Autumn Wood – Phase II

Application to Washoe County for a:

Tentative Subdivision Map

Prepared by:

John F. Krmpotic, AICP
KLS Planning & Design Group
1 East 1st St, Suite 1400
Reno, Nevada 89501

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General Manager of Development
Summit Engineering Corporation
5405 Mae Anne Avenue
Reno, NV 89523

Prepared for:

Thomas H. Warley
D.R. Horton
Land Development Manager – Reno
5588 Longley Lane
Reno, NV 89511

May 15, 2018

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Geotechnical Investigation (Wood Rodgers – January 2, 2018)

Plan Set

Preliminary Landscape Plan

Civil Engineering Plan Set (6 sheets)

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C1 - Site Plan
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Project Request - This application includes the following request:

- A request for a Tentative Subdivision Map to allow development of 17 single family lots as a Common Open Space Development project on a single 5.83-acre parcel known as the Autumn Wood – Phase II single family project.

Property Location

The site is located adjacent to Jeppson Lane (a private street owned by the applicant) but will be accessed from the Autumn Breeze Circle with a planned street connection to Jeppson Lane. This is located on APN 162-010-31, a 5.83-acre parcel.

Project Description & Summary

Autumn Wood is a common open space development which promotes the concept of clustering lots to the usable area and providing more open space in exchange for clustering. In this case, 2/3^{rds} of the site is open space used primarily for the off-site drainage and detention areas. The 1/3rd remainder of the site is development area to includes homes, yards, and streets for access.

MDS Zoning Standards

Density: 3 du per acre allowed; 2.91 du per acre proposed

Building setbacks are directly from the MDS zoning standards which include:
- Front Yards = 20' to the house or garage
- Side yards = 8' on one side and attached on the other side
- Rear yards = 20'

Maximum Height: 2 stories allowed and all 2 story homes are being proposed
Minimum lot size is 3,8000 sf, average lot size = 5,014 sf

A separate and related SUP is proposed to solve the offsite overland sheet flow drainage affecting this parcel, the adjacent parcel to the south, along with parcels to the east. The basic intent of the SUP is to create a way to cut-off and capture flood waters from a major storm event that will otherwise sheet flow over the Autumn Wood project area (both phases) and the adjacent properties downstream to the East and Northeast towards Virginia Street. The biggest benefit in doing this is to reduce flooding potential for those properties by rerouting the drainage toward Whites Creek.

Figure 1 - Vicinity Map

Figure 2 – Autumn Wood (Phase II Site Plan)

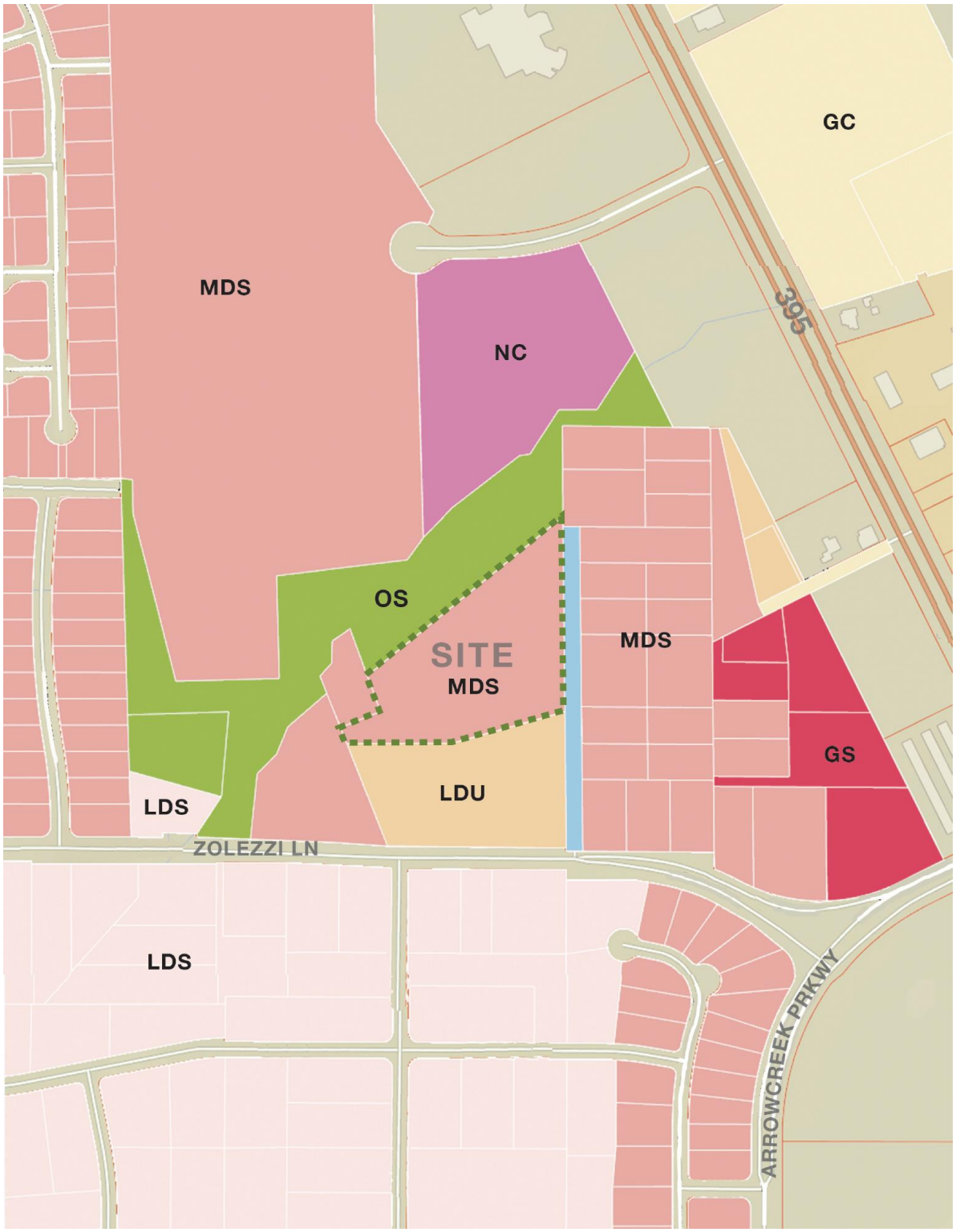


Figure 3 – WC Zoning

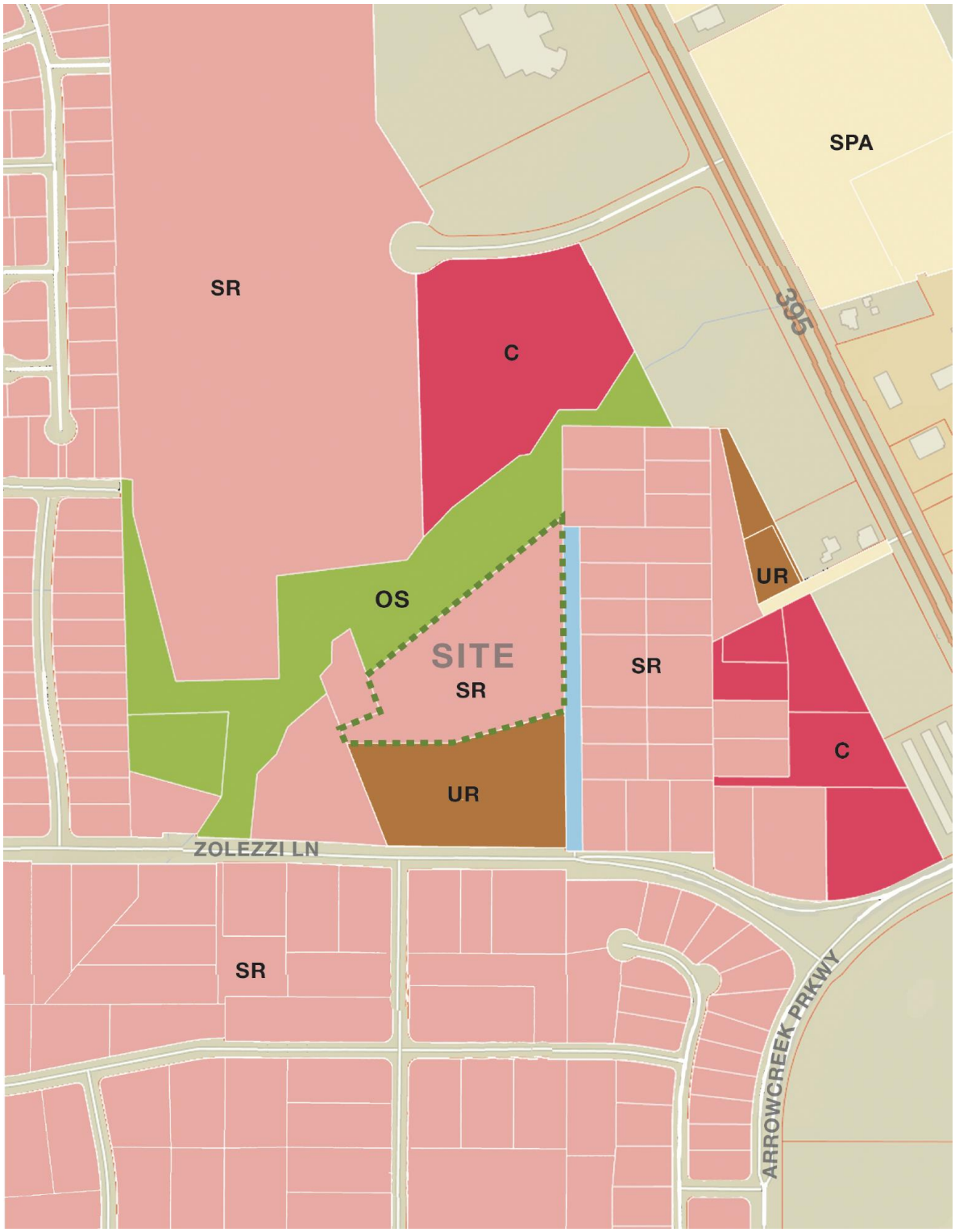


Figure 4 – WC Master Plan

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

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

   The proposed subdivision map meets all of the pertinent goals and policies of the Master Plan, and the Southwest Area Plan. The project falls under the allowable density established in the Area Plan and complies with all known policies that allow 3 du per acre for residential uses.

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

   The proposed map meets all of the density, lot size and opens space criteria of the Master Plan, and the Southwest Area Plan. Specifically, the proposed development is below the allowable density of 3 units per acre of the MDS zoning and Suburban master plan. Also, the proposed subdivision complies with the Common Open Space criteria for pedestrian access, open space, community amenities, etc.

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

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

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

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

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

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

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

   The design of the subdivision and improvements will not cause significant public health

problems because most of the infrastructure is already in place. Dust control related to grading will be the most obvious public health issue which is tightly regulated with dust control permitting. Additionally, the proposed amenities such as pedestrian trails, landscaping and common area will enhance the aesthetic and recreational value of the immediate neighborhood.

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

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

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

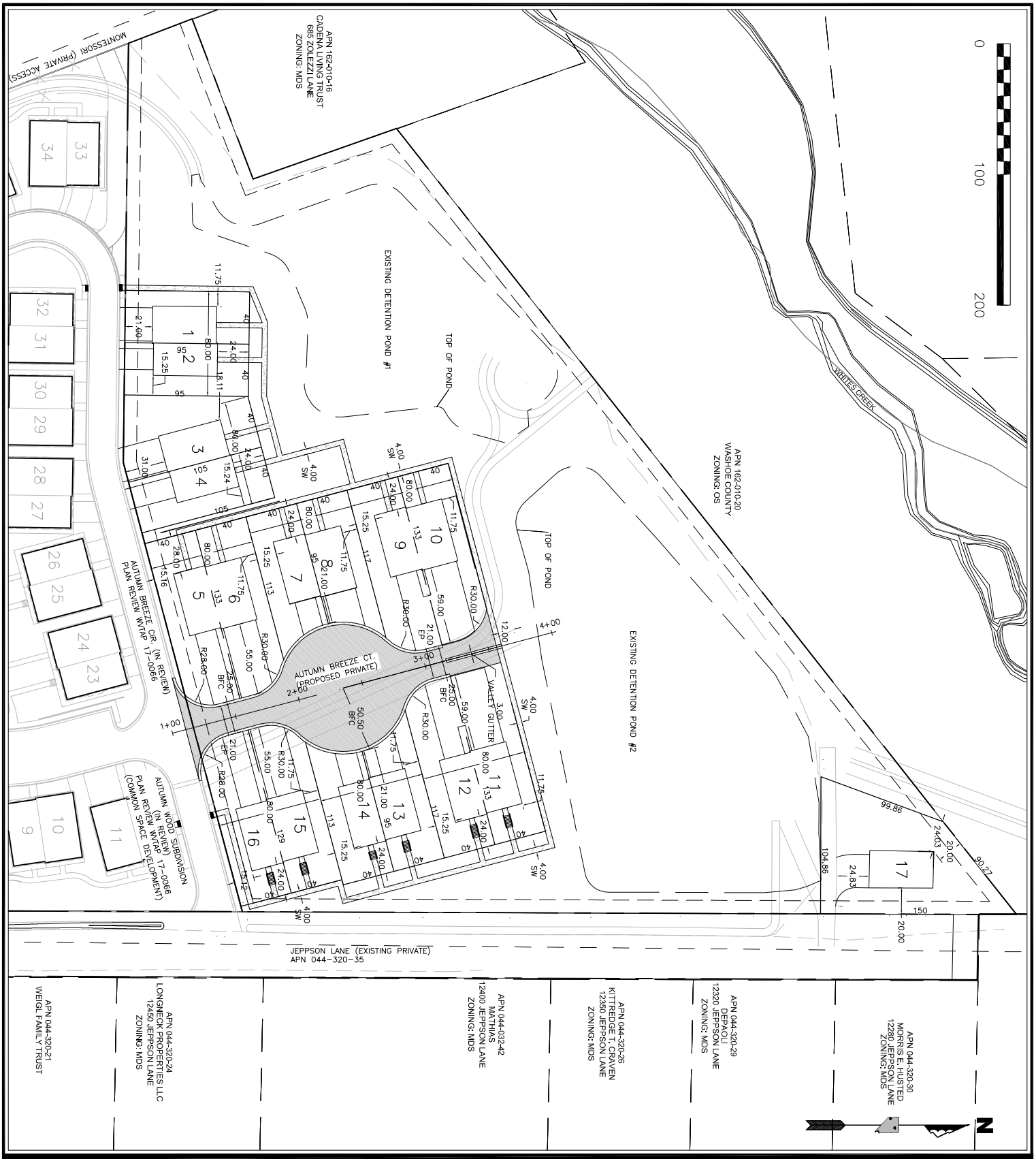
The design of the subdivision will provide for good pedestrian and emergency vehicle access to these surrounding uses.

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

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

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

To the extent possible, the design of the subdivision provides for future passive or natural heating or cooling opportunities. The layout is very much governed by the topographic conditions on the site which is the form of a 3% slope across the site.



TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
SITE PLAN

SCALE: 1"=100'

SUMMIT ENGINEERING CORPORATION
5405 MAE ANNE AVENUE, RENO, NV. 89523
PHONE:(775) 747-8550 FAX:(775) 747-8559

SHEET 1 OF 1

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Appendix

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Washoe County Development Application

Project Information

Project Name (commercial/industrial projects only):
Autumn Wood – Phase II

Project Description**: A Tentative Subdivsion Map and a Common Open Space Development project to create 17 single family lots.**

Project Address: No Address at this time

Project Area (acres or square feet): 5.83 acres

Location Information

Project Location (with point of reference to major cross streets **AND** area locator):
The 5.83 acre site is located on Jeppson Lane (private street) just north of Zolezzi Lane and west of the intersection with Arrowcreek Parkway

Assessor's Parcel No(s):	Parcel Acreage:	Assessor's Parcel No(s):	Parcel Acreage:
162-010-31	5.83 acres		

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

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

Applicant Information

Property Owner:	**Professional Consultant:**
Name: DR Horton, Inc	Name: KLS Planning & Design
Address: 5588 Longley Lane	Address: 1 East 1st St, Suite 1400
Reno, NV Zip: 89511	Reno, NV Zip: 89501
Phone: 775 856 8423 Fax: N/A	Phone: 852-7606 Fax: 852-7609
Email: THWarley@drhorton.com	**Email: : johnk@klsdesigngroup.com**
Cell: 775-225-9283 Other: N/A	Cell: 857- 7710 Other: N/A
Contact Person: Tom Warley	Contact Person: John F. Krmpotic, AICP
Applicant/Developer:	**Other Persons to be Contacted:**
Name: D.R. Horton, Inc	Name: Summit Engineering Corporation
Address: : 5588 Longley Lane	Address: 5405 Mae Anne Ave
Reno, Nv 89511	Reno, NV Zip: 89523
Phone: 856-8423 Fax: 844 -566-3365	Phone: 775-747-8550 Fax: N/A
Email: THWarley@drhorton.com	**Email: robert@summitnv.com**
Cell: 775 225-9283 Other: N/A	Cell: 775-560-6125 Other: N/A
Contact Person: Tom Warley	Contact Person: Robert Gelu, P.E.

For Office Use Only

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

Owner Affidavit

Project Name: Autumn Wood – Phase II

Application Type

❑ **Abandonment** (AB)	❑ **Final Map Certificate of Amendment** (CA)
❑ **Administrative Permit** (AP)	❑ **Final Map Major/Minor Amendment**
❑ **Agricultural Exemption Land Division** (AELD)	❑ **Final Subdivision Map/Const Plan Review**
❑ **Amendment of Conditions of Approval**	❑ **Parcel Map Waiver** (PM)
❑ **Boundary Line Adjustment** (BL)	❑ **Reversion to Acreage** (RA)
❑ **Cooperative Plan Amendment** (CP)	❑ **Special Use Permit** (SB/SW) ☐ with EIS/EA
❑ **Comprehensive Plan Amendment**	❑ **Specific Plan** (SP)
❑ Land Use Designation Change	❑ **Tentative Map of Div into Large Parcels** (DL)
❑ Text Change	❑ **Tentative Parcel Map** (PM)
❑ **Design Review Committee Submittal** (DRC)	❑ **Tentative Subdivision Map** (TM)
❑ **Development Agreement** (DA)	❑ Hillside Development ❑ Significant Hydrologic Resource
❑ **Development Code Amendment** (DC)	❑ Common Open Space Development
❑ **Ext of Time Requests (Approved Applications)**	❑ **Variance** (VA)
❑ **Ext of Time Requests (Tent Subdivision Maps)**	

The receipt of an application at the time of submittal does not imply the application complies with all requirements of the Washoe County Development Code, the Washoe County Comprehensive Plan or the applicable area plan, or that it is deemed complete and will be processed.

STATE OF NEVADA)
)
COUNTY OF WASHOE)

I,_____,
being duly sworn, depose and say that I am an owner* of property involved in this petition 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 the Department of Community Development staff.

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

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

- ❑ Owner
- ❑ Corporate Officer/Partner (Provide copy of record 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

Signed_____

Address_____

_____

Subscribed and sworn to before me this _____ day of _____, _____.

(Notary Stamp)

_____
Notary Public in and for said county and state

My commission expires:_____

Property Owner Affidavit

Applicant Name: D. R. Horton

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, Thomas H. Warley,
(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 Building.

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

Assessor Parcel Number(s): 162-010-31 and 044-320-35

Printed Name Thomas H. Warley

Signed

Address 5588 Longley Ln, Reno, NV 89511

Subscribed and sworn to before me this 8th day of May, 2019.

Thomas H. Warley, Asst. Secretary
DR Horton, Inc.
Notary Public in and for said county and state

(Notary Stamp)
TED S. BROWN
Notary Public - State of Nevada
Appointment Recorded in Washoe County
No: 9-38852-2 - Expires January 19, 2020

My commission expires: 01/19/2020

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

- ☐ Owner
- ☒ Corporate Officer/Partner (Provide copy of record 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

CERTIFICATE OF ASSISTANT SECRETARY

The undersigned hereby certifies as follows:

1. She is a duly elected, qualified and acting Assistant Secretary of D.R. Horton, Inc., a Delaware corporation *(the "Company")*, is familiar with the facts herein certified and is duly authorized to certify the same.

2. The following is a true, correct and complete copy of resolutions related to the subject matter as adopted by the Consent of Executive Committee of the Board of Directors of the Company dated August 25, 2017 *(the "Resolutions")*. The Resolutions have not been amended, rescinded or modified and remain in full force and effect as of the date hereof.

Election of Assistant Secretary

RESOLVED, that Tom Warley is hereby elected to the office of Assistant Secretary *(the "Assistant Secretary")* of the Company in the Company's Las Vegas Division *(the "Division")*, to serve until the next annual meeting of the directors of the Company and until his successor is duly elected and qualified or until his earlier death, resignation or removal.

RESOLVED FURTHER, that the Assistant Secretary is hereby authorized and empowered, in the Reno area *(the "Area")* of the Division and in the name and on behalf of (i) the Company, (ii) any partnership of which the Company is a general partner, manager or agent, and (iii) any limited liability company of which the Company is a member, manager or agent *(collectively, the "Entities")* to sign, modify and terminate, from time to time as he deems it to be in the best interest of the Entities, homeowner association documents, CC&Rs, subdivision agreements, utility agreements, condominium plans, all agency applications relating to development, construction contracts, purchase orders, consultant agreements, final maps, permits, engineering agreements and other similar or equivalent agreements or documents for the Area relating to the business of the Entities.

IN WITNESS WHEREOF, the undersigned has signed on the 11th day of September, 2017.

Ashley Dagley
Assistant Secretary

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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 site is located adjacent to Jeppson Lane (a private street owned by the applicant) but will be accessed from the Autumn Breeze Circle with a planned street connection to Jeppson Lane. This is located on APN 162-010-31, a 5.83-acre parcel.

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

Autumn Wood – Phase II

3. Density and lot design:

a. Acreage of project site	5.83
b. Total number of lots	17
c. Dwelling units per acre	2.91 gross density
d. Minimum and maximum area of proposed lots	Min is 3,800 sf; 5,372 sf is largest lot
e. Minimum width of proposed lots	40 feet
f. Average lot size	5,014 sf

4. Utilities:

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

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

   a. Acreage of common open space:

   5.83 acres which is 66% of the site

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

   Whites Creek is a water feature running thru on the site. There is a setback required for the Sensitive Stream Zone environment and two detention areas included on the site to serve as a broader neighborhood wide benefit in the case of major flooding. It does create more challenges in developing the site.

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

   Lots sizes range from 3,800 sf to 5,373 sf

   d. Average lot size:

   The average is 5,014 sf

   e. Proposed yard setbacks if different from standard:

   Front = 20’
   Side = 8’
   Rear = 20’

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

   None Proposed

   g. Identify all proposed non-residential uses:

   The only use is an attached single-family project. There is a walking path located in the common area adjacent to the project with several connections to the exterior sidewalk network.

   h. Improvements proposed for the common open space:

There is a walking path that will be designed at minimum grades to accommodate all types of users along with common area landscaping. The path plan was to have a connection to all of the streets for good circulation thru the neighborhood.

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

Please see the attached path on the tentative map.

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

The path is established in the common area and open for public use. It will connect all lots and streets to the exterior of the property. The intent is to have good integration in the neighborhood and to the exterior.

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

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

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

There is a 6’ tall open view fence proposed for the perimeter of the site. It is an intended design feature of the home builder to create an open feel of the project and open character.

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

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

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

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

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

❑ Yes	❑ No

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

❑ Yes	❑ No	If yes, within what city?

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

There is a SUP required to allow grading for the site. Specifically, there are 28,000 yds of material being excavated and mass grading of the entire site. Both, exceed the thresholds for a Grading SUP. That application is being submitted with this Tentative Map but as a separate application because it serves a purpose to address off-site drainage for the adjacent property to the south. So, it is not entirely stand alone for Autumn Wood Phase 2.

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

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

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

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

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

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

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

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

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

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

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

The project will contain only private roads that meet county standards, However, it will not be gated. There is only one existing road on the south side of the site and a court that serves access to the site.

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

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

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

We are not aware of any policies in the Southwest Truckee Meadows Area Plan that require compliance.

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

There are no applicable Southwest Truckee Meadows Area Plan modifiers that require compliance.

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

This project will be completed in one phase consisting of 17 lots for that phase and a total project with 17 lots.

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

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

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

❑ Yes	❑ No	If yes, include separate attachments.

Grading

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

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

Our prelim Grading Plan includes about 28,000 yards of excavation material and 5.83 acres of area being graded. See below.

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

There will not be export or import of material with this grading plan. Our civil engineers have expressed that they believe they will balance the site with grading. All disturbed areas on the site will be seeded or hydro seed as a minimum and many areas include plantings and landscaping

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

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

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

There is a maximum of 3:1 slope used for the detention areas. Those slopes will be treated with rock rip-rap for stabilization or an acceptable means based on accepted industry standards and county approval. The bottom of the basins will be treated with seed mix to reveg those areas.

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

There is no berming proposed or needed as the site is flat or minor slope of 3% across the site and the finished conditions are such that berming has no purpose in the project design.

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?

There will not be any rockery walls and or retaining walls per the grading plan.

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

There are trees being removed with the proposed project. It quantity is not known and a precise number will be determined.

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

Re-vegetation is being proposed that will include a seed mix shown on the landscape plan. Reveg is a typical seed mix for the bottom of the detention areas. We will agree to an industry application rate in terms of lbs/acre. Mulch is not appropriate for this application.

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

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

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

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

Tahoe Basin

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

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

N/A

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

❑ Yes	❑ No	If yes, which CP?

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

    a. Land Use:

N/A

    b. Transportation:

N/A

    c. Conservation:

N/A

d. Recreation:

N/A

e. Public Services:

N/A

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

N/A

35. Will this project remove or replace existing housing?

❑ Yes	❑ No	If yes, how many units?

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

None

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

Not applicable

Bill Detail

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

Washoe County Parcel Information

Parcel ID	Status	Last Update
16201031	Active	5/15/2018 2:06:41 AM

Current Owner:
D R HORTON INC
1081 WHITNEY RANCH DR 141
HENDERSON, NV 89014

SITUS:
0 ZOLEZZI LN
WCTY NV

Taxing District
4000

Geo CD:

Legal Description
Township 18 Section 17 Lot 2 Block Range 20 SubdivisionName _UNSPECIFIED

Installments

Period	Due Date	Tax Year	Tax	Penalty/Fee	Interest	Total Due
INST 1	8/21/2017	2017	$0.00	$0.00	$0.00	$0.00
INST 2	10/2/2017	2017	$0.00	$0.00	$0.00	$0.00
INST 3	1/1/2018	2017	$0.00	$0.00	$0.00	$0.00
INST 4	3/5/2018	2017	$0.00	$0.00	$0.00	$0.00
		Total Due:	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Tax Detail

	Gross Tax	Credit	Net Tax
State of Nevada	$173.44	$0.00	$173.44
Truckee Meadows Fire Dist	$550.94	($31.65)	$519.29
Washoe County	$1,419.88	$0.00	$1,419.88
Washoe County Sc	$1,161.56	$0.00	$1,161.56
TRUCKEE MDWS/SUN VALLEY WATER BASIN	$0.03	$0.00	$0.03
Total Tax	**$3,305.85**	**($31.65)**	**$3,274.20**

Payment History

Tax Year	Bill Number	Receipt Number	Amount Paid	Last Paid
2017	2017155867	B17.19253	$818.58	7/31/2017
2017	2017155867	B17.19255	$818.54	7/31/2017
2017	2017155867	B17.248594	$1,753.68	3/27/2018

Pay By Check

Please make checks payable to:
WASHOE COUNTY TREASURER

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

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

Change of Address

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

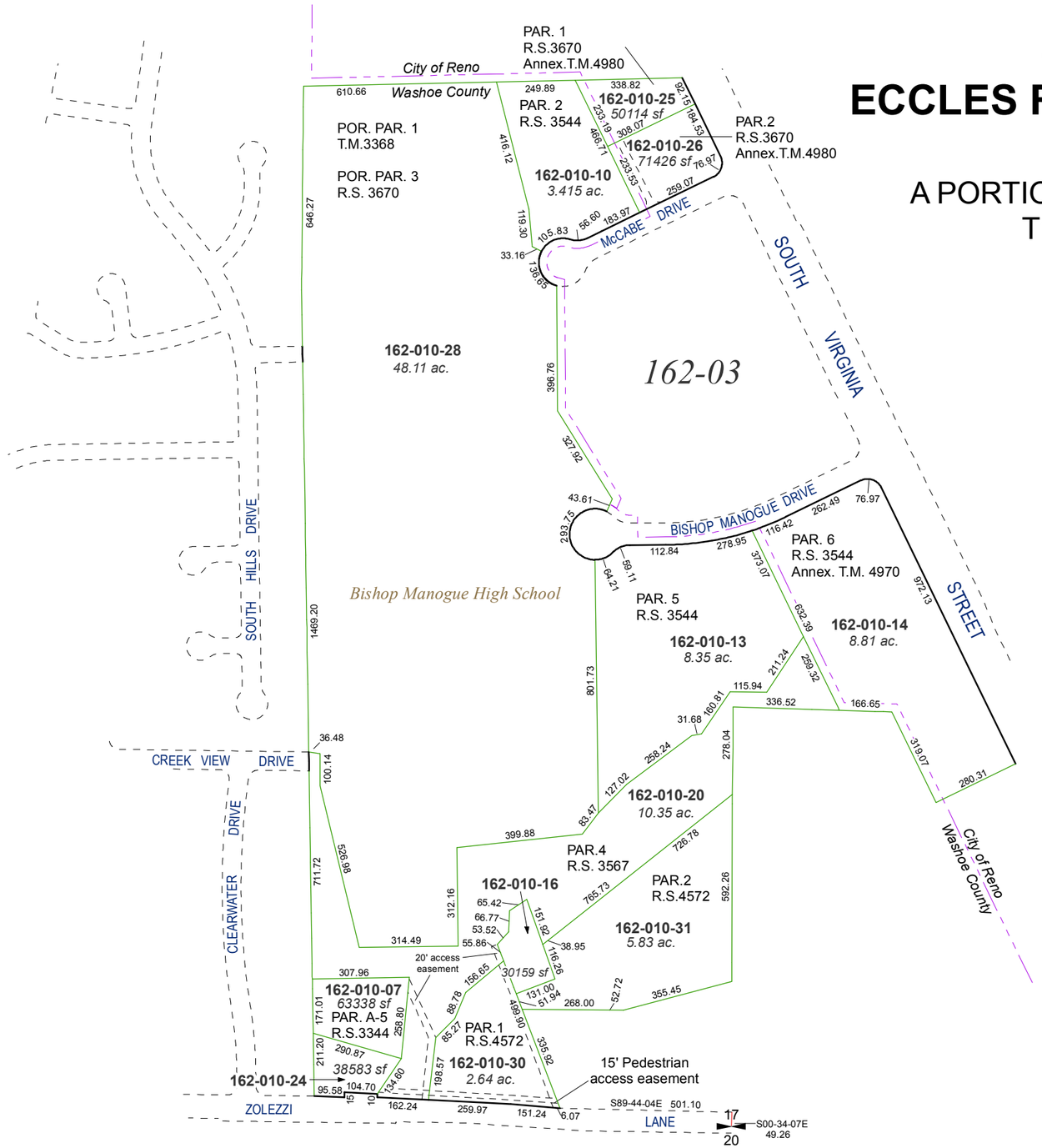
To submit your address change online click here

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

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

(#3368)
ECCLES RANCH ESTATES
UNIT 1

A PORTION OF SECTION 17
T18N - R20E



Assessor's Map Number

162-01

STATE OF NEVADA

WASHOE COUNTY

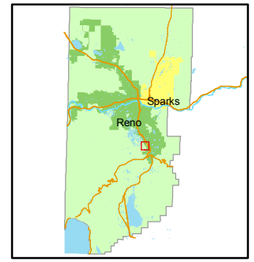
ASSESSOR'S OFFICE

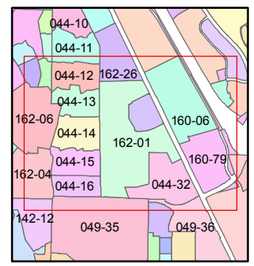
Joshua G. Wilson, Assessor

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

Feet
0 50 100 200 300 400

1 inch = 400 feet





created by: CFB 3/28/2011

last updated: NLH 7/15/11

area previously shown on map(s)

044-31

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.

Request to Reserve New Street Name(s)

The Applicant is responsible for all sign costs.

Applicant Information

Name: DR Horton

Address: 5588 Longley Lane

Reno, NV 89511

Phone (Home) : _____ Phone (Work): (775)683-9030

☐ 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.)

Autumn Breeze Ct.	
Autumn Breeze Dr.	

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: Autumn Wood Phase 2

☐ Reno ☐ Sparks ☑ Washoe County

Parcel Numbers: 162-00-31

☑ 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 Department of Public Works

Post Office Box 11130 - 1001 E. Ninth Street

Reno, NV 89520-0027

Phone: (775) 328-2344 Please email form to: Addressing@washoecounty.us

TENTATIVE MAP PLANS
FOR
AUTUMN WOOD PHASE 2
WASHOE CO.
RENO
NEVADA

OWNER / DEVELOPER

D.R. HORTON
5588 LONGLEY LANE
RENO, NV 89511
(775) 683-9030

ENGINEER

SUMMIT ENGINEERING CORPORATION

GENERAL NOTES

1. THESE NOTES CONTAIN INFORMATION NECESSARY FOR THE PROPER EXECUTION OF THE WORK CONTAINED ON THESE IMPROVEMENT PLANS. THESE NOTES APPLY TO ALL PLAN SHEETS. ADDITIONAL CONSTRUCTION NOTES MAY ALSO BE SHOWN ON INDIVIDUAL PLAN SHEETS. THE CONTRACTOR IS RESPONSIBLE TO READ AND COMPLY WITH ALL NOTES SHOWN ON THIS SET OF PLANS. THE TERM "CONTRACTOR", AS USED IN THESE NOTES AND ELSEWHERE IN THIS PLAN SET, MEANS THE GENERAL CONTRACTOR AND ALL SUBCONTRACTORS AND INDIVIDUALS AUTHORIZED TO PERFORM WORK SHOWN ON THESE IMPROVEMENT PLANS. THE CONTRACTOR IS RESPONSIBLE TO COMPLY WILL ALL NOTES APPLICABLE TO HIS/HER WORK. ALL CONTRACTORS ARE DIRECTED TO CONTACT THIS ENGINEER FOR ANY QUESTIONS REGARDING THE STATED OR IMPLIED MEANING OF ANY NOTE OR OTHER INFORMATION CONTAINED ON THESE IMPROVEMENT PLANS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSURE THAT HIS/HER CONTRACT FOR SERVICES INCLUDES THE RESPONSIBILITIES DEFINED BY THE APPLICABLE NOTES.
2. THE CONTRACTOR IS RESPONSIBLE FOR THE MEANS AND METHODS OF CONSTRUCTION AND THE SAFETY OF ALL CONSTRUCTION PERSONNEL IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL CODES. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE ALL NECESSARY TRAFFIC AND PEDESTRIAN CONTROL DURING CONSTRUCTION INCLUDING WARNING SIGNS AND CONSTRUCTION FENCING WHERE REQUIRED.
3. THE EXISTING UTILITIES SHOWN ON THESE IMPROVEMENT PLANS WERE OBTAINED FROM VARIOUS SOURCES AND SHOULD BE FIELD VERIFIED PRIOR TO MAKING ANY NECESSARY CONNECTIONS. THE LOCAL UTILITY COMPANY SHOULD BE CONTACTED PRIOR TO REMOVING, REPLACING, RELOCATING OR CONNECTING TO, ANY EXISTING UTILITY. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY UTILITY CONFLICTS DISCOVERED.
4. IT IS THE INTENT OF THESE SPECIFICATIONS AND IMPROVEMENT PLANS THAT THE WORK PERFORMED UNDER THE CONTRACT SHALL RESULT IN A COMPLETE OPERATING SYSTEM IN SATISFACTORY WORKING CONDITION WITH RESPECT TO THE FUNCTIONAL PURPOSES OF THE INSTALLATION. IF THERE ARE ANY QUESTIONS REGARDING THE STATED OR IMPLIED MEANING OF THESE PLANS, THE CONTRACTOR IS DIRECTED TO CONTACT THE CONSULTING ENGINEER IMMEDIATELY.
5. SHOULD ANY HISTORIC OR PREHISTORIC REMAINS OR ARTIFACTS BE DISCOVERED DURING SITE DEVELOPMENT, WORK SHALL TEMPORARILY BE HALTED AT THE SPECIFIC SITE AND THE STATE HISTORIC PRESERVATION OFFICE OF THE DEPARTMENT OF MUSEUMS, LIBRARY AND ARTS, SHALL BE NOTIFIED TO RECORD AND PHOTOGRAPH THE SITE. THE PERIOD OF TEMPORARY DELAY SHALL BE LIMITED TO A MAXIMUM OF TWO WORKING DAYS FROM THE DATE OF NOTIFICATION.
6. NO MATERIALS OF ANY KIND SHALL BE STOCKPILED OR CONSTRUCTION EQUIPMENT PARKED ON CONCRETE OR ASPHALT SURFACES TO BE DEDICATED TO WASHOE COUNTY.
7. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT ALL IMPROVEMENTS ARE CONSTRUCTED ACCORDING TO THESE PLANS AND DETAILS. ANY CHANGES TO THE LOCATION (HORIZONTAL OR VERTICAL), OR ANY OTHER PLAN DESIGNATION, SHALL BE APPROVED BY THE ENGINEER PRIOR TO PROCEEDING WITH THE WORK. THE CONTRACTOR IS RESPONSIBLE TO KEEP THE NECESSARY RECORDS TO ENABLE THE ENGINEER TO PREPARE AS-BUILT DRAWINGS OF THE FINAL CONSTRUCTED IMPROVEMENTS.
8. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING CONFORMANCE WITH ALL PERMITS, INCLUDING GRADING PERMIT, STREET CUT PERMITS, BUILDING PERMITS, DUST CONTROL PERMIT, AND THE STORM WATER DISCHARGE PERMIT (ISSUED BY THE STATE OF NEVADA DIVISION OF ENVIRONMENTAL PROTECTION).
9. ALL BUILDABLE LOTS AND PARCELS WITHIN AN APPROVED SUBDIVISION REQUIRE THAT THE INDIVIDUAL BUILDING SITE PLOT PLANS SUBMITTED FOR BUILDING PERMITS SHALL SHOW ALL FINISH GRADE ELEVATIONS, HIGH POINT LOCATIONS, AND DRAINAGE SWALE LOCATIONS WITH A MINIMUM SLOPE OF 1.0%. THE INFORMATION SHALL BE SHOWN ON BOTH THE INDIVIDUAL PLOT PLANS AND THE APPROVED CONSTRUCTION GRADING PLANS. ALL APPROVED CONSTRUCTION PLANS AND INDIVIDUAL PLOT PLANS SHALL BE STAMPED BY A NEVADA REGISTERED CIVIL ENGINEER.
10. ALL PARCELS WITHIN AN APPROVED SUBDIVISION SHALL REQUIRE THAT A NEVADA REGISTERED CIVIL ENGINEER OR A NEVADA REGISTERED LAND SURVEYOR SUBMIT A CERTIFICATION LETTER TO THE BUILDING OFFICIAL PRIOR TO THE SCHEDULING OF INSPECTIONS FOR THE FOLLOWING:
    1.1 SOILS INVESTIGATION REPORT INDICATING SOILS CLASSIFICATION AND DESIGN PRIOR TO THE FOUNDATION INSPECTION.
    1.2 ELEVATION, GRADING, AND DRAINAGE CERTIFICATION PER THE APPROVED CONSTRUCTION PLANS PRIOR TO THE ISSUANCE OF A CERTIFICATE.
    2. NEVADA REGISTERED CIVIL ENGINEER OR A NEVADA REGISTERED LAND SURVEYOR TO CERTIFY:
    2.1 FOUNDATION ELEVATION AND BUILDING SETBACK CERTIFICATION AS PER THE APPROVED PLOT PLAN PRIOR TO THE FOUNDATION INSPECTION.
11. THE CONTRACTOR SHALL PROVIDE A 30' FIRE BREAK AROUND THE LIMITS OF THE CONSTRUCTION PHASE CLEARED OF ALL COMBUSTIBLE MATERIAL INCLUDING WEEDS AND BRUSH PER THE REQUIREMENTS OF THE TRUCKEE MEADOWS FIRE DEPARTMENT. THE CONTRACTOR SHALL MAINTAIN THE 30' FIRE BREAK DURING ALL CONSTRUCTION OF THE CONSTRUCTION PHASE. AFTER ALL CONSTRUCTION HAS BEEN COMPLETED THE HOMEOWNER'S ASSOCIATION SHALL MAINTAIN THE FIRE BREAKS.
12. NO GRADING OR CONSTRUCTION TRAFFIC SHALL OCCUR OUTSIDE THE LIMITS OF THE PHASE OTHER THAN THE DELIVERY OF MATERIALS OR THE REMOVAL OF TRASH BY MEANS OF THE CONSTRUCTION HAUL ROUTE. THIS DEVELOPMENT SHALL UTILIZE THE DAMONTE RANCH PKWY EXIT, THEN ZOLEZZI LANE TO THE AUTUMNWOOD BOUNDARY. TEMPORARY DIRT ROADS WILL THEN BE UTILIZED FROM THE PROJECT BOUNDARY TO THE CONSTRUCTION SITE. GRAVEL APRONS SHALL BE PLACED AT ANY LOCATION WHERE CONSTRUCTION TRAFFIC EXITS TO A PAVED STREET OR OTHER ACCESS. GRAVEL APRONS SHALL BE OF SUFFICIENT AREA AND DEPTH TO PREVENT THE TRACKING OF SEDIMENT AND DEBRIS BEYOND THE CONSTRUCTION SITE.
13. THE DEVELOPER IS RESPONSIBLE TO RETAIN THE SERVICES OF THE ENGINEER OF RECORD TO PROVIDE ALL REQUIRED TESTING AND INSPECTION OF GRADING AND CONSTRUCTION NOT INSPECTED DIRECTLY BY WASHOE COUNTY OR TMWA. THE CONTRACTOR SHALL PROVIDE ANY INSPECTING ENTITY 48 HOURS ADVANCE NOTICE OF ANY REQUIRED TESTING OR INSPECTION.
14. ALL GRADING AND CONSTRUCTION SHALL BE DONE IN ACCORDANCE WITH THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (PWC) AND THE LATEST DETAILS FOR (PWC) ADOPTED BY WASHOE COUNTY, AND THE "GEOTECHNICAL DESIGN UPDATE 2, ZOLEZZI 46" DATED 08-28-2017 AND "FUTURE POND LOCATION BORING, ZOLEZZI 46" DATED 10-04-2017, BOTH PREPARED BY WOOD RODGERS. AS WELL AS THE "GEOTECHNICAL INVESTIGATION PROPOSED AUTUMN WOODS DUETS", PREPARED BY PEZONELLA, DATED 01-04-2007. ALL SEWER CONSTRUCTION SHALL ALSO CONFORM TO THE WASHOE COUNTY DEPARTMENT OF PUBLIC WORKS UTILITY DIVISION DESIGN STANDARDS AND REVIEW GUIDELINES FOR WASTEWATER SYSTEMS. ALL WATER CONSTRUCTION SHALL ALSO CONFORM TO THE REQUIREMENTS OF TMWA.
15. IN ORDER TO EXPEDITE THE INSPECTION AND TESTING OF MATERIALS, THE CONTRACTOR SHALL FURNISH COMPLETE STATEMENTS TO THE GEOTECHNICAL ENGINEER AS TO THE ORIGIN, COMPOSITION AND MANUFACTURE OF ALL MATERIALS TO BE USED IN THE WORK. SUCH STATEMENTS SHALL BE FURNISHED PROMPTLY AFTER EXECUTION OF THE CONTRACT, BUT IN ALL CASES PRIOR TO DELIVERY OF SUCH MATERIALS.
16. AREAS TO BE GRADED SHALL BE CLEARED OF ALL SURFACE VEGETATION AND DEBRIS. THIS DEBRIS IS TO BE DISPOSED OF IN CONFORMANCE WITH WASHOE COUNTY REGULATIONS OR PLACED IN APPROVED NON-STRUCTURAL FILL AREAS IF SHOWN ON THE APPROVED GRADING PLANS.
17. ALL GRADING WITHIN PROPOSED STREET RIGHT-OF WAYS AND OTHER STRUCTURAL AREAS SHALL BE TO SUBGRADE ELEVATIONS. REFER TO THE DETAIL SHEETS FOR SPECIFIC INFORMATION ON SUBGRADE ELEVATIONS. SOIL WITHIN TWO FEET OF SUBGRADE ELEVATIONS MUST MEET THE REQUIREMENTS FOR STRUCTURAL FILL AS DEFINED IN THE GEOTECHNICAL INVESTIGATION AND AS VERIFIED IN THE FIELD BY THE GEOTECHNICAL FIELD INSPECTOR. INDIVIDUAL LOTS SHALL BE GRADED SUCH THAT THERE WILL BE NO IMPORT OF MATERIAL REQUIRED TO COMPLETE THE FINAL LOT GRADING TO THE FINISHED GRADES NOTED ON THE PLANS AFTER THE FOUNDATION IS POURED. THIS MAY BE ACCOMPLISHED BY STOCKPILING BACKFILL ON THE LOT OR LEAVING THE PADS AT 6 TO 12 INCHES ABOVE BOTTOM OF FOOTING GRADE FOR CAN-OUT BY THE CONCRETE CONTRACTOR. THE GRADING CONTRACTOR SHALL WORK OUT A SPECIFIC PLAN FOR THIS OPERATION WITH THE DEVELOPER PRIOR TO CONSTRUCTION. SOIL WITHIN THREE FEET OF BOTTOM OF FOOTING MUST ALSO MEET THE REQUIREMENTS FOR STRUCTURAL FILL TO BE VERIFIED BY THE FIELD INSPECTOR. GRADING WITHIN DETENTION BASINS AND OTHER REVEGETATED AREAS SHALL BE TO THE FINISHED GRADES NOTED ON THE PLANS AND MUST BE READY TO RECEIVE REVEGETATION WITHIN 15 DAYS OF COMPLETION.
18. DRAINAGE: THE CONTRACTOR SHALL MAINTAIN ALL EXISTING DRAINAGE FACILITIES WITHIN THE CONSTRUCTION AREA UNTIL NEW DRAINAGE IMPROVEMENTS ARE IN PLACE AND FUNCTIONING. NO FENCE OR OTHER OBSTRUCTION WHICH INTERFERES WITH DRAINAGE SHALL BE ALLOWED WITHIN A DRAINAGE OR STORM DRAIN EASEMENT. STORM RUNOFF FROM THE CONSTRUCTION AREA SHALL BE CONTROLLED AT ALL TIMES TO PREVENT THE TRANSPORT OF SEDIMENT AND DEBRIS TO EXISTING PAVED STREETS, STORM DRAIN SYSTEMS OR NATURAL DRAINAGE WAYS. SPECIFIC DETAILS OF STRAW BALE DAMS ARE INCLUDED IN THIS PLAN SET. STRAW BALE DAMS ARE THE MINIMUM PROTECTION REQUIRED. SILT FENCING OR OTHER APPROVED METHODS WILL BE REQUIRED IF SEDIMENT CAN NOT BE ADEQUATELY CONTROLLED BY STRAW BALE DAMS. ALL SEDIMENT CONTROL DEVICES SHALL BE CLEANED AND MAINTAINED PERIODICALLY DURING CONSTRUCTION AND IMMEDIATELY AFTER ANY RAINSTORM. AT THE COMPLETION OF CONSTRUCTION, ALL NEW STORM DRAIN SYSTEMS SHALL BE CLEANED PRIOR TO DEDICATION TO WASHOE COUNTY.
19. ALL STORM DRAIN INLETS AND OUTLETS SHALL BE ARMOURED WITH GROUTED ROCK RIP-RAP (SIZE AND QUANTITY AS NOTED ON THE PLANS) AND SHALL BE GROUTED OR APPLIED OVER A LAYER OF MIRAFI 140N OR EQUIVALENT FABRIC.
20. THE CONTRACTOR SHALL MAINTAIN A 24-HOUR DUST CONTROL PROGRAM IN CONFORMITY WITH SECTION 40.030 OF THE WASHOE COUNTY AIR POLLUTION REGULATIONS AND THE APPROVED DUST CONTROL PERMIT FOR THE PROJECT. DUST SHALL BE CONTROLLED AT ALL TIMES BY DIRECT WATERING OF AREAS DISTURBED BY GRADING OPERATIONS. OPEN WATERING SHALL BE BY WATER TRUCK OR PRESSURE IRRIGATION SYSTEM. AREAS DESIGNATED FOR REVEGETATION SHALL BE REVEGETATED WITHIN 15 DAYS OF COMPLETION OF GRADING. AREAS NOT TO RECEIVE PERMANENT REVEGETATION SHALL BE TREATED WITH AN APPROVED DUST PALLIATIVE WITHIN 15 DAYS OF COMPLETION OF GRADING OPERATIONS. A LIST OF ACCEPTABLE DUST PALLIATIVES CAN BE OBTAINED FROM THE WASHOE COUNTY AIR QUALITY DIVISION.
21. SLOPE STABILIZATION AND REVEGETATION: ALL DISTURBED AREAS OUTSIDE THE PROPOSED STREET RIGHT OF WAYS AND LOT AREAS, INCLUDING DETENTION BASINS AND TEMPORARY DITCHES SHALL BE PERMANENTLY REVEGETATED WITHIN 15 DAYS OF COMPLETION OF GRADING OPERATIONS USING THE SEED MIX AND APPLICATION INSTRUCTIONS SHOWN BELOW. TEMPORARY IRRIGATION IS RECOMMENDED FOR AT LEAST TWO GROWING SEASONS TO ENSURE THE SUCCESS OF THE SEEDING.

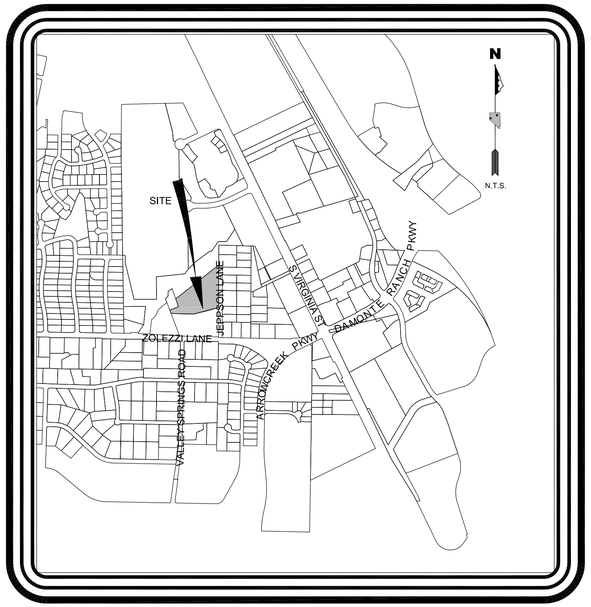
SPECIES	LBS PER ACRE
GRASSES	
WHEAT GRASS CRESTED/BLUEBUNCH WHEAT GRASS	4
WHEAT GRASS SIBERIAN P-27	4
BLUEGRASS CANBY/SANDBERG	4
FESCUE SHEEP COVER	4
WILDRYE GREAT BASIN MAGNAR/NATIVE	2
RYEGRASS ANNUAL (NURSE CROP)	8
SHRUBS	
SAGEBRUSH BASIN	0.5
RABBIT BRUSH	0.5
SALT BUSH FOURWING	3
BITTER BRUSH	0.5
SPINY HIPSAGE	0.5
FLOWERS	
DRYLAND AGGRESSIVE BLEND	1
	32 LBS PER ACRE

MULCH SHALL CONSIST OF DEGRADABLE GREEN DYED CELLULOSE FIBER (RECYCLED NEWSPAPER) (AGRI-FIBER BY GREENSTONE INDUSTRIES OAE). MULCH SHALL BE FREE FROM WEEDS OR OTHER FOREIGN MATTER TOXIC TO SEED GERMINATION AND SUITABLE FOR HYDROMULCHING. APPLY AT A RATE OF 2,000 LBS PER ACRE. MULCH APPLICATION SHALL INCLUDE 15-30-5 FERTILIZER AT AN APPLICATION RATE OF 30 LBS PER ACRE.

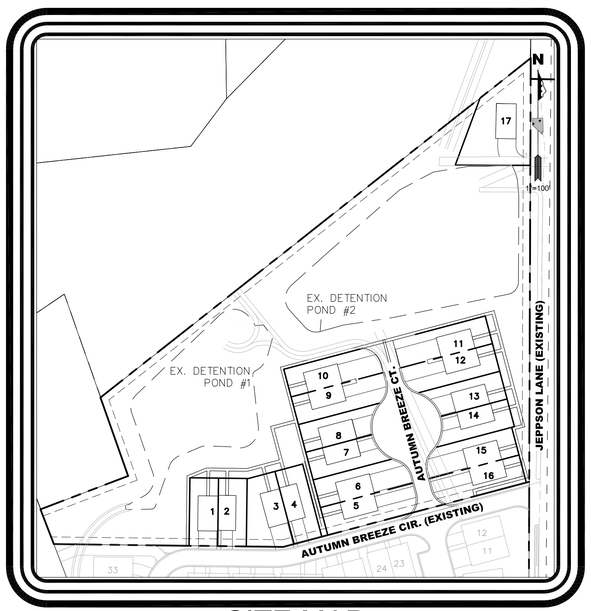
SOIL AND MULCH TACKIFIER SHALL BE USED AT A RATE OF 100 LBS PER ACRE FOR HYDRAULIC APPLICATION OF SEED, WOOD FIBER MULCH, AND TACKIFIER TO STABILIZE THE SOIL SURFACE, AND SHALL CONSIST OF AT LEAST THREE DIFFERENT BUT COMPLIMENTARY ACTIVE HYDROCOLLOIDS FROM NATURAL PLANT SOURCES. THE COMBINATION SHALL EXHIBIT SWELLING AND LUBRICITY QUALITIES WHEN HYDRATED IN WATER SLURRY, AND WHEN DRY ON THE SOIL SURFACE SHALL FORM LOOSE CONNECTING FIBRALS IN A CHAIN-LIKE TACKING FILM, AS MANUFACTURED BY RECLAMARE COMPANY UNDER THE TRADE NAME J-TAC, OR APPROVED EQUAL, AND SHALL CONTAIN NO GERMINATION OR GROWTH INHIBITING FACTORS.

ALL FILL DIRT IMPORTED AS PART OF THE PROJECT IS REQUIRED TO BE "CERTIFIED WEED FREE."

BEST MANAGEMENT PRACTICES WILL BE USED TO PREVENT THE SPREAD OF NOXIOUS AND INVASIVE WEEDS DURING CONSTRUCTION ACTIVITIES.



VICINITY MAP



SITE MAP

ABBREVIATIONS

AC	ASPHALTIC CONCRETE
AGG.	AGGREGATE
BC	BEGIN CURVE
BF	BOTTOM OF FOOTING
BVC	BEGIN VERTICAL CURVE
BW	BOTTOM OF WALL
CB	CATCH BASIN
CBU	CLUSTER BOX UNIT
℄	CENTERLINE
CONC.	CONCRETE
CONST.	CONSTRUCT
ELEV.	ELEVATION
EC	END OF CURVE
EVC	END OF VERTICAL CURVE
EXIST.	EXISTING
(e)	EXISTING
FF	FINISHED FLOOR
FFC	FRONT FACE OF CURB
FG	FINISHED GRADE
FHA	FIRE HYDRANT
FL	FLOW LINE
FLG	FLANGE
G	GAS
GB	GRADE BREAK
HP	HIGH POINT
IE	INVERT ELEVATION
LF	LINEAL FEET
LP	LOW POINT
LT.	LEFT
MH	MANHOLE
P	PAD ELEVATION
PI	POINT OF INTERSECTION
PRC	POINT OF REVERSE CURVATURE
PVC	POLYVINYL CHLORIDE PIPE
PO	PUSH ON
P.U.E.	PUBLIC UTILITY EASEMENT
℗	PROPERTY LINE
Q10	10-YEAR STORM FLOW
Q100	100-YEAR STORM FLOW
(R)	RADIAL
R	RADIUS
REF.	REFERENCE
RCP	REINFORCED CONCRETE PIPE
RP	RADIUS POINT
RT.	RIGHT
R/W	RIGHT OF WAY
S	SLOPE
SS	SANITARY SEWER
SW	SIDEWALK
STA.	STATION
SD	STORM DRAIN
TBC	TOP OF BACK OF CURB
TC	TOP OF CURB
TYP	TYPICAL
VC	VERTICAL CURVE
VPI	VERTICAL POINT OF INTERSECTION
W	WATER
Δ	CURVE DELTA

SHEET INDEX

BASIS OF BEARINGS

NORTH AMERICAN DATUM OF 1983 (NAD83), NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE AND USING A COMBINED GRID-TO-GROUND SCALE FACTOR OF 1.000197939 TO SCALE THE STATE PLANE GRID COORDINATES TO GROUND. GROUND COORDINATES AT THIS SITE ARE 0.16 FOOT GREATER IN NORTHING AND 0.14 LESSER IN EASTING THAN COORDINATES DETERMINED USING THE WASHOE COUNTY PUBLISHED NAD83/94 LATITUDE AND LONGITUDE OF 39°25'17.995250" NORTH AND 119° 45' 12.030210" WEST FOR REGIONAL GPS CORS "WSZOLEZZI" (WASHOE COUNTY IDENTIFIER S62SM01279).

BASIS OF ELEVATION

NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND HOLDING THE CITY OF RENO MARCH 2017 PUBLISHED ELEVATION OF 4513.49 FEET FOR CITY OF RENO BENCHMARK 2308, A 1 1/2 INCH STEEL CAP IN THE TOP OF THE CURB, NEAR THE SOUTHERLY CURB RETURN ON SOUTH VIRGINIA STREET AT THE SOUTHWEST OF THE INTERSECTION WITH HOLCOMB LANE

SPECIFICATIONS

ALL CONSTRUCTION SHALL CONFORM TO THE LATEST ADOPTED EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION SPONSORED AND DISTRIBUTED BY RENO, SPARKS, AND WASHOE COUNTY, AS WELL AS TO THE RECOMMENDATIONS ESTABLISHED BY THE SOILS INVESTIGATION OF THIS SITE DATED JANUARY 4, 2007, AND THE GEOTECHNICAL DESIGN UPDATE REPORTS DATED JUNE 19, 2017 AND OCTOBER 04, 2017.

ENGINEER'S STATEMENT

THESE PLANS (SHEETS T-1 OF 6 AND C-1 OF 6 HAVE BEEN PREPARED IN ACCORDANCE WITH COUNTY COMMISSION CONDITIONS OF APPROVAL, WITH ACCEPTED ENGINEERING PROCEDURES AND GUIDELINES, AND ARE IN SUBSTANTIAL COMPLIANCE WITH APPLICABLE STATUTES, COUNTY ORDINANCES, AND CODES. IN THE EVENT OF CONFLICT BETWEEN ANY PORTION OF THESE PLANS AND COUNTY CODES, THE COUNTY CODES SHALL PREVAIL.

ROBERT GELU — P.E. #17741

PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT GELU
Exp. 6-30-19
CIVIL
No. 17741

USA NORTH 811 Call Before You Dig

SUMMIT ENGINEERING CORPORATION
5405 MAE ANNE AVENUE, SUITE 100, RENO, NEVADA 89523 PHONE: (775) 746-3500 FAX: (775) 746-3520

DESIGNED BY: MS
DRAWN BY: SD
CHECKED BY: RG

NEVADA

TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
TITLE SHEET

WASHOE COUNTY

REV.	DATE	DESCRIPTION	BY	APPR'D

SCALE
HORIZ:
VERT:
JOB NO: J-30552

SHEET T-1 OF 6

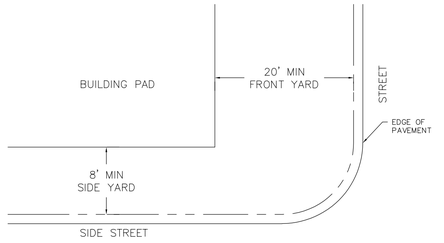
N:\DWGS\J30552_DR\Horton_Zolezzi2\Civil\T2 TITLE BLOCK.DWG - 12:15 PM * 01-MAY-2018

PROJECT INFO

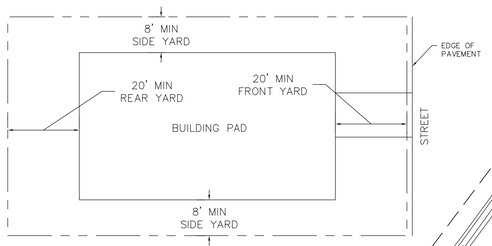
MIN. LOT SIZE:	3600 SF
MIN. SETBACKS:	
REAR YARD:	20 FT
FRONT YARD:	20 FT
SIDE YARD:	8 FT
MIN LOT WIDTH:	40 FT
MIN. DRIVEWAY LENGTH:	20 FT

APN:	162-01-31
ADDRESS:	0 ZOLEZZI LANE
	WASHOE COUNTY, NV 89511
NUMBER OF LOTS:	17
TOTAL AREA:	5.83 AC
LOT AREA:	1.94 AC
PAVED AREA:	0.26 AC
COMMON AREA:	3.63 AC
ZONING:	MDS

COMMON OPEN SPACE DEVELOPMENT
AVERAGE LOT SIZE: 5014 SF
LARGEST LOT SIZE: 10219 SF
SMALLEST LOT SIZE: 3800 SF



CORNER LOT MINIMUM SETBACKS



TYPICAL LOT WITH MINIMUM SETBACKS

USA NORTH 811 Call Before You Dig

SUMMIT ENGINEERING CORPORATION
5405 MAE ANNE AVENUE RENO, NV 89523 PHONE (775) 746-3500 FAX (775) 746-3520

DESIGNED BY: MS
DRAWN BY: SD
CHECKED BY: RG

TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
SITE PLAN

WASHOE COUNTY NEVADA

REV.	DATE	DESCRIPTION	BY	APP'D

SCALE
HORIZ: 1" = 40'
VERT:

JOB NO: J-30552

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SHEET C-1 OF 6

PROFESSIONAL ENGINEER STATE OF NEVADA
ROBERT GELU
Exp. 6-30-19
CIVIL
No. 17741

GENERAL NOTES:

THE CONTRACTOR SHALL MAINTAIN A DUST CONTROL PROGRAM, INCLUDING WATERING OF OPEN AREAS. THE CONTRACTOR SHALL ALSO MAINTAIN CONFORMITY WITH ALL APPLICABLE AIR QUALITY AND POLLUTION REGULATIONS.

THE CONTRACTOR SHALL MAINTAIN AN ONGOING PROCESS OF REMOVAL OF ALL SPILLAGE OF EXCAVATION MATERIAL ON ALL PAVED STREETS.

THE INSPECTION AND TESTING OF SOILS SHALL BE TO THE WASHOE COUNTY SPECIFICATIONS.

LAND GRADING SHALL BE DONE IN A METHOD TO PREVENT DUST FROM TRAVERSING THE PROPERTY LINE.

THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY PERMITS AND FEES REQUIRED FOR CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED PUBLIC ENTITIES AND THE ENGINEER OF RECORD 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.

THE CONTRACTOR SHALL VERIFY IN FIELD, ALL ELEVATIONS, DIMENSIONS, FLOW LINES, EXISTING CONDITIONS, AND POINTS OF CONNECTIONS WITH ADJOINING PROPERTY (PUBLIC OR PRIVATE), ANY DISCREPANCIES SHALL BE CALLED TO THE ATTENTION OF THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

THE CONTRACTOR SHALL NOTIFY THE PROJECT ENGINEER, THE SOILS ENGINEER, WASHOE COUNTY, AND NV ENERGY 48 HOURS PRIOR TO COMMENCEMENT OF WORK.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGE TO EXISTING UTILITIES ENCOUNTERED DURING CONSTRUCTION. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO CONTACT THE UTILITY COMPANIES FOR LOCATIONS OR POTHOLING PRIOR TO CONSTRUCTION.

ADD 4500 FEET TO ALL SPOT ELEVATIONS.

ALL RETAINING WALLS SHALL BE DESIGNED BY A STRUCTURAL ENGINEER AND SUBMITTED TO THE WASHOE COUNTY UNDER A SEPARATE PERMIT.

- INDICATES A DEEPENED FOOTING
- INDICATES MODEL 2451 CREST ONLY
- "BW" INDICATES BOTTOM OF WALL GRADE @ FINISH GRADE AND DOES NOT INCLUDE THE FOOTING DEPTH REF. STRUCTURAL ENGINEERING PLANS FOR DESIGN OF FOOTINGS AND FABRIC REINFORCEMENT. (TYPICAL OF ALL WALLS)

VOIDS IN ALL ROCKERY WALLS SHALL BE FILLED BY PLACING SMALLER ROCK WITHIN 6" OF THE FACE FOR THE ENTIRE HEIGHT OF THE ROCK WALLS

REFERENCE WALL SHEETS FOR ADDITIONAL WALL GRADING.

REF C-5 FOR ALL SECTIONS SHOWN ON THESE PLANS

ALL RETAINING WALLS AND ALL CUTS INTO STABLE ROCK MATERIAL THAT DO NOT REQUIRE STABILIZATION BY MEANS OF RETAINING WALLS SHALL BE TREATED WITH "PERMEON" SIMULATED DESERT VARNISH OR AN EQUIVALENT ROCK STAIN PRODUCT TO ENSURE THAT ALL NEWLY EXPOSED ROCK SURFACES AND ALL ROCKERY WALLS MATCH THE COLOR OF THE SURROUNDING HILLSIDE AS CLOSELY AS PRACTICABLE.

GROUTED RIP RAP SHALL BE USED TO PREVENT EROSION AT THE INLET AND OUTLET OF ALL CULVERTS.

SHOULD ANY PREHISTORIC REMAINS/ARTIFACTS BE DISCOVERED DURING SITE DEVELOPMENT, WORK SHALL TEMPORARILY BE HALTED AT THE SPECIFIC SITE AND THE STATE HISTORIC PRESERVATION OFFICE OF THE DEPARTMENT OF MUSEUMS, LIBRARY AND ARTS, SHALL BE NOTIFIED TO RECORD AND PHOTOGRAPH THE SITE. THE PERIOD OF TEMPORARY DELAY SHALL BE LIMITED TO A MAXIMUM OF TWO (2) WORKING DAYS FROM THE DATE OF NOTIFICATION.

NO HABITABLE STRUCTURES SHALL BE LOCATED ON A FAULT THAT HAS BEEN ACTIVE DURING THE HOLOCENE EPOCH OF GEOLOGICAL TIME.

FENCES ON THE PROPERTY LINES OF THE INDIVIDUAL HOMES ARE OPTIONAL AND WILL BE UNIFORMLY DECIDED UPON AT THE FINAL MAP STAGE OR WITH INDIVIDUAL PLOT PLANS.

LEGEND

- AC PAVEMENT AREA
- CONCRETE AREA
- GRADE BREAK
- CATCH BASIN (HOLLOW IF EXISTING)
- 2 — LOT NUMBER
- 52.00 TC / 51.50 FC — PROPOSED ELEV. @ FRONT/BACK FACE TOP OF CURB
- 51.00 GB — PROPOSED ELEV. @ GRADE BREAK
- 50.00 FG — PROPOSED ELEV. @ FINISHED GRADE
- 4500 — EXISTING CONTOUR LINE W/ ELEVATION
- 4500 — PROPOSED CONTOUR LINE W/ ELEVATION
- PEDESTRIAN RAMP FOR THE DISABLED
- SD — STORM DRAIN (DASHED IF EXISTING)
- 2% — SWALE
- 2% — CL W/ SLOPE

GRADING QUANTITIES

EXCAVATION: 777 CY
FILL: 2090 CY
TOTAL DISTURBED AREA: 96589 SF

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0 40 80 120 160 200

APN 044-320-41
BRENNAN
12200 JEPPSON LANE
PAR. B P.M. 1610
ZONING: MDS

APN 044-320-30
MORRIS E. HUSTED
12280 JEPPSON LANE
ZONING: MDS

APN 044-320-29
DEPAOLI
12320 JEPPSON LANE
ZONING: MDS

APN 044-320-26
KITTREDGE T. CRAVEN
12350 JEPPSON LANE
ZONING: MDS

APN 044-032-42
MATHIAS
12408 JEPPSON LANE
ZONING: MDS

APN 044-320-24
LONGNECK PROPERTIES LLC
12450 JEPPSON LANE
ZONING: MDS

APN 044-320-21

APN 162-010-20
WASHOE COUNTY
ZONING: OS

APN 162-010-16
CADENA LIVING TRUST
685 ZOLEZZI LANE
ZONING: MDS

APN 162-010-30
SIERRA NEVADA MONTESSORI SCHOOL
565 ZOLEZZI LANE
ZONING: MDS

WHITES CREEK

30.0' CRITICAL STREAM BUFFER

150 SENSITIVE STREAM BUFFER

EXISTING DETENTION POND #2
TOP OF POND=4559.00
100 YR W.S.E.=4558.00
VOLUME=191559 CF

EXISTING DETENTION POND #1
TOP OF POND=4569.00
100 YR W.S.E.=4568.00
VOLUME=137888 CF

LIMITS OF GRADING

DEEPENED FOOTING
NO GRADING INSIDE SENSITIVE STREAM BUFFER

AUTUMN BREEZE CT. (PROPOSED PRIVATE)

AUTUMN BREEZE CIR. (IN REVIEW)
PLAN REVIEW WVTAP 17-0066

AUTUMN WOOD SUBDIVISION (IN REVIEW)
PLAN REVIEW WVTAP 17-0066
(COMMON SPACE DEVELOPMENT)

JEPPSON LANE (EXISTING PRIVATE)
APN 044-320-35

MONTESSORI (PRIVATE)

17 FG=4561.00
1 2 FG=4580.68
3 4 FG=4578.03
5 6 FG=4573.65
7 8 FG=4573.27
9 10 FG=4572.51
11 12 FG=4568.24
13 14 FG=4568.93
15 16 FG=4569.68

EX. BUILDING

DROPPED GARAGE

2' LANDSCAPE WALL

8" THICK SIDEWALK

TOP OF POND

N

SUMMIT ENGINEERING CORPORATION
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DESIGNED BY: MS
DRAWN BY: SD
CHECKED BY: RG

TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
GRADING PLAN

NEVADA
WASHOE COUNTY

REV.	DATE	DESCRIPTION	BY	APP'D

SCALE
HORIZ: 1" = 40'
VERT:

JOB NO. J-30552

SHEET C-2 OF 6

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ROBERT DEER Exp. 6-30-19 CIVIL PROFESSIONAL ENGINEER - STATE OF NEVADA No. 17747

LEGEND

- SANITARY SEWER W/SIZE & DIRECTION INDICATOR (DASHED IF EXISTING)
- STORM DRAIN W/SIZE & DIRECTION INDICATOR (DASHED IF EXISTING)
- MANHOLE (HOLLOW IF EXISTING)
- SEWER LATERAL W/ DISTANCE FROM UPSTREAM MANHOLE
- CATCH BASIN (HOLLOW IF EXISTING)
- FIRE HYDRANT
- LOT NUMBER
- SINGLE WATER SERVICE
- DOUBLE WATER SERVICE
- IRRIGATION SLEEVE
- HANDICAP RAMP
- (e) EXISTING
- (f) FUTURE
- 8"W WATER MAIN IN COMMON TRENCH WITH GAS (W/ DIRECTION INDICATED, DASHED IF EXISTING)
- GATE VALVE
- FLUSH VALVE
- THRUST BLOCK
- AIR/VAC ASSEMBLY

GENERAL UTILITY NOTES

1. THIS IS A PARTIAL LIST OF GENERAL NOTES RELATED TO CONSTRUCTION. REFER TO SHEET T-1 FOR ADDITIONAL GENERAL NOTES RELATED TO CONSTRUCTION.
2. SAND AND GRAVEL BARRIERS SHALL BE USED AT THE INLETS TO ANY EXISTING OR PROPOSED STORM DRAIN RECEIVING RUNOFF FROM THE CONSTRUCTION AREA TO CONTROL SEDIMENT TRANSPORT. STRAW BALE DAMS SHALL BE MAINTAINED UNTIL THE COMPLETION OF PERMANENT EROSION CONTROL AND STREET PAVING. REFER TO THE EROSION CONTROL NOTES ON SHEET C-2 FOR MORE SPECIFIC INFORMATION.
3. GAS IS SHOWN FOR APPROXIMATE LOCATION ONLY. REFER TO DESIGN PLANS BY NV ENERGY FOR FINAL GAS SIZING, CONSTRUCTION NOTES, DETAILS, AND SPECIFICATIONS.
4. AS-BUILT DRAWINGS SHALL BE SUPPLIED TO THE WASHOE COUNTY COMMUNITY SERVICES DEPARTMENT PRIOR TO ACCEPTANCE OF SEWER IMPROVEMENTS. THE AS-BUILT DRAWINGS WILL BE PREPARED BY THIS ENGINEER BASED ON FIELD INFORMATION SUPPLIED BY THE CONTRACTOR WITH RESPECT TO THE FOLLOWING:
   1. DIMENSION FROM DOWNSTREAM SSMH TO EACH SEWER LATERAL.
   2. ANY CHANGES TO THE LOCATION OF SSMH'S OR DIMENSION BETWEEN SSMH'S.
   3. ANY CHANGES TO INVERT ELEVATIONS, PIPE SLOPE OR ALIGNMENT.
   4. ANY CHANGES IN PIPE OR MANHOLE SIZE OR TYPE.
5. A PRECONSTRUCTION CONFERENCE SHALL BE HELD WITH WASHOE COUNTY ENGINEERING, TMWA, AND NV ENERGY PRIOR TO CONSTRUCTION.
6. WATER AND SEWER (SANITARY OR STORM) SEPARATION REQUIREMENTS:
   A. A MINIMUM HORIZONTAL SEPARATION OF 10 FEET (AS MEASURED FROM THE OUTSIDE OF THE PIPES) SHALL BE MAINTAINED BETWEEN ALL WATER AND SEWER MAINS RUNNING PARALLEL TO EACH OTHER. IF THE SEWER MAIN IS AT LEAST 18 INCHES BELOW THE WATER MAIN, THE HORIZONTAL SEPARATION MAY BE REDUCED TO 5 FEET, BUT ONLY IF FIELD CONDITIONS PROHIBIT THE STANDARD 10 FEET SEPARATION AND WITH APPROVAL OF THE WATER UTILITY.
   B. WHERE WATER LINES CROSS OVER SEWER LINES WITH A MINIMUM OF 18 INCHES VERTICAL CLEARANCE, NO SPECIAL CONDITIONS APPLY.
   C. WHERE WATER LINES CROSS OVER SEWER LINES WITH LESS THAN 18 INCHES OF CLEARANCE OR WHERE WATER LINES CROSS UNDER SEWER LINES, SEWER AND STORM DRAIN MAIN PIPE LENGTHS AND SLOPES ARE MEASURED FROM CENTER TO CENTER OF MANHOLES AND ARE ROUNDED TO THE NEAREST LINEAL FOOT. CATCH BASIN LATERAL LENGTHS ARE MEASURED FROM INSIDE EDGE OF CATCH BASIN TO INSIDE EDGE OF MANHOLE AND ARE ROUNDED TO THE NEAREST LINEAL FOOT.

ALL CATCH BASIN LATERALS SHALL BE SDR 35 PVC UNLESS NOTED OTHERWISE.

ALL IMPROVEMENTS SHALL REQUIRE FIELD INSPECTION DURING INSTALLATION. THE FOLLOWING ENTITIES ARE RESPONSIBLE FOR INSPECTION AND SHALL BE GIVEN PROPER ADVANCE NOTIFICATION.

7. SANITARY SEWER: WASHOE COUNTY COMMUNITY SERVICES DEPARTMENT WATER: TRUCKEE MEADOWS WATER AUTHORITY; GAS AND ELECTRIC: NV ENERGY; TELEPHONE AND CABLE TV: AT&T CABLE ALL OTHER IMPROVEMENTS: WASHOE COUNTY COMMUNITY SERVIES DEPARTMENT.

NO IMPROVEMENTS WILL BE ACCEPTED WITHOUT THE NECESSARY INSPECTIONS. FAILURE TO OBTAIN INSPECTIONS COULD RESULT IN THE REMOVAL OF IMPROVEMENTS AT THE CONTRACTOR'S EXPENSE.

STORM DRAIN NOTES

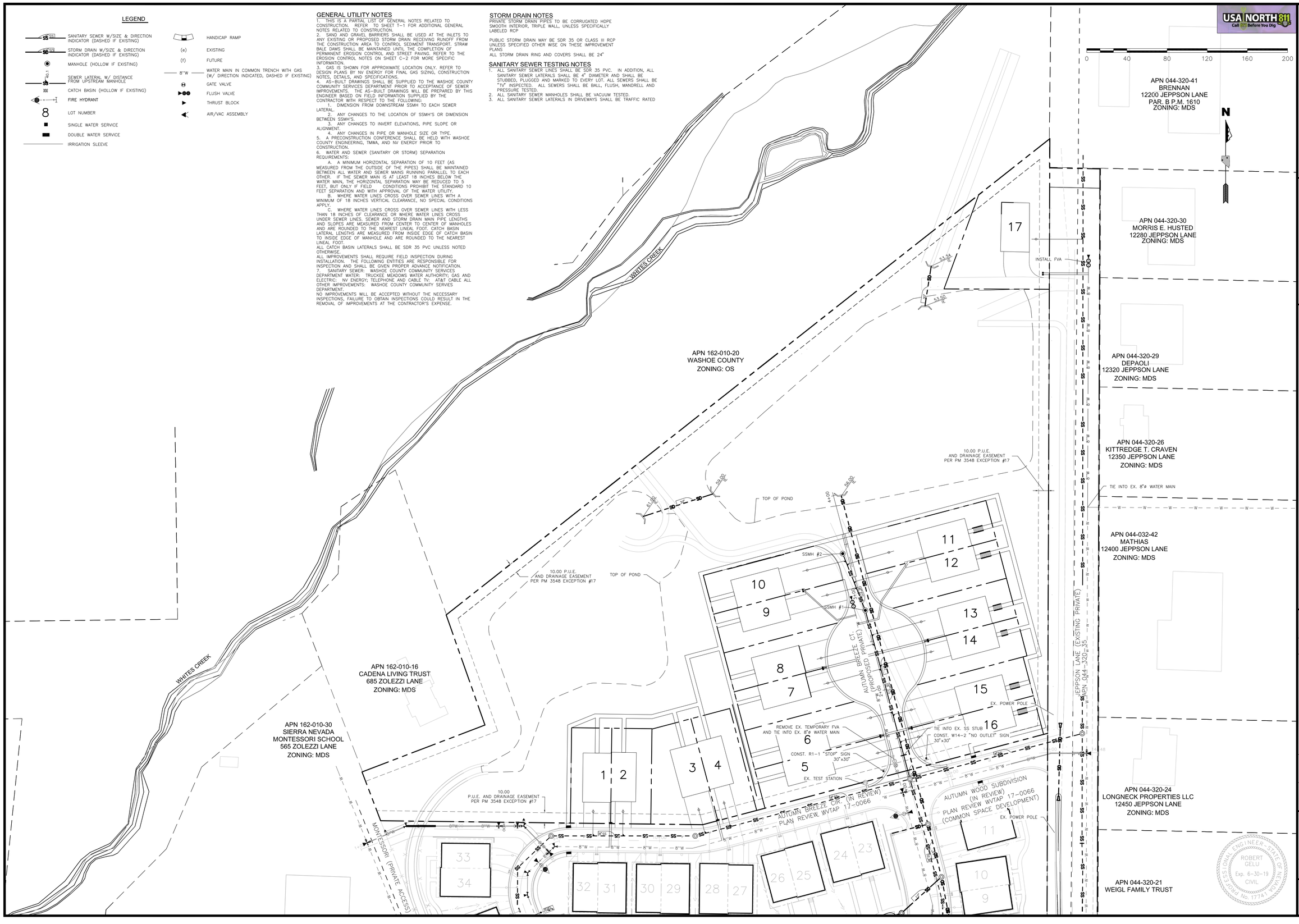
PRIVATE STORM DRAIN PIPES TO BE CORRUGATED HDPE SMOOTH INTERIOR, TRIPLE WALL, UNLESS SPECIFICALLY LABELED RCP

PUBLIC STORM DRAIN MAY BE SDR 35 OR CLASS III RCP UNLESS SPECIFIED OTHER WISE ON THESE IMPROVEMENT PLANS

ALL STORM DRAIN RING AND COVERS SHALL BE 24"

SANITARY SEWER TESTING NOTES

1. ALL SANITARY SEWER LINES SHALL BE SDR 35 PVC. IN ADDITION, ALL SANITARY SEWER LATERALS SHALL BE 4" DIAMETER AND SHALL BE STUBBED, PLUGGED AND MARKED TO EVERY LOT. ALL SEWERS SHALL BE "TV" INSPECTED. ALL SEWERS SHALL BE BALL, FLUSH, MANDRELL AND PRESSURE TESTED.
2. ALL SANITARY SEWER MANHOLES SHALL BE VACUUM TESTED.
3. ALL SANITARY SEWER LATERALS IN DRIVEWAYS SHALL BE TRAFFIC RATED



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CHECKED BY:	RG
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TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
UTILITY PLAN

NEVADA

WASHOE COUNTY

REV.	DATE	DESCRIPTION	BY	APP'D

SCALE
HORIZ: 1" = 40'
VERT:

JOB NO: J-30552

SHEET C-3 OF 6

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Exp. 6-30-19
CIVIL
No. 17741
PROFESSIONAL ENGINEER - STATE OF NEVADA

LEGEND

Symbol	Description
	INSTALL CONSTRUCTION SITE ENTRANCE & EXIT (BMP SC-8)
	RIPRAP AREA (BMP EC-7)
	INSTALL FIBER ROLLS (BMP SC-1)
	INSTALL REVEGETATION (BMP EC-8)
SWM	SOLID AND DEMOLITION WASTE MANAGEMENT (BMP GM-3)
	STORM DRAIN INLET PROTECTION (BMP DP-3)
	SAND AND GRAVEL BAG BARRIERS (BMP SC-3)
CWM	HANDLING AND DISPOSAL OF CONCRETE AND CEMENT (BMP GM-9)
SM	STOCKPILE MANAGEMENT (BMP GM-2)
SS	SANITARY/SEPTIC WASTE MANAGEMENT (BMP GM-14)
	PROPERTY BOUNDARY / RIGHT OF WAY
	INSTALL SILT FENCE (BMP SC-5)
SWEEP	STREET & SURFACE CLEANING (BMP GM-5)

SWPPP NOTES

1. STANDARD NOTE NO. 1: THE OWNER, SITE DEVELOPER, CONTRACTOR AND/OR THEIR AUTHORIZED AGENTS SHALL EACH DAY REMOVE ALL SEDIMENT, MUD, CONSTRUCTION DEBRIS, OR OTHER POTENTIAL POLLUTANTS THAT MAY HAVE BEEN DISCHARGED TO, OR ACCUMULATE IN, THE PUBLIC RIGHTS OF WAYS OF WASHOE COUNTY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS SITE DEVELOPMENT OR CONSTRUCTION PROJECT. SUCH MATERIALS SHALL BE PREVENTED FROM ENTERING THE STORM DRAIN SYSTEM.

2. STANDARD NOTE NO. 2: ADDITIONAL CONSTRUCTION SITE DISCHARGE MANAGEMENT PRACTICES MAY BE REQUIRED OF THE OWNER AND HIS OR HER AGENTS DUE TO UNFORESEEN EROSION PROBLEMS OR IF THE SUBMITTED PLAN DOES NOT MEET THE PERFORMANCE STANDARDS SPECIFIED IN WASHOE COUNTY ORDINANCE NO. 1223 AND THE MOST CURRENT EDITION OF THE "TRUCKEE MEADOWS CONSTRUCTION SITE BEST MANAGEMENT PRACTICES HANDBOOK.

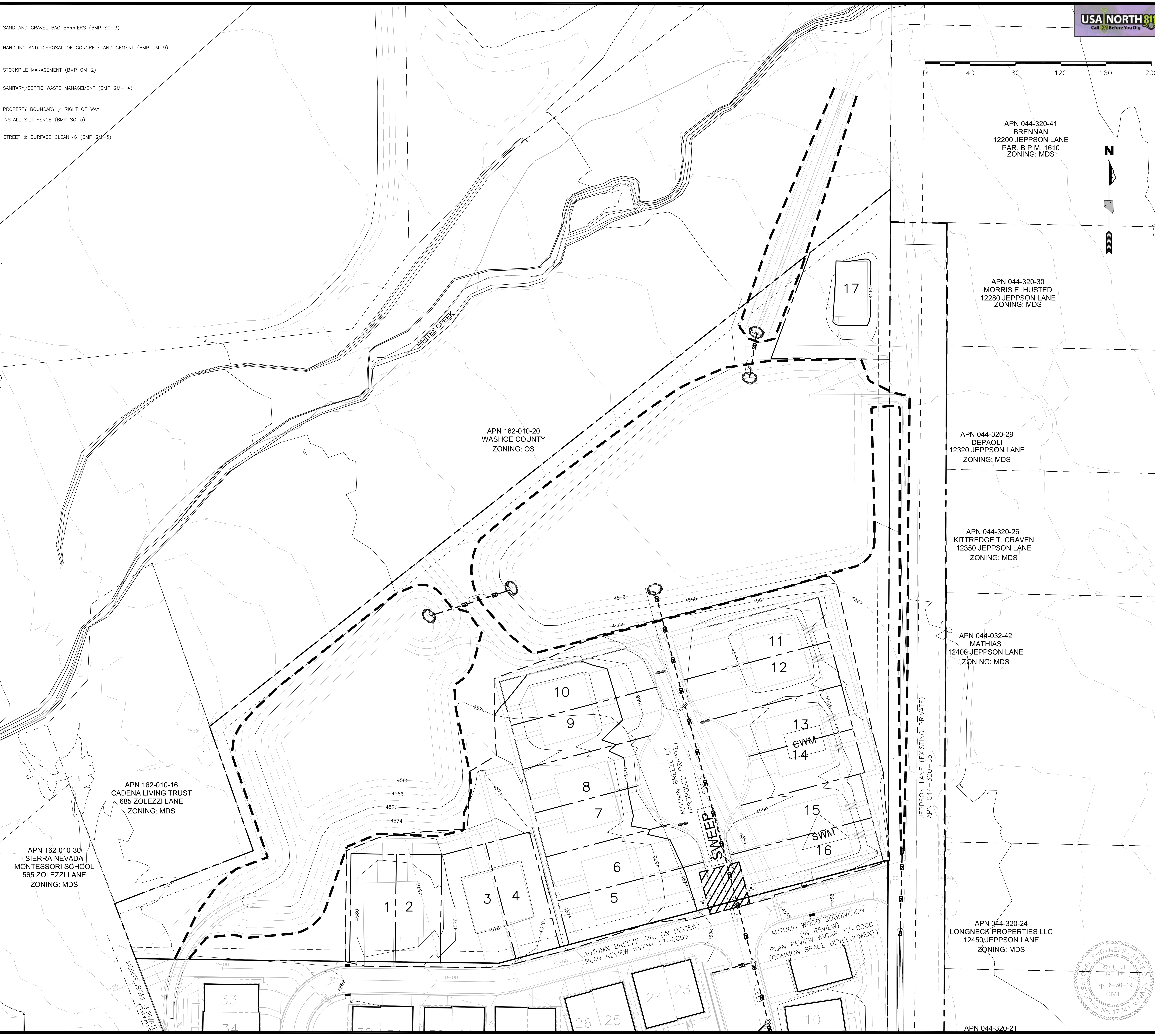
3. STANDARD NOTE NO. 3: TEMPORARY OR PERMANENT STABILIZATION PRACTICES WILL BE INSTALLED ON DISTURBED AREAS AS SOON AS PRACTICABLE AND NO LATER THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS TEMPORARILY OR PERMANENTLY CEASED. SOME EXCEPTIONS MAY APPLY; REFER TO STORMWATER GENERAL PERMIT NVR100000, SECTION 3.1.2.

4. STANDARD NOTE NO. 4: AT A MINIMUM, THE CONTRACTOR OR HIS AGENT SHALL INSPECT ALL DISTURBED AREAS, AREAS USED FOR STORAGE OF MATERIALS AND EQUIPMENT THAT ARE EXPOSED TO PRECIPITATION, VEHICLE ENTRANCE AND EXIT LOCATIONS AND ALL BMP'S WEEKLY, PRIOR TO A FORECASTED RAIN EVENT AND WITHIN 24 HOURS AFTER ANY ACTUAL RAIN EVENT. THE CONTRACTOR OR HIS AGENT SHALL UPDATE OR MODIFY THE STORM WATER POLLUTION PREVENTION PLAN AS NECESSARY. SOME EXCEPTIONS TO WEEKLY INSPECTIONS MAY APPLY, SUCH AS FROZEN GROUND CONDITIONS OR SUSPENSION OF LAND DISTURBANCE ACTIVITIES. REFER TO STORM WATER GENERAL PERMIT NVR100000, SECTION 5.2.2.

5. STANDARD NOTE NO. 5: ACCUMULATED SEDIMENT IN BMP's SHALL BE REMOVED AND PROPERLY DISPOSED OF AT REGULAR INTERVALS, WITHIN SEVEN DAYS AFTER A STORM WATER RUNOFF EVENT, AND PRIOR TO THE NEXT ANTICIPATED STORM EVENT. SEDIMENT MUST BE REMOVED WHEN BMP CAPACITY HAS BEEN REDUCED BY 50 PERCENT OR MORE.

6. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL HAVE IN PLACE ALL NECESSARY BEST MANAGEMENT PRACTICES THAT SHALL BE USED TO MINIMIZE DUST, PREVENT EROSION AND PREVENT POLLUTION LADEN RUNOFF FROM ENTERING THE ADJACENT STORM DRAIN FACILITIES. BMP'S MAY INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING: (1) SILT FENCING OR STRAW WADDLES AT THE DOWNHILL LIMITS OF GRADING, (2) STABILIZED CONSTRUCTION SITE ENTRY/EXIT, (3) PERMANENT SLOPE REVEGETATION ON ALL DISTURBED AREAS, (4) INLET PROTECTION AT EXISTING CATCH BASINS, (5) STOCKPILE MANAGEMENT BMP'S, (6) DUST CONTROL BMP'S, (7) A CONCRETE WASHOUT AREA, AND (8) MEASURES TO PROTECT EXISTING NATIVE VEGETATION. THE CONTRACTOR SHALL MAINTAIN, REPAIR, REPLACE, SUBSTITUTE OR SUPPLEMENT BMP'S AT THE CONSTRUCTION SITE AS CONDITIONS WARRANT DURING CONSTRUCTION.

7. CONTRACTOR TO UTILIZE THE EXISTING CONCRETE DISPOSAL AREA PROVIDED BY THE AUTUMNWOOD PROJECT.



TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
EROSION CONTROL PLAN

WASHOE COUNTY NEVADA

SUMMIT ENGINEERING CORPORATION™
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SHEET C-4 OF 6

PROFESSIONAL ENGINEER - STATE OF NEVADA
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CIVIL
No. 17741

SECTION A–A'
ACROSS SITE

SECTION B–B'
ALONG SITE

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TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
CROSS SECTIONS

NEVADA
WASHOE COUNTY

REV.	DATE	DESCRIPTION	BY	APP'D

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SHEET C-5
OF 6

PROFESSIONAL ENGINEER - STATE OF NEVADA
ROBERT GELLI
Exp. 6-30-19
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No. 17741

LANDSCAPE LEGEND

DECIDUOUS SHADE TREE
- PLATANUS X ACERFOLIA 'BLOODGOOD'/LONDON PLANE
- QUERCUS RUBRA/NORTHERN RED OAK

FLOWERING ORNAMENTAL TREE
- MALUS IOENSIS 'PRAIRIE ROSE'/FRUITLESS CRABAPPLE
- PRUNUS CERASIFERA/FLOWERING PLUM
- PYRUS CALLERYANA/FLOWERING PEAR

EVERGREEN TREE
- PICEA PUNGENS/BLUE SPRUCE
- PINUS NIGRA/AUSTRIAN PINE

NARROW EVERGREEN TREE
- PINUS STROBUS 'FASTIGIATA'/COLUMNAR WHITE PINE

SHRUB PLANTING BEDS WITH ROCK OR DECOMPOSED GRANITE MULCH
- ARONIA ARBUTIFOLIA/RED CHOKECHERRY
- BUXUS X 'GREEN MOUNTAIN'/BOXWOOD
- CORNUS SERICEA 'ISANTI'/RED TWIG DOGWOOD
- COTONEASTER DAMMERII/CREEPING COTONEASTER
- EUONYMUS FORTUNEI/WINTERCREEPER
- JUNIPERUS CHINENSIS BLUE CHIP/BLUE CHIP JUNIPER
- ROSA X GROUNDCOVER/RED GROUNDCOVER ROSE

PERIMETER LANDSCAPING - ADAPTIVE NATIVE PLANTS
- ELAEGNUS PUNGEN 'FRUITLANDII' - FRUITLAND SILVERBERRY
- FALLUGIA PARADOXA - APACHE PLUME
- PEROVSKIA ATRIPLICIFOLIA - RUSSIAN SAGE
- RIBES AUREUM - GOLDEN CURRENT
- SHEPHERDIA ARGENTEA - SILVER BUFFALOBERRY

TURF GRASS - OPTIONAL BY OWNER

NOTES:
- 50% DECIDUOUS TREES & EVERGREEN TREES SHALL BE 2" CALIPER OR 7' HEIGHT
- 50% DECIDUOUS TREES & EVERGREEN TREES MAY BE 1" CALIPER OR 5' HEIGHT
- SHRUBS: 1 GALLON MINIMUM

LANDSCAPE DATA

SITE AREA: 2.2 ACRES SQ FT
ZONING: MF MULTI FAMILY

PROVIDED LANDSCAPE AREA: 19,166 SQ FT+
- 20% OF DEVELOPED AREA

TREES REQUIRED: 35 TREES
- 15 (1 TREE PER 50 LINEAR FEET OF STREET FRONTAGE = 725 LF)
- 10 (ALL YARDS ADJOINING STREET: 1 TREE PER 50 LF OF STREET FRONTAGE = 484)
  10 (1 TREE PER 50 LF OF PRIVATE STREET FRONTAGE = 243 X 2)

TREES PROVIDED: 35 MIN.

SHRUBS: 100% GROUND COVERAGE AFTER 3 YEARS.

GENERAL NOTES

1) ALL PLANTING AND IRRIGATION SHALL BE INSTALLED PER LOCAL GOVERNING CODES.

2) 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).

3) ALL PLANTER BEDS WILL RECEIVE 4" DEPTH OF MULCH WITH WEED CONTROL.

4) ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED UNLESS NOTED OTHERWISE ON THE PLAN. TURF GRASS WILL BE IRRIGATED USING LOW ANGLE SPRAY, ROTARY, AND/OR IMPACT HEADS TO REDUCE WIND DRIFT. CONTAINER PLANTINGS WILL BE DRIP IRRIGATED. A REDUCED-PRESSURE-TYPE BACKFLOW PREVENTOR WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.

L.A. Studio Nevada
the landscape architecture studio
1552 C Street
Sparks, NV 89431
(775) 323-2223
www.lastudionevada.com
NV RLA #440

Nevada

Preliminary Landscape Plan

Autumn Wood Phase 2

DR Horton America's Builder

Washoe Co.

Reno

No.	Revision Date

LA No: 155-544-04-18
Designed: KRD
Drawn: KRD
Checked: RAH
Date: 5/11/18

Sheet
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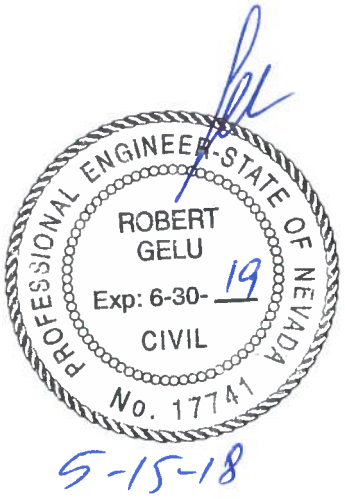
of
1

PRELIMINARY HYDROLOGY REPORT
FOR
AUTUMN WOOD PHASE 2

PREPARED FOR:

DR HORTON
5588 LONGLEY LANE
RENO, NEVADA 89519

PREPARED BY:



SUMMIT ENGINEERING CORPORATION

5405 MAE ANNE AVENUE
RENO, NEVADA 89523
(775) 747 – 8550

MAY 15, 2018

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INTRODUCTION

The following report presents the results of the hydrologic analysis for Autumn Wood Phase 2 subdivision. The Autumn Wood subdivision consists of 16 single-family attached residential units and one single-family residence. Runoff from the existing road, Autumn Breeze Circle (reference Site Map), will flow to Autumn Breeze Ct.

All flows collected on-site will be carried to the existing lower detention basin #2 north of the Autumn Wood development.

Flows behind the lots on the east side of the development will be collected and carried by the existing roadside ditch on the respective end of the development. The ditch will carry all flows along Jeppson Lane and into the detention pond.

The off-site hydrology was analyzed in the DEW Hydrology Report *Autumn Woods Project* dated 12/7/17 and revised on 05/11/18.

HYDROLOGY METHODOLOGY

Rational Method

The hydrology was determined using the *Truckee Meadows Regional Drainage Manual* (TMRDM) and the "Rational Method". The parameters for the Rational Method of analysis are:

1. The Drainage Area
2. Time of Concentration
3. Runoff Coefficient
4. Rainfall Intensity

The time of concentration is calculated using the TMRDM. The equations for determining the t_c are:

t_c = the lesser of $t_c = t_i + t_t$ where $t_i = \frac{1.8(1.1-R)L^{1/2}}{S^{1/3}}$ and $t_t = \frac{L}{60V}$

Or for urbanized basins $t_c = \frac{L}{180} + 10$

$t_{c\ min.}$ = 10 min. for urbanized basins and 10 min. for non-urban watersheds

Where:

L = the travel distance (ft)

V = channel or overland velocity (fps) (obtained from *FlowMaster* –Appendix B)

R = 5-year runoff coefficient (C_5)

S = average overland basin slope (percent)

Reference 5-year and 100-year spread sheets for time of concentration determinations.

Rainfall intensities were obtained from the rainfall intensity-duration-frequency curves determined by NOAA Atlas 14, Volume 1, Version 5. Reference Appendix A for rainfall-intensity-duration-frequency curves for the 5-year and 100-year storm events.

Peak runoff is calculated using the following equation:

$$Q = CiA$$

Where:

Q = Peak Runoff

C = Coefficient of Runoff (Table 701 Appendix A)

i = Rainfall Intensity (in/hr)

A = Total Area (acres) for each drainage sub-area

The runoff coefficients, C, were obtained from the TMRDM Table 701.

The runoff coefficients, C, used for this analysis are:

Surface characteristics	5-year storm	100-year storm
Lot areas (1/8 Acre (Multi-Unit)	0.60	0.78
Pavement	0.88	0.93
Open areas – parc with access road	0.20	0.50
Undeveloped areas - range	0.20	0.50

Time of concentration: t_c=10 min

The resulting flows determined from the above information were used to determine the catch basin capacities and associated pipe network designs.

EXISTING HYDROLOGY

The existing on-site flows in Autumn Wood Phase 2 consists of one area which all flows northeast towards Jeppson Lane. Runoff from Autumn Wood Phase 1 is carried through a temporary ditch to the existing Detention Basin #2. Reference Table 1: Peak Runoff Existing Conditions, for the existing flow information. Reference sheet HY-1, in the Map Pocket, for the display of the existing hydrology. For information on the off-site hydrology, reference the DEW hydrology report *Autumn Woods Project* dated 12/7/17 and revised on 05/11/18.

PROPOSED HYDROLOGY

The resulting "Rational Method" developed flows determined from the above information were used to determine the flows generated on-site by the subdivision.

The proposed Autumn Wood Phase 2 on-site area was divided into 7 sub-areas taking into account the on-site flows that affect the site (reference Proposed Hydrology Display in Map Pocket). The sub-areas are grouped based on where the sub-areas flow to. The calculated 5-year peak flow and 100-year peak flows, along with street capacities can be found in Table 2 in Appendix B. The runoff produced from Autumn Wood Phase 1, which is carried by the temporary ditch, will be carried by Autumn Breeze Ct. and into existing Detention Pond #2. The detention pond has the required volume to detain the excess flows generated by Autumn Wood Phase 2. The pond allows for infiltration of the 2-year storm before releasing the flows to the existing culvert. Reference the map pocket for the proposed onsite hydrology display map.

CONCLUSION

With the development of Autumn Wood Phase 2, all of the 5-year and 100-year developed peak flows will be intercepted by the proposed storm drain system which carries all collected flows into the existing detention ponds. Every aspect of the proposed storm drain system is designed to completely carry all the generated flows form the Autumn Wood development. The generated runoff will be conveyed away from the development, and into the existing detention basin #2 to the north of the development. The excess 100-year flows will be detained in the pond. The system should be re-analyzed for any future developments in the area.

APPENDIX A

VICINITY MAP AND SUPPORTING DATA

VICINITY MAP FOR AUTUMN WOOD PHASE 2

SCALE
N.T.S.

N: \DWGS\J30552_DRHorton_Zolezzi2\Civil\Z2-T-1.DWG ~ 11:29 AM * 04-MAY-2018

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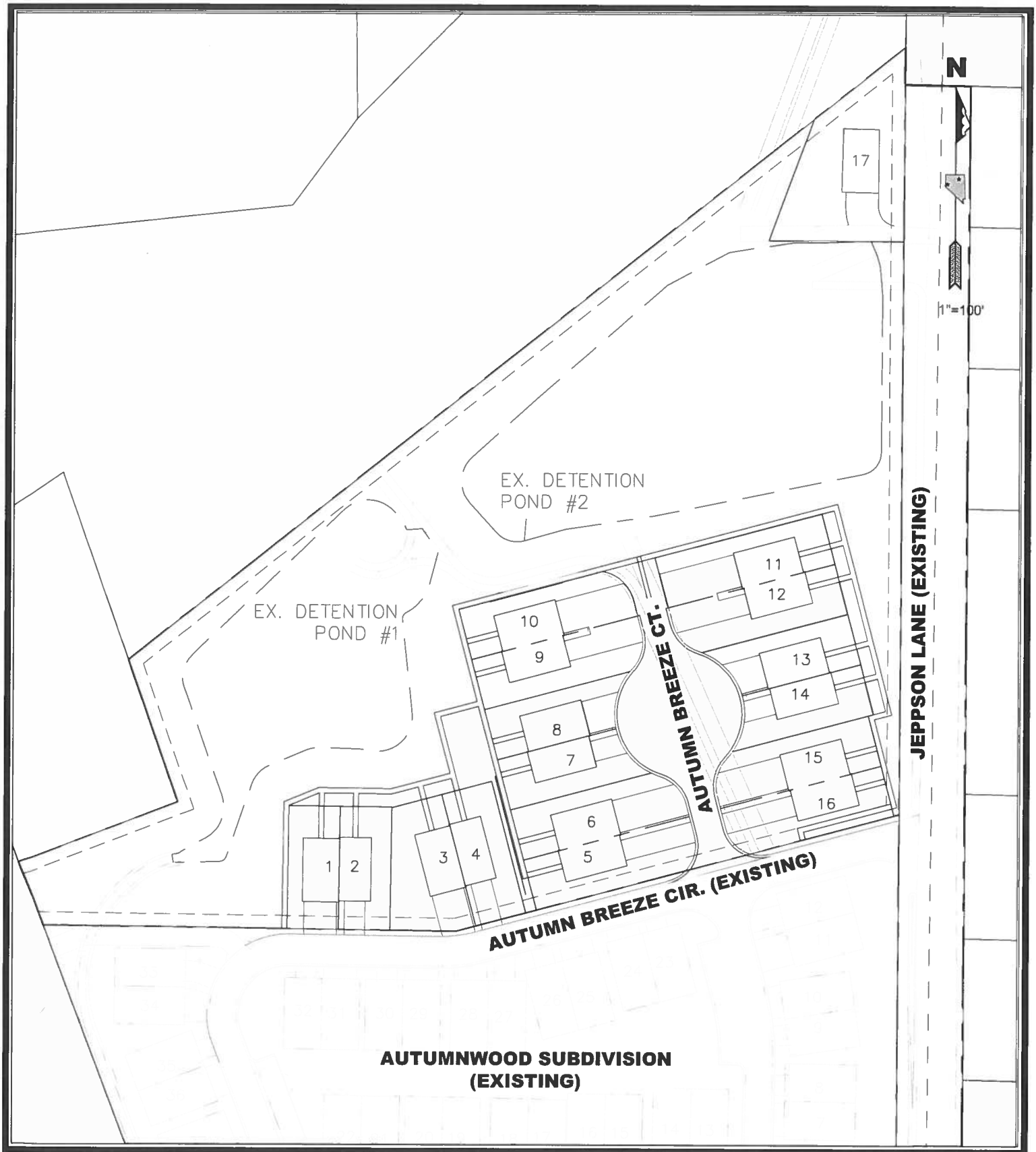
PHONE:(775) 747-8550 FAX:(775) 747-8559

SHEET 1
OF 1



SITE MAP FOR AUTUMN WOOD PHASE 2

SCALE
1"=100'

N: \DWGS\J30552_DRHorton_Zolezzi2\Civil\Z2-T-1.DWG ~ 6:18 PM * 14-MAY-2018

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PHONE:(775) 747-8550 FAX:(775) 747-8559

SHEET 1
OF 1

RATIONAL FORMULA METHOD
RUNOFF COEFFICIENTS

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

Notes:

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

NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.4195°, Longitude: -119.7623°
Elevation: 4569.96 ft**
* source: ESRI Maps
** source: USGS

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

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.09 (0.936-1.28)	1.36 (1.16-1.61)	1.82 (1.56-2.17)	2.27 (1.92-2.70)	3.02 (2.47-3.62)	3.72 (2.94-4.50)	4.55 (3.48-5.57)	5.54 (4.06-6.94)	7.15 (4.91-9.19)	8.60 (5.64-11.3)
10-min	0.828 (0.714-0.978)	1.03 (0.882-1.22)	1.39 (1.18-1.65)	1.73 (1.46-2.06)	2.30 (1.88-2.75)	2.83 (2.24-3.43)	3.46 (2.64-4.24)	4.22 (3.09-5.27)	5.45 (3.74-7.00)	6.55 (4.29-8.59)
15-min	0.684 (0.588-0.808)	0.852 (0.728-1.01)	1.15 (0.976-1.36)	1.43 (1.21-1.70)	1.90 (1.56-2.28)	2.34 (1.85-2.83)	2.86 (2.18-3.50)	3.49 (2.56-4.36)	4.50 (3.09-5.78)	5.42 (3.54-7.10)
30-min	0.460 (0.394-0.544)	0.572 (0.490-0.680)	0.772 (0.658-0.918)	0.962 (0.812-1.15)	1.28 (1.05-1.53)	1.57 (1.25-1.91)	1.92 (1.47-2.36)	2.35 (1.72-2.93)	3.03 (2.08-3.89)	3.65 (2.39-4.78)
60-min	0.285 (0.244-0.336)	0.354 (0.304-0.421)	0.477 (0.407-0.569)	0.595 (0.503-0.709)	0.792 (0.649-0.949)	0.974 (0.772-1.18)	1.19 (0.910-1.46)	1.45 (1.06-1.82)	1.88 (1.29-2.41)	2.26 (1.48-2.96)
2-hr	0.191 (0.168-0.220)	0.237 (0.209-0.274)	0.305 (0.266-0.352)	0.362 (0.312-0.419)	0.452 (0.378-0.526)	0.532 (0.434-0.628)	0.624 (0.495-0.748)	0.739 (0.566-0.917)	0.946 (0.692-1.22)	1.14 (0.802-1.49)
3-hr	0.151 (0.134-0.172)	0.188 (0.169-0.215)	0.237 (0.210-0.269)	0.276 (0.243-0.315)	0.331 (0.286-0.380)	0.379 (0.321-0.440)	0.435 (0.361-0.512)	0.510 (0.414-0.614)	0.642 (0.504-0.818)	0.765 (0.584-1.00)
6-hr	0.104 (0.093-0.118)	0.131 (0.116-0.148)	0.163 (0.144-0.184)	0.188 (0.165-0.213)	0.220 (0.191-0.251)	0.245 (0.210-0.281)	0.270 (0.228-0.314)	0.301 (0.248-0.354)	0.350 (0.280-0.419)	0.400 (0.314-0.509)
12-hr	0.067 (0.060-0.075)	0.084 (0.075-0.094)	0.106 (0.094-0.119)	0.123 (0.109-0.139)	0.146 (0.127-0.165)	0.163 (0.140-0.186)	0.180 (0.153-0.209)	0.198 (0.164-0.233)	0.222 (0.178-0.267)	0.242 (0.190-0.295)
24-hr	0.041 (0.037-0.046)	0.051 (0.046-0.057)	0.065 (0.058-0.072)	0.075 (0.068-0.084)	0.090 (0.081-0.100)	0.102 (0.091-0.114)	0.114 (0.101-0.128)	0.127 (0.110-0.143)	0.144 (0.123-0.165)	0.157 (0.133-0.182)
2-day	0.024 (0.022-0.027)	0.030 (0.027-0.034)	0.038 (0.034-0.043)	0.044 (0.040-0.050)	0.053 (0.047-0.060)	0.060 (0.053-0.068)	0.067 (0.058-0.077)	0.075 (0.064-0.086)	0.085 (0.071-0.099)	0.093 (0.077-0.110)
3-day	0.018 (0.016-0.020)	0.022 (0.020-0.025)	0.028 (0.025-0.031)	0.033 (0.029-0.037)	0.039 (0.035-0.044)	0.045 (0.040-0.051)	0.051 (0.044-0.057)	0.057 (0.049-0.065)	0.065 (0.055-0.076)	0.072 (0.059-0.085)
4-day	0.014 (0.013-0.016)	0.018 (0.016-0.020)	0.023 (0.021-0.025)	0.027 (0.024-0.030)	0.033 (0.029-0.037)	0.037 (0.033-0.042)	0.042 (0.037-0.048)	0.048 (0.041-0.054)	0.055 (0.046-0.064)	0.061 (0.051-0.072)
7-day	0.009 (0.008-0.011)	0.012 (0.011-0.013)	0.015 (0.014-0.017)	0.018 (0.016-0.020)	0.022 (0.019-0.025)	0.025 (0.022-0.028)	0.028 (0.025-0.032)	0.032 (0.027-0.036)	0.036 (0.031-0.042)	0.040 (0.033-0.047)
10-day	0.007 (0.007-0.008)	0.009 (0.008-0.010)	0.012 (0.011-0.014)	0.014 (0.013-0.016)	0.017 (0.015-0.019)	0.020 (0.017-0.022)	0.022 (0.019-0.025)	0.024 (0.021-0.028)	0.028 (0.023-0.032)	0.030 (0.025-0.036)
20-day	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.007 (0.007-0.008)	0.009 (0.008-0.010)	0.010 (0.009-0.012)	0.012 (0.010-0.013)	0.013 (0.011-0.015)	0.014 (0.012-0.016)	0.016 (0.014-0.019)	0.017 (0.015-0.020)
30-day	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.006 (0.005-0.006)	0.006 (0.006-0.007)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.010 (0.008-0.011)	0.011 (0.009-0.012)	0.012 (0.010-0.014)	0.013 (0.011-0.015)
45-day	0.003 (0.002-0.003)	0.003 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.005-0.006)	0.006 (0.005-0.007)	0.007 (0.006-0.007)	0.007 (0.006-0.008)	0.008 (0.007-0.009)	0.009 (0.008-0.010)	0.009 (0.008-0.010)
60-day	0.002 (0.002-0.003)	0.003 (0.003-0.003)	0.004 (0.003-0.004)	0.004 (0.004-0.005)	0.005 (0.004-0.006)	0.006 (0.005-0.006)	0.006 (0.005-0.007)	0.006 (0.006-0.007)	0.007 (0.006-0.008)	0.007 (0.006-0.008)

[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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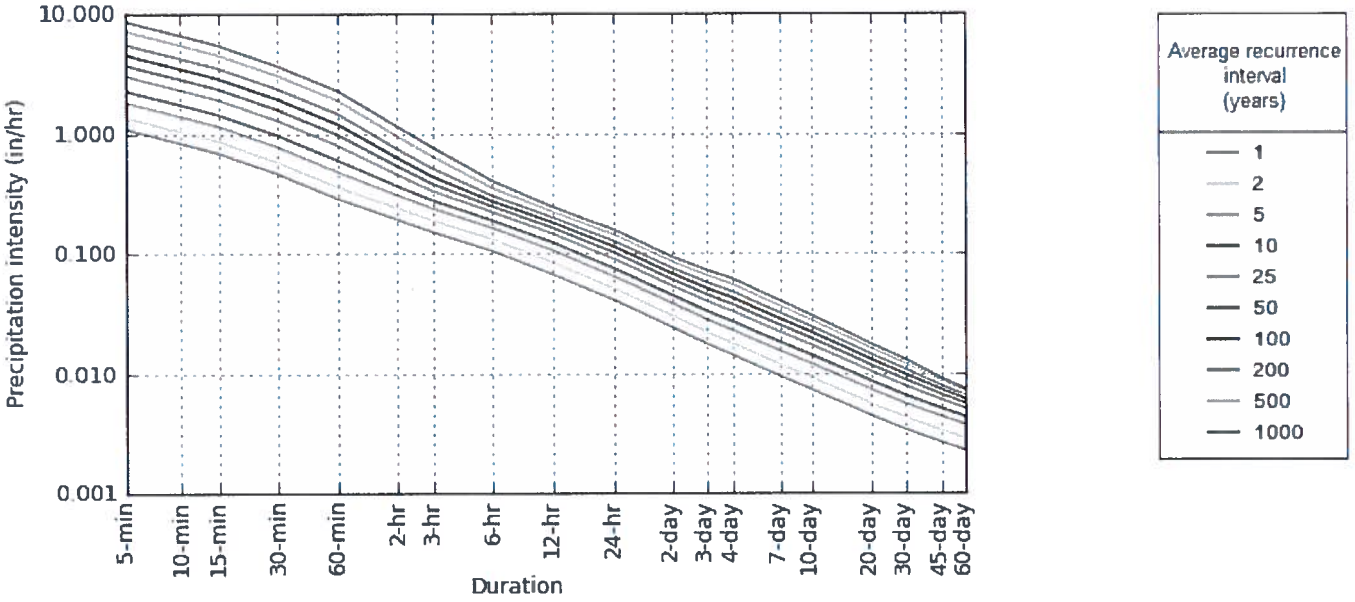
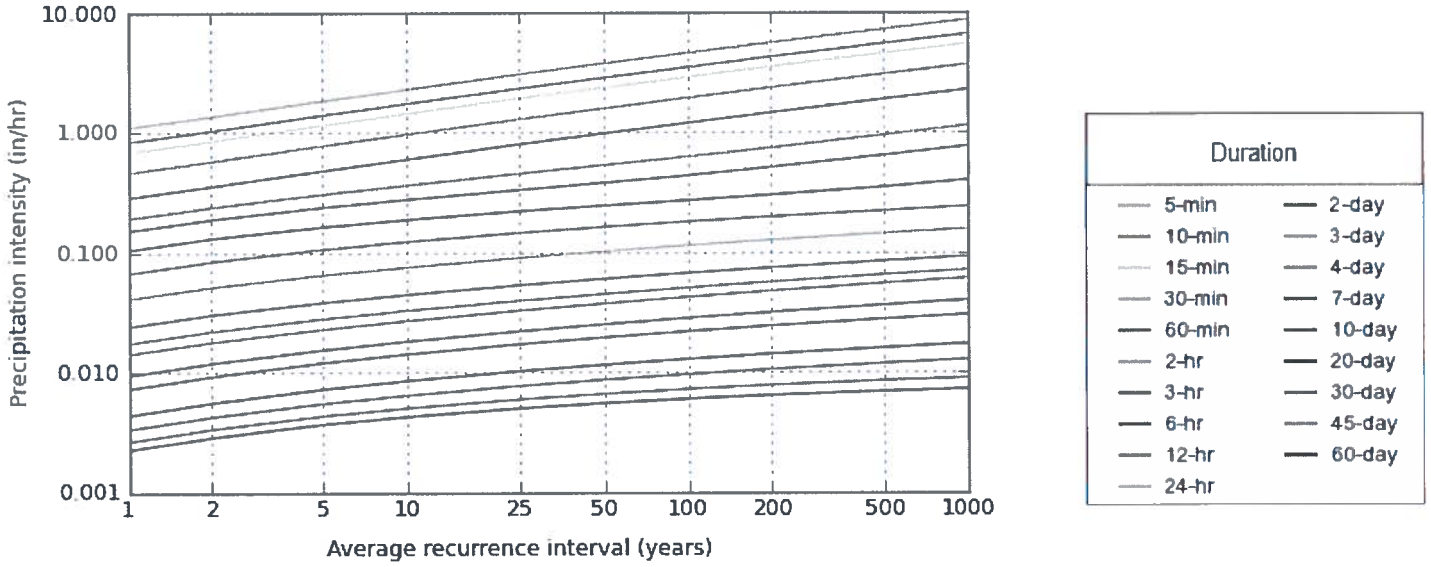
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 39.4195°, Longitude: -119.7623°





NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Mon May 7 22:23:50 2018

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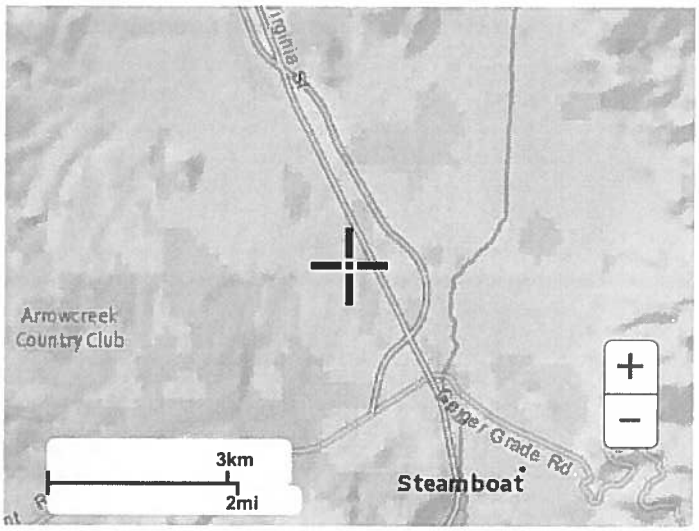
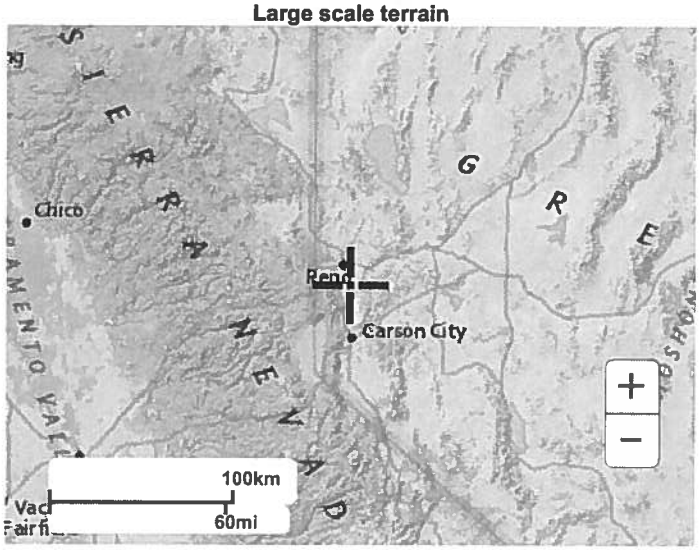
Maps & aerials

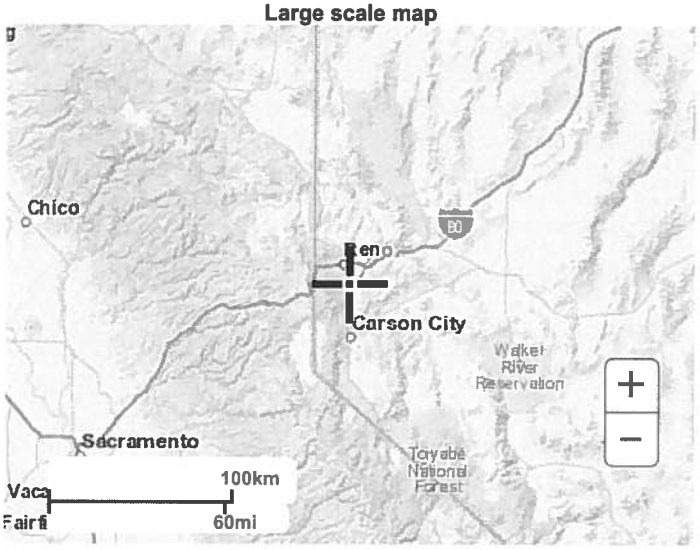
Small scale terrain



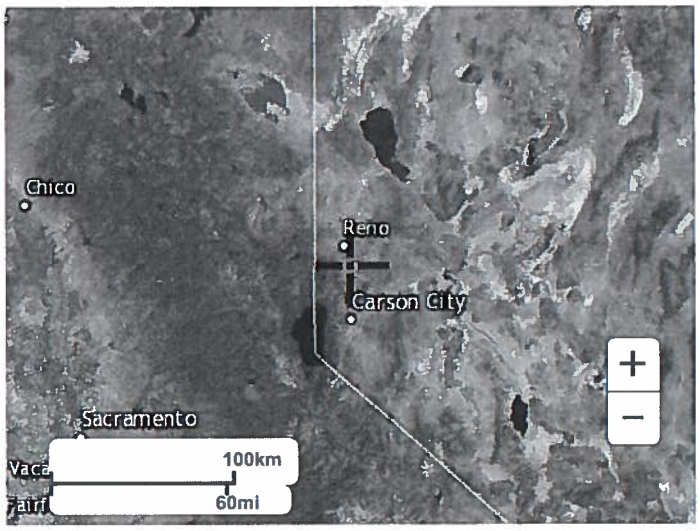
Large scale terrain



Large scale map



Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX B

TABLES

TABLE 1: PEAK RUNOFF EXISTING CONDITION								
NAME	AREA (ac)	i5	i100	C5	C100	Q5 (cfs)	Q100 (cfs)	TO
AREA X1	2.63	1.4	3.48	0.2	0.5	0.74	4.57	NE
RUNOFF FROM PHASE 1	0.45			0.88	0.93	0.55	1.45	DP#2

TABLE 2: PEAK RUNOFF PROPOSED CONDITIONS										
AREA #	AREA [AC]	i5	i100	C5	Q5[cfs]	Q5 str.cap [cfs]	C100	Q100 [cfs]	Q100 str.cap [cfs]	TO
1	0.56	1.4	3.48	0.6	0.47		0.78	1.53		DB#1
2	0.22			0.6	0.18		0.78	0.59		DB#2
3	0.43			0.6	0.36		0.78	1.16		DB#2
4	0.42			0.6	0.35		0.78	1.13		DB#2
5	0.35			0.6	0.29		0.78	0.94		W DITCH
6	0.24			0.88	0.84	2.95	0.93	2.21	12.87	DB#2
7	0.23			0.6	0.84		0.78	2.21		DB#2

APPENDIX C

5 YEAR AND 100 YEAR STREET CAPACITY CALCULATIONS

AUTUMN BREEZE 5YR STREET CAP

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	1.51	%
Normal Depth	0.25	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.50
0+01	0.00
0+02	0.13
0+13	0.34
0+23	0.13
0+25	0.00
0+25	0.50
0+25	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge		2.95	ft³/s
Elevation Range	0.00 to 0.50 ft		
Flow Area		1.35	ft²
Wetted Perimeter		16.13	ft

AUTUMN BREEZE 5YR STREET CAP

Results

Hydraulic Radius		0.08	ft
Top Width		15.61	ft
Normal Depth		0.25	ft
Critical Depth		0.27	ft
Critical Slope		0.00851	ft/ft
Velocity		2.18	ft/s
Velocity Head		0.07	ft
Specific Energy		0.33	ft
Froude Number		1.31	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.25	ft
Critical Depth	0.27	ft
Channel Slope	1.51	%
Critical Slope	0.00851	ft/ft

AUTUMN BREEZE 100YR STREET CAP

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	1.51	%
Normal Depth	0.37	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	0.50
0+01	0.50
0+01	0.00
0+02	0.13
0+13	0.34
0+23	0.13
0+25	0.00
0+25	0.50
0+25	0.50

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 0.50)	(0+25, 0.50)	0.016

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge		12.87	ft³/s
Elevation Range	0.00 to 0.50 ft		
Flow Area		3.88	ft²
Wetted Perimeter		24.76	ft

AUTUMN BREEZE 100YR STREET CAP

Results

Hydraulic Radius		0.16	ft
Top Width		24.00	ft
Normal Depth		0.37	ft
Critical Depth		0.42	ft
Critical Slope		0.00660	ft/ft
Velocity		3.32	ft/s
Velocity Head		0.17	ft
Specific Energy		0.54	ft
Froude Number		1.45	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.37	ft
Critical Depth	0.42	ft
Channel Slope	1.51	%
Critical Slope	0.00660	ft/ft

TABLE 1: PEAK RUNOFF EXISTING CONDITION								
NAME	AREA (ac)	i5	i100	C5	C100	Q5 (cfs)	Q100 (cfs)	TO
AREA X1	2.63	1.4	3.48	0.2	0.5	0.74	4.57	NE
RUNOFF FROM PHASE 1	0.45			0.88	0.93	0.55	1.45	DP#2

USA NORTH 811 Call Before You Dig

0 40 80 120 160 200

N

APN 044-320-41
BRENNAN
12200 JEPPSON LANE
PAR. B P.M. 1610
ZONING: MDS

APN 044-320-30
MORRIS E. HUSTED
12280 JEPPSON LANE
ZONING: MDS

APN 044-320-29
DEPAOLI
12320 JEPPSON LANE
ZONING: MDS

APN 044-320-26
KITTREDGE T. CRAVEN
12350 JEPPSON LANE
ZONING: MDS

APN 044-032-42
MATHIAS
12400 JEPPSON LANE
ZONING: MDS

APN 044-320-24
LONGNECK PROPERTIES LLC
12450 JEPPSON LANE
ZONING: MDS

APN 044-320-21
WEIGL FAMILY TRUST

APN 162-010-20
WASHOE COUNTY
ZONING: OS

APN 162-010-16
CADENA LIVING TRUST
685 ZOLEZZI LANE
ZONING: MDS

APN 162-010-30
SIERRA NEVADA
MONTESSORI SCHOOL
565 ZOLEZZI LANE
ZONING: MDS

WHITES CREEK

EXISTINGDETENTION POND #2
TOP OF POND=4559.00
100 YR W.S.E.=4558.00
VOLUME=191559 CF

EXISITING DETENTION POND #1
TOP OF POND=4569.00
100 YR W.S.E.=4568.00
VOLUME=137888 CF

AREA X1
(2.63 AC)

RUNOFF FROM PHASE 1
Q(5)=0.55 cfs
Q(100)=1.45 cfs

JEPPSON LANE (EXISTING)

AUTUMN BREEZE (EXISTING)

MONTESSORI (PRIVATE ACCESS)

4556 4560 4562 4564 4566 4568 4570 4572 4574 4576 4578 4580

50 50 50

SUMMIT ENGINEERING CORPORATION
5405 MAE ANNE AVENUE RENO, NV 89523 PHONE (775) 746-3500 FAX (775) 746-3520

DESIGNED BY: MS
DRAWN BY: SD
CHECKED BY: RG

TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
EXISTING HYDROLOGY DISPLAY

NEVADA
WASHOE COUNTY

REV.	DATE	DESCRIPTION	BY	APP'D

SCALE
HORIZ: 1" = 40'
VERT:

JOB NO: J-30552

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SHEET HY-1 OF 2

ROBERT GELU Exp. 6-30-19 CIVIL No. 17747 STATE OF NEVADA REGISTERED PROFESSIONAL ENGINEER

TABLE 2: PEAK RUNOFF PROPOSED CONDITIONS										
AREA #	AREA [AC]	i5	i100	C5	Q5[cfs]	Q5 str.cap [cfs]	C100	Q100 [cfs]	Q100 str.cap [cfs]	TO
1	0.56	1.4	3.48	0.6	0.47		0.78	1.53		DB#1
2	0.22			0.6	0.18		0.78	0.59		DB#2
3	0.43			0.6	0.36		0.78	1.16		DB#2
4	0.42			0.6	0.35		0.78	1.13		DB#2
5	0.35			0.6	0.29		0.78	0.94		W DITCH
6	0.24			0.88	0.84	2.95	0.93	2.21	12.87	DB#2
7	0.23			0.6	0.84		0.78	2.21		DB#2

USA NORTH 811 Call Before You Dig

0 40 80 120 160 200

N

APN 044-320-41
BRENNAN
12200 JEPPSON LANE
PAR. B P.M. 1610
ZONING: MDS

APN 044-320-30
MORRIS E. HUSTED
12280 JEPPSON LANE
ZONING: MDS

APN 044-320-29
DEPAOLI
12320 JEPPSON LANE
ZONING: MDS

APN 044-320-26
KITTREDGE T. CRAVEN
12350 JEPPSON LANE
ZONING: MDS

APN 044-032-42
MATHIAS
12400 JEPPSON LANE
ZONING: MDS

APN 044-320-24
LONGNECK PROPERTIES LLC
12450 JEPPSON LANE
ZONING: MDS

APN 044-320-21
WEIGL FAMILY TRUST

AREA #5
(0.35 AC)

WHITES CREEK

APN 162-010-20
WASHOE COUNTY
ZONING: OS

EXISTING DETENTION POND #2
TOP OF POND=4559.00
100 YR W.S.E.=4558.00
VOLUME=191559 CF

EXISTING DETENTION POND #1
TOP OF POND=4569.00
100 YR W.S.E.=4568.00
VOLUME=137888 CF

AREA #1
(0.59 AC)

AREA #2
(0.23 AC)

AREA #3
(0.40)

AREA #4
(0.40 AC)

AREA #6
(0.26 AC)

AUTUMN BREEZE CT.
(PROPOSED PRIVATE)

AUTUMN BREEZE CIR. (IN REVIEW)
PLAN REVIEW WVTAP 17-0066

AUTUMN WOOD SUBDIVISION
(IN REVIEW)
PLAN REVIEW WVTAP 17-0066
(COMMON SPACE DEVELOPMENT)

JEPPSON LANE (EXISTING PRIVATE)
APN 044-320-35

APN 162-010-16
CADENA LIVING TRUST
685 ZOLEZZI LANE
ZONING: MDS

APN 162-010-30
SIERRA NEVADA
MONTESSORI SCHOOL
565 ZOLEZZI LANE
ZONING: MDS

MONTESSORI (PRIVATE ACCE

SUMMIT ENGINEERING CORPORATION
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DESIGNED BY: MS
DRAWN BY: SD
CHECKED BY: RG

TENTATIVE MAP PLANS
AUTUMN WOOD PHASE 2
PROPOSED HYDROLOGY DISPLAY

NEVADA
WASHOE COUNTY

REV.	DATE	DESCRIPTION	BY	APP'D

SCALE
HORIZ: 1" = 40'
VERT:

JOB NO: J-30552

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SHEET HY-2 OF 2

ROBERT DELLI Exp. 6-30-19 CIVIL PROFESSIONAL ENGINEER STATE OF NEVADA No. 17741

HYDROLOGY REPORT FOR

AUTUMN WOOD PROJECT

WASHOE COUNTY, NEVADA

Prepared for:

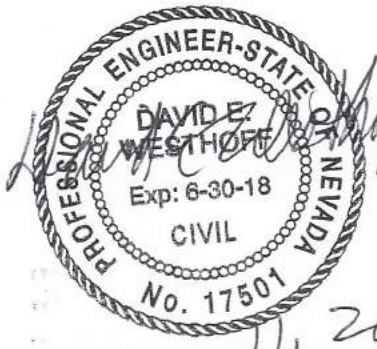
Summit Engineering Corporation

5405 Mae Anne Avenue

Reno, NV 89523

Prepared by:

DEW Hydrology
10180 Grizzly Hill Court
Reno, NV 89521



May 11, 2018

Revised

May 11, 2018

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APPENDICES

1.0 INTRODUCTION

1.1 Background

This report presents the methods and results of a study done to prepare a Hydrology Master Plan for the proposed Autumn Wood project. The project is in Reno, NV, on the south side of Zolezzi Lane and west of Jeppson Lane (Figure 1 in Appendix A). The project area is under the jurisdiction of Washoe County. The project is in Section 17, T 18 N, R 20 E.

1.2 Existing Drainage Pattern and Flow Rates

The Autumn Wood project is in the Whites Creek watershed. This watershed can be divided into 2 parts, upper Whites Creek and Lower Whites Creek. The upper part originates in the east slope of the Carson Range and flows eastward under rather steep slopes. The watershed extends to an elevation of over 10,600 feet. The upper reaches are largely vegetated with pine trees and mountain mahogany brush. These transition to sagebrush, grasses and suburban developments in the reaches downstream (east) of Timberline Road. At about elevation 5,000 feet the creek splits into 4 branches, Branches 1, 2, 3, and 4. This split is known as the Diffluence and is the start of Lower Whites Creek. Actually, the lower watershed is divided into 4 sub-watersheds, one for each of the 4 branches. Branch 1 is the branch that affects Autumn Wood. Branch 1 further splits into Branches 1A and 1B at Zolezzi Lane, near the northwest corner of the project. All of the branches eventually empty into Steamboat Creek.

Since the effective flow rates in Whites Creek were set in 1994, the recommended precipitation values have increased and there has been significant development in the watershed. This study uses the new rainfall data and the affects of recent developments to update the models used to set the flow rates. Also, the study was conducted to determine flow rates at key sites in the project area, evaluate the impacts of the proposed development and evaluate means of mitigating those impacts.

Washoe County has established 2 flow rates to be used for projects in the Whites Creek Watershed. These flow rates were set in a report entitled "Preliminary Whites Creek Basin Management Study (Final Report)" by Cella Barr Associates (August 17, 1994). One rate, the portion of the 100 year flow diverted to a given branch, is to be used to size structures such as culverts. The second flow rate assumes that the total 25 year Whites Creek flow at the diffluence could go into any of the 4 branches. This rate is to be used for floodplain management, that is, to set the water surface elevation for designing finished floor elevations. At the diffluence, the current 100 year flow on Whites Creek is 5,100 cfs and division between the branches is 700 cfs to Branch 1, 1,950 cfs to Branch 2, 1,100 cfs to Branch 3 and 1,350 cfs to Branch 4. The 25 year flow rate at the diffluence is 3,000 cfs. So, on Branch 1, the flow rate for sizing structures is 700 cfs, while the flow rate for floodplain management is 3,000 cfs. These are not the flow rates used by FEMA in establishing the floodplains shown on the FIRM. This study does not investigate Branches 2, 3, or 4.

1.3 Description Of The Project Area

The project is situated on APNs 044-320-48 and 162-010-3, located at the northwest corner of the intersection of Zolezzi Lane and Jeppson Lane. Parcel 044-320-48 is the southern parcel, adjacent to Zolezzi Lane, and is referred to as Z-46, while the other, northern parcel, is referrred to as Z-2. Z-46 has an area of 4.7 acres and Z-2 has an area of 5.8 acres. Z-46 was formerly a trailer park. Whites Creek Branch 1A flows along the northern and western boundary of the project and Branch 1B flows eastward along the southern boundary, parallel and adjacent to Zolezzi Lane. The ground is generally level and slopes east and northeast. Sagebrush and grasses are the predominant vegetation. It is bounded on the west by the Montessori School, on the east by Jeppson Lane and some homes, to the north by undeveloped land, then St. Rose Church and Bishop Manogue High School, and on the south by Zolezzi Lane and Whites Creek Estates, a residential area. The onsite drainage shows limited channel development. Stormwater is discharged generally as sheet flow traveling in an east-northeast direction.

The project will consist of residential lots, typically 1/8 acre (5,000 to 5,500 square feet) in size. Onsite stormwater will be collected in a storm sewer and piped to two detention basins on Z-2(Figure 3). These are labeled the Upper and Lower Detention Basins. Water will be routed through the Upper and then to the Lower Detention Basins and then discharged to Branch 1A near Jeppson Lane.

1.4 Recent Land Developments in the Whites Creek Basin

Since the Cella Barr report was written in 1994, significant development has occurred in the Whites Creek watershed upstream of the diffluence and in the Branch 1 basin downstream of the diffluence. Upstream, the most notable of these are the Legend Trail and White Rose developments, while downstream the Wolf Run Golf Course and ArrowCreek Parkway have been constructed. These will be discussed further in Section 3.8.

1.5 FEMA Floodplains

The parcels are located on Flood Insurance Rate Map (FIRM) panel 32031C3245 (Figure 4). Portions of the parcels are in Zone A, while the remainder is in Zone X (unshaded). Zone A floodplains were not analyzed in a detailed manner and FEMA has no analytical information. Zone X areas are outside the 100 year floodplain.

2.0 PREVIOUS STUDIES

The two most important reports affecting this study are Preliminary Whites Creek Basin Management Study by Cella Barr (1994) and Hydraulic Analysis of Whites Creek Branch 1 and Portions of Branches 1A and 1B for the Autumn Wood Subdivision Washoe County, NV by Quad Knopf (Amended May, 2007). The Cella Barr report established the Washoe County design flows for the Whites Creek Basin, including Branch 1. The 100 year rate in Branch 1 for design purposes (channels, culverts and similar structures) is 700 cfs, while the floodplain management rate (for elevations of homes and other buildings) is 3,000 cfs.

The Quad Knopf report use the flow rates from the Cella Barr report to perform a detailed analysis of flow paths through the residential area south of Zolezzi Lane. The purpose was to determine how much water would reach the Autumn Wood site and what impact a development there would have on water surface elevations and adjoining structures.

Several other studies have been conducted for projects in the Whites Creek basin. The ones of most relevance are:

- Whites Creek Detention Facility Feasibility Study, Washoe County, Nevada, by Nimbus Engineers (revised June 1993). This report conducted an hydraulic analysis of the Whites Creek diffluence and determined the flow rates that would go into each branch. These rates were later adopted by Cella Barr.
- Hydrologic and Hydraulic Analysis and Drainage Master Plan for Eccles Ranch Subdivision, Nimbus Engineers (July, 1995). This is for a proposed development east of Autumn Wood, in the vicinity of where Bishop Manogue High School and St. Rose of Lima Church are located. It analyzed the flow split between Branches 1A and 1B at Zolezzi Lane.
- Hydraulic Report for Bishop Manogue Business Park Road A and B by WRC Nevada, Inc. (Sept. 1998). Similar area as Eccles Ranch.
- Hydrology and Hydraulic Report for Zolezzi Lane Rehabilitation Between Thomas Creek Road and Arrowcreek Parkway by WRC Nevada, Inc. (Sept. 2000). This contains an hydraulic analysis adjacent to Zolezzi Lane.
- Flood Control Master Plan for Bishop Manogue by Nimbus Engineers (May, 1999).
- Application for Conditional Letter of Map Revision Mountaingate Development, Nimbus, 2005. Updated the model used by Cella Barr for Whites Creek and concentrated onBranch 2 of Whites Creek downstream of the diffluence.
- Application for Letter of Map Revision Reno-Sparks Paiute Indian Colony Reno, NV, January, 2006, Quad Knopf. Conducted for a parcel of land east of the Autumn Wood project and South Virginia Street. In it, the flow split between Whites Creek Branches 1A and 1B from the Eccles Ranch study was included.

3.0 HYDROLOGIC AND HYDRAULIC 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 1 and 2. Supporting calculations are in Appendix B.

Flow rates at the diffluence are used for flood management purposes on Branch 1. Models for the 100-year and 25-year events were created to compute the flow rates at the diffluence. Models were created for the 100-year and 5-year events for existing and proposed conditions on the project site. The models are presented 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.. This shows a 100-year, 25-year and 5-year rainfall depths for each watershed are shown in Table 1. A balanced storm distribution was used in this study.

3.3 Watershed Delineation

The existing conditions watershed boundaries are based on existing topography as well as roads, ditches and other man-made features. Developed conditions are based on poroposed grading and lot layouts.

3.4 Runoff Curve Number

To calculate the runoff curve number (CN), the soil types within each 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 into all soil groups.

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 where soil moisture has been depleted 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, AMC II was used in this study. Vegetation also is a factor in evaluating curve number. The vegetation in the upper reaches is largely with pine trees and mountain mahogany brush. The vegetation in the lower areas is sagebrush and grasses. Suburban developments in the lower reaches have lot sizes varying from 2+ acres to half acre lots.

Curve numbers were based on the characteristics described above and Table 702 of the Regional Drainage 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. In the Drainage Manual, for watersheds over 1 square mile in area or over 10% in slope, the Bureau of Reclamation method is recommended (Equation 710 in the Drainage Manual). This results in longer lag time values than other methods. In smaller, flatter, watersheds, 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 Current Effective Model

As discussed earlier, the base model for Whites Creek was developed by Nimbus Engineers in 1993 and used by Cella Barr in 1994 to establish the design flows for Whites Creek and its branches. Neither the original Nimbus report nor the model was located for this study. However, the Mountaingate CLOMR (Nimbus, 2005) and subsequent LOMR reports used that model as a starting point and updated it based on newer techniques, notably using the Bureau of Reclamation method for calculating lag time in the upstream watersheds. This method produces longer lag times and lower peak flow rates. This partially offsets the affects of using of newer, higher rainfall values.

3.8 Updated Regional Model

The Autumn Wood (AW) model uses the Legend Trail Master Plan model as a starting point. Since then, more development has taken place in the Whites Creek watershed between Timberline Road and the diffluence. In the Mountaingate model, the Whites Creek watershed from the Carson Range to the diffluence is divided into 8 watersheds, W1R through W8R with W1R at the source of Whites Creek in the Carson Range and W8R just upstream of the diffluence. W1R through W6R are west of Timberline Road and have had no development in

them, although a part of W6R is incorporated into the Legend Trails model. W7R and W8R are between Timberline Road and the diffluence and are either developed or have planned developments in them. Starting from the west, the developments in these watersheds are White Rose Estates, Legend Trail, and the Estates at Mt. Rose in W7R, and Saddlehorn, the Reserve at Monte Rosa and Lancer Estates in W8R. The developments in W7R have lot sizes greater than 1 acre, while the developments in W8R typically have 0.5 acre lots.

The Legend Trail Hydrology Master Plan (Nimbus, June, 2004) includes the White Rose development in its model. Portions of that report pertinent to this study are presented in Appendix B. No report for the Wolf Run Golf course or other developments was located. The AW model takes into account the newer developments upstream of AW. It also the latest rainfall data and calculates watershed parameters using methods described in the Manual. Modifications of watershed parameters for developed areas without hydrology studies are based on field investigations and review of Google Earth images. A watershed map is shown as Figure 2 and Table 1 is a summary of the updated watershed parameters upstream of the diffluence.

3.9 Results at the Diffluence

The 100-year model showed a peak flow of 6,153 cfs at the diffluence. Of this, 861 cfs would go to Branch 1. The 25-year flow at the diffluence is 3,777 cfs. Using the Cella Barr report criteria, all of this could go to any of the 4 branches, including Branch 1.

TABLE 1. WATERSHED PARAMETERS WHITES CREEK WATERSHED

Watershed	Area, mi^2	CN+%imprv	Lag time, hr	Precip, in		
				5 yr	25 yr	100 yr
W1R	1.38	59	1.07	5.19	7.42	9.58
W2R	0.83	59	0.52	5.55	7.95	10.3
W3R	1.38	60	1.04	5.05	7.22	9.33
W4R	1.43	58	1.08	4.36	6.24	8.05
W5R	1.20	60	1.07	4.04	5.76	7.43
W6R	1.52	63	1.84	2.91	4.14	5.32
W7R*	0.3	65+15%	0.43	2.74	3.89	4.98
W8R	0.75	65+25%	0.43	2.03	2.86	3.65

*The rainfall for W7R was used in the Legend Trail portion of the model. The other Legend Trail parameters and their calculations are shown in Appendix B.

3.10 Flow Routing Downstream of the Diffluence

3.10.1 100-Year Flow

The flow rates used to design structures and set elevations for homes are based on the flows at the diffluence and do not add flows from areas downstream of the diffluence. This is probably due to the likelihood that flows from areas downstream of the diffluence will have peaked and left the area prior to the arrival of the peak from Upper Whites Creek. Modeling for this and other studies support this assumption. However, recent developments below the diffluence can attenuate the peak rate, particularly the Wolf Run Golf Course. Detailed surveys of Branch 1show that it cannot completely contain the 100 or 25 year flow rates downstream of the Golf Course.

Downstream of the diffluence, Branch 1 flows through an area of 2.5 acre lots (labeled ARCK on maps and in the model) down to ArrowCreek Parkway (Figure 2). There it passes through 2 large box culverts at ArrowCreek Parkway to the Wolf Run Golf Course (labeled Golf). From the golf course, it flows through Whites Creek Estates (WCE) to Zolezzi Lane. Whites Creek Estates has a typical lot size of 1 acre, and the home sites are elevated for flood protection. Not all reaches of Branch 1 of Whites Creek can hold the 100 year flow rate of 841 cfs. The 2007 report by Quad Knopf detailed flow spillage from Branch 1 and the paths the spilled flow takes through Whites Creek Estates. It did not take into account the impacts of routing the flow through the Wolf Run Golf Course. Branch 1 enters the Golf Course through 2 large box culverts under ArrowCreek Parkway, while it leaves the Golf Course through a 3 ft x 4 ft corrugated metal arch pipe which has a capacity of about 110 cfs. The Golf Course reach of Branch 1 was modeled and showed the 100 year flow rate was reduced by about 30 cfs with the majority of the flow leaving the golf course overtopping the berm along the its east side. The resulting flow rate of 841 cfs was then routed through Whites Creek Estates using the Branch 1 model and routings from the 2007 Quad Knopf report. Below is a description of the 100-year flow from the diffluence to Zolezzi Lane.

Whites Creek at Diffluence: 6,219 cfs
Branch 1 at the diffluence: 871 cfs
Branch 1 at outlet from Golf Course: 841 cfs
Through Whites Creek Estates 216 cfs flows eastward away from Branch 1 towards a ditch alongside Valley Springs Road, leaving 625 cfs in the Branch 1 channel and overbank area.

Branch 1 at Zolezzi Lane has 625 cfs:

- 199 cfs in channel which flows through culverts under Zolezzi Lane to Branch 1A
- 426 cfs overland, which then splits
  - 320 north towards Branch 1A
  - 106 east towards Branch 1B

Branch 1A on north side of Zolezzi

- Of the 320 flowing overland northward, 45 cfs is intercepted by a ditch flowing eastward parallel to Zolezzi, therefore (320-45)=275 cfs continues to 1A where it combines with the 199 cfs in the channel for a total of 474 cfs in 1A.

Branch 1B has 106 cfs flowing eastward on and adjacent to Zolezzi Lane. There are 7 drop inlets (DI) on Zolezzi between Whites Creek and the west boundary of the Autumn Wood property. These have a capacity of 6 cfs each, for a total of 42 cfs which is discharged into the Zolezzi storm drain. Therefore, (106-42)=64 cfs flows eastward on Zolezzi. However, the capacity of Zolezzi at this section, under subcritical flow conditions, is 28 cfs. So (64-28)=36 cfs spills northward into the ditch parallel to Zolezzi. So now there are 28 cfs flowing north on Zolezzi and (36+45)=81 cfs in the ditch parallel to Zolezzi. But the ditch section adjacent to the Montessori school has a limiting capacity of 20 cfs, so **(81-20)=61 cfs spills onto Autumn Wood**. This 61 cfs currently sheetflows across the Autumn Wood site. Under proposed conditions it will be intercepted in a ditch and conveyed north to detention basins.

Just west of Valley Springs Road, there are 2 more DI's on Zolezzi that can intercept a combined 12 cfs, reducing the amount of flow on Zolezzi to (28-12)=16 cfs, which is below the capacity of Zolezzi (25 cfs) at this section. It also increases the amount of flow in the storm drain to 54 cfs, near the storm drain's capacity of 60 cfs.

A ditch at Valley Springs Road conveys 30 cfs to Zolezzi. Assuming the storm drain can't accept any more flow, this water enters Zolezzi, giving a total of (16+30)=46 cfs on Zolezzi. Downstream, the limiting capacity of Zolezzi is currently 28 cfs. Therefore, 18 cfs spills northward into the ditch along Zolezzi. The capacity of this ditch increases east of the Montessori School. Then the total flow in that ditch is (20+18)=38 cfs. Under proposed conditions, a floodwall will keep the entire 46 cfs within Zolezzi Lane and adjacent area.

3.10.2 25-Year Flow

Following is a summary of the 25-year Whites Creek flow rates for the Autumn Wood project. Because the capacities of ditches and culverts remain the same, several of the flow rates match those in the 100-year analysis.

Whites Creek at Diffluence: 3,777 cfs
Branch 1 at the diffluence: 3,777 cfs
Branch 1 at outlet from Golf Course: 3,756 cfs
Through Whites Creek Estates 1,975 cfs leave Branch 1 and flow towards a ditch alongside Valley Springs Road

Branch 1 at Zolezzi Lane:

- 200 cfs in channel (capacity of culvert under Zolezzi)
- 1,581 cfs overland, which then splits
  - 1,312 north towards Branch 1A
  - 269 east towards Branch 1B

Branch 1A on north side of Zolezzi

- Of 1,312 cfs overland, 45 cfs is intercepted by a ditch flowing eastward parallel to Zolezzi, therefore (1,312-45)=1,267 cfs continues to 1A where it combines with the 200 cfs in the channel for a total of 1,467 cfs in 1A.

Branch 1B has 269 cfs flowing eastward. There are 7 drop inlets on Zolezzi between Whites Creek and the west boundary of the Autumn Wood property with a capacity of 6 cfs each, for a total of 42 cfs. This 42 cfs is discharged into the storm drain. Therefore, (269-42)=247 cfs flows eastward on Zolezzi. However, the capacity of Zolezzi at this section, under subcritical flow conditions, is 28 cfs. So (247-28)=219 cfs spills northward into the ditch parallel to Zolezzi. So now there is 28 cfs flowing east on Zolezzi and (219+45)=264 cfs in the ditch parallel to Zolezzi. But the ditch has a limiting capacity of 20 cfs, so **(264-20)=244 cfs spills onto Autumn Wood**. This flow currently sheetflows across the Autumn Wood site. Under proposed conditions it will be collected in a ditch and routed north to detention basins.

Just west of Valley Springs Road, there are 2 DI's that can intercept a combined 12 cfs, reducing the amount of flow on Zolezzi to (28-12)=16 cfs, which is below the capacity of Zolezzi (25 cfs)at this section. It also increases the amount of flow in the storm drain to 54 cfs, which is nearing its capacity of 60 cfs.

A ditch at Valley Springs Road conveys 30 cfs to Zolezzi. Assuming the storm drain can't accept any more flow, this water enters Zolezzi, giving a total of (16+30)=46 cfs on Zolezzi. Downstream, the limiting capacity of Zolezzi is 28 cfs. Therefore, 18 cfs will spill northward into the ditch along Zolezzi. Then the total flow in that ditch is (20+18)=38 cfs in this ditch. Under proposed conditions, a floodwall will keep the entire 46 cfs within Zolezzi Lane and adjacent area.

3.10.3 5-Year Flow

The 5-year event produces a peak flow rate of 1,538 cfs at the diffluence. Branch 1 receives 215 cfs. Branch 1 has the capacity to carry this flow to Zolezzi Lane. The culverts under Zolezzi have a capacity of 200 cfs, so 13 cfs are diverted to Branch 1B and 200 cfs continue to Branch 1A. Zolezzi has the capacity to carry 13 cfs, so there is no spillage onto the Autumn Wood Property.

3.11 Modeling Results

3.11.1 Existing Conditions

In order to determine the impacts of developing Autumn Wood on local and regional flows, the hydrologic model was extended to include the Autumn Wood project area. This model takes into account attenuation that takes place in the Wolf Run Golf Course and flow that is lost from Whites Creek Branch 1 due to the channel's limited capacity in the Whites Creek Estates area. The flow losses and splits are those in the Quad Knopf 2007report with the following modifications:

- Survey data provided by Summit Engineering showed that the ditch adjacent to Valley Springs Road has a capacity of 30 cfs, not 80 cfs as was used by Quad Knopf
- Summit also surveyed Zolezzi Lane. When the sections were modeled using subcritical flow rates, as required by FEMA, it showed the capacity of the street to be 28 cfs

At the point where Branch 1 leaves the Golf Course, the outlet pipe is a 3 ft high by 4 ft wide corrugated metal arch pipe culvert through a berm. With a little over 3 feet of head above the culvert, its capacity is about 110 cfs. There is limited storage upstream of the culvert, so the water eventually overtops the berm on the east side of the golf course. The net effect is to reduce the peak flow by about 30 cfs in the 100 year event and 8 cfs in the 25 year event.

Under existing conditions, the Autumn Wood parcel generates 3 cfs of runoff in the 100 year event. This water flows generally east northeast towards Jeppson Lane. It eventually reaches Branch 1A. Also, 61 cfs will sheet flow in a northeasterly direction from the flow split at Zolezzi across the property, ultimately reaching Branch 1A. This flow probably enters Branch 1A gradually between Jeppson Lane and South Virginia Street.

3.11.2 Proposed Conditions

Under proposed conditions the Autumn Wood parcels will be developed with a typical lot size of 1/8 acre. The offsite flow entering the property at its southwest corner from Branch 1, 61 cfs in the 100 year event, will be intercepted by a ditch and conveyed northward to 2 detention basins (Figure 4). The upper detention basin will be about 0.4 acre in area and the lower one about 0.85 acres in area. The onsite flow, 10 cfs in the 100 year event, will also be collected in a storm drain system and conveyed to these basins. The combined flows will be routed through the upper basin and then the lower basin before being discharged into Branch 1A (Figure 4). A comparison of the flow rates for existing and proposed conditions is shown in Table 2.

TABLE 2, Results of Hydrologic Modeling

Storm Event	1A at Jeppson Lane		1A South Virginia Street		1B at Jeppson Lane	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
5 year	111	111	111	111	30	30
25 year	--	1507	--	1507	--	223
100 year	473	492	534	492	67	67

NOTE: Flow rates in cfs.

Table 2 shows that the 5 year flow rate is not changed by the project. The 100 year flow in Branch 1A increased by 22 cfs due to intercepting the sheet flow across the property and routing it to Branch 1A at Jeppson Lane. The table also shows that the flow rate in Branch 1A decreased compared to existing conditions at South Virginia Street. To determine the impacts of the increase at Jeppson Lane, a HEC-RAS model was prepared for the section of Branch 1A from Jeppson to South Virginia Street. Using new sections surveyed by Summit Engineering, the model showed that the water surface elevation increased by less than 0.1 foot at all sections and the flood plain width increased by a maximum of 4 feet (Appendix D). The floodplain width actually decreased compared to the effective FIRM map. These elevations and widths assumed that none of the sheet flow reached Branch 1A until South Virginia Street, but it is likely that some of this flow is entering 1A between at Jeppson and shortly downstream of Jeppson due to the influence of Jeppson Lane and homes east of Jeppson.

4.0 FINDINGS

The findings of this study are:

- Updating the regional Whites Creek hydrologic model using newer rainfall data and incorporating the affects of recent developments increased the 100 year flow rate to 6,219 cfs at the diffluence with 871 cfs going to Branch 1.
- Similarly, the 25 year flow at the diffluence increased to 3,777 cfs at the diffluence. Per the Cella Bar report criteria, all of this could enter Branch 1.
- Routing the Branch 1 flow from the diffluence to Zolezzi Lane resulted in a 100 year flow rate of 625 cfs, a 25 year flow rate 1,781 cfs at Zolezzi Lane, and a 5 year flow rate of 215 cfs.
- The 100 year flow rate at in Branch 1A at Jeppson Lane increased from 473 to 492 cfs due to intercepting and routing overland flow northward. The 100 year flow rate in 1A at South Virginia Street decreased from 534 to 492 cfs.
- The increased flow rate increased water surface elevations by less than 0.1 foot and floodplain widths by a maximum of 4 feet. The floodplain widths are less than those shown on the FIRM.
- The 100 year flow rate on Branch 1B was 67 cfs in both scenarios.
- The 25 year flow rate in Branch 1A is 1,507 cfs and in Branch 1B is 223 cfs.
- The 5-year flow rates on both branches were not affected by development of the project.

Based on these findings, the Autumn Wood project can be developed without impacting downstream properties.

5.0 REFERENCES

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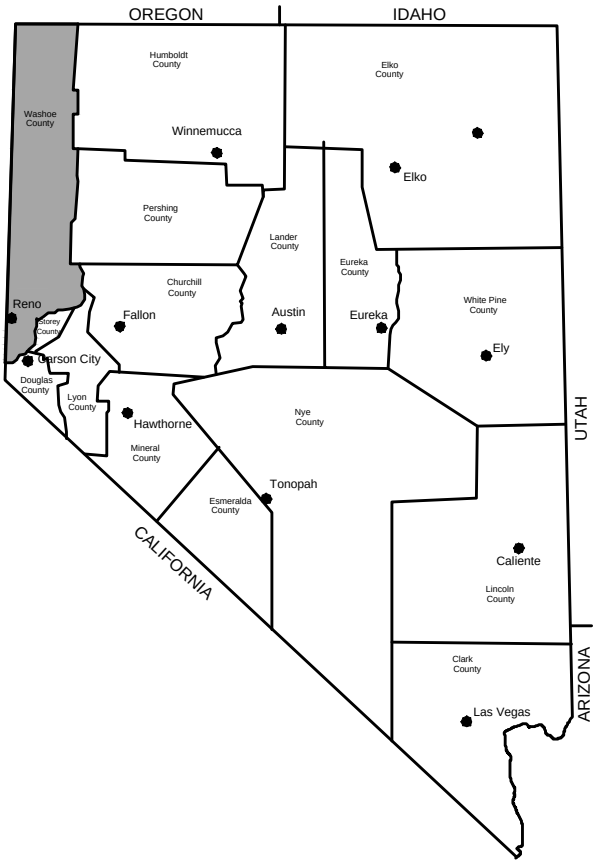
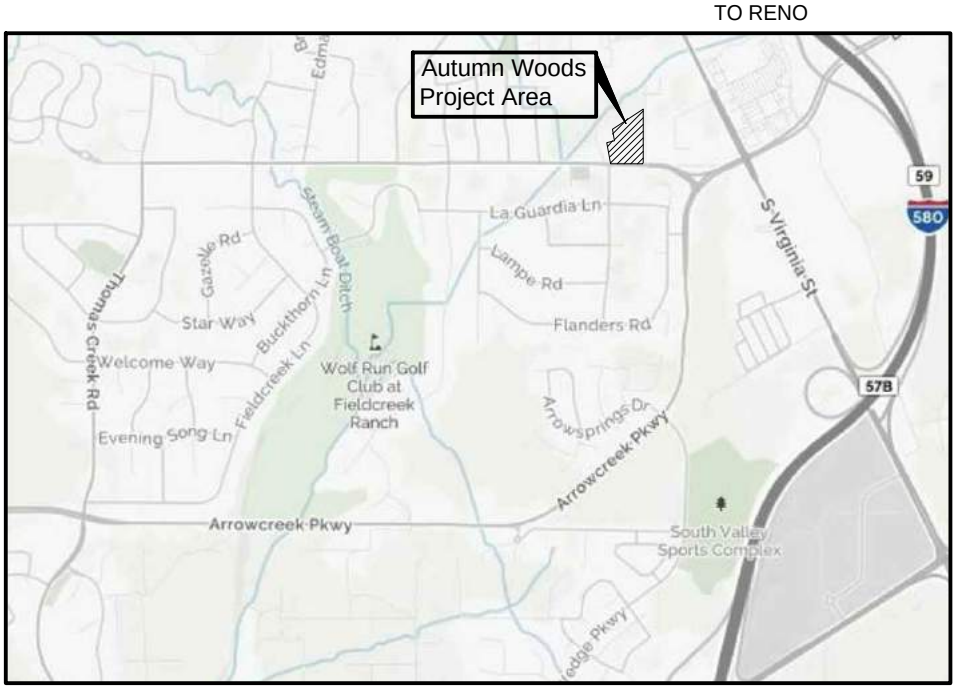
APPENDIX A

FIGURES



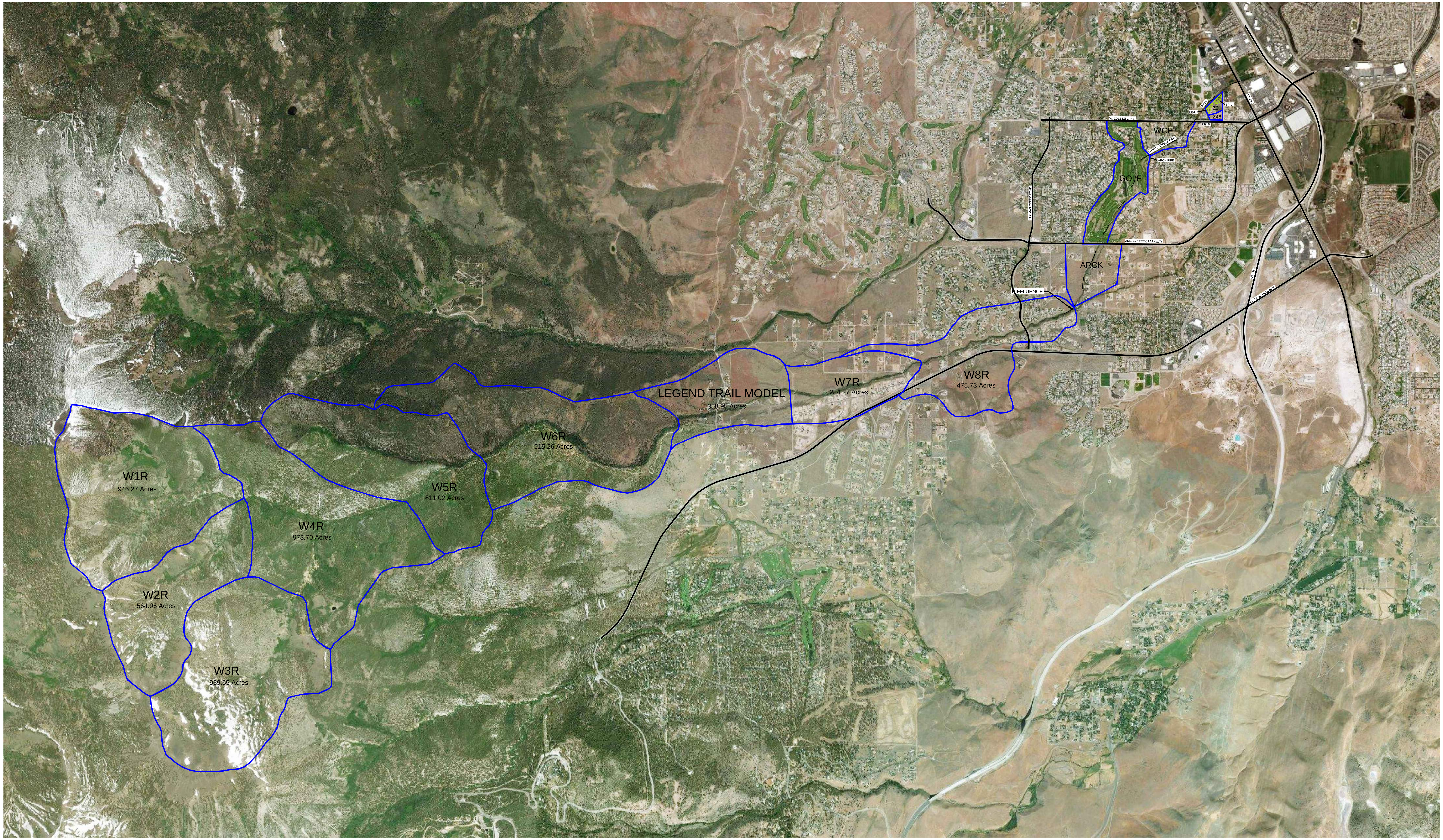
State of Nevada



Vicinity Map

FIGURE 1
Vicinity Map
Autumn Wood
Reno, Nevada
December 6, 2017

DEW Hydrology
10180 Grizzly Hill Court
Reno, Nevada 89521
Phone: (775) 815-2293



DEW Hydrology
10180 Grizzly Hill Court
Reno, Nevada 89521
Phone: (775) 815-2293

WATERSHED MAP
AUTUMN WOOD

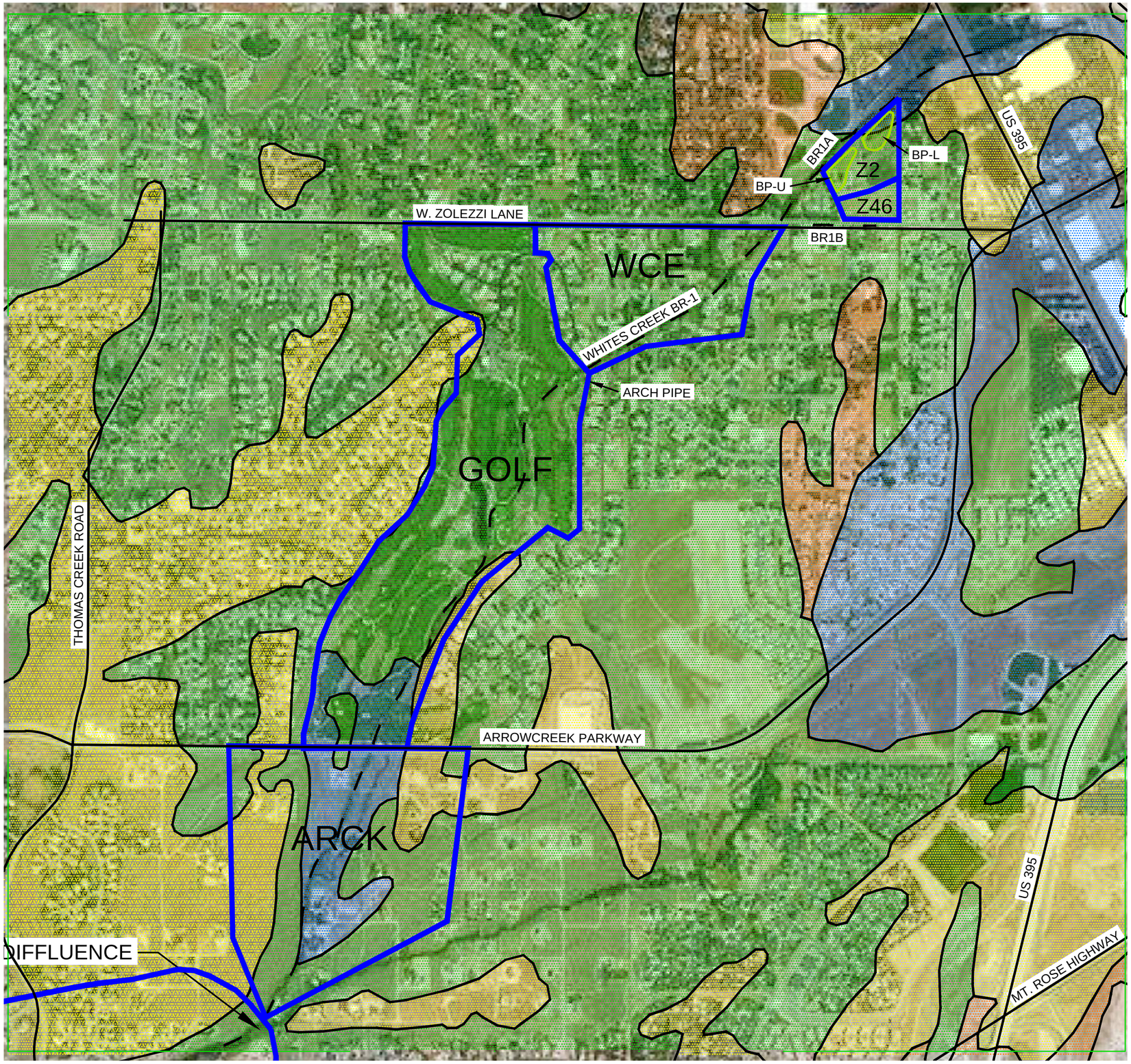
NEVADA
WASHOE COUNTY
RENO

SHEET REVISIONS		
NO.	DESCRIPTION/DATE	BY

JOB NO.	
DESIGNED	D.W.
DRAWN	S.R.M.
CHECKED	
DATE	

FIGURE 2

OF SHEETS



0 400' 800' 1600'

LEGEND

- Watershed Map Proposed Conditions
- Soils Boundaries
- A
- B
- C
- D

DEW Hydrology
10180 Grizzly Hill Court
Reno, Nevada 89521
Phone: (775) 815-2293

SOILS MAP

AUTUMN WOOD

WASHOE COUNTY NEVADA

RENO

SHEET REVISIONS		
NO.	DESCRIPTION/DATE	BY

JOB NO.	
DESIGNED	D.W.
DRAWN	S.R.M.
CHECKED	
DATE	

FIGURE 3

OF SHEETS

LEGEND

Watershed Map Proposed Conditions

Detension Pond

DP-L

DEW Hydrology
10180 Grizzly Hill Court
Reno, Nevada 89521
Phone: (775) 815-2293

ENLARGED PARCEL AREA

AUTUMN WOOD

WASHOE COUNTY NEVADA

RENO

	SHEET REVISIONS	
NO.	DESCRIPTION/DATE	BY

JOB NO.	
DESIGNED	D.W.
DRAWN	S.R.M.
CHECKED	
DATE	

FIGURE 4

OF SHEETS

APPENDIX B

SUPPORTING CALCULATIONS

NOAA Atlas 14, Volume 1, Version 5
Location name: Incline Village, Nevada, USA*
Latitude: 39.3225°, Longitude: -119.9°
Elevation: 8500.28 ft**
* source: ESRI Maps
** source: USGS

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

PF tabular

W IR

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	0.154 (0.134-0.180)	0.192 (0.168-0.224)	0.250 (0.215-0.292)	0.304 (0.259-0.354)	0.389 (0.324-0.457)	0.466 (0.377-0.555)	0.556 (0.433-0.674)	0.667 (0.496-0.830)	0.846 (0.588-1.09)	1.02 (0.665-1.34)
10-min	0.234 (0.204-0.273)	0.291 (0.255-0.341)	0.381 (0.328-0.445)	0.462 (0.395-0.539)	0.593 (0.494-0.695)	0.710 (0.574-0.844)	0.847 (0.659-1.02)	1.01 (0.755-1.26)	1.29 (0.894-1.65)	1.55 (1.01-2.04)
15-min	0.290 (0.253-0.339)	0.361 (0.317-0.423)	0.472 (0.407-0.552)	0.573 (0.489-0.668)	0.735 (0.612-0.862)	0.880 (0.711-1.05)	1.05 (0.817-1.27)	1.26 (0.936-1.57)	1.60 (1.11-2.05)	1.92 (1.25-2.53)
30-min	0.390 (0.341-0.456)	0.486 (0.426-0.570)	0.636 (0.547-0.743)	0.772 (0.659-0.900)	0.990 (0.824-1.16)	1.19 (0.959-1.41)	1.41 (1.10-1.71)	1.69 (1.26-2.11)	2.15 (1.49-2.76)	2.58 (1.69-3.41)
60-min	0.483 (0.422-0.565)	0.602 (0.528-0.705)	0.787 (0.678-0.919)	0.955 (0.816-1.11)	1.23 (1.02-1.44)	1.47 (1.19-1.74)	1.75 (1.36-2.12)	2.10 (1.56-2.61)	2.66 (1.85-3.41)	3.19 (2.09-4.22)
2-hr	0.649 (0.580-0.728)	0.806 (0.718-0.904)	1.01 (0.892-1.13)	1.18 (1.03-1.32)	1.43 (1.22-1.61)	1.65 (1.38-1.88)	1.90 (1.55-2.21)	2.23 (1.76-2.65)	2.80 (2.11-3.45)	3.34 (2.42-4.24)
3-hr	0.820 (0.738-0.911)	1.02 (0.927-1.13)	1.24 (1.12-1.38)	1.42 (1.27-1.58)	1.66 (1.47-1.86)	1.87 (1.63-2.11)	2.08 (1.79-2.38)	2.42 (2.04-2.82)	2.98 (2.44-3.55)	3.51 (2.80-4.29)
6-hr	1.29 (1.15-1.43)	1.59 (1.43-1.77)	1.93 (1.72-2.15)	2.18 (1.94-2.44)	2.50 (2.19-2.82)	2.74 (2.37-3.10)	2.96 (2.53-3.39)	3.22 (2.71-3.74)	3.58 (2.95-4.21)	3.89 (3.16-4.66)
12-hr	1.87 (1.67-2.09)	2.34 (2.09-2.62)	2.90 (2.57-3.25)	3.33 (2.93-3.75)	3.91 (3.39-4.43)	4.34 (3.72-4.96)	4.79 (4.03-5.53)	5.22 (4.32-6.11)	5.77 (4.66-6.90)	6.18 (4.89-7.52)
24-hr	3.23 (2.83-3.78)	4.06 (3.56-4.75)	5.19 (4.52-6.07)	6.11 (5.29-7.16)	7.42 (6.35-8.69)	8.47 (7.19-9.92)	9.58 (8.05-11.3)	10.8 (8.91-12.8)	12.4 (10.1-14.8)	13.7 (10.9-16.6)
2-day	4.20 (3.59-5.02)	5.34 (4.57-6.38)	6.99 (5.94-8.37)	8.36 (7.06-10.0)	10.3 (8.63-12.4)	12.0 (9.91-14.4)	13.7 (11.2-16.6)	15.6 (12.6-19.1)	18.4 (14.5-22.6)	20.6 (15.9-25.8)
3-day	4.96 (4.25-5.88)	6.34 (5.44-7.52)	8.44 (7.22-10.0)	10.2 (8.69-12.1)	12.8 (10.7-15.1)	14.9 (12.4-17.7)	17.2 (14.2-20.5)	19.7 (16.0-23.7)	23.4 (18.6-28.5)	26.5 (20.7-32.6)
4-day	5.71 (4.91-6.73)	7.35 (6.31-8.66)	9.90 (8.49-11.7)	12.0 (10.3-14.2)	15.2 (12.8-17.8)	17.8 (14.9-21.0)	20.7 (17.2-24.4)	23.9 (19.5-28.3)	28.5 (22.7-34.3)	32.4 (25.4-39.3)
7-day	6.86 (5.86-8.06)	8.90 (7.60-10.4)	12.2 (10.4-14.3)	14.9 (12.6-17.4)	18.8 (15.8-22.0)	22.0 (18.4-25.8)	25.5 (21.1-30.0)	29.3 (24.0-34.8)	34.9 (28.1-41.9)	39.5 (31.3-47.7)
10-day	7.99 (6.83-9.38)	10.4 (8.89-12.2)	14.2 (12.1-16.6)	17.3 (14.7-20.2)	21.6 (18.2-25.3)	25.2 (21.1-29.5)	29.0 (24.1-34.1)	33.1 (27.2-39.1)	38.9 (31.5-46.5)	43.7 (34.9-52.7)
20-day	10.8 (9.40-12.5)	14.1 (12.2-16.2)	19.0 (16.4-21.9)	22.9 (19.7-26.3)	28.3 (24.2-32.6)	32.6 (27.8-37.7)	37.1 (31.4-43.2)	41.9 (35.1-49.1)	48.6 (40.1-57.5)	54.0 (43.9-64.5)
30-day	13.3 (11.6-15.5)	17.3 (15.0-20.0)	23.4 (20.2-27.0)	28.1 (24.2-32.5)	34.7 (29.7-40.1)	39.9 (33.9-46.1)	45.4 (38.3-52.8)	51.1 (42.7-59.8)	59.1 (48.7-69.8)	65.5 (53.3-78.1)
45-day	16.4 (14.2-18.7)	21.3 (18.5-24.2)	28.7 (24.9-32.6)	34.3 (29.6-39.1)	41.9 (36.0-47.9)	47.9 (41.0-54.9)	54.1 (45.9-62.2)	60.6 (50.9-70.0)	69.5 (57.5-81.0)	76.5 (62.6-89.9)
60-day	18.8 (16.1-21.7)	24.6 (21.1-28.4)	33.1 (28.3-38.2)	39.3 (33.5-45.2)	47.4 (40.3-54.6)	53.5 (45.2-61.9)	59.7 (50.2-69.3)	65.9 (55.0-76.8)	74.2 (61.4-87.2)	80.5 (66.1-95.4)

[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.

Back to Top

NOAA Atlas 14, Volume 1, Version 5
Location name: Incline Village, Nevada, USA*
Latitude: 39.3386°, Longitude: -119.915°
Elevation: 9612.58 ft**
* source: ESRI Maps
** source: USGS

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

PF tabular

W2R

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	0.160 (0.140-0.186)	0.199 (0.175-0.233)	0.259 (0.224-0.302)	0.314 (0.269-0.365)	0.402 (0.337-0.471)	0.482 (0.391-0.570)	0.575 (0.450-0.692)	0.689 (0.516-0.852)	0.876 (0.612-1.12)	1.05 (0.695-1.38)
10-min	0.243 (0.213-0.283)	0.303 (0.266-0.354)	0.395 (0.341-0.460)	0.478 (0.410-0.556)	0.612 (0.512-0.716)	0.733 (0.596-0.868)	0.875 (0.684-1.05)	1.05 (0.785-1.30)	1.33 (0.932-1.70)	1.60 (1.06-2.10)
15-min	0.302 (0.264-0.351)	0.375 (0.330-0.439)	0.489 (0.423-0.570)	0.593 (0.509-0.689)	0.759 (0.635-0.887)	0.909 (0.738-1.08)	1.09 (0.848-1.31)	1.30 (0.973-1.61)	1.65 (1.16-2.11)	1.99 (1.31-2.61)
30-min	0.406 (0.356-0.473)	0.506 (0.445-0.591)	0.659 (0.570-0.768)	0.798 (0.685-0.928)	1.02 (0.855-1.20)	1.22 (0.994-1.45)	1.46 (1.14-1.76)	1.75 (1.31-2.17)	2.23 (1.56-2.84)	2.68 (1.77-3.51)
60-min	0.503 (0.440-0.585)	0.626 (0.550-0.732)	0.815 (0.705-0.950)	0.988 (0.848-1.15)	1.26 (1.06-1.48)	1.52 (1.23-1.79)	1.81 (1.41-2.18)	2.17 (1.62-2.68)	2.75 (1.93-3.51)	3.32 (2.19-4.35)
2-hr	0.678 (0.607-0.759)	0.840 (0.752-0.942)	1.05 (0.930-1.17)	1.22 (1.07-1.37)	1.48 (1.27-1.67)	1.71 (1.43-1.95)	1.97 (1.61-2.28)	2.31 (1.84-2.74)	2.91 (2.21-3.57)	3.47 (2.54-4.37)
3-hr	0.859 (0.777-0.953)	1.07 (0.973-1.18)	1.29 (1.17-1.44)	1.48 (1.33-1.64)	1.73 (1.53-1.93)	1.94 (1.70-2.19)	2.17 (1.87-2.48)	2.53 (2.13-2.93)	3.11 (2.56-3.69)	3.66 (2.94-4.44)
6-hr	1.36 (1.23-1.51)	1.69 (1.52-1.87)	2.03 (1.82-2.26)	2.29 (2.04-2.56)	2.63 (2.31-2.95)	2.87 (2.50-3.24)	3.10 (2.66-3.53)	3.37 (2.85-3.90)	3.76 (3.13-4.40)	4.11 (3.37-4.89)
12-hr	2.01 (1.79-2.24)	2.51 (2.24-2.80)	3.09 (2.75-3.46)	3.55 (3.14-3.99)	4.16 (3.62-4.71)	4.62 (3.98-5.26)	5.09 (4.31-5.87)	5.55 (4.62-6.47)	6.13 (4.98-7.30)	6.56 (5.23-7.95)
24-hr	3.45 (3.04-3.99)	4.34 (3.83-5.03)	5.55 (4.87-6.43)	6.55 (5.70-7.60)	7.95 (6.84-9.24)	9.08 (7.75-10.6)	10.3 (8.67-12.0)	11.5 (9.60-13.6)	13.3 (10.8-15.8)	14.7 (11.8-17.8)
2-day	4.51 (3.88-5.33)	5.73 (4.93-6.79)	7.51 (6.42-8.92)	9.01 (7.65-10.7)	11.2 (9.35-13.3)	12.9 (10.7-15.5)	14.8 (12.2-17.9)	16.9 (13.7-20.5)	19.9 (15.7-24.4)	22.3 (17.2-27.8)
3-day	5.27 (4.55-6.19)	6.75 (5.83-7.93)	8.99 (7.73-10.6)	10.9 (9.31-12.8)	13.6 (11.5-16.0)	15.9 (13.3-18.7)	18.4 (15.2-21.8)	21.1 (17.2-25.1)	25.0 (19.9-30.1)	28.2 (22.1-34.5)
4-day	6.03 (5.23-7.04)	7.76 (6.72-9.07)	10.5 (9.04-12.2)	12.7 (11.0-14.8)	16.0 (13.7-18.7)	18.8 (15.9-22.0)	21.9 (18.3-25.6)	25.2 (20.7-29.7)	30.1 (24.2-35.9)	34.2 (27.0-41.2)
7-day	7.28 (6.25-8.51)	9.44 (8.12-11.0)	12.9 (11.1-15.1)	15.8 (13.5-18.4)	19.9 (16.8-23.3)	23.3 (19.6-27.3)	27.0 (22.5-31.8)	31.1 (25.6-36.8)	37.0 (29.8-44.3)	41.9 (33.3-50.5)
10-day	8.46 (7.27-9.88)	11.0 (9.48-12.8)	15.0 (12.9-17.5)	18.3 (15.6-21.3)	22.9 (19.4-26.7)	26.6 (22.4-31.0)	30.6 (25.6-35.9)	34.9 (28.8-41.2)	41.1 (33.3-48.9)	46.1 (36.9-55.4)
20-day	11.5 (10.0-13.3)	14.9 (13.0-17.2)	20.1 (17.5-23.2)	24.2 (21.0-27.9)	29.9 (25.7-34.5)	34.4 (29.4-39.9)	39.2 (33.2-45.6)	44.2 (37.0-51.8)	51.2 (42.2-60.7)	56.9 (46.2-68.0)
30-day	14.2 (12.4-16.5)	18.5 (16.1-21.4)	24.9 (21.6-28.9)	30.0 (25.9-34.6)	37.0 (31.7-42.8)	42.5 (36.2-49.2)	48.3 (40.8-56.2)	54.4 (45.5-63.6)	62.9 (51.8-74.3)	69.6 (56.7-83.0)
45-day	17.6 (15.3-20.0)	22.8 (19.9-25.9)	30.7 (26.7-34.9)	36.6 (31.8-41.8)	44.8 (38.6-51.2)	51.2 (43.9-58.7)	57.9 (49.1-66.5)	64.7 (54.5-74.9)	74.3 (61.6-86.6)	81.9 (67.1-96.2)
60-day	20.1 (17.3-23.1)	26.3 (22.6-30.2)	35.3 (30.3-40.5)	41.8 (35.9-48.0)	50.4 (43.2-58.0)	56.9 (48.4-65.7)	63.5 (53.6-73.5)	70.1 (58.8-81.5)	78.9 (65.6-92.5)	85.8 (70.6-101)

[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: Incline Village, Nevada, USA*
Latitude: 39.34°, Longitude: -119.903°
Elevation: 9669.6 ft**
* source: ESRI Maps
** source: USGS

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

W3R

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	0.153 (0.133-0.179)	0.191 (0.167-0.223)	0.249 (0.215-0.292)	0.303 (0.259-0.354)	0.389 (0.324-0.457)	0.466 (0.376-0.556)	0.556 (0.432-0.675)	0.666 (0.495-0.832)	0.845 (0.585-1.09)	1.01 (0.662-1.35)
10-min	0.233 (0.203-0.272)	0.290 (0.254-0.340)	0.380 (0.327-0.445)	0.461 (0.394-0.538)	0.592 (0.492-0.696)	0.709 (0.573-0.846)	0.846 (0.657-1.03)	1.01 (0.753-1.27)	1.29 (0.891-1.66)	1.54 (1.01-2.05)
15-min	0.289 (0.252-0.338)	0.360 (0.316-0.422)	0.471 (0.405-0.551)	0.571 (0.488-0.667)	0.734 (0.611-0.862)	0.879 (0.710-1.05)	1.05 (0.814-1.27)	1.26 (0.934-1.57)	1.59 (1.11-2.05)	1.91 (1.25-2.54)
30-min	0.389 (0.340-0.455)	0.485 (0.425-0.568)	0.634 (0.546-0.742)	0.770 (0.658-0.899)	0.988 (0.822-1.16)	1.18 (0.957-1.41)	1.41 (1.10-1.72)	1.69 (1.26-2.12)	2.15 (1.49-2.77)	2.58 (1.68-3.42)
60-min	0.482 (0.420-0.563)	0.600 (0.526-0.703)	0.784 (0.676-0.918)	0.953 (0.814-1.11)	1.22 (1.02-1.44)	1.47 (1.18-1.75)	1.75 (1.36-2.12)	2.10 (1.56-2.62)	2.66 (1.84-3.42)	3.19 (2.08-4.23)
2-hr	0.649 (0.579-0.728)	0.805 (0.718-0.904)	1.01 (0.892-1.13)	1.18 (1.03-1.33)	1.43 (1.22-1.61)	1.65 (1.38-1.88)	1.90 (1.54-2.21)	2.23 (1.76-2.66)	2.81 (2.10-3.46)	3.34 (2.41-4.26)
3-hr	0.819 (0.737-0.911)	1.02 (0.926-1.13)	1.24 (1.12-1.38)	1.42 (1.27-1.58)	1.66 (1.47-1.86)	1.86 (1.62-2.11)	2.08 (1.78-2.37)	2.42 (2.03-2.81)	2.98 (2.44-3.56)	3.51 (2.80-4.31)
6-hr	1.28 (1.15-1.42)	1.59 (1.43-1.77)	1.92 (1.72-2.15)	2.17 (1.93-2.44)	2.50 (2.19-2.82)	2.73 (2.37-3.10)	2.95 (2.52-3.39)	3.21 (2.69-3.73)	3.56 (2.93-4.20)	3.86 (3.13-4.64)
12-hr	1.87 (1.66-2.09)	2.33 (2.08-2.62)	2.89 (2.56-3.24)	3.32 (2.92-3.75)	3.89 (3.38-4.43)	4.33 (3.71-4.95)	4.77 (4.01-5.52)	5.20 (4.30-6.10)	5.75 (4.63-6.89)	6.16 (4.85-7.51)
24-hr	3.13 (2.75-3.65)	3.95 (3.46-4.60)	5.05 (4.40-5.88)	5.95 (5.15-6.95)	7.22 (6.17-8.45)	8.24 (6.98-9.65)	9.33 (7.80-11.0)	10.5 (8.62-12.5)	12.1 (9.72-14.5)	13.3 (10.5-16.3)
2-day	4.06 (3.48-4.83)	5.16 (4.42-6.15)	6.75 (5.74-8.08)	8.08 (6.82-9.69)	9.99 (8.32-12.0)	11.6 (9.54-14.0)	13.2 (10.8-16.1)	15.1 (12.1-18.5)	17.7 (13.8-21.9)	19.9 (15.2-25.0)
3-day	4.80 (4.14-5.66)	6.15 (5.29-7.25)	8.18 (7.02-9.66)	9.88 (8.44-11.7)	12.4 (10.4-14.6)	14.4 (12.0-17.1)	16.7 (13.7-19.8)	19.1 (15.5-22.9)	22.6 (18.0-27.5)	25.6 (19.9-31.4)
4-day	5.54 (4.79-6.49)	7.13 (6.16-8.35)	9.60 (8.29-11.2)	11.7 (10.1-13.6)	14.7 (12.5-17.2)	17.3 (14.6-20.2)	20.0 (16.7-23.5)	23.1 (19.0-27.3)	27.6 (22.1-33.0)	31.3 (24.7-37.8)
7-day	6.67 (5.72-7.81)	8.65 (7.42-10.1)	11.8 (10.1-13.8)	14.4 (12.3-16.9)	18.2 (15.4-21.3)	21.3 (17.9-25.0)	24.7 (20.5-29.1)	28.4 (23.4-33.7)	33.8 (27.2-40.5)	38.3 (30.4-46.2)
10-day	7.75 (6.65-9.06)	10.1 (8.66-11.8)	13.8 (11.8-16.1)	16.7 (14.3-19.5)	20.9 (17.7-24.4)	24.4 (20.5-28.4)	28.1 (23.4-32.9)	32.0 (26.3-37.7)	37.6 (30.4-44.8)	42.2 (33.8-50.8)
20-day	10.5 (9.15-12.1)	13.6 (11.9-15.7)	18.4 (16.0-21.2)	22.1 (19.2-25.5)	27.3 (23.5-31.5)	31.5 (26.9-36.4)	35.9 (30.4-41.7)	40.5 (33.9-47.4)	46.9 (38.7-55.5)	52.1 (42.4-62.2)
30-day	13.0 (11.3-15.0)	16.8 (14.7-19.5)	22.7 (19.7-26.3)	27.3 (23.6-31.5)	33.7 (28.9-39.0)	38.7 (33.0-44.8)	44.0 (37.2-51.2)	49.6 (41.5-58.0)	57.3 (47.3-67.7)	63.4 (51.7-75.7)
45-day	16.0 (13.9-18.2)	20.8 (18.1-23.6)	27.9 (24.2-31.7)	33.3 (28.9-37.9)	40.7 (35.1-46.5)	46.5 (39.9-53.3)	52.5 (44.6-60.4)	58.8 (49.5-68.0)	67.4 (55.9-78.7)	74.3 (60.9-87.3)
60-day	18.3 (15.7-21.1)	23.9 (20.5-27.5)	32.1 (27.6-37.0)	38.1 (32.7-43.7)	46.0 (39.3-52.8)	51.9 (44.0-59.8)	57.8 (48.8-67.0)	63.9 (53.5-74.2)	71.9 (59.7-84.3)	78.0 (64.2-92.1)

[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.

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CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Autumn Wood
SUBBASIN: Z-46 Existing & proposed conditons
AREA, AC.: 5.3
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	Sage-grass/fair	5.30	1.000	51	51.0	
C		0.00	0.000	79	0.0	
			0.000		0.0	
			0.000		0.0	
		5.30	1.000			
			FINAL CN VALUE:		**51.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Autumn Wood
SUBBASIN: Z-2 Existing conditions
AREA, AC.: 4.7
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	Sage-grass/Poor	4.70	1.000	67	67.0	
C		0.00	0.000	79	0.0	
D		0.00	0.000	84	0.0	
			0.000		0.0	
			0.000		0.0	
		4.70	1.000			
			FINAL CN VALUE:		**67.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Autumn Wood
SUBBASIN: Z-2 Proposed conditions
AREA, AC.: 4.7
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
A	1/8 acre lots	4.70	1.000	85	85.0	
C		0.00	0.000	70	0.0	
D		0.00	0.000	77	0.0	
None		0.00	0.000	77	0.0	
			0.000		0.0	
			0.000		0.0	
		4.70	1.000			
			FINAL CN VALUE:		**85.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.37°, Longitude: -119.894°
Elevation: 7622.26 ft**
* source: ESRI Maps
** source: USGS

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

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W5R

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	0.146 (0.127-0.171)	0.182 (0.159-0.214)	0.238 (0.205-0.279)	0.290 (0.248-0.339)	0.374 (0.311-0.440)	0.450 (0.364-0.537)	0.539 (0.418-0.654)	0.648 (0.481-0.808)	0.824 (0.571-1.06)	0.991 (0.647-1.31)
10-min	0.222 (0.194-0.260)	0.277 (0.243-0.325)	0.363 (0.312-0.425)	0.442 (0.377-0.517)	0.569 (0.474-0.670)	0.685 (0.553-0.817)	0.820 (0.637-0.996)	0.986 (0.732-1.23)	1.25 (0.869-1.62)	1.51 (0.985-2.00)
15-min	0.276 (0.240-0.322)	0.343 (0.301-0.403)	0.450 (0.388-0.527)	0.547 (0.468-0.640)	0.706 (0.588-0.831)	0.849 (0.686-1.01)	1.02 (0.789-1.24)	1.22 (0.907-1.53)	1.56 (1.08-2.00)	1.87 (1.22-2.48)
30-min	0.371 (0.323-0.434)	0.463 (0.405-0.542)	0.606 (0.522-0.709)	0.738 (0.630-0.862)	0.951 (0.791-1.12)	1.14 (0.924-1.36)	1.37 (1.06-1.66)	1.65 (1.22-2.05)	2.10 (1.45-2.70)	2.52 (1.65-3.34)
60-min	0.459 (0.400-0.537)	0.572 (0.501-0.671)	0.750 (0.646-0.878)	0.913 (0.780-1.07)	1.18 (0.980-1.39)	1.42 (1.14-1.69)	1.69 (1.32-2.06)	2.04 (1.51-2.54)	2.59 (1.80-3.34)	3.12 (2.04-4.13)
2-hr	0.621 (0.554-0.698)	0.772 (0.687-0.867)	0.966 (0.855-1.09)	1.13 (0.990-1.28)	1.38 (1.18-1.55)	1.59 (1.33-1.82)	1.83 (1.49-2.14)	2.16 (1.70-2.58)	2.73 (2.04-3.37)	3.25 (2.35-4.16)
3-hr	0.780 (0.702-0.868)	0.969 (0.882-1.08)	1.18 (1.06-1.32)	1.36 (1.22-1.51)	1.59 (1.40-1.78)	1.79 (1.55-2.02)	2.00 (1.71-2.29)	2.33 (1.95-2.72)	2.88 (2.35-3.45)	3.40 (2.71-4.19)
6-hr	1.21 (1.08-1.34)	1.50 (1.35-1.67)	1.82 (1.62-2.03)	2.05 (1.82-2.30)	2.36 (2.07-2.66)	2.59 (2.24-2.93)	2.80 (2.38-3.20)	3.04 (2.55-3.53)	3.40 (2.80-4.00)	3.71 (3.01-4.46)
12-hr	1.74 (1.55-1.94)	2.17 (1.94-2.44)	2.69 (2.39-3.02)	3.10 (2.73-3.49)	3.64 (3.16-4.13)	4.05 (3.47-4.62)	4.46 (3.76-5.16)	4.86 (4.03-5.70)	5.38 (4.34-6.44)	5.77 (4.56-7.03)
24-hr	2.71 (2.39-3.13)	3.41 (3.01-3.94)	4.36 (3.82-5.04)	5.14 (4.47-5.96)	6.24 (5.36-7.24)	7.12 (6.05-8.27)	8.05 (6.76-9.45)	9.03 (7.47-10.7)	10.4 (8.40-12.4)	11.5 (9.11-14.0)
2-day	3.47 (2.99-4.10)	4.41 (3.80-5.21)	5.76 (4.93-6.84)	6.89 (5.85-8.19)	8.50 (7.11-10.2)	9.83 (8.14-11.8)	11.3 (9.18-13.6)	12.8 (10.3-15.6)	15.0 (11.7-18.5)	16.8 (12.8-21.1)
3-day	4.13 (3.58-4.83)	5.28 (4.58-6.19)	7.02 (6.06-8.23)	8.48 (7.28-9.94)	10.6 (8.98-12.4)	12.3 (10.4-14.5)	14.2 (11.8-16.9)	16.3 (13.3-19.4)	19.3 (15.4-23.3)	21.8 (17.1-26.7)
4-day	4.80 (4.17-5.57)	6.16 (5.36-7.16)	8.28 (7.19-9.63)	10.1 (8.71-11.7)	12.7 (10.8-14.7)	14.9 (12.6-17.3)	17.2 (14.4-20.1)	19.8 (16.4-23.3)	23.7 (19.1-28.1)	26.9 (21.3-32.3)
7-day	5.78 (4.98-6.75)	7.49 (6.45-8.74)	10.2 (8.78-11.9)	12.5 (10.7-14.5)	15.7 (13.3-18.4)	18.4 (15.5-21.5)	21.3 (17.7-25.1)	24.5 (20.1-29.0)	29.1 (23.5-34.8)	32.9 (26.1-39.7)
10-day	6.63 (5.72-7.73)	8.62 (7.44-10.0)	11.7 (10.1-13.7)	14.3 (12.2-16.6)	17.8 (15.1-20.8)	20.7 (17.5-24.2)	23.8 (19.9-28.0)	27.2 (22.4-32.1)	31.9 (25.9-38.1)	35.8 (28.7-43.1)
20-day	8.97 (7.82-10.4)	11.6 (10.1-13.4)	15.7 (13.6-18.1)	18.8 (16.3-21.7)	23.2 (20.0-26.8)	26.7 (22.9-31.0)	30.5 (25.8-35.5)	34.3 (28.8-40.3)	39.8 (32.8-47.2)	44.1 (35.9-52.8)
30-day	11.2 (9.73-13.0)	14.5 (12.6-16.8)	19.5 (16.9-22.6)	23.4 (20.3-27.2)	28.9 (24.8-33.5)	33.2 (28.3-38.5)	37.7 (31.9-44.0)	42.5 (35.6-49.8)	49.1 (40.5-58.1)	54.3 (44.3-64.9)
45-day	13.7 (11.9-15.6)	17.8 (15.5-20.2)	23.8 (20.7-27.1)	28.5 (24.7-32.5)	34.8 (30.0-39.8)	39.7 (34.1-45.6)	44.9 (38.2-51.6)	50.2 (42.3-58.1)	57.6 (47.8-67.2)	63.4 (52.0-74.6)
60-day	15.6 (13.4-17.9)	20.4 (17.6-23.4)	27.4 (23.5-31.4)	32.4 (27.9-37.1)	39.1 (33.5-44.9)	44.1 (37.5-50.8)	49.1 (41.5-56.8)	54.2 (45.5-62.9)	61.0 (50.7-71.4)	66.3 (54.5-78.0)

[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: 39.38°, Longitude: -119.886°
Elevation: 7131.58 ft**
* source: ESRI Maps
** source: USGS

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

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W 6R

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	0.142 (0.123-0.166)	0.177 (0.154-0.207)	0.232 (0.200-0.272)	0.283 (0.242-0.331)	0.365 (0.305-0.431)	0.440 (0.356-0.526)	0.527 (0.412-0.642)	0.635 (0.474-0.794)	0.811 (0.566-1.05)	0.977 (0.644-1.30)
10-min	0.216 (0.188-0.252)	0.269 (0.235-0.315)	0.353 (0.304-0.413)	0.430 (0.368-0.504)	0.555 (0.464-0.656)	0.669 (0.542-0.801)	0.803 (0.627-0.977)	0.967 (0.722-1.21)	1.24 (0.861-1.59)	1.49 (0.981-1.97)
15-min	0.268 (0.233-0.313)	0.334 (0.291-0.391)	0.438 (0.377-0.513)	0.533 (0.457-0.625)	0.689 (0.575-0.813)	0.830 (0.672-0.993)	0.995 (0.777-1.21)	1.20 (0.895-1.50)	1.53 (1.07-1.98)	1.84 (1.22-2.45)
30-min	0.361 (0.314-0.421)	0.450 (0.393-0.526)	0.589 (0.508-0.691)	0.718 (0.615-0.841)	0.928 (0.774-1.10)	1.12 (0.905-1.34)	1.34 (1.05-1.63)	1.61 (1.21-2.02)	2.06 (1.44-2.66)	2.48 (1.64-3.30)
60-min	0.447 (0.389-0.521)	0.557 (0.486-0.652)	0.730 (0.629-0.855)	0.889 (0.761-1.04)	1.15 (0.958-1.36)	1.38 (1.12-1.65)	1.66 (1.30-2.02)	2.00 (1.49-2.50)	2.55 (1.78-3.29)	3.07 (2.03-4.08)
2-hr	0.602 (0.537-0.678)	0.747 (0.666-0.842)	0.937 (0.830-1.06)	1.10 (0.963-1.24)	1.34 (1.15-1.52)	1.55 (1.30-1.79)	1.80 (1.46-2.10)	2.12 (1.67-2.53)	2.68 (2.02-3.32)	3.21 (2.33-4.11)
3-hr	0.754 (0.679-0.840)	0.936 (0.852-1.05)	1.14 (1.03-1.28)	1.31 (1.18-1.47)	1.54 (1.36-1.73)	1.74 (1.51-1.97)	1.95 (1.67-2.24)	2.28 (1.91-2.66)	2.84 (2.31-3.39)	3.36 (2.66-4.14)
6-hr	1.16 (1.04-1.29)	1.44 (1.30-1.61)	1.75 (1.56-1.95)	1.98 (1.76-2.21)	2.28 (2.00-2.57)	2.50 (2.17-2.83)	2.70 (2.31-3.09)	2.95 (2.48-3.42)	3.32 (2.74-3.90)	3.67 (2.99-4.38)
12-hr	1.67 (1.49-1.86)	2.08 (1.86-2.34)	2.59 (2.30-2.90)	2.98 (2.63-3.35)	3.50 (3.05-3.96)	3.89 (3.35-4.43)	4.29 (3.63-4.95)	4.68 (3.89-5.47)	5.18 (4.20-6.19)	5.56 (4.42-6.76)
24-hr	2.51 (2.22-2.88)	3.16 (2.80-3.62)	4.04 (3.56-4.63)	4.75 (4.17-5.46)	5.76 (4.99-6.63)	6.57 (5.64-7.57)	7.43 (6.30-8.64)	8.33 (6.96-9.77)	9.59 (7.84-11.4)	10.6 (8.51-12.7)
2-day	3.21 (2.78-3.75)	4.07 (3.53-4.77)	5.31 (4.58-6.25)	6.35 (5.43-7.48)	7.83 (6.60-9.26)	9.05 (7.56-10.7)	10.4 (8.53-12.4)	11.8 (9.55-14.2)	13.8 (10.9-16.9)	15.4 (11.9-19.2)
3-day	3.80 (3.31-4.42)	4.85 (4.22-5.65)	6.44 (5.59-7.52)	7.77 (6.70-9.06)	9.70 (8.27-11.3)	11.3 (9.54-13.2)	13.0 (10.9-15.4)	14.9 (12.3-17.7)	17.7 (14.2-21.3)	20.0 (15.7-24.3)
4-day	4.39 (3.83-5.08)	5.64 (4.92-6.53)	7.57 (6.59-8.78)	9.20 (7.98-10.7)	11.6 (9.93-13.4)	13.6 (11.5-15.7)	15.7 (13.2-18.3)	18.1 (15.0-21.2)	21.6 (17.4-25.6)	24.5 (19.4-29.4)
7-day	5.30 (4.56-6.19)	6.86 (5.91-8.01)	9.35 (8.03-10.9)	11.4 (9.75-13.3)	14.4 (12.2-16.8)	16.8 (14.1-19.7)	19.5 (16.2-23.0)	22.4 (18.4-26.6)	26.6 (21.4-31.9)	30.1 (23.9-36.5)
10-day	6.05 (5.23-7.06)	7.87 (6.80-9.17)	10.7 (9.22-12.5)	13.0 (11.2-15.2)	16.3 (13.8-19.0)	18.9 (15.9-22.1)	21.8 (18.2-25.5)	24.8 (20.5-29.3)	29.1 (23.6-34.8)	32.6 (26.1-39.4)
20-day	8.17 (7.12-9.46)	10.6 (9.24-12.3)	14.3 (12.4-16.5)	17.2 (14.9-19.8)	21.2 (18.2-24.5)	24.4 (20.8-28.3)	27.7 (23.5-32.4)	31.3 (26.2-36.8)	36.2 (29.8-43.1)	40.2 (32.6-48.3)
30-day	10.2 (8.86-11.8)	13.2 (11.5-15.4)	17.8 (15.4-20.7)	21.4 (18.5-24.8)	26.3 (22.6-30.6)	30.3 (25.8-35.2)	34.4 (29.1-40.3)	38.7 (32.4-45.6)	44.7 (36.9-53.1)	49.5 (40.3-59.3)
45-day	12.5 (10.9-14.2)	16.2 (14.1-18.4)	21.7 (18.9-24.7)	25.9 (22.5-29.6)	31.7 (27.3-36.3)	36.2 (31.0-41.6)	40.9 (34.7-47.1)	45.7 (38.5-53.0)	52.4 (43.5-61.4)	57.8 (47.3-68.2)
60-day	14.2 (12.2-16.3)	18.5 (16.0-21.2)	24.9 (21.4-28.5)	29.5 (25.3-33.8)	35.5 (30.4-40.8)	40.0 (34.1-46.2)	44.6 (37.7-51.6)	49.3 (41.3-57.2)	55.5 (46.0-64.9)	60.2 (49.5-70.9)

[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.

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NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.45°, Longitude: -119.87°
Elevation: 6198.12 ft**
* source: ESRI Maps
** source: USGS

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

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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	0.120 (0.103-0.138)	0.150 (0.129-0.174)	0.197 (0.169-0.231)	0.242 (0.207-0.283)	0.314 (0.263-0.373)	0.381 (0.309-0.459)	0.461 (0.362-0.565)	0.558 (0.420-0.701)	0.717 (0.507-0.934)	0.867 (0.583-1.16)
10-min	0.183 (0.157-0.210)	0.228 (0.196-0.265)	0.300 (0.258-0.351)	0.368 (0.315-0.431)	0.479 (0.400-0.568)	0.580 (0.470-0.699)	0.701 (0.550-0.859)	0.849 (0.639-1.07)	1.09 (0.771-1.42)	1.32 (0.887-1.77)
15-min	0.227 (0.195-0.261)	0.283 (0.243-0.328)	0.373 (0.320-0.435)	0.456 (0.390-0.534)	0.594 (0.496-0.704)	0.719 (0.583-0.866)	0.869 (0.682-1.07)	1.05 (0.793-1.32)	1.35 (0.956-1.76)	1.64 (1.10-2.19)
30-min	0.305 (0.263-0.351)	0.381 (0.328-0.442)	0.502 (0.431-0.586)	0.614 (0.525-0.719)	0.800 (0.668-0.949)	0.969 (0.785-1.17)	1.17 (0.919-1.43)	1.42 (1.07-1.78)	1.82 (1.29-2.37)	2.20 (1.48-2.95)
60-min	0.378 (0.325-0.434)	0.471 (0.405-0.547)	0.621 (0.534-0.725)	0.760 (0.650-0.891)	0.990 (0.827-1.17)	1.20 (0.972-1.44)	1.45 (1.14-1.78)	1.76 (1.32-2.20)	2.26 (1.59-2.94)	2.73 (1.83-3.65)
2-hr	0.502 (0.448-0.569)	0.623 (0.557-0.709)	0.788 (0.696-0.898)	0.929 (0.812-1.06)	1.15 (0.973-1.32)	1.34 (1.11-1.56)	1.56 (1.26-1.84)	1.84 (1.44-2.22)	2.35 (1.76-2.97)	2.84 (2.05-3.69)
3-hr	0.621 (0.559-0.694)	0.771 (0.702-0.865)	0.951 (0.856-1.07)	1.10 (0.980-1.23)	1.30 (1.14-1.47)	1.47 (1.27-1.69)	1.68 (1.43-1.95)	1.96 (1.63-2.32)	2.47 (1.99-2.99)	2.94 (2.32-3.73)
6-hr	0.935 (0.845-1.04)	1.17 (1.05-1.30)	1.42 (1.28-1.58)	1.61 (1.44-1.80)	1.86 (1.64-2.10)	2.05 (1.78-2.32)	2.23 (1.92-2.55)	2.44 (2.07-2.83)	2.81 (2.33-3.30)	3.20 (2.62-3.82)
12-hr	1.33 (1.19-1.48)	1.66 (1.49-1.85)	2.07 (1.85-2.31)	2.39 (2.12-2.67)	2.81 (2.46-3.17)	3.13 (2.71-3.56)	3.45 (2.95-3.96)	3.77 (3.16-4.40)	4.19 (3.42-5.00)	4.52 (3.62-5.47)
24-hr	1.82 (1.63-2.05)	2.29 (2.06-2.57)	2.91 (2.61-3.27)	3.42 (3.05-3.85)	4.14 (3.67-4.66)	4.71 (4.14-5.31)	5.32 (4.62-6.04)	5.95 (5.12-6.81)	6.84 (5.77-7.89)	7.55 (6.27-8.81)
2-day	2.29 (2.03-2.63)	2.91 (2.57-3.33)	3.78 (3.31-4.32)	4.49 (3.92-5.14)	5.51 (4.77-6.34)	6.35 (5.45-7.33)	7.24 (6.14-8.42)	8.20 (6.86-9.62)	9.56 (7.83-11.4)	10.7 (8.57-12.9)
3-day	2.57 (2.27-2.94)	3.27 (2.89-3.75)	4.31 (3.78-4.93)	5.17 (4.52-5.92)	6.41 (5.55-7.36)	7.43 (6.38-8.56)	8.54 (7.24-9.90)	9.74 (8.14-11.4)	11.5 (9.37-13.6)	12.9 (10.3-15.4)
4-day	2.84 (2.51-3.26)	3.64 (3.21-4.17)	4.84 (4.26-5.55)	5.84 (5.12-6.70)	7.30 (6.33-8.38)	8.51 (7.31-9.80)	9.84 (8.34-11.4)	11.3 (9.41-13.1)	13.4 (10.9-15.7)	15.1 (12.1-18.0)
7-day	3.44 (2.98-4.00)	4.43 (3.85-5.15)	5.98 (5.17-6.96)	7.25 (6.24-8.44)	9.07 (7.74-10.6)	10.6 (8.93-12.4)	12.2 (10.2-14.3)	14.0 (11.5-16.5)	16.5 (13.3-19.7)	18.6 (14.8-22.5)
10-day	3.96 (3.44-4.60)	5.12 (4.45-5.94)	6.91 (5.99-8.03)	8.35 (7.21-9.70)	10.4 (8.88-12.1)	12.0 (10.2-14.0)	13.8 (11.6-16.1)	15.6 (13.0-18.4)	18.3 (14.9-21.8)	20.4 (16.4-24.6)
20-day	5.26 (4.60-6.09)	6.80 (5.95-7.88)	9.11 (7.94-10.5)	10.9 (9.48-12.6)	13.4 (11.6-15.5)	15.4 (13.2-17.9)	17.5 (14.8-20.4)	19.6 (16.5-23.1)	22.7 (18.7-27.0)	25.1 (20.4-30.1)
30-day	6.46 (5.64-7.53)	8.35 (7.30-9.75)	11.2 (9.73-13.0)	13.4 (11.6-15.6)	16.4 (14.1-19.1)	18.8 (16.1-22.0)	21.3 (18.1-25.1)	23.9 (20.1-28.3)	27.6 (22.8-32.8)	30.4 (24.9-36.6)
45-day	7.91 (6.92-9.01)	10.2 (8.96-11.7)	13.7 (11.9-15.6)	16.3 (14.2-18.6)	19.8 (17.1-22.7)	22.5 (19.4-25.9)	25.4 (21.6-29.2)	28.3 (23.9-32.8)	32.3 (26.9-37.8)	35.5 (29.1-41.8)
60-day	9.02 (7.82-10.3)	11.8 (10.2-13.4)	15.7 (13.6-18.0)	18.5 (16.0-21.2)	22.2 (19.1-25.5)	25.0 (21.4-28.8)	27.8 (23.6-32.1)	30.6 (25.8-35.5)	34.3 (28.6-40.1)	37.1 (30.7-43.6)

[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.

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NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.387°, Longitude: -119.83°
Elevation: 5797.24 ft**
* source: ESRI Maps
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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

PF tabular

W & R

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	0.120 (0.104-0.141)	0.149 (0.129-0.176)	0.197 (0.169-0.233)	0.242 (0.206-0.286)	0.315 (0.261-0.375)	0.382 (0.306-0.461)	0.460 (0.356-0.565)	0.556 (0.412-0.700)	0.709 (0.493-0.922)	0.852 (0.561-1.14)
10-min	0.182 (0.157-0.213)	0.227 (0.196-0.268)	0.301 (0.257-0.354)	0.368 (0.313-0.435)	0.479 (0.397-0.571)	0.581 (0.467-0.701)	0.700 (0.542-0.860)	0.846 (0.628-1.07)	1.08 (0.750-1.40)	1.30 (0.854-1.73)
15-min	0.226 (0.195-0.265)	0.282 (0.243-0.331)	0.373 (0.319-0.439)	0.457 (0.388-0.539)	0.595 (0.493-0.708)	0.720 (0.578-0.869)	0.868 (0.672-1.07)	1.05 (0.778-1.32)	1.34 (0.930-1.74)	1.61 (1.06-2.15)
30-min	0.304 (0.263-0.357)	0.379 (0.328-0.446)	0.502 (0.429-0.591)	0.615 (0.523-0.726)	0.801 (0.663-0.953)	0.970 (0.779-1.17)	1.17 (0.905-1.44)	1.41 (1.05-1.78)	1.80 (1.25-2.34)	2.16 (1.43-2.89)
60-min	0.376 (0.326-0.441)	0.469 (0.406-0.552)	0.621 (0.531-0.732)	0.761 (0.647-0.899)	0.991 (0.821-1.18)	1.20 (0.964-1.45)	1.45 (1.12-1.78)	1.75 (1.30-2.20)	2.23 (1.55-2.90)	2.68 (1.77-3.58)
2-hr	0.499 (0.442-0.566)	0.619 (0.550-0.703)	0.784 (0.690-0.891)	0.925 (0.805-1.05)	1.14 (0.963-1.30)	1.32 (1.09-1.54)	1.54 (1.24-1.81)	1.82 (1.41-2.22)	2.31 (1.71-2.93)	2.76 (1.97-3.61)
3-hr	0.611 (0.547-0.687)	0.761 (0.688-0.856)	0.941 (0.841-1.06)	1.09 (0.966-1.22)	1.28 (1.12-1.45)	1.45 (1.25-1.66)	1.64 (1.39-1.90)	1.93 (1.59-2.27)	2.40 (1.92-2.96)	2.83 (2.22-3.65)
6-hr	0.897 (0.800-1.00)	1.12 (1.00-1.25)	1.37 (1.22-1.54)	1.56 (1.38-1.76)	1.81 (1.58-2.05)	2.00 (1.72-2.28)	2.18 (1.84-2.51)	2.39 (1.99-2.79)	2.71 (2.21-3.22)	3.02 (2.41-3.67)
12-hr	1.23 (1.09-1.38)	1.54 (1.37-1.73)	1.92 (1.71-2.16)	2.22 (1.96-2.51)	2.62 (2.27-2.98)	2.92 (2.50-3.34)	3.22 (2.71-3.74)	3.52 (2.91-4.14)	3.92 (3.15-4.71)	4.23 (3.33-5.17)
24-hr	1.72 (1.53-1.96)	2.15 (1.92-2.46)	2.74 (2.43-3.13)	3.22 (2.84-3.68)	3.89 (3.39-4.45)	4.42 (3.82-5.07)	4.98 (4.25-5.77)	5.57 (4.69-6.51)	6.39 (5.26-7.54)	7.04 (5.69-8.44)
2-day	2.11 (1.84-2.45)	2.66 (2.33-3.10)	3.45 (2.99-4.02)	4.09 (3.53-4.78)	5.00 (4.25-5.87)	5.74 (4.84-6.77)	6.53 (5.42-7.78)	7.37 (6.04-8.85)	8.55 (6.83-10.4)	9.52 (7.43-11.8)
3-day	2.46 (2.16-2.84)	3.13 (2.75-3.62)	4.11 (3.59-4.76)	4.93 (4.28-5.70)	6.10 (5.24-7.07)	7.06 (6.01-8.21)	8.10 (6.80-9.48)	9.22 (7.64-10.9)	10.8 (8.76-12.9)	12.2 (9.64-14.7)
4-day	2.82 (2.48-3.24)	3.60 (3.17-4.14)	4.78 (4.20-5.49)	5.77 (5.04-6.62)	7.19 (6.22-8.26)	8.38 (7.18-9.65)	9.67 (8.18-11.2)	11.1 (9.23-12.9)	13.1 (10.7-15.5)	14.8 (11.8-17.7)
7-day	3.37 (2.93-3.90)	4.34 (3.78-5.01)	5.83 (5.06-6.75)	7.05 (6.10-8.16)	8.81 (7.55-10.2)	10.3 (8.71-11.9)	11.8 (9.93-13.8)	13.5 (11.2-15.9)	15.9 (13.0-19.0)	17.9 (14.3-21.5)
10-day	3.85 (3.36-4.45)	4.98 (4.34-5.75)	6.71 (5.82-7.74)	8.08 (6.99-9.34)	10.0 (8.60-11.6)	11.6 (9.87-13.4)	13.3 (11.2-15.5)	15.0 (12.5-17.6)	17.6 (14.4-20.8)	19.6 (15.8-23.5)
20-day	5.06 (4.44-5.81)	6.53 (5.73-7.50)	8.72 (7.64-9.99)	10.4 (9.10-12.0)	12.8 (11.1-14.7)	14.7 (12.6-16.9)	16.6 (14.2-19.3)	18.7 (15.7-21.8)	21.5 (17.8-25.4)	23.7 (19.4-28.3)
30-day	6.19 (5.43-7.13)	7.99 (7.02-9.21)	10.7 (9.33-12.3)	12.8 (11.1-14.7)	15.6 (13.5-18.0)	17.9 (15.4-20.6)	20.2 (17.2-23.5)	22.7 (19.1-26.5)	26.0 (21.6-30.7)	28.7 (23.6-34.2)
45-day	7.52 (6.61-8.53)	9.73 (8.55-11.0)	12.9 (11.4-14.7)	15.4 (13.5-17.4)	18.7 (16.2-21.2)	21.2 (18.3-24.2)	23.8 (20.4-27.3)	26.5 (22.6-30.5)	30.2 (25.3-35.0)	33.0 (27.4-38.7)
60-day	8.61 (7.48-9.81)	11.2 (9.74-12.7)	14.9 (12.9-17.0)	17.6 (15.2-20.0)	21.1 (18.2-24.0)	23.6 (20.3-27.1)	26.3 (22.4-30.1)	28.8 (24.4-33.2)	32.2 (27.1-37.4)	34.8 (28.9-40.6)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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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

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PF tabular

Difference

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	0.098 (0.085-0.116)	0.123 (0.105-0.145)	0.165 (0.140-0.195)	0.204 (0.172-0.242)	0.270 (0.221-0.322)	0.330 (0.262-0.399)	0.402 (0.308-0.492)	0.488 (0.358-0.611)	0.627 (0.433-0.809)	0.754 (0.496-0.994)
10-min	0.150 (0.129-0.176)	0.187 (0.160-0.221)	0.250 (0.213-0.297)	0.310 (0.262-0.368)	0.410 (0.337-0.490)	0.502 (0.399-0.607)	0.611 (0.468-0.748)	0.743 (0.546-0.930)	0.955 (0.659-1.23)	1.15 (0.755-1.51)
15-min	0.186 (0.160-0.219)	0.232 (0.199-0.274)	0.310 (0.264-0.368)	0.385 (0.325-0.456)	0.509 (0.418-0.608)	0.623 (0.494-0.752)	0.758 (0.580-0.928)	0.921 (0.677-1.15)	1.18 (0.817-1.53)	1.42 (0.935-1.88)
30-min	0.250 (0.215-0.295)	0.312 (0.267-0.369)	0.418 (0.356-0.496)	0.519 (0.437-0.615)	0.685 (0.563-0.819)	0.839 (0.666-1.01)	1.02 (0.782-1.25)	1.24 (0.912-1.55)	1.59 (1.10-2.06)	1.92 (1.26-2.53)
60-min	0.310 (0.266-0.365)	0.386 (0.331-0.457)	0.517 (0.440-0.614)	0.642 (0.542-0.761)	0.848 (0.696-1.01)	1.04 (0.824-1.25)	1.26 (0.967-1.55)	1.54 (1.13-1.92)	1.97 (1.36-2.54)	2.37 (1.56-3.13)
2-hr	0.412 (0.363-0.474)	0.512 (0.452-0.589)	0.657 (0.573-0.755)	0.779 (0.672-0.897)	0.968 (0.812-1.12)	1.14 (0.929-1.33)	1.33 (1.06-1.59)	1.58 (1.21-1.94)	2.01 (1.47-2.57)	2.41 (1.70-3.16)
3-hr	0.495 (0.441-0.561)	0.617 (0.554-0.702)	0.773 (0.687-0.877)	0.899 (0.792-1.02)	1.07 (0.931-1.23)	1.23 (1.04-1.42)	1.40 (1.17-1.64)	1.65 (1.34-1.96)	2.06 (1.63-2.59)	2.44 (1.88-3.19)
6-hr	0.696 (0.620-0.782)	0.871 (0.777-0.983)	1.08 (0.958-1.22)	1.24 (1.09-1.40)	1.45 (1.26-1.65)	1.61 (1.38-1.85)	1.77 (1.50-2.06)	1.97 (1.63-2.31)	2.27 (1.83-2.71)	2.58 (2.04-3.22)
12-hr	0.913 (0.813-1.03)	1.15 (1.02-1.29)	1.45 (1.28-1.63)	1.68 (1.48-1.89)	1.98 (1.72-2.25)	2.22 (1.90-2.54)	2.45 (2.07-2.85)	2.69 (2.23-3.16)	3.01 (2.42-3.62)	3.27 (2.57-4.00)
24-hr	1.17 (1.05-1.31)	1.46 (1.32-1.64)	1.85 (1.66-2.07)	2.16 (1.94-2.42)	2.59 (2.31-2.91)	2.94 (2.59-3.30)	3.30 (2.88-3.74)	3.67 (3.17-4.20)	4.18 (3.54-4.83)	4.59 (3.83-5.37)
2-day	1.38 (1.23-1.57)	1.73 (1.54-1.97)	2.21 (1.96-2.51)	2.59 (2.29-2.95)	3.13 (2.73-3.57)	3.55 (3.08-4.08)	4.00 (3.43-4.64)	4.47 (3.78-5.23)	5.12 (4.24-6.08)	5.64 (4.58-6.81)
3-day	1.53 (1.37-1.74)	1.94 (1.73-2.19)	2.49 (2.22-2.82)	2.94 (2.61-3.33)	3.58 (3.15-4.07)	4.10 (3.57-4.68)	4.65 (4.00-5.34)	5.24 (4.45-6.06)	6.07 (5.04-7.13)	6.74 (5.49-8.03)
4-day	1.69 (1.51-1.91)	2.14 (1.91-2.41)	2.77 (2.48-3.12)	3.29 (2.93-3.71)	4.04 (3.56-4.56)	4.65 (4.06-5.27)	5.30 (4.58-6.05)	6.01 (5.12-6.90)	7.02 (5.84-8.18)	7.85 (6.41-9.25)
7-day	1.98 (1.76-2.25)	2.52 (2.23-2.86)	3.30 (2.92-3.75)	3.93 (3.47-4.47)	4.82 (4.22-5.49)	5.54 (4.80-6.33)	6.31 (5.41-7.25)	7.11 (6.03-8.24)	8.25 (6.87-9.70)	9.18 (7.52-10.9)
10-day	2.22 (1.96-2.52)	2.84 (2.51-3.22)	3.73 (3.30-4.25)	4.44 (3.91-5.05)	5.43 (4.73-6.18)	6.21 (5.38-7.09)	7.03 (6.04-8.06)	7.88 (6.69-9.11)	9.06 (7.56-10.6)	9.99 (8.23-11.8)
20-day	2.74 (2.44-3.10)	3.50 (3.11-3.97)	4.60 (4.09-5.20)	5.44 (4.82-6.16)	6.59 (5.81-7.46)	7.48 (6.55-8.51)	8.40 (7.28-9.61)	9.34 (8.02-10.7)	10.6 (8.96-12.4)	11.6 (9.67-13.6)
30-day	3.23 (2.88-3.67)	4.13 (3.68-4.70)	5.41 (4.80-6.14)	6.39 (5.65-7.25)	7.72 (6.78-8.76)	8.74 (7.63-9.96)	9.79 (8.47-11.2)	10.9 (9.31-12.5)	12.3 (10.4-14.3)	13.4 (11.2-15.8)
45-day	3.87 (3.44-4.32)	4.95 (4.41-5.53)	6.46 (5.75-7.21)	7.58 (6.74-8.46)	9.06 (8.01-10.1)	10.2 (8.95-11.4)	11.3 (9.85-12.7)	12.3 (10.7-13.9)	13.7 (11.8-15.6)	14.7 (12.5-16.9)
60-day	4.40 (3.90-4.94)	5.65 (5.01-6.34)	7.39 (6.53-8.27)	8.62 (7.62-9.63)	10.2 (8.99-11.4)	11.3 (9.94-12.7)	12.4 (10.8-14.0)	13.5 (11.7-15.2)	14.8 (12.7-16.8)	15.7 (13.4-18.0)

[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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W&R

NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.3946°, Longitude: -119.7916°
Elevation: 5167.87 ft**
* source: ESRI Maps
** source: USGS

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

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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	0.104 (0.089-0.122)	0.130 (0.111-0.153)	0.173 (0.148-0.205)	0.214 (0.181-0.254)	0.281 (0.232-0.336)	0.343 (0.273-0.415)	0.417 (0.321-0.511)	0.505 (0.373-0.634)	0.647 (0.449-0.838)	0.777 (0.513-1.03)
10-min	0.158 (0.136-0.186)	0.198 (0.170-0.234)	0.264 (0.225-0.313)	0.326 (0.276-0.387)	0.429 (0.353-0.512)	0.523 (0.417-0.632)	0.634 (0.488-0.777)	0.768 (0.567-0.965)	0.985 (0.683-1.27)	1.18 (0.780-1.57)
15-min	0.196 (0.169-0.231)	0.245 (0.210-0.289)	0.327 (0.279-0.388)	0.404 (0.342-0.479)	0.532 (0.438-0.635)	0.648 (0.517-0.783)	0.786 (0.605-0.964)	0.952 (0.703-1.20)	1.22 (0.846-1.58)	1.47 (0.968-1.94)
30-min	0.265 (0.227-0.311)	0.330 (0.283-0.390)	0.440 (0.375-0.522)	0.544 (0.461-0.645)	0.716 (0.589-0.855)	0.873 (0.696-1.06)	1.06 (0.815-1.30)	1.28 (0.947-1.61)	1.65 (1.14-2.13)	1.98 (1.30-2.62)
60-min	0.328 (0.281-0.385)	0.409 (0.351-0.483)	0.545 (0.465-0.646)	0.674 (0.570-0.799)	0.886 (0.729-1.06)	1.08 (0.861-1.31)	1.31 (1.01-1.61)	1.59 (1.17-1.99)	2.04 (1.41-2.64)	2.44 (1.61-3.24)
2-hr	0.432 (0.381-0.495)	0.537 (0.475-0.616)	0.687 (0.600-0.787)	0.814 (0.703-0.934)	1.01 (0.848-1.17)	1.18 (0.967-1.38)	1.38 (1.10-1.64)	1.63 (1.26-2.01)	2.08 (1.53-2.66)	2.49 (1.77-3.27)
3-hr	0.521 (0.464-0.590)	0.649 (0.584-0.738)	0.811 (0.722-0.920)	0.942 (0.832-1.07)	1.12 (0.975-1.28)	1.28 (1.09-1.48)	1.46 (1.22-1.71)	1.71 (1.40-2.03)	2.14 (1.70-2.69)	2.54 (1.96-3.31)
6-hr	0.740 (0.659-0.831)	0.926 (0.826-1.04)	1.15 (1.01-1.29)	1.31 (1.16-1.48)	1.54 (1.33-1.75)	1.70 (1.46-1.95)	1.87 (1.58-2.16)	2.07 (1.71-2.43)	2.38 (1.92-2.84)	2.69 (2.13-3.34)
12-hr	0.981 (0.873-1.10)	1.23 (1.10-1.39)	1.55 (1.38-1.75)	1.80 (1.58-2.03)	2.13 (1.85-2.42)	2.38 (2.04-2.72)	2.63 (2.22-3.06)	2.89 (2.38-3.39)	3.22 (2.59-3.87)	3.50 (2.75-4.27)
24-hr	1.28 (1.15-1.45)	1.61 (1.45-1.81)	2.03 (1.83-2.29)	2.38 (2.13-2.68)	2.86 (2.54-3.23)	3.25 (2.85-3.67)	3.65 (3.17-4.16)	4.07 (3.49-4.68)	4.64 (3.91-5.40)	5.10 (4.22-6.01)
2-day	1.53 (1.36-1.75)	1.93 (1.71-2.20)	2.46 (2.17-2.82)	2.90 (2.55-3.32)	3.51 (3.05-4.04)	4.00 (3.45-4.63)	4.52 (3.84-5.27)	5.06 (4.25-5.96)	5.83 (4.78-6.96)	6.44 (5.17-7.82)
3-day	1.72 (1.53-1.96)	2.18 (1.93-2.48)	2.81 (2.50-3.20)	3.34 (2.95-3.80)	4.08 (3.57-4.66)	4.69 (4.06-5.37)	5.34 (4.57-6.16)	6.03 (5.09-7.01)	7.02 (5.78-8.27)	7.82 (6.33-9.35)
4-day	1.91 (1.71-2.17)	2.43 (2.16-2.75)	3.16 (2.82-3.59)	3.78 (3.35-4.28)	4.66 (4.09-5.29)	5.38 (4.68-6.12)	6.16 (5.29-7.05)	7.00 (5.93-8.06)	8.20 (6.79-9.58)	9.20 (7.48-10.9)
7-day	2.26 (1.99-2.57)	2.88 (2.54-3.28)	3.80 (3.35-4.33)	4.54 (3.99-5.19)	5.60 (4.88-6.41)	6.46 (5.57-7.41)	7.38 (6.30-8.51)	8.35 (7.05-9.71)	9.74 (8.05-11.5)	10.9 (8.85-12.9)
10-day	2.54 (2.24-2.90)	3.26 (2.88-3.72)	4.32 (3.80-4.93)	5.16 (4.52-5.89)	6.33 (5.50-7.24)	7.26 (6.27-8.33)	8.25 (7.05-9.50)	9.27 (7.84-10.8)	10.7 (8.90-12.6)	11.9 (9.72-14.1)
20-day	3.19 (2.82-3.62)	4.08 (3.62-4.64)	5.38 (4.77-6.11)	6.39 (5.64-7.25)	7.77 (6.81-8.82)	8.84 (7.70-10.1)	9.95 (8.58-11.4)	11.1 (9.47-12.8)	12.6 (10.6-14.8)	13.9 (11.5-16.3)
30-day	3.81 (3.37-4.34)	4.88 (4.33-5.57)	6.43 (5.68-7.32)	7.61 (6.70-8.67)	9.23 (8.07-10.5)	10.5 (9.11-12.0)	11.8 (10.1-13.5)	13.1 (11.2-15.2)	14.9 (12.5-17.4)	16.3 (13.6-19.2)
45-day	4.57 (4.06-5.13)	5.87 (5.21-6.58)	7.71 (6.83-8.63)	9.08 (8.03-10.2)	10.9 (9.59-12.2)	12.3 (10.7-13.8)	13.7 (11.9-15.4)	15.0 (13.0-17.1)	16.8 (14.4-19.3)	18.2 (15.4-21.0)
60-day	5.23 (4.62-5.90)	6.75 (5.95-7.61)	8.87 (7.80-9.98)	10.4 (9.13-11.7)	12.3 (10.8-13.9)	13.7 (12.0-15.5)	15.1 (13.1-17.2)	16.5 (14.2-18.7)	18.2 (15.6-20.8)	19.4 (16.5-22.4)

[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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Criteria of Washoe County
Sub-basin lag time and time of concentration standard form

Job # 0333

Conditions: Pre-development Development: Legend Trail Calculated by: EBM Date: 1/20/04

See post development calcs

Subbasin [1]	Area (mi^2)	CN	Watercourse, L (mi)	Length to Centroid, Lc (mi)	Upper Elevation (ft)	Lower Elevation (ft)	Elevation Change (ft)	Average Slope, S (ft/mi)	Roughness, Kn	Lag Time (hr)	Lag Time (min)
W1R	1.38	59	1.72	0.87	10080	7780	2300	1337.21	0.14	1.07	63.97
W2R	0.83	59	1.88	1.11	10600	7720	2880	1531.91	0.15	1.25	74.86
W3R	1.38	60	1.78	0.82	10770	8120	2650	1488.76	0.14	1.04	62.32
W4R	1.43	58	2.03	0.55	9100	7035	2065	1017.24	0.15	1.08	65.07
W5R	1.20	60	1.84	0.64	9038	6780	2258	1227.17	0.15	1.07	64.19
W6R	1.52	63	3.10	1.32	7800	6030	1770	570.97	0.15	1.84	110.45
LT1	0.11	73	0.71	0.31	6450	5817	633	887.95	0.08	0.34	20.68
LT5A	0.06	68	0.56	0.29	6358	5907	451	811.34	0.08	0.31	18.89
LT9	0.14	74	0.91	0.42	6620	5818	802	881.10	0.08	0.42	24.91
LT9a	0.04	71	0.63	0.34	6620	5909	711	1122.63	0.08	0.33	19.70

Notes:

[1] sub-basin slope are greater than 10 percent and/or sub-basin area larger than 1 mi^2

[2] The roughness coefficient was weighted based on developed and undeveloped land use catagories outlined in the Washoe County Hydrologic Criteria & Drainage Design Manual.

[3] Lag time calculated based on Equation 710 in the Washoe County Hydrologic Criteria & Drainage Design Manual:
Equation 710: $T_{LAG} = 22.1 * K_n * [L * L_c / (S^{0.5})]^{0.33}$

Criteria of Washoe County
Sub-basin lag time and time of concentration standard form

Conditions: Post Development Devlopment: Legend Trail Computed by: E. Miller Date: Revised May 2004

Sub-basin Data				Overland Flow Travel Time (t_i)			Channelized Flow Travel Time (t_t)					Lag Time[1]			
Sub-basin ID	CN	R	Area (mi^2)	Length (ft)	Slope (%)	t_i (min)	Length (ft)	Slope (%)	Velocity[2] (f/s)	t_t (min)	t_c (min)	$T_{lag} = 0.6*(T_c)/60$ (hours)	T_{lag} = Tc*60 (minutes)	T-lag Minimum Value (minutes)[3]	T-lag Minimum Value (hours)
LT2	74	0.59	0.033	230.0	8.20	6.9	345	6.10	2.8	2	9	0.09	5	5	
				street		0	360	3.95	4.8	1	1	0.01	1	6	0.10
LT3	73	0.57	0.016	0.0	0.00	0.0	1433	6.35	2.7	9	9	0.09	5	5	0.09
LT4	74	0.59	0.033	242.0	6.61	7.7	1307	6.35	2.7	8	16	0.16	9	9	0.16
LT4b	76	0.61	0.007	309.0	5.50	8.7	1000	5.50	2.4	7	16	0.16	9	9	0.16
LT5a1	79	0.65	0.004	385.0	4.94	9	93	2.15	2.8	0.55	10	0.10	6	10	0.17
LT5b	71	0.55	0.026	0.0	0.00	0.0	1897	5.48	2.4	13	13	0.13	8	8	0.13
LT5c	76	0.61	0.005	500.0	4.80	11.6	505	5.54	2.4	4	15	0.15	9		
				street			166	3.01	3.5	1	1	0.01	0	10	0.16
LT5d	76	0.61	0.035	158.0	5.00	6.4	200	6.00	2.5	1	8	0.08	5		
				street			2416	4.50	4.3	9	9	0.09	6	10	0.17
LT6	72	0.56	0.015	0.0	0.00	0.0	1055	5.60	2.4	7	7	0.07	4	5	0.08
LT7	74	0.59	0.021	485.0	4.45	12.4									
				street			1042	2.92	3.4	5	17	0.17	10	10	0.17
LT8	73	0.57	0.018	500.0	4.80	12.6	1962	5.30	2.3	14	27	0.27	16	16	0.27

Notes:

[1] Lag times are calculated based on Equations 701, 702, 703, & 709 outlined in the City of Sparks and Washoe County Hydrologic Criteria & Drainage Design Manual for sub-basins with **areas less than 1 mi^2** and/or **slopes less than 10 percent**.

Equation 701: $t_c = t_i + t_t$

Equation 702: $t_i = [1.8 * (1.1 - R) * L^{0.5}] / S^{0.33}$

Equation 703: $R = (0.0132 * CN) - 0.39$

Equation 709: $T_{LAG} = 0.6 * t_c$

[2] Travel time velocity category for this analysis was defined as "*alluvial fans western mountain region*" Figure 701 in the Washoe County Hydrologic Criteria and Drainage Design Manual.

[3] Minimum value of 5 minutes used for t_c for urban watershed areas as per Washoe County Hydrologic Criteria and Drainage Design Maunal.

TIME OF CONCENTRATION CALCULATIONS

PROJECT: Autumn Woods

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
Wolf Run	61	0.415	0	7.7	0.00	5120	4.7	3.4	25.10	25.10	5120	38.44	25.1
T-bolt	79	0.653	0	2.8	0.00	783	3.1	2.7	4.83	4.83	783	14.35	5
W7R	77	0.626	100	1	8.52	3723	1	2	31.03	39.55	3823	31.24	31
W8R	80	0.666	500	1	17.47	1700	1	2	14.17	53.72	6023	43.46	43

$t_i = ((1.8)(1.1-R))(L^{.5}/S^{.33})$ 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

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **W1R** Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
756	20	33	41	6	142.58	0.16	3.2	5.3	6.6	1.0
1100		60	30	10	211.94	0.24	0.0	14.4	7.2	2.4
1440		100			141.74	0.16	0.0	16.0	0.0	0.0
1450	30	10	5	55	291.84	0.33	9.9	3.3	1.6	18.1
1460		62	4	34	97.43	0.11	0.0	6.8	0.4	3.7
			Total Area (Acres) =		885.53	1.00	13.1	45.8	15.9	25.2
			Total Area (Mi^2) =		1.384		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Forest (evergreen)	0.70	30	54	66	75	41
Shrub/Brush	0.30	35	56	70	77	18

Total % 1.0 Final Weighted Watershed CN = **59**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use } \%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL

Sub-basin: **W3R**

Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
756	20	33	41	6	17.31	0.02	0.4	0.6	0.8	0.1
1100		60	30	10	488.01	0.55	0.0	33.2	16.6	5.5
1432		20	70	10	51.17	0.06	0.0	1.2	4.1	0.6
1440		100			66.88	0.08	0.0	7.6	0.0	0.0
1450	30	10	5	55	258.59	0.29	8.8	2.9	1.5	16.1
			Total Area (Acres) =		881.95	1.00	9.2	45.5	22.9	22.4
			Total Area (Mi^2) =		1.378		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Forest (evergreen)	0.70	30	54	66	75	41
Shrub/Brush	0.30	35	56	70	77	19
Total %	1.0			Final Weighted Watershed CN =		**60**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use ={[(%A * CN_A)+(%B *CN_B)+(%C*CN_C)+(%D*CN_D)]/100}*(Land Use %)

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Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **W3R** Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
756	20	33	41	6	17.31	0.02	0.4	0.6	0.8	0.1
1100		60	30	10	488.01	0.55	0.0	33.2	16.6	5.5
1432		20	70	10	51.17	0.06	0.0	1.2	4.1	0.6
1440		100			66.88	0.08	0.0	7.6	0.0	0.0
1450	30	10	5	55	258.59	0.29	8.8	2.9	1.5	16.1
			Total Area (Acres) =		881.95	1.00	9.2	45.5	22.9	22.4
			Total Area (Mi^2) =		1.378		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Forest (evergreen)	0.70	30	54	66	75	41
Shrub/Brush	0.30	35	56	70	77	19

Total % 1.0 Final Weighted Watershed CN = 60

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.
[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.
[3] Weighted CN by Land Use ={[(%A * CN_A)+(%B *CN_B)+(%C*CN_C)+(%D*CN_D)]/100}*(Land Use %)

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **W4R** Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
756	20	33	41	6	603.68	0.66	13.2	21.7	27.0	3.9
990				100	4.40	0.00	0.0	0.0	0.0	0.5
1100		60	30	10	47.80	0.05	0.0	3.1	1.6	0.5
1432		20	70	10	261.11	0.28	0.0	5.7	19.9	2.8
9998				100	0.81	0.00	0.0	0.0	0.0	0.1
			Total Area (Acres) =		917.80	1.00	13.2	30.5	48.4	7.9
			Total Area (Mi^2) =		1.434		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Forest (evergreen)	1.00	30	54	66	75	58

Total % 1.0 Final Weighted Watershed CN = **58**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use ={[(%A * CN_A)+(%B *CN_B)+(%C*CN_C)+(%D*CN_D)]/100}*(Land Use %)

Criteria of Washoe County
Sub-basin soils worksheet
Job Number: 333

Development: LEGEND TRAIL Sub-basin: **W5R** Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
756	20	33	41	6	401.89	0.53	10.5	17.3	21.5	3.2
990				100	9.66	0.01	0.0	0.0	0.0	1.3
1120		100			24.41	0.03	0.0	3.2	0.0	0.0
1432		20	70	10	329.22	0.43	0.0	8.6	30.1	4.3
			Total Area (Acres) =		765.18	1.00	10.5	29.1	51.7	8.7
			Total Area (Mi^2) =		1.196		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Forest (evergreen)	1.00	30	54	66	75	60

Total % 1.0 Final Weighted Watershed CN = **60**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C*CN_C)+(\%D*CN_D)]/100\}*(\text{Land Use }\%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **W6R** Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
612		5	5	90	1.77	0.00	0.0	0.0	0.0	0.2
930				100	4.24	0.00	0.0	0.0	0.0	0.4
990				100	1.05	0.00	0.0	0.0	0.0	0.1
1120		100			79.48	0.08	0.0	8.2	0.0	0.0
1121		100			101.52	0.10	0.0	10.5	0.0	0.0
1432		20	70	10	778.74	0.80	0.0	16.0	56.2	8.0
			Total Area (Acres) =		970.41	1.00	0.0	34.8	56.5	8.7
			Total Area (Mi^2) =		1.516		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Forest (evergreen)	0.98	30	54	66	75	61
developed 1acre+	0.02	51	68	79	84	2
Total %	1.0			Final Weighted Watershed CN =		63

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use } \%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL
Existing and Proposed conditions

Sub-basin: **LT1**

Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
222				100	27.19	0.39	0.0	0.0	0.0	39.1
557			85	15	0.19	0.00	0.0	0.0	0.2	0.0
559			100		38.75	0.56	0.0	0.0	55.8	0.0
612		5	5	90	0.53	0.01	0.0	0.0	0.0	0.7
930				100	1.71	0.02	0.0	0.0	0.0	2.5
1432		20	70	10	1.11	0.02	0.0	0.3	1.1	0.2
			Total Area (Acres) =		69.47	1.00	0.0	0.4	57.2	42.5
			Total Area (Mi^2) =		0.109		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	1.00	35	56	70	77	73

Total % 1.0

Final Weighted Watershed CN = **73**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use } \%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **LT2** Computed by: Ellen Miller
Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
557			85	15	3.51	0.16	0.0	0.0	13.9	2.5
559			100		17.90	0.84	0.0	0.0	83.6	0.0
			Total Area (Acres) =		21.41	1.00	0.0	0.0	97.5	2.5
			Total Area (Mi^2) =		0.033		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	0.66	35	56	70	77	47
developed 1acre	0.34	51	68	79	84	27
Total %	1.0			Final Weighted Watershed CN =		74

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.
[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.
[3] Weighted CN by Land Use ={[(%A * CN_A)+(%B *CN_B)+(%C*CN_C)+(%D*CN_D)]/100}*(Land Use %)

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: LT3 Computed by: Ellen Miller

Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		10.51	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		10.51	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.016		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	0.73	35	56	70	77	51
developed 1acre+	0.27	51	68	79	84	22
Total %	1.0			Final Weighted Watershed CN =		73

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use ={[(%A * CN_A)+(%B *CN_B)+(%C*CN_C)+(%D*CN_D)]/100}*(Land Use %)

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **LT4** Computed by: Ellen Miller
Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		22.12	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		22.12	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.035		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	0.67	35	56	70	77	47
developed 1acre+	0.33	51	68	79	84	27
Total %	1.0			Final Weighted Watershed CN =		**74**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use } \%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL
Proposed conditions

Sub-basin: **LT4b**

Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		4.78	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		4.78	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.007		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush developed 1acre+	0.48	35	56	70	77	33
	0.52	51	68	79	84	42
Total %	1.0			Final Weighted Watershed CN =		**76**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use } \%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **LT5a1** Computed by: Ellen Miller

Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		2.79	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		2.79	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.004		%A	%B	%C	%D

Curve Numbers by Land Use/Soil Type (CN) [2]

Land Use Category	Fraction of Land Use	CN_A	CN_B	CN_C	CN_D	Weighted CN*
developed 1acre+	0.45	51	68	79	84	36
Shrub/Brush	0.36	35	56	70	77	25
Paved road	0.19	98	98	98	98	19
Total %	1.0			Final Weighted Watershed CN =		**79**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use ={[(%A * CN_A)+(%B *CN_B)+(%C*CN_C)+(%D*CN_D)]/100}*(Land Use %)

Criteria of Washoe County
Sub-basin soils worksheet
Job Number: 333

Development: LEGEND TRAIL
Proposed conditions

Sub-basin: **LT5b** revised

Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		16.70	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		16.70	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.026		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	0.91	35	56	70	77	64
developed 1acre+	0.09	51	68	79	84	7
Total %	1.0			Final Weighted Watershed CN =		**71**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.
[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.
[3] Weighted CN by Land Use ={[(%A * CN_A)+(%B *CN_B)+(%C*CN_C)+(%D*CN_D)]/100}*(Land Use %)

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **LT5c** Computed by: Ellen Miller

Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		2.96	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		2.96	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.005		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	0.50	35	56	70	77	35
developed 1acre+	0.50	51	68	79	84	41
Total %	1.0			Final Weighted Watershed CN =		**76**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use }\%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **LT5d** revised Computed by: Ellen Miller
Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		22.55	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		22.55	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.035		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	0.50	35	56	70	77	35
developed 1acre+	0.50	51	68	79	84	41
Total %	1.0			Final Weighted Watershed CN =		**76**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.
[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.
[3] Weighted CN by Land Use ={[(%A * CN_A)+(%B *CN_B)+(%C*CN_C)+(%D*CN_D)]/100}*(Land Use %)

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **LT6** revised Computed by: Ellen Miller
Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		9.29	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		9.29	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.015		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	0.78	35	56	70	77	55
developed 1acre+	0.22	51	68	79	84	17
Total %	1.0			Final Weighted Watershed CN =		**72**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use \%})$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **LT7** revised Computed by: Ellen Miller

Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		13.68	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		13.68	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.021		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN[3]
Shrub/Brush	0.60	35	56	70	77	42
developed 1acre+	0.40	51	68	79	84	32
Total %	1.0			Final Weighted Watershed CN =		**74**

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.
[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.
[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use }\%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL Sub-basin: **LT8** revised Computed by: Ellen Miller

Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		11.41	1.00	0.0	0.0	100.0	0.0
			Total Area (Acres) =		11.41	1.00	0.0	0.0	100.0	0.0
			Total Area (Mi^2) =		0.0177		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	0.69	35	56	70	77	49
developed 1acre+	0.31	51	68	79	84	25
Total %	1.0			Final Weighted Watershed CN =		73

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use } \%)$

J:\0333\documents\spreadsheets\CN

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL
Proposed conditions

Sub-basin: **LT9**

Computed by: Ellen Miller

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
222				100	0.31	0.00	0.0	0.0	0.0	0.0
559			100		40.14	0.46	0.0	0.0	46.3	0.0
612		5	5	90	3.99	0.05	0.0	0.2	0.2	4.1
930				100	42.19	0.49	0.0	0.0	0.0	48.7
1121		100			0.00	0.00	0.0	0.0	0.0	0.0
1432		20	70	10	0.00	0.00	0.0	0.0	0.0	0.0
			Total Area (Acres) =		86.63	1.00	0.0	0.2	46.5	53.2
			Total Area (Mi^2) =		0.135		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	1.00	35	56	70	77	74
developed 1acre+	0.00	51	68	79	84	0
Total %	1.0			Final Weighted Watershed CN =		74

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1995.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use } \%)$

Criteria of Washoe County
Sub-basin soils worksheet
Job Number; 333

Development: LEGEND TRAIL

Sub-basin: **LT9a**

Computed by: Ellen Miller

Proposed conditions

Soil Unit	Percentage of Major SCS Soil Types [1] % A	% B	% C	% D	Area (Acres)	Faction of Total Area	Contributing to Watershed A	B	C	D
559			100		12.44	0.52	0.0	0.0	52.2	0.0
612		5	5	90	0.67	0.03	0.0	0.1	0.1	2.5
930				100	7.98	0.34	0.0	0.0	0.0	33.5
1121		100			2.54	0.11	0.0	10.7	0.0	0.0
1432		20	70	10	0.18	0.01	0.0	0.2	0.5	0.1
			Total Area (Acres) =		23.80	1.00	0.0	10.9	52.9	36.1
			Total Area (Mi^2) =		0.037		%A	%B	%C	%D

Land Use Category	Fraction of Land Use	Curve Numbers by Land Use/Soil Type (CN) [2] CN_A	CN_B	CN_C	CN_D	Weighted CN*
Shrub/Brush	1.00	35	56	70	77	71
developed 1acre+	0.00	51	68	79	84	0
Total %	1.0			Final Weighted Watershed CN =		71

Notes:

[1] Soil units are described in the U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Washoe County, Nevada, South Part, August 1983. They are described by their general percentage of the four major SCS soil types A, B, C, and D.

[2] Curve numbers are obtained from the Washoe County Hydrologic Criteria and Drainage Design Manual, December 1996.

[3] Weighted CN by Land Use $=\{[(\%A * CN_A)+(\%B * CN_B)+(\%C * CN_C)+(\%D * CN_D)]/100\} * (\text{Land Use \%})$

Curve Number Worksheet

Project Dorostkar

Location Subbasin W8R

Area (mi^2) 0.75

Hydrologic Soil Type	Curve Number	Area (%)	Weighted Curve Number
A	-	0	-
B	56	34	19.04
C	68	57	38.76
D	75	9	6.75
	Total	**100**	**65**

Curve Number Worksheet

Project Dorostkar

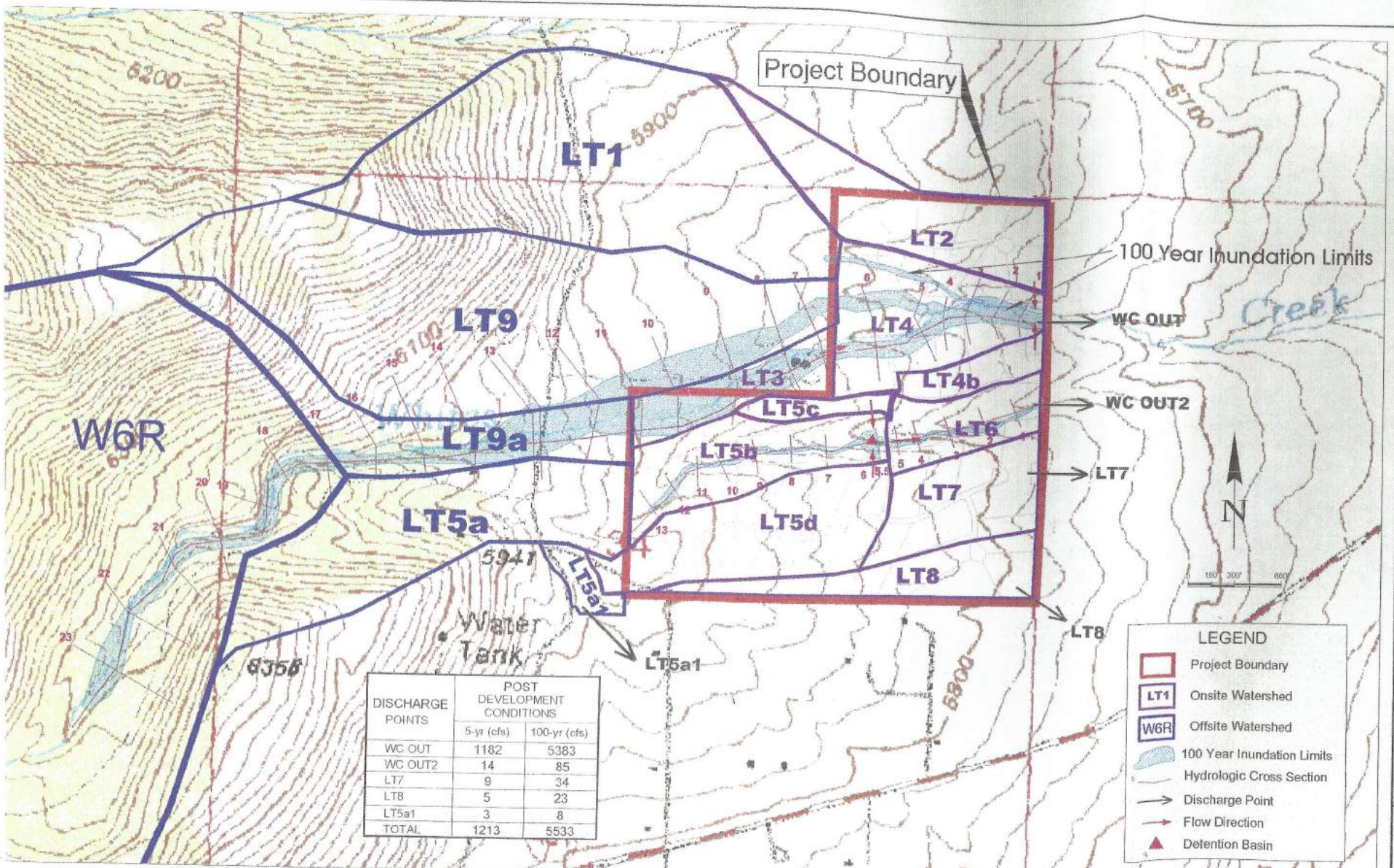
Location Subbasin W7R

Area (mi^2) 0.85

Hydrologic Soil Type	Curve Number	Area (%)	Weighted Curve Number
A	-	0	-
B	56	8	4.48
C	68	77	52.36
D	75	15	11.25
	Total	**100**	**68**

The original curve number calculations for W7R and W8R are from the Mountaingate CLOMR (Nimbus, January, 2005)

To account for recent developments add 15% impervious area to W7R and 25% impervious area to W8R.



DISCHARGE POINTS	POST DEVELOPMENT CONDITIONS	
	5-yr (cfs)	100-yr (cfs)
WC OUT	1182	5383
WC OUT2	14	85
LT7	9	34
LT8	5	23
LT5a1	3	8
TOTAL	1213	5533

Nimbus Engineers
3795 Baker Ln., Suite 201 • Reno, NV 89509
Mail: P.O. Box 11320 • Reno, NV 89510
(775) 688-8800 • Fax (775) 884-8814
www.nimbusengineers.com

Revisions:

Scale: 1" = 600'
Ck: 40 Ft
File Name: base_gh.dwg
Drawn By: AES
Designed By: EM

FIGURE 5
Post Development
Hydrologic Workmap

Legend Trail

Washoe County Nevada

Sheet 1 of 1
Nimbus Job # 0333
Date: June, 2004 (rev.)

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Autumn Wood
SUBBASIN: Z-46 Existing conditons
AREA, AC.: 5.3
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	Sage-grass/fair	5.30	1.000	51	51.0	
C		0.00	0.000	79	0.0	
		5.30	1.000			
			FINAL CN VALUE:		**51.0**	

PROJECT: Autumn Wood
SUBBASIN: Z-2 Existing conditions
AREA, AC.: 4.7
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	Sage-grass/Poor	4.70	1.000	67	67.0	
C		0.00	0.000	79	0.0	
		4.70	1.000			
			FINAL CN VALUE:		**67.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Autumn Wood
SUBBASIN: Z-2 Proposed conditions
AREA, AC.: 4.7
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	1/8 acre lots	2.35	0.500	85	42.5	
B	Open space:ponds	2.35	0.500	61	30.5	
		4.70	1.000			
			FINAL CN VALUE:		**73.0**	

PROJECT: Autumn Wood
SUBBASIN: Z-46 Proposed conditons
AREA, AC.: 5.3
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	1/8 acre lots	5.30	1.000	85	85.0	
		0.00	0.000	79	0.0	
		5.30	1.000			
			FINAL CN VALUE:		**85.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

CURVE NUMBER CALCULATION WORKSHEET

PROJECT: Autumn Wood
SUBBASIN: Z-46 Existing conditons
AREA, AC.: 5.3
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	Sage-grass/fair	5.30	1.000	51	51.0	
C		0.00	0.000	79	0.0	
		5.30	1.000			
			FINAL CN VALUE:		**51.0**	

PROJECT: Autumn Wood
SUBBASIN: Z-2 Existing conditions
AREA, AC.: 4.7
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	Sage-grass/Poor	4.70	1.000	67	67.0	
C		0.00	0.000	79	0.0	
		4.70	1.000			
			FINAL CN VALUE:		**67.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

PROJECT: Autumn Wood
SUBBASIN: Z-2 Proposed conditions
AREA, AC.: 4.7
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	1/8 acre lots	2.35	0.500	85	42.5	
B	Open space:ponds	2.35	0.500	61	30.5	
		4.70	1.000			
			FINAL CN VALUE:		**73.0**	

PROJECT: Autumn Wood
SUBBASIN: Z-46 Proposed conditons
AREA, AC.: 5.3
CALCULATED BY: DEW

HSG	LAND USE & CONDITION	AREA, ACRES	FRACTION OF AREA	CN*	WTD. CN	REMARKS
B	1/8 acre lots	5.30	1.000	85	85.0	
		0.00	0.000	79	0.0	
		5.30	1.000			
			FINAL CN VALUE:		**85.0**	

*Curve number values based on Truckee Meadows Regional Drainage Manual (2009)

APPENDIX C

HYDROLOGIC MODELS

100 YEAR EXISTING CONDITIONS

100 YR EX

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*        JUN 1998 AND FEB 2010          *
*           VERSION 4.1R                *
*        RGMHEC2000 WWW.HEC-1.COM       *
*  RUN DATE   11MAY18  TIME  08:09:57   *
*                                       *
*****************************************
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
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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        100 yr 24 hr event
    2         ID  AUTUMN WOODS PROJECT     WHITES CREEK
    3         ID  FILE NAME AW100XX.DAT  PROPOSED CONDITIONS
    4         ID  USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
    5         ID  W7R SPLIT INTO LEGEND TRAIL SUBBASINS
    6         ID  USING TYPE II STORM DISTRIBUTION
              *       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
    7         IT     10                800
    8         IO      5       0
    9         JR   PREC    1.0     .99     .98     .97     .96     .95

   10         KK    W1R
   11         BA   1.38
   12         PB   9.58
   13         PC    0.0    .002    .005    .008    .011    .014    .017    .020    .023    .026
   14         PC   .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
   15         PC   .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
   16         PC   .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
   17         PC   .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
   18         PC   .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
   19         PC   .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
   20         PC   .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
   21         PC   .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
   22         PC   .983    .986    .992    .995    .998   1.00
   23         LS              59
   24         UD   1.07

   25         KK    W2R
   26         BA   0.83
   27         PB   10.3
   28         LS              59
   29         UD   0.52

   30         KK   W1+W2
   31         HC      2

   32         KK    RT-A
   33         RM      1   0.122     0.4

   34         KK    W3R
   35         BA   1.38
   36         PB   9.33
   37         LS              60
   38         UD   1.04
```

1 HEC-1 INPUT PAGE 2

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   39         KK    RT-A
   40         RM      1   0.095     0.4

   41         KK    W4R
   42         BA   1.43
   43         PB   8.05
   44         LS              58
   45         UD   1.08

   46         KK   W1234
   47         HC      3
```

```
 48          KK    RT-B
 49          RM       1  0.0597     0.4

 50          KK     W5R
 51          BA    1.20
 52          PB    7.43
 53          LS                60
 54          UD    1.07

 55          KK   W5+CH
 56          HC       2

 57          KK    RT-C
 58          RM       2   0.185     0.4

 59          KK     W6R
 60          BA    1.52
 61          PB    5.32
 62          LS                63
 63          UD    1.84

 64          KK   W6+CH
 65          HC       2

 66          KK    RT-D
 67          RM       1   0.122     0.4

 68          KK    LT9A        LEGEND TRAIL OFFSITE 9A
 69          KM  BEGIN LEGEND TRAIL MODEL REVISING W7R
 70          BA     .04
 71          PB    4.98
 72          LS                71
 73          UD    0.33

 74          KK   WCIN1        WHITE CREEK FLOW @ BNDRY
 75          HC       2
1                                        HEC-1 INPUT                                        PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10

 76          KK     LT3
 77          BA    0.16
 78          PB    5.01
 79          LS                73
 80          UD     0.9

 81          KK  LT9A&3
 82          HC       2

 83          KK     LT9
 84          BA    .135
 85          LS                74
 86          UD    0.42

 87          KK     LT1
 88          BA    .109
 89          LS                73
 90          UD     .34

 91          KK   LT139
 92          HC       2

 93          KK     LT4
 94          BA    .033
 95          LS                74
 96          UD     .16

 97          KK    LT4b
 98          BA    .007
 99          LS                76
100          UD    0.16

101          KK     LT2
102          BA    .033
103          LS                74
104          UD    0.10

105          KK   WCOUT
106          HC       4

107          KK    LT5a
108          KM  WHITE ROSE ESTATES MODEL
109          BA    .057
110          LS                68
111          UD    0.31

112          KK    LT5b
113          BA    .026
114          LS                71
115          UD    0.13
1                                        HEC-1 INPUT                                        PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10

116          KK   5A&5B
117          HC       2

118          KK    LT5D
119          BA    .035
120          LS                76
121          UD    0.17

122          KK    LT5c
```

```
123          BA    .005
124          LS              76
125          UD    0.16

126          KK    DBIN
127          HC       3

128          KK     DB1
129          RS       1    STOR       0
130          SA   .0001   .0003   .0138   .0372   .0868   .1508  0.2289   .3177   .4198   .5231
131          SA   .6328   .7464   .8582   .9654
132          SE  5803.5    5804    5804    5806    5807    5808    5809    5810    5811    5812
133          SE    5813    5814    5815    5816
134          SQ       0       1     3.8     5.5     6.7     7.8     8.8     9.2     9.6   35.98
135          SQ   47.14   63.06   75.43   85.88   95.15
136          SE    5804    5804    5806    5807    5808    5809    5810  5810.5    5811  5811.5
137          SE    5812    5813    5814    5815    5816

138          KK     LT6
139          BA    .015
140          LS              72
141          UD    0.08

142          KK   WCOUT2
143          HC       2

144          KK     LT7
145          BA    .021
146          LS              74
147          UD    0.17

148          KK    LT-Q        TOTAL FLOW IN WHITES CREEK BELOW LEGEND TRAIL
149          HC       3

150          KK     W7R        REMAINDER OF W7R BELOW LEGEND TRAIL PROJECT
151          BA     0.3
152          LS              68      15
153          UD    0.31

154          KK   WHTCKQ       TOTAL FLOW IN WHITES CRK AT D/S END OF W7R
155          HC       3
1                                        HEC-1 INPUT                                        PAGE  5

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

156          KK   RT-DIF
157          RM       1    .104      .4

158          KK     W8R
159          KM   ADD 25% IMPERVIOUS & RECALCULAT LAG TIME
160          BA    0.75
161          PB    3.65
162          LS              65      25
163          UD    0.43

164          KK   CP-DIF
165          HC       2

166          KK    BR-1        DIVERT OUT FLOW TO BRANCHES, 2, 3 AND 4
167          DT     234
168          DI       0     100     500    1000    2000    5000    7000   10000
169          DQ       0      86     430     860    1720    4300    6020    8600

170          KK  RTACRK        ROUTE FLOW FROM DIFFLUENCE TO ARROWCREEK PARKWAY
171          RD    2980    .052    .045            TRAP      50       1

172          KK  RTGOLF        ROUTE ACROSS GOLF COURSE
173          RD    5120    .047     .03            TRAP      16       1

174          KK  WOLFDT        DETENTION AT WOLF RUN GOLF COURSE
175          RS       1    STOR       0
176          SA       0     .19    3.12    3.87    4.48
177          SE    4672    4680    4682    4684    4686
178          SQ       0      10      25      50      75     100     110     120     130     320
179          SE    4672 4673.09 4673.85 4674.76 4675.91 4677.47 4678.19 4678.94 4679.13    4680

180          KK  RTTBLT        ROUTE FLOW FROM THUNDERBOLT TO ZOLEZZI
181          RD    1923    .031     .03            TRAP      10       4

182          KK   WCKDV        DIVERT OUT FLOWSTHAT SPILL FROM WHITES CREEK
183          KM  BETWEEN THUNDERBOLT AND ZOLLEZI
184          DT   VLYSPG
185          DI       0     200     300     400     500     600     700     800     841     900
186          DQ       0     100     126     148     165     182     197     211     216     223

187          KK   1A-CH        DIVERT 200 CFS IN 1A CHANEL
188          DT   1A-CH
189          DI       0     100     200     201     400     600
190          DQ       0     100     200     200     200     200

191          KK  ZOL-ST        DIVERT FLOW THATWILL GO EAST TO ZOLEZZI          55 CFS
192          DT     ZOL
193          DI       0       1      55      56     100     200
194          DQ       0       1      55      55      55      55
1                                        HEC-1 INPUT                                        PAGE  6

           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

195          KK  ZLSPLT        SPLIT OVERLAND FLOW ON ZOLEZZI
196          DT      1A
197          DI       0      86     157     242     289     338     349     445
198          DQ       0      29      91     164     204     247     255     338

199          KK   DVPND        DIVERT 61CFS OVERLAND FLOW ACROSS AUTUMN WOOD
```

```
200          DT      1B
201          DI       0       61       62       70       80      100      200
202          DQ       0        0        1        9       19       39      139

203          KK    1A-CH        RECALL 1A CHANNEL FLOW
204          DR    1A-CH

205          KK      1A         RECALL OVERLAND FLOW RETURNING TO 1A CHANEL
206          DR      1A

207          KK     Z-2         UNDEVELOPED WATERSHED
208          BA    .007
209          LS                 67
210          UD      .1

211          KK   1A-TOT         TOTAL FLOW IN 1A AT JEPPSON
212          HC       3

213          KK    Z-46
214          BA    .007
215          LS                 51
216          UD     0.1

217          KK     SVA         TOTAL FLOW IN 1A AT SOUTH VIRGINIA
218          HC       3

219          KK    BR-1B        RECALL BRANCH 1B
220          DR      1B

221          KK     ZOL         RECALL OVERLAND FLOW CROSSING AUTUMN WOODS PARCEL
222          DR     ZOL

223          KK   1B-TOT
224          HC       2

225          KK   1B-ZOL         DIVERT 54 CFS TO STORM DRAINS ON ZOLEZZI
226          DT    STDRN
227          DI       0       10       42       54       55       60      100      120
228          DQ       0       10       42       54       54       54       54       54

229          KK   VLYSPG         RECALL FLOW GOING TOWARDS VALLEY SPGS ROAD
230          DR   VLYSPG
```



```
LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

231          KK   VSDTCH         DIVERT THE FLOW INTERCEPTED BY VALLY SPGS RD DITCH 30 CF
232          DT      OUT
233          DI       0       10       30       31       40       50      100      200      400
234          DQ       0        0        0        1       10       20       70      170      370

235          KK    1BTOT         TOTAL FLOW IN 1BAT JEPPSON LANE
236          HC       2
237          ZZ
```

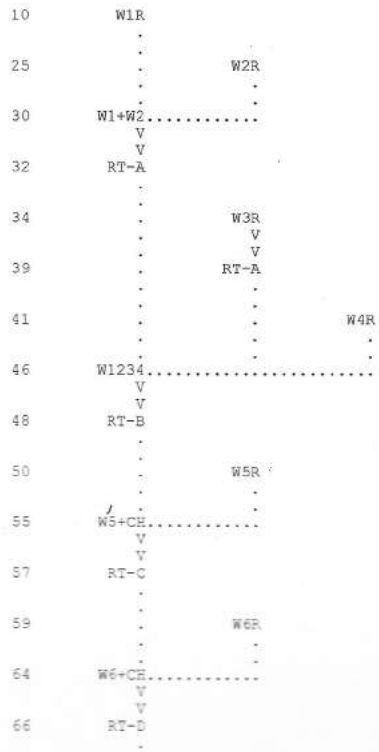
1

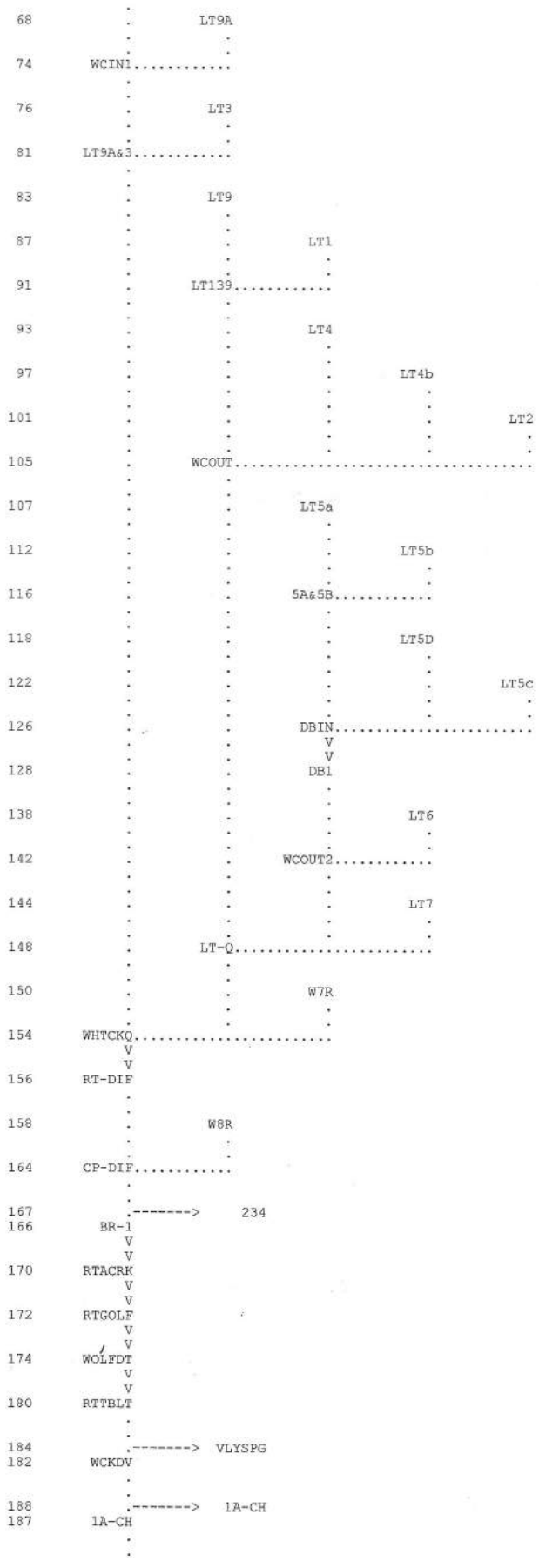
SCHEMATIC DIAGRAM OF STREAM NETWORK

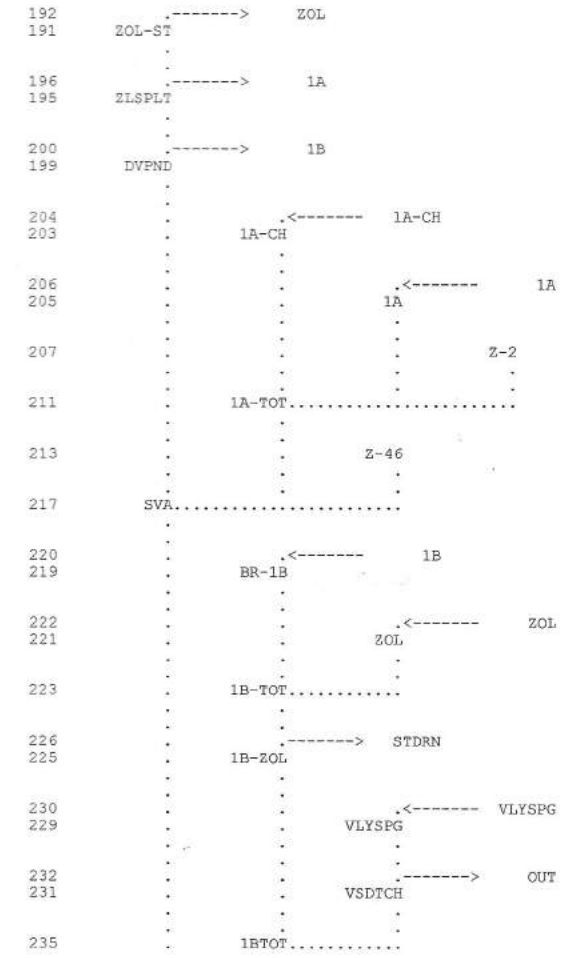
INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<---) RETURN OF DIVERTED OR PUMPED FLOW




68 LT9A
74 WCIN1
76 LT3
81 LT9A&3
83 LT9
87 LT1
91 LT139
93 LT4
97 LT4b
101 LT2
105 WCOUT
107 LT5a
112 LT5b
116 5A&5B
118 LT5D
122 LT5c
126 DBIN
128 DB1
138 LT6
142 WCOUT2
144 LT7
148 LT-Q
150 W7R
154 WHTCKQ
156 RT-DIF
158 W8R
164 CP-DIF
167
166 BR-1
234
170 RTACRK
172 RTGOLF
174 WOLFDT
180 RTTBLT
184
182 WCKDV
VLYSPG
188
187 1A-CH
1A-CH



(***) 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   11MAY18  TIME  08:07:31   *
*                                       *
*****************************************
```

```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS    *
*    HYDROLOGIC ENGINEERING CENTER   *
*         609 SECOND STREET          *
*       DAVIS, CALIFORNIA 95616      *
*           (916) 756-1104           *
*                                    *
**************************************
```

100 yr 24 hr event
AUTUMN WOODS PROJECT WHITES CREEK
FILE NAME LT1DIFX.DAT PROPOSED CONDITIONS
USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
W7R SPLIT INTO LEGEND TRAIL SUBBASINS
USING TYPE II STORM DISTRIBUTION

8 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	10	MINUTES IN COMPUTATION INTERVAL
IDATE	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	800	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	6 0	ENDING DATE
NDTIME	1310	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .17 HOURS
TOTAL TIME BASE 133.17 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      .96      .95
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
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       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
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       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
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 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
1
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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	RATIO 5 .96	RATIO 6 .95
					RATIOS APPLIED TO PRECIPITATION					
HYDROGRAPH AT										
+	W1R	1.380	1	FLOW	1487.94	1461.40	1434.94	1408.57	1382.28	1356.09
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W2R	.830	1	FLOW	1675.46	1646.53	1617.67	1588.89	1560.19	1531.57
				TIME	8.50	8.50	8.50	8.50	8.50	8.50
2 COMBINED AT										
+	W1+W2	2.210	1	FLOW	2674.86	2627.13	2579.55	2532.13	2484.86	2437.76
				TIME	8.67	8.67	8.67	8.67	8.67	8.67
ROUTED TO										
+	RT-A	2.210	1	FLOW	2647.74	2600.69	2553.78	2507.02	2460.41	2413.96
				TIME	8.83	8.83	8.83	8.83	8.83	8.83
HYDROGRAPH AT										
+	W3R	1.380	1	FLOW	1499.18	1472.22	1445.35	1418.57	1391.87	1365.27

				TIME	9.00	9.00	9.00	9.00	9.00	9.00
ROUTED TO										
+	RT-A	1.380	1	FLOW	1500.56	1473.80	1447.13	1420.54	1394.03	1367.62
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W4R	1.430	1	FLOW	1064.75	1043.48	1022.30	1001.22	980.24	959.36
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
3 COMBINED AT										
+	W1234	5.020	1	FLOW	5007.17	4915.36	4823.87	4732.71	4641.88	4551.40
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
ROUTED TO										
+	RT-B	5.020	1	FLOW	5017.87	4925.35	4833.16	4741.31	4649.80	4558.64
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
HYDROGRAPH AT										
+	W5R	1.200	1	FLOW	831.02	814.46	797.98	781.57	765.24	748.98
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
2 COMBINED AT										
+	W5+CH	6.220	1	FLOW	5839.19	5729.93	5621.08	5512.65	5404.64	5297.07
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
ROUTED TO										
+	RT-C	6.220	1	FLOW	5822.22	5713.05	5604.30	5495.96	5388.06	5280.59
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W6R	1.520	1	FLOW	404.44	395.40	386.42	377.50	368.64	359.85
				TIME	10.00	10.00	10.00	10.00	10.00	10.00
2 COMBINED AT										
+	W6+CH	7.740	1	FLOW	6108.22	5993.88	5879.97	5766.51	5653.52	5540.99
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
ROUTED TO										
+	RT-D	7.740	1	FLOW	6115.91	6000.18	5884.91	5770.11	5655.80	5541.97
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	LT9A	.040	1	FLOW	42.65	41.85	41.06	40.26	39.47	38.68
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	WCIN1	7.780	1	FLOW	6123.90	6008.04	5892.65	5777.73	5663.29	5549.34
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	LT3	.160	1	FLOW	100.42	98.58	96.75	94.92	93.10	91.29
				TIME	8.83	8.83	8.83	8.83	8.83	8.83
2 COMBINED AT										
+	LT9A&3	7.940	1	FLOW	6205.64	6088.38	5971.59	5855.27	5739.43	5624.10
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	LT9	.135	1	FLOW	147.27	144.65	142.05	139.44	136.85	134.27
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT1	.109	1	FLOW	126.65	124.39	122.14	119.90	117.66	115.43
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	LT139	.244	1	FLOW	273.92	269.04	264.18	259.34	254.51	249.70
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT4	.033	1	FLOW	52.56	51.66	50.77	49.88	48.99	48.10
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT4b	.007	1	FLOW	11.97	11.78	11.58	11.39	11.19	11.00
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT2	.033	1	FLOW	74.95	73.64	72.34	71.04	69.74	68.45
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
4 COMBINED AT										
+	WCOUT	.317	1	FLOW	340.70	334.54	328.40	322.28	316.18	310.10
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5a	.057	1	FLOW	54.54	53.38	52.22	51.07	49.93	48.86
				TIME	8.17	8.17	8.17	8.17	8.33	8.33
HYDROGRAPH AT										
+	LT5b	.026	1	FLOW	43.47	42.64	41.81	40.98	40.15	39.33
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	5A&5B	.083	1	FLOW	88.34	86.57	84.80	83.05	81.29	79.55
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5D	.035	1	FLOW	60.64	59.65	58.66	57.68	56.69	55.71
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5c	.005	1	FLOW	8.55	8.41	8.27	8.13	8.00	7.86
				TIME	8.17	8.17	8.17	8.17	8.17	8.17

3 COMBINED AT										
+	DBIN	.123	1	FLOW	157.53	154.63	151.74	148.86	145.99	143.12
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
ROUTED TO										
+	DB1	.123	1	FLOW	83.39	82.47	81.56	80.65	79.74	78.83
				TIME	8.50	8.50	8.50	8.50	8.50	8.50
			** PEAK STAGES IN FEET **							
			1	STAGE	5814.76	5814.67	5814.59	5814.50	5814.41	5814.33
				TIME	8.50	8.50	8.50	8.50	8.50	8.50
HYDROGRAPH AT										
+	LT6	.015	1	FLOW	34.11	33.48	32.87	32.25	31.63	31.02
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	WCOUT2	.138	1	FLOW	89.81	88.90	88.00	87.10	86.20	85.30
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT7	.021	1	FLOW	33.86	33.29	32.71	32.13	31.56	30.98
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	LT-Q	.476	1	FLOW	460.98	453.32	445.68	438.07	430.47	422.91
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	W7R	.300	1	FLOW	353.63	347.34	341.07	334.83	328.62	322.43
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	WHTCKQ	8.716	1	FLOW	6382.09	6261.31	6141.11	6021.44	5902.15	5782.37
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
ROUTED TO										
+	RT-DIF	8.716	1	FLOW	6365.78	6245.73	6126.25	6007.28	5888.73	5770.14
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	W8R	.750	1	FLOW	446.84	438.97	431.17	423.42	415.73	408.10
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	CP-DIF	9.466	1	FLOW	6461.72	6340.13	6219.11	6098.60	5978.52	5858.42
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	234	9.466	1	FLOW	5557.08	5452.51	5348.43	5244.80	5141.53	5038.24
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	BR-1	9.466	1	FLOW	904.64	887.62	870.67	853.80	836.99	820.18
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RTACRK	9.466	1	FLOW	902.22	885.26	868.40	851.60	834.85	818.06
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RTGOLF	9.466	1	FLOW	893.64	877.35	860.74	843.96	827.04	809.95
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	WOLFDT	9.466	1	FLOW	872.44	856.59	840.82	825.26	810.25	796.40
				TIME	9.83	9.83	9.83	9.83	9.83	9.67
			** PEAK STAGES IN FEET **							
			1	STAGE	4682.53	4682.46	4682.39	4682.31	4682.25	4682.18
				TIME	9.83	9.83	9.83	9.83	9.67	9.67
ROUTED TO										
+	RTTBLT	9.466	1	FLOW	871.79	856.21	840.29	825.01	810.04	795.37
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO										
+	VLYSPG	9.466	1	FLOW	219.65	217.80	215.91	214.05	212.22	210.35
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	WCKDV	9.466	1	FLOW	652.14	638.40	624.38	610.96	597.82	585.02
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO										
+	1A-CH	9.466	1	FLOW	200.00	200.00	200.00	200.00	200.00	200.00
				TIME	8.83	8.83	8.83	8.83	8.83	9.00
HYDROGRAPH AT										
+	1A-CH	9.466	1	FLOW	452.14	438.40	424.38	410.96	397.82	385.02
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO										
+	ZOL	9.466	1	FLOW	55.00	55.00	55.00	55.00	55.00	55.00
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
HYDROGRAPH AT										
+	ZOL-ST	9.466	1	FLOW	397.14	383.40	369.38	355.96	342.82	330.02
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO										
+	1A	9.466	1	FLOW	296.62	284.74	272.62	261.01	250.50	240.00
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	ZLSPLT	9.466	1	FLOW	100.52	98.66	96.76	94.94	92.31	90.02

				TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO										
+	1B	9.466	1	FLOW	39.52	37.66	35.76	33.94	31.31	29.02
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	DVPND	9.466	1	FLOW	61.00	61.00	61.00	61.00	61.00	61.00
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	1A-CH	.000	1	FLOW	200.00	200.00	200.00	200.00	200.00	200.00
				TIME	8.83	8.83	8.83	8.83	8.83	9.00
HYDROGRAPH AT										
+	1A	.000	1	FLOW	296.62	284.74	272.62	261.01	250.50	240.00
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	Z-2	.007	1	FLOW	5.48	5.33	5.18	5.03	4.89	4.74
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
3 COMBINED AT										
+	1A-TOT	.007	1	FLOW	496.99	485.11	472.98	461.37	450.85	440.34
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	Z-46	.007	1	FLOW	.49	.46	.43	.40	.37	.34
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	SVA	9.480	1	FLOW	558.14	546.25	534.12	522.50	511.98	501.46
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	BR-1B	.000	1	FLOW	39.52	37.66	35.76	33.94	31.31	29.02
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	ZOL	.000	1	FLOW	55.00	55.00	55.00	55.00	55.00	55.00
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
2 COMBINED AT										
+	1B-TOT	.000	1	FLOW	94.52	92.66	90.76	88.94	86.31	84.02
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO										
+	STDRN	.000	1	FLOW	54.00	54.00	54.00	54.00	54.00	54.00
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
HYDROGRAPH AT										
+	1B-ZOL	.000	1	FLOW	40.52	38.66	36.76	34.94	32.31	30.02
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	VLYSPG	.000	1	FLOW	219.65	217.80	215.91	214.05	212.22	210.35
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO										
+	OUT	.000	1	FLOW	189.65	187.80	185.91	184.05	182.22	180.35
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	VSDTCH	.000	1	FLOW	30.00	30.00	30.00	30.00	30.00	30.00
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	1BTOT	.000	1	FLOW	70.52	68.66	66.76	64.94	62.31	60.02
				TIME	9.83	9.83	9.83	9.83	9.83	9.83

100 YEAR PROPOSED CONDITIONS

100 YR PR

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*        JUN 1998 AND FEB 2010          *
*             VERSION 4.1R              *
*        RGMHEC2000 WWW.HEC-1.COM       *
*  RUN DATE   11MAY18  TIME  08:13:35   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*          (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        100 yr 24 hr event
    2         ID  AUTUMN WOODS PROJECT    WHITES CREEK
    3         ID  USING REVISED POND DATA  DATE: MAY 4, 2018
    4         ID  FILE NAME AWCLMR.DAT  PROPOSED CONDITIONS
    5         ID  USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
    6         ID  W7R SPLIT INTO LEGEND TRAIL SUBBASINS
    7         ID  USING TYPE II STORM DISTRIBUTION
              *       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
    8         IT     10                800
    9         IO      5       0
   10         JR   PREC     1.0     .99     .98     .97     .96     .95

   11         KK    W1R
   12         BA   1.38
   13         PB   9.58
   14         PC    0.0    .002    .005    .008    .011    .014    .017    .020    .023    .026
   15         PC   .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
   16         PC   .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
   17         PC   .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
   18         PC   .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
   19         PC   .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
   20         PC   .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
   21         PC   .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
   22         PC   .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
   23         PC   .983    .986    .992    .995    .998   1.00
   24         LS              59
   25         UD   1.07

   26         KK    W2R
   27         BA   0.83
   28         PB   10.3
   29         LS              59
   30         UD   0.52

   31         KK   W1+W2
   32         HC      2

   33         KK    RT-A
   34         RM      1   0.122     0.4

   35         KK    W3R
   36         BA   1.38
   37         PB   9.33
   38         LS              60
   39         UD   1.04
```

1 HEC-1 INPUT PAGE 2

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   40         KK    RT-A
   41         RM      1   0.095     0.4

   42         KK    W4R
   43         BA   1.43
   44         PB   8.05
   45         LS              58
   46         UD   1.08

   47         KK   W1234
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 48          HC       3

 49          KK    RT-B
 50          RM       1  0.0597     0.4

 51          KK     W5R
 52          BA    1.20
 53          PB    7.43
 54          LS              60
 55          UD    1.07

 56          KK    W5+CH
 57          HC       2

 58          KK    RT-C
 59          RM       2   0.185     0.4

 60          KK     W6R
 61          BA    1.52
 62          PB    5.32
 63          LS              63
 64          UD    1.84

 65          KK    W6+CH
 66          HC       2

 67          KK    RT-D
 68          RM       1   0.122     0.4

 69          KK    LT9A        LEGEND TRAIL OFFSITE 9A
 70          KM  BEGIN LEGEND TRAIL MODEL REVISING W7R
 71          BA     .04
 72          PB    4.98
 73          LS              71
 74          UD    0.33

 75          KK    WCIN1        WHITE CREEK FLOW @ BNDRY
 76          HC       2
1                                      HEC-1 INPUT                                    PAGE  3

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 77          KK     LT3
 78          BA    0.16
 79          PB    5.01
 80          LS              73
 81          UD     0.9

 82          KK  LT9A&3
 83          HC       2

 84          KK     LT9
 85          BA    .135
 86          LS              74
 87          UD    0.42

 88          KK     LT1
 89          BA    .109
 90          LS              73
 91          UD     .34

 92          KK   LT139
 93          HC       2

 94          KK     LT4
 95          BA    .033
 96          LS              74
 97          UD     .16

 98          KK    LT4b
 99          BA    .007
100          LS              76
101          UD    0.16

102          KK     LT2
103          BA    .033
104          LS              74
105          UD    0.10

106          KK   WCOUT
107          HC       4

108          KK    LT5a
109          KM  WHITE ROSE ESTATES MODEL
110          BA    .057
111          LS              68
112          UD    0.31

113          KK    LT5b
114          BA    .026
115          LS              71
116          UD    0.13
1                                      HEC-1 INPUT                                    PAGE  4

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

117          KK   5A&5B
118          HC       2

119          KK    LT5D
120          BA    .035
121          LS              76
122          UD    0.17
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123          KK    LT5c
124          BA    .005
125          LS              76
126          UD    0.16

127          KK    DBIN
128          HC       3

129          KK     DB1
130          RS       1    STOR        0
131          SA   .0001   .0003   .0138   .0372   .0868   .1508  0.2289   .3177   .4198   .5231
132          SA   .6328   .7464   .8582   .9654
133          SE  5803.5    5804    5804    5806    5807    5808    5809    5810    5811    5812
134          SE    5813    5814    5815    5816
135          SQ       0       1     3.8     5.5     6.7     7.8     8.8     9.2     9.6   35.98
136          SQ   47.14   63.06   75.43   85.88   95.15
137          SE    5804    5804    5806    5807    5808    5809    5810  5810.5    5811  5811.5
138          SE    5812    5813    5814    5815    5816

139          KK     LT6
140          BA    .015
141          LS              72
142          UD    0.08

143          KK  WCOUT2
144          HC       2

145          KK     LT7
146          BA    .021
147          LS              74
148          UD    0.17

149          KK    LT-Q        TOTAL FLOW IN WHITES CREEK BELOW LEGEND TRAIL
150          HC       3

151          KK     W7R        REMAINDER OF W7R BELOW LEGEND TRAIL PROJECT
152          BA     0.3
153          LS              68      15
154          UD    0.31

155          KK  WHTCKQ        TOTAL FLOW IN WHITES CRK AT D/S END OF W7R
156          HC       3
1                                        HEC-1 INPUT                                    PAGE  5
           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

157          KK  RT-DIF
158          RM       1    .104      .4

159          KK     W8R
160          KM  ADD 25% IMPERVIOUS & RECALCULAT LAG TIME
161          BA    0.75
162          PB    3.65
163          LS              65      25
164          UD    0.43

165          KK  CP-DIF
166          HC       2

167          KK    BR-1        DIVERT OUT FLOW TO BRANCHES, 2, 3 AND 4
168          DT     234
169          DI       0     100     500    1000    2000    5000    7000   10000
170          DQ       0      86     430     860    1720    4300    6020    8600

171          KK  RTACRK        ROUTE FLOW FROM DIFFLUENCE TO ARROWCREEK PARKWAY
172          RD    2980    .052    .045            TRAP      50       1

173          KK  RTGOLF        ROUTE ACROSS GOLF COURSE
174          RD    5120    .047     .03            TRAP      16       1

175          KK  WOLFDT        DETENTION AT WOLF RUN GOLF COURSE
176          RS       1    STOR        0
177          SA       0     .19    3.12    3.87    4.48
178          SE    4672    4680    4682    4684    4686
179          SQ       0      10      25      50      75     100     110     120     130     320
180          SE    4672 4673.09 4673.85 4674.76 4675.91 4677.47 4678.19 4678.94 4679.13    4680

181          KK  RTTBLT        ROUTE FLOW FROM THUNDERBOLT TO ZOLEZZI
182          RD    1923    .031     .03            TRAP      10       4

183          KK   WCKDV        DIVERT OUT FLOWSTHAT SPILL FROM WHITES CREEK
184          KM  BETWEEN THUNDERBOLT AND ZOLLEZI
185          DT  VLYSPG
186          DI       0     200     300     400     500     600     700     800     841     900
187          DQ       0     100     126     148     165     182     197     211     216     223

188          KK   1A-CH        DIVERT 200 CFS IN 1A CHANEL
189          DT   1A-CH
190          DI       0     100     200     201     400     600
191          DQ       0     100     200     200     200     200

192          KK  ZOL-ST        DIVERT FLOW THATWILL GO EAST TO ZOLEZZI          55 CFS
193          DT     ZOL
194          DI       0       1      55      56     100     200
195          DQ       0       1      55      55      55      55
1                                        HEC-1 INPUT                                    PAGE  6
           LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

196          KK  ZLSPLT        SPLIT OVERLAND FLOW ON ZOLEZZI
197          DT      1A
198          DI       0      86     157     242     289     338     349     445
199          DQ       0      29      91     164     204     247     255     338
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200          KK   DVPND        DIVERT 61CFS TO PONDS
201          DT     1B
202          DI      0   96.76
203          DQ      0   35.76

204          KK    Z-46
205          BA    .007
206          LS              85
207          UD     .05

208          KK     Z-2        UNDEVELOPED WATERSHED
209          BA    .007
210          LS              73
211          UD     .05

212          KK  Z46+Z2        COMBINE FLOWS FROM AUTUMN WOOD PARCELS
213          HC      2

214          KK   CP-DP        COMBINE FLOW GOING TO DETENTION PONDS
215          HC      2

216          KK   DP-Z1        UPPER DET POND NEAR ZOLEZZI PARCELS
217          KM  30" RCP OUTLET@ 61 FT
218          RS      1    STOR      0
219          SA    .09    0.30    0.34    0.38    0.43    0.47    0.52    0.58
220          SE     61      62      63      64      65      66      67      68
221          SQ      0       7      16      28      39      45      50      55
222          SE     61      62      63      64      65      66      67      68

223          KK   DP-Z2        LOWER DET POND NEAR ZOLEZZI PARCELS
224          KM  30" RCP OUTLET a 4154 FT
225          RS      1    STOR      0
226          SA    .31    0.64    0.88    0.94    1.01    1.08
227          SE     53      54      55      56      57      58
228          SQ      0       0       7      16      28      39      42
229          SE     53    53.5    54.5    55.5    56.5    57.5      58

230          KK   1A-CH        RECALL 1A CHANNEL FLOW
231          DR   1A-CH

232          KK     1A         RECALL OVERLAND FLOW RETURNING TO 1A CHANEL
233          DR     1A

234          KK  1A-TOT        TOTAL FLOW IN 1A AT JEPPSON
235          HC      3
1                                        HEC-1 INPUT                                        PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

236          KK    BR1B        RECALL FLOW ON BRANCH 1B
237          DR      1B

238          KK     ZOL        RECALL FLOW ON ZOLEZZI
239          DR     ZOL

240          KK  1B-TOT
241          HC      2

242          KK  1B-ZOL        DIVERT 54 CFS TO STORM DRAINS ON ZOLEZZI
243          DT   STDRN
244          DI      0      10      42      54      55      60     100     120
245          DQ      0      10      42      54      54      54      54      54

246          KK  VLYSPG        RECALL FLOW GOING TOWARDS VALLEY SPRINGS ROAD
247          DR  VLYSPG

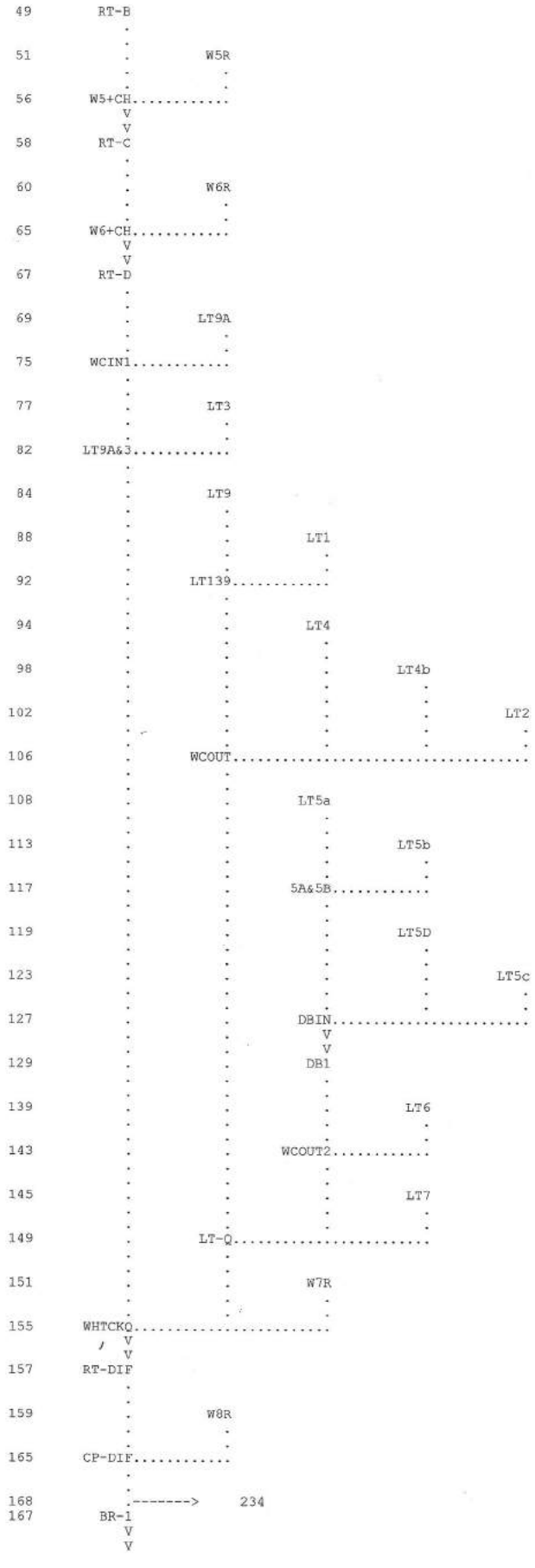
248          KK  VSDTCH        DIVERT THE FLOW INTERCEPTED BY VALLEY SPRINGS RD DITCH 30 CFS
249          DT     OUT
250          DI      0      10      30      31      40      50     100     200     400
251          DQ      0       0       0       1      10      20      70     170     370

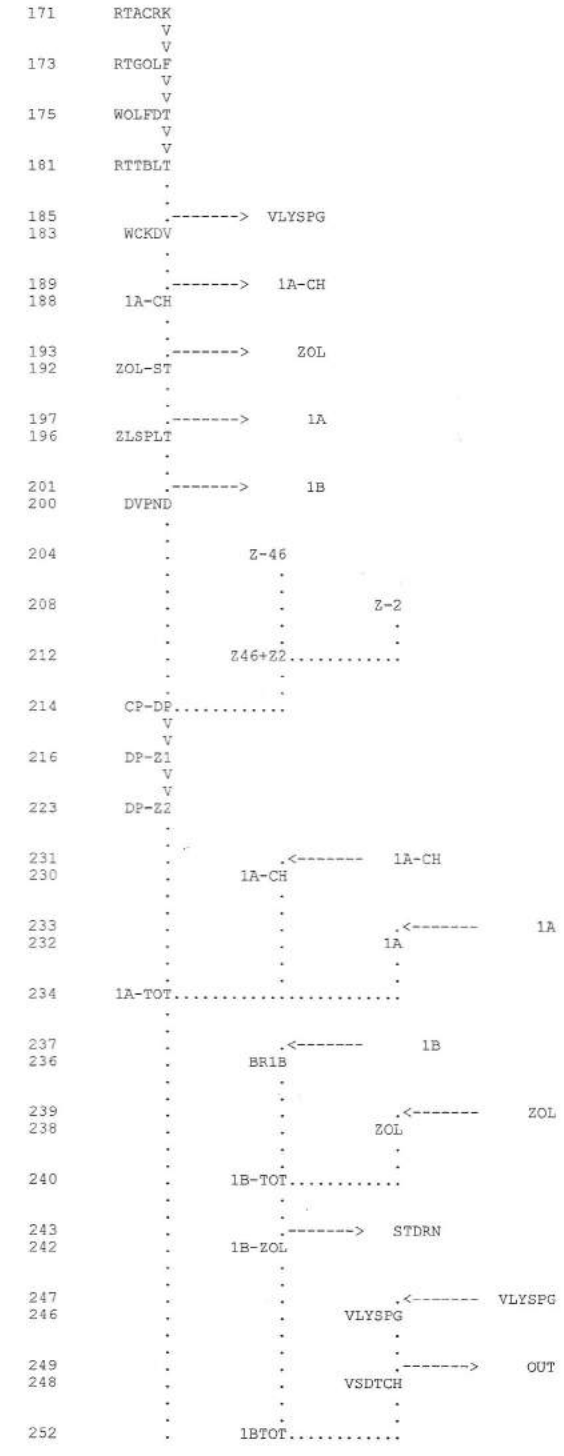
252          KK   1BTOT
253          HC      2
254          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK

 INPUT
  LINE      (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

    11          W1R
                  .
                  .
    26            .          W2R
                  .            .
                  .            .
    31        W1+W2............
                  V
                  V
    33          RT-A
                  .
                  .
    35            .          W3R
                  .            V
                  .            V
    40            .        RT-A
                  .            .
                  .            .
    42            .            .          W4R
                  .            .            .
                  .            .            .
    47        W1234.........................
                  V
                  V
```


49 RT-B
51 W5R
56 W5+CH
58 RT-C
60 W6R
65 W6+CH
67 RT-D
69 LT9A
75 WCIN1
77 LT3
82 LT9A&3
84 LT9
88 LT1
92 LT139
94 LT4
98 LT4b
102 LT2
106 WCOUT
108 LT5a
113 LT5b
117 5A&5B
119 LT5D
123 LT5c
127 DBIN
129 DB1
139 LT6
143 WCOUT2
145 LT7
149 LT-Q
151 W7R
155 WHTCKQ
157 RT-DIF
159 W8R
165 CP-DIF
168
167 BR-1
234



(***) 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   11MAY18  TIME  08:13:35   *
*                                       *
*****************************************
```

```
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*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104              *
*                                       *
*****************************************
```

100 yr 24 hr event
AUTUMN WOODS PROJECT WHITES CREEK
USING REVISED POND DATA DATE: MAY 4, 2018
FILE NAME AWCLMR.DAT PROPOSED CONDITIONS
USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R

```
                     W7R SPLIT INTO LEGEND TRAIL SUBBASINS
                     USING TYPE II STORM DISTRIBUTION

 9 IO         OUTPUT CONTROL VARIABLES
                   IPRNT          5  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT         HYDROGRAPH TIME DATA
                   NMIN          10  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1   0  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        800  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE      6   0  ENDING DATE
                  NDTIME       1310  ENDING TIME
                   ICENT         19  CENTURY MARK

               COMPUTATION INTERVAL     .17 HOURS
                    TOTAL TIME BASE  133.17 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      .96      .95
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
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   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
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***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
   ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
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ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).

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	RATIO 5 .96	RATIO 6 .95
HYDROGRAPH AT										
+	W1R	1.380	1	FLOW	1487.94	1461.40	1434.94	1408.57	1382.28	1356.09
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W2R	.830	1	FLOW	1675.46	1646.53	1617.67	1588.89	1560.19	1531.57
				TIME	8.50	8.50	8.50	8.50	8.50	8.50
2 COMBINED AT										
+	W1+W2	2.210	1	FLOW	2674.86	2627.13	2579.55	2532.13	2484.86	2437.76
				TIME	8.67	8.67	8.67	8.67	8.67	8.67
ROUTED TO										
+	RT-A	2.210	1	FLOW	2647.74	2600.69	2553.78	2507.02	2460.41	2413.96
				TIME	8.83	8.83	8.83	8.83	8.83	8.83
HYDROGRAPH AT										
+	W3R	1.380	1	FLOW	1499.18	1472.22	1445.35	1418.57	1391.87	1365.27
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
ROUTED TO										
+	RT-A	1.380	1	FLOW	1500.56	1473.80	1447.13	1420.54	1394.03	1367.62
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W4R	1.430	1	FLOW	1064.75	1043.48	1022.30	1001.22	980.24	959.36
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
3 COMBINED AT										
+	W1234	5.020	1	FLOW	5007.17	4915.36	4823.87	4732.71	4641.88	4551.40
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
ROUTED TO										
+	RT-B	5.020	1	FLOW	5017.87	4925.35	4833.16	4741.31	4649.80	4558.64
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
HYDROGRAPH AT										
+	W5R	1.200	1	FLOW	831.02	814.46	797.98	781.57	765.24	748.98
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
2 COMBINED AT										
+	W5+CH	6.220	1	FLOW	5839.19	5729.93	5621.08	5512.65	5404.64	5297.07
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
ROUTED TO										
+	RT-C	6.220	1	FLOW	5822.22	5713.05	5604.30	5495.96	5388.06	5280.59
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W6R	1.520	1	FLOW	404.44	395.40	386.42	377.50	368.64	359.85
				TIME	10.00	10.00	10.00	10.00	10.00	10.00
2 COMBINED AT										
+	W6+CH	7.740	1	FLOW	6108.22	5993.88	5879.97	5766.51	5653.52	5540.99
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
ROUTED TO										
+	RT-D	7.740	1	FLOW	6115.91	6000.18	5884.91	5770.11	5655.80	5541.97
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	LT9A	.040	1	FLOW	42.65	41.85	41.06	40.26	39.47	38.68
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	WCIN1	7.780	1	FLOW	6123.90	6008.04	5892.65	5777.73	5663.29	5549.34
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	LT3	.160	1	FLOW	100.42	98.58	96.75	94.92	93.10	91.29
				TIME	8.83	8.83	8.83	8.83	8.83	8.83
2 COMBINED AT										
+	LT9A&3	7.940	1	FLOW	6205.64	6088.38	5971.59	5855.27	5739.43	5624.10
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	LT9	.135	1	FLOW	147.27	144.65	142.05	139.44	136.85	134.27
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT1	.109	1	FLOW	126.65	124.39	122.14	119.90	117.66	115.43
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	LT139	.244	1	FLOW	273.92	269.04	264.18	259.34	254.51	249.70
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT4	.033	1	FLOW	52.56	51.66	50.77	49.88	48.99	48.10
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT4b	.007	1	FLOW	11.97	11.78	11.58	11.39	11.19	11.00

				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT2	.033	1	FLOW	74.95	73.64	72.34	71.04	69.74	68.45
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
4 COMBINED AT										
+	WCOUT	.317	1	FLOW	340.70	334.54	328.40	322.28	316.18	310.10
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5a	.057	1	FLOW	54.54	53.38	52.22	51.07	49.93	48.86
				TIME	8.17	8.17	8.17	8.17	8.33	8.33
HYDROGRAPH AT										
+	LT5b	.026	1	FLOW	43.47	42.64	41.81	40.98	40.15	39.33
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	5A&5B	.083	1	FLOW	88.34	86.57	84.80	83.05	81.29	79.55
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5D	.035	1	FLOW	60.64	59.65	58.66	57.68	56.69	55.71
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5c	.005	1	FLOW	8.55	8.41	8.27	8.13	8.00	7.86
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	DBIN	.123	1	FLOW	157.53	154.63	151.74	148.86	145.99	143.12
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
ROUTED TO										
+	DB1	.123	1	FLOW	83.39	82.47	81.56	80.65	79.74	78.83
				TIME	8.50	8.50	8.50	8.50	8.50	8.50
			**	PEAK STAGES IN FEET	**					
			1	STAGE	5814.76	5814.67	5814.59	5814.50	5814.41	5814.33
				TIME	8.50	8.50	8.50	8.50	8.50	8.50
HYDROGRAPH AT										
+	LT6	.015	1	FLOW	34.11	33.48	32.87	32.25	31.63	31.02
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	WCOUT2	.138	1	FLOW	89.81	88.90	88.00	87.10	86.20	85.30
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT7	.021	1	FLOW	33.86	33.29	32.71	32.13	31.56	30.98
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	LT-Q	.476	1	FLOW	460.98	453.32	445.68	438.07	430.47	422.91
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	W7R	.300	1	FLOW	353.63	347.34	341.07	334.83	328.62	322.43
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	WHTCKQ	8.716	1	FLOW	6382.09	6261.31	6141.11	6021.44	5902.15	5782.37
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
ROUTED TO										
+	RT-DIF	8.716	1	FLOW	6365.78	6245.73	6126.25	6007.28	5888.73	5770.14
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	W8R	.750	1	FLOW	446.84	438.97	431.17	423.42	415.73	408.10
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	CP-DIF	9.466	1	FLOW	6461.72	6340.13	6219.11	6098.60	5978.52	5858.42
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	234	9.466	1	FLOW	5557.08	5452.51	5348.43	5244.80	5141.53	5038.24
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	BR-1	9.466	1	FLOW	904.64	887.62	870.67	853.80	836.99	820.18
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RTACRK	9.466	1	FLOW	902.22	885.26	868.40	851.60	834.85	818.06
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RTGOLF	9.466	1	FLOW	893.64	877.35	860.74	843.96	827.04	809.95
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	WOLFDT	9.466	1	FLOW	872.44	856.59	840.82	825.26	810.25	796.40
				TIME	9.83	9.83	9.83	9.83	9.83	9.67
			**	PEAK STAGES IN FEET	**					
			1	STAGE	4682.53	4682.46	4682.39	4682.31	4682.25	4682.18
				TIME	9.83	9.83	9.83	9.83	9.67	9.67
ROUTED TO										
+	RTTBLT	9.466	1	FLOW	871.79	856.21	840.29	825.01	810.04	795.37
				TIME	9.83	9.83	9.83	9.83	9.83	9.83

DIVERSION TO									
+ VLYSPG	9.466	1	FLOW	219.65	217.80	215.91	214.05	212.22	210.35
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT									
+ WCKDV	9.466	1	FLOW	652.14	638.40	624.38	610.96	597.82	585.02
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO									
+ 1A-CH	9.466	1	FLOW	200.00	200.00	200.00	200.00	200.00	200.00
			TIME	8.83	8.83	8.83	8.83	8.83	9.00
HYDROGRAPH AT									
+ 1A-CH	9.466	1	FLOW	452.14	438.40	424.38	410.96	397.82	385.02
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO									
+ ZOL	9.466	1	FLOW	55.00	55.00	55.00	55.00	55.00	55.00
			TIME	9.00	9.00	9.00	9.00	9.00	9.00
HYDROGRAPH AT									
+ ZOL-ST	9.466	1	FLOW	397.14	383.40	369.38	355.96	342.82	330.02
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO									
+ 1A	9.466	1	FLOW	296.62	284.74	272.62	261.01	250.50	240.00
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT									
+ ZLSPLT	9.466	1	FLOW	100.52	98.66	96.76	94.94	92.31	90.02
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO									
+ 1B	9.466	1	FLOW	37.15	36.46	35.76	35.09	34.12	33.27
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT									
+ DVPND	9.466	1	FLOW	63.37	62.20	61.00	59.85	58.20	56.75
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT									
+ Z-46	.007	1	FLOW	15.68	15.45	15.21	14.98	14.75	14.52
			TIME	8.00	8.00	8.00	8.00	8.00	8.00
HYDROGRAPH AT									
+ Z-2	.007	1	FLOW	8.96	8.77	8.58	8.39	8.20	8.02
			TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT									
+ Z46+Z2	.014	1	FLOW	24.64	24.22	23.79	23.37	22.95	22.54
			TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT									
+ CP-DP	9.480	1	FLOW	64.43	63.25	62.03	60.87	59.20	57.74
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
ROUTED TO									
+ DP-Z1	9.480	1	FLOW	50.86	50.13	49.38	48.57	47.74	46.96
			TIME	10.33	10.33	10.33	10.33	10.33	10.33
		** PEAK STAGES IN FEET **							
		1	STAGE	67.17	67.03	66.88	66.71	66.55	66.39
			TIME	10.33	10.33	10.33	10.33	10.33	10.33
ROUTED TO									
+ DP-Z2	9.480	1	FLOW	39.40	38.78	37.92	37.17	36.38	35.56
			TIME	11.17	11.17	11.00	11.00	11.00	11.00
		** PEAK STAGES IN FEET **							
		1	STAGE	57.57	57.48	57.40	57.33	57.26	57.19
			TIME	11.17	11.17	11.00	11.00	11.00	11.00
HYDROGRAPH AT									
+ 1A-CH	.000	1	FLOW	200.00	200.00	200.00	200.00	200.00	200.00
			TIME	8.83	8.83	8.83	8.83	8.83	9.00
HYDROGRAPH AT									
+ 1A	.000	1	FLOW	296.62	284.74	272.62	261.01	250.50	240.00
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
3 COMBINED AT									
+ 1A-TOT	9.480	1	FLOW	517.03	504.55	491.79	479.55	468.36	457.22
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT									
+ BR1B	.000	1	FLOW	37.15	36.46	35.76	35.09	34.12	33.27
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT									
+ ZOL	.000	1	FLOW	55.00	55.00	55.00	55.00	55.00	55.00
			TIME	9.00	9.00	9.00	9.00	9.00	9.00
2 COMBINED AT									
+ 1B-TOT	.000	1	FLOW	92.15	91.46	90.76	90.09	89.12	88.27
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO									
+ STDRN	.000	1	FLOW	54.00	54.00	54.00	54.00	54.00	54.00
			TIME	9.00	9.00	9.00	9.00	9.00	9.00
HYDROGRAPH AT									
+ 1B-ZOL	.000	1	FLOW	38.15	37.46	36.76	36.09	35.12	34.27
			TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT									
+ VLYSPG	.000	1	FLOW	219.65	217.80	215.91	214.05	212.22	210.35

				TIME	9.83	9.83	9.83	9.83	9.83	9.83
DIVERSION TO										
+	OUT	.000	1	FLOW	189.65	187.80	185.91	184.05	182.22	180.35
				TIME	9.83	9.83	9.83	9.83	9.83	9.83
HYDROGRAPH AT										
+	VSDTCH	.000	1	FLOW	30.00	30.00	30.00	30.00	30.00	30.00
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	1BTOT	.000	1	FLOW	68.15	67.46	66.76	66.09	65.12	64.27
				TIME	9.83	9.83	9.83	9.83	9.83	9.83

25 YEAR PROPOSED CONDITIONS

25 YR PR.

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*        JUN 1998 AND FEB 2010          *
*           VERSION 4.1R                *
*        RGMHEC2000 WWW.HEC-1.COM       *
*  RUN DATE   11MAY18  TIME  08:02:01   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*          (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        25 yr 24 hr event
    2         ID  AUTUMN WOODS PROJECT    WHITES CREEK
    3         ID  FILE  AW25FNL.DAT      PROPOSED CONDITIONS
    4         ID  USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
    5         ID  W7R SPLIT INTO LEGEND TRAIL SUBBASINS
    6         ID  USING TYPE II STORM DISTRIBUTION
              *       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
    7         IT     10                800
    8         IO      5       0
    9         JR    PREC     1.0     .99     .98     .97     .96     .95

   10         KK     W1R
   11         BA    1.38
   12         PB    7.42
   13         PC     0.0    .002    .005    .008    .011    .014    .017    .020    .023    .026
   14         PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
   15         PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
   16         PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
   17         PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
   18         PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
   19         PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
   20         PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
   21         PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
   22         PC    .983    .986    .992    .995    .998   1.00
   23         LS              59
   24         UD    1.07

   25         KK     W2R
   26         BA    0.83
   27         PB    7.95
   28         LS              59
   29         UD    0.52

   30         KK    W1+W2
   31         HC        2

   32         KK     RT-A
   33         RM        1   0.122     0.4

   34         KK     W3R
   35         BA    1.38
   36         PB    7.22
   37         LS              60
   38         UD    1.04
```



```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   39         KK     RT-A
   40         RM        1   0.095     0.4

   41         KK     W4R
   42         BA    1.43
   43         PB    6.24
   44         LS              58
   45         UD    1.08

   46         KK    W1234
   47         HC        3
```

```
   48          KK    RT-B
   49          RM       1  0.0597     0.4

   50          KK     W5R
   51          BA    1.20
   52          PB    5.76
   53          LS              60
   54          UD    1.07

   55          KK   W5+CH
   56          HC       2

   57          KK    RT-C
   58          RM       2   0.185     0.4

   59          KK     W6R
   60          BA    1.52
   61          PB    4.14
   62          LS              63
   63          UD    1.84

   64          KK   W6+CH
   65          HC       2

   66          KK    RT-D
   67          RM       1   0.122     0.4

   68          KK    LT9A        LEGEND TRAIL OFFSITE 9A
   69          KM  BEGIN LEGEND TRAIL MODEL REVISING W7R
   70          BA     .04
   71          PB    4.98
   72          LS              71
   73          UD    0.33

   74          KK   WCIN1        WHITE CREEK FLOW @ BNDRY
   75          HC       2
1                                        HEC-1 INPUT                                    PAGE  3

LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10

   76          KK     LT3
   77          BA    0.16
   78          PB    5.01
   79          LS              73
   80          UD     0.9

   81          KK  LT9A&3
   82          HC       2

   83          KK     LT9
   84          BA    .135
   85          LS              74
   86          UD    0.42

   87          KK     LT1
   88          BA    .109
   89          LS              73
   90          UD     .34

   91          KK   LT139
   92          HC       2

   93          KK     LT4
   94          BA    .033
   95          LS              74
   96          UD     .16

   97          KK    LT4b
   98          BA    .007
   99          LS              76
  100          UD    0.16

  101          KK     LT2
  102          BA    .033
  103          LS              74
  104          UD    0.10

  105          KK   WCOUT
  106          HC       4

  107          KK    LT5a
  108          KM  WHITE ROSE ESTATES MODEL
  109          BA    .057
  110          LS              68
  111          UD    0.31

  112          KK    LT5b
  113          BA    .026
  114          LS              71
  115          UD    0.13
1                                        HEC-1 INPUT                                    PAGE  4

LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9.....10

  116          KK   5A&5B
  117          HC       2

  118          KK    LT5D
  119          BA    .035
  120          LS              76
  121          UD    0.17

  122          KK    LT5c
```

```
199          RS       1    STOR       0
200          SA     .09    0.30    0.34    0.38    0.43    0.47    0.52    0.58
201          SE      61      62      63      64      65      66      67      68
202          SQ       0       7      16      28      39      45      50      55
203          SE      61      62      63      64      65      66      67      68

204          KK   DP-Z2         LOWER DET POND NEAR ZOLEZZI PARCELS
205          KM  30" RCP OUTLET a 4154 FT
206          RS       1    STOR       0
207          SA     .31    0.64    0.88    0.94    1.01    1.08
208          SE      53      54      55      56      57      58
209          SQ       0       0       7      16      28      39      42
210          SE      53    53.5    54.5    55.5    56.5    57.5      58

211          KK   1A-CH         RECALL 1A CHANNEL FLOW
212          DR   1A-CH

213          KK      1A         RECALL OVERLAND FLOW RETURNING TO 1A CHANEL
214          DR      1A

215          KK  1A-TOT         TOTAL FLOW IN 1A AT JEPPSON
216          HC       3

217          KK    BR1B         RECALL FLOW ON BRANCH 1B
218          DR      1B

219          KK     ZOL         RECALL FLOW ON ZOLEZZI
220          DR     ZOL

221          KK  1B-TOT
222          HC       2

223          KK  1B-ZOL         DIVERT 54 CFS TO STORM DRAINS ON ZOLEZZI
224          DT   STDRN
225          DI       0      10      42      54      55      60     100     120
226          DQ       0      10      42      54      54      54      54      54

227          KK  VLYSPG         RECALL FLOW GOING TOWARDS VALLEY SPRINGS ROAD
228          DR  VLYSPG

229          KK  VSDTCH         DIVERT THE FLOW INTERCEPTED BY VALLEY SPRINGS RD DITCH 30 CFS
230          DT     OUT
231          DI       0      10      30      31      40      50     100     200     400
232          DQ       0       0       0       1      10      20      70     170     370
1                                          HEC-1 INPUT                                    PAGE  7

          LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

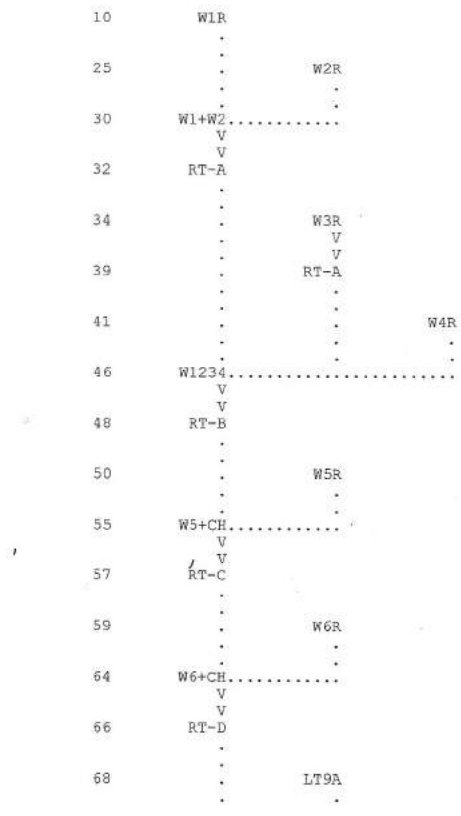
233          KK   1BTOT
234          HC       2
235          ZZ
1
```

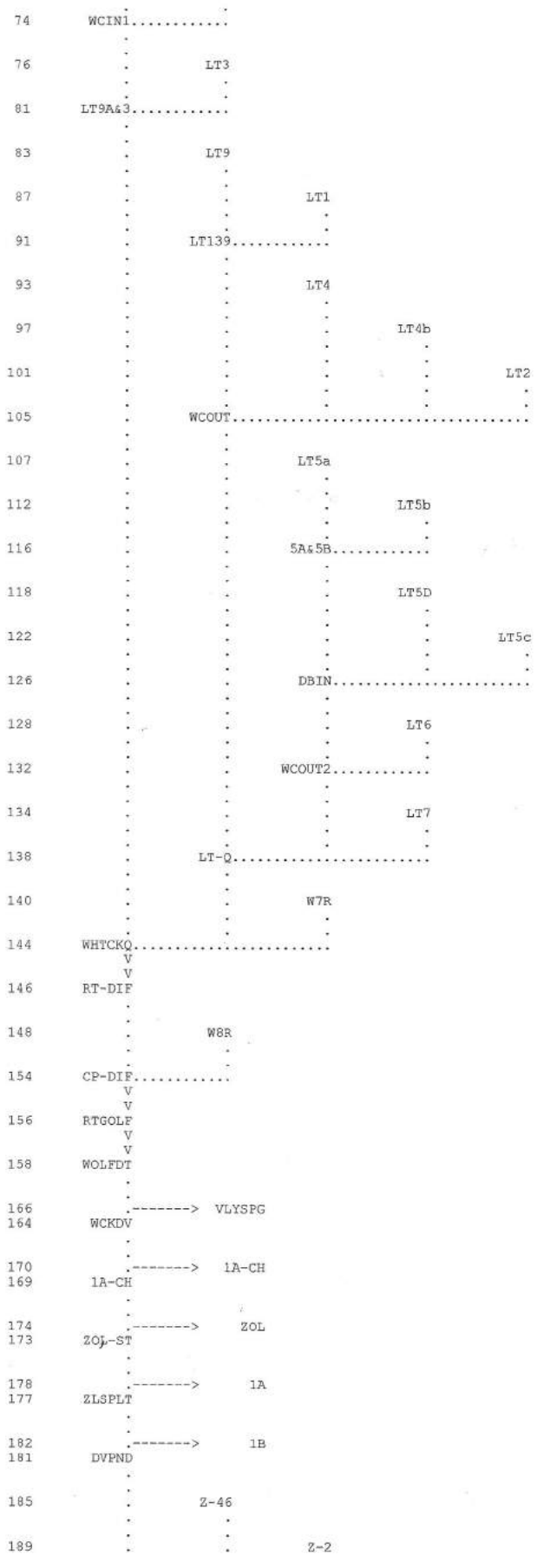
SCHEMATIC DIAGRAM OF STREAM NETWORK

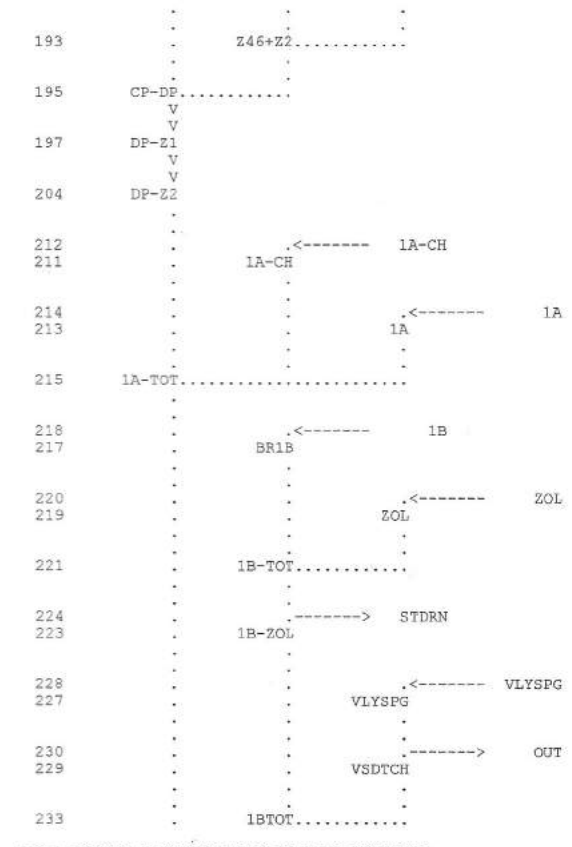
INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW




74 WCIN1
76 LT3
81 LT9A&3
83 LT9
87 LT1
91 LT139
93 LT4
97 LT4b
101 LT2
105 WCOUT
107 LT5a
112 LT5b
116 5A&5B
118 LT5D
122 LT5c
126 DBIN
128 LT6
132 WCOUT2
134 LT7
138 LT-Q
140 W7R
144 WHTCKQ
146 RT-DIF
148 W8R
154 CP-DIF
156 RTGOLF
158 WOLFDT
166 VLYSPG
164 WCKDV
170 1A-CH
169 1A-CH
174 ZOL
173 ZOL-ST
178 1A
177 ZLSPLT
182 1B
181 DVPND
185 Z-46
189 Z-2



(***) 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   11MAY18  TIME  08:02:01   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

25 yr 24 hr event
AUTUMN WOODS PROJECT WHITES CREEK
FILE AW25FNL.DAT PROPOSED CONDITIONS
USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
W7R SPLIT INTO LEGEND TRAIL SUBBASINS
USING TYPE II STORM DISTRIBUTION

```
  8 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          5  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                      NMIN         10  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1    0  STARTING DATE
                     ITIME        0000  STARTING TIME
                        NQ         800  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      6    0  ENDING DATE
                    NDTIME       1310  ENDING TIME
                     ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL     .17 HOURS
                      TOTAL TIME BASE  133.17 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       .96       .95
***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
     ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
```

WARNING --- ROUTED OUTFLOW (56.) IS GREATER THAN MAXIMUM OUTFLOW (42.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (56.) IS GREATER THAN MAXIMUM OUTFLOW (42.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (55.) IS GREATER THAN MAXIMUM OUTFLOW (42.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (48.) IS GREATER THAN MAXIMUM OUTFLOW (42.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (50.) IS GREATER THAN MAXIMUM OUTFLOW (42.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (47.) IS GREATER THAN MAXIMUM OUTFLOW (42.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (44.) IS GREATER THAN MAXIMUM OUTFLOW (42.) IN STORAGE-OUTFLOW TABLE
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	RATIO 5 .96	RATIO 6 .95
HYDROGRAPH AT										
+	W1R	1.380	1	FLOW	913.52	894.87	876.31	857.83	839.45	821.17
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W2R	.830	1	FLOW	1038.42	1017.90	997.46	977.11	956.84	936.67
				TIME	8.50	8.50	8.50	8.50	8.50	8.50
2 COMBINED AT										
+	W1+W2	2.210	1	FLOW	1636.04	1602.62	1569.35	1536.25	1503.32	1470.57
				TIME	8.67	8.67	8.67	8.67	8.67	8.67
ROUTED TO										
+	RT-A	2.210	1	FLOW	1623.28	1590.28	1557.43	1524.74	1492.22	1459.87
				TIME	8.83	8.83	8.83	8.83	8.83	8.83
HYDROGRAPH AT										
+	W3R	1.380	1	FLOW	915.28	896.82	878.45	860.17	841.97	823.86
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
ROUTED TO										

+	RT-A	1.380	1	FLOW	919.68	900.90	882.20	863.59	845.07	826.65
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W4R	1.430	1	FLOW	613.42	599.07	584.81	570.64	556.59	542.63
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
3 COMBINED AT										
+	W1234	5.020	1	FLOW	3024.72	2961.00	2897.62	2834.59	2771.91	2709.60
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
ROUTED TO										
+	RT-B	5.020	1	FLOW	3021.45	2957.39	2893.68	2830.32	2767.34	2704.72
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
HYDROGRAPH AT										
+	W5R	1.200	1	FLOW	479.68	468.49	457.37	446.33	435.37	424.50
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
2 COMBINED AT										
+	W5+CH	6.220	1	FLOW	3488.98	3413.72	3338.90	3264.51	3190.99	3118.90
				TIME	9.00	9.00	9.00	9.00	9.17	9.17
ROUTED TO										
+	RT-C	6.220	1	FLOW	3487.41	3413.45	3339.88	3266.73	3194.00	3121.70
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	W6R	1.520	1	FLOW	220.55	214.83	209.17	203.55	197.99	192.49
				TIME	10.17	10.17	10.17	10.17	10.17	10.17
2 COMBINED AT										
+	W6+CH	7.740	1	FLOW	3654.80	3576.14	3497.92	3420.17	3342.88	3266.08
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
ROUTED TO										
+	RT-D	7.740	1	FLOW	3636.48	3558.56	3481.07	3404.04	3327.47	3251.38
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	LT9A	.040	1	FLOW	42.65	41.85	41.06	40.26	39.47	38.68
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	WCIN1	7.780	1	FLOW	3644.15	3565.21	3487.63	3410.49	3333.82	3257.62
				TIME	9.33	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	LT3	.160	1	FLOW	100.42	98.58	96.75	94.92	93.10	91.29
				TIME	8.83	8.83	8.83	8.83	8.83	8.83
2 COMBINED AT										
+	LT9A&3	7.940	1	FLOW	3725.90	3645.13	3564.82	3485.01	3405.69	3326.89
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	LT9	.135	1	FLOW	147.27	144.65	142.05	139.44	136.85	134.27
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT1	.109	1	FLOW	126.65	124.39	122.14	119.90	117.66	115.43
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	LT139	.244	1	FLOW	273.92	269.04	264.18	259.34	254.51	249.70
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT4	.033	1	FLOW	52.56	51.66	50.77	49.88	48.99	48.10
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT4b	.007	1	FLOW	11.97	11.78	11.58	11.39	11.19	11.00
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT2	.033	1	FLOW	74.95	73.64	72.34	71.04	69.74	68.45
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
4 COMBINED AT										
+	WCOUT	.317	1	FLOW	340.70	334.54	328.40	322.28	316.18	310.10
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5a	.057	1	FLOW	54.54	53.38	52.22	51.07	49.93	48.86
				TIME	8.17	8.17	8.17	8.17	8.33	8.33
HYDROGRAPH AT										
+	LT5b	.026	1	FLOW	43.47	42.64	41.81	40.98	40.15	39.33
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	5A&5B	.083	1	FLOW	88.34	86.57	84.80	83.05	81.29	79.55
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5D	.035	1	FLOW	60.64	59.65	58.66	57.68	56.69	55.71
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5c	.005	1	FLOW	8.55	8.41	8.27	8.13	8.00	7.86
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	DBIN	.123	1	FLOW	157.53	154.63	151.74	148.86	145.99	143.12
				TIME	8.17	8.17	8.17	8.17	8.17	8.17

HYDROGRAPH AT										
+	LT6	.015	1	FLOW	34.11	33.48	32.87	32.25	31.63	31.02
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	WCOUT2	.138	1	FLOW	173.05	169.88	166.72	163.57	160.44	157.31
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT7	.021	1	FLOW	33.86	33.29	32.71	32.13	31.56	30.98
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	LT-Q	.476	1	FLOW	547.61	537.70	527.83	517.98	508.17	498.40
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	W7R	.300	1	FLOW	353.63	347.34	341.07	334.83	328.62	322.43
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	WHTCKQ	8.716	1	FLOW	3881.56	3798.46	3715.83	3633.70	3552.06	3470.94
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
ROUTED TO										
+	RT-DIF	8.716	1	FLOW	3880.42	3797.78	3715.61	3633.92	3552.72	3472.02
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	W8R	.750	1	FLOW	290.67	285.62	280.62	275.66	270.75	265.90
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	CP-DIF	9.466	1	FLOW	3944.35	3860.62	3777.36	3694.58	3612.30	3530.53
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RTGOLF	9.466	1	FLOW	3937.87	3849.58	3765.44	3686.37	3601.93	3517.93
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	WOLFDT	9.466	1	FLOW	3930.33	3840.99	3756.02	3676.72	3590.67	3505.96
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
			** PEAK STAGES IN FEET **							
			1	STAGE	4683.07	4683.00	4682.94	4682.88	4682.81	4682.75
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	VLYSPG	9.466	1	FLOW	2066.67	2019.69	1975.01	1933.31	1888.07	1843.52
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	WCKDV	9.466	1	FLOW	1863.66	1821.30	1781.01	1743.41	1702.60	1662.44
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	1A-CH	9.466	1	FLOW	200.00	200.00	200.00	200.00	200.00	200.00
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	1A-CH	9.466	1	FLOW	1663.66	1621.30	1581.01	1543.41	1502.60	1462.44
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	ZOL	9.466	1	FLOW	55.00	55.00	55.00	55.00	55.00	55.00
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	ZOL-ST	9.466	1	FLOW	1608.66	1566.30	1526.01	1488.41	1447.60	1407.44
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	1A	9.466	1	FLOW	1344.08	1307.46	1272.62	1240.11	1204.84	1170.11
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	ZLSPLT	9.466	1	FLOW	264.58	258.84	253.39	248.29	242.77	237.33
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	1B	9.466	1	FLOW	203.58	197.84	192.39	187.29	181.77	176.33
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	DVPND	9.466	1	FLOW	61.00	61.00	61.00	61.00	61.00	61.00
				TIME	8.17	8.17	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	Z-46	.007	1	FLOW	10.73	10.55	10.38	10.21	10.03	9.86
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
HYDROGRAPH AT										
+	Z-2	.007	1	FLOW	5.06	4.93	4.80	4.67	4.54	4.42
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	Z46+Z2	.014	1	FLOW	15.79	15.48	15.18	14.88	14.57	14.27
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	CP-DP	9.480	1	FLOW	68.28	68.15	67.62	66.46	65.33	64.30
				TIME	8.17	8.17	8.17	8.17	8.17	8.33
ROUTED TO										

+	DP-Z1	9.480	1	FLOW	60.92	60.89	60.83	60.82	60.77	60.72
				TIME	13.00	13.00	13.00	12.83	12.83	12.67
			** PEAK STAGES IN FEET **							
			1	STAGE	69.18	69.18	69.17	69.16	69.15	69.14
				TIME	13.00	13.00	13.00	12.83	12.83	12.67
ROUTED TO										
+	DP-Z2	9.480	1	FLOW	56.48	56.34	56.19	56.04	55.86	55.70
				TIME	13.83	13.67	13.67	13.67	13.50	13.50
			** PEAK STAGES IN FEET **							
			1	STAGE	60.41	60.39	60.37	60.34	60.31	60.28
				TIME	13.83	13.67	13.67	13.67	13.50	13.50
HYDROGRAPH AT										
+	1A-CH	.000	1	FLOW	200.00	200.00	200.00	200.00	200.00	200.00
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	1A	.000	1	FLOW	1344.08	1307.46	1272.62	1240.11	1204.84	1170.11
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
3 COMBINED AT										
+	1A-TOT	9.480	1	FLOW	1578.11	1541.45	1506.56	1473.97	1438.61	1403.79
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	BR1B	.000	1	FLOW	203.58	197.84	192.39	187.29	181.77	176.33
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	ZOL	.000	1	FLOW	55.00	55.00	55.00	55.00	55.00	55.00
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
2 COMBINED AT										
+	1B-TOT	.000	1	FLOW	258.58	252.84	247.39	242.29	236.77	231.33
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	STDRN	.000	1	FLOW	54.00	54.00	54.00	54.00	54.00	54.00
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	1B-ZOL	.000	1	FLOW	204.58	198.84	193.39	188.29	182.77	177.33
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	VLYSPG	.000	1	FLOW	2066.67	2019.69	1975.01	1933.31	1888.07	1843.52
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	OUT	.000	1	FLOW	2036.67	1989.69	1945.01	1903.31	1858.07	1813.52
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	VSDTCH	.000	1	FLOW	30.00	30.00	30.00	30.00	30.00	30.00
				TIME	7.67	7.67	7.67	7.67	7.67	7.67
2 COMBINED AT										
+	1BTOT	.000	1	FLOW	234.58	228.84	223.39	218.29	212.77	207.33
				TIME	9.50	9.50	9.50	9.50	9.50	9.50

5 YEAR EXISTING CONDITIONS

5 YR EX

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1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*         JUN 1998 AND FEB 2010         *
*              VERSION 4.1R             *
*        RGMHEC2000 WWW.HEC-1.COM       *
*  RUN DATE   11MAY18  TIME  08:05:22   *
*                                       *
*****************************************
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*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*            (916) 756-1104             *
*                                       *
*****************************************
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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
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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

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

              *DIAGRAM
    1         ID        5 yr 24 hr event
    2         ID  AUTUMN WOODS PROJECT    WHITES CREEK
    3         ID  FILE NAME AW5E.DAT     EXISTING CONDITIONS
    4         ID  USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
    5         ID  W7R SPLIT INTO LEGEND TRAIL SUBBASINS
    6         ID  USING TYPE II STORM DISTRIBUTION
              *       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
    7         IT     10                800
    8         IO      5       0
    9         JR    PREC     1.0     .99     .98     .97     .96     .95

   10         KK     W1R
   11         BA    1.38
   12         PB    5.19
   13         PC     0.0    .002    .005    .008    .011    .014    .017    .020    .023    .026
   14         PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
   15         PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
   16         PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
   17         PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
   18         PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
   19         PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
   20         PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
   21         PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
   22         PC    .983    .986    .992    .995    .998   1.00
   23         LS              59
   24         UD    1.07

   25         KK     W2R
   26         BA    0.83
   27         PB    5.55
   28         LS              59
   29         UD    0.52

   30         KK    W1+W2
   31         HC       2

   32         KK     RT-A
   33         RM       1   0.122     0.4

   34         KK     W3R
   35         BA    1.38
   36         PB    5.05
   37         LS              60
   38         UD    1.04
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1 HEC-1 INPUT PAGE 2

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   39         KK     RT-A
   40         RM       1   0.095     0.4

   41         KK     W4R
   42         BA    1.43
   43         PB    4.36
   44         LS              58
   45         UD    1.08

   46         KK    W1234
   47         HC       3
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 48          KK    RT-B
 49          RM       1  0.0597     0.4

 50          KK     W5R
 51          BA    1.20
 52          PB    4.04
 53          LS              60
 54          UD    1.07

 55          KK   W5+CH
 56          HC       2

 57          KK    RT-C
 58          RM       2   0.185     0.4

 59          KK     W6R
 60          BA    1.52
 61          PB    2.91
 62          LS              63
 63          UD    1.84

 64          KK   W6+CH
 65          HC       2

 66          KK    RT-D
 67          RM       1   0.122     0.4

 68          KK    LT9A        LEGEND TRAIL OFFSITE 9A
 69          KM  BEGIN LEGEND TRAIL MODEL REVISING W7R
 70          BA     .04
 71          PB    2.74
 72          LS              71
 73          UD    0.33

 74          KK   WCIN1        WHITE CREEK FLOW @ BNDRY
 75          HC       2
1                                        HEC-1 INPUT                                        PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 76          KK     LT3
 77          BA    0.16
 78          PB    2.74
 79          LS              73
 80          UD     0.9

 81          KK  LT9A&3
 82          HC       2

 83          KK     LT9
 84          BA    .135
 85          LS              74
 86          UD    0.42

 87          KK     LT1
 88          BA    .109
 89          LS              73
 90          UD     .34

 91          KK   LT139
 92          HC       2

 93          KK     LT4
 94          BA    .033
 95          LS              74
 96          UD     .16

 97          KK    LT4b
 98          BA    .007
 99          LS              76
100          UD    0.16

101          KK     LT2
102          BA    .033
103          LS              74
104          UD    0.10

105          KK   WCOUT
106          HC       4

107          KK    LT5a
108          KM  WHITE ROSE ESTATES MODEL
109          BA    .057
110          LS              68
111          UD    0.31

112          KK    LT5b
113          BA    .026
114          LS              71
115          UD    0.13
1                                        HEC-1 INPUT                                        PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

116          KK   5A&5B
117          HC       2

118          KK    LT5D
119          BA    .035
120          LS              76
121          UD    0.17

122          KK    LT5c
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123          BA    .005
124          LS              76
125          UD    0.16

126          KK    DBIN
127          HC       3

128          KK     DB1
129          RS       1    STOR       0
130          SA   .0001   .0003   .0138   .0372   .0868   .1508  0.2289   .3177   .4198   .5231
131          SA   .6328   .7464   .8582   .9654
132          SE  5803.5    5804    5804    5806    5807    5808    5809    5810    5811    5812
133          SE    5813    5814    5815    5816
134          SQ       0       1     3.8     5.5     6.7     7.8     8.8     9.2     9.6   35.98
135          SQ   47.14   63.06   75.43   85.88   95.15
136          SE    5804    5804    5806    5807    5808    5809    5810  5810.5    5811  5811.5
137          SE    5812    5813    5814    5815    5816

138          KK     LT6
139          BA    .015
140          LS              72
141          UD    0.08

142          KK   WCOUT2
143          HC       2

144          KK     LT7
145          BA    .021
146          LS              74
147          UD    0.17

148          KK    LT-Q        TOTAL FLOW IN WHITES CREEK BELOW LEGEND TRAIL
149          HC       3

150          KK     W7R        REMAINDER OF W7R BELOW LEGEND TRAIL PROJECT
151          BA     0.3
152          LS              68      15
153          UD    0.31

154          KK   WHTCKQ       TOTAL FLOW IN WHITES CRK AT D/S END OF W7R
155          HC       3
1                                        HEC-1 INPUT                                        PAGE  5

           LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

156          KK   RT-DIF
157          RM       1    .104      .4

158          KK     W8R
159          KM  ADD 25% IMPERVIOUS & RECALCULAT LAG TIME
160          BA    0.75
161          PB    2.03
162          LS              65      25
163          UD    0.43

164          KK   CP-DIF
165          HC       2

166          KK    BR-1        DIVERT OUT FLOW TO BRANCHES, 2, 3 AND 4
167          DT     234
168          DI       0     100     500    1000    2000    5000    7000   10000
169          DQ       0      86     430     860    1720    4300    6020    8600

170          KK  RTACRK        ROUTE FLOW FROM DIFFLUENCE TO ARROWCREEK PARKWAY
171          RD    2980    .052    .045            TRAP      50       1

172          KK  RTGOLF        ROUTE ACROSS GOLF COURSE
173          RD    5120    .047     .03            TRAP      16       1

174          KK  WOLFDT        DETENTION AT WOLF RUN GOLF COURSE
175          RS       1    STOR       0
176          SA       0     .19    3.12    3.87    4.48
177          SE    4672    4680    4682    4684    4686
178          SQ       0      10      25      50      75     100     110     120     130     320
179          SE    4672 4673.09 4673.85 4674.76 4675.91 4677.47 4678.19 4678.94 4679.13    4680

180          KK  RTTBLT        ROUTE FLOW FROM THUNDERBOLT TO ZOLEZZI
181          RD    1923    .031     .03            TRAP      10       4

182          KK   WCKDV        DIVERT OUT FLOWSTHAT SPILL FROM WHITES CREEK
183          KM  BETWEEN THUNDERBOLT AND ZOLLEZI
184          DT  VLYSPG
185          DI       0     200     300     400     500     600     700     800     841     900
186          DQ       0     100     126     148     165     182     197     211     216     223

187          KK   1A-CH        DIVERT 200 CFS IN 1A CHANEL
188          DT   1A-CH
189          DI       0     100     200     201     400     600
190          DQ       0     100     200     200     200     200

191          KK  ZOL-ST        DIVERT FLOW THATWILL GO EAST TO ZOLEZZI          55 CFS
192          DT     ZOL
193          DI       0       1      55      56     100     200
194          DQ       0       1      55      55      55      55
1                                        HEC-1 INPUT                                        PAGE  6

           LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

195          KK  ZLSPLT        SPLIT OVERLAND FLOW ON ZOLEZZI
196          DT      1A
197          DI       0      86     157     242     289     338     349     445
198          DQ       0      29      91     164     204     247     255     338

199          KK   DVPND        DIVERT 61CFS OVERLAND FLOW ACROSS AUTUMN WOOD
```

```
200          DT      1B
201          DI       0      61      62      70      80     100     200
202          DQ       0       0       1       9      19      39     139

203          KK   1A-CH        RECALL 1A CHANNEL FLOW
204          DR   1A-CH

205          KK      1A        RECALL OVERLAND FLOW RETURNING TO 1A CHANEL
206          DR      1A

207          KK     Z-2        UNDEVELOPED WATERSHED
208          BA    .007
209          LS              67
210          UD      .1

211          KK  1A-TOT        TOTAL FLOW IN 1A AT JEPPSON
212          HC       3

213          KK    Z-46
214          BA    .007
215          LS              51
216          UD     0.1

217          KK     SVA        TOTAL FLOW IN 1A AT SOUTH VIRGINIA
218          HC       3

219          KK   BR-1B        RECALL BRANCH 1B
220          DR      1B

221          KK     ZOL        RECALL OVERLAND FLOW CROSSING AUTUMN WOODS PARCEL
222          DR     ZOL

223          KK  1B-TOT
224          HC       2

225          KK  1B-ZOL        DIVERT 54 CFS TO STORM DRAINS ON ZOLEZZI
226          DT   STDRN
227          DI       0      10      42      54      55      60     100     120
228          DQ       0      10      42      54      54      54      54      54

229          KK  VLYSPG        RECALL FLOW GOING TOWARDS VALLEY SPGS ROAD
230          DR  VLYSPG
```



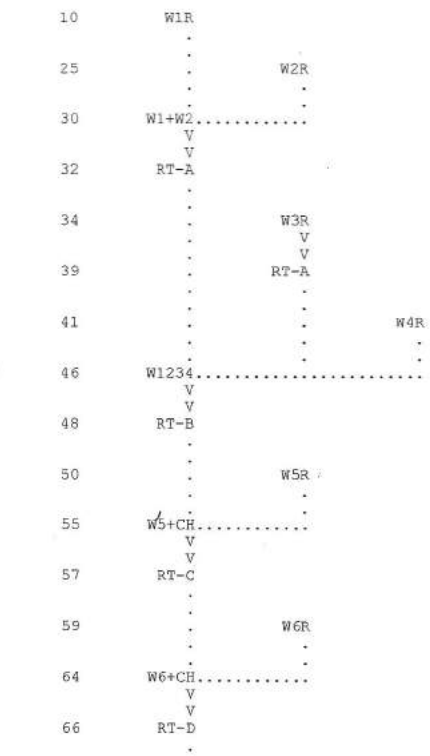
```
LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

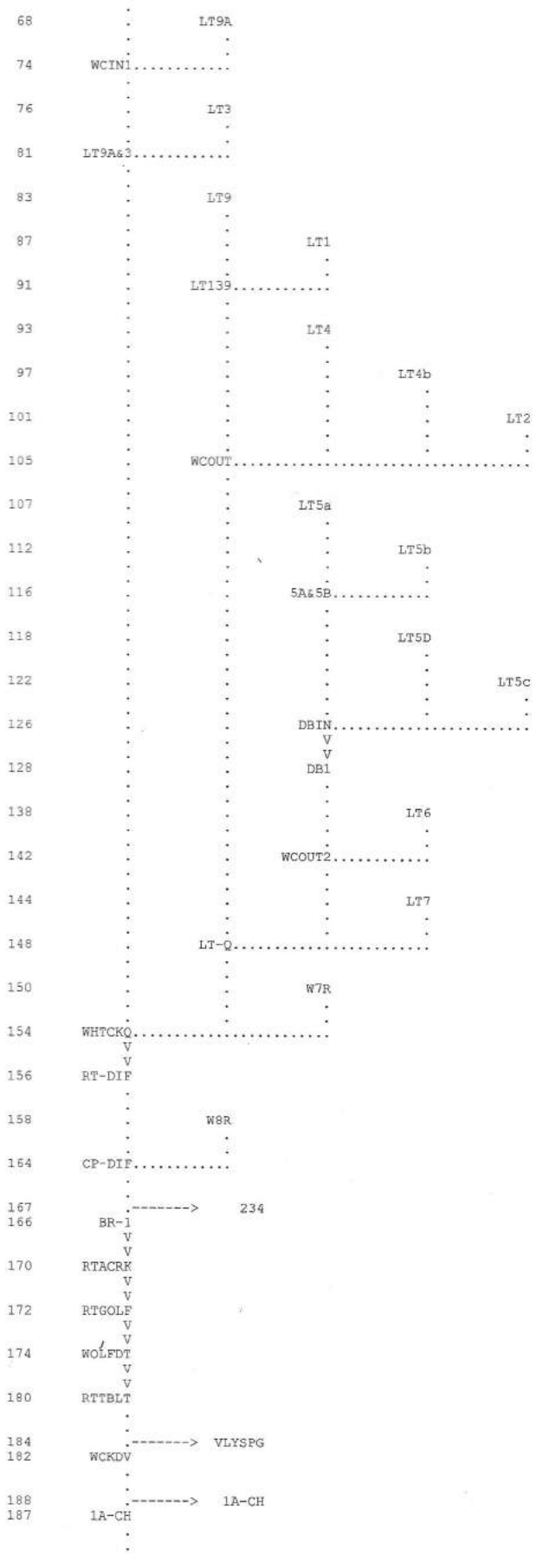
231          KK  VSDTCH        DIVERT THE FLOW INTERCEPTED BY VALLY SPGS RD DITCH 30 CFS
232          DT     OUT
233          DI       0      10      30      31      40      50     100     200     400
234          DQ       0       0       0       1      10      20      70     170     370

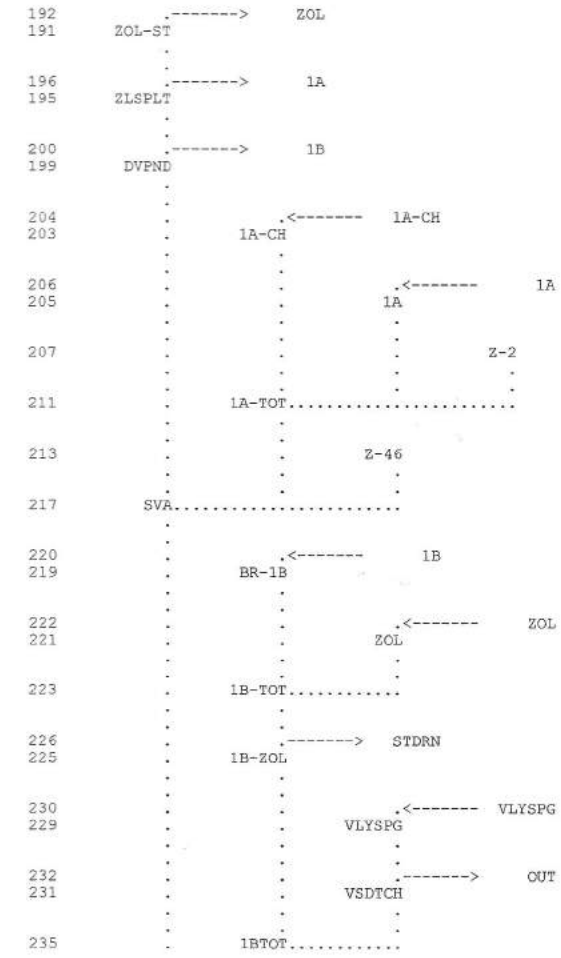
235          KK   1BTOT        TOTAL FLOW IN 1BAT JEPPSON LANE
236          HC       2
237          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK




68 LT9A
74 WCIN1
76 LT3
81 LT9A&3
83 LT9
87 LT1
91 LT139
93 LT4
97 LT4b
101 LT2
105 WCOUT
107 LT5a
112 LT5b
116 5A&5B
118 LT5D
122 LT5c
126 DBIN
128 DB1
138 LT6
142 WCOUT2
144 LT7
148 LT-Q
150 W7R
154 WHTCKQ
156 RT-DIF
158 W8R
164 CP-DIF
167 234
166 BR-1
170 RTACRK
172 RTGOLF
174 WOLFDT
180 RTTBLT
184 VLYSPG
182 WCKDV
188 1A-CH
187 1A-CH



(***) 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   11MAY18  TIME  08:05:22   *
*                                       *
*****************************************
```

```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS    *
*    HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET         *
*       DAVIS, CALIFORNIA 95616      *
*           (916) 756-1104           *
*                                    *
**************************************
```

5 yr 24 hr event
AUTUMN WOODS PROJECT WHITES CREEK
FILE NAME AW5E.DAT EXISTING CONDITIONS
USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
W7R SPLIT INTO LEGEND TRAIL SUBBASINS
USING TYPE II STORM DISTRIBUTION

8 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	10	MINUTES IN COMPUTATION INTERVAL
IDATE	1 0	STARTING DATE
ITIME	0000	STARTING TIME
NQ	800	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	6 0	ENDING DATE
NDTIME	1310	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .17 HOURS
TOTAL TIME BASE 133.17 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        .96        .95
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
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       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
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       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
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       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
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       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH     RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH   RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH   RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH   RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH   RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH   RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH   RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
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  RATIO 5  RATIO 6
                                                        1.00      .99      .98      .97      .96      .95

 HYDROGRAPH AT
 +                   W1R     1.380     1     FLOW     401.49   391.11   380.82   370.61   360.50   350.49
                                               TIME       9.17     9.17     9.17     9.17     9.17     9.17

 HYDROGRAPH AT
 +                   W2R      .830     1     FLOW     465.24   453.44   441.73   430.11   418.58   407.15
                                               TIME       8.50     8.50     8.50     8.50     8.50     8.50

  2 COMBINED AT
 +                 W1+W2     2.210     1     FLOW     718.62   700.12   681.78   663.60   645.58   627.74
                                               TIME       8.67     8.67     8.67     8.67     8.67     8.67

 ROUTED TO
 +                  RT-A     2.210     1     FLOW     716.31   697.99   679.82   661.81   643.96   626.27
                                               TIME       8.83     8.83     8.83     8.83     8.83     8.83

 HYDROGRAPH AT
 +                   W3R     1.380     1     FLOW     406.88   396.51   386.23   376.03   365.93   355.92
```

				TIME	9.17	9.17	9.17	9.17	9.17	9.17
ROUTED TO										
+	RT-A	1.380	1	FLOW	403.93	393.61	383.52	373.52	363.60	353.77
				TIME	9.17	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	W4R	1.430	1	FLOW	234.46	227.44	220.50	213.63	206.85	200.15
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
3 COMBINED AT										
+	W1234	5.020	1	FLOW	1295.83	1262.00	1228.46	1195.24	1162.33	1129.74
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
ROUTED TO										
+	RT-B	5.020	1	FLOW	1297.97	1263.82	1229.98	1196.45	1163.25	1130.38
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W5R	1.200	1	FLOW	185.64	180.04	174.59	169.20	163.87	158.60
				TIME	9.17	9.33	9.33	9.33	9.33	9.33
2 COMBINED AT										
+	W5+CH	6.220	1	FLOW	1483.61	1443.77	1404.31	1365.23	1326.55	1288.26
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
ROUTED TO										
+	RT-C	6.220	1	FLOW	1482.58	1442.68	1403.17	1364.04	1325.31	1286.98
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	W6R	1.520	1	FLOW	76.65	73.99	71.38	68.80	66.26	63.76
				TIME	10.33	10.33	10.33	10.33	10.33	10.33
2 COMBINED AT										
+	W6+CH	7.740	1	FLOW	1534.53	1492.58	1451.06	1409.96	1369.29	1329.05
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
ROUTED TO										
+	RT-D	7.740	1	FLOW	1533.40	1491.71	1450.42	1409.55	1369.10	1329.08
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	LT9A	.040	1	FLOW	10.71	10.40	10.09	9.79	9.49	9.19
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	WCIN1	7.780	1	FLOW	1535.75	1494.01	1452.67	1411.76	1371.26	1331.19
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	LT3	.160	1	FLOW	27.26	26.55	25.84	25.14	24.45	23.76
				TIME	9.00	9.00	9.00	9.00	9.00	9.00
2 COMBINED AT										
+	LT9A&3	7.940	1	FLOW	1556.47	1514.23	1472.41	1431.02	1390.04	1349.50
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	LT9	.135	1	FLOW	40.33	39.26	38.20	37.15	36.11	35.08
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT1	.109	1	FLOW	34.43	33.51	32.60	31.69	30.79	29.90
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	LT139	.244	1	FLOW	74.77	72.78	70.80	68.85	66.91	64.98
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT4	.033	1	FLOW	15.41	15.02	14.64	14.26	13.89	13.52
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT4b	.007	1	FLOW	3.79	3.70	3.62	3.53	3.45	3.36
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT2	.033	1	FLOW	21.12	20.57	20.03	19.49	18.95	18.42
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
4 COMBINED AT										
+	WCOUT	.317	1	FLOW	92.09	89.72	87.37	85.03	82.72	80.42
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT5a	.057	1	FLOW	11.56	11.18	10.79	10.42	10.04	9.67
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT5b	.026	1	FLOW	10.10	9.79	9.47	9.16	8.86	8.56
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	5A&5B	.083	1	FLOW	19.07	18.45	17.83	17.23	16.63	16.04
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5D	.035	1	FLOW	19.09	18.66	18.22	17.79	17.36	16.93
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5c	.005	1	FLOW	2.71	2.64	2.58	2.52	2.46	2.40
				TIME	8.17	8.17	8.17	8.17	8.17	8.17

3 COMBINED AT										
+	DBIN	.123	1	FLOW	40.87	39.75	38.64	37.54	36.45	35.37
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
ROUTED TO										
+	DB1	.123	1	FLOW	17.60	16.94	16.29	15.08	12.30	11.46
				TIME	8.67	8.67	8.67	8.67	8.83	8.83
			** PEAK STAGES IN FEET **							
			1	STAGE	5811.15	5811.14	5811.13	5811.10	5811.05	5811.04
				TIME	8.67	8.67	8.67	8.67	8.83	8.83
HYDROGRAPH AT										
+	LT6	.015	1	FLOW	8.86	8.60	8.35	8.11	7.86	7.62
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	WCOUT2	.138	1	FLOW	18.97	18.28	17.60	16.37	14.02	13.70
				TIME	8.67	8.67	8.67	8.67	8.00	8.00
HYDROGRAPH AT										
+	LT7	.021	1	FLOW	9.87	9.62	9.38	9.13	8.89	8.65
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	LT-Q	.476	1	FLOW	113.28	110.38	107.50	104.65	101.82	99.02
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	W7R	.300	1	FLOW	105.82	103.54	101.29	99.06	96.85	94.66
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
3 COMBINED AT										
+	WHTCKQ	8.716	1	FLOW	1607.99	1564.94	1522.32	1480.12	1438.35	1397.01
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RT-DIF	8.716	1	FLOW	1604.63	1561.21	1518.22	1475.67	1433.57	1391.91
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	W8R	.750	1	FLOW	165.99	163.57	161.18	158.83	156.51	154.22
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	CP-DIF	9.466	1	FLOW	1639.39	1595.34	1551.72	1508.54	1465.81	1423.54
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	234	9.466	1	FLOW	1409.88	1371.99	1334.48	1297.35	1260.60	1224.24
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	BR-1	9.466	1	FLOW	229.52	223.35	217.24	211.20	205.21	199.30
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RTACRK	9.466	1	FLOW	228.49	222.71	216.90	211.06	205.10	199.02
				TIME	9.67	9.67	9.67	9.67	9.67	9.67
ROUTED TO										
+	RTGOLF	9.466	1	FLOW	227.47	221.00	215.06	209.12	203.41	197.52
				TIME	9.67	9.83	9.83	9.67	9.67	9.83
ROUTED TO										
+	WOLFDT	9.466	1	FLOW	235.16	229.02	222.68	216.72	208.48	199.08
				TIME	9.67	9.67	9.67	9.67	9.67	9.67
			** PEAK STAGES IN FEET **							
			1	STAGE	4679.61	4679.58	4679.55	4679.53	4679.49	4679.45
				TIME	9.67	9.67	9.67	9.67	9.67	9.67
ROUTED TO										
+	RTTBLT	9.466	1	FLOW	227.45	222.26	214.94	209.46	202.47	196.40
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
DIVERSION TO										
+	VLYSPG	9.466	1	FLOW	107.14	105.79	103.89	102.46	100.64	98.20
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
HYDROGRAPH AT										
+	WCKDV	9.466	1	FLOW	120.32	116.47	111.06	107.00	101.83	98.20
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
DIVERSION TO										
+	1A-CH	9.466	1	FLOW	120.32	116.47	111.06	107.00	101.83	98.20
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
HYDROGRAPH AT										
+	1A-CH	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
DIVERSION TO										
+	ZOL	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	ZOL-ST	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
DIVERSION TO										
+	1A	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	ZLSPLT	9.466	1	FLOW	.00	.00	.00	.00	.00	.00

				TIME	.00	.00	.00	.00	.00	.00
DIVERSION TO										
+	1B	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	DVPND	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	1A-CH	.000	1	FLOW	120.32	116.47	111.06	107.00	101.83	98.20
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
HYDROGRAPH AT										
+	1A	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	Z-2	.007	1	FLOW	.45	.41	.38	.35	.33	.30
				TIME	8.00	8.00	8.00	8.00	8.00	8.17
3 COMBINED AT										
+	1A-TOT	.007	1	FLOW	120.43	116.58	111.16	107.10	101.92	98.29
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
HYDROGRAPH AT										
+	Z-46	.007	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	15.33	15.33	15.33	15.33	.00	.00
3 COMBINED AT										
+	SVA	9.480	1	FLOW	120.43	116.58	111.16	107.10	101.92	98.29
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
HYDROGRAPH AT										
+	BR-1B	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	ZOL	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
2 COMBINED AT										
+	1B-TOT	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
DIVERSION TO										
+	STDRN	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	1B-ZOL	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	VLYSPG	.000	1	FLOW	107.14	105.79	103.89	102.46	100.64	98.20
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
DIVERSION TO										
+	OUT	.000	1	FLOW	77.14	75.79	73.89	72.46	70.64	68.20
				TIME	9.67	9.67	9.67	9.67	9.67	9.83
HYDROGRAPH AT										
+	VSDTCH	.000	1	FLOW	30.00	30.00	30.00	30.00	30.00	30.00
				TIME	8.83	8.83	8.83	8.83	8.83	8.83
2 COMBINED AT										
+	1BTOT	.000	1	FLOW	30.00	30.00	30.00	30.00	30.00	30.00
				TIME	8.83	8.83	8.83	8.83	8.83	8.83

5 YEAR PROPOSED CONDITIONS

5 YR PR

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*        JUN 1998 AND FEB 2010          *
*           VERSION 4.1R                *
*        RGMHEC2000 WWW.HEC-1.COM       *
*  RUN DATE   11MAY18  TIME  08:11:42   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*          (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        5 yr 24 hr event
    2         ID  AUTUMN WOODS PROJECT    WHITES CREEK
    3         ID  FILE NAME AW5PFN.DAT   PROPOSED CONDITIONS
    4         ID  USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
    5         ID  W7R SPLIT INTO LEGEND TRAIL SUBBASINS
    6         ID  USING TYPE II STORM DISTRIBUTION
              *       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
    7         IT     10                800
    8         IO      5       0
    9         JR    PREC     1.0     .99     .98     .97     .96     .95

   10         KK     W1R
   11         BA    1.38
   12         PB    5.19
   13         PC     0.0    .002    .005    .008    .011    .014    .017    .020    .023    .026
   14         PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
   15         PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
   16         PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
   17         PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
   18         PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
   19         PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
   20         PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
   21         PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
   22         PC    .983    .986    .992    .995    .998   1.00
   23         LS              59
   24         UD    1.07

   25         KK     W2R
   26         BA    0.83
   27         PB    5.55
   28         LS              59
   29         UD    0.52

   30         KK    W1+W2
   31         HC       2

   32         KK     RT-A
   33         RM       1   0.122     0.4

   34         KK     W3R
   35         BA    1.38
   36         PB    5.05
   37         LS              60
   38         UD    1.04
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```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   39         KK     RT-A
   40         RM       1   0.095     0.4

   41         KK     W4R
   42         BA    1.43
   43         PB    4.36
   44         LS              58
   45         UD    1.08

   46         KK    W1234
   47         HC       3
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 48          KK    RT-B
 49          RM       1  0.0597     0.4

 50          KK     W5R
 51          BA    1.20
 52          PB    4.04
 53          LS              60
 54          UD    1.07

 55          KK   W5+CH
 56          HC       2

 57          KK    RT-C
 58          RM       2   0.185     0.4

 59          KK     W6R
 60          BA    1.52
 61          PB    2.91
 62          LS              63
 63          UD    1.84

 64          KK   W6+CH
 65          HC       2

 66          KK    RT-D
 67          RM       1   0.122     0.4

 68          KK    LT9A        LEGEND TRAIL OFFSITE 9A
 69          KM  BEGIN LEGEND TRAIL MODEL REVISING W7R
 70          BA     .04
 71          PB    2.74
 72          LS              71
 73          UD    0.33

 74          KK   WCIN1        WHITE CREEK FLOW @ BNDRY
 75          HC       2
1                                        HEC-1 INPUT                                    PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 76          KK     LT3
 77          BA    0.16
 78          PB    2.74
 79          LS              73
 80          UD     .09

 81          KK  LT9A&3
 82          HC       2

 83          KK     LT9
 84          BA    .135
 85          LS              74
 86          UD    0.42

 87          KK     LT1
 88          BA    .109
 89          LS              73
 90          UD     .34

 91          KK   LT139
 92          HC       2

 93          KK     LT4
 94          BA    .033
 95          LS              74
 96          UD     .16

 97          KK    LT4b
 98          BA    .007
 99          LS              76
100          UD    0.16

101          KK     LT2
102          BA    .033
103          LS              74
104          UD    0.10

105          KK   WCOUT
106          HC       4

107          KK    LT5a
108          KM  WHITE ROSE ESTATES MODEL
109          BA    .057
110          LS              68
111          UD    0.31

112          KK    LT5b
113          BA    .026
114          LS              71
115          UD    0.13
1                                        HEC-1 INPUT                                    PAGE  4

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

116          KK   5A&5B
117          HC       2

118          KK    LT5D
119          BA    .035
120          LS              76
121          UD    0.17

122          KK    LT5c
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```
          BA    .005
          LS              76
          UD    0.16

          KK    DBIN
          HC       3

          KK     DB1
          RS       1    STOR       0
          SA   .0001   .0003   .0138   .0372   .0868   .1508  0.2289   .3177   .4198   .5231
          SA   .6328   .7464   .8582   .9654
          SE  5803.5    5804    5804    5806    5807    5808    5809    5810    5811    5812
          SE    5813    5814    5815    5816
          SQ       0       1     3.8     5.5     6.7     7.8     8.8     9.2     9.6   35.98
          SQ   47.14   63.06   75.43   85.88   95.15
          SE    5804    5804    5806    5807    5808    5809    5810  5810.5    5811  5811.5
          SE    5812    5813    5814    5815    5816

          KK     LT6
          BA    .015
          LS              72
          UD    0.08

          KK   WCOUT2
          HC       2

          KK     LT7
          BA    .021
          LS              74
          UD    0.17

          KK    LT-Q        TOTAL FLOW IN WHITES CREEK BELOW LEGEND TRAIL
          HC       3

          KK     W7R        REMAINDER OF W7R BELOW LEGEND TRAIL PROJECT
          BA     0.3
          LS              68      15
          UD    0.31

          KK  WHTCKQ        TOTAL FLOW IN WHITES CRK AT D/S END OF W7R
          HC       3
1                                        HEC-1 INPUT                                        PAGE  5

     LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          KK  RT-DIF
          RM       1    .104      .4

          KK     W8R
          KM  ADD 25% IMPERVIOUS & RECALCULAT LAG TIME
          BA    0.75
          PB    2.03
          LS              65      25
          UD    0.43

          KK  CP-DIF
          HC       2

          KK    BR-1        DIVERT OUT FLOW TO BRANCHES, 2, 3 AND 4
          DT     234
          DI       0     100     500    1000    2000    5000    7000   10000
          DQ       0      86     430     860    1720    4300    6020    8600

          KK  RTACRK        ROUTE FLOW FROM DIFFLUENCE TO ARROWCREEK PARKWAY
          RD    2980    .052    .045            TRAP      50       1

          KK  RTGOLF        ROUTE ACROSS GOLF COURSE
          RD    5120    .047     .03            TRAP      16       1

          KK  WOLFDT        DETENTION AT WOLF RUN GOLF COURSE
          RS       1    STOR       0
          SA       0     .19    3.12    3.87    4.48
          SE    4672    4680    4682    4684    4686
          SQ       0      10      25      50      75     100     110     120     130     320
          SE    4672 4673.09 4673.85 4674.76 4675.91 4677.47 4678.19 4678.94 4679.13    4680

          KK  RTTBLT        ROUTE FLOW FROM THUNDERBOLT TO ZOLEZZI
          RD    1923    .031     .03            TRAP      10       4

          KK   WCKDV        DIVERT OUT FLOWSTHAT SPILL FROM WHITES CREEK
          KM  BETWEEN THUNDERBOLT AND ZOLLEZI
          DT  VLYSPG
          DI       0     200     300     400     500     600     700     800     841     900
          DQ       0     100     126     148     165     182     197     211     216     223

          KK   1A-CH        DIVERT 200 CFS IN 1A CHANEL
          DT   1A-CH
          DI       0     100     200     201     400     600
          DQ       0     100     200     200     200     200

          KK  ZOL-ST        DIVERT FLOW THATWILL GO EAST TO ZOLEZZI          55 CFS
          DT     ZOL
          DI       0       1      55      56     100     200
          DQ       0       1      55      55      55      55
1                                        HEC-1 INPUT                                        PAGE  6

     LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          KK  ZLSPLT        SPLIT OVERLAND FLOW ON ZOLEZZI
          DT      1A
          DI       0      86     157     242     289     338     349     445
          DQ       0      29      91     164     204     247     255     338

          KK   DVPND        DIVERT 61CFS TO PONDS
```

```
200          DT      1B
201          DI       0      61      62      70      80     100     200
202          DQ       0       0       1       9      19      39     139

203          KK    Z-46
204          BA    .007
205          LS                 85
206          UD     .05

207          KK     Z-2         PART OF AUTUMN WOODS
208          BA    .007
209          LS                 73
210          UD     .05

211          KK  Z46+Z2         COMBINED FLOW FROM AUTUMN WOODS
212          HC       2

213          KK   CP-DP         COMBINE FLOW GOING TO DETENTION PONDS
214          HC       2

215          KK   DP-Z1         UPPER DET POND NEAR ZOLEZZI PARCELS
216          KM  30" RCP OUTLET @ 61 FT
217          RS       1    STOR       0
218          SA     .09     .30     .34     .38     .43     .47     .52     .58
219          SE      61      62      63      64      65      66      67      68
220          SQ       0       6      35      60      78      90
221          SE      61      62      63      64      65      66      67      68

222          KK   DP-Z2         LOWER DET POND NEAR ZOLEZZI PARCELS
223          KM  30" RCP OUTLET
224          RS       1    STOR       0
225          SA     .31     .65     .88     .94    1.01    1.08
226          SE      53      54      55      56      57      58
227          SQ       0       0       7      16      28      39      42
228          SE      53    53.5    54.5    55.5    56.5    57.5      58

229          KK   1A-CH         RECALL 1A CHANNEL FLOW
230          DR   1A-CH

231          KK      1A         RECALL OVERLAND FLOW RETURNING TO 1A CHANEL
232          DR      1A

233          KK  1A-TOT         TOTAL FLOW IN 1A AT JEPPSON
234          HC       3
1                                        HEC-1 INPUT                                                    PAGE  7

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

235          KK    BR1B         RECALL FLOW IN BRANCH 1B
236          DR      1B

237          KK     ZOL         RECALL F LOW ON ZOLEZZI
238          DR     ZOL

239          KK  1B-TOT
240          HC       2

241          KK  1B-ZOL         DIVERT 5R CFS TO STORM DRAINS ON ZOLEZZI
242          DT   STDRN
243          DI       0      10      42      54      55      60     100     120
244          DQ       0      10      42      54      54      54      54      54

245          KK  VLYSPG         RECALL FLOW GOING TOWARDS VALLEY SPG ROAD
246          DR  VLYSPG

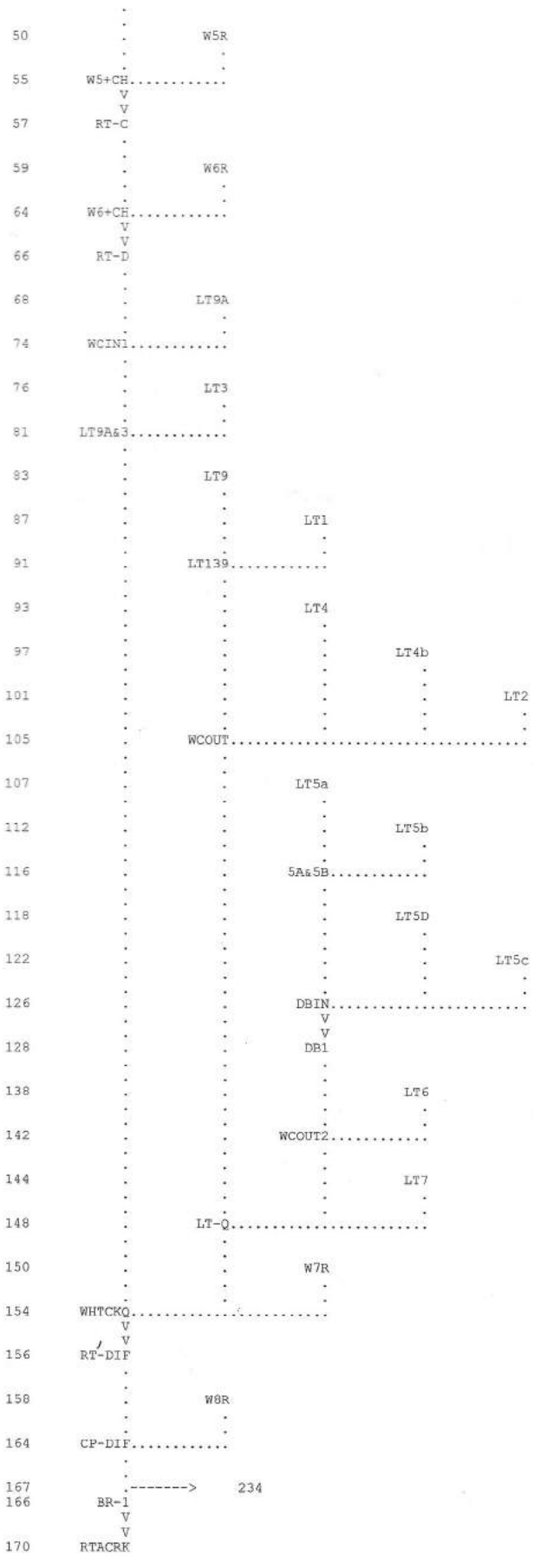
247          KK  VSDTCH         DIVERT THE FLOW INTERCEPTED BY VALLY SPGS RD DITCH
248          DT     OUT
249          DI       0      10      30      31      40      50     100     200     400
250          DQ       0       0       0       1      10      20      70     170     370

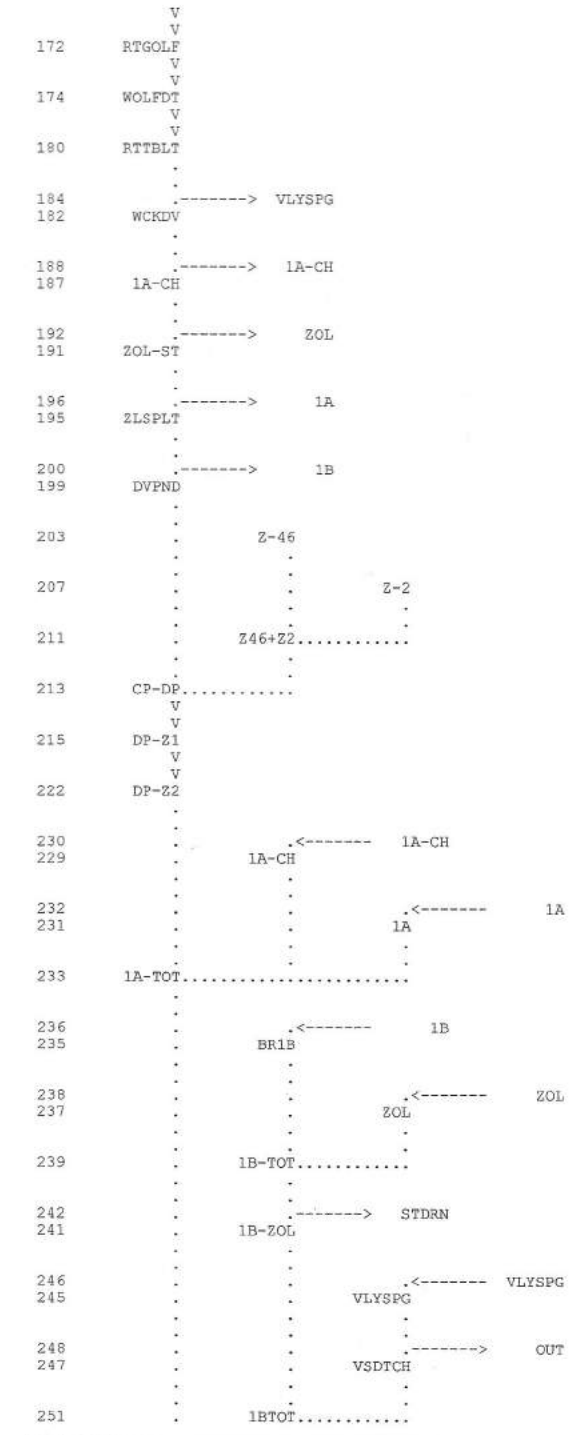
251          KK   1BTOT         TOTAL FLOW IN BRANCH 1B AT JEPPSON
252          HC       2
253          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT
 LINE     (V) ROUTING          (---->) DIVERSION OR PUMP FLOW

  NO.     (.) CONNECTOR        (<----) RETURN OF DIVERTED OR PUMPED FLOW

   10        W1R
               .
               .
   25          .         W2R
               .           .
               .           .
   30       W1+W2.........
               V
               V
   32        RT-A
             /  .
               .
   34          .         W3R
               .           V
               .           V
   39          .       RT-A
               .           .
               .           .
   41          .           .         W4R
               .           .           .
               .           .           .
   46       W1234.......................
               V
               V
   48        RT-B
```


50 W5R
55 W5+CH
57 RT-C
59 W6R
64 W6+CH
66 RT-D
68 LT9A
74 WCIN1
76 LT3
81 LT9A&3
83 LT9
87 LT1
91 LT139
93 LT4
97 LT4b
101 LT2
105 WCOUT
107 LT5a
112 LT5b
116 5A&5B
118 LT5D
122 LT5c
126 DBIN
128 DB1
138 LT6
142 WCOUT2
144 LT7
148 LT-Q
150 W7R
154 WHTCKQ
156 RT-DIF
158 W8R
164 CP-DIF
167 234
166 BR-1
170 RTACRK



(***) 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   11MAY18  TIME  08:11:42   *
 *                                       *
 *****************************************
```

```
**************************************
*                                    *
*    U.S. ARMY CORPS OF ENGINEERS    *
*    HYDROLOGIC ENGINEERING CENTER   *
*          609 SECOND STREET         *
*        DAVIS, CALIFORNIA 95616     *
*           (916) 756-1104           *
*                                    *
**************************************
```

5 yr 24 hr event
AUTUMN WOODS PROJECT WHITES CREEK
FILE NAME AW5PFN.DAT PROPOSED CONDITIONS
USING DATA FROM LEGEND TRAIL FOR WATERSHEDS W1R THRU W6R
W7R SPLIT INTO LEGEND TRAIL SUBBASINS
USING TYPE II STORM DISTRIBUTION

```
  8 IO          OUTPUT CONTROL VARIABLES
                         IPRNT          5  PRINT CONTROL
                         IPLOT          0  PLOT CONTROL
                         QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                          NMIN         10  MINUTES IN COMPUTATION INTERVAL
                         IDATE      1   0  STARTING DATE
                         ITIME       0000  STARTING TIME
                            NQ        800  NUMBER OF HYDROGRAPH ORDINATES
                        NDDATE      6   0  ENDING DATE
                        NDTIME       1310  ENDING TIME
                         ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL     .17 HOURS
                       TOTAL TIME BASE  133.17 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       .96       .95
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-A.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-B.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-C.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH    RT-D.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
 ***** WARNING *****  POSSIBLE INSTABILITIES IN THE MUSKINGUM ROUTING FOR REACH  RT-DIF.
       ADJUST NSTPS AND/OR COMPUTATION INTERVAL TO MEET CRITERIA IN USER MANUAL).
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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		RATIOS APPLIED TO PRECIPITATION RATIO 1 1.00	RATIO 2 .99	RATIO 3 .98	RATIO 4 .97	RATIO 5 .96	RATIO 6 .95
HYDROGRAPH AT										
+	W1R	1.380	1	FLOW	401.49	391.11	380.82	370.61	360.50	350.49
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W2R	.830	1	FLOW	465.24	453.44	441.73	430.11	418.58	407.15
				TIME	8.50	8.50	8.50	8.50	8.50	8.50
2 COMBINED AT										
+	W1+W2	2.210	1	FLOW	718.62	700.12	681.78	663.60	645.58	627.74
				TIME	8.67	8.67	8.67	8.67	8.67	8.67
ROUTED TO										
+	RT-A	2.210	1	FLOW	716.31	697.99	679.82	661.81	643.96	626.27
				TIME	8.83	8.83	8.83	8.83	8.83	8.83
HYDROGRAPH AT										
+	W3R	1.380	1	FLOW	406.88	396.51	386.23	376.03	365.93	355.92
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
ROUTED TO										
+	RT-A	1.380	1	FLOW	403.93	393.61	383.52	373.52	363.60	353.77
				TIME	9.17	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	W4R	1.430	1	FLOW	234.46	227.44	220.50	213.63	206.85	200.15
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
3 COMBINED AT										
+	W1234	5.020	1	FLOW	1295.83	1262.00	1228.46	1195.24	1162.33	1129.74
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
ROUTED TO										
+	RT-B	5.020	1	FLOW	1297.97	1263.82	1229.98	1196.45	1163.25	1130.38
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
HYDROGRAPH AT										
+	W5R	1.200	1	FLOW	185.64	180.04	174.59	169.20	163.87	158.60
				TIME	9.17	9.33	9.33	9.33	9.33	9.33
2 COMBINED AT										
+	W5+CH	6.220	1	FLOW	1483.61	1443.77	1404.31	1365.23	1326.55	1288.26
				TIME	9.17	9.17	9.17	9.17	9.17	9.17
ROUTED TO										
+	RT-C	6.220	1	FLOW	1482.58	1442.68	1403.17	1364.04	1325.31	1286.98
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
HYDROGRAPH AT										
+	W6R	1.520	1	FLOW	76.65	73.99	71.38	68.80	66.26	63.76
				TIME	10.33	10.33	10.33	10.33	10.33	10.33
2 COMBINED AT										
+	W6+CH	7.740	1	FLOW	1534.53	1492.58	1451.06	1409.96	1369.29	1329.05
				TIME	9.33	9.33	9.33	9.33	9.33	9.33
ROUTED TO										
+	RT-D	7.740	1	FLOW	1533.40	1491.71	1450.42	1409.55	1369.10	1329.08
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	LT9A	.040	1	FLOW	10.71	10.40	10.09	9.79	9.49	9.19
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	WCIN1	7.780	1	FLOW	1535.75	1494.01	1452.67	1411.76	1371.26	1331.19
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	LT3	.160	1	FLOW	99.46	96.76	94.09	91.43	88.80	86.18
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	LT9A&3	7.940	1	FLOW	1543.68	1501.78	1460.30	1419.24	1378.60	1338.38
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	LT9	.135	1	FLOW	40.33	39.26	38.20	37.15	36.11	35.08
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT1	.109	1	FLOW	34.43	33.51	32.60	31.69	30.79	29.90
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	LT139	.244	1	FLOW	74.77	72.78	70.80	68.85	66.91	64.98
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT4	.033	1	FLOW	15.41	15.02	14.64	14.26	13.89	13.52
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT4b	.007	1	FLOW	3.79	3.70	3.62	3.53	3.45	3.36
				TIME	8.17	8.17	8.17	8.17	8.17	8.17

HYDROGRAPH AT										
+	LT2	.033	1	FLOW	21.12	20.57	20.03	19.49	18.95	18.42
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
4 COMBINED AT										
+	WCOUT	.317	1	FLOW	92.09	89.72	87.37	85.03	82.72	80.42
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT5a	.057	1	FLOW	11.56	11.18	10.79	10.42	10.04	9.67
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
HYDROGRAPH AT										
+	LT5b	.026	1	FLOW	10.10	9.79	9.47	9.16	8.86	8.56
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	5A&5B	.083	1	FLOW	19.07	18.45	17.83	17.23	16.63	16.04
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5D	.035	1	FLOW	19.09	18.66	18.22	17.79	17.36	16.93
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	LT5c	.005	1	FLOW	2.71	2.64	2.58	2.52	2.46	2.40
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	DBIN	.123	1	FLOW	40.87	39.75	38.64	37.54	36.45	35.37
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
ROUTED TO										
+	DB1	.123	1	FLOW	17.60	16.94	16.29	15.08	12.30	11.46
				TIME	8.67	8.67	8.67	8.67	8.83	8.83
			** PEAK STAGES IN FEET **							
			1	STAGE	5811.15	5811.14	5811.13	5811.10	5811.05	5811.04
				TIME	8.67	8.67	8.67	8.67	8.83	8.83
HYDROGRAPH AT										
+	LT6	.015	1	FLOW	8.86	8.60	8.35	8.11	7.86	7.62
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	WCOUT2	.138	1	FLOW	18.97	18.28	17.60	16.37	14.02	13.70
				TIME	8.67	8.67	8.67	8.67	8.00	8.00
HYDROGRAPH AT										
+	LT7	.021	1	FLOW	9.87	9.62	9.38	9.13	8.89	8.65
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
3 COMBINED AT										
+	LT-Q	.476	1	FLOW	113.28	110.38	107.50	104.65	101.82	99.02
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
HYDROGRAPH AT										
+	W7R	.300	1	FLOW	105.82	103.54	101.29	99.06	96.85	94.66
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
3 COMBINED AT										
+	WHTCKQ	8.716	1	FLOW	1595.20	1552.50	1510.21	1468.34	1426.90	1385.90
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RT-DIF	8.716	1	FLOW	1590.27	1547.24	1504.64	1462.47	1420.74	1380.12
				TIME	9.50	9.50	9.50	9.50	9.50	9.67
HYDROGRAPH AT										
+	W8R	.750	1	FLOW	165.99	163.57	161.18	158.83	156.51	154.22
				TIME	8.33	8.33	8.33	8.33	8.33	8.33
2 COMBINED AT										
+	CP-DIF	9.466	1	FLOW	1625.03	1581.37	1538.13	1495.34	1452.99	1411.09
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
DIVERSION TO										
+	234	9.466	1	FLOW	1397.53	1359.97	1322.79	1285.99	1249.57	1213.54
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
HYDROGRAPH AT										
+	BR-1	9.466	1	FLOW	227.50	221.39	215.34	209.35	203.42	197.55
				TIME	9.50	9.50	9.50	9.50	9.50	9.50
ROUTED TO										
+	RTACRK	9.466	1	FLOW	226.73	220.54	214.54	209.03	203.39	197.70
				TIME	9.67	9.67	9.67	9.67	9.67	9.67
ROUTED TO										
+	RTGOLF	9.466	1	FLOW	225.49	219.40	213.23	207.77	201.66	195.94
				TIME	9.67	9.67	9.83	9.83	9.83	9.83
ROUTED TO										
+	WOLFDT	9.466	1	FLOW	233.22	228.31	220.76	213.33	205.10	196.24
				TIME	9.67	9.67	9.67	9.67	9.67	9.67
			** PEAK STAGES IN FEET **							
			1	STAGE	4679.60	4679.58	4679.55	4679.51	4679.47	4679.43
				TIME	9.67	9.67	9.67	9.67	9.67	9.67
ROUTED TO										
+	RTTBLT	9.466	1	FLOW	226.41	221.07	213.80	206.44	200.46	195.41
				TIME	9.67	9.67	9.67	9.67	9.83	9.83
DIVERSION TO										
+	VLYSPG	9.466	1	FLOW	106.87	105.48	103.59	101.68	100.12	97.71

				TIME	9.67	9.67	9.67	9.67	9.83	9.83
HYDROGRAPH AT										
+	WCKDV	9.466	1	FLOW	119.55	115.59	110.21	104.77	100.34	97.71
				TIME	9.67	9.67	9.67	9.67	9.83	9.83
DIVERSION TO										
+	1A-CH	9.466	1	FLOW	119.55	115.59	110.21	104.77	100.34	97.71
				TIME	9.67	9.67	9.67	9.67	9.83	9.83
HYDROGRAPH AT										
+	1A-CH	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
DIVERSION TO										
+	ZOL	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	ZOL-ST	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
DIVERSION TO										
+	1A	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	ZLSPLT	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
DIVERSION TO										
+	1B	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	DVPND	9.466	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	Z-46	.007	1	FLOW	5.84	5.72	5.61	5.50	5.39	5.28
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
HYDROGRAPH AT										
+	Z-2	.007	1	FLOW	1.71	1.64	1.58	1.51	1.44	1.38
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	Z46+Z2	.014	1	FLOW	7.55	7.37	7.19	7.01	6.83	6.66
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
2 COMBINED AT										
+	CP-DP	9.480	1	FLOW	7.55	7.37	7.19	7.01	6.83	6.66
				TIME	8.00	8.00	8.00	8.00	8.00	8.00
ROUTED TO										
+	DP-Z1	9.480	1	FLOW	3.22	3.14	3.06	2.99	2.91	2.84
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
			**	PEAK STAGES IN FEET **						
			1	STAGE	61.54	61.52	61.51	61.50	61.49	61.47
				TIME	8.17	8.17	8.17	8.17	8.17	8.17
ROUTED TO										
+	DP-Z2	9.480	1	FLOW	.61	.57	.54	.51	.48	.45
				TIME	9.83	9.83	10.00	10.00	10.00	10.17
			**	PEAK STAGES IN FEET **						
			1	STAGE	53.59	53.58	53.58	53.57	53.57	53.56
				TIME	9.83	9.83	10.00	10.00	10.00	10.17
HYDROGRAPH AT										
+	1A-CH	.000	1	FLOW	119.55	115.59	110.21	104.77	100.34	97.71
				TIME	9.67	9.67	9.67	9.67	9.83	9.83
HYDROGRAPH AT										
+	1A	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
3 COMBINED AT										
+	1A-TOT	9.480	1	FLOW	120.14	116.15	110.74	105.25	100.81	98.14
				TIME	9.67	9.67	9.67	9.67	9.83	9.83
HYDROGRAPH AT										
+	BR1B	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	ZOL	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
2 COMBINED AT										
+	1B-TOT	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
DIVERSION TO										
+	STDRN	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	1B-ZOL	.000	1	FLOW	.00	.00	.00	.00	.00	.00
				TIME	.00	.00	.00	.00	.00	.00
HYDROGRAPH AT										
+	VLYSPG	.000	1	FLOW	106.87	105.48	103.59	101.68	100.12	97.71
				TIME	9.67	9.67	9.67	9.67	9.83	9.83

DIVERSION TO										
+	OUT	.000	1	FLOW	76.87	75.48	73.59	71.68	70.12	67.71
				TIME	9.67	9.67	9.67	9.67	9.83	9.83
HYDROGRAPH AT										
+	VSDTCH	.000	1	FLOW	30.00	30.00	30.00	30.00	30.00	30.00
				TIME	8.67	8.67	8.83	8.83	8.83	8.83
2 COMBINED AT										
+	1BTOT	.000	1	FLOW	30.00	30.00	30.00	30.00	30.00	30.00
				TIME	8.67	8.67	8.83	8.83	8.83	8.83

APPENDIX D

HYDRAULIC CALCULATIONS

HEC-RAS MODEL OF BRANCH 1A

FLOW SPLIT AT ZOLEZZI

C=3.3		L=250			C=3.3		L=40		
H	H^1.5-	CL	QNORTH	CL	QEAST	Zolezzi	East Total	DQTOTAL	
0.53	0.385846	825	318	132	51	55		424	100 YEAR
1.365	1.594773	825	1316	132	211	55		1581	25YEAR

Calculate capacity of catch basins
use information on Neenah website (NEI)

Use type R-1878-A56 grate

Weir flow

$P = 7.8$ ft
$h = 0.5$ ft
$C = 3.3$

$Q_{cap} = C P H^{3/2} = 3.3(7.8)(.5)^{3/2}$

$Q_{cap} = 9$ cfs

Orifice flow

$A = 1.8$ ft^2
$h = 0.5$ ft
$C = 0.6$

$Q = C A \sqrt{2gh} = (.6)(1.8)\sqrt{(2)(32.2)(.5)}$

$Q = 1.08\sqrt{32.2} = (1.08)(5.7)$

$Q = 6$ cfs

Use 6 cfs as capacity of catch basins

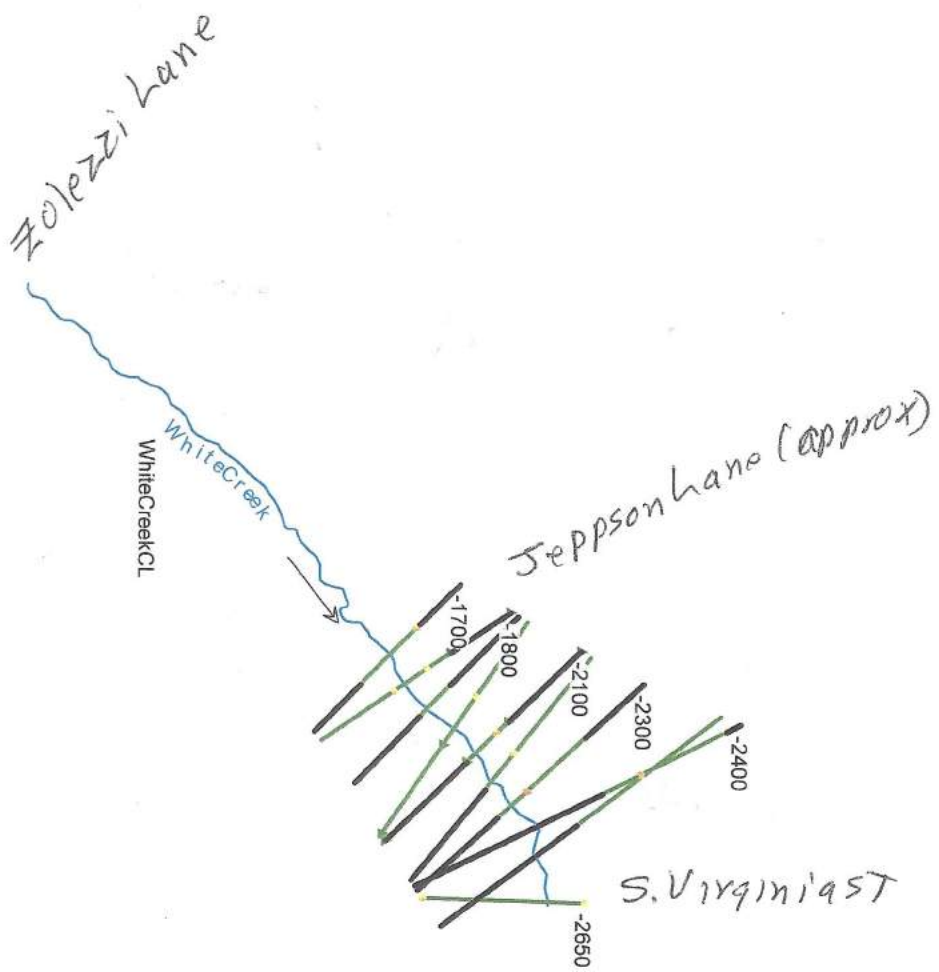
FREE OPEN AREAS OF NEENAH GRATES

CATALOG NUMBER	GRATE TYPE	SQ. FT. OPEN	WEIR PERIMETER LINEAL FEET
R-1792-AG	G	0.2	2.7
R-1792-BG	G	0.3	3.5
R-1792-CG	G	0.5	4.3
R-1792-DG	G	0.7	4.8
R-1792-EG	G	1.0	5.8
R-1792-FG	G	1.7	6.6
R-1792-GG	G	2.0	7.4
R-1792-HG	G	2.1	9.0
R-1792-JG	G	3.7	10.5
R-1792-KG	G	4.8	12.1
R-1878-A1G	A or C	0.5	4.6
R-1878-A2G	A or C	0.8	6.0
R-1878-A3G	A or C	1.0	6.7
R-1878-A4G	A or C	1.1	7.3
R-1878-A5G	A or C	1.8	7.8
R-1878-A6G	A or C	2.7	8.6
R-1878-A7G	A or C	2.1	9.2
R-1878-A8G	A or C	2.3	9.8
R-1878-A9G	A or C	2.5	10.6
R-1878-A10G	A or C	3.0	12.3
R-1878-B1G	A	0.6	5.7
R-1878-B2G	A	0.9	6.5
R-1878-B3G	A	1.2	7.5
R-1878-B4G	A	2.1	8.5
R-1878-B5G	A	2.5	9.6
R-1878-B6G	C	2.6	9.5
R-1878-B7G	A	2.6	10.5
R-1878-B8G	A	3.7	12.6
R-1878-B9G	C	3.3	11.6
R-1878-B10G	C	4.9	13.5
R-1878-B11G	A	5.0	14.7
R-1879-A1G	A or C	0.4	4.6
R-1879-A2G	A or C	0.8	6.0
R-1879-A3G	A or C	1.2	6.7
R-1879-A4G	A or C	1.4	7.3
R-1879-A5G	A or C	1.9	7.8
R-1879-A6G	A or C	2.0	8.6
R-1879-A7G	A or C	1.7	9.2
R-1879-A8G	A or C	2.2	9.8
R-1879-A9G	A or C	2.8	10.6
R-1879-A10G	A or C	3.7	12.3
R-1879-B1G	A	0.6	5.7
R-1879-B2G	C	0.9	6.5
R-1879-B3G	C	1.0	7.5
R-1879-B4G	A	1.4	8.5
R-1879-B5G	A	1.9	9.6
R-1879-B6G	A	2.4	9.5
R-1879-B7G	A	3.0	10.6
R-1879-B8G	A	3.2	12.6
R-1879-B9G	A	3.2	11.6
R-1879-B10G	C	4.2	13.5
R-2014	C	1.1	6.0
R-2014	E	1.3	6.0
R-2015	D	0.9	6.0
R-2015	C	1.1	6.0
R-2015	G	1.2	6.0
R-2030	D	1.1	6.0
R-2030	C	1.1	6.0
R-2031	D	1.1	6.0
R-2031	E	1.1	6.0
R-2040	D	0.9	6.0
R-2040	C	1.1	6.0
R-2040	E	1.1	6.0
R-2040	F	0.7	6.0
R-2050	D	0.9	6.0
R-2050	C	1.1	6.0
R-2050	E	1.1	6.0
R-2050	F	0.7	6.0
R-2060	A	1.1	6.0
R-2060	B	1.2	6.0
R-2060	C	1.1	6.0
R-2060	E	1.1	6.0
R-2070	D	0.9	6.0
R-2070	B	1.2	6.0
R-2070	E	1.1	6.0
R-2077	B	1.2	6.0
R-2077	C	1.1	6.0
R-2077	D	1.0	6.0
R-2077	E	1.1	6.0
R-2077	F	0.6	6.0
R-2080	D	1.0	5.9
R-2080	C	1.2	5.9
R-2090	A	1.1	5.0
R-2090	B	1.2	5.8
R-2090	C	1.2	5.8
R-2090	D	1.0	5.8
R-2090	E	1.1	5.8
R-2090	G	1.0	5.8
R-2100	A	1.1	5.8
R-2100	C	1.1	5.8
R-2100	E	1.1	5.8
R-2100	F	0.6	5.8
R-2110	A	1.1	5.8
R-2110	E	1.1	5.8
R-2112	A	1.1	5.8
R-2112	B	1.2	5.8
R-2112	C	1.1	5.8
R-2112	E	1.1	5.8
R-2112	F	0.6	5.8
R-2112	G	0.6	5.8
R-2120	A	1.1	5.8
R-2120	C	1.1	5.8
R-2120	F	0.6	5.8
R-2120	G	1.1	5.8
R-2250	G	3.0	9.9
R-2251	G	2.9	9.4
R-2255	C	1.4	8.4
R-2255	G	1.9	8.4
R-2270	G	1.9	8.4
R-2275	G	1.9	8.4
R-2290	K	1.2	7.6
R-2290-A	K	1.2	7.6
R-2290-B	K	1.0	7.5
R-2293	G	1.6	7.2
R-2296	B	1.2	6.7
R-2296	F	1.2	6.7
R-2297	B	1.2	6.7
R-2297	F	1.2	6.7
R-2298	B	1.2	6.7
R-2298	F	1.2	6.7
R-2299	B	1.2	6.7
R-2299	F	1.2	6.7
R-2300	G	1.2	6.8
R-2300	C	1.6	6.8
R-2370	B	1.2	6.8
R-2370	F	1.3	6.8
R-2370	A	1.1	6.8
R-2370	G	1.2	6.8
R-2371	G	1.2	6.7
R-2390	G	1.4	6.7
R-2390	C	1.5	6.7
R-2392	C	1.4	6.7
R-2392	G	1.4	6.7
R-2394	G	1.2	6.8
R-2395-1	G	1.6	6.6
R-2398	G	1.4	6.7
R-2401	G	1.4	6.8
R-2401	C	1.6	6.8
R-2401-A	G	1.2	6.5
R-2401-B	E	0.9	6.2
R-2402	G	0.7	6.5
R-2402	C	1.1	6.5
R-2404	G	1.1	6.7
R-2405	A	1.0	6.5
R-2405	C	1.6	6.5
R-2410	K	0.9	6.1
R-2411-A	G	0.7	6.6
R-2412-A	G	1.0	6.2
R-2412-A1	E	1.0	6.3
R-2412-A2	G	0.7	6.5
R-2412-A3	C	1.1	6.3
R-2412-A3	E	1.0	6.3
R-2412-A4	C	1.0	6.5
R-2412-A5	K	0.8	6.3
R-2412-A6	G	1.1	6.3
R-2414	D	1.0	6.1
R-2418	G	1.0	6.2
R-2418-A	K	1.0	6.3
R-2420-A	A	1.0	6.4
R-2420-B	G	1.1	5.9
R-2421-A	A	1.0	6.1
R-2422-A	K	1.0	6.2
R-2422-C	G	1.0	6.2
R-2423	G	1.0	6.2
R-2424-A	G	0.9	5.9
R-2427	D	0.9	6.0
R-2427-A	G	1.0	6.2
R-2428	D	1.0	6.0
R-2428	C	1.1	6.0
R-2428	F	0.6	6.0
R-2429	D	1.0	5.9
R-2429	E	1.3	5.9
R-2429	G	1.2	5.9
R-2435	G	0.9	5.8
R-2437	D	1.0	5.9
R-2437	E	1.3	5.9
R-2437-B	G	0.9	5.8
R-2438	D	1.0	5.9
R-2438	E	1.3	5.9
R-2453	K	0.8	6.2
R-2461-A	A	1.1	5.8
R-2461-A	B	1.2	5.8
R-2461-A	C	1.1	5.8
R-2464	D	1.0	6.0
R-2466-A	B	1.2	5.8
R-2466-A	E	1.1	5.8
R-2467	C	1.1	5.9
R-2467	D	0.9	5.9
R-2471	D	0.9	5.9
R-2471-B	D	0.9	5.9
R-2474	A	1.1	5.7
R-2474	G	1.2	5.7
R-2475	A	1.1	5.8
R-2481	A	1.1	5.7
R-2494	G	0.8	5.1
R-2496	G	0.6	4.7
R-2498	G	0.4	4.1
R-2498-A	G	0.4	4.1
R-2498-B	G	0.4	4.1
R-2499	G	0.2	3.1
R-2500	H	0.9	6.2
R-2501	A	1.1	6.8
R-2501	C	1.2	6.8
R-2501	F	1.4	6.8
R-2501	G	1.1	6.8
R-2502	C	1.2	6.0
R-2502	D	0.9	6.0
R-2502	E	1.5	6.0
R-2502	G	1.3	6.0
R-2504	G	1.3	6.0
R-2504	D	0.9	6.0
R-2504	C	1.2	6.0
R-2510	C	1.3	5.8
R-2510-1	G	0.4	4.1
R-2510-2	G	1.6	7.2
R-2510-A	Beehive	1.1	5.8
R-2525-A	E	0.2	3.1
R-2525-C	G	0.4	4.1
R-2525-D	G	0.4	4.1
R-2525-E	E	0.6	4.7
R-2525-F	G	0.8	5.4
R-2525-G	G	0.8	5.1
R-2533	A	1.1	5.8
R-2533	C	1.0	5.8
R-2533	B	1.2	5.8
R-2534	C	0.9	6.0
R-2535	C	1.1	5.8
R-2535-A	C	1.1	5.8
R-2540	D	1.1	5.9
R-2540-A	D	1.1	5.9
R-2545	K	0.4	4.7
R-2546	K	0.4	3.5
R-2548	V	0.8	6.7
R-2549	D	0.9	6.0
R-2552	K	0.8	6.2
R-2553	G	1.1	6.3
R-2554	G	1.1	6.3
R-2555	G	1.1	6.3
R-2556	G	1.5	6.7

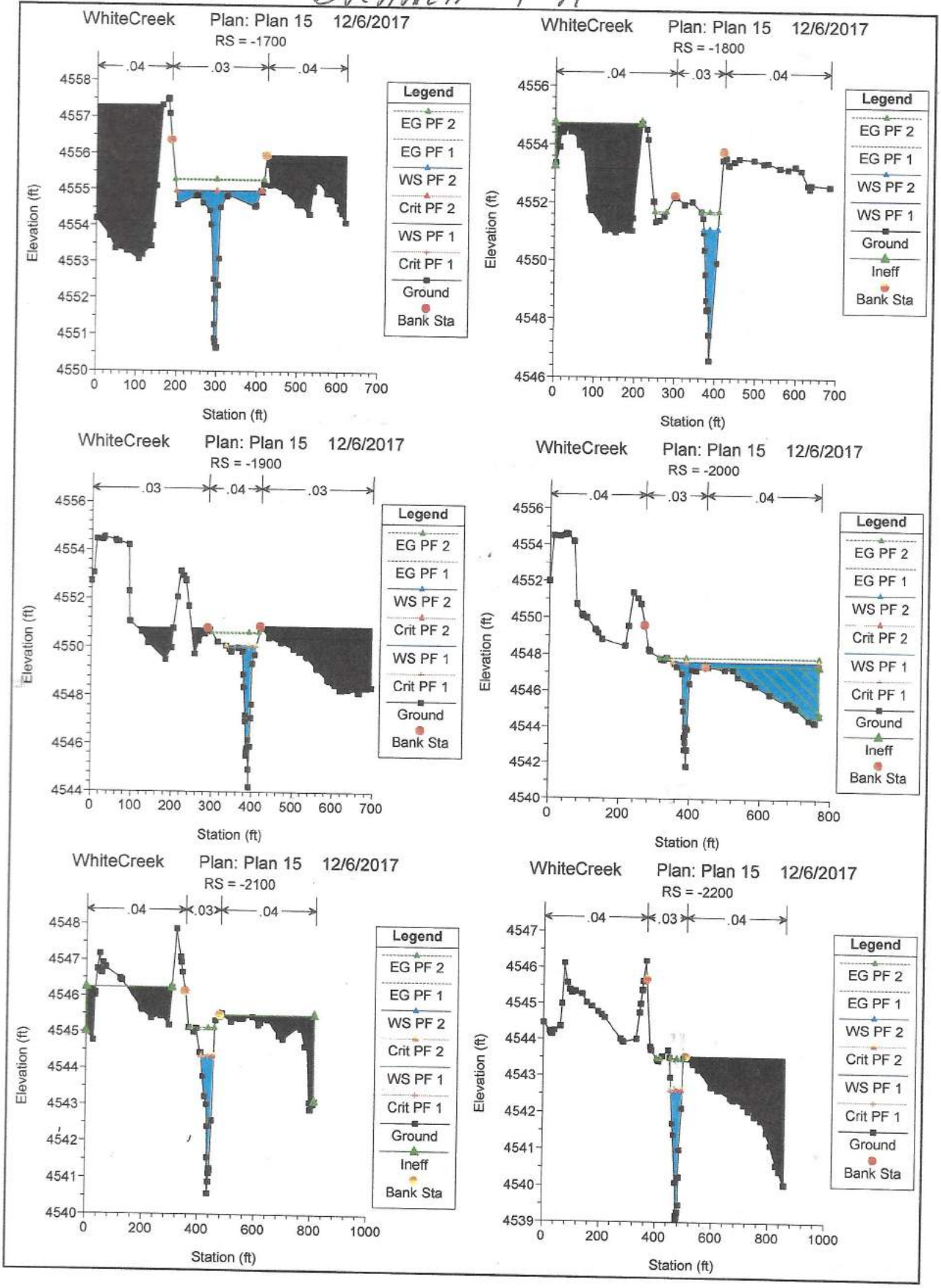
• NOTE: On catalog #'s R-4990-AA thru R-4999-L9, SQ.FT. OPEN and WEIR PERIMETER are per lineal foot.
Type K indicates "Special" grate style and is not among standard types illustrated.
** Roll-type or mountable curb

CLICK HERE to return to the Table of Contents

HEC-RAS BRANCH 1-A



BRANCH 1-A


WhiteCreek Plan: Plan 15 12/6/2017
RS = -1700
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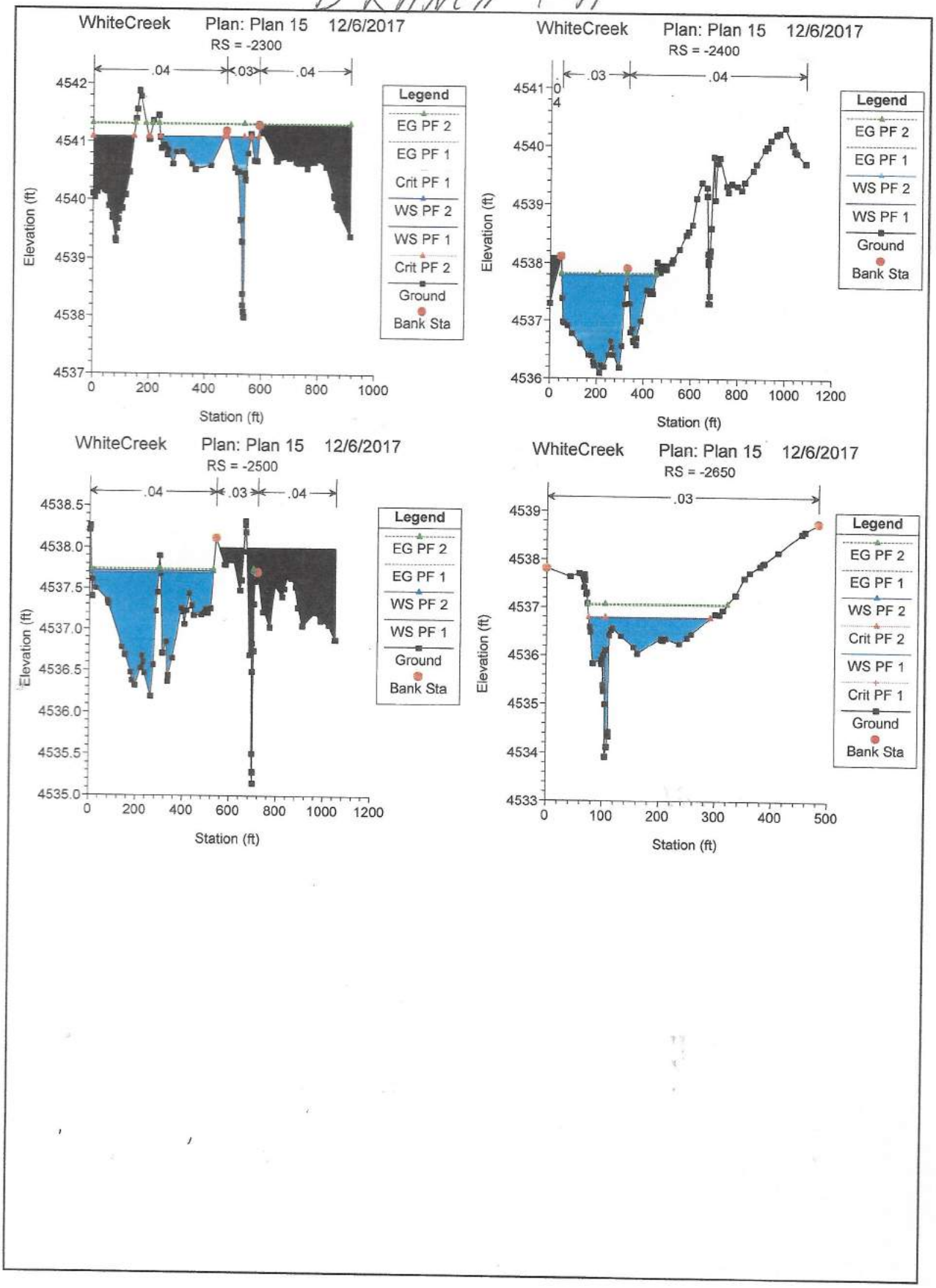
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
WhiteCreek Plan: Plan 15 12/6/2017
RS = -1800
.04 .03 .04
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Ineff
Bank Sta
WhiteCreek Plan: Plan 15 12/6/2017
RS = -1900
.03 .04 .03
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
WhiteCreek Plan: Plan 15 12/6/2017
RS = -2000
.04 .03 .04
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
WhiteCreek Plan: Plan 15 12/6/2017
RS = -2100
.04 .03 .04
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Ineff
Bank Sta
WhiteCreek Plan: Plan 15 12/6/2017
RS = -2200
.04 .03 .04
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta

BRANCH 1-A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RS = -2300
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
Crit PF 1
WS PF 2
WS PF 1
Crit PF 2
Ground
Bank Sta
WhiteCreek Plan: Plan 15 12/6/2017
RS = -2400
.03
.04
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
WhiteCreek Plan: Plan 15 12/6/2017
RS = -2500
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
WS PF 1
Ground
Bank Sta
WhiteCreek Plan: Plan 15 12/6/2017
RS = -2650
.03
Elevation (ft)
Station (ft)
Legend
EG PF 2
EG PF 1
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta

B RANCH 1-A

HEC-RAS Plan: Plan 14 River: WhiteCreek Reach: WhiteCreekCL

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Right Sta Eff	Left Sta Eff	Diff	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Cum Ch Len	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)		(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	(ft)	
WhiteCreekCL	-1700	PF 1	472.00	4550.64	4554.95	411.28	198.24	213.04	4554.95	4555.26	0.020577	4.47	105.52	209.38	950.00	
WhiteCreekCL	-1700	PF 2	492.00	4550.64	4554.96	411.58	198.11	213.47	4554.96	4555.28	0.020591	4.53	108.71	212.08	950.00	1.11
WhiteCreekCL	-1800	PF 1	472.00	4546.59	4551.04	406.58	370.97	35.61		4551.62	0.005773	6.12	77.13	35.62	850.00	1.11
WhiteCreekCL	-1800	PF 2	492.00	4546.59	4551.09	406.80	370.76	36.04		4551.69	0.005996	6.23	78.93	36.04	850.00	0.73
WhiteCreekCL	-1900	PF 1	472.00	4544.20	4550.02	409.07	339.91	69.16	4550.02	4550.58	0.023594	6.01	78.51	69.16	750.00	0.74
WhiteCreekCL	-1900	PF 2	492.00	4544.20	4550.07	409.77	336.07	73.70	4550.07	4550.63	0.023677	5.97	82.39	73.70	750.00	0.99
WhiteCreekCL	-2000	PF 1	472.00	4541.81	4547.58	767.47	353.22	414.25	4547.58	4547.80	0.007419	4.16	165.43	414.25	650.00	1.00
WhiteCreekCL	-2000	PF 2	492.00	4541.81	4547.60	767.47	351.82	415.65	4547.60	4547.82	0.007391	4.17	173.34	415.65	650.00	0.73
WhiteCreekCL	-2100	PF 1	472.00	4540.57	4544.29	453.66	409.06	44.60	4544.29	4545.06	0.012002	7.01	67.34	44.60	550.00	0.73
WhiteCreekCL	-2100	PF 2	492.00	4540.57	4544.35	453.89	408.50	45.39	4544.35	4545.12	0.011854	7.05	69.78	45.40	550.00	1.01
WhiteCreekCL	-2200	PF 1	472.00	4539.08	4542.56	492.26	453.20	39.06	4542.56	4543.40	0.012105	7.37	64.08	39.05	450.00	1.00
WhiteCreekCL	-2200	PF 2	492.00	4539.08	4542.61	492.53	452.85	39.68	4542.61	4543.47	0.012095	7.44	66.12	39.68	450.00	1.01
WhiteCreekCL	-2300	PF 1	472.00	4537.98	4541.08	587.30	0.00	587.30	4541.08	4541.29	0.014270	4.34	150.17	483.01	350.00	1.02
WhiteCreekCL	-2300	PF 2	492.00	4537.98	4541.08	587.30	0.00	587.30	4541.08	4541.31	0.015505	4.52	150.17	483.01	350.00	0.96
WhiteCreekCL	-2400	PF 1	472.00	4536.10	4537.78	451.89	50.23	401.66		4537.81	0.000510	1.27	408.22	396.84	250.00	1.00
WhiteCreekCL	-2400	PF 2	492.00	4536.10	4537.80	452.71	50.09	402.62		4537.83	0.000526	1.30	415.60	398.51	250.00	0.20
WhiteCreekCL	-2500	PF 1	472.00	4536.00	4537.69	528.92	9.20	519.72		4537.72	0.001882		363.89	510.98	150.00	0.21
WhiteCreekCL	-2500	PF 2	492.00	4536.00	4537.71	529.40	9.06	520.34		4537.74	0.001893		372.88	512.33	150.00	0.00
WhiteCreekCL	-2650	PF 1	472.00	4533.91	4536.77	289.63	75.12	214.51	4536.77	4537.04	0.017976	4.23	111.57	214.51		0.00
WhiteCreekCL	-2650	PF 2	492.00	4533.91	4536.78	291.64	74.97	216.67	4536.78	4537.06	0.017543	4.25	115.67	216.66		1.03
																1.03

January 02, 2018
Project No. 3520001

Mr. Ted Brown
Land Acquisition Project Manager
DR HORTON
190 West Huffaker Lane, Suite 408
Reno, NV 89511

RE: Asphalt Concrete Structural Pavement Section Addendum
Zolezzi 46

REF: Geotechnical Investigation
Proposed Autumn Wood Duets
Reno, Nevada
Pezonella Associates, Inc. Job No: 5689.01-A
January 4, 2007

Zolezzi 2 – Autumn Woods North Parcel
(APN 162-010-31)
Geotechnical Design Update 2
Zolezzi 46
Wood Rodgers, Incorporated
August 28, 2017

Geotechnical Design Update
Zolezzi 46
Reno, Nevada
Wood Rodgers, Incorporated
June 19, 2017

Zolezzi 2 – Autumn Woods North Parcel
Addendum
Future Pond Location Boring
Zolezzi 46
Wood Rodgers, Incorporated
Submitted October 04, 2017
Revised October 19, 2017

Dear Mr. Brown

Wood Rodgers, Incorporated is pleased to present this geotechnical addendum for the structural section design of Asphalt Concrete (AC) pavements for the overall Zolezzi 46 development project presented in Figure 1. Unless specifically modified herein, the recommendations and considerations presented in the above referenced reports are considered valid.

FIGURE 1 - PROJECT DEVELOPMENT AREA

Based on the laboratory testing results and our experience with similar types of soils, an R-value of greater than 15 was considered for the soils encountered on the project site. Information on anticipated traffic loading was not provided so the

structural pavement sections were designed following the AASHTO 1993 low volume roads design method. A low range of ESALs (50,000 to 300,000) was developed for the pavement section design based on: the number of residences served with an average truck percentage of 3, and an average of 10 construction trucks per residence with a truck factor approaching 1. We have determine that a structural AC pavement section of 3 inches of Type 2 or 3 asphalt concrete over 6 inches of Type 2, Class B aggregate base compacted to 95-percent relative compaction per ASTM D1557 will be adequate for local residential streets within the Zolezzi 46 development.

We appreciate the opportunity to prepare this addendum for you. These design recommendations are based on the understanding that the recommendations presented in the referenced reports and updates are incorporated in site grading and development. Please contact our office should you have any related questions or comments.

Sincerely,
WOOD RODGERS, INCORPORATED

James G. Smith, PE
Principal

Justin M. McDougal, PE
Project Engineer
PE Number: 24474
Expires: 12/31/2019

JGS:JMM:da
Enclosures

Submitted October 04, 2017
Revised October 19, 2017
Project No. 3520001

Mr. Ted Brown
Land Acquisition Project Manager
DR HORTON
190 West Huffaker Lane, Suite 408
Reno, NV 89511

RE: Zolezzi 2 – Autumn Woods North Parcel Addendum
Future Pond Location Boring
Zolezzi 46

REF: Zolezzi 2 – Autumn Woods North Parcel (APN 162-010-31)
Geotechnical Design Update 2
Zolezzi 46

Dear Mr. Brown:

Wood Rodgers, Incorporated is pleased to present this geotechnical addendum for the Zolezzi 2 – Autumn Woods North Parcel, as shown in Figure 1. The purpose of this addendum is to identify the depth of groundwater and to note any indication of seasonal high groundwater levels at the future pond location.

FIGURE 1 - PROJECT DEVELOPMENT AREA

EXPLORATION

On October 4, 2017, the project was explored by advancing one borehole in the future pond location. The approximate borehole location is presented on Plate A-1 (Site Map) in Appendix A. The maximum depth of the borehole advance was 45.0 feet below the existing ground surface.

Wood Rodgers' personnel examined and classified all soils in the field in general accordance with ASTM D 2488 (Description and Identification of Soils). The borehole log is presented as Plate A-2.

GROUNDWATER CONDITION

The static groundwater level was encountered at 44.0 feet below the existing ground surface. The boring cuttings were examined for any evidence of seasonal high groundwater levels. No mottling or any indication of seasonal high groundwater levels was encountered in the soils above the static water level.

CONCLUSION

We appreciate the opportunity to prepare this addendum for DR Horton. Please contact our office should you have any related questions or comments.

Sincerely,
WOOD RODGERS, INCORPORATED

Jim G. Smith, PE
Principal

Justin M. McDougal, PE
Project Engineer
RE Number: 24474
Expires: 12/31/2017

STS:JMM:da
Enclosures

Appendix A – Geotechnical Plates

Appendix B – Previous Reports

APPENDIX A
GEOTECHNICAL PLATES

WOOD RODGERS

1361 Corporate Boulevard, Reno, NV 89502

Phone 775.823.4068 Fax 775.823.4066

SITE MAP

Geotechnical Investigation

ZOLEZZI 2

AUTUMN WOODS NORTH PARCEL

RENO, WASHOE COUNTY, NEVADA

Project No.: 3520001

Date: 10.03.17

PLATE A-1

Wood Rodgers, Inc.
1361 Corporate Boulevard
Reno, Nevada / 89502
Telephone: 775-823-4068
Fax: 775-823-4066

BORING NUMBER BH-1

CLIENT DR Horton
PROJECT NAME Zolezzi 2 - Pond Borehole
PROJECT NUMBER 3520001
PROJECT LOCATION Reno, Nevada
DATE STARTED 10/4/17 **COMPLETED** 10/4/17
GROUND ELEVATION 4570 ft **HOLE SIZE** 4 inches
DRILLING CONTRACTOR Taber Drilling
GROUND WATER LEVELS:
DRILLING METHOD CME 55
AT TIME OF DRILLING 44.0 ft
LOGGED BY Justin McDougal **CHECKED BY** Justin McDougal
AT END OF DRILLING 44.0 ft
NOTES: 39.42112°N, -119.76215°E
AFTER DRILLING 44.00 ft / Elev 4526.00 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION
0		SM		SILTY SAND, (SM) loose, dry to slightly moist, light orange brown, non plastic
3.0				4567.0
5		SM		SILTY SAND WITH GRAVEL, (SM) medium dense to dense, dry to slightly moist, light orange brown, non plastic
10				Color change to light brown
15				
17.0				4553.0
20		SC/ GC		CLAYEY SAND WITH GRAVEL TO CLAYEY GRAVEL WITH SAND, (SC-GC) dense to very dense, moist, brown, medium plasticity
25				

(Continued Next Page)

Wood Rodgers, Inc.
1361 Corporate Boulevard
Reno, Nevada / 89502
Telephone: 775-823-4068
Fax: 775-823-4066

BORING NUMBER BH-1

CLIENT DR Horton **PROJECT NAME** Zolezzi 2 - Pond Borehole

PROJECT NUMBER 3520001 **PROJECT LOCATION** Reno, Nevada

DEPTH (ft)	SAMPLE TYPE NUMBER	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	
25		SC/ GC		CLAYEY SAND WITH GRAVEL TO CLAYEY GRAVEL WITH SAND, (SC-GC) dense to very dense, moist, brown, medium plasticity *(continued)*	
				28.0	4542.0
				CLAYEY SAND, (SC) dense to very dense, moist, dark brown, high plasticity	
30					
				Slightly moist, Increase in sand	
35		SC			
40					
				Moist, brown, Increase in fines	
45				45.0	4525.0
				Bottom of Borehole at 45.0 Feet.	

APPENDIX B
PREVIOUS REPORTS

August 28, 2017
Project No. 3520001

Mr. Ted Brown
Land Acquisition Project Manager
DR HORTON
190 West Huffaker Lane, Suite 408
Reno, NV 89511

RE: Zolezzi 2 – Autumn Woods North Parcel (APN 162-010-31)
Geotechnical Design Update 2
Zolezzi 46

REF: Geotechnical Investigation
Proposed Autumn Wood Duets
Reno, Nevada
Pezonella Associates, Inc. Job No: 5689.01-A
January 4, 2007

Geotechnical Design Update
Zolezzi 46
Reno, Nevada
Wood Rodgers, Incorporated
June 19, 2017

International Residential Code, 2012 (IRC) & Northern Nevada Amendments

Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils (PTI DC10.5-12)

Design of Slab-on-Ground Foundations (WRI TF 700-R-03 Update)

Dear Mr. Brown:

Wood Rodgers, Incorporated is pleased to present this geotechnical update for Zolezzi 46. The purpose of this report is to incorporate the north parcel (APN 162-010-31) as part of the Zolezzi 46 development, as well as development of geotechnical design parameters for structural slabs-on-grade. Unless specifically modified herein, the recommendations and considerations presented in the update report dated June 19, 2017, and the original geotechnical report dated January 4, 2007, are considered valid.

PROJECT DESCRIPTION

It is our understanding that the structures will be 1 and 2-stories supported by either standard spread or structural foundations with associated parking and drive areas. Foundation loads are expected to be light.

All parking and drive improvements will be constructed in accordance with local practices and the City of Reno design standards. Paved drive areas will facilitate access to the housing units. Underground utilities will be provided by a variety of public and private companies. Cuts and fills are anticipated to be less than 10-feet.

FIGURE 1 - PROJECT DEVELOPMENT AREA

SITE CONDITIONS

The overall site, located in Reno, Washoe County, Nevada, encompasses an approximate area of 10 acres. Figure 1 presents the project development area which consists of APN's 162-010-31 and 044-320-48. The development is contained in Section 17, Township 18N, Range 20E, M.D.M. As shown in Figure 1, the site is bordered by Whites Creek to the north, residential development to the east and in the northwest corner, Zolezzi Lane to the south, and a school to the west. The site slopes at approximately 3-percent downward to the northeast. Vegetation across the site includes trees, heavy grasses and brush.

An existing gravel drive and parking circle is located in the southwestern area of the north parcel, as depicted in Figure 1.

EXPLORATION

On August 7, 2017, the project was explored by excavating a series of 3 test pits using a CAT 416D loader backhoe. The approximate locations of the test pits are presented on Plate A-1b (Site Map) in Appendix A. The maximum depth of test pit advance was 8.0 feet below the existing ground surface due to practical refusal of the backhoe. Bulk samples for index testing were collected from specific depths in various soil horizons.

Wood Rodgers' personnel examined and classified all soils in the field in general accordance with ASTM D 2488 (Description and Identification of Soils). During exploration, representative bulk samples were placed in sealed plastic bags or buckets and 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-2. A USCS chart has been included as Plate A-3 (Unified Soil Classification and Key to Soil Descriptions).

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 D6913), and plasticity indices (ASTM D 4318). Additional testing included chemical testing for the potential of corrosion to concrete. Results of these tests are shown in Appendix A on Plate A-4c (Chemical Testing Results). Table 1 presents a summary of the test data. The test results were used to classify soils according to the USCS (ASTM D 2487) and to verify the field logs which were then updated.

Table 1 - Summary of Test Data

Test Hole	Depth (Ft.)	Moisture (%)	%Gravel (+ #4)*	% Sand (#4-#200)	%Fines (-#200)	Liquid Limit	Plastic Index	USCS
ASTM Standard		D2216	D6913			D4318		D2487
TP-2	2 - 8	5.7	41	45	14	NP	NP	SM
TP-3	0 - 3	6.7	41	38.1	20.9	21	14	GC

* 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".

GEOTECHNICAL CONSIDERATIONS

General Information
The following definitions characterize terms utilized in this report:

- Rockfill possesses more than 30-perent retained on the 3/4-inch sieve. Rockfill may or may not present oversize, i.e. particles greater than 6-inches.
- Clay soil possesses more than 30 percent passing the number 200 sieve and exhibits a plasticity index greater than 15.
- Granular soil does not meet the above criteria, has a maximum particle size less than 6-inches, possesses less than 40 percent passing the number 200 sieve, and has a plasticity index less than 15.

Seismic Design Criteria

Per the City of Reno Northern Nevada Amendments to the 2012 International Residential Code (IRC), residential structures are to be designed for Seismic Design Category D2. Table 2 presents a summary of seismic design values for the site based on International Residential Code (IRC) requirements. The USGS detailed report is attached in this report.

Table 2 - Summary of ASCE 7-10 Seismic Design Values

Lat.	Lon.	S_S	S_1	SDC	F_a	F_v	S_{MS}	S_{M1}	S_{DS}	S_{D1}	F_{PGA}	PGA_M
39.419	-119.763	2.190	0.728	D2	1.000	1.500	2.190	1.091	1.460	0.728	1.000	0.853

Site Preparation, Grading and Filling

All vegetation and topsoil is to be stripped and grubbed from structural areas. A minimum stripping depth of 0.3 to 0.5 feet is anticipated. Localized deeper areas will be required in areas of large brush. Some vegetation could be placed in non-structural fill areas at least 5 feet away from the structure footprint and away from parking and drive areas. Concentration of the vegetation must be avoided since placing large concentrated layers of vegetation could lead to excessive settlement and subsequent surface depressions. In addition, permission from the owner/developer must be secured prior to blending vegetation in non-structural areas.

All areas to receive structural fill or structural loading should be densified to a minimum depth of 6-inches to at least 90 percent relative compaction in accordance with ASTM D 1557. It is recommended that soils have moisture contents of plus or minus 3 percent of optimum moisture (ASTM D1557) prior to densification. 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.

Structural fill is defined as any material placed below structural elements and includes foundations, concrete slabs-on-grade, pavements, or any structure that derives support from the underlying soil. Granular soil generated on-site that is substantially free of vegetation, organic matter and other deleterious material can be used as structural fill. Oversize (i.e. > 8-inches) shall be screened from the soils prior to use. A soil fill or 3-inch minus rock fill is normally used for the final 12 inches of pad fills to facilitate fine grading and utility trenching. Imported structural fill should be substantially free of vegetation, organic matter, any deleterious material, and meet the requirements of Table 3; however, imported material should have a maximum particle size of 4-inches.

Table 3 - Guideline Specification for Imported Structural Fill

Sieve Size (ASTM D6913)	Percent by Weight Passing
8 Inch	100
4 Inch	90 - 100
¾ Inch	70 - 100
No. 40	15 - 70
No. 200	5 - 30
Maximum Liquid Limit (ASTM D4318)	35
Maximum Plasticity Index	15
Soluble Sulfate Level (ACI 318, Table 4.3.1)	Negligible
R-Value (ASTM D2844)	30 Min.

Adjustments to the recommended limits presented in Table 3 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. It is our intent that rockfills consist of an 8-inch-minus, well-graded soil.

Structural fill should be placed in maximum 12-inch thick (loose) level lifts or layers and densified to at least 90 percent relative compaction. All soils should target moisture contents of at least plus or minus 3 percent of optimum moisture (ASTM D1557) prior to densification. If rockfill is imported for use, a placement specification shall be developed by the contractor and approved by the geotechnical engineer as part of the submittal process.

Site grading and pad preparation shall be observed and tested under the full-time services of a materials testing and inspection firm accredited by AASHTO in ASTM E329. In addition, field testing and inspection personnel is recommended to be ICC certified in Soils or NAQTC certified in Sampling and Density. Field density testing (ASTM D6938, or ASTM D1556) shall be performed at a minimum rate of 1 test per 1,000 cubic yards of material placed for mass graded fills and one density test per 300-feet of trench for backfill of footing over-excavation trenches.

Standard Spread Foundations

Provided the foundation soils have been prepared in accordance with the recommendations of this report, the bearing pressures presented in Table 4 can be utilized for design.

Table 4 - Allowable Foundation Bearing Pressures

Loading Condition	Maximum Net Allowable Bearing Pressure (PSF)[1]
Dead Load Plus Full Time Live Load	2,500
Dead Load Plus Live Loads, Plus Transient Wind or Seismic Loads	3,330

[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 two feet below adjacent outside or unheated interior finish grades. 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.

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 0.45, and has been reduced by a factor of 1.5 on the ultimate soil strength. Design values for active and passive equivalent fluid pressures are 35 and 375 pounds per square foot per foot of depth, respectively. In designing for passive pressure, the upper one-foot of the soil profile should not be included unless confined by a concrete slab, or pavement. These design values are based on spread footings bearing on native granular soils or native fine-grained soils and compacted backfill adjacent to the stemwall.

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 the structures is anticipated to be on the order of 1-inch, or less. Differential settlement between foundations with similar loads and sizes is anticipated to be ½ of the total settlement.

Structural Slabs-on-Grade

The design values presented in Table 5 are in accordance of WRI and have been developed for use when considering design of structural foundations. Our design profile was based on test pit TP-3 of the 8/7/17 investigation.

Table 5 - Structural Slab-on-Grade Design Recommendations

Design Values	Effective P.I.	C_S	C_W	C_O
Wire Reinforcement Institute (WRI)	15	1	15	1

The soils at the site are granular and do not meet the requisite requirements for expansive soils as presented in Section 4.1.2 of the referenced PTI document or the IBC. The original report performed an Expansion Index (EI) test on the dark brown silty, clayey sand with gravel which yielded a value of 7.5, and PTI indicates an EI greater than 20 is necessary in order to be considered expansive soil. Additionally, the clayey gravel encountered in test pit TP-3 of the 8/7/17 investigation was tested by performing a plasticity index (P.I.) test and hydrometer test which indicated the soil was not considered expansive. Therefore, PTI recommends design for slabs on stable soils which includes a BRAB Type II foundation in order to lightly reinforce against shrinkage and temperature cracking and a BRAB Type III foundation which is reinforced and stiffened. The perimeter of the foundation system must: extend at least 24-inches below lowest adjacent exterior grade as required by code, be insulated, or designed to resist the potential effects due to frost heave. An allowable bearing value of 2,500 pounds per square foot may be used in design. This value may be increased by a factor of 1.33 when considering effects due to lateral loading (wind or seismic). Settlement due to bearing capacity response should approach approximately 1/2-inch at the recommended design value.

A 4-inch minimum compacted base course (Type 2, Class B, Standard Specifications for Public Works Construction) is recommended beneath concrete slabs-on-grade. When considering placement of a moisture vapor barrier/retarder PTI presents several coefficients of friction values for slabs cast on soils, aggregates, or polyethylene sheeting. Design values are presented in Table 6 for consideration depending on the preferred placement of the vapor barrier/retarder. Wood Rodgers' preferred placement is below the aggregate base layer when a deep enough turndown is present to preclude a ready avenue for moisture migration from developing. It is also our opinion that placement directly on the base layer reduces the potential for the concrete to curl due to differential curing in our arid environment; curing practices become critical. A sand layer and size No. 67 concrete aggregate is not recommended for direct slab support. For the WRI protocol, the coefficient of friction should be 0.45.

Table 6 - Coefficient of Friction for 5-inch Slabs

Material	First Movement	Average Subsequent Movements
Aggregate Base	1.95	1.37
Polyethylene Sheeting	0.88	0.55

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. All concrete placement and curing should 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.

Sulfate testing on the native soils in the immediate area yielded results in the negligible range. No special requirements are needed for sulfate resistance.

Pavements

Table 7 presents the minimum structural pavement sections for parking and driveways within the development.

Table 7 - Structural Pavement Sections

Condition	Pavement Thickness (In.)	Pavement Type[1]	Type II Base Course Thickness (In.)
Dedicated Roadways and Main Access Drives	4	2" Type 3/2" Type 2	6*
Parking and Automobile Traffic Driveways	3	Type 3 + Lime	6

[1] Per the Standard Specifications for Public Works Construction

* The City of Reno requires the subgrade to be corrected to an R-value of 30

All roadway construction shall be in accordance with the approved plans and the 2012 Standard Specifications for Public Works Construction. Roadway subgrade shall be prepared in accordance with the requirements described in referenced report. 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 should 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.

CONCLUSION

We appreciate the opportunity to prepare this update for you. These design recommendations are based on the understanding that the recommendations presented in the referenced update are incorporated in site grading and development. Please contact our office should you have any related questions or comments.

Sincerely,
WOOD RODGERS, INCORPORATED

James G. Smith, PE
Principal

PROFESSIONAL ENGINEER-STATE OF NEVADA
STEVEN P. STRICKLAND
Exp: 6-30-18
CIVIL
No. 15972
8/28/17

Justin M. McDougal, PE
Project Engineer
RE Number: 24474
Expires: 12/31/2017

PROFESSIONAL ENGINEER-STATE OF NEVADA
JUSTIN M. MCDOUGAL
Exp. 12/31/17
CIVIL
No. 24474
8/28/17

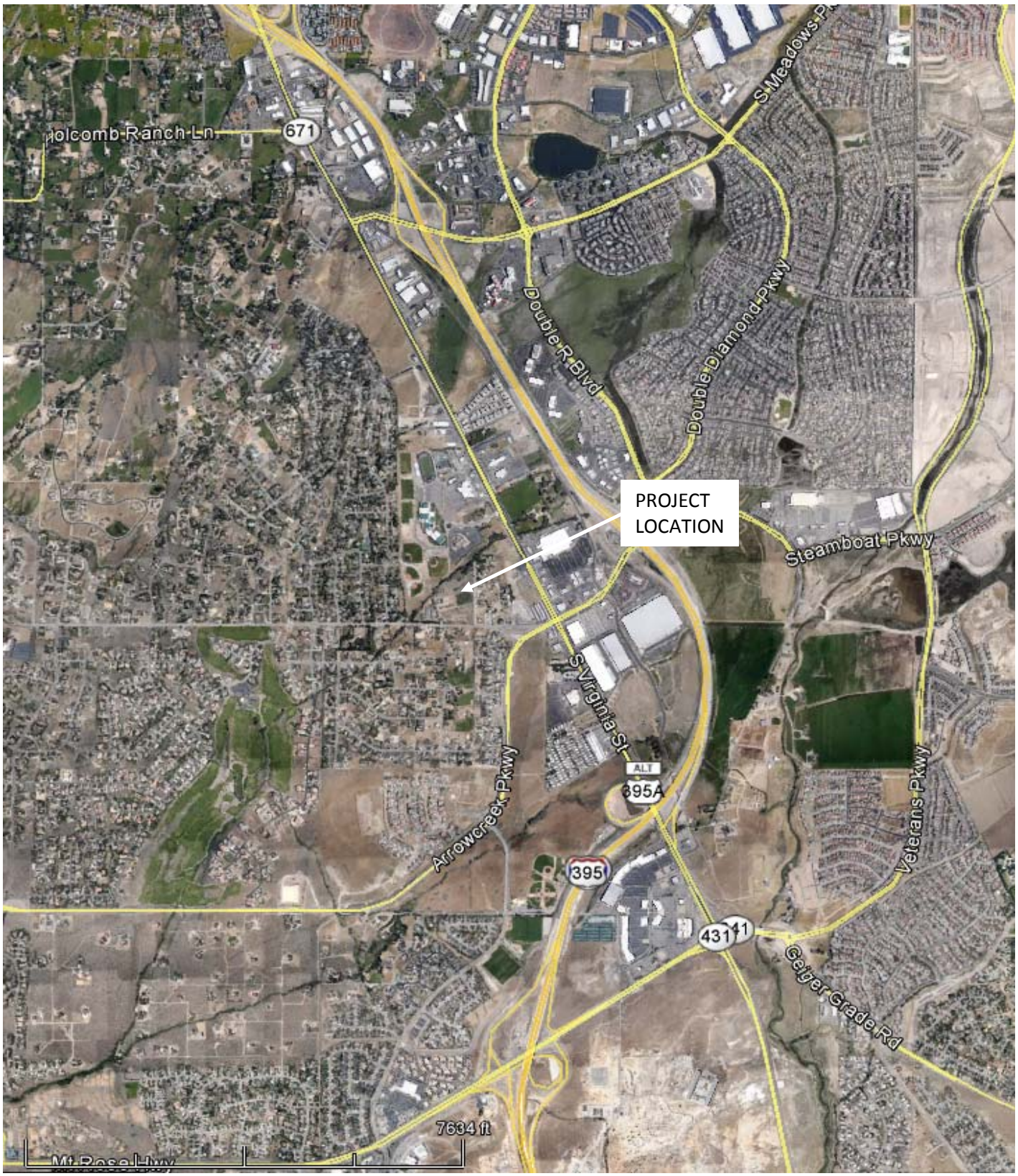
MJS:JMM:da
Enclosures

Appendix A – Geotechnical Plates

Appendix B – USGS Design Maps Detailed Report

Appendix C – Previous Reports

APPENDIX A
GEOTECHNICAL PLATES



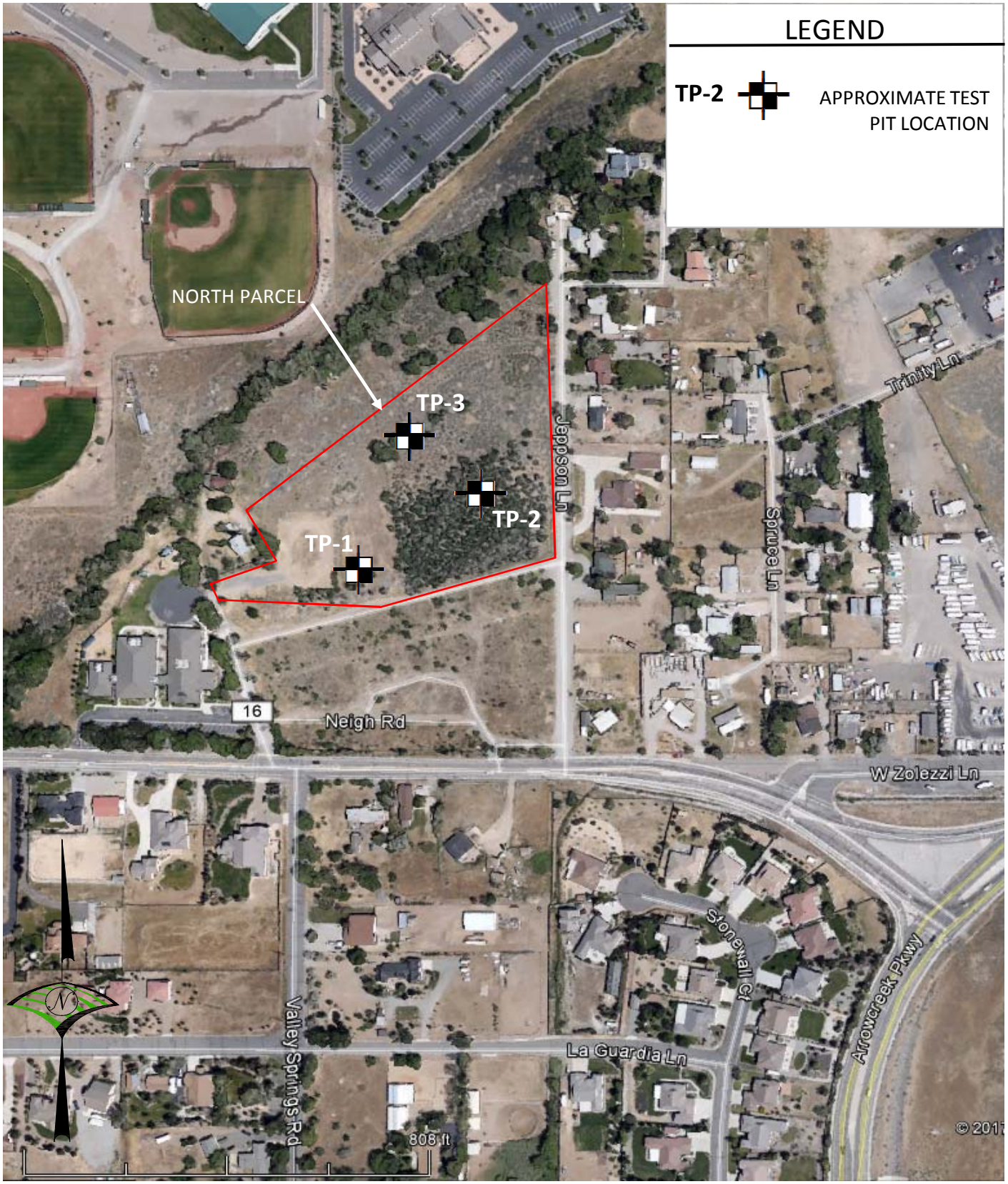
WOOD RODGERS
1361 Corporate Boulevard, Reno, NV 89502
Phone 775.823.4068 Fax 775.823.4066

VICINITY MAP

Geotechnical Investigation
ZOLEZZI 2
AUTUMN WOODS NORTH PARCEL
RENO, WASHOE COUNTY, NEVADA

Project No.: 3520001
Date: 08/01/17

PLATE A-1a



WOOD RODGERS

1361 Corporate Boulevard, Reno, NV 89502

Phone 775.823.4068 Fax 775.823.4066

SITE MAP

Geotechnical Investigation

ZOLEZZI 2

AUTUMN WOODS NORTH PARCEL

RENO, WASHOE COUNTY, NEVADA

Project No.: 3520001

Date: 08/25/17

PLATE A-1b

Wood Rodgers, Inc.
1361 Corporate Boulevard
Reno, Nevada / 89502
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-1

CLIENT DR Horton
PROJECT NAME Zolezzi 2 - North Parcel
PROJECT NUMBER 3520001
PROJECT LOCATION Reno, Nevada
DATE STARTED 8/7/17 **COMPLETED** 8/7/17
GROUND ELEVATION 4584 ft **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Northwest Construction
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 416D
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Dylan DuHamel **CHECKED BY** Justin McDougal
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, CLAYEY GRAVEL WITH SAND, (GC-GM) very dense, slightly moist, brown, non-plastic to low plasticity, boulders to 3-feet in diameter	GB 1A									
2.5												
5.0												
7.5												

Practical Refusal at 8.0 feet.
Sloughing from 5 - 8 feet.
Bottom of Test Pit at 8.0 feet.

Wood Rodgers, Inc.
1361 Corporate Boulevard
Reno, Nevada / 89502
Telephone: 775-823-4068
Fax: 775-823-4066

TEST PIT NUMBER TP-2

CLIENT DR Horton
PROJECT NAME Zolezzi 2 - North Parcel
PROJECT NUMBER 3520001
PROJECT LOCATION Reno, Nevada
DATE STARTED 8/7/17 **COMPLETED** 8/7/17
GROUND ELEVATION 4580 ft **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Northwest Construction
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 416D
AT TIME OF EXCAVATION --- No Free Water Encountered
LOGGED BY Dylan DuHamel **CHECKED BY** Justin McDougal
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		CLAYEY SAND, (SC) dense, slightly moist, brown, low to medium plasticity	GB 2A									
2.5		SILTY SAND WITH GRAVEL, (SM) dense, slightly moist, brown, non-plastic, cobbles to 12-inches in diameter										
5.0			GB 2B					5.70	NP	NP	NP	14.0
7.5												

Practical Refusal at 8.0 feet.
Sloughing from 2 - 8 feet.
Bottom of Test Pit at 8.0 feet.

Wood Rodgers, Inc.
1361 Corporate Boulevard
Reno, Nevada / 89502
Telephone: 775-823-4068
Fax: 775-823-4066

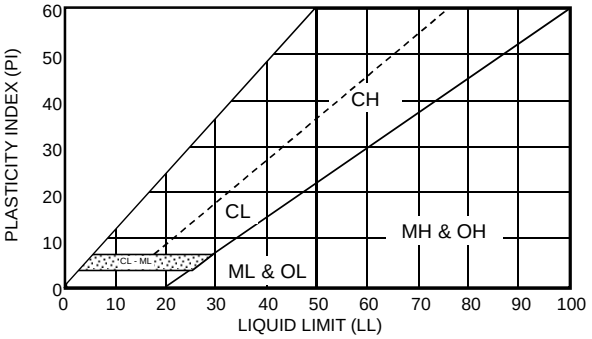
TEST PIT NUMBER TP-3

CLIENT DR Horton
PROJECT NAME Zolezzi 2 - North Parcel
PROJECT NUMBER 3520001
PROJECT LOCATION Reno, Nevada
DATE STARTED 8/7/17 **COMPLETED** 8/7/17
GROUND ELEVATION 4577 ft **TEST PIT SIZE** 24 inches
EXCAVATION CONTRACTOR Northwest Construction
GROUND WATER LEVELS:
EXCAVATION METHOD CAT 416D
AT TIME OF EXCAVATION ---
LOGGED BY Dylan DuHamel **CHECKED BY** Justin McDougal
AT END OF EXCAVATION ---
NOTES:
AFTER EXCAVATION ---

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		CLAYEY GRAVEL WITH SAND, (GC) very dense, moist, brown, medium plasticity, boulders to 18-inches in diameter	GB 3A					6.60 5.20 8.30	24	10	14	20.9
2.5		SILTY, CLAYEY GRAVEL WITH SAND, (GC-GM) very dense, moist, brown, slightly plastic to low plasticity, boulders to 18-inches in diameter	GB 3B					7.10				
			GB 3C					8.50				
5.0			GB 3D					7.50				
			GB 3E					7.40				

Practical Refusal at 7.0 feet.
Sloughing from 3 - 8 feet.
Bottom of Test Pit at 7.0 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
1361 Corporate Boulevard, Reno, NV 89502
Phone 775.823.4068 Fax 775.823.4066

UNIFIED SOIL CLASSIFICATION AND KEY TO SOIL DESCRIPTIONS

Geotechnical Investigation
ZOLEZZI 2
AUTUMN WOODS NORTH PARCEL
RENO, WASHOE COUNTY, NEVADA

Project No.: 3520001
Date: 08/25/17

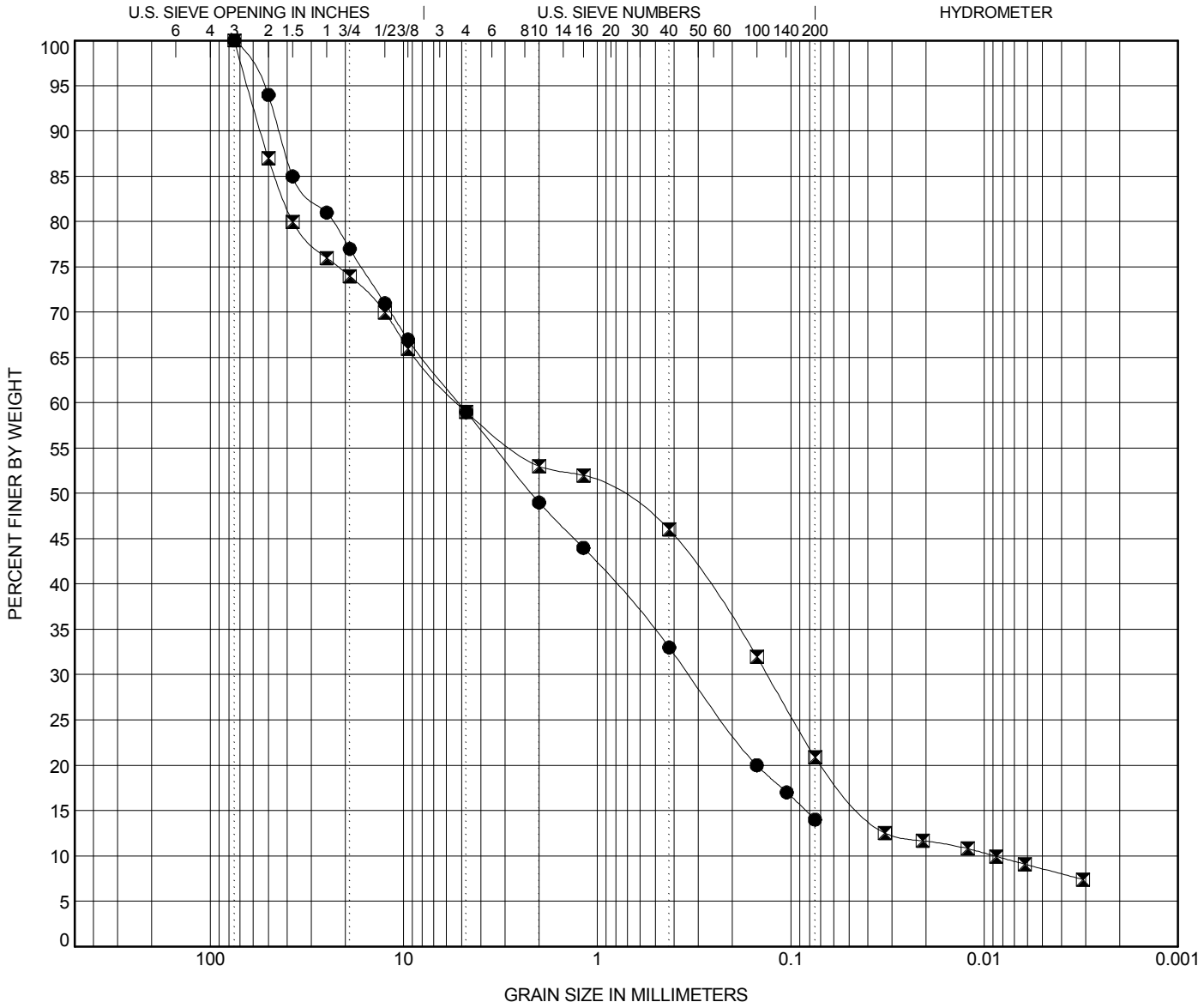
PLATE A-3

Wood Rodgers, Inc.
1361 Corporate Boulevard
Reno, Nevada / 89502
Telephone: 775-823-4068
Fax: 775-823-4066

GRAIN SIZE DISTRIBUTION

CLIENT DR Horton **PROJECT NAME** Zolezzi 2 - North Parcel

PROJECT NUMBER 3520001 **PROJECT LOCATION** Reno, Nevada



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	TEST PIT	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	**TP-2**	**2.0**	**SILTY SAND with GRAVEL(SM)**	**NP**	**NP**	**NP**		
⊠	**TP-3**	**0.0**	**CLAYEY GRAVEL with SAND(GC)**	**24**	**10**	**14**	**0.37**	**587.65**

	TEST PIT	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**TP-2**	**2.0**	**75**	**5.18**	**0.334**		**41.0**	**45.0**	**14.0**	
⊠	**TP-3**	**0.0**	**75**	**5.244**	**0.132**	**0.009**	**41.0**	**38.1**	**12.3**	**8.6**

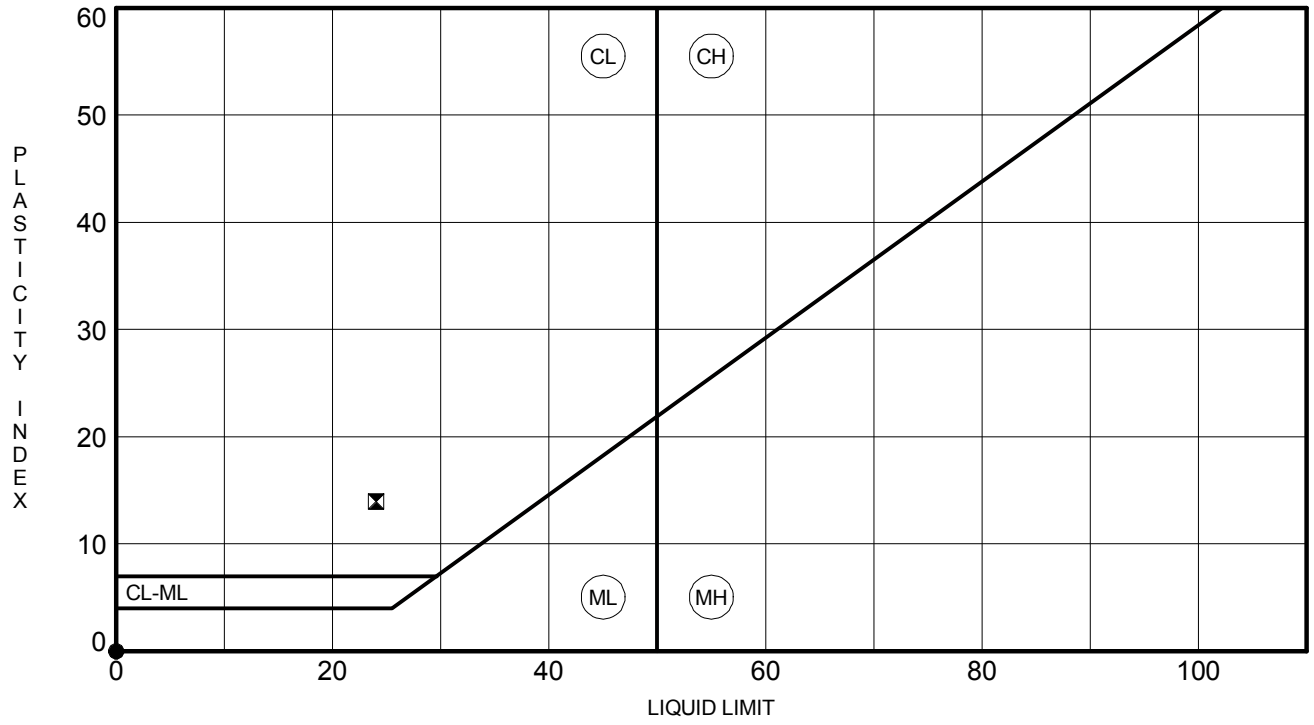
GRAIN SIZE - GINT STD US LAB.GDT - 8/25/17 11:03 - \\RENOSRV04\PRODUCTIONDATA\JOBS-RENO\JOBS\3520_ZOLEZZI 46\ZOLEZZI 46_OA\GEOTECH\GEOTECH\GINT\BORING_LOGS.GPJ

Wood Rodgers, Inc.
1361 Corporate Boulevard
Reno, Nevada / 89502
Telephone: 775-823-4068
Fax: 775-823-4066

ATTERBERG LIMITS' RESULTS

CLIENT DR Horton **PROJECT NAME** Zolezzi 2 - North Parcel

PROJECT NUMBER 3520001 **PROJECT LOCATION** Reno, Nevada



	TEST PIT	DEPTH	LL	PL	PI	Fines	Classification
●	**TP-2**	**2.0**	**NP**	**NP**	**NP**	**14**	**SILTY SAND with GRAVEL(SM)**
⊠	**TP-3**	**0.0**	**24**	**10**	**14**	**21**	**CLAYEY GRAVEL with SAND(GC)**

Silver State Labs-Reno
1135 Financial Blvd
Reno, NV 89502
(775) 857-2400 FAX: (888) 398-7002
www.ssalabs.com

Analytical Report

Workorder#: **17080511**
Date Reported: **8/16/2017**

Client: Wood Rodgers
Project Name: 3520.001 / Zolezzi TP-1 0' - 8'
PO #: LAB 3961

Sampled By: D.Huhamel

Laboratory Accreditation Number: NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
17080511-01	Zolezzi TP-1 0' - 8'	08/08/2017 12:00	8/9/2017

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Sodium	ASTM D2791	< 0.01	%	0.01	LRB	08/14/2017 13:36	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	LRB	08/14/2017 14:56	
Sulfate	SM4500 SO4E	< 0.01	%	0.01	LRB	08/14/2017 13:37	

APPENDIX B
USGS DESIGN MAPS DETAILED REPORT

USGS Design Maps Detailed Report

ASCE 7-10 Standard (39.41917°N, 119.76279°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 2.190 g
From Figure 22-2 [2]	S_1 = 0.728 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\overline{v}_S$	$\overline{N}$ or $\overline{N}_{ch}$	$\overline{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\overline{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 2.190 g, F_a = 1.000

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.728 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 2.190 = 2.190$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.728 = 1.091$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

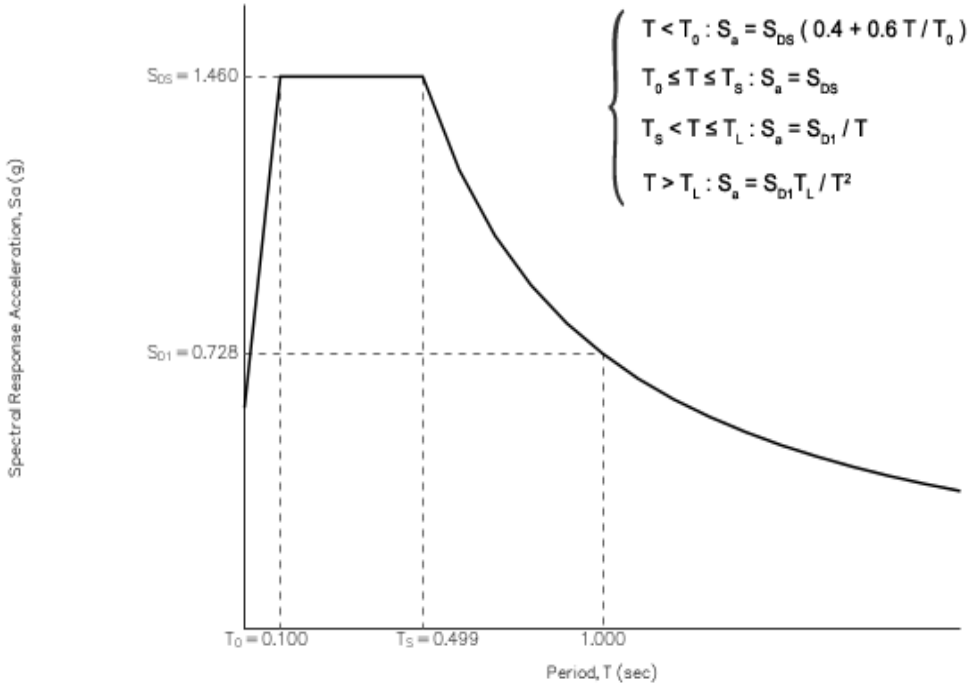
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 2.190 = 1.460$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 1.091 = 0.728$ g

Section 11.4.5 — Design Response Spectrum

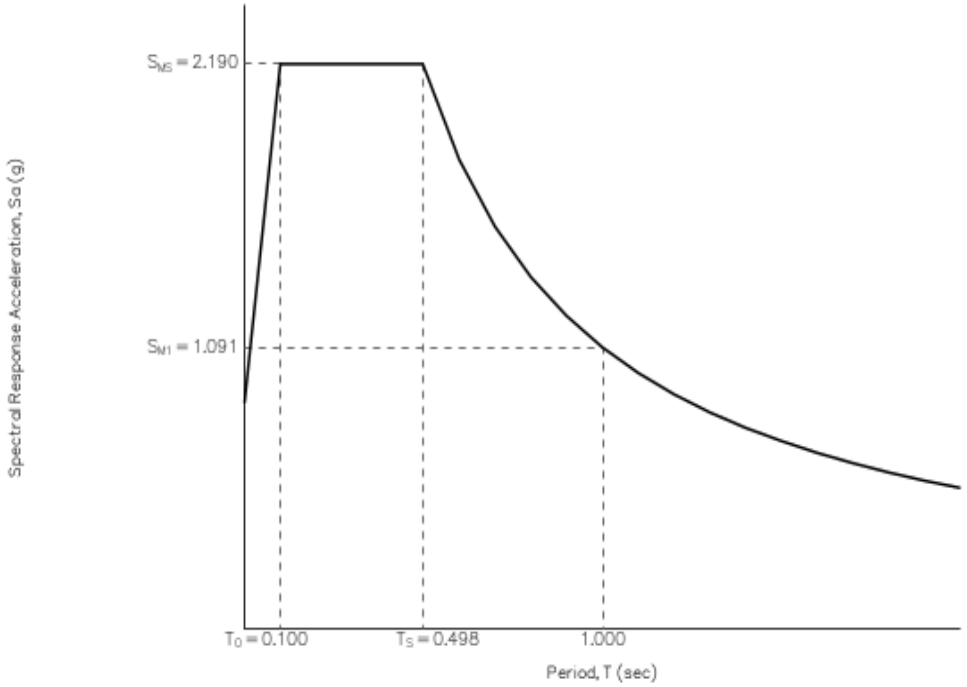
From Figure 22-12 [3] $T_L = 6$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.853

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.853 = 0.853$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.853 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.871

From Figure 22-18 [6] C_{R1} = 0.869

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.460 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.728 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

APPENDIX C
PREVIOUS REPORTS

June 19, 2017
Project No. 3520001

Mr. Ted Brown
Land Acquisition Project Manager
DR HORTON
190 West Huffaker Lane, Suite 408
Reno, NV 89511

RE: Zolezzi 46
Geotechnical Design Update

REF: Geotechnical Investigation
Proposed Autumn Wood Duets
Reno, Nevada
Pezonella Associates, Inc. Job No: 5689.01-A
January 4, 2007

International Residential Code, 2012 (IRC) & Northern Nevada Amendments

Dear Mr. Brown:

Wood Rodgers, Incorporated is pleased to present this geotechnical update of the Zolezzi 46 development. This report presents our review of the referenced geotechnical design report, a summary of the site grading, and our opinions regarding additional geotechnical services that may be required as property development continues. Unless specifically modified herein, the recommendations and considerations presented in the original geotechnical report are considered valid.

REVIEW OF EXISTING GEOTECHNICAL REPORT

The referenced geotechnical report indicates that the overall site development included removal of existing mobile homes and construction of isolated building pads for residential development to be serviced by community water, sewer, and storm drain systems. Cuts and fills are expected on the order of 1 to 2 feet.

Soils encountered consisted of medium dense to very dense silty, clayey sand (SC-SM) with gravel and medium dense silty sand (SM) with gravel on the top layer. Some portions of this soil are overlain by thin layers (< 12 inches) of fill material that consists medium dense silty, clayey sand (SC-SM) with gravel. No free water was recorded during the field exploration. Soil and fill material was reported to exhibit very low potential for expansion, moderate supporting capabilities, and negligible corrosion potential for

Portland cement concrete. Some portions do exhibit a moderate corrosion potential to uncoated steel or metal.

Primary concerns with the development consist of the presence of oversize aggregate, the potential for flooding to occur, and the presence of existing development which are discussed clearly in the referenced document. Wood Rodgers has verified the flood zones in the referenced report are consistent with the most current FEMA flood map. Shallow conventional spread foundations were the recommended foundation system for the referenced project based on the presented grading recommendations.

GEOTECHNICAL CONSIDERATIONS

Seismic Design Criteria

Per the City of Reno Northern Nevada Amendments to the 2012 International Residential Code (IRC), residential structures are to be designed for Seismic Design Category D2. Table 1 presents a summary of seismic design values for the site based on International Residential Code (IRC) requirements. The USGS detailed report is attached in this report.

Table 1 - Summary of ASCE 7-10 Seismic Design Values

Lat.	Lon.	S_S	S_1	SDC	F_a	F_v	S_{MS}	S_{M1}	S_{DS}	S_{D1}	F_{PGA}	PGA_M
39.419	-119.763	2.190	0.728	D	1.000	1.500	2.190	1.091	1.460	0.728	1.000	0.853

Site Preparation, Grading and Filling

Structural fill is defined as any material placed below structural elements and includes foundations, concrete slabs-on-grade, pavements, or any structure that derives support from the underlying soil. Soil generated on site meeting the requirements of Table 2 below may be used as structural fill. Oversize (i.e. > 8-inches) shall be screened from the soils prior to use. A soil fill or 3-inch minus rock fill is normally used for the final 12 inches of pad fills to facilitate fine grading and utility trenching. Imported structural fill should be substantially free of vegetation, organic matter, any deleterious material, and meet the requirements of Table 2; however, imported material should have a maximum particle size of 4-inches.

Table 2 - Guideline Specification for Imported Structural Fill

Sieve Size (ASTM D6913)	Percent by Weight Passing
8 Inch	100
4 Inch	90 - 100
¾ Inch	70 - 100
No. 40	15 - 70
No. 200	5 - 30
Maximum Liquid Limit (ASTM D4318)	35
Maximum Plasticity Index	15
Soluble Sulfate Level (ACI 318, Table 4.3.1)	Negligible
R-Value (ASTM D2844)	30 Min.

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. It is our intent that rockfills consist of an 8-inch-minus, well-graded soil.

Structural fill should be placed in maximum 12-inch thick (loose) level lifts or layers and densified to at least 90 percent relative compaction. All soils should target moisture contents of at least plus or minus 3 percent of optimum moisture (ASTM D1557) prior to densification. If rockfill is imported for use, a placement specification shall be developed by the contractor and approved by the geotechnical engineer as part of the submittal process.

Site grading and pad preparation shall be observed and tested under the full-time services of a materials testing and inspection firm accredited by AASHTO in ASTM E329. In addition, field testing and inspection personnel is recommended to be ICC certified in Soils or NAQTC certified in Sampling and Density. Field density testing (ASTM D6938, or ASTM D1556) shall be performed at a minimum rate of 1 test per 1,000 cubic yards of material placed for mass graded fills and one density test per 300-feet of trench for backfill of footing over-excavation trenches.

Foundations

It is our understanding that spread footings will be utilized for this project. Provided the foundation soils have been prepared in accordance with the recommendations of the referenced report, the bearing pressures, active and passive pressures, and friction factors are considered valid.

For frost protection, footings should all be set at least two feet below adjacent outside or unheated interior finish grades. 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.

In designing for passive pressure, the upper one-foot of the soil profile should not be included unless confined by a concrete slab, or pavement. These design values are based on spread footings bearing on native granular soils, native fine-grained soils, or structural fill and backfilled with structural fill.

If loose, soft, wet, disturbed or clay 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.

Pavements

Table 3 presents the minimum structural pavement sections for parking and driveways within the development.

Table 3 - Structural Pavement Sections

Condition	Pavement Thickness (In.)	Pavement Type[1]	Type II Base Course Thickness (In.)
Dedicated Roadways and Main Access Drives	4	2” Type 3/2” Type 2	6*
Parking and Automobile Traffic Driveways	3	Type 3 + Lime	6

[1] Per the Standard Specifications for Public Works Construction
* The City of Reno requires the subgrade to be corrected to an R-value of 30

All roadway construction shall be in accordance with the approved plans and the 2012 Standard Specifications for Public Works Construction. Roadway subgrade shall be prepared in accordance with the requirements described in referenced report. 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 should 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.

CONCLUSION

We appreciate the opportunity to provide our geotechnical services for you. Please contact our office should you have any related questions or comments.

Sincerely,

WOOD RODGERS, INCORPORATED

James G. Smith, PE
Principal

Justin M. McDougal, PE
Project Engineer
RE Number: 24474
Expires: 12/31/2017

6/19/17

JGS:JMM:da
Enclosures

USGS Design Maps Detailed Report

ASCE 7-10 Standard (39.41917°N, 119.76279°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 2.190 g
From Figure 22-2 [2]	S_1 = 0.728 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\overline{v}_S$	$\overline{N}$ or $\overline{N}_{ch}$	$\overline{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index *PI* > 20, • Moisture content *w* ≥ 40%, and • Undrained shear strength $\overline{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 2.190 g, F_a = 1.000

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.728 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 2.190 = 2.190$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.728 = 1.091$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

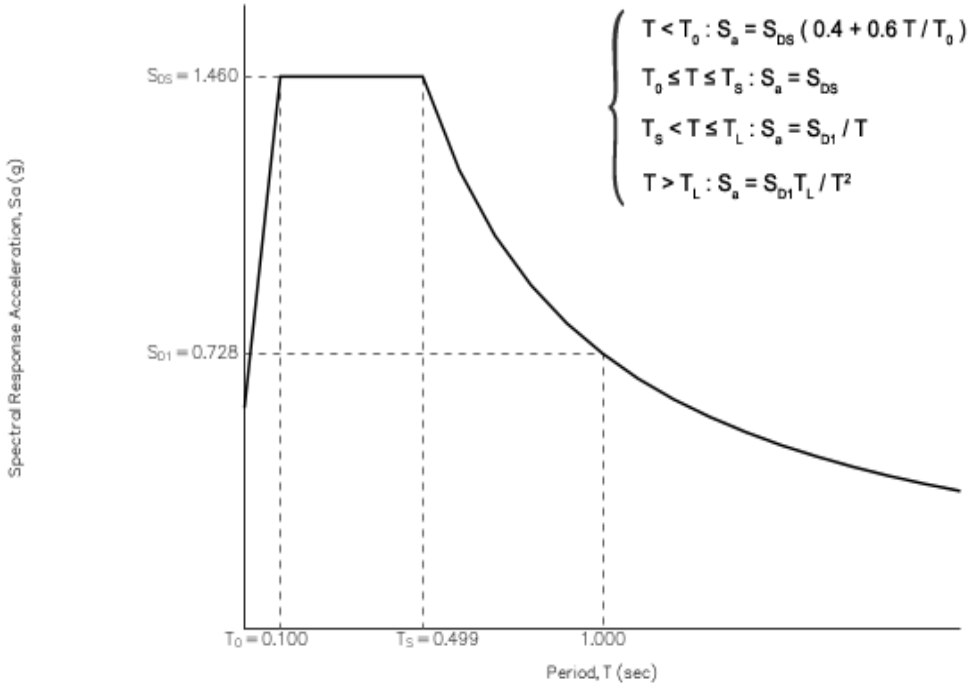
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 2.190 = 1.460$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 1.091 = 0.728$ g

Section 11.4.5 — Design Response Spectrum

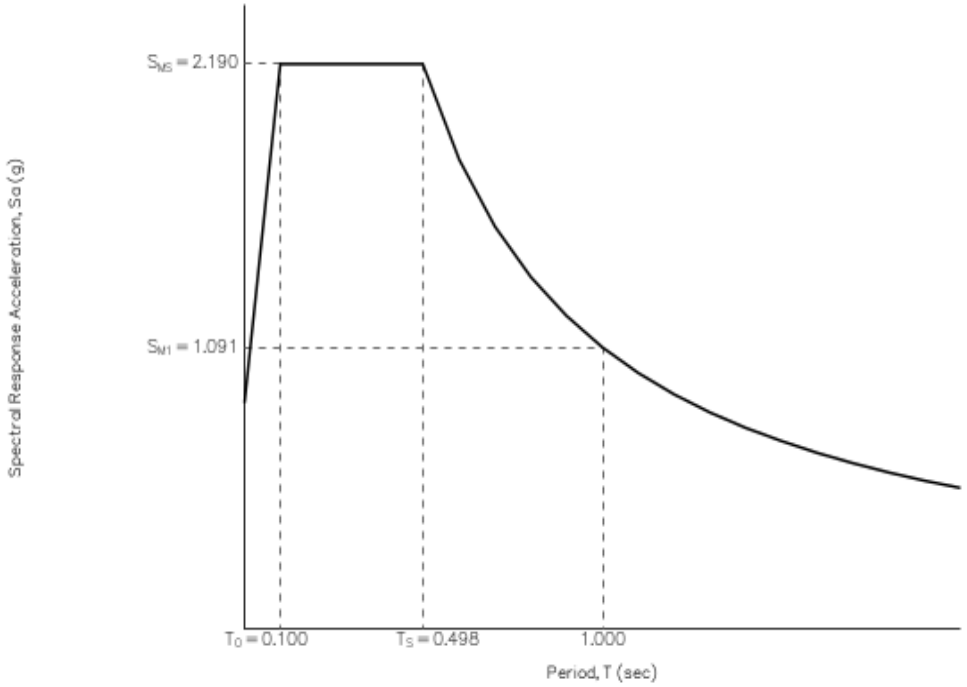
From Figure 22-12 [3] $T_L = 6$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.853

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.853 = 0.853$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.853 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.871

From Figure 22-18 [6] C_{R1} = 0.869

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.460 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.728 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

GEOTECHNICAL INVESTIGATION

PROPOSED

AUTUMN WOOD DUETS

RENO, NEVADA

Prepared For

Alpha Homes, LLC
2989 U. S. Highway 50
Carson City, Nevada 89701

Attention: Ms. Pat Hon

January 4, 2007

Job No. 5689.01-A

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January 4, 2007
Job No. 5689.01-A

Alpha Homes, LLC
2989 U. S. Highway 50
Carson City, Nevada 89701

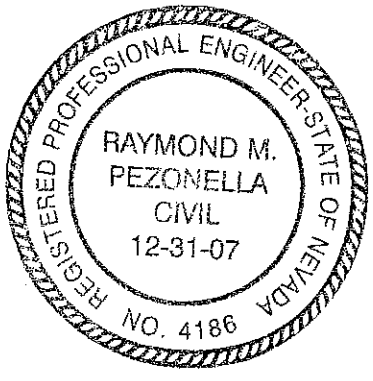
Attention: Ms. Pat Hon

Geotechnical Investigation
Proposed Autumn Wood Duets
Reno, Nevada

This report presents the results of our geotechnical investigation and provides recommendations for the design and construction of the referenced project.

As discussed in the attached report, based on the results of our investigation, knowledge of the area and understanding of project development, we conclude that, from a geotechnical engineering standpoint, the primary concerns to be considered in the design and construction of the project, are the presence of **oversize aggregate**, the potential for **flooding** to occur, and the presence of **existing development**.

We appreciate having been selected to perform this investigation and trust that the results will fulfill project design requirements. If you, or any of your design consultants, have any questions, please contact us.



1.4.07

Respectfully,

PEZONELLA ASSOCIATES, INC.

Raymond M. Pezonella
Civil Engineer - 4186

GEOTECHNICAL INVESTIGATION

PROPOSED

AUTUMN WOOD DUETS

RENO, NEVADA

Prepared For

Alpha Homes, LLC
2989 U. S. Highway 50
Carson City, Nevada 89701

By

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Engineering Geologist

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January 4, 2007

Job No. 5689.01-A

TABLE OF CONTENTS

I. INTRODUCTION

This report presents results of the geotechnical investigation our firm performed for design and construction of the proposed Autumn Wood Duets to be located in Reno, Nevada. The 4.476-acre site is located at the northwest corner of Zolezzi Lane, at its intersection with Jeppson Lane and encompasses Washoe County Assessor's Parcel Number 044-320-48. We have not received architectural plans; however, we understand the project will include removal of the existing mobile homes and construction of isolated building pads for residential development to be serviced by community water, sewer and storm drain systems. The structures will be 1 to 2 stories, wood framed with joist supported floors, and will be supported with shallow conventional spread foundations. Asphaltic concrete surfaced accessways and parking areas will complete project development.

We have not received structural information; however, we anticipate that foundation loads will be normal (relatively light) for the type of construction proposed, that foundations will bottom at least 24 inches below lowest adjacent exterior ground surface and that structural design will be in accordance with the 2003 edition of the International Building Code.

We have not received civil design plans; however, we anticipate that earthwork necessary to attain the proposed finished floor elevations will consist of cuts and fills on the order of 1 to 2 feet. Depth of utility trench excavation is unknown; however, it is expected to be less than 5 feet. We anticipate that any slopes will be constructed at maximum final inclinations of three horizontal to one vertical (3:1), or flatter, and less than 5 feet in height. Earth retaining walls are not proposed. We anticipate that any underground utilities existing within proposed structural areas will be abandoned and/or relocated.

As stated in our proposal dated April 28, 2006, the purpose of our investigation was to determine the general subsurface soil conditions across the site, and to provide opinions and recommendations concerning:

1. Potential geological hazards;
2. Site preparation and grading;
3. Soil engineering criteria for foundation design with estimates of settlement;
4. Support of slabs-on-grade; and,
5. Design and support of flexible pavement sections.

This report is geotechnical in nature and not intended to identify other site constraints such as environmental hazards, wetlands determinations or the potential presence of buried utilities. Additionally, recommendations included in this report are specific to development within the limits of the property and, as such, are not intended for off-site development.

To aid in our investigation, we reviewed the results of a geotechnical investigation report dated August 19, 1998, which our firm prepared for design and construction of the Bishop Manogue High School (Job No. 867.31-A) located to the north.

Previously, in a memorandum dated November 17, 2006, we presented interim recommendations for design and construction.

II. FIELD EXPLORATION AND LABORATORY TESTS

Access across the site was limited due to the presence of existing development and its associated improvements and trees. To attain a general overview, however, of the underlying soil conditions at the site, we drilled 6 test borings with a truck mounted Central Mine Equipment (CME 55) drill rig using hollow-stem auger equipment to depths of 15 to 21 feet below the existing ground surface. The test borings, positioned in the field using pace and compass and with respect to a site plan provided by Jeff Codega Planning/Design, Inc. are depicted (approximate locations) on Plate 1. No greater accuracy is implied.

Our field geologist recorded the location of each test boring using the global positioning system (GPS), logged and visually classified the materials encountered. Relatively undisturbed samples were collected from the test borings in a split spoon sampler utilizing a 140-pound hammer with a 30-inch drop and the blows per foot required to advance the sampler were recorded (Standard Penetration Test). Sampler refusal and difficulty obtaining relatively undisturbed samples were occasionally encountered due to the very dense nature associated with the underlying soils and/or the presence of oversize aggregate such as gravel and cobbles. Logs of the test borings are presented on Plates 2 through 5. The materials encountered are classified in accordance with the Unified Soil Classification System, which is explained on Plate 6.

The samples were returned to our laboratory and reviewed by our staff engineer to confirm their field classifications, to select representative samples for laboratory testing and to determine engineering design parameters. Results of in-situ moisture content and dry unit weight determinations, particle size analysis, triaxial compression tests, Atterberg Limits, Expansion Index, sand equivalent, and Resistance Value determinations are presented on the logs and on Plates 7 through 12. Additional tests, resistivity, pH and SO_4, were performed by an independent laboratory on selected samples to evaluate the corrosion potential and are presented on the test boring logs.

Any proposed development outside the limits of our investigation or any conceptual changes to project development, such as the use of alternative foundations or grade changes, may require additional drilling, laboratory testing and engineering analysis.

III. SITE AND SOIL CONDITIONS

The site is developed (mobile home park) and bordered by Zolezzi Lane to the south, undeveloped land to the north, Jeppson Lane to the east, and the Mountain View Montessori school to the west. The site is relatively level with a gentle grade downward from the southwest to the northeast, and essentially matches elevations of adjacent development. The surface is covered by several mobile home trailers, a single-story brick residence (trailer park office), gravel, landscape and large trees.

Based on mapping by the U. S. Department of Agriculture, Soil Conservation Service (*Soil Survey of Washoe County, Nevada, South Part*, Sheet No. 27, dated 1980), the site is underlain by Oest bouldery sandy loam, 2 to 8 percent slopes (# 661). This very deep, well drained soil is on alluvial fans and terraces. It formed in alluvium from mixed rock sources. Typically, about 1 percent of the surface is covered with boulders. The surface layer is a grayish brown bouldery sandy loam about 14 inches thick. The subsoil is a brown very gravelly sandy loam about 26 inches thick. The substratum is a pale brown very gravelly loamy sand that extends to 60 inches. Permeability is moderate in the subsoil and rapid in the substratum. Available water capacity is moderate. Effective rooting depth is more than 60 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight. Limitations associated with the use of this soil for urban development, as described by the soil survey, are the presence of stones, the rapidly permeable substratum, and the susceptibility to frost heaving.

Based on mapping completed by H. F. Bonham, Jr. and David K. Rogers (*Mt. Rose NE Quadrangle, Geologic Map,* Nevada Bureau of Mines and Geology, dated 1983), the material underlying the site consist of Quaternary age Donner Lake Outwash - Mount Rose Fan Complex (Qdm). This complex consists of pediment and thin fan deposits from major streams draining alpine glaciers on Mount Rose. It typically consists of brown to brownish-gray, sandy, muddy, poorly sorted, large pebble gravel; cobbles and small boulders common. Clasts are dominantly volcanic (porphyritic andesite and latite) while surface granitic clasts rare. It is deeply weathered with a strongly developed soil profile similar to Donner Lake Outwash (Qdo). Locally, it is overlain by undifferentiated veneer of Tahoe Outwash (Qtm) and is well cemented and/or hydrothermally altered in the Steamboat Hills area.

Review of the referenced previously performed geotechnical investigation indicates that the underlying native soil in the site vicinity consists of alternating layers of medium dense to very dense (possibly cemented), silty and clayey sand that contain varying amounts of gravel and cobbles (and possibly boulders) and dense gravel that contains silt, sand and cobbles to the depths explored (19-1/2 to 25-1/2 feet). Laboratory test results indicate that, overall, the clayey portions of the native soils exhibit a low to negligible potential for expansion. At the time of the subsurface exploration (June, 1998), no free ground water was encountered. The report states that the primary geotechnical concerns to be considered during design and construction are the very dense nature and presence of oversize aggregate (gravel cobbles and possibly boulders), the potential for seasonal ground water and the potential for flooding to occur.

Our subsurface explorations confirm, in general, the soil and geologic mapping and referenced geotechnical report, with the upper native soils consisting of brown to dark-brown medium dense to very dense silty, clayey sand (SC-SM) with gravel and brown medium dense silty sand (SM) with gravel. This soil is underlain by alternating layers of brown very dense silty gravel (GM) with sand cobbles, brown medium dense to dense silty sand (SM) with varying amounts of clay and gravel, brown very dense clayey gravel (GC) with sand and cobbles, brown very dense silty gravel (GM) with sand and cobbles, brown medium dense to dense clayey sand (SC) and brown medium dense clean (little or no binder) sand (SP) with silt to the depths explored. Our investigation reveals that portions of the native soils are overlain by thin layers (less than 12 inches) of fill material that consists of brown medium dense silty, clayey sand (SC-SM) with gravel.

At the time of our subsurface exploration (August and September, 2006), no free water was recorded in any of the test borings to the depths explored, and the soils encountered predominantly existed in a relatively dry moisture state.

Our investigation reveals that the native soils and fill material exist, overall, in a relatively compact density state, exhibit very low potential for expansion, moderate supporting capabilities (Resistance Value for roadways and Modulus of Subgrade Reaction for slabs). Tests conducted through an independent laboratory indicate that the native soils exhibit a negligible corrosion potential for portland cement concrete; however, portions do exhibit a moderate corrosion potential to uncoated steel or metal.

IV. GEOLOGIC AND SEISMIC CONSIDERATIONS

To delineate possible faulting and evaluate any other geological hazards on the site, our investigation included a review of available geological literature and maps.

A. Geology

The project is located in the southwestern foothills of the Truckee Meadows, a complex basin bounded by Peavine Mountain, Steamboat Hills, the Virginia Range and the Sierra Nevada to the north, south, east and west, respectively. The basin is transitional between the Basin and Range physiographic province to the east and the Sierra Nevada to the West. The geologic structure of the area is characterized by high angle extensional normal faults trending in a north-northeast direction.

B. Faulting and Seismicity

Based on mapping prepared by Gail Cordy Szecsody (*Mt. Rose NE Quadrangle Earthquake Hazards Map,* Nevada Bureau of Mines and Geology, dated 1983), no known faults are illustrated as crossing the subject property. Based on mapping by John W. Bell (*Quaternary Fault Map of Nevada,* Nevada Bureau of Mines and Geology, Reno Sheet, dated 1984), no Holocene age faults (less than 10 to 12,000 years old) cross the site.

Based on mapping by Craig M. dePolo, John G. Anderson, Diane M. dePolo, and Jonathan G. Price (*Earthquake Occurrence in the Reno-Carson City Urban Corridor,* Seismological Research Letters, Volume 68, dated May/June 1997), the nearest principal Quaternary fault to the project site is the Mount Rose Fault Zone. The Nevada Seismological Laboratory indicates an earthquake of magnitude 7.1 is possible along this fault zone (*Reno/Carson Fault Information*, updated January 31, 2003).From the USGS Maximum Considered Earthquake Ground Motion web site, the S_S is 1.3202g and S_1 is 0.4894g.

Although a complete assessment of the Soil Profile Type in accordance with Table 1615.1.1 (Site Class Definitions) of the 2003 International Building Code would require drilling to a depth of 100 feet, we believe that the subsurface soils approximate a Site Class of at least D as defined in the referenced table.

C. Liquefaction

Liquefaction, a loss of soil shear strength, is a phenomenon associated with loose saturated granular deposits subjected to earthquake shaking, which can result in unacceptable movement of foundations supported by these soils. As a detailed analysis of liquefaction potential, which would require additional drilling to depths of at least 40 to 50 feet, plus detailed laboratory testing and engineering analysis, was not part of the scope of our work, we recommend that the decision to further evaluate the potential for liquefaction be weighed by the Owner or Developer. Generally, these types of mitigation measures are reserved for public safety facilities such as fire, police and hospitals or other buildings with high occupancy such as schools. If future information is requested, our office can be of assistance. From a preliminary standpoint, however, as our investigation indicates that site is underlain by compact soils absent of ground water, we estimate the potential for liquefaction is low.

D. Slope Stability

Based on the level nature of the site, the relatively compact density state of the underlying soils, and our anticipation that any proposed slopes will be constructed at a maximum inclination of three horizontal to one vertical (3:1) or flatter, and less than 5 feet in height, we do not believe the site is susceptible to slope failure, slumps or rockfalls. Shoring should be provided during trenching to mitigate trench wall instability.

E. Radon

Radon, a colorless, odorless, radioactive gas derived from the natural decay of uranium, is found in nearly all rocks and soils. The Environmental Protection Agency (EPA) suggests that remedial action be taken to reduce radon in any structure with average indoor radon of 4.0 pCi/L or more. Based on studies completed by the Nevada Bureau of Mines and Geology in cooperation with the Nevada Division of Health and the U.S. Environmental Protection Agency (*Radon In Nevada*, Nevada Bureau of Mines and Geology, Bulletin 108, 1994), the site (as well of much of Reno and Sparks) exists in an area with a potential for average indoor measurements to equal or be greater than 4.0 pCi/L.

F. Flooding

Flood Hazard studies completed by the Federal Emergency Management Agency (FEMA), Community Panel Number 32031C3170 E, dated September 30, 1994, indicate that the site is located within Flood Hazard Zone X (unshaded) and Flood Hazard Zone A. Zone X (unshaded) are areas determined to be outside the 500-year floodplain, while Zone A are special flood hazard area inundated by 100-year flooding with no base flood elevations determined.

V. CONCLUSIONS

Based on the results of our investigation, knowledge of the area and understanding of project development, we conclude that, from a geotechnical engineering standpoint, the primary concerns to be considered in the design and construction of the project, are the presence of **oversize aggregate**, the potential for **flooding** to occur, and the presence of **existing development**.

Our investigation reveals that the underlying soils may contain oversize aggregate such as gravel, cobbles and possibly boulders. Consideration should be given to the difficulty of earthwork associated with these materials and the fact that excavation depths can be limited. Based on our experience in the area, we believe that excavations limited to the upper 15 feet can be excavated, overall, with a 225 track-mounted Caterpillar Backhoe or equivalent earthmoving equipment. Resistant areas may be encountered which may require the use of specialty equipment such as a hydraulic rock hammer; however, we do not believe that blasting will be necessary. Where encountered, removal of cobbles or boulders can result in undercutting of excavation sidewalls. The resulting trench width could be increased substantially and overbreak can occur. Additionally, as the presence of oversize aggregate will affect fine grading, a leveling course could be needed to maintain structural sections. Boulders which protrude into foundations will require drilling, and epoxy for reinforcing steel and footings may need to be formed and/or stepped.

Consideration should be given to the subsequent reduction of the quantity of material available for use as fill as oversize aggregate, which will require screening, will be generated during grading operations. Screening of oversize aggregate will reduce the volume of material available for reuse unless sufficiently large equipment designed for compacting rock fill is utilized. Compaction approval will be based on visual performance specifications established by the Geotechnical Engineer and based on a performance specification with sufficient on-site observation. Technician time will be increased using a performance procedure which will increase the cost of inspection services. Screened rock could require off-hauling, thus requiring import material to balance earthwork quantities or to attain proposed grades. Screened oversize aggregate may be stockpiled for use within landscape areas or possibly as rip rap. Landscaping which incorporates oversize aggregate should be considered.

A portion of the site has been delineated as existing within an area of potential flooding. Consideration should be given to both local and federal regulations which may impose construction constraints (such as requiring minimum finish floor elevations or ordinances banning basements within areas designated as lying in flood zones). Due to the constant revisions associated with flood zoning, the site delineation with respect to flood zoning should be verified with the most current mapping at the time of building permit application.

As the site is developed, consideration should be given to the potential for the presence of basements, heating oil tanks or service (such as sewer and utility) trenches associated with the structures. Consideration should be given to the fact that, within development areas, these components will require complete removal and replacement with approved fill material as subsequently recommended.

Our investigation indicates that portions of the native soils exhibit a moderate corrosion potential for uncoated steel and/or metal. Based on our results, however, we believe that adequate mitigation can be achieved through the use of properly prepared conventional Type II portland cement concrete, by maintaining a minimum (3-inch) concrete cover where reinforcing steel or other metal which is in close proximity to native soils and by maintaining good workmanship during concrete placement and finishing. Where uncoated steel and/or metal pipes are proposed near native soils, we recommend that the Contractor follow the Manufacturer's recommendation regarding corrosion protection.

In addition to their corrosion potential, consideration should also be given to chemical constituents which may inhibit establishment of landscaping, such as lawns, plants and other vegetation growth, not indigenous to the area. Laboratory testing to determine the agronomic characteristics of the native soils was not part of the scope of our work; however, it should be considered.

As previously mentioned, portions of the native soils are blanketed by fill material. Due to their relatively thin nature and depth, however, we do not believe that the presence of this fill material or loose native soils will adversely impact site development.

The soil survey indicates that additional constraints associated with the underlying materials for urban development may be variable permeability rates and the susceptibility to frost heave. Based on our anticipation that project development will utilize community water, sewer and storm drain systems, we do not believe that variable permeability will adversely impact site development. Consideration should be given, however, to permeability rates if on-site storm water retention/detention is proposed. Based on our anticipation that foundations will bottom 24 inches below lowest exterior ground surface, that slabs-on-grade, exterior flatwork and pavement sections will be supported on approved materials and that proper site drainage will be provided, we do not believe that frost heave will adversely impact site development.

Studies regarding the presence of radon gas suggest that the project site is in an area, or within close proximity to an area, which could exceed the action levels established by the Environmental Protection Agency. Determinations regarding the presence and concentration of radon gas should be performed prior to site development.

As previously discussed, we recommend that the decision to further evaluate the potential for liquefaction be weighed by the Owner or Developer. From a preliminary standpoint, however, as our investigation indicates that site is underlain by compact soils absent of ground water, we estimate the potential for liquefaction is low.

There are no other apparent geologic hazards which will place unusual constraints on the project; however, faults in the region are capable of generating strong earthquakes, and strong shaking associated with an earthquake should be expected during the life of the project.

VI. RECOMMENDATIONS

C. Site Preparation and Grading

Subsequent to planned demolition of any of the existing improvements, particular attention should be given to complete removal within the development area of all associated remnants, including, but not limited to bituminous surfacing, portland cement concrete slabs and footings, septic system components and trenches, heating oil tanks, and utility trenches. All backfill procedures associated with razing of existing development shall be performed as subsequently recommended.

Areas to be developed should be cleared of any debris or rubbish. These materials should be removed from the site. As directed by the Geotechnical Engineer (or his representative in the field), any significant root layers or organic soils should be stripped. Particular attention should be given to the complete removal of root systems associated with mature trees and shrubs. Generally, minor roots remaining after clearing or stripping may be disked or tilled in-place through the use of a disk harrow or equivalent equipment. Stripped soils should be stockpiled for future use within landscape or designated "non-structural" areas. Mowed vegetation and stripping should be evenly blended with soil, conditioned to a suitable moisture content, placed in 8-inch loose lifts and compacted to provide a firm surface. Delineation of any designated "non-structural" areas where vegetation or organics are placed should be illustrated on the "as built" plans to facilitate future development (i.e. additions) if proposed.

Within development areas, any existing fill material should be removed for its full depth and replaced with approved compacted fill as subsequently recommended.

To reduce the thickness of aggregate base and reinforcing steel, soil within 6 inches of exterior flatwork and pavement subgrades shall meet the gradation requirement for select fill (private areas) and structural fill (dedicated areas) as outlined in the *Standard Specifications for Public Works Construction*.

The surfaces exposed by clearing, stripping, removal or overexcavation shall be observed by the Geotechnical Engineer (or his representative in the field) to document that the conditions are as anticipated and that no objectionable materials exist.

Approved surfaces shall be scarified to a depth of 6 inches, moisture conditioned to near optimum (2 to 4 percent over-optimum if excessively clayey) and compacted to at least 90 percent relative compaction[1]. Where attaining compaction is inhibited, such as due to the presence of excessively clayey soil or oversize aggregate, compaction of the exposed surfaces with sufficiently large and appropriate equipment (approved by the Geotechnical Engineer) shall be performed. The number of compaction passes will be determined by the Geotechnical Engineer (or his representative in the field) based on the condition of the exposed surface and the equipment used. The Earthwork Contractor is responsible for obtaining approval for each prepared surface prior to proceeding with placement of structural components and/or any new fill and for maintaining the recommended moisture content during construction.

[1] Relative compaction refers to the in-place dry unit weight of soil expressed as a percentage of the maximum dry unit weight of the same soil, as determined by the laboratory procedure ASTM Test Designation: D 1557.

B. **Material Quality and Reuse**

Where referred to within the text of this report, soil with a low potential for expansion is defined as having an Expansion Index between 35 and 51 and in excess of 12 percent passing the No. 200 sieve. Materials with a medium potential for expansion are defined as having an Expansion Index between 50 and 91 and in excess of 12 percent passing the No. 200 sieve. Materials with a high potential for expansion are defined as having an Expansion Index between 90 and 130 and in excess of 12 percent passing the No. 200 sieve. Materials with an Expansion Index of 35 or less are considered to exhibit very low potential for expansion.

Select fill materials (with the exception of structural fill material to be placed within public improvement areas) should be non-corrosive, free of organic matter and conform, in general, to the following requirements:

Sieve Size	Percent Passing (by dry weight)
6 Inch	100
3/4 Inch	70 - 100
No. 4	50 - 100
No. 200	20 - 40

Expansion Index = 35 Maximum

Our investigation indicates that the native soils and existing fill material will be suitable for reuse as select fill; however, they may not meet the requirements for structural fill (*Standard Specifications for Public Works Construction*) within dedicated public improvement areas. Generally, materials which do not meet these requirements may be reused as mass fill outside the defined structural zones with approval of the Geotechnical Engineer (or his representative in the field) or governing agency. As previously mentioned, portions of the native soils exhibit a moderate corrosion potential for uncoated steel or metal.

The Earthwork Contractor shall ensure that all proposed fills are approved by the Geotechnical Engineer (or his representative in the field). Fill sources shall be identified at least 10 working days prior to use to allow for sampling and testing.

Select or structural fill material shall be conditioned to a near optimum moisture content and compacted to at least 95 percent relative compaction. Mass fill should be conditioned to a near optimum moisture content (2 to 4 percent over-optimum is excessively clayey) and compacted to at least 90 percent relative compaction.

The thickness of all lifts will be restricted to a maximum of 8 inches (loose), and individually tested, unless the Earthwork Contractor can demonstrate his ability to uniformly achieve the required compaction for the entire layer of material placed. If any surface or layer becomes frozen, earthwork construction cannot proceed until it is allowed to thaw. The Earthwork Contractor shall obtain approval from the Geotechnical Engineer (or his representative in the field) of each lift prior to placement of subsequent fill and for maintaining the recommended moisture content during construction.

The recommendations for select fill are intended as a guideline and define a readily attainable, acceptable material. Adjustments to the specified gradation limits to address the use of other potentially acceptable materials, such as those containing oversize particles (typically, material retained on the 3/4-inch sieve), or which deviate from the classification requirements, may be made provided: 1) the Earthwork Contractor can demonstrate his ability to place and compact the material in substantial conformance with industry standards to achieve an equivalent finished product as that specified; 2) the Geotechnical Engineer gives his written approval (requires a minimum of 5 working days from request); 3) the Geotechnical Engineer (or his representative) directly observes and approves the placement

method; and 4) all parties understand that the Standard ASTM Compaction Test procedures are invalid when the oversize fraction retained on the 3/4-inch sieve is 30% or more, or the oversize fraction retained on the #4 sieve is 40% or more. Where select fill containing oversize particles is allowed, compaction approval will be based on other criteria such as a performance specification with sufficient on-site observation. This will result in substantial increase of Technician time and the subsequent cost of inspection services.

C. Site Drainage and Landscape

The ground surface shall be permanently sloped (at least 1 percent for concrete, 2 percent for bituminous concrete, and 4 percent for soil) to drain away from any structure (at least 10 feet), so that water is not allowed to pond against perimeter walls, and to restrict infiltration within exterior flatwork and pavement areas. Gutters, with downspouts connected to solid pipe, shall be used to contain storm water and direct it away from any structure. Landscaping adjacent to structures shall be limited and irrigation should be drip-type.

Laboratory testing to determine the agronomic characteristics of the native soils was not part of the scope of our work; however, consideration should also be given to chemical constituents which may inhibit establishment of landscaping not indigenous to the area.

To mitigate the potential for water to collect within the structural section and to prevent the potential buildup of hydrostatic pressure, a provision (i.e. gravity outlet, French drain or sump pump) with positive drainage can convey any collected water to a disposal area outside the building. The ground surface in crawl spaces shall be sloped toward a suitable point which will aid in conveying any collected water to a disposal area outside the building.

Backfill around foundation stemwalls shall consist of fine grained soil, moisture conditioned to near optimum, and compacted to 90 percent relative compaction. To control water migration, an impermeable membrane shall be placed between foundations and stemwalls and material used as backfill and extend a sufficient distance to effectively cover all placed backfill (see Plate 12).

Due to the potential for lateral vapor migration to occur associated with seasonal moisture change and differences between the building interior and exterior ambient conditions, a vapor inhibitor shall be placed throughout the crawlspace with at least 12 inches of overlap and adhered to the foundations (see Plate 12).

D. Foundation Support and Lateral Resistance

Foundations can gain adequate support on the previously specified minimum section of approved compact native soils with very low potential for expansion or select fill material (see Subsections A and B). In preparation for foundation construction, the Earthwork Contractor shall ensure that field density tests have been performed to document the relative compaction of the upper 6 inches of exposed materials and all new fill, and shall be responsible for maintaining the recommended moisture content during construction. Preparation of these materials shall be documented prior to placement of structural components.

For foundations supported as recommended, we recommend the use of an allowable dead plus long-term live load bearing capacity of 2500 pounds per square foot (psf). The allowable pressure can be increased by 1/3 for total load including wind or seismic forces. Resistance to lateral loads can be obtained from passive earth pressure and soil friction. For design, we recommend a passive earth resistance of 300 pounds per cubic foot (equivalent fluid) per foot of depth and a friction factor of 0.35.

As previously mentioned, although a complete assessment of the Soil Profile Type in accordance with Table 1615.1.1 (Site Class Definitions) of the 2003 International Building Code would require drilling to a depth of 100 feet, we believe that the subsurface soils approximate a Site Class of at least D as defined in the referenced table.

For foundations constructed as subsequently recommended, we judge that total post-construction movement associated with foundation loads will be approximately 3/4-inch and total post-construction differential movement will be about 1/2-inch.

Adequate corrosion potential mitigation can be obtained by using properly prepared and placed Type II portland cement concrete, by maintaining a minimum (3-inch) concrete cover over reinforcing steel or metal, and by maintaining good workmanship during concrete placement and finishing.

E. Slab-on-Grade Support

Interior slabs-on-grade and exterior flatwork, such as walkways and patios, can gain adequate support on the previously specified minimum section of approved compact native soils with very low potential for expansion and/or approved compacted select fill (structural fill within dedicated areas) - see Subsections A and B. In preparation for slab and flatwork construction, the Earthwork Contractor shall ensure that field density tests have been performed to document the relative compaction of the upper 6 inches of exposed materials and all new fill, and shall be responsible for maintaining the recommended moisture content during construction. Preparation of these materials shall be documented prior to placement of crushed gravel, aggregate base and/or structural components.

To provide uniform slab section support, all subgrade surfaces (upper 6 inches) should be scarified, moisture conditioned, and compacted to at least 95 percent relative compaction. The resulting surface should be smooth, firm and non-yielding.

For slab-on-grade design, a Modulus of Subgrade Reaction (k) of 150 pounds per square inch per inch may be used for materials meeting the requirement for select or structural fill.

We understand that fill materials, which do not conform strictly to the gradation requirements contained in the *Standard Specifications for Public Works Construction* and are proposed to be placed within public improvement areas, will require review and approval by the governing agency prior to use.

All dedicated exterior flatwork should conform to standards provided by the governing agency including section composition, supporting material and reinforcing steel.

Interior slabs-on-grade should be underlain by at least 6 inches of clean (free draining) ¾-inch crushed gravel or drain rock (compacted with a vibratory plate) or Type 2, Class B Aggregate base material compacted to at least 95 percent relative compaction. Within lightly loaded interior slab-on-grade and/or private exterior flatwork, the thickness of gravel or base may be reduced to 4 inches.

Exterior flatwork should consist of at least 4 inches of Type II portland cement concrete with a minimum 28-day compressive strength of 4000 pounds per square inch (psi) with entrained air. Portland cement concrete with a lesser compressive strength may be used within private areas; however, the Owner or Developer should weigh the benefits associated with more durable concrete.

Concrete mix proportions and construction techniques, including the addition of water and improper curing, can adversely affect the finished quality of the concrete and result in cracking and spalling of the slabs. We recommend that all placement and curing be performed in accordance with procedures outlined by the Portland Cement Association and American Concrete Institute. Special consideration should be given to concrete placed and cured during hot or cold weather conditions. Proper control joints and reinforcing steel should be provided to minimize any damage resulting from shrinkage.

F. Trench Excavation and Backfilling

We believe that earthwork limited to the upper 15 feet can be excavated, overall, with a Caterpillar 225 track-mounted Backhoe or D7 Dozer (or equal) earthmoving equipment. Due to the presence of oversize aggregate, excavation instability can result. For safety, the sides of the trench should be sloped or shoring should be used and dewatering may be necessary. The Earthwork Contractor must comply with the *Safety and Health Regulations for Construction* as directed by the Occupational Safety and Health Act (OSHA Standards, Volume 11, Part 1926, Subpart P) while excavating and backfilling. The Earthwork Contractor is also responsible for providing a competent person, as defined by the OSHA standards, to ensure excavation safety.

To reduce potential water migration, pipe bedding shall consist of Class A Backfill, moisture conditioned to near optimum, placed in thin lifts and compacted to at least 90 percent relative compaction. A "J-bar" shall be used to ensure proper placement and compaction adjacent to the pipe. Backfill shall consist of fine grained soils (less permeable) that is moisture conditioned to near optimum, placed in 8-inch (loose) maximum lifts and compacted to at least 90 percent relative compaction.

At the direction of the Manufacturer, special coverings should be provided where uncoated steel or metal is proposed.

G. Permanent Cut and Fill Slopes

All permanent cut and fill slopes less than 5 feet in height can be constructed at maximum inclinations of three horizontal to one vertical (3:1). Where fill is to be placed on natural slopes of 5:1 or steeper, keying and benching shall be provided along the fill/native soil interface. A keyway, located at the base of the slope, shall be at least 2 feet in depth (or into competent material) and 10 feet in width (see Plate 13).

The Contractor shall overfill and trim the face of all fill slopes or compact them to provide a firm surface, free of loose soil that would be subject to erosion and sloughing. To further minimize erosion potential and future maintenance, upon completion of grading, all three to one (3:1) or flatter slopes should be protected with dense-rooted, rapid growing vegetation.

All slopes should be evaluated by the Geotechnical Engineer in the field to document that the conditions are as anticipated and that the recommended bench width and slope heights are appropriate.

H. Pavement Sections

Flexible pavement sections can gain adequate support on the previously specified minimum section of approved compact native soils with very low potential for expansion and/or approved compacted select fill (structural fill within dedicated areas) - see Subsections A and B. In preparation for pavement construction, the Earthwork Contractor shall ensure that field density tests have been performed to document the relative compaction of the upper 6 inches of exposed materials and all new fill, and shall be responsible for maintaining the recommended moisture content during construction. Preparation of these materials shall be documented prior to placement of aggregate base.

To provide uniform pavement section support, all subgrade surfaces (upper 6 inches) should be scarified, moisture conditioned, and compacted to at least 95 percent relative compaction. The resulting surface should be smooth, firm and non-yielding.

We understand that fill materials, which do not conform strictly to the gradation requirements contained in the *Standard Specifications for Public Works Construction* (latest edition), and proposed to be placed within public improvement areas, will require review and approval by the governing agency prior to use.

We have not received information concerning anticipated traffic weights or volumes; however, based on our understanding of project development, we believe that a minimum section consisting of 3 inches of Type 2 or 3 asphaltic concrete over 6 inches of Type 2, Class B aggregate base underlain by the previously specified minimum section of approved subbase is adequate within accessways and parking areas.

Regardless of our recommended flexible pavement section, all dedicated sections must conform to standards adopted by the governing agency, including section composition, supporting material thickness and any requirements for reinforcing steel. Based on information included in the Asphalt Institute Manual Series No. 1 (MS-1 *Thickness Design Asphalt Pavements for Highways & Streets)*, we believe that the minimum section adopted by the City of Reno and consisting of 4 inches of Type 2 or 3 asphaltic concrete over 6 inches of Type 2, Class B aggregate base underlain by the previously specified minimum section of approved subgrade is more than adequate within parking areas and accessways.

Where "dumpster" type garbage containers are utilized, the paved areas in the loading vicinity of the container experience increased stresses from the dynamic effect of the trash hauling vehicles. We recommend the use of a 5-inch thick portland cement concrete slab with reinforcing steel over 6 inches of aggregate base material in the loading vicinity of a dumpster. If the Owner/Developer elects to utilize bituminous concrete in this area, to minimize the damage, we recommend the use of 4 inches of bituminous concrete over 8 inches of aggregate base.

In preparation for placement of the pavement section, the Earthwork Contractor shall ensure that proposed subgrade materials have been observed and/or tested by the Geotechnical Engineer (or his representative in the field) to document conformance with the gradation requirements.

Aggregate base materials should be placed in thin lifts and compacted to at least 95 percent relative compaction. All subgrades and final grades should be rolled to provide a uniform surface which is smooth, firm, and non-yielding.

Aggregates should conform to the requirements contained in the *Standard Specifications for Public Works Construction*.

A bituminous concrete mix design should be submitted for approval prior to paving. During paving, the bituminous mixture should be sampled and tested by the Geotechnical Engineer to ensure material quality and compaction. Periodic crack sealing and surface sealing must be implemented to increase service life of the pavement.

I. Additional Geotechnical Engineering Services

This report is geotechnical in nature and not intended to identify other site constraints such as environmental hazards, wetlands determinations and/or the potential presence of buried utilities. We can assist in evaluating these considerations should further information be requested.

Consideration should be given to review of all plans and specifications for conformance with this geotechnical report and approval by the Geotechnical Engineer prior to submitting to the governing agency.

The recommendations presented in this report are based on the assumption that sufficient field inspection and construction review will be provided during all phases of construction. Prior to construction, a pre-job conference should be scheduled to include, but not be limited to, the Owner, Architect, Civil Engineer, General Contractor, Earthwork and Materials Sub-Contractors, Building Official and Geotechnical Engineer. The recommendations presented in this report should be reviewed by all parties to discuss applicable specifications and testing requirements. At this time, any applicable material quality and mix design reports should be submitted for approval by the Geotechnical Engineer.

We should provide on-site observations and testing during site preparation and grading, excavation, fill placement, foundation installation and paving. These observations would allow us to document that the soil conditions are as anticipated, and that the Contractor's work is in conformance with the intent of our recommendations and the approved plans and specifications.

VII. GLOSSARY OF TEST PROCEDURES

ASTM Test Designation: C 136: *Standard Test Methods for Sieve Analysis of Fine and Coarse Aggregates.*

ASTM Test Designation: D 420: *Standard Guide to Site Characterization for Engineering Design and Construction Purposes.*

ASTM Test Designation: D 1140: *Standard Test Methods for Amount of Material in Soils Finer Than the No. 200 (75-um) Sieve.*

ASTM Test Designation: D 1586: *Standard Test Method for Penetration Test and Split-Barrel Sampling of soils.*

ASTM Test Designation: D 2216: *Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass.*

ASTM Test Designation: D 2419: *Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.*

ASTM Test Designation: D 2487: *Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).*

ASTM Test Designation: D 2844: *Standard Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils.*

ASTM Test Designation: D 4318: *Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.*

ASTM Test Designation: D 4767: *Consolidated-Undrained Triaxial Compression Test on Cohesive Soils.*

ASTM Test Designation: D 4829: *Expansion Index of Soils.*

VIII. DISTRIBUTION

Unbound original and two bound copies to:

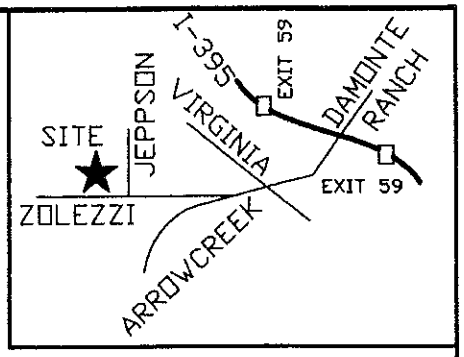
Alpha Homes, LLC
2989 U. S. Highway 50
Carson City, Nevada 89701
Attention: Ms. Pat Hon
Telephone: (775) 882-5000
Facsimile: (775) 882-1618

&

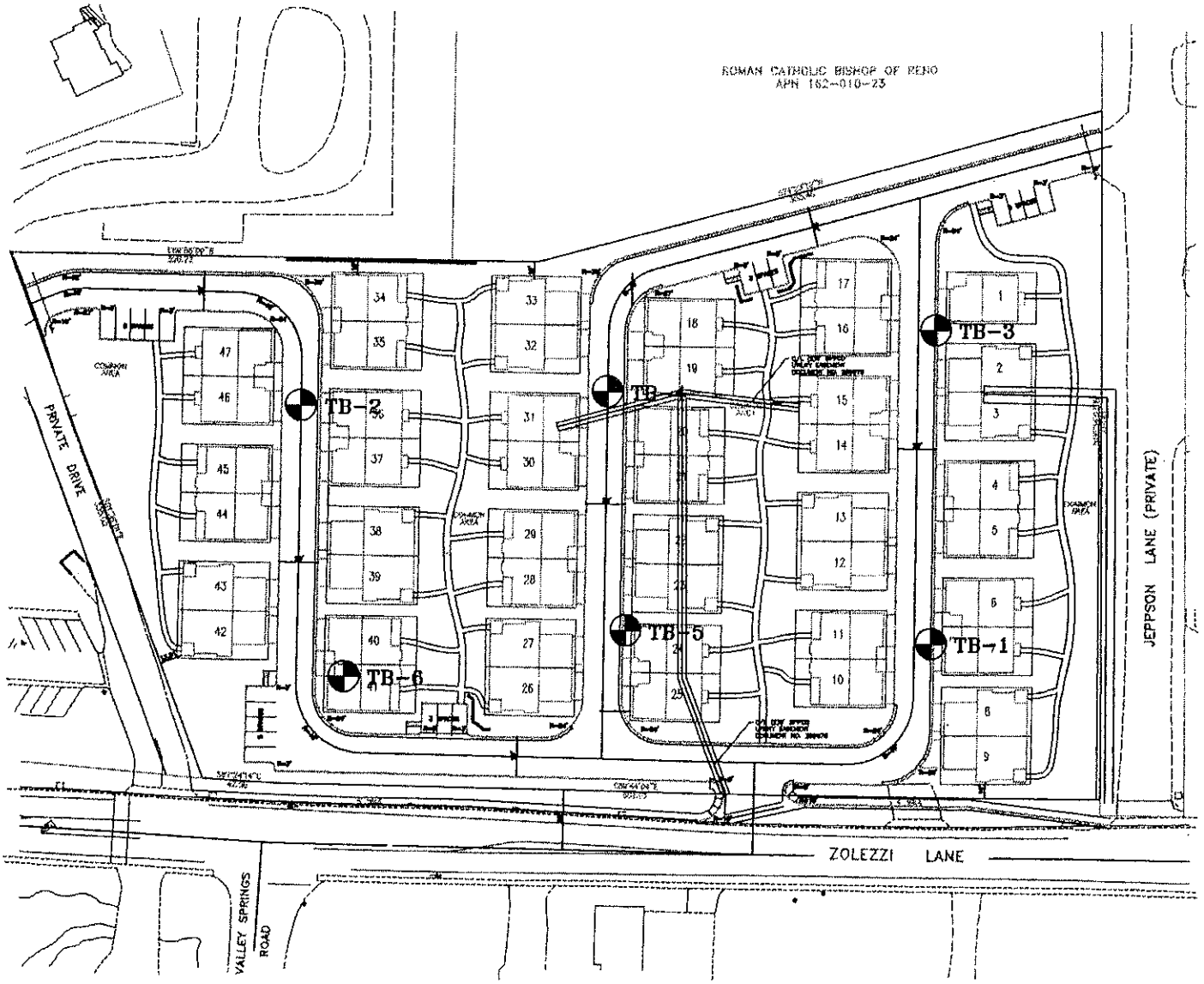
One unbound copy and three bound wet stamped copies to:

Palmer Engineering Group, Limited
611 North Nevada Street
Carson City, Nevada 89703-3968
Attention: Mr. Harold Morris, PE
Telephone: (775) 884-0479
Facsimile: (775) 884-4226

IX. LIST OF ILLUSTRATIONS



VICINITY MAP



Remarks: Not To Scale

Layout from Site Plan furnished by Jeff Codega Planning/Design, Inc.

= Test Boring Location

Job No. 5689.01-A	SITE AND EXPLORATION PLAN	CDP appr./11-08-06
Pezonella Associates, Inc Consulting Engineers 5520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6043	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 1

LOG OF BORING 1

Equipment CME 55 Hollow Stem Auger

Elevation 4567 Date 08-31-06

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	
	14/6"				BROWN SILTY, CLAYEY SAND (SC-SM) with gravel medium dense, dry
* Particle Size Distribution Report with Atterberg Limits (See Plate 7)	20/6"			*	BROWN SILTY, CLAYEY SAND (SC-SM) with gravel dense, dry
Expansion Index (See Plate 9)	27/3"				becoming very dense below 2.0 feet
R-Value Test Data (See Plate 11)					sampler refusal at 2.5 feet
Sand Equivalent = 37	27/6"			5	BROWN SILTY GRAVEL (GM) with sand and cobbles very dense, dry
	29/6"				sampler refusal at 6.5 feet
	29			10	BROWN SILTY SAND (SM) medium dense, moist
					with gravel and becoming dense below 12.0 feet
	43			15	
					with clay below 18.0 feet
	36/11"			20	
					sampler refusal at 21.0 feet
					No Free Water Encountered
				25	

Fill

Elevation Reference:

Topographical data taken from Site Plan furnished by Jeff Codega Planning/Design, Inc.

GPS: 39°25.124'N 119°45.717'W

Job No. 5689.01-A	BORING LOG	CMB/appr./11-08-06
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6042	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 2

LOG OF BORING 2

Equipment CME 55 Hollow Stem Auger

Elevation 4574 Date 08-31-06

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample	
	19				BROWN SILTY SAND (SM) with gravel medium dense, dry
	12/6"	3.8	116		BROWN SILTY, CLAYEY SAND (SC-SM) with gravel medium dense, dry
	10/6" 14/6"				
	27/6"			5	BROWN CLAYEY GRAVEL (GC) with sand and cobbles very dense, dry sampler refusal at 5.0 feet
	30			10	BROWN SILTY SAND (SM) dense, dry
	38			15	BROWN CLAYEY SAND (SC) dense, dry
	44			20	sampler refusal at 21.0 feet
					No Free Water Encountered
				25	

Elevation Reference:

See Log of Boring 1

GPS: 39°25.160'N
119°45.819'W

Job No. 5689.01-A	BORING LOG	CMB/appr./11-08-06
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6042	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 3

LOG OF BORING 3

Equipment CME 55 Hollow Stem Auger

Elevation 4572 Date 09-01-06

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample
* pH=6.66 SO_4=17.2 ppm Resistivity=2890 Ohm-cm.	16/6"			
	36			
	26	3.8	111	*
	50			5
	27/3"			10
	10/0"			15

BROWN SILTY, CLAYEY SAND (SC-SM) with gravel
dense, dry

change to medium dense below 2.0 feet

BROWN CLAYEY GRAVEL (GC) with sand and cobbles
very dense, dry

sampler refusal at 10.5 feet

bag auger cutings at 13.5 feet

sampler refusal at 15.0 feet

GPS: 39°25.177'N
119°45.728'W

No Free Water Encountered

Elevation Reference:

See Log Of Boring 1

LOG OF BORING 4

Equipment CME 55 Hollow Stem Auger

Elevation 4576 Date 09-01-06

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample
* Particle Size Distribution Report (See Plate 8) Expansion Index (See Plate 10) Sand Equivalent = 27 ** Triaxial Compression Test	10/6" 14/6" 22/6"	11.2	116	* **
	20/6" 27/6"			
	15			5
	19	7.8	106	10
*** Percent passing the No. 200 sieve = 10.6	24	6.8	116	***15

DARK BROWN SILTY, CLAYEY SAND (SC-SM) with gravel
medium dense, dry
becoming dense below 12 inches

change to medium dense below 4.0 feet

GRAY-BROWN SAND (SP-SM) with silt
medium dense, dry

GPS: 39°25.167'N
119°45.776'W

No Free Water Encountered

Elevation Reference:

See Log Of Boring 1

Job No. 5689.01-A	BORING LOG	Appr./11-08-06
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6042	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 4

LOG OF BORING 5

Equipment CME 55 Hollow Stem Auger

Elevation 102.5 Date 09-01-06

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample
	11/6" 19/6" 27/4"			BROWN SILTY, CLAYEY SAND (SC-SM) with gravel dense, dry
	27/3"			BROWN CLAYEY GRAVEL (GC) with sand and cobbles very dense, dry sampler refusal at 2.5 feet
	27/5"			5 sampler refusal at 5.0 feet
				GRAY-BROWN SILTY GRAVEL (GM) with sand and cobbles very dense, dry
	27/5"			10 sampler refusal at 10.0 feet
				GRAY SILTY SAND (SM) with gravel dense, dry
	31			15

GPS: 39°25.127'N
119°45.758'W

No Free Water Encountered

Elevation Reference:

See Log Of Boring 1

LOG OF BORING 6

Equipment CME 55 Hollow Stem Auger

Elevation 4280 Date 09-06-06

Laboratory Tests and (Other Information)	Driving Resistance Blows/Ft.	Moisture Content (%)	Dry Density (pcf)	Depth (ft) Sample
	12/6" 14/6" 16/6"	4.0	114	BROWN SILTY, CLAYEY SAND (SC-SM) with gravel medium dense, dry
	23			
* pH=6.80 SO_4=14.8 ppm Resistivity=11,765 Ohm-cm.	22			5 * BROWN SILTY SAND (SM) with gravel medium dense, dry
				BROWN CLAYEY GRAVEL (GC) with sand and cobbles very dense, dry
	30/6"			10
				BROWN CLAYEY SAND (SC) medium dense, moist
	22			15

GPS: 39°25.136'N
119°45.803'W

No Free Water Encountered

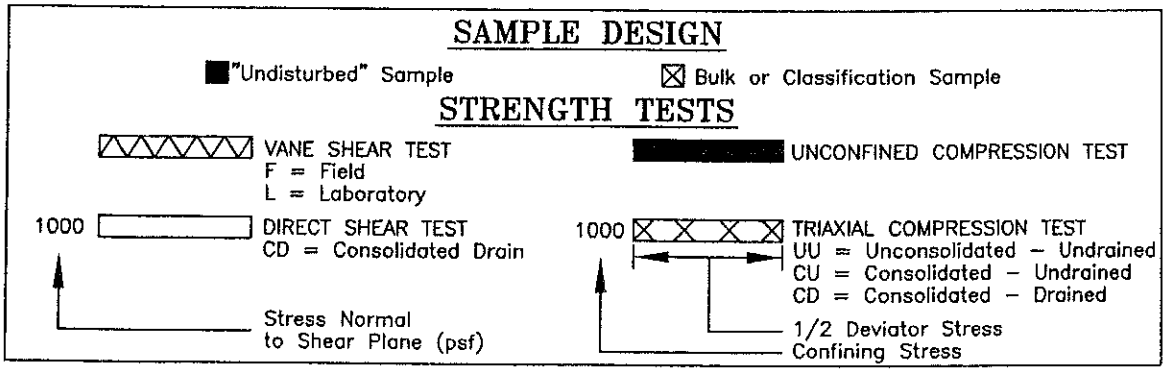
Elevation Reference:

See Log Of Boring 1

Job No. 5689.01-A	BORING LOG	appr./11-08-06
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6048	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 5

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS (MORE THAN HALF IS LARGER THAN #200 SIEVE)	GRAVELS MORE THAN HALF COURSE FRACTION IS LARGER THAN No. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL–SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL–SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL–SAND SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL–SAND–CLAY MIXTURES
	SANDS MORE THAN HALF COURSE FRACTION IS SMALLER THAN No. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND–SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND–CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN HALF IS SMALLER THAN #200 SIEVE)	SILTS AND CLAY LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS SILTY CLAYS, LEAN CLAYS
			OL	INORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

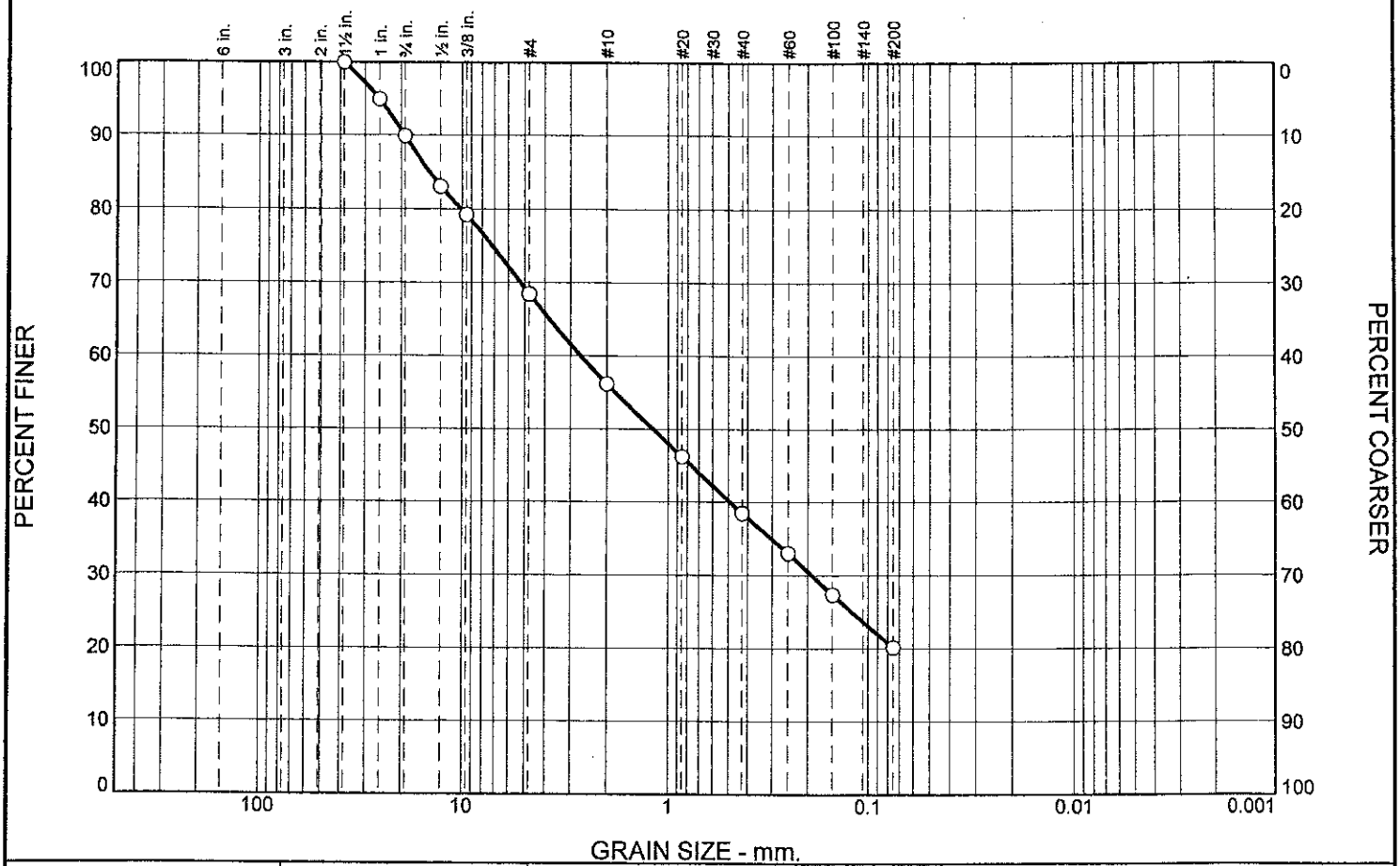
UNIFIED SOIL CLASSIFICATION SYSTEM



KEY TO TEST DATA

Job No. 5689.01-A	AUTUMN WOOD DUETS	appr./11-08-06
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-5042	SOIL CLASSIFICATION CHART AND KEY TO TEST DATA	Plate No. 6

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.1	21.5	12.2	17.7	18.4	20.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	95.0		
.75	89.9		
.5	83.0		
.375	79.2		
#4	68.4		
#10	56.2		
#20	46.2		
#40	38.5		
#60	33.0		
#100	27.3		
#200	20.1		

* (no specification provided)

Soil Description

Brown silty, clayey sand (SC-SM) with gravel

Atterberg Limits

PL= 15 LL= 21 PI= 6

Coefficients

D_{85}= 14.4316 D_{60}= 2.6793 D_{50}= 1.1896
D_{30}= 0.1902 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-1-b

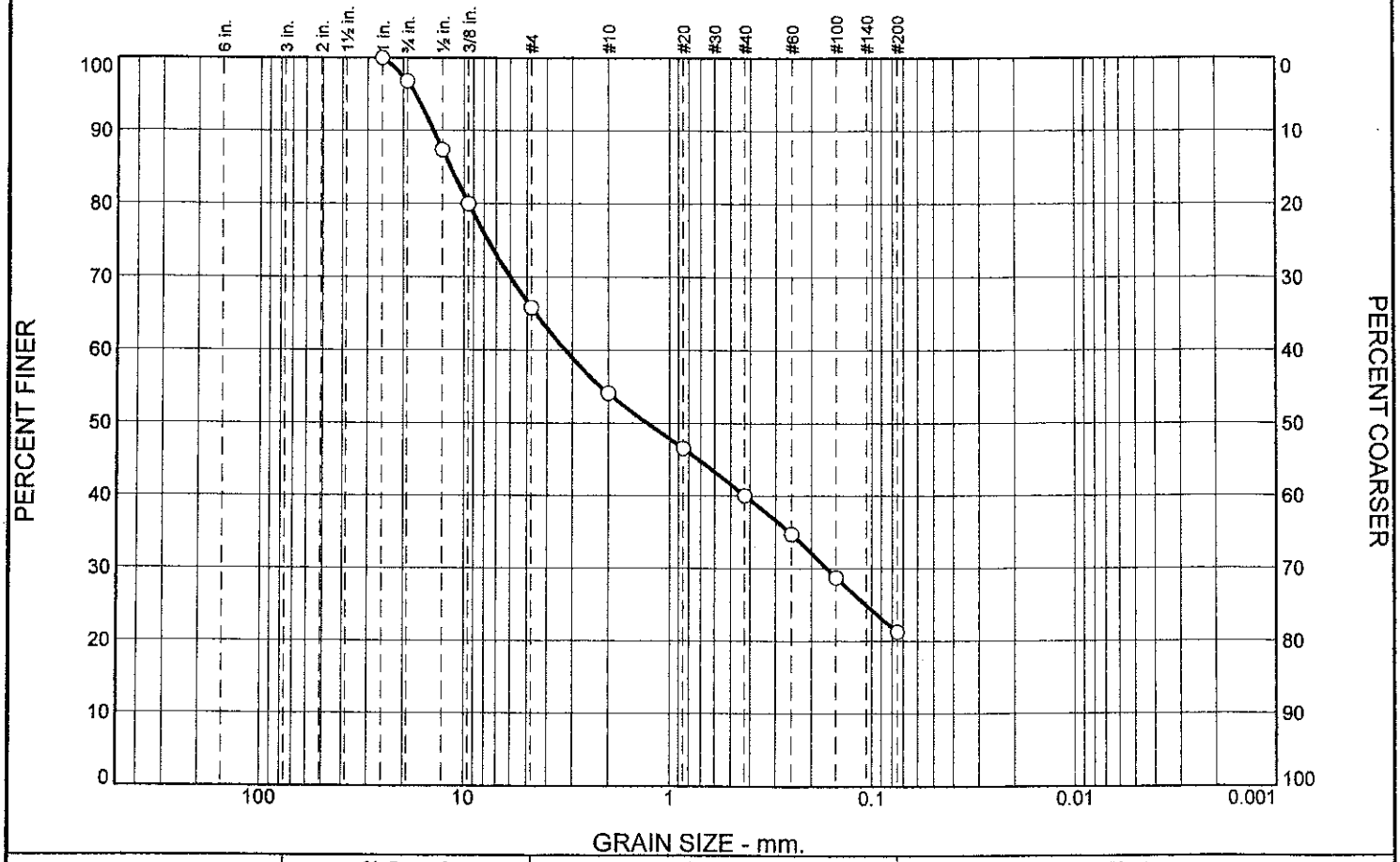
Remarks

Sample No.: 747 **Source of Sample:** TB-1 **Date:** 10-30-06
Location: **Elev./Depth:** 1.0 to 3.5 feet

PEZONELLA ASSOCIATES, INC.
Reno, Nevada

Client:
Project: Autumn Wood Duets
Project No: 5689.01-A **Plate** 7

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.2	31.0	11.7	14.1	18.8	21.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.8		
.5	87.3		
.375	79.9		
#4	65.8		
#10	54.1		
#20	46.5		
#40	40.0		
#60	34.7		
#100	28.7		
#200	21.2		

* (no specification provided)

Soil Description

Dark brown silty, clayey sand (SC-SM) with gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 11.6248 D_{60}= 3.2618 D_{50}= 1.2870
D_{30}= 0.1671 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= (SC-SM) AASHTO=

Remarks

Sample No.: 750 **Source of Sample:** TB-4 CDB **Date:** 10-30-06
Location: **Elev./Depth:** 1.0 to 5.0 feet

PEZONELLA ASSOCIATES, INC.
Reno, Nevada

Client:
Project: Autumn Wood Duets
Project No: 5689.01-A **Plate** 8

Sample Location: TB-1

Depth: 1.0 to 3.5 feet

Soil Classification: Brown silty, clayey sand (SC-SM) with gravel

Test Specification: ASTM D4829

S.G. 2.7

Degree of Saturation (S_{meas}) 48.02

EI_{meas} 80.8

EI_{50}* 1

I.B.C. Criteria (¶1802.3.2)

Soils meeting all 4 of the following provisions shall be considered expansive, except that tests to show compliance with items 1, 2 and 3 shall not be required if the test provided in item 4 is conducted.

1. ☐ PI > 15 (ASTM D4318)
2. ☐ > 10% smaller than 75 microns (ASTM D422)
3. ☐ > 10% smaller than 5 microns (ASTM D422)
4. ☒ EI > 20 (ASTM D4829)

CLASSIFICATION OF POTENTIALLY EXPANSIVE SOIL (ASTM D4829; ¶5.3)

EXPANSION INDEX	POTENTIAL EXPANSION
0-20	VERY LOW
21-50	LOW
51-90	MEDIUM
91-130	HIGH
>130	VERY HIGH

EXPANSION INDEX 1

POTENTIAL EXPANSION VERY LOW

* Expansion Index (EI_{50}) calculated by using EI_{meas} within 40 and 60% saturation in accordance with ASTM D4829, ¶10.1.2

Job No. 5689.01-A	EXPANSION INDEX REPORT	Date: 11-08-06
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6042	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 9

Sample Location: TB-4

Depth: 1.0 to 5.0 feet

Soil Classification: Dark brown silty,clayey sand (SC-SM) with gravel

Test Specification: ASTM D4829

S.G. 2.7

Degree of Saturation (S_{meas}) 52.6

EI_{meas} 6.4

EI_{50}* 7.5

I.B.C. Criteria (¶1802.3.2)

Soils meeting all 4 of the following provisions shall be considered expansive, except that tests to show compliance with items 1, 2 and 3 shall not be required if the test provided in item 4 is conducted.

1. ☐ PI > 15 (ASTM D4318)
2. ☐ > 10% smaller than 75 microns (ASTM D422)
3. ☐ > 10% smaller than 5 microns (ASTM D422)
4. ☒ EI > 20 (ASTM D4829)

CLASSIFICATION OF POTENTIALLY EXPANSIVE SOIL (ASTM D4829; ¶5.3)

EXPANSION INDEX	POTENTIAL EXPANSION
0-20	VERY LOW
21-50	LOW
51-90	MEDIUM
91-130	HIGH
>130	VERY HIGH

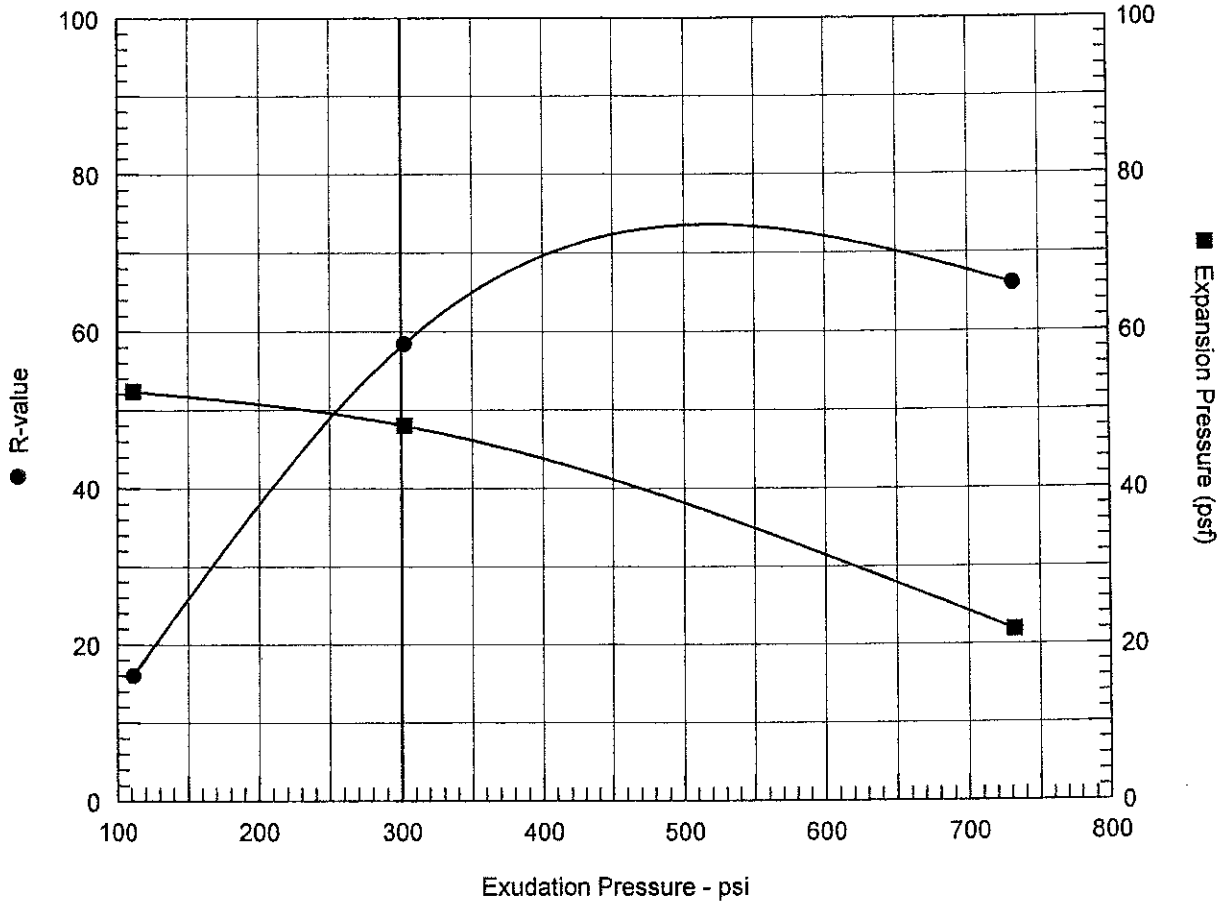
EXPANSION INDEX 7.5

POTENTIAL EXPANSION VERY LOW

* Expansion Index (EI_{50}) calculated by using EI_{meas} within 40 and 60% saturation in accordance with ASTM D4829, ¶10.1.2

Job No. 5689.01-A	EXPANSION INDEX REPORT	Date: CDB 11-08-06
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6042	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 10

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - ASTM D 2844

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	45	124.0	11.3	52	116	2.49	111	16.0	16.0
2	200	128.2	8.3	48	50	2.42	302	60.4	58.4
3	300	121.1	6.7	22	40	2.57	732	64.4	66.0

Test Results	Material Description
R-value at 300 psi exudation pressure = 58.0 **Exp. pressure at 300 psi exudation pressure =** 48 psf	Brown silty, clayey sand (SC-SM) with gravel

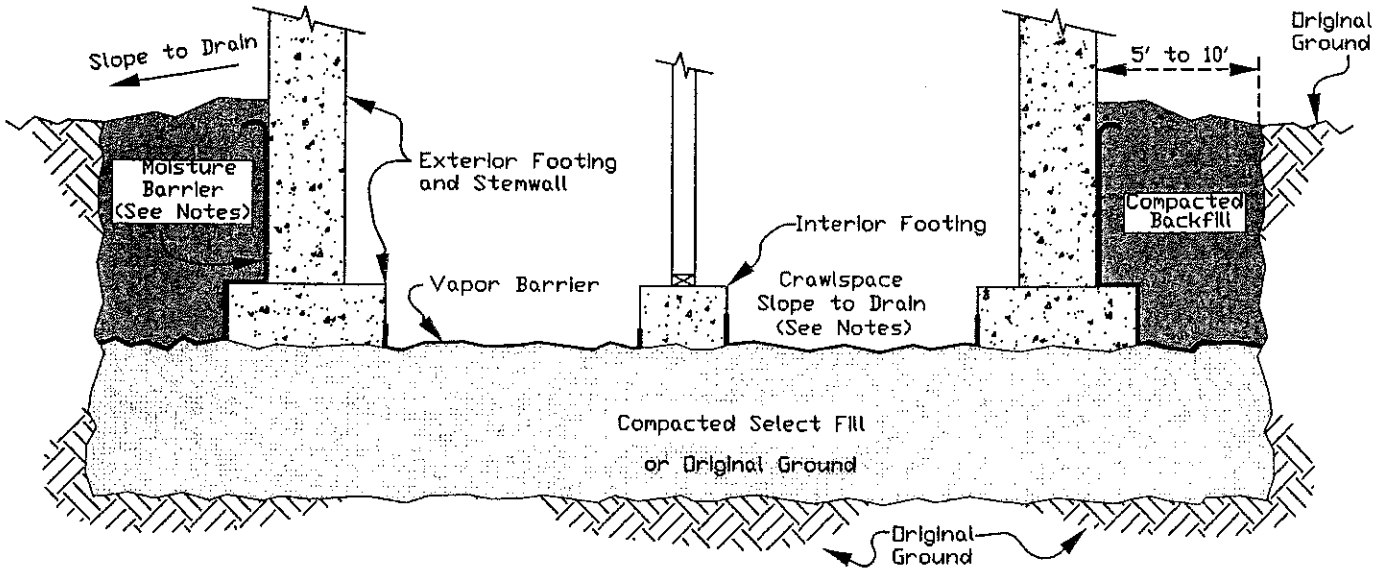
Project No.: 5689.01-A
Project: Autumn Wood Duets
Source of Sample: TB-1 **Depth:** 1.0 to 3.5 feet
Sample Number: 747
Date: 1/8/2007

Tested by:
Checked by: DJB
Remarks:

R-VALUE TEST REPORT

PEZONELLA ASSOCIATES, INC.

Plate 11



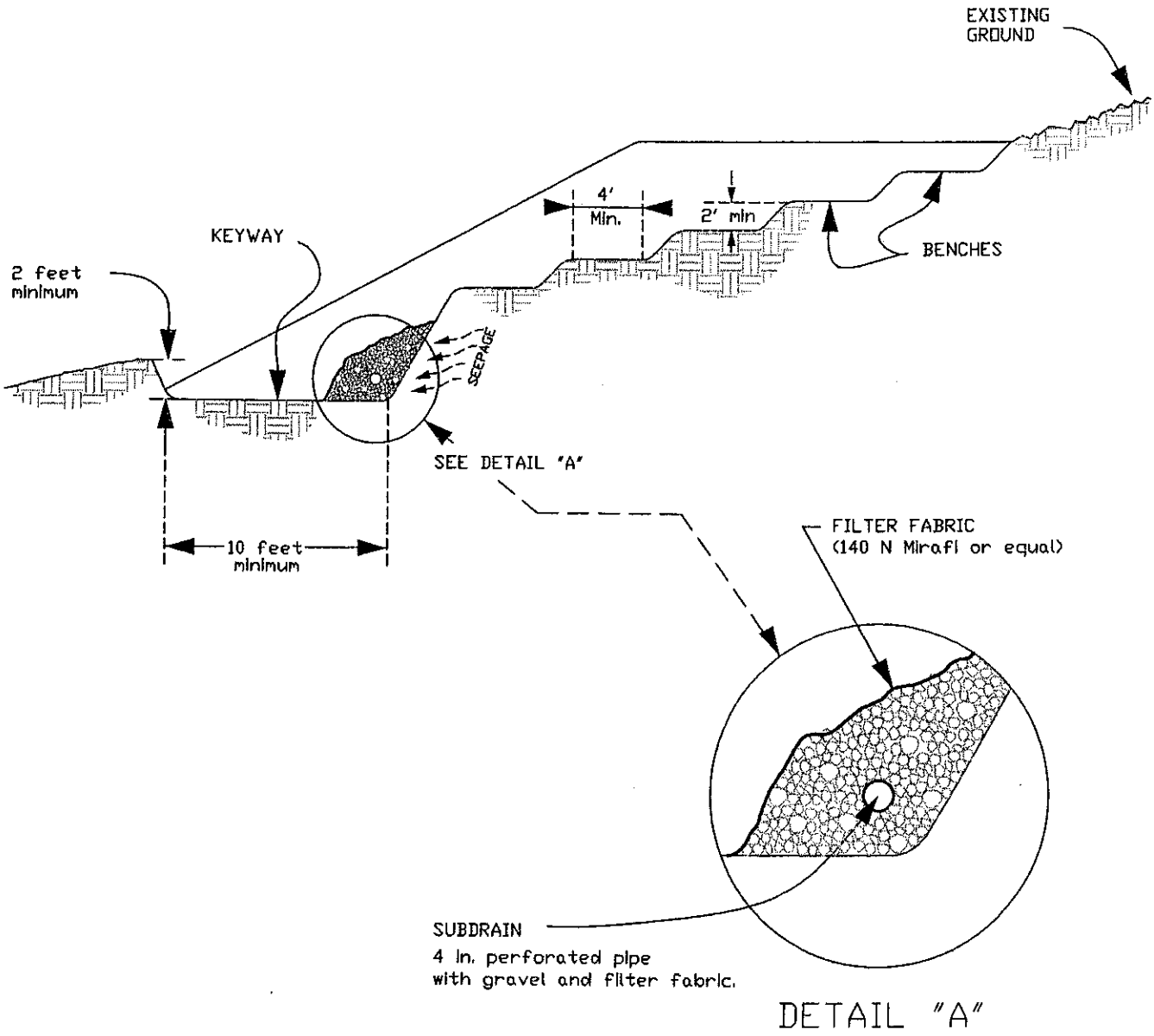
NOTES:

1.) A 20-mil (minimum) moisture barrier shall be provided where granular material is used as backfill.

2.) Crawlspace shall be sloped to a suitable point which will aid in conveying any collected water outside the building.

Not to Scale

Job No. 5689.01-A	FOUNDATION AND BACKFILL DETAIL	SAS /appr./11-08-06
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6042	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 12



DETAIL "A"

NOTE: This detail applies when existing ground slopes are 5:1 and steeper.

Not to Scale

Job No. 5689.01-A	DETAIL FOR FILLING ON SLOPES	appr./11-08-0
Pezonella Associates, Inc Consulting Engineers 520 Edison Way Reno, Nevada 89502 PHONE (775) 856-5566 FAX (775) 856-6043	AUTUMN WOOD DUETS RENO, NEVADA	Plate No. 13