC) medium dense, moist, dark yellow brown										
7.5			GB 7B									
10.0		Bottom of Test Pit at 10.0 Feet.										

MAJOR DIVISION					TYPICAL NAMES
COARSED-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	**GRAVEL** MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES		GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
				GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES		GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND
				GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SAND MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES		SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
				SP	POORLY GRADED SAND WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES		SM	SILTY SANDS WITH OR WITHOUT GRAVEL
				SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	**SILT AND CLAY** LIQUID LIMIT 50% OR LESS			ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
				OL	ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILT AND CLAY LIQUID LIMIT GREATER THAN 50%			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOLID, ELASTIC SILTS
				CH	INORGANIC CLAYS OR HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC SILTS OR CLAYS MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS



CONSISTENCY		RELATIVE DENSITY	
SILTS & CLAYS	SPT BLOW* COUNTS (N)	SANDS & GRAVELS	SPT BLOW* COUNTS (N)
VERY SOFT	0 - 2	VERY LOOSE	0 - 4
SOFT	3 - 4	LOOSE	5 - 10
MEDIUM STIFF	5 - 8	MEDIUM DENSE	11 - 30
STIFF	9 - 15	DENSE	31 - 50
VERY STIFF	16 - 30	VERY DENSE	50 +
HARD	30 +		

* The Standard Penetration Resistance (N) In blows per foot is obtained by the ASTM D1585 procedure using 2" O.D., 1 3/8" I.D. samplers.

DESCRIPTION OF ESTIMATED PERCENTAGES OF GRAVEL, SAND, AND FINES	
TRACE	Particles are present but est. < 5%
FEW	5% - 10%
LITTLE	15% - 20%
SOME	30% - 45%
MOSTLY	50% - 100%

NOTE: Percentages are presented within soil description for soil horizon with laboratory tested soil samples.

DEFINITIONS OF SOIL FRACTIONS	
SOIL COMPONENT	PARTICLE SIZE RANGE
COBBLES	ABOVE 3 INCHES
GRAVEL	3 IN. TO NO. 4 SIEVE
COARSE GRAVEL	3 IN. TO 3/4 IN.
FINE GRAVEL	3/4 IN. TO NO. 4 SIEVE
SAND	NO. 4 TO NO. 200
COARSE SAND	NO. 4 TO NO. 10
MEDIUM SAND	NO. 10 TO NO. 40
FINE SAND	NO. 40 TO NO. 200
FINES (SILT OR CLAY)	MINUS NO. 200 SIEVE

WOOD RODGERS
5440 Reno Corporate Drive, Reno, NV 89511
Phone 775.823.4068 Fax 775.823.4066

UNIFIED SOIL CLASSIFICATION AND KEY TO SOIL DESCRIPTIONS

Geotechnical Investigation

MOONLIGHT HILLS ESTATES
WASHOE COUNTY, NEVADA

Project No.: 3228.004
Date: 06/05/15

PLATE A-3a

CONSOLIDATION OF SEDIMENTARY ROCKS

Usually determined from unweathered samples. Largley dependent on cementation.

U = unconsolidated **M** = moderately consolidated
P = poorly consolidated **W** = well consolidated

BEDDING OF SEDIMENTARY ROCKS / FRACTURING

Splitting Property	Thickness	Stratification	Intensity	Size of Pieces in Feet
Massive	Greater than 4.0 ft.	Very thick-bedded	Very little fractured	Greater than 4.0
Blocky	2.0 to 4.0 ft.	Thick-bedded	Occasionally fractured	1.0 to 4.0
Slabby	0.2 to 2.0 ft.	Thin-bedded	Moderately fractured	0.5 to 1.0
Flaggy	0.05 to 0.2 ft.	Very thin bedded	Closely fractured	0.1 to 0.5
Shaly or platy	0.01 to 0.05 ft.	Laminated	Intensely fractured	0.005 to 0.1
Papery	Less than 0.01 ft.	Thinly laminated	Crushed	Less than 0.005

HARDNESS

1. Soft - Reserved for plastic material alone
2. Moderately soft - can be gouged deeply or carved easily with a knife blade
3. Moderately hard - can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away
4. Hard - can be scratched with difficulty; scratch produces little powder and is often faintly visible
5. Very Hard - cannont be scratched with a knife blade; leaves a metallic streak

STRENGTH

1. Plastic - very low strength
2. Friable - crumbles easily by rubbing with fingers
3. Weak - An unfractured specimen of such material will crumble under light hammer blows
4. Moderately Strong - Specimen will withstand a few heavy hammer blows before breaking
5. Strong - Specimen will withstand a few heavy hammer blows, and will yeild with difficulty only dust and small flying fragments
6. Very Strong - Specimen will resist heavy ringing hammer blows and will yeild with difficulty only dust and small flying fragments

WEATHERING

The physical and chemical disintegration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation, freezing, and thawing

D. Deep - Moderate to complete mineral decomposition; extensive disintegration; deep and thorough discoloration, many fractures, all extensively coated or filled with oxides, carbonates and/or clay silt

M. Moderate - Slight change or partial decomposition of minerals; little disintegration; cementation little to unaffected; Moderate to occasionally intense discoloration; Moderately coated features

S. Slightly - No megascopic decomposition of minerals; little or no effect on normal cementation; Slight and inter-mittent, or localized discoloration; Few stains on fracture surfaces

F. Fresh - Unaffected by weathering agents; No disintegration or discoloration; Fractures usually less numerous than joints

WOOD RODGERS
5440 Reno Corporate Drive, Reno, NV 89511
Phone 775.823.4068 Fax 775.823.4066

CRITERIA FOR ROCK DESCRIPTIONS

Geotechnical Investigation

MOONLIGHT HILLS ESTATES
WASHOE COUNTY, NEVADA

Project No.: 3228.004
Date: 06/05/15

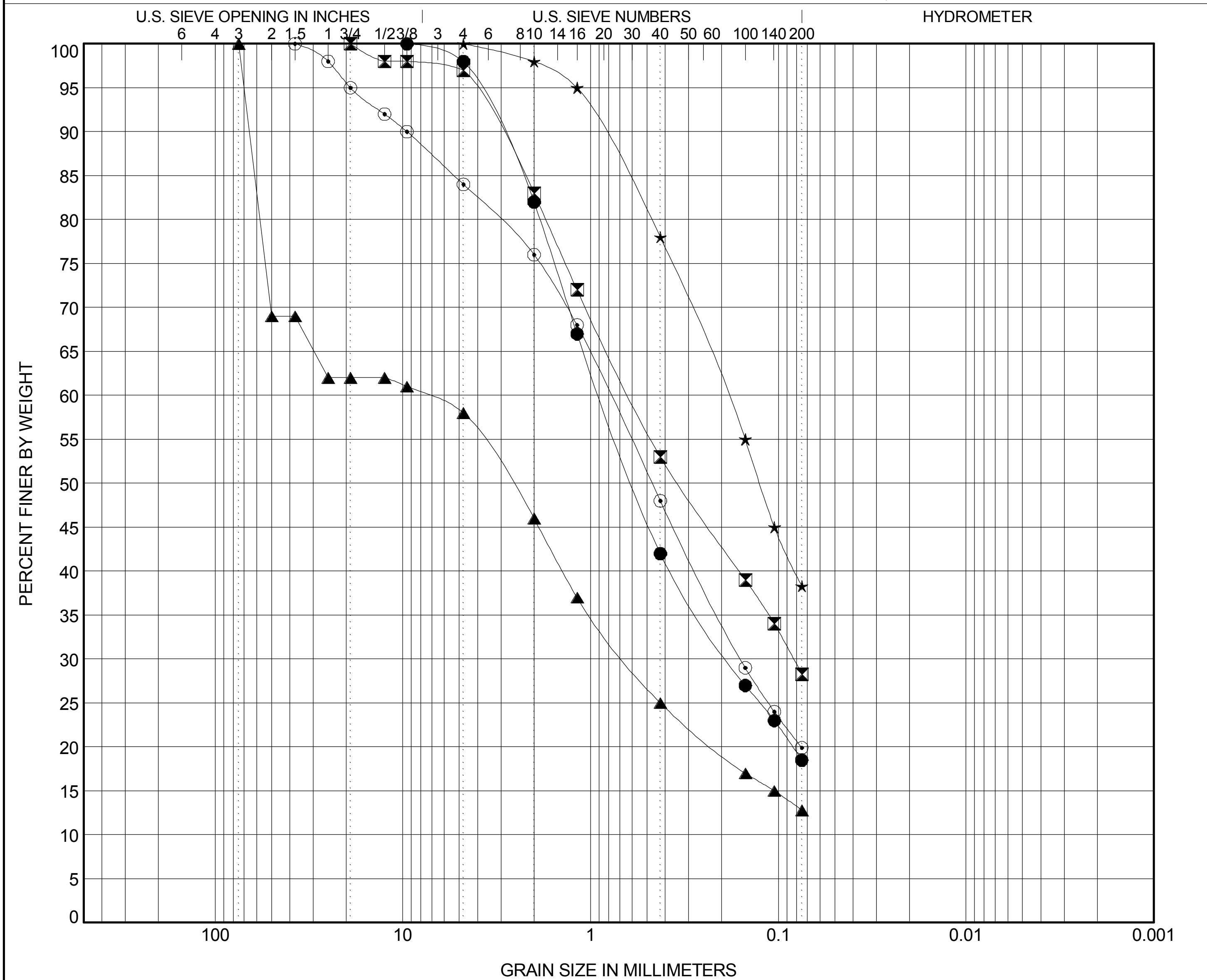
PLATE A-3b

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

GRAIN SIZE DISTRIBUTION

CLIENT Moonlight Hills Estates **PROJECT NAME** Golden Valley Estates

PROJECT NUMBER 3228.004 **PROJECT LOCATION** Golden Valley Nevada



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	TEST PIT	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**TP-1**	**0.0**	**SILTY SAND(SM)**	**NP**	**NP**	**NP**		
⧗	**TP-1**	**4.0**	**CLAYEY SAND(SC)**	**24**	**13**	**11**		
▲	**TP-3**	**2.0**	**CLAYEY SAND with GRAVEL(SC)**	**24**	**14**	**10**		
★	**TP-6**	**0.5**	**CLAYEY SAND(SC)**	**43**	**11**	**32**		
⊙	**TP-7**	**0.0**	**SILTY SAND with GRAVEL(SM)**	**NP**	**NP**	**NP**		

	TEST PIT	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**TP-1**	**0.0**	**9.5**	**0.887**	**0.185**		**2.0**	**79.5**	**18.5**	
⧗	**TP-1**	**4.0**	**19**	**0.619**	**0.083**		**3.0**	**68.7**	**28.3**	
▲	**TP-3**	**2.0**	**75**	**7.54**	**0.65**		**42.0**	**45.2**	**12.8**	
★	**TP-6**	**0.5**	**4.75**	**0.188**			**0.0**	**61.7**	**38.3**	
⊙	**TP-7**	**0.0**	**37.5**	**0.784**	**0.158**		**16.0**	**64.1**	**19.9**	

GRAIN SIZE - GINT STD US LAB.GDT - 5/27/15 13:55 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\MOONLIGHT HILLS\GOLDEN VALLEY ESTATES.GPJ

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, NV 89511
Telephone: 775-823-4068
Fax: 775-823-4066

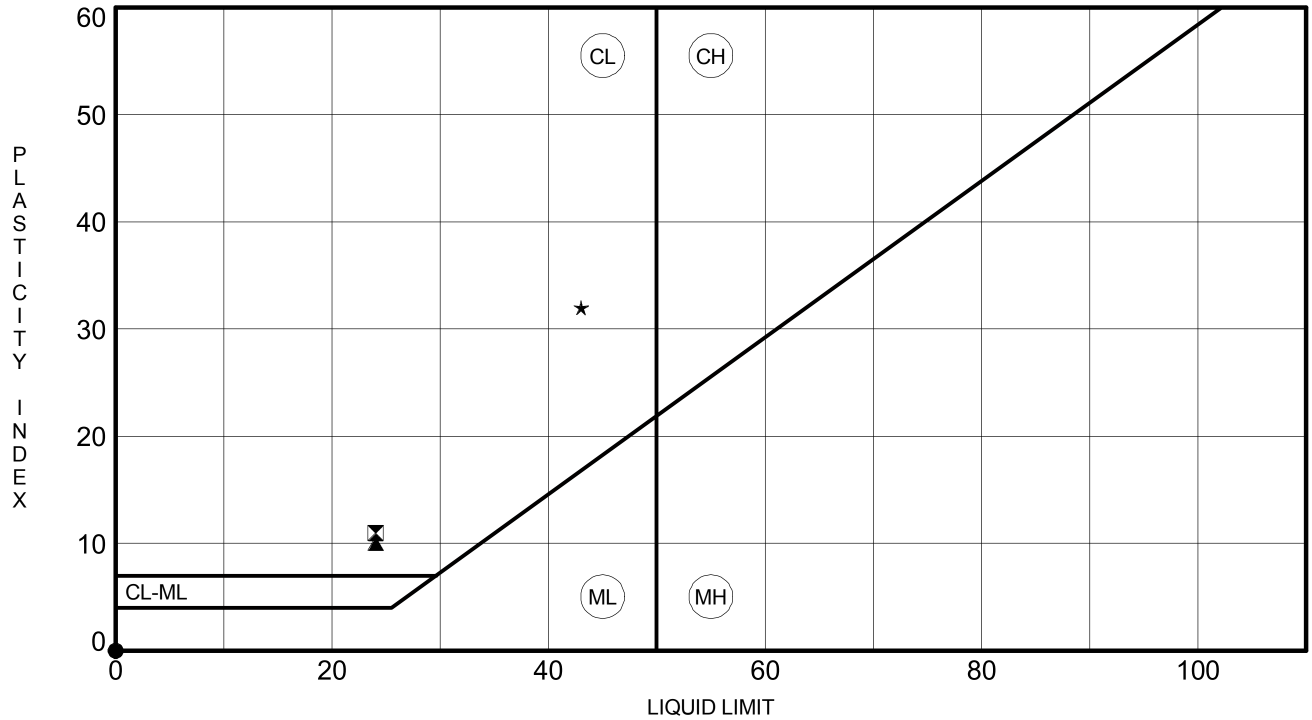
ATTERBERG LIMITS' RESULTS

CLIENT Moonlight Hills Estates

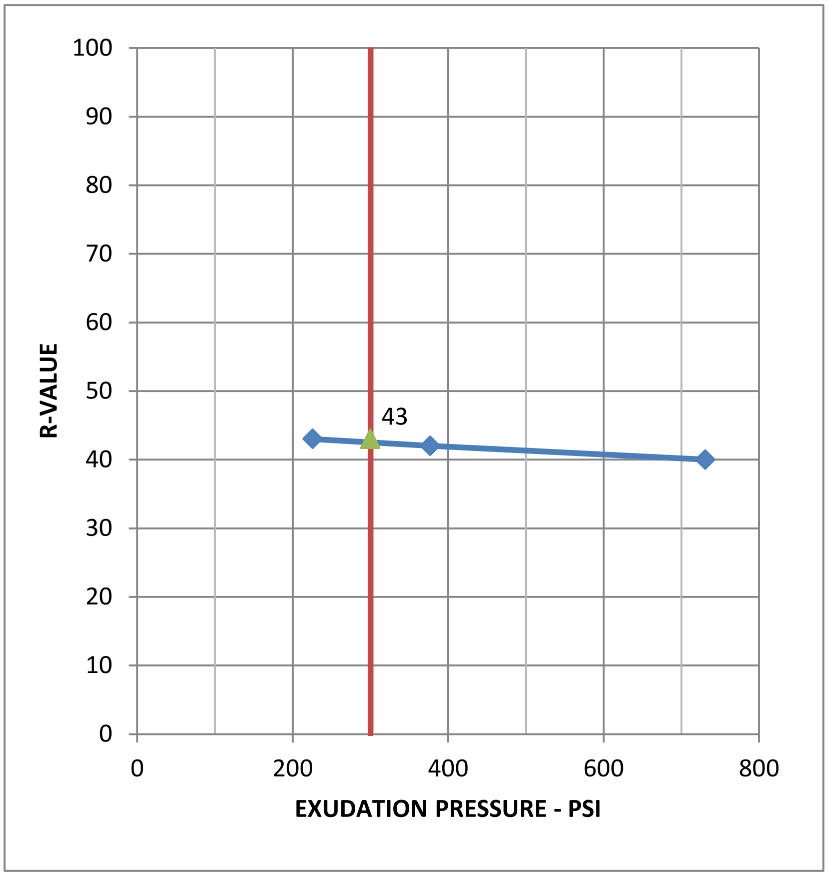
PROJECT NAME Golden Valley Estates

PROJECT NUMBER 3228.004

PROJECT LOCATION Golden Valley Nevada



	TEST PIT	DEPTH	LL	PL	PI	Fines	Classification
●	**TP-1**	**0.0**	**NP**	**NP**	**NP**	**19**	**SILTY SAND(SM)**
⧗	**TP-1**	**4.0**	**24**	**13**	**11**	**28**	**CLAYEY SAND(SC)**
▲	**TP-3**	**2.0**	**24**	**14**	**10**	**13**	**CLAYEY SAND with GRAVEL(SC)**
★	**TP-6**	**0.5**	**43**	**11**	**32**	**38**	**CLAYEY SAND(SC)**
⊙	**TP-7**	**0.0**	**NP**	**NP**	**NP**	**20**	**SILTY SAND with GRAVEL(SM)**



Subgrade			
Unit Weight (pcf)	120.2	117.6	113.0
Moisture (%)	13.9	15.4	16.6
Foot Pressure (psi)	250	250	190
Exudation Pressure (psi)	731	377	226
Expansion Pressure (psf)	110	92	70
R-Value$_{300psi\ Exudation}$	40	42	43

WOOD RODGERS
5440 Reno Corporate Drive, Reno, NV 89511
Phone 775.823.4068 Fax 775.823.4066

SUMMARY OF R-VALUE TEST DATA

Geotechnical Investigation

Moonlight Hills Estate

Project No.: 3228.004
Date: 05/19/15

PLATE A-4c

LABORATORY REPORT

DATE: May 27, 2015

LABORATORY NO: R15-0238

CLIENT: Wood Rodgers
5440 Reno Corporate Dr
Reno, NV 89511

PAGE: 1 of 1

CLIENT PROJECT: 3056

PO#:

Sampled By: Client
Date Sampled: ---
Time Sampled: ---

Submitted By: Casey Engels
Date Received: 05/26/15
Time Received: 0900

Sample ID:	Test	Result	Unit	MRL	Method	Date	Analyst
TP-4 @ 1'-10'	Sulfate	<0.01	%	0.01	SM4500E	05/27/15	LB
	Sodium	<0.01	%	0.01	ASTM D2791A	05/27/15	LB
	Sodium Sulfate	<0.01	%	0.01	Calculation	05/27/15	LB
TP-3 @ 2'-8'	Sulfate	<0.01	%	0.01	SM4500E	05/27/15	LB
	Sodium	<0.01	%	0.01	ASTM D2791A	05/27/15	LB
	Sodium Sulfate	<0.01	%	0.01	Calculation	05/27/15	LB

Note: The results for each constituent denote the percentage (%) for that particular element which is soluble in a 1:5 (soil to water) extraction ratio and corrected for dilution.

REVIEWED BY: Caseyelwd signing for
John Sloan
Laboratory Manager
EPA: NV00930 (SSAL-Las Vegas)
EPA: NV00931 (SSAL-Reno

3638 East Sunset Road, Suite 100 • Las Vegas, NV 89120 • Tel: 702-873-4478 Fax: 702-873-7967
4587 Longley Lane, No. 2 • Reno, NV 89502 • Tel: 775-825-1127 Fax: 775-825-1167
www.ssalabs.com • www.envirotechonline.com

TENTATIVE MAP APPLICATION
FOR
GOLDEN MESA SOUTH
WASHOE COUNTY NEVADA

ENGINEER

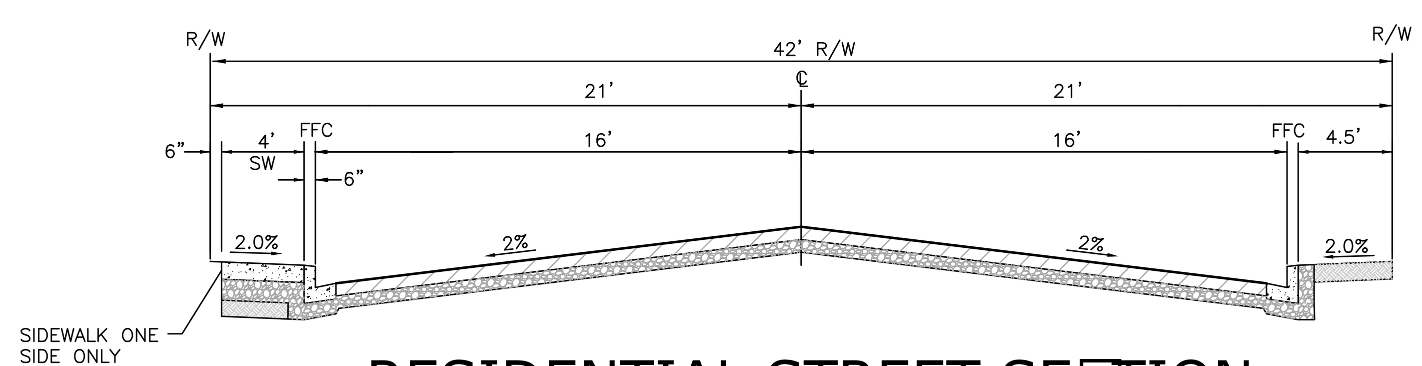
Axion ENGINEERING
Civil Engineering • Land Development
681 EDISON WAY – RENO, NEVADA 89502
PH 775-771-5554 / FX 775-856-3951

OWNER/DEVELOPER

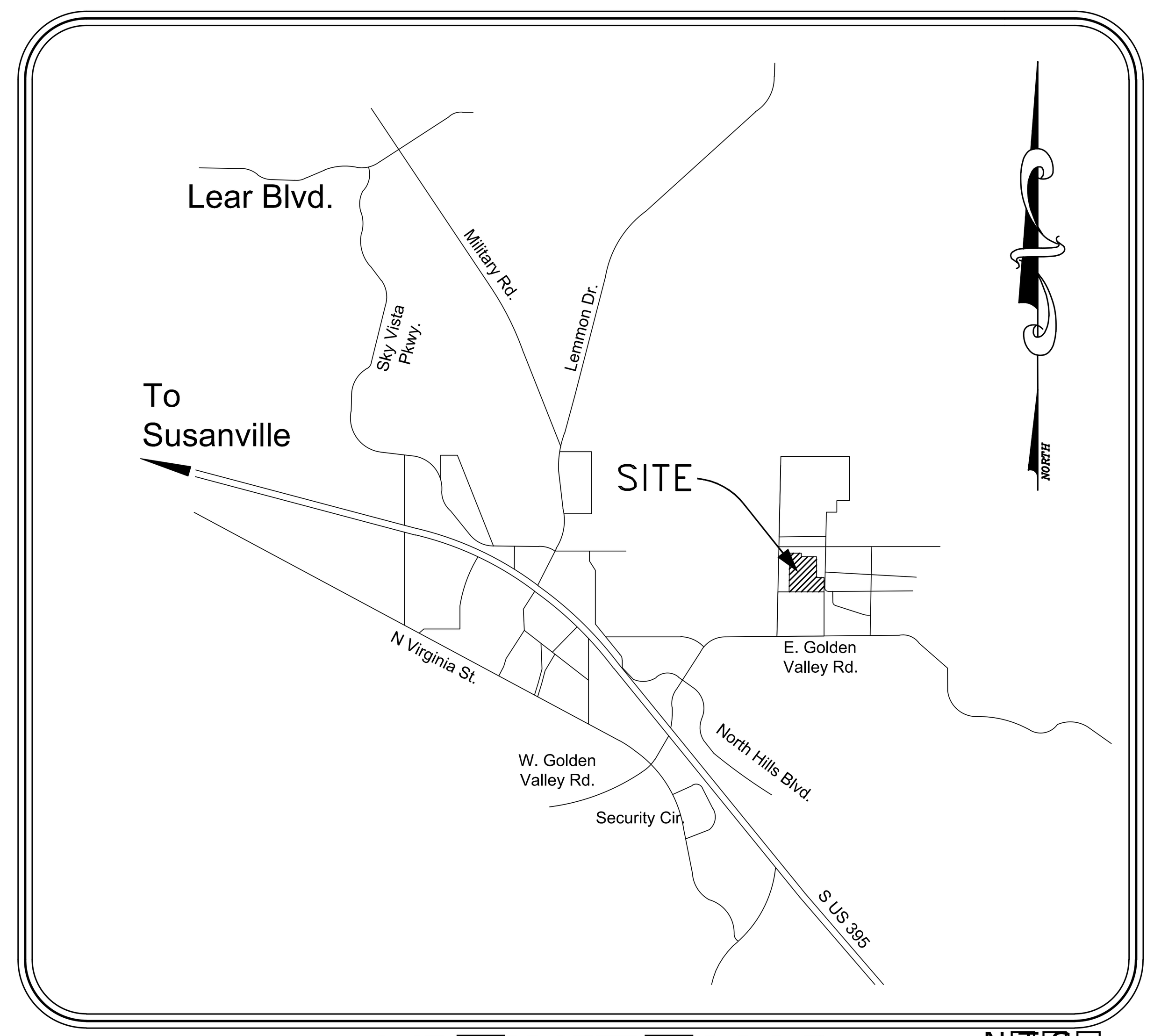
MOONLIGHT HILLS ESTATES, LLC
5390 BELLAZZA COURT
RENO, NV 89519
PHONE: (775) 826-0674

PUBLIC SERVICES

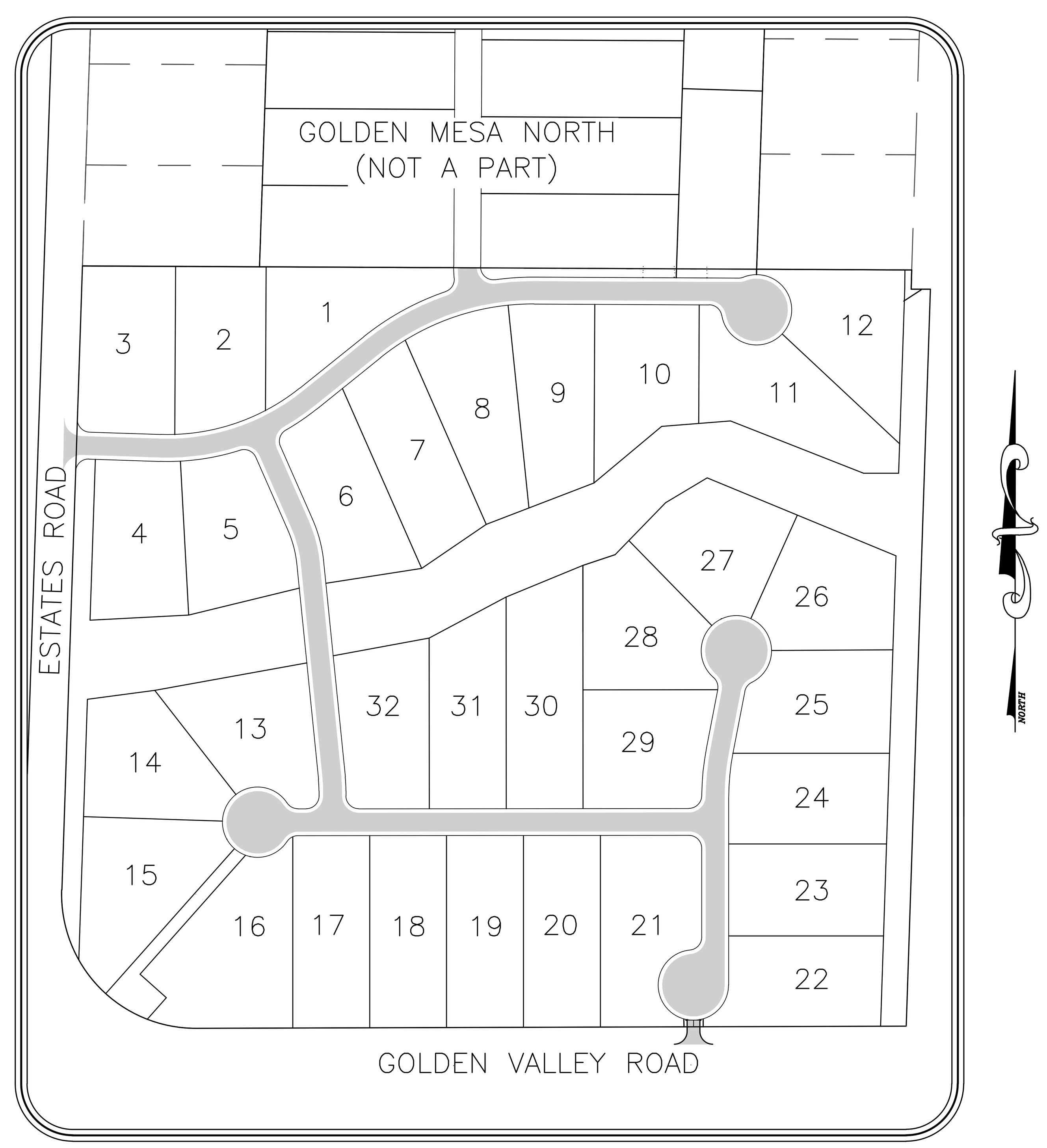
GAS & ELECTRICAL SERVICE: NV ENERGY
WATER SERVICE: TRUCKEE MEADOWS WATER AUTHORITY
SEWER SERVICE: WASHOE COUNTY & CITY OF RENO
TELEPHONE: AT&T
CABLE TV: CHARTER COMMUNICATIONS
FIRE PROTECTION: TRUCKEE MEADOWS FIRE DEPARTMENT
POLICE PROTECTION: WASHOE COUNTY SHERIFF DEPARTMENT



RESIDENTIAL STREET SECTION



VICINITY MAP N.T.S.

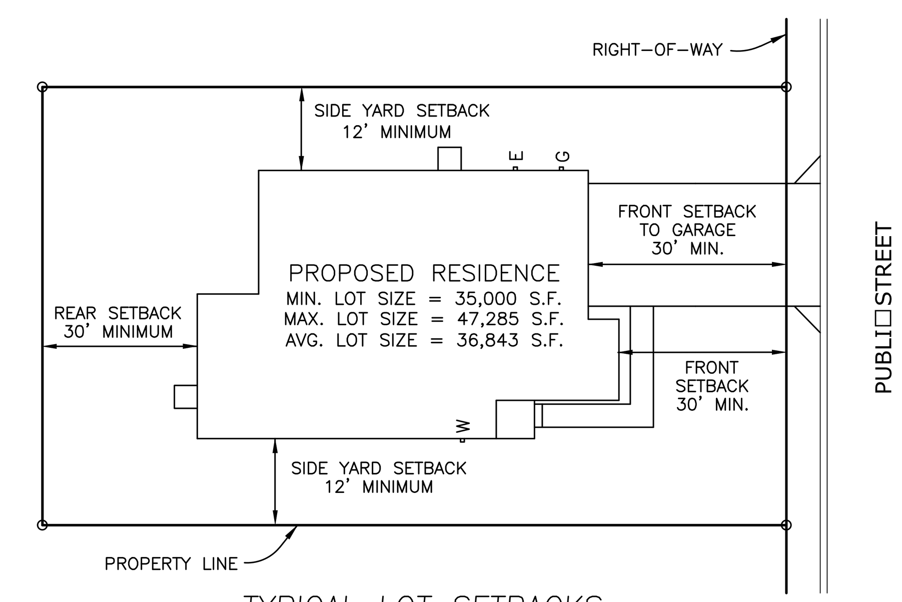


SITE PLAN N.T.S.

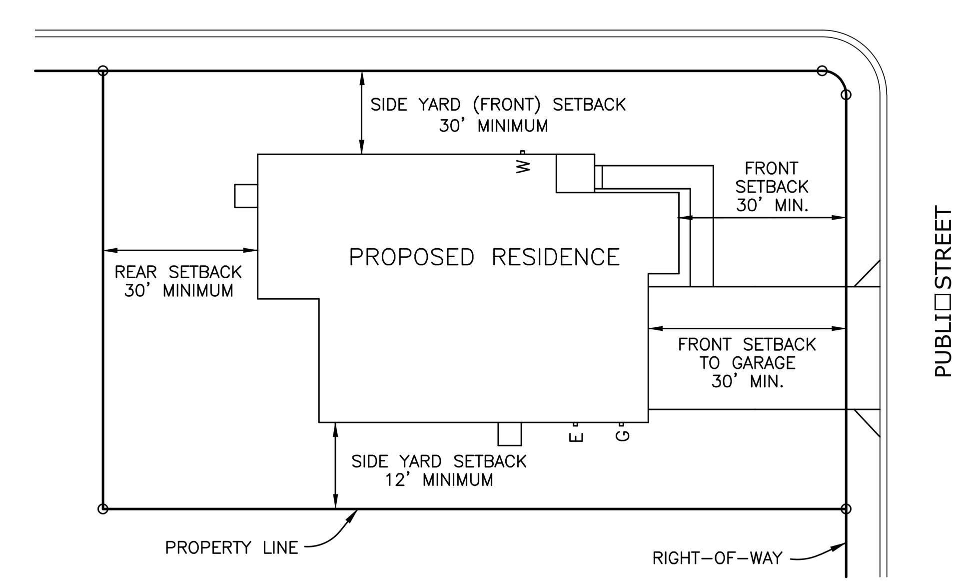
SHEET INDEX

C-1 .... TITLE SHEET
C-2 .... SITE PLAN
C-3 .... GRADING PLAN
C-4 .... UTILITY PLAN
C-5 .... CROSS SECTIONS
L-1 .... LANDSCAPE PLAN

MINIMUM SETBACKS



TYPICAL LOT SETBACKS



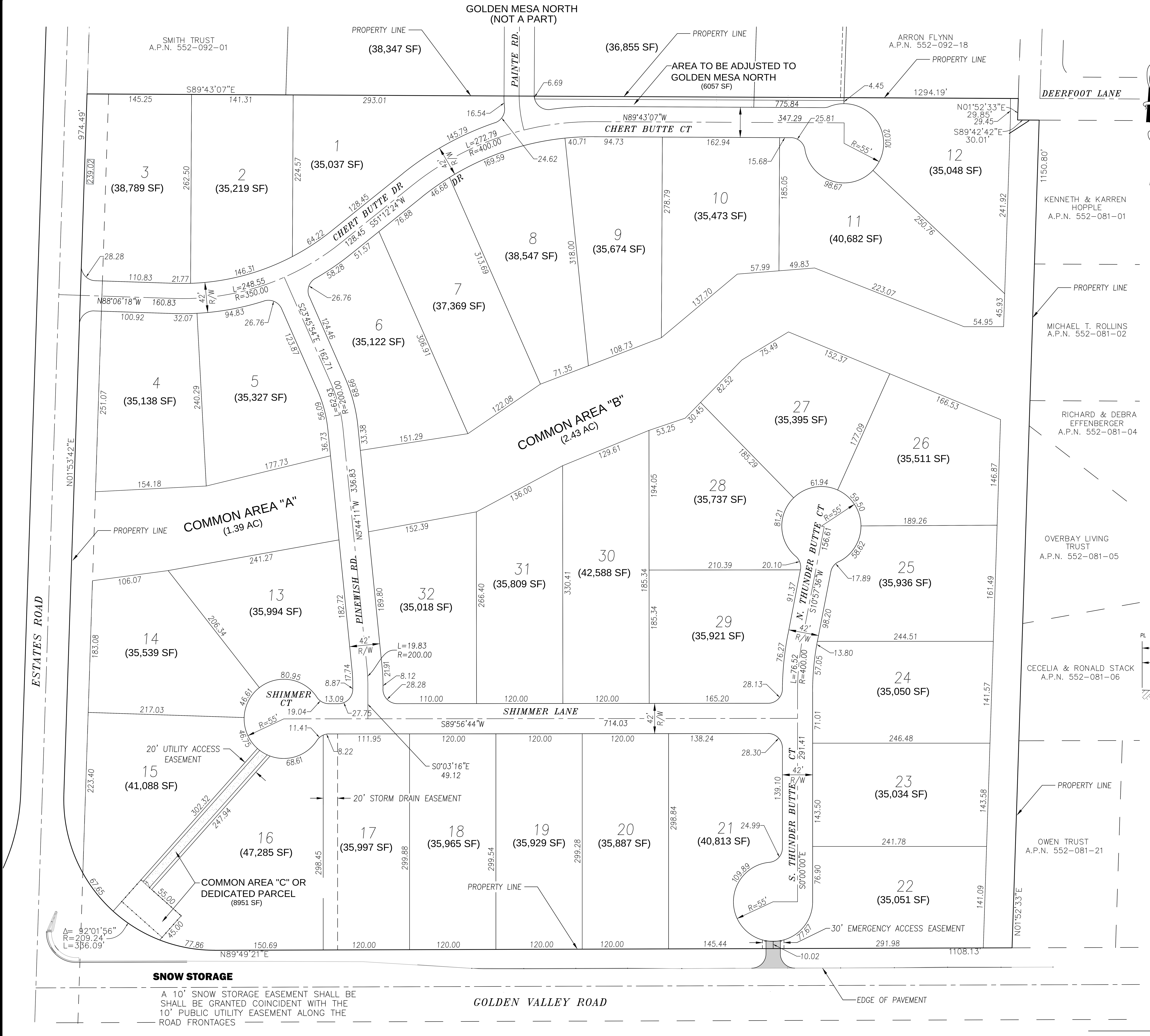
CORNER LOT SETBACKS

ENGINEERS STATEMENT

I, GARY K. GUZELIS, DO HEREBY CERTIFY THAT THIS MAP HAS BEEN PREPARED BY ME, OR UNDER MY SUPERVISION AND WAS COMPLETED ON THIS 25th DAY OF AUGUST, 2017.

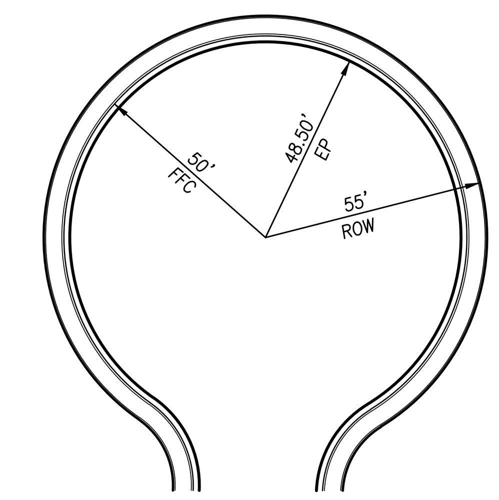
GARY K. GUZELIS P.E. #10372

GOLDEN MESA SOUTH TITLE SHEET

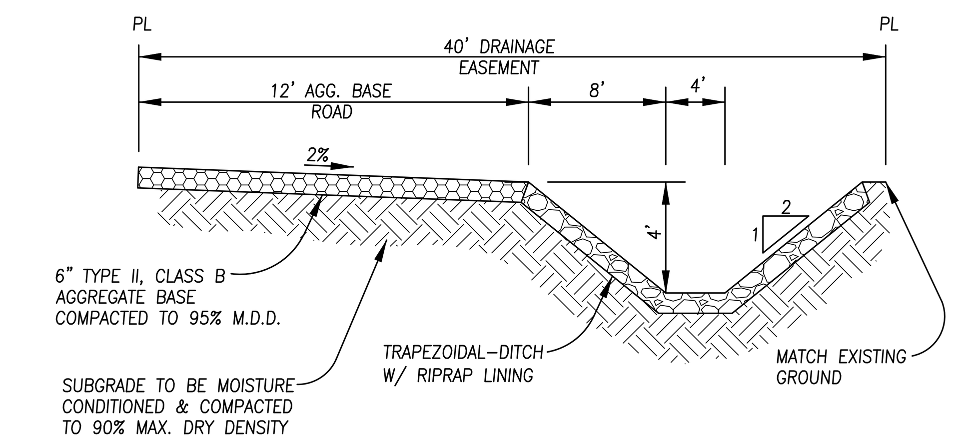


GOLDEN MESA SOUTH
PROJECT DEVELOPMENT SUMMARY

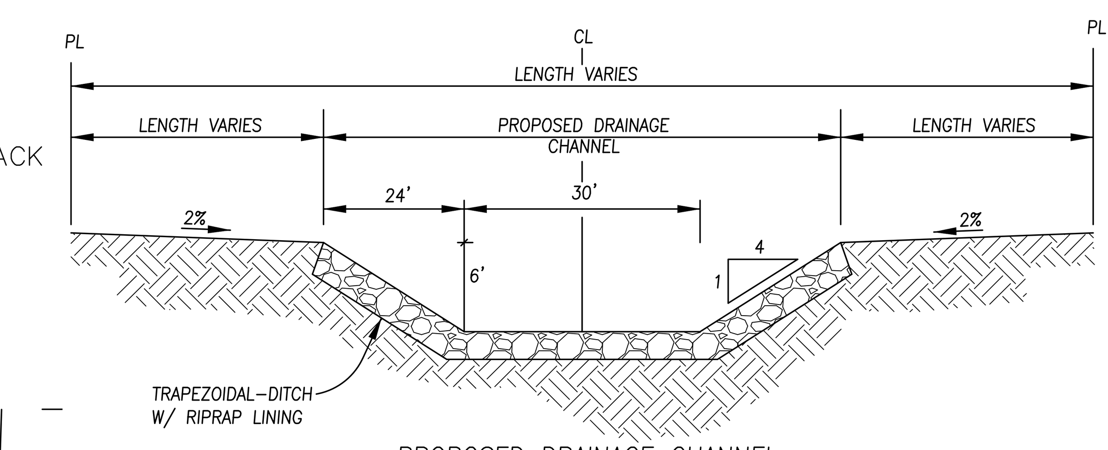
1.	TOTAL PROJECT SITE	35.79 ACRES
2.	LOT AREA	27.20 ACRES
3.	RIGHT OF WAY	3.57 ACRES
4.	COMMON AREA	5.02 ACRES
5.	GROSS DENSITY	0.89 DU/ACRE
6.	NET DENSITY	1.18 DU/ACRE
7.	AVERAGE LOT SIZE	36,843 SF
8.	MAXIMUM LOT SIZE	47,285 SF
9.	MINIMUM LOT SIZE	35,000 SF
10.	DWELLING UNITS	32 EA
11.	COMMON AREA LOTS	2 EA
12.	LIFT STATION PARCEL	1 EA



TYPICAL CUL-DE-SAC DETAIL
NTS



EASTERLY DRAINAGE CHANNEL
NTS



PROPOSED DRAINAGE CHANNEL
NTS

Axion ENGINEERING
Civil Engineering • Land Development

681 EDISON WAY – RENO, NEVADA 89502
PH 775-771-5554 / FX 775-856-3951

SCALE: 1"=50'

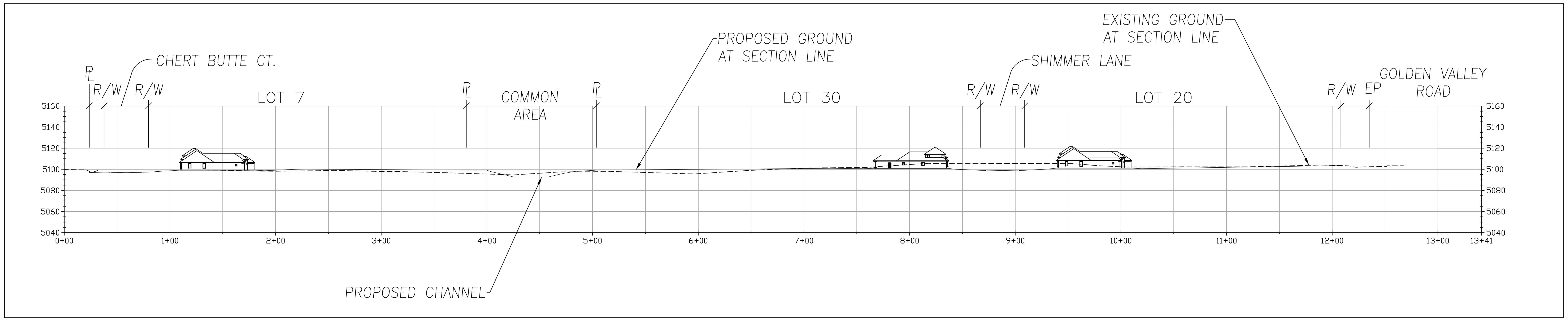
SITE PLAN

1"=50'

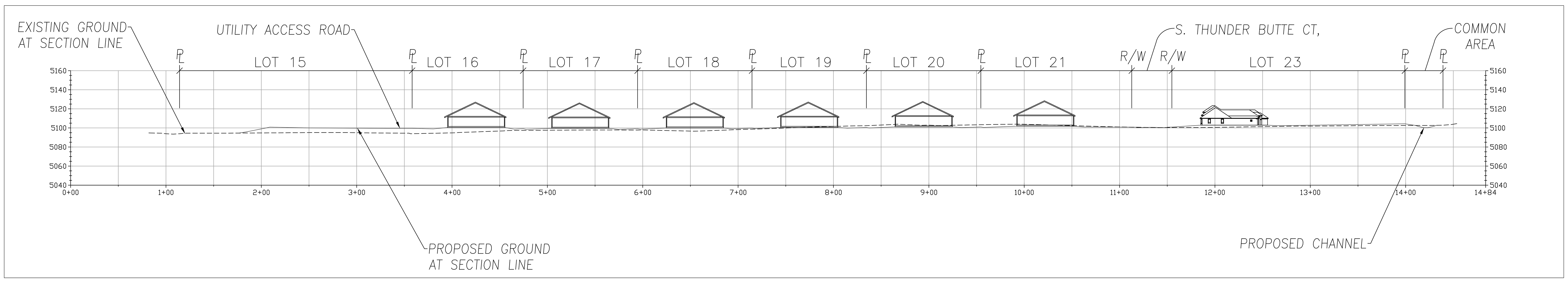
2


GOLDEN MESA NORTH
(NOT A PART)
PROPOSED SWALE
DEERFOOT LANE
CHERT BUTTE CT
CHERT BUTTE DR.
EXISTING ROADSIDE CHANNEL
KENNETH & KARREN HOPPLE A.P.N. 552-081-01
PROPOSED INTERCEPTOR CHANNEL
PROPOSED IMPROVED DRAINAGE WAY
MICHAEL T. ROLLINS A.P.N. 552-081-02
RICHARD & DEBRA EFFENBERGER A.P.N. 552-081-04
EXISTING DRAINAGE IMPROVEMENTS
PROPOSED IMPROVED DRAINAGE WAY
EXISTING DRAINAGE IMPROVEMENTS
OVERBAY LIVING TRUST A.P.N. 552-081-05
PINEWISH RD.
N. THUNDER BUTTE CT
S. THUNDER BUTTE CT
SHIMMER CT
SHIMMER LANE
CECELIA & RONALD STACK A.P.N. 552-081-06
PROPOSED INTERCEPTOR CHANNEL
ESTATES ROAD
OWEN TRUST A.P.N. 552-081-21
GOLDEN VALLEY ROAD
NEW SDMH TO INTERCEPT NV HIGHSCHOOL DRAINAGE
EARTHWORK
CUT: 64,174 CUBIC YARD
FILL: 96,695 CUBIC YARDS
BALANCES w/GOLDEN MESA NORTH
DISTURBED AREA EQUALS APPROXIMATELY 35.85 ACRES
DISTURBED AREAS TO BE REVEGETATED WITH NATIVE SEED MIX. (INCLUDES SLOPES)
Axion ENGINEERING
Civil Engineering • Land Development
681 EDISON WAY - RENO, NEVADA 89502
PH 775-771-5554 / FX 775-856-3951
SCALE: 1"=50'
GRADING PLAN


GOLDEN MESA NORTH
(NOT A PART)
PROPOSED 8" SS MAIN
CHERT BUTTE CT
PROPOSED 8" WATER MAIN
PROPOSED 8" SS MAIN
CHERT BUTTE DR
STORM DRAIN MANHOLE (TYPICAL)
PROPOSED CATCH BASIN (TYPICAL)
FEMA FLOOD LIMITS
ZONE X
ZONE X (SHADED)
ZONE AE
COLLECTOR CHANNEL
IMPROVED DRAINAGE WAY
EXISTING STORM DRAIN JUNCTION BOX
ESTATES ROAD
STORM DRAIN MANHOLE (TYPICAL)
PROPOSED STORM DRAIN
PROPOSED 8" WATER MAIN
PROPOSED 8" SS MAIN (TYP.)
EXISTING HEADWALL
IMPROVED DRAINAGE WAY
PINEWISH RD.
PROPOSED 8" SS MAIN
N. THUNDER BUTTE CT
ZONE AE
ZONE X
PROPOSED SEWER MANHOLE (TYPICAL)
PROPOSED STORM DRAIN
SHIMMER CT
SHIMMER LANE
PROPOSED SEWER MANHOLE (TYPICAL)
S. THUNDER BUTTE CT
COLLECTOR CHANNEL
COMMON AREA
PROPOSED 8" SS MAIN (TYP.)
4" FORCE MAIN
PROPOSED CATCH BASIN (TYPICAL)
12' ACCESS ROAD
EXISTING GAS MAIN
20' STORM DRAIN EASEMENT
EXISTING 8" SS MAIN
PROPOSED 8" WATER MAIN
EMERGENCY ACCESS CONTROL GATE
ZONE X (SHADED)
ZONE AE
PROPOSED SSMH
ZONE X
PROPOSED SANITARY SEWER LIFT STATION
EXISTING 12" WATER MAIN
WATER MAIN POINT OF CONNECTION
WATER MAIN POINT OF CONNECTION
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
LEGEND
MANHOLE
CATCH BASIN
STORM DRAIN MAIN (DASHED IF EXISTING)
SANITARY SEWER MAIN (DASHED IF EXISTING)
WATER MAIN
WATER VALVE
ELBOW FITTINGS (w/THRUST BLOCKS)
FLUSH VALVE ASSEMBLY
Axion ENGINEERING
Civil Engineering • Land Development
681 EDISON WAY – RENO, NEVADA 89502
PH 775-771-5554 / FX 775-856-3951
50 0 25 50 100
SCALE: 1"=50'
UTILITY PLAN
1"=50'



SECTION A-A



SECTION B-B

VERT. SCALE: 1"=50'

HORIZ. SCALE: 1"=50'

Axion ENGINEERING
Civil Engineering • Land Development
681 EDISON WAY – RENO, NEVADA 89502
PH 775-771-5554 / FX 775-856-3951

CROSS SECTIONS

1"=100'

LANDSCAPE LEGEND/REQUIREMENTS

REQUIRED YARDS ADJOINING STREETS - ALL REQUIRED FRONT, REAR, AND SIDE YARDS WHICH ADJOIN A PUBLIC STREET SHALL BE LANDSCAPED AND SHALL INCLUDE AT LEAST ONE (1) TREE FOR EVERY FIFTY (50) LINEAR FEET OF STREET FRONTAGE, OR FRACTION THEREOF.

SUBDIVISION PERIMETERS - NEW RESIDENTIAL SUBDIVISION, REGARDLESS OF THE NUMBER OF DWELLING UNITS PER PARCEL, SHALL PROVIDE AT LEAST ONE (1) TREE FOR EVERY FIFTY (50) LINEAR FEET OF PERIMETER FRONTAGE ADJOINING AN ARTERIAL OR COLLECTOR IDENTIFIED IN THE WASHOE COUNTY COMPREHENSIVE PLAN STREETS AND HIGHWAYS SYSTEM PLAN MAP.

ORNAMENTAL STREETSCAPE

REVEGETATED DRAINAGE CHANNEL

NOTE: THE COMPOSITION OF TREES SHALL REPRESENT A MIXTURE OF DECIDUOUS AND CONIFEROUS VARIETIES AS FOLLOWS:

- AT LEAST ONE-HALF (1/2) OF ALL EVERGREEN TREES SHALL BE AT LEAST SEVEN (7) FEET IN HEIGHT, AND THE REMAINDER MUST BE AT LEAST FIVE (5) FEET IN HEIGHT AT THE TIME OF PLANTING.
- AT LEAST ONE-HALF (1/2) OF THE REQUIRED NUMBER OF DECIDUOUS TREES SHALL BE AT LEAST TWO (2) INCH CALIPER PER AMERICAN NURSERY STANDARDS AT THE TIME OF PLANTING. THE REMAINING NUMBER OF REQUIRED DECIDUOUS TREES SHALL BE AT LEAST ONE (1) INCH CALIPER AT THE TIME OF PLANTING.
- ALL PLANTING AND IRRIGATION SHALL BE INSTALLED PER LOCAL GOVERNING CODES.
- FINAL PLANT SELECTION AND LAYOUT WILL BE BASED ON SOUND HORTICULTURAL PRACTICES RELATING TO MICRO-CLIMATE, SOIL, AND WATER REGIMES. ALL TREES WILL BE STAKED SO AS TO REMAIN UPRIGHT AND PLUMB FOLLOWING INSTALLATION. PLANT SIZE AND QUALITY AT TIME OF PLANTING WILL BE PER CURRENT EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1).
- ALL PLANTER BEDS WILL RECEIVE 3" MINIMUM DEPTH OF MULCH WITH WEED CONTROL.
- ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED UNLESS NOTED OTHERWISE ON THE PLAN. CONTAINER PLANTINGS WILL BE DRIP IRRIGATED. A REDUCED-PRESSURE-TYPE BACKFLOW PREVENTER WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.

0' 60' 120' 180'

Scale in Feet

L.A. StudioNevada
the landscape architecture studio
1552 C Street
Sparks, NV 89431
(775) 323-2223
www.lastudionevada.com
NV RLA #440

Preliminary Landscape Plan
GOLDEN MESA SOUTH
Axion Engineering

Washoe County, Nevada

No.	Revision Date

LA No:	532-515-08-17
Designed:	RWH
Drawn:	LA
Checked:	RWH
Date:	9/11/17

Sheet
L1
of
1