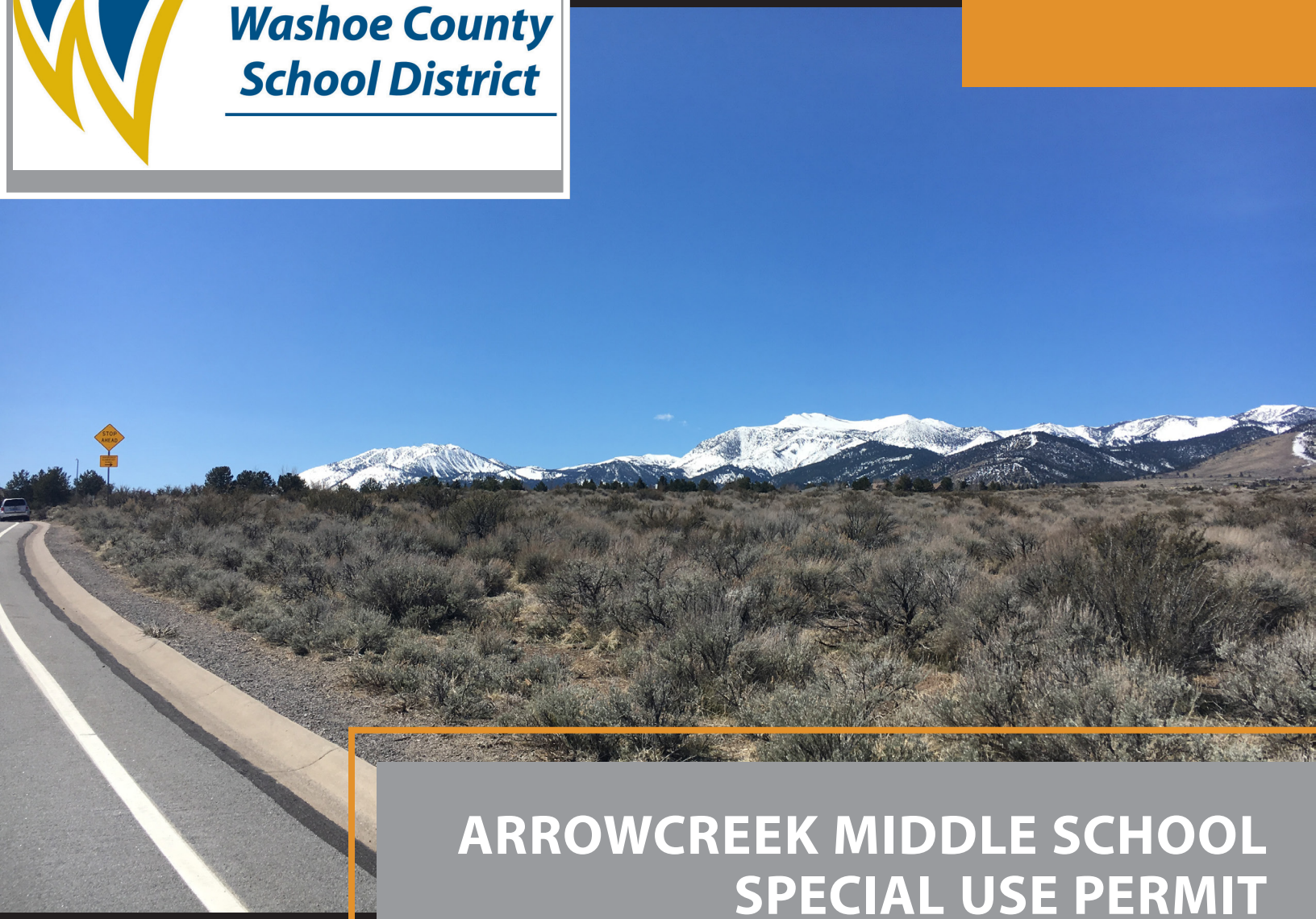
9222 Prototype Drive
Reno, Nevada 89521
Tel. 775.827.6111
Fax 775.827.6122
www.LumosInc.com

Washoe County School District



ARROWCREEK MIDDLE SCHOOL SPECIAL USE PERMIT

April 16, 2018

Prepared by:

LUMOS & ASSOCIATES 40th ANNIVERSARY

Odyssey ENGINEERING INCORPORATED

Table of Contents

Appendices

Maps

Project Request

Project Summary

Commissioner District:	2
Applicant:	Washoe County School District
APN Number:	049-010-29
Request:	This is a request for a Special Use Permit to allow grading per Washoe County Development Code Section 110.438.35(a).
Zoning:	Low Density Suburban (LDS)
Master Plan:	Suburban Residential
Planning Area:	Southwest Truckee Meadows Planning Area

Project Background

In November of 2016, Washoe County voters approved WC-1, which gives the Washoe County School District (WCSD) funding to repair and renovate older schools, and to build new schools to address overcrowding. This approval came at a time when population growth within Washoe County has placed a strain on the School District resources and has led to overcrowding in many local schools. As the community is coming out of one of the worst recessions in history, the WCSD is working to address overcrowding in schools. Construction of a new middle school in south Reno has been identified as a high priority and immediate need for the community.

The WCSD has submitted an application requesting conveyance of 60 acres of U.S. Forest Service land through the Education Land Grant Act, which authorizes the Secretary of Agriculture to convey National Forest System lands to a public school district for use for educational purposes.

The WCSD is in the process of designing a new middle school located in south Reno. The proposed site (APN 049-010-29) is zoned Low Density Suburban (LDS), and has a master plan designation of Suburban Residential. The parcel is located in the Southwest Truckee Meadows Planning Area.

The site is located north of Arrowcreek Parkway and west of Thomas Creek Road. The west edge of the parcel abuts Crossbow Court, and is directly adjacent to Hunsberger Elementary and Sage Ridge Schools. The site is surrounded by single family homes to the north, east and south, with a vacant parcel on the northern third of the parcel's west edge and a vacant parcel at its southeastern edge. The property also abuts a 2.43-acre parcel owned by the Truckee Meadows Water Authority, at its northwestern corner.

The proposed use as a WCSD middle school, is allowed by right without discretionary review, in accordance with Article 440, Public School Facilities Design Standards, of the Washoe County

Development Code. Development of the site requires grading that exceeds the thresholds of "Major Grading" in accordance with Article 438, Grading Standards, of the Washoe County Development Code, specifically:

1) Grading on slopes of less than fifteen percent of more than four acres on a parcel of any size.
2) Excavation of five thousand cubic yards or more, whether the material is intended to be permanently located on the project site or temporarily stored on a site for relocation to another final site.

The proposed developed area of approximately 28.4 acres will result in ±247,980 cubic yards of cut and ±251,748 cubic yards of fill. This will result in ±3,767 cubic yards of overall fill for the project. The cut/fill slopes have been minimized with the addition of 8-foot tall retaining walls. The walls have been designed to create varying curvilinear contours, which breaks up the appearance of a manufactured slope. This is also in accordance with the Southwest Truckee Meadows Area Plan, which requires grading to complement the original contours of the landscape and minimize disruption of the natural topography.

The grading has been visually minimized through extensive landscaping that includes over ±5.6 acres of landscape area. A total of 566 trees and 2,492 shrubs are included in the landscape design, which will help to screen the grading from public view on the adjacent roadways and neighboring properties. The mix of trees will include both deciduous and coniferous varieties measuring 1"-2" caliper shade and ornamental trees and 5'-7' tall evergreens. All disturbed areas will be seeded with a native revegetation seed mix and temporary irrigation.

This special use permit application is for grading only, and does not include specific information on the proposed school use. However, background information has been provided to better explain the uniqueness of the property use and parcel ownership.

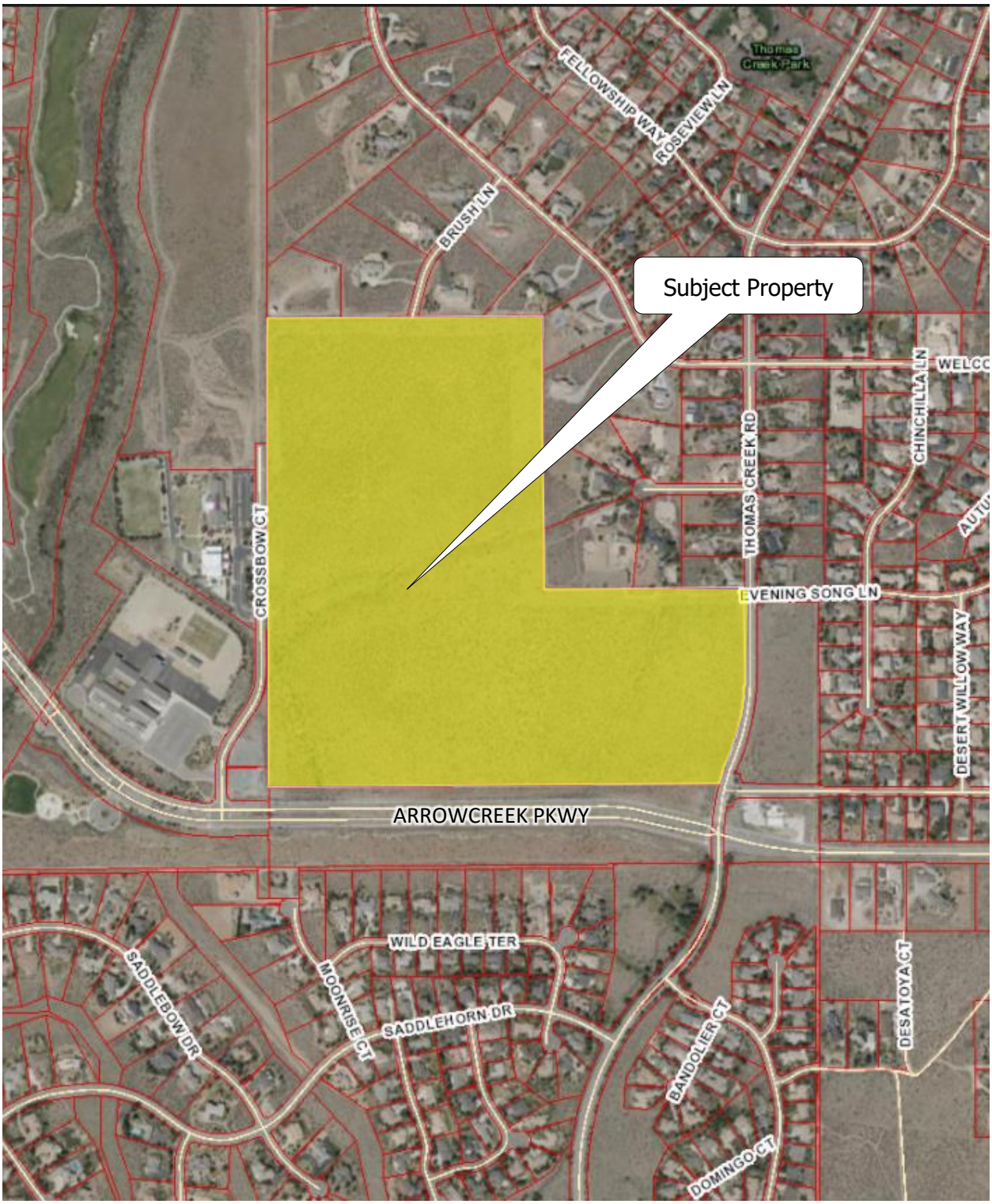


Figure 1 - Vicinity Map

View of the property facing west.

View of the property facing east.

Figure 5 - Site Photographs

View of the property facing north.

View of the property facing south.

Figure 6 - Site Photographs

Special Use Permit Findings

Prior to approving an application for a special use permit, the Planning Commission, Board of Adjustment or a hearing examiner shall find that all of the following are true:

1. Consistency – The proposed use is consistent with the action programs, policies, standards and maps of the Master Plan and the applicable area plan;

The proposed project is in conformance with Washoe County Master Plan and the Southwest Truckee Meadows Area Plan. There are no specific Policies or Action Programs included in the Southwest Truckee Meadows Area Plan that are applicable to the proposed grading for a public Middle School. However, the proposed project is consistent with the following Policies related to grading and provision of schools:

SW.5.2 – The Washoe County Departments of Community Development and Public Works will establish and oversee compliance with design standards for grading that minimize the visual impact of all residential and non-residential hillside development, including road cuts and driveways.

SW.5.3 – The grading design standards referred to in Policy SW.5.2 will, at a minimum, ensure that disturbed areas shall be finished and fill slopes will not exceed a 3:1 slope, and that hillside grading will establish an undulating naturalistic appearance by creating varying curvilinear contours.

Goal Eight – The Southwest Truckee Meadows planning area will contain an extensive system of trails that integrates other recreational facilities, the Regional Trail System, public lands, schools and transit facilities. This trail system will contribute to the preservation and implementation of community character.

SW.20.3.h – Proposed amendments shall complement the long range plans of facilities providers for transportation, water resources, schools and parks, as reflected in the policy growth level established in Policy 1.2.

SW.20.3.i – If the proposed intensification results in existing public school facilities exceeding design capacity and compromises the Washoe County School District's ability to implement the neighborhood school philosophy for elementary facilities, then there must be a current capital improvement plan or rezoning plan in place that would enable the District to absorb the additional enrollment. The Washoe County Planning Commission, upon request of the Washoe County School Board of Trustees, may waive this finding.

2. Improvements – Adequate utilities, roadway improvements, sanitation, water supply, drainage, and other necessary facilities have been provided, the proposed improvements are properly related to existing and proposed roadways, and an adequate public facilities determination has been made in accordance with Division Seven;

Adequate roadways, sanitation, water supply, drainage and other necessary facilities and utilities will be provided to the site, as the grading is intended to create appropriate access and facilitate construction of a public Middle School.

3. Site Suitability – The site is physically suitable for the type of development and for the intensity of development;

The property has some topographic constraints that require grading. However, the grading plan has been designed to minimize visual impacts by means of retaining walls and the additional of a significant amount of landscaping. The proposed developed area of approximately 28.4 acres will result in ±3,767 cubic yards of overall fill for the project. The cut/fill slopes have been minimized with the addition of 8-foot tall retaining walls. The walls have been designed to create varying curvilinear contours, which breaks up the appearance of a manufactured slope. This is also in accordance with the Southwest Truckee Meadows Area Plan, which requires grading to complement the original contours of the landscape and minimize disruption of the natural topography. The grading has been visually minimized through extensive landscaping that includes over ±5.6 acres of landscape area. A total of 566 trees and 2,492 shrubs have been included in the landscape design, which will help to screen the grading from public view on the adjacent roadways and neighboring properties.

4. Issuance Not Detrimental – Issuance of the permit will not be significantly detrimental to the public health, safety or welfare; injurious to the property or improvements of adjacent properties; or detrimental to the character of the surrounding area;

Issuance of the permit will not be significantly detrimental to the public health, safety or welfare of the surrounding area. Consideration has been given to the neighboring property through the overall site design. This includes placement of the buildings and play fields away from the residential properties. The extensive landscaping will help to mitigate the grading impacts and screen the development from public view.

5. Effect on a Military Installation – Issuance of the permit will not have a detrimental effect on the location, purpose or mission of the military installation.

The proposed project has no effect on the location, purpose or mission of military installation. There are no military installations in the area.

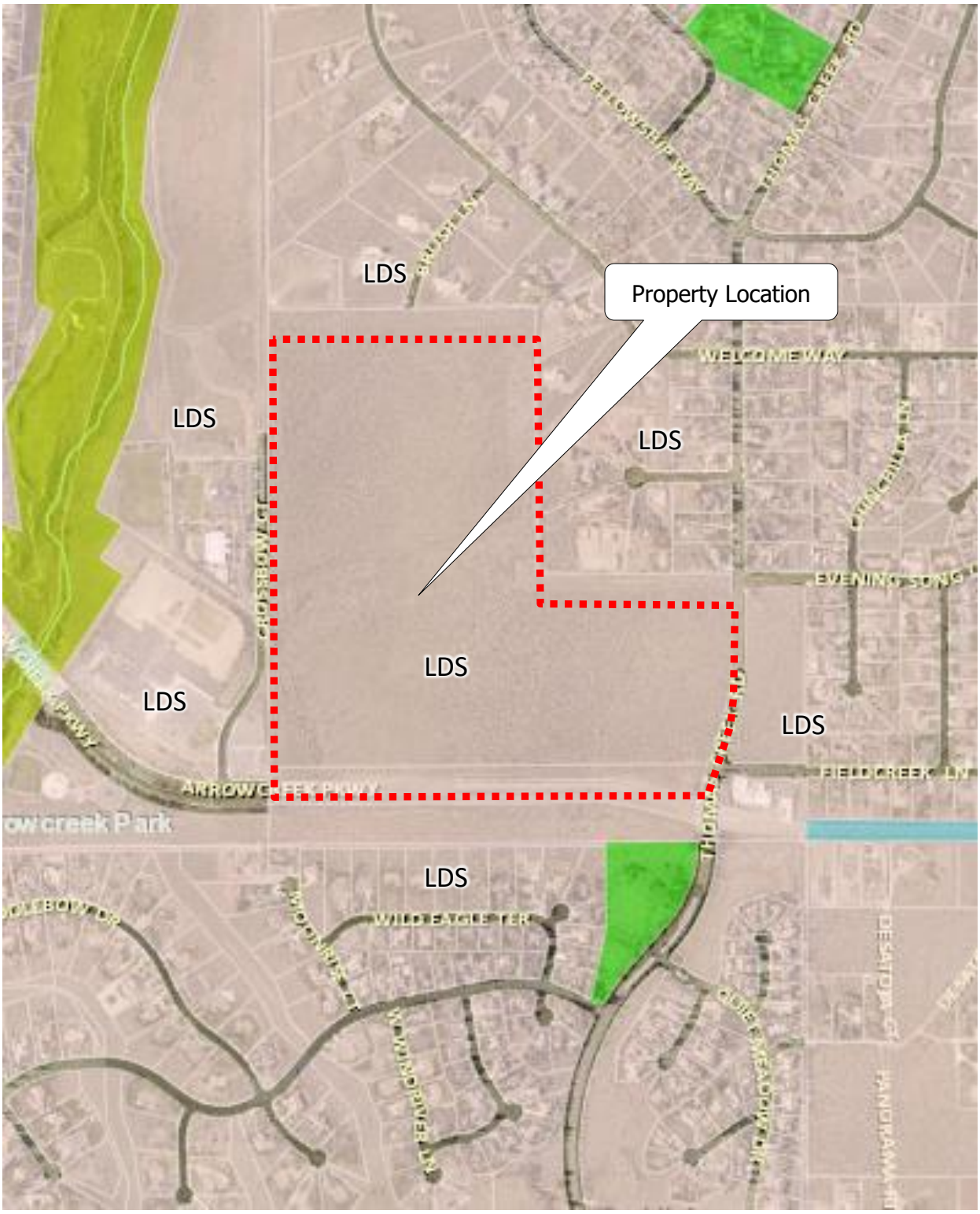


Figure 7 - Zoning Map

Washoe County Development Application

Your entire application is a public record. If you have a concern about releasing personal information, please contact Planning and Building staff at 775.328.6100.

Project Information	**Staff Assigned Case No.:**

Project Name: Arrowcreek Middle School Grading SUP

Project Description: Request for a special use permit for grading to allow for a new middle school.

Project Address: 0 Thomas Creek

Project Area (acres or square feet): parcel size is 91.46 acres

Project Location (with point of reference to major cross streets **AND** area locator):

Located north of Arrowcreek Parkway and east of Crossbow Court

Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
049-010-29	91.46		

Section(s)/Township/Range: Section 24 T18 R19

Indicate any previous Washoe County approvals associated with this application:

Case No.(s).

Applicant Information (attach additional sheets if necessary)

Property Owner: United States of America		**Professional Consultant:**	
Name: Bill Dunkelberger, Forest Supervisor		Name: Lumos & Associates	
Address:		Address: 9222 Prototype Drive	
Sparks, NV	Zip: 89431	Reno, NV	Zip: 89512
Phone: 775-331-6444	Fax:	Phone: 827-6111	Fax:
Email: wadunkelberger@fs.fed.us		Email: afuss@lumosinc.com	
Cell:	Other:	Cell: 771-6408	Other:
Contact Person: Bill Dunkelberger		Contact Person: Angela Fuss	
Applicant/Developer:		**Other Persons to be Contacted:**	
Name: Washoe County School District		Name: Washoe County School District	
Address: 14101 Old Virginia Road		Address: 14101 Old Virginia Road	
Reno, NV	Zip: 89521	Reno, NV	Zip: 89521
Phone: 789-3810	Fax:	Phone: 789-3810	Fax:
Email: adam.searcy@washoeschools.net		Email: mboster@washoeschools.net	
Cell: 354-6007	Other:	Cell:	Other:
Contact Person: Adam Searcy		Contact Person: Mike Boster	

For Office Use Only

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

Refer to attached documentation for owner affidavit information from the U.S. Forest Service.

Applicant Name: _____

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,_____,
(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): 049-010-29

Printed Name_____

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:_____

*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

fully executed
copy 28 NOV. 2017

USDA Forest Service

OMB 0596-0217
FS-1500-19

MODIFICATION OF GRANT OR AGREEMENT

PAGE 1 OF PAGES 2

1. U.S. FOREST SERVICE GRANT/AGREEMENT NUMBER:	2. RECIPIENT/COOPERATOR GRANT or AGREEMENT NUMBER, IF ANY:	3. MODIFICATION NUMBER:
17-CO-11041710-062		001

4. NAME/ADDRESS OF U.S. FOREST SERVICE UNIT ADMINISTERING GRANT/AGREEMENT (unit name, street, city, state, and zip + 4):
Byron Keely
1249 S. Vinnell Way, Suite 200 Boise, ID 83709
208-373-4266 byrondkeely@fs.fed.us

5. NAME/ADDRESS OF U.S. FOREST SERVICE UNIT ADMINISTERING PROJECT/ACTIVITY (unit name, street, city, state, and zip + 4):
David Drake
1200 Franklin Way Sparks NV. 89431
775-352-1246 ddrake@fs.fed.us

6. NAME/ADDRESS OF RECIPIENT/COOPERATOR (street, city, state, and zip + 4, county):
Mike Boster
14101 Old Virginia Road, Reno NV. 89521
775-789-3810 mboster@washoeschools.net

7. RECIPIENT/COOPERATOR'S DHS SUB ACCOUNT NUMBER (For DHS payment use only):

8. PURPOSE OF MODIFICATION

CHECK ALL THAT APPLY:	
	This modification is issued pursuant to the modification provision in the grant/agreement referenced in item no. 1, above.
☒	CHANGE IN PERFORMANCE PERIOD: expire date changed from 12/31/2017 to 12/31/2018
☐	CHANGE IN FUNDING:
☐	ADMINISTRATIVE CHANGES:
☐	OTHER (Specify type of modification):

Except as provided herein, all terms and conditions of the Grant/Agreement referenced in 1, above, remain unchanged and in full force and effect.

9. ADDITIONAL SPACE FOR DESCRIPTION OF MODIFICATION (add additional pages as needed):
Title: ARROWCREEK SCHOOL - ELGA.

10. ATTACHED DOCUMENTATION (Check all that apply):

☐	Revised Scope of Work
☐	Revised Financial Plan
☐	Other:

11. SIGNATURES

AUTHORIZED REPRESENTATIVE: BY SIGNATURE BELOW, THE SIGNING PARTIES CERTIFY THAT THEY ARE THE OFFICIAL REPRESENTATIVES OF THEIR RESPECTIVE PARTIES AND AUTHORIZED TO ACT IN THEIR RESPECTIVE AREAS FOR MATTERS RELATED TO THE ABOVE-REFERENCED GRANT/AGREEMENT.

11.A. Washoe County Schools District SIGNATURE (Signature of Signatory Official)	11.B. DATE SIGNED	11.C. U.S. FOREST SERVICE SIGNATURE (Signature of Signatory Official)	11.D. DATE SIGNED
	11/27/17		11/28/2017
11.E. NAME (type or print): PETE ETCHART		11.F. NAME (type or print): WILLIAM A. DUNKELBERGER	
11.G. TITLE (type or print): Chief Operations Officer		11.H. TITLE Humboldt-Toiyabe Forest Supervisor	

12. G&A REVIEW

12.A. The authority and format of this modification have been reviewed and approved for signature by:	12.B. DATE SIGNED
BYRON KEELY U.S. Forest Service Grants & Agreements Specialist	11/28/2017

Burden Statement

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0217. The time required to complete this information collection is estimated to average 30 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call toll free (866) 632-9992 (voice). TDD users can contact USDA through local relay or the Federal relay at (800) 877-8339 (TDD) or (866) 377-8642 (relay voice). USDA is an equal opportunity provider and employer.

USDA United States Department of Agriculture
Forest Service
Humboldt-Toiyabe National Forest
Carson Ranger District
1536 South Carson Street
Carson City, NV 89701
775-882-2766

File Code: 5570
Date: May 11, 2017

Michael S. Boster
Washoe County School District, School Planner
14101 Old Virginia Road
Reno, NV 89521

Dear Mr. Boster,

Enclosed is my response to your ELGA application that I received April 27. 2017.

Sincerely,

IRENE DAVIDSON
District Ranger

Mr. Michael S. Boster,
Washoe County School District
Capital Projects
14101 Old Virginia Road
Reno, NV. 89521

Dear Mr. Boster:
This letter Acknowledges receipt of your recent Educational Land Grant Act Application (ELGA) to acquire 60 acres of National Forest System (NFS) lands within the Humboldt Toiyabe National Forest.

I received your application on May 27, 2017 and have reviewed it to ensure we have a complete application package.
Following is a list of minimum requirements necessary for an application package to be complete.

1. A legal description of the land requested, including appropriate maps that accurately depict the area requested.

2. A statement that the conveyed NFS land will be used for a public or publicly funded elementary or secondary school to provide grounds or facilities for that school.

3. Documentation that the total acreage requested is the minimum amount necessary for the intended purpose.

4. Documentation of other alternatives considered, such as, private, local governmental, or State lands, and the reason(s) why they cannot accommodate this need.

5. Documentation that the conveyed land is within the applicant school district and contiguous to an existing school. If either of these two conditions is not met, the applicant school district must:

    a. Demonstrate the objective educational benefit which will be served by the conveyance, and
    b. Provide documentation on how access to the conveyed land will be obtained.

6. Documentation that the school district is financially capable of completing the proposed project.

7. Reasons why the applicant school district feels that the conveyance of NFS lands for educational purposes outweigh the public objectives and values that would be served by keeping the land in the National Forest System.

8. A development plan that describes the proposed public educational use of the conveyed land, the type(s) of facilities that will be constructed and their location, proposed access, utility routes, environmental controls during construction, and estimated construction times. The development plan must be included in the environmental assessment of the proposed conveyance.

After reviewing your application and weighing it against these criteria I have determined it to be complete as it meets the minimum requirements set forth in the Forest Service Handbook (FSH) 5509.11 Chapter 30 sec 34.12 – Application Content. If a decision on the proposal is not made within 120 days, the Forest Service will provide a written explanation as to why a decision has not been made and give a revised timeframe for a final decision on the project.

The next steps will be to set up a cooperative agreement between Washoe County School District and the Forest Service for payment of cost incurred as a result of this project. You will be required to pay a nominal fee of $10 per acre conveyed, plus all Forest Service costs directly associated with the project, that the Forest Service may incur to evaluate and process the application, including costs associated with National Environmental Policy Act (NEPA) compliance, document preparation, surveys, posting of property monuments, markers, or posts, and so forth. Costs incurred by the Forest Service in the evaluation and processing of an ELGA application are payable by the school district regardless of whether or not the conveyance is approved.

It is my understanding the school district will contract with a third party to perform the necessary NEPA studies and the Forest Service will provide the criteria to be used including what documents or reports will be needed. The Forest Service will review the documents produced by the school districts contractors and approve them when they are sufficient for the Forest Service to make a decision on.

As a part of the public notice and comment the Forest Service requires a name of the proposed school, I understand there is a process required by the school district for this but it is imperative we meet this requirement please take whatever actions are necessary to ensure we can meet this legal requirement.

A couple of other item to be aware of are a reversionary interest in the United States will be retained in all land conveyed under this law which will vest if a school district attempts to convey the land to another party or where the lands are devoted to another use different from the use for which the land is conveyed by the United States, and a conveyance under this law may not convey mineral or water rights. If necessary, the exact acreage and legal description shall be determined by a survey satisfactory to the Secretary at the expense of the applicant.

Sincerely,

Irene Davidson
DISTRICT RANGER

RGJ media
PART OF THE USA TODAY NETWORK

The Mason Valley News

"The Only Newspaper in the World that Gives a Damn About Yerington"

Order Confirmation for Ad #: 0002718638

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Address: 14101 OLD VIRGINIA RD
RENO NV 89521 USA
Acct. #: REN-313227
Phone: 7758508025

WASHOE CO SCHOOL DISTRICT
Ordered By: Krystal Higgins

OrderStart Date: 02/09/2018 **Order End Date: 02/09/2018**

Tear Sheets	Affidavits	Blind Box	Promo Type	Materials	Special Pricing	Size
0	1					2 X 50.00

Net Amount	Tax Amount	Total Amount	Payment Method	Payment Amount	Amount Due
$327.00	$0.00	$327.00	Credit Card	$0.00	$327.00

Ad Order Notes:

Sales Rep: ncampbell **Order Taker:** ncampbell **Order Created** 02/07/2018

Product	# Ins	Start Date	End Date
REN-Gazette Journal	**1**	**02/09/2018**	**02/09/2018**
02-09-18,			
REN-rgj.com	**1**	**02/09/2018**	**02/09/2018**
02-09-18,			

*** ALL TRANSACTIONS CONSIDERED PAID IN FULL UPON CLEARANCE OF FINANCIAL INSTITUTION**

Text of Ad: 02/07/2018

The Carson Ranger District of the Humboldt-Toiyabe National Forest (Forest) is initiating a comment period for a preliminary Environmental Assessment (EA) for the proposed Education Land Grant Act Transfer of National Forest System Land to Washoe County School District #52446, displaying the proposed action and potential effects of the project. The Forest is proposing to convey approximately 60 acres of National Forest System land in accordance with the Educational Land Grant Act (ELGA) to the Washoe County School District (WCSD). If conveyed, the WCSD would use the land to develop a school campus. The Project Area is located in southwest Reno, Washoe County at the intersection of Thomas Creek Road and Arrowcreek Parkway. Specifically, the project area is located at T. 18 N., R. 19 E., Sec. 24 S ½SE ¼ excepting that portion conveyed by U.S. Patent No. 27-96-0035.

The preliminary EA, including the proposed action, is available for review and can be downloaded from the Humboldt-Toiyabe National Forest website at https://www.fs.usda.gov/project/?project=52446. To obtain a hard copy of the preliminary EA and proposed action please contact Irene Davidson, Carson District Ranger, Humboldt-Toiyabe National Forest, 1536 S. Carson Street, Carson City, NV 89701, 775 884-8100 idavidson@fs.fed.us.

This preliminary EA is subject to comment pursuant to 36 CFR 218, Subparts A and B. Only those who submit timely project-specific written comments during a public comment period are eligible to file an objection. Furthermore, issues raised in objections must be based on previously submitted specific written comments regarding the proposed conveyance or activity and attributed to the objector, unless the issue is based on new information that arose after the opportunities for comment. Individuals or representatives of an entity submitting comments must sign the comments or verify identity upon request.

HOW TO COMMENT AND TIMEFRAMES

The Forest Service will accept comments on the preliminary EA for 30 days following publication of the opportunity to comment legal notice in the Reno- Gazette Journal, which is the exclusive means for calculating the comment period. Commenters should not rely upon dates or timeframe information provided by any other source. It is the commenter's responsibility to ensure timely receipt of comments (36 CFR 218.25).

Please submit your comments on the proposal website, at https://cara.ecosystem-managment.org/Public/CommentInput?project=52446. If your computer is not compatible with the website, try using a different web browser, or you can email comments to: comments-intermtn-humboldt-toiyabe-carson@fs.fed.us. All formal comments on the EA must be submitted in writing.

In cases where no identifiable name is attached to a comment, a verification of identity will be required for appeal eligibility. If using an electronic message, a scanned signature is one way to provide verification. It is the responsibility of persons providing comments to submit them by the close of the comment period. Names of commenters will be part of the public record subject to the Freedom of Information Act.

The Forest Service will host an open house forum meeting to discuss the preliminary EA and the Forest Service's decision to be made. The meeting will be held at 6:30 pm on February 22, 2018 at the South Valley Library Diamond Room, located at 15650-A Wedge Parkway, Reno, NV 89511. The meeting will include a brief introduction of the proposed land conveyance by the Forest Service followed by an opportunity to discuss with Forest staff members.

WILLIAM A. DUNKELBERGER
Forest Supervisor

No. 2718638 Feb. 9, 2018

2nd notice

15 Feb RGJ Legal notice

The Mason Valley News

"The Only Newspaper in the World that Gives a Damn About Yerington"

Order Confirmation for Ad #: 0002733449

Public Notices **Public Notices**

The Carson Ranger District of the Humboldt-Toiyabe National Forest (Forest) is initiating a comment period for a preliminary Environmental Assessment (EA) for the proposed Education Land Grant Act Transfer of National Forest System Land to Washoe County School District #52446, displaying the proposed action and potential effects of the project. The Forest is proposing to convey approximately 60 acres of National Forest System land in accordance with the Educational Land Grant Act (ELGA) to the Washoe County School District (WCSD). If conveyed, the WCSD would use the land to development of a school campus. The Project Area is located in southwest Reno, Washoe County at the intersection of Thomas Creek Road and Arrowcreek Parkway. Specifically, the project area is located at T. 18 N., R. 19 E., Sec. 24 S ½SE ¼ excepting that portion conveyed by U.S. Patent No. 27-96-0035.

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WILLIAM A. DUNKELBERGER
Forest Supervisor

No. 2733449 Feb. 15, 2018

02/15/2018

Materials	Special Pricing	Size
		2 X 50.00

od	Payment Amount	Amount Due
	$0.00	$327.00

campbell **Order Created** 02/14/2018

# Ins	Start Date	End Date
1	02/15/2018	02/15/2018
1	02/15/2018	02/15/2018

*** ALL TRANSACTIONS CONSIDERED PAID IN FULL UPON CLEARANCE OF FINANCIAL INSTITUTION**

15 Feb 2018 - RGJ legal notice

Special Use Permit Application
for Grading
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 special use permits may be found in Article 810, Special Use Permits. Article 438, Grading, and Article 418, Significant Hydrologic Resources, are the ordinances specifically involved in this request.

1. What is the purpose of the grading?

The Washoe County School District (WCSD) is in the process of designing a new middle school located north of Arrowcreek Parkway and west of Thomas Creek Parkway in the Southwest Truckee Meadows area. The proposed site (APN 049-010-29) is located on part of a larger ±91acre parcel owned by the U.S. Forest Service. A special use permit for grading is needed to develop the site.

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

±247,980 cubic yards of cut and ±251,748 cubic yards of fill will result in ±3,767 cubic yards of overall fill for the project.

3. How many square feet of surface of the property are you disturbing?

Approximately 28.4 acres will be disturbed.

4. How many cubic yards of material are you exporting or importing? If none, how are you managing to balance the work on-site?

The proposed developed area of approximately 28.4 acres will result in ±3,767 cubic yards of overall fill for the project. The cut/fill slopes have been minimized with the addition of 8-foot tall retaining walls. The walls have been designed to create varying curvilinear contours, which breaks up the appearance of a manufactured slope. This is also in accordance with the Southwest Truckee Meadows Area Plan, which requires grading to complement the original contours of the landscape and minimize disruption of the natural topography. The grading has been visually minimized through extensive landscaping that includes over ±5.6 acres of landscape area. A total of 566 trees and 2,492 shrubs have been included in the landscape design, which will help to screen the grading from public view on the adjacent roadways and neighboring properties.

5. Is it possible to develop your property without surpassing the grading thresholds requiring a Special Use Permit? (Explain fully your answer.)

No. A middle school and accessory uses, including outdoor fields, requires a substantial area of land. While there are portions of the site with minimal slopes, the overall acreage needed to build the school makes it prohibitive to develop the site as a school without exceeding the grading thresholds required for a special use permit.

6. Has any portion of the grading shown on the plan been done previously? (If yes, explain the circumstances, the year the work was done, and who completed the work.)

No. The site is currently used as open space by the U.S. Forest Service. There are existing dirt roads on the site, but otherwise, the site has not been disturbed.

7. Have you shown all areas on your site plan that are proposed to be disturbed by grading? (If no, explain fully your answer.)

Yes, please refer to the attached grading plan and cut/fill maps.

8. Can the disturbed area be seen from off-site? If yes, from which directions, and which properties or roadways?

Yes, the site can be seen from the adjacent roadways of Arrowcreek Parkway, Crossbow Court and Thomas Creek Raod. The school building will be two stories, which will help to reduce the overall building footprint and disturbance of area.

The cut/fill slopes have been minimized with the addition of 8-foot tall retaining walls. The walls have been designed to create varying curvilinear contours, which breaks up the appearance of a manufactured slope. This is also in accordance with the Southwest Truckee Meadows Area Plan, which requires grading to complement the original contours of the landscape and minimize disruption of the natural topography. The grading has been visually minimized through extensive landscaping that includes over ±5.6 acres of landscape area. A total of 566 trees and 2,492 shrubs have been included in the landscape design, which will help to screen the grading from public view on the adjacent roadways and neighboring properties.

9. Could neighboring properties also be served by the proposed access/grading requested (i.e. if you are creating a driveway, would it be used for access to additional neighboring properties)?

Access to the site is off of Crossbow Court and Thomas Creek Road. These are existing roadways and no new access is proposed through this project, onto adjacent properties.

10. 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?

The cut and fill slopes proposed on the site are designed using a maximum 3:1 ratio, with swales at the top of all slopes that will intercept drainage from above. Hydro seeding with temporary irrigation in combination with silt fences, fiber rolls, or straw matting will be utilized to prevent erosion.

11. Are you planning any berms?

❑ Yes	■ No	If yes, how tall is the berm at its highest?

12. If your property slopes and you are leveling a pad for a building, are retaining walls going to be required? If so, how high will the walls be and what is their construction (i.e. rockery, concrete, timber, manufactured block)?

Retaining walls will be incorporated in the design with a maximum height of 8-feet, constructed of manufactured block. Visual mitigation will include revegetation of disturbed areas and rounding of slopes. The retaining walls will be a maximum of 8-feet in height.

13. What are you proposing for visual mitigation of the work?

The cut/fill slopes have been minimized with the addition of 8-foot tall retaining walls. The walls have been designed to create varying curvilinear contours, which breaks up the appearance of a manufactured slope. This is also in accordance with the Southwest Truckee Meadows Area Plan, which requires grading to complement the original contours of the landscape and minimize disruption of the natural topography. The grading has been visually minimized through extensive landscaping that includes over ±5.6 acres of landscape area. A total of 566 trees and 2,492 shrubs have been included in the landscape design, which will help to screen the grading from public view on the adjacent roadways and neighboring properties.

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

There are no trees on the site.

15. 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?

A standard dry land mix, either hand broadcast at 32 lbs./acre or drill seeded at 20 lbs./acre (PLS). If mulch is to be used, application rate of no less than 2,000 lbs/acre, applied hydraulically. Portions of the site will also include decomposed granite (DG) or rock mulch.

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

Yes, temporary irrigation will be used for revegetation.

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

No

18. Are there any restrictive covenants, recorded conditions, or deed restrictions (CC&Rs) that may prohibit the requested grading?

❑ Yes	■ No	If yes, please attach a copy.

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

Washoe County Treasurer
Tammi Davis

Account Detail

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

Washoe County Parcel Information

Parcel ID	Status	Last Update
04901029	Active	4/14/2018 2:06:39 AM

Current Owner:
UNITED STATES OF AMERICA

NONE
RENO, NV 00000

SITUS:
0 THOMAS CREEK RD
WCTY NV

Taxing District

Geo CD:

Legal Description

Range 19 Township 18 SubdivisionName _UNSPECIFIED Section 24

Tax Bill (Click on desired tax year for due dates and further details)

Tax Year	Net Tax	Total Paid	Penalty/Fees	Interest	Balance Due
2017	$0.00	$0.00	$0.00	$0.00	$0.00
2016	$0.00	$0.00	$0.00	$0.00	$0.00
2015	$0.00	$0.00	$0.00	$0.00	$0.00
2014	$0.00	$0.00	$0.00	$0.00	$0.00
2013	$0.00	$0.00	$0.00	$0.00	$0.00
				Total	$0.00

Important Payment Information

- ALERTS: If your real property taxes are delinquent, the search results displayed may not reflect the correct amount owing. Please contact our office for the current amount due.
- For your convenience, online payment is available on this site. E-check payments are accepted without a fee. However, a service fee does apply for online credit card payments. See Payment Information for details.

Pay Online

$0.00

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

Payment Information

Special Assessment District

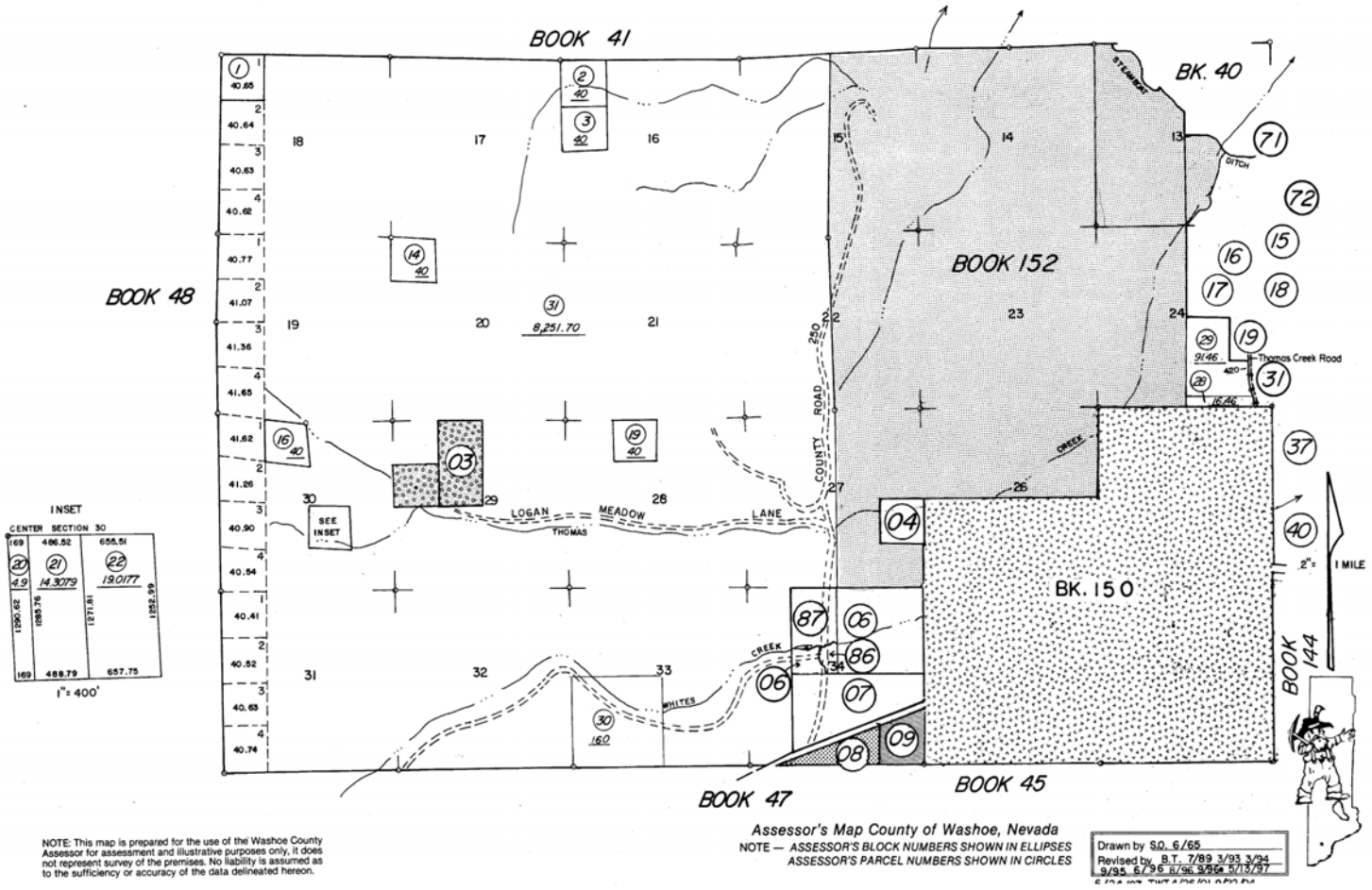
Installment Date Information

Assessment Information

PORTION OF N^2 -T18N-R19E

PORTION OF S^2 -T18N-R19E

49-01



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

Assessor's Map County of Washoe, Nevada

NOTE — *ASSESSOR'S BLOCK NUMBERS SHOWN IN ELLIPSES*
ASSESSOR'S PARCEL NUMBERS SHOWN IN CIRCLES

Drawn by S.O. 6/65
Revised by B.T. 7/89 3/93 3/94 9/95 6/96 8/96 9/96 5/13/97

PRELIMINARY HYDROLOGIC AND HYDRAULIC ANALYSIS REPORT

FOR

ARROW CREEK MIDDLE SCHOOL

Prepared for

Washoe County School District
Capital Projects and Facilities Management
14101 Old Virginia Road
Reno, Nevada 89521-8912

Prepared by

895 Roberta Lane, Suite 104, Sparks, NV 89431
(775) 359-3303 Fax (775) 359-3329
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April 2018

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1 INTRODUCTION

The following report represents the preliminary hydrologic and hydraulic analysis for the Washoe County School District - Arrow Creek Middle School Project (ACMS Project) which is located east of Crossbow Court, West of Thomas Creek Road, and north of Arrow Creek Parkway. The Washoe County School District - Arrow Creek Middle School is a proposed development that includes buildings, athletic facilities, landscaping, and parking.

The ACMS Project is located within the Southwestern 1/4 of Section 24, Township 18 North, and Range 19 East. The site is undeveloped ground with native shrubs and grasses. Site topography consists of slopes from south – southeast to west – northwest, ranging from 0% to 6%. Rainfall runoff from the site flows in a north-northwesterly direction towards an existing ephemeral drainage channels towards an existing housing development and civil improvements.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Community-Panel Number 32031C3245G dated March 16, 2009, the subject property is in Zone X. Zone X is an area determined to be outside the 100-year floodplain. Reference FEMA panel in Appendix A.

The purpose of this preliminary report is to analyze the existing and proposed conditions of the subject property based on the 5-year and 100-year peak flow events. The report contains the following sections: (1) Methodology, (2) Existing Hydrology, (3) Proposed Hydrology, and (4) Conclusion.

2 METHODOLOGY

Hydrologic Method

Hydrologic analyses were performed to determine the peak discharge for the 5-year and 100-year peak flow events. *AutoDesk Storm and Sanitary Analysis (SSA)* was used to perform a *Rational Method* analysis to model the hydrologic basins that contribute in the existing and proposed conditions.

2.1 RATIONAL ANALYSIS METHOD

The on-site analysis was performed using the Rational Method. Rational Method peak flows were used to design the storm drain facilities for the proposed project. The hydrology was determined using the Truckee Meadows Regional Drainage Manual (TMRDM) and the Rational Method (Appendix A). The parameters for the Rational Method of analysis are:

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

The runoff coefficients were obtained from the TMRDM (Reference Appendix A). The resulting "Rational Method" developed flows determined from the above information was used to determine the proposed storm drain facilities. The rainfall characteristics were modeled using the NOAA database to determine site specific depth of precipitation (Appendix A).

2.2 HYDRAULIC ANALYSIS METHODS

Hydraulic analyses were performed using the associated hydrologic data to provide the estimates of the elevation of floods for the selected recurrence intervals. Water-surface elevations were computed in SSA using hydrodynamic routing.

3 EXISTING CONDITIONS HYDROLOGY

For the existing catchments, a time of concentration (T_C) and Rational Method coefficient were selected, based on the Rational Method (Appendix A), taking into consideration the catchment characteristics, which include catchment area, slope and length of the longest channel, watershed boundaries, urbanization, and land cover. Table 1 and Figure 2 summarize the characteristics of the on-site catchment area. Reference Appendix B for the complete Rational Method analysis. Reference Figure 1 (Existing Hydrology) in the map pocket for existing hydrological drainage and the associated 5-year and 100-year peak flow events.

Table 1 – Existing Conditions Rational Method Model Summary for the ACMS Project, Reno, NV.

Sub-Basin	Area (Ac.)	Rational Method Coefficient (C_5/C_{100})	Time of Concentration (min)	Rainfall Intensity (I_5/I_{100}) (in/hr)	5-Year Peak Flows (cfs)	100-Year Peak Flows (cfs)
X-01	11.83	0.31/0.57	17.39	1.18/2.85	4.3	19.2
X-02	9.81	0.26/0.54	16.50	1.21/2.93	3.1	15.5
X-03	13.98	0.24/0.52	28.84	0.88/2.13	3.0	15.5
X-04	16.16	0.20/0.50	17.76	1.16/2.81	3.8	22.7
X-05	22.98	0.20/0.50	13.49	1.35/3.26	6.2	37.4
X-06	13.52	0.20/0.50	14.15	1.32/3.19	3.6	21.5
X-07	10.62	0.20/0.50	13.92	1.33/3.21	2.8	17.0
TOTAL	**98.90**	-----	-----	-----	**26.8**	**148.8**

The 5-year and 100-year peak flows from off-site catchments (X-01 through X-03) in the existing condition are 10.4 cfs and 50.2 cfs, respectively. The 5-year and 100-year peak flows from on-site catchment (X-04 through X-07) in the existing condition are 16.4 cfs and 98.60 cfs, respectively. Therefore, the total existing flows are 26.8 cfs and 148.8 cfs in the 5-year and 100-year peak flow events, respectively (Appendix B). The flows are discharged towards the existing ephemeral drainages and existing civil improvements.

4 PROPOSED CONDITIONS HYDROLOGY AND HYDRAULICS

4.1 PROPOSED HYDROLOGY

SSA, the hydrologic modeling software has the capacity to route the flows and analyze the attenuation throughout the system. The proposed ACMS project has discharge values of the proposed sub-basins (Table 2) which will be directed through the proposed storm drain system, existing ephemeral drainages, and the proposed detention facility.

There are six on-site proposed development sub-basins with the ACMS development area (Figures 2). The sub-areas took into account the proposed on- and off-site flows that affect the site. The calculated 5-year and 100-year peak flows can be found in Table 2. Weighted run-off coefficients were calculated for each basin (Table 2). Routing was used to determine the intensities for the off- and on-site sub-basins, the proposed storm drain systems will route and attenuate flows to the ACMS Project points of discharge (Figure 2). Figure 2 provides a comparative 100-year peak flow discharge analysis for the existing areas that currently have peak runoff. Refer to Appendix C, Hydrologic Analysis for all data and supporting calculations using the Rational Method. Reference Table 2 below for a summary of the proposed drainage conditions.

Table 2 – Proposed Rational Method Model Summary for the ACMS Project, Reno, NV.

Sub-Basin	Area (Ac.)	Rational Method Coefficient (C_5/C_{100})	Time of Concentration (min)	Rainfall Intensity (I_5/I_{100}) (in/hr)	5-Year Peak Flows (cfs)	100-Year Peak Flows (cfs)
P-01	11.83	0.31/0.57	17.39	1.18/2.85	4.3	19.2
P-02	9.81	0.26/0.54	16.50	1.21/2.93	3.1	15.5
P-03	13.98	0.24/0.52	28.84	0.88/2.13	3.0	15.5
P-04	7.11	0.20/0.50	12.03	1.42/3.43	2.0	12.2
P-05	9.19	0.20/0.50	10.00	1.55/3.74	2.8	17.2
P-06	26.94	0.55/0.72	13.41	1.35/3.27	20.0	63.3
P-07	10.01	0.20/0.50	13.24	1.36/3.28	2.7	16.4
P-08	2.28	0.20/0.50	10.00	1.55/3.74	0.7	4.3
P-09	7.75	0.20/0.50	11.99	1.42/3.44	2.2	13.3
TOTAL	**98.90**	-----	-----	-----	**26.8**	**148.8**

4.2 DETENTION

The proposed detention facility is approximately eight-feet deep with an overall detention capacity of 1.26 ac-ft. During 100-year peak flow event, the proposed detention facility will have a 100-year peak flow of 37.2 cfs and will discharge 20.0 cfs with a freeboard of 1.97 feet.

5 CONCLUSIONS

The proposed improvements and the analyses presented herein are in accordance with drainage regulations presented in Chapter II – Storm Drainage, in conjunction with the *Truckee Meadows Regional Drainage Manual (TMRDM, April 30, 2009).*

This analysis is a preliminary analysis to provide an overview of the proposed development, a comprehensive hydrologic and hydraulic analysis will be completed once the civil improvements have been completed. However, this preliminary analysis determined that the proposed project improvements, roadways, and storm water conveyance facilities, once constructed, will not adversely impact upstream or downstream properties adjacent to this site. Actually, the proposed improvements will decrease overall flows towards the existing residential development. As seen of Figure 2, the three critical discharge sites will all experience decreased runoff from the associated peak flow events.

APPENDIX A

SUPPORTING DATA

NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.4068°, Longitude: -119.7959°
Elevation: 5136.61 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	**1.21** (1.04–1.43)	**1.52** (1.30–1.79)	**2.03** (1.73–2.40)	**2.52** (2.12–2.98)	**3.31** (2.72–3.96)	**4.04** (3.22–4.90)	**4.92** (3.78–6.04)	**5.98** (4.40–7.50)	**7.68** (5.30–9.92)	**9.24** (6.08–12.2)
10-min	**0.924** (0.792–1.09)	**1.16** (0.990–1.36)	**1.55** (1.31–1.83)	**1.91** (1.62–2.27)	**2.53** (2.08–3.01)	**3.08** (2.45–3.73)	**3.74** (2.87–4.59)	**4.55** (3.35–5.70)	**5.84** (4.04–7.56)	**7.03** (4.63–9.31)
15-min	**0.764** (0.656–0.900)	**0.956** (0.820–1.13)	**1.28** (1.09–1.51)	**1.58** (1.34–1.87)	**2.09** (1.72–2.49)	**2.55** (2.03–3.08)	**3.10** (2.38–3.79)	**3.76** (2.77–4.71)	**4.83** (3.34–6.24)	**5.81** (3.82–7.69)
30-min	**0.516** (0.442–0.606)	**0.644** (0.552–0.760)	**0.860** (0.732–1.02)	**1.07** (0.900–1.26)	**1.40** (1.15–1.68)	**1.72** (1.37–2.07)	**2.08** (1.60–2.55)	**2.53** (1.86–3.17)	**3.25** (2.25–4.21)	**3.91** (2.58–5.18)
60-min	**0.319** (0.274–0.375)	**0.398** (0.341–0.470)	**0.533** (0.453–0.630)	**0.659** (0.557–0.781)	**0.869** (0.715–1.04)	**1.06** (0.845–1.28)	**1.29** (0.991–1.58)	**1.57** (1.15–1.96)	**2.01** (1.39–2.60)	**2.42** (1.59–3.20)
2-hr	**0.212** (0.187–0.243)	**0.264** (0.233–0.302)	**0.336** (0.294–0.386)	**0.400** (0.345–0.459)	**0.496** (0.416–0.572)	**0.581** (0.476–0.681)	**0.679** (0.542–0.809)	**0.804** (0.620–0.992)	**1.03** (0.756–1.31)	**1.23** (0.874–1.62)
3-hr	**0.170** (0.152–0.192)	**0.212** (0.191–0.241)	**0.265** (0.236–0.300)	**0.308** (0.272–0.349)	**0.367** (0.319–0.419)	**0.419** (0.357–0.483)	**0.478** (0.400–0.559)	**0.560** (0.458–0.667)	**0.703** (0.558–0.884)	**0.835** (0.645–1.09)
6-hr	**0.121** (0.108–0.136)	**0.152** (0.135–0.171)	**0.187** (0.166–0.211)	**0.215** (0.190–0.243)	**0.251** (0.218–0.285)	**0.278** (0.239–0.318)	**0.305** (0.258–0.353)	**0.338** (0.280–0.396)	**0.389** (0.315–0.465)	**0.442** (0.351–0.551)
12-hr	**0.080** (0.071–0.090)	**0.101** (0.090–0.113)	**0.126** (0.112–0.142)	**0.146** (0.129–0.165)	**0.173** (0.151–0.197)	**0.193** (0.166–0.221)	**0.214** (0.181–0.248)	**0.235** (0.194–0.276)	**0.262** (0.211–0.314)	**0.284** (0.224–0.347)
24-hr	**0.052** (0.047–0.059)	**0.066** (0.059–0.074)	**0.083** (0.075–0.094)	**0.097** (0.087–0.110)	**0.117** (0.104–0.132)	**0.133** (0.117–0.150)	**0.149** (0.130–0.170)	**0.166** (0.143–0.191)	**0.190** (0.161–0.220)	**0.209** (0.174–0.245)
2-day	**0.031** (0.028–0.036)	**0.039** (0.035–0.045)	**0.050** (0.045–0.058)	**0.059** (0.052–0.068)	**0.072** (0.062–0.082)	**0.082** (0.071–0.094)	**0.092** (0.079–0.107)	**0.103** (0.087–0.122)	**0.119** (0.098–0.142)	**0.131** (0.106–0.159)
3-day	**0.023** (0.021–0.026)	**0.029** (0.026–0.033)	**0.038** (0.034–0.043)	**0.045** (0.040–0.051)	**0.055** (0.048–0.063)	**0.063** (0.055–0.072)	**0.072** (0.062–0.083)	**0.081** (0.069–0.095)	**0.095** (0.078–0.111)	**0.105** (0.085–0.126)
4-day	**0.019** (0.017–0.022)	**0.024** (0.022–0.028)	**0.032** (0.028–0.036)	**0.038** (0.034–0.043)	**0.047** (0.041–0.053)	**0.054** (0.047–0.062)	**0.062** (0.053–0.071)	**0.070** (0.059–0.081)	**0.082** (0.068–0.096)	**0.092** (0.075–0.109)
7-day	**0.013** (0.011–0.015)	**0.017** (0.015–0.019)	**0.022** (0.019–0.025)	**0.026** (0.023–0.030)	**0.032** (0.028–0.037)	**0.037** (0.032–0.043)	**0.042** (0.036–0.049)	**0.048** (0.040–0.056)	**0.056** (0.046–0.066)	**0.062** (0.051–0.074)
10-day	**0.010** (0.009–0.012)	**0.013** (0.012–0.015)	**0.017** (0.015–0.020)	**0.021** (0.018–0.024)	**0.025** (0.022–0.029)	**0.029** (0.025–0.033)	**0.033** (0.028–0.038)	**0.037** (0.031–0.043)	**0.043** (0.036–0.051)	**0.048** (0.039–0.057)
20-day	**0.006** (0.006–0.007)	**0.008** (0.007–0.009)	**0.011** (0.010–0.012)	**0.013** (0.011–0.015)	**0.016** (0.014–0.018)	**0.018** (0.016–0.020)	**0.020** (0.017–0.023)	**0.022** (0.019–0.026)	**0.026** (0.022–0.030)	**0.028** (0.023–0.033)
30-day	**0.005** (0.005–0.006)	**0.007** (0.006–0.007)	**0.009** (0.008–0.010)	**0.010** (0.009–0.012)	**0.012** (0.011–0.014)	**0.014** (0.012–0.016)	**0.016** (0.014–0.018)	**0.018** (0.015–0.020)	**0.020** (0.017–0.023)	**0.022** (0.018–0.026)
45-day	**0.004** (0.004–0.005)	**0.005** (0.005–0.006)	**0.007** (0.006–0.008)	**0.008** (0.007–0.009)	**0.010** (0.009–0.011)	**0.011** (0.010–0.012)	**0.012** (0.011–0.014)	**0.013** (0.012–0.015)	**0.015** (0.013–0.017)	**0.016** (0.014–0.019)
60-day	**0.003** (0.003–0.004)	**0.005** (0.004–0.005)	**0.006** (0.005–0.007)	**0.007** (0.006–0.008)	**0.008** (0.007–0.009)	**0.009** (0.008–0.010)	**0.010** (0.009–0.011)	**0.011** (0.009–0.013)	**0.012** (0.010–0.014)	**0.013** (0.011–0.015)

[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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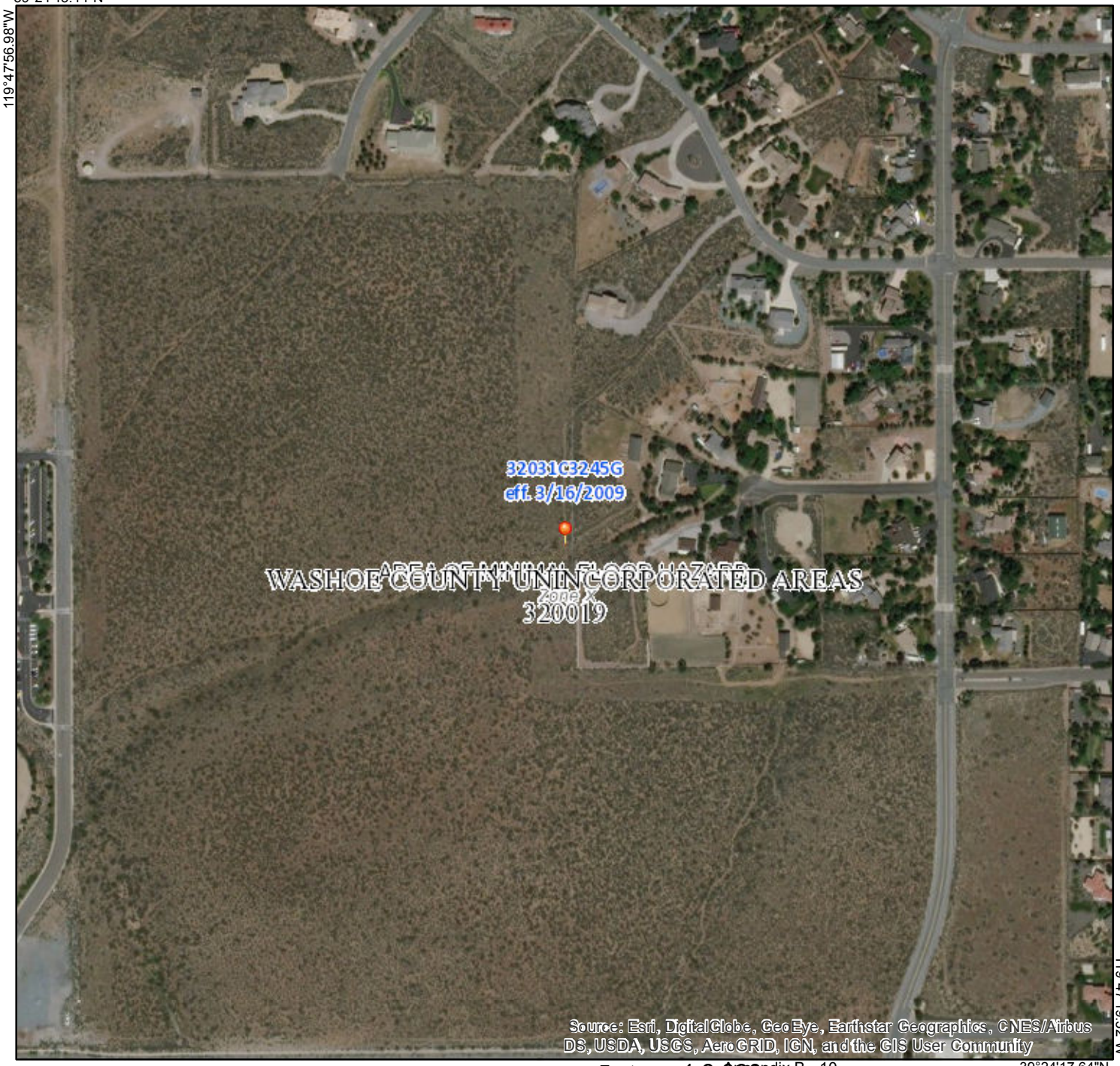
National Flood Hazard Layer FIRMette

FEMA

39°24'45.44"N

119°47'56.98"W



119°47'19.52"W

39°24'17.64"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth
- Regulatory Floodway *Zone AE, AO, AH, VE, AR*

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The base map shown complies with FEMA's base map accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/9/2018 at 7:46:26 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: base map imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Engineering Handbook, Section 4 (SCS, 1985). The antecedent moisture condition of the watershed is explained as follows:

> The amount of rainfall in a period of 5 to 30 days preceding a particular storm is referred to as antecedent rainfall, and the resulting condition of the watershed in regard to potential runoff is referred to as an antecedent moisture condition. In general, the heavier the antecedent rainfall, the greater the direct runoff that occurs from a given storm. The effects of infiltration and evapotranspiration during the antecedent period are also important, as they may increase or lessen the effect of antecedent rainfall. Because of the difficulties of determining antecedent storm conditions from data normally available, the conditions are reduced to three cases, AMC-I, AMC-II and AMC-III.

For the Washoe County area, an AMC-II condition shall be used for determining storm runoff.

Having determined the soil group, land use and treatment class and the antecedent moisture condition, CN values can be determined from Table 702.

There will be areas to which the values in Table 702 do not apply. The percentage of impervious area for the various types of residential areas or the land use condition for the pervious portions may vary from the conditions assumed in Table 702. A curve for each pervious CN can be developed to determine the composite CN for any density of impervious area. Figure 702 has been developed assuming a CN of 98 for the impervious area. The curves in Figure 702 can help in estimating the increase in runoff as more land within a given area is covered with impervious material.

There are a number of methods available for computing the percentage of impervious area in a watershed. Some methods include using U.S. Geological Survey topographic maps, land use maps, aerial photographs, and field reconnaissance. Care must be exercised when using methods based on such parameters as population density, street density, and age of the development as a means of determining the percentage of impervious area. The available data on runoff from urban areas are not yet sufficient to validate widespread use of these methods. Therefore, the CN to be used in the Washoe County area shall be based on Table 702 or Figure 702 in this Manual. A CN computation example is included in Section 711.

704 RATIONAL FORMULA METHOD

For drainage basins that are not complex and have small drainage areas, the design storm runoff may be analyzed using the Rational Formula Method in accordance with Section 304.3. This method was introduced in 1889 and is still being used in many engineering offices in the United States. Even though this method has frequently come under academic criticism for its simplicity, no other practical drainage design method has evolved to such a level of general acceptance by practicing engineers. The Rational Formula Method, when properly understood and applied, can produce satisfactory results for determining peak discharge.

704.1 METHODOLOGY

The Rational Formula Method is based on the formula:

$$Q = CIA \qquad (708)$$

Q is defined as the maximum rate of runoff in cubic feet per second (actually, Q has units of acre inches per hour, which is approximately equal to the units of cubic feet per second). C is a runoff coefficient and represents the runoff-producing conditions of the subject land area (see Section 704.5).

I is the average intensity of rainfall in inches per hour for a duration equal to the time of concentration.
A is the contributing basin area in acres.

704.2 ASSUMPTIONS

The basic assumptions made when applying the Rational Formula Method are as follows:

1. The computed maximum rate of runoff to the design point is a function of the average rainfall rate during the time of concentration to that point.
2. The maximum rate of rainfall occurs during the time of concentration, and the design rainfall depth during the time of concentration is converted to the average rainfall intensity for the time of concentration.
3. The maximum runoff rate occurs when the entire area is contributing flow. However, this assumption has been modified from time to time when local rainfall/runoff data was used to improve calculated results.

704.3 LIMITATIONS ON METHODOLOGY

The Rational Formula Method adequately approximates the peak rate of runoff from a rainstorm in a given basin. The critics of the method usually are unsatisfied with the fact that the answers are only approximations. A shortcoming of the Rational Formula Method is that only one point on the runoff hydrograph is computed (the peak runoff rate).

Another disadvantage of the Rational Formula Method is that with typical design procedures one normally assumes that all of the design flow is collected at the design point and that there is no "carry over water" running overland to the next design point. However, this is not the fault of the Rational Formula Method, but of the design procedure. The problem becomes one of routing the surface and subsurface hydrographs which have been separated by the storm sewer system. In general, this sophistication is not warranted and a conservative assumption is made wherein the entire routing occurs through the storm sewer system when this system is present.

704.4 RAINFALL INTENSITY

The rainfall intensity, I, is the average rainfall rate in inches per hour for the period of maximum rainfall of a given frequency having a duration equal to the time of concentration. After the design storm frequency has been selected, a graph should be prepared showing rainfall intensity versus time. Information on local rainfall data is presented in Section 600 of this Manual.

704.5 RUNOFF COEFFICIENT

The runoff coefficient, C, represents the integrated effects of infiltration, evaporation, retention, flow routing, and interception, all which affect the time distribution and peak rate of runoff. Determination of the coefficient requires judgment and understanding on the part of the engineer. Table 701 presents the recommended values of C for the various recurrence frequency storms. The values are presented for different surface characteristics as well as for different aggregate land uses. Variations to these values are subject to the approval of the Jurisdictional Entity.

A composite runoff coefficient is computed on the basis of the percentage of different types of surfaces in the drainage area. For homogeneous developed areas, this procedure is often applied to a typical "sample" area as a guide to selection of reasonable values of the coefficient for an entire area. Suggested coefficients with respect to surface type are also given in Table 701 under the column

labeled "Percent Impervious". Where land use features are mixed, a composite C analysis will result in more accurate results. The runoff coefficients in Table 701 also vary with recurrence frequency.

704.6 APPLICATION OF THE RATIONAL FORMULA METHOD

The first step in applying the Rational Formula Method is to obtain a topographic map and define the boundaries of all the relevant drainage basins. Basins to be defined include all basins tributary to the area of study and sub-basins within the study area. A field check and possibly field surveys should be made for each basin. At this stage of planning, the possibility for the diversion of transbasin waters should be identified.

The major storm drainage basin does not always coincide with the minor storm drainage basin. This is often the case in urban areas where a low flow will stay next to a curb and follow the lowest grade, but when a large flow occurs the water will be deep enough so that part of the water will overflow street crowns and flow into a new sub-basin. An example of how to apply the Rational Formula Method is presented in Section 711.

704.7 MAJOR STORM ANALYSIS

When analyzing the major runoff occurring within an area that has a storm sewer system sized for the minor storm, care must be used when applying the Rational Formula Method. Normal application of the Rational Method assumes that all of the runoff is collected by the storm sewer. For the minor storm design, the time of concentration is dependent upon the flow time in the sewer. However, during the major storm runoff, the sewers will probably be at capacity and would not carry the additional water flowing to the inlets. This additional water then flows overland past the inlets, generally at a lower velocity than the flow in the storm sewers.

If a separate time of concentration analysis is made for the pipe flow and surface flow, a time lag between the surface flow peak and the pipe flow peak will occur. This lag, in effect, will allow the pipe to carry a larger portion of the major storm runoff than would be predicted using the minor storm time of concentration. The basis for this increased benefit is that the excess water from one inlet will flow to the next inlet downhill, using the overland route. If that inlet is also at capacity, the water will often continue on until capacity is available in the storm sewer. The analysis of this aspect of the interaction between the storm sewer system and the major storm runoff is complex. The simplified approach of using the minor storm time of concentration for all frequency analysis is acceptable for use in Washoe County.

705 SCS UNIT HYDROGRAPH METHOD

The SCS Unit Hydrograph method was developed for the SCS by Mr. Victor Mockus. The SCS Unit Hydrograph was derived from a large number of natural unit hydrographs from watersheds varying widely in size and geographic location. The SCS Unit Hydrograph has been in use for many years and has produced satisfactory results for many applications. This method may be used for drainage areas within the Washoe County area in accordance with Section 304.3.

705.1 METHODOLOGY

The SCS Unit Hydrograph method uses the unit hydrograph theory as a basis for runoff computations. The unit hydrograph theory computes rainfall excess hydrographs for a unit amount of rainfall excess applied uniformly over a sub-basin for a given unit of time (or unit duration). The rainfall excess hydrographs are then transformed to a sub-basin hydrograph by superimposing each excess hydrograph lagged by the unit duration.

SECTION 700

STORM RUNOFF

701 INTRODUCTION

For the area within the jurisdiction of this Manual, two deterministic hydrological models can be used to predict storm runoff (Policy Section 304). These models are the Rational Formula Method and the Soil Conservation Service, U.S. Department of Agriculture (SCS) Unit Hydrograph method. The procedures for using these methods are presented in this section. The Rational Formula Method may be employed without the use of computers. Computer modeling using the U.S. Army Corps of Engineers HEC-1 or HEC-HMS Flood Hydrograph Package or other hydrologic computer modeling programs is required for the SCS method. For certain circumstances, where adequate recorded stream flow data are available and the drainage area is large (> 10 square miles), a statistical analysis may be required to predict the storm runoff peaks or for calibration of deterministic models (see Section 708).

701.1 BASIN CHARACTERISTICS

The basin characteristics needed for the subject runoff computation methods include the drainage area, soil type, the various flow path lengths, slopes, and characteristics (i.e., overland, grassed channel, gutter) and land use types. The drainage basin boundary and area may be determined from available topographic maps or site-specific mapping depending upon the level of detail required. A field investigation is recommended to verify drainage boundaries. The land use and flow path characteristics can be obtained from zoning maps, aerial photographs, field investigations, or detailed topographic maps.

702 TIME OF CONCENTRATION

The definition of the time of concentration, t_c, for the purpose of this Manual, is the time required for water to flow from the hydraulically most distant part of the drainage area to the point under consideration. For the Rational Formula Method, the time of concentration must be estimated so that the average rainfall rate for the corresponding duration can be determined from the rainfall intensity-duration-frequency curves. For the SCS Unit Hydrograph method, the time of concentration is used to determine the time-to-peak, t_p, of the unit hydrograph and subsequently, the peak runoff.

In the past, several different time of concentration equations have been used with the runoff methods discussed in the following sections. However, as both methods have the same definition of the time of concentration, and to promote consistency between the two runoff methods, the time of concentration equations presented in this section shall be used for all watersheds of total area less than one square mile and whose basin slope is less than ten percent. For larger watersheds and for watersheds with basin slopes equal to or greater than ten percent, the basin lag equation shall be used (see Section 705.3).

For urban areas, the time of concentration consists of an inlet time or overland flow time (t_i) plus the time of travel (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a combined form, such as a small swale, channel, or wash. The latter portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or wash. Inlet time, on the other hand, will vary with surface slope, depression storage, surface cover,

antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. Thus, the time of concentration for both urban and non-urban areas shall be calculated as follows:

$$t_c = t_i + t_t \quad (701)$$

In which t_c = time of concentration (minutes)
t_i = initial, inlet, or overland flow time (minutes)
t_t = travel time in the ditch, channel, gutter, storm sewer, etc. (minutes)

To aid in the computation of t_c, Standard Form 2 (see Section - 1500) has been developed to organize the computation. In all drainage studies, t_c calculations should be submitted using Standard Form 2.

The initial or overland flow time, t_i, may be calculated using the following equation:

$$t_i = \frac{1.8\,(1.1 - R)\,L_o^{1/2}}{S^{1/3}} \quad (702)$$

Where t_i = initial or overland flow time (minutes)
R = flow runoff coefficient
L_o = length of overland flow (feet, 500 feet maximum)
S = average overland basin slope (percent)

Equation 702 was originally developed by the Federal Aviation Administration (FAA, 1970) for use with the Rational Formula Method. However, the equation is also valid for computation of the initial or overland flow time for the SCS Unit Hydrograph method using the appropriate flow runoff coefficient.

For the Rational Formula Method, the 5-year runoff coefficient, C_5, presented in Table 701 shall be used as the flow runoff coefficient, R. For the SCS Unit Hydrograph method, R shall be calculated using the following equation:

$$R = .0132\,CN - 0.39 \quad (703)$$

This equation was developed by converting CN factors to typical C_5 runoff coefficients.

The overland flow length, L_o, is generally defined as the length of flow over which the flow characteristics appear as sheet flow or very shallow flow in grassed swales. Changes in land slope, surface characteristics, and small drainage ditches or gullies will tend to force the overland flow into a concentrated flow condition. Thus, the initial flow time would generally end at these locations.

For longer basin lengths, initial or overland flow needs to be considered in combination with the travel time, t_t, which is calculated using the hydraulic properties of the swale, ditch, or channel. For preliminary work, travel time can be estimated with the help of Figure 701 (SCS, 1985). The time of concentration is then the sum of the initial flow time, t_i and the travel time t_t (Equation 701). The minimum t_c in Washoe County for non-urban watersheds shall be 10 minutes.

702.1 URBANIZED BASINS

Overland flow in urbanized basins can occur from the back of the lot to the street, in parking lots, in greenbelt areas, or within park areas. It can be calculated using the procedure described in Section 702 except that the travel time, t_t, to the first design point or inlet is estimated using the "Paved Area (Sheet Flow) & Shallow Gutter Flow" line in Figure 701. The time of concentration for the first design point in an urbanized basin using this procedure should not exceed the time of concentration

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.

VERSION: April 30, 2009	REFERENCE:	TABLE
WRC ENGINEERING, INC.	USDCM, DROCOG, 1969 (with modifications)	701

APPENDIX B

EXISTING HYDROLOGIC ANALYSIS

Project Description

File Name	WCSD ARROW CREEK EXIST 5YR.SPF
Description	
	WASHOE COUNTY SCHOOL DISTRICT
	ARROW CREEK MIDDLE SCHOOL
	PRELIMINARY HYDROLOGIC ANALYSIS
	5-YR EXISTING CONDITIONS

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Apr 05, 2018	00:00:00
End Analysis On	Apr 06, 2018	00:00:00
Start Reporting On	Apr 05, 2018	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	7
Nodes	9
Junctions	4
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	4
Channels	2
Pipes	2
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	5 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	X-01	11.83	0.3100	0.34	0.11	1.24	4.31	0 00:17:23
2	X-02	9.81	0.2600	0.33	0.09	0.85	3.09	0 00:16:30
3	X-03	13.98	0.2400	0.42	0.10	1.41	2.95	0 00:28:50
4	X-04	16.16	0.2000	0.35	0.07	1.12	3.76	0 00:17:45
5	X-05	22.98	0.2000	0.30	0.06	1.40	6.19	0 00:13:29
6	X-06	13.53	0.2000	0.31	0.06	0.84	3.56	0 00:14:09
7	X-07	10.62	0.2000	0.31	0.06	0.66	2.82	0 00:13:55

Project Description

File Name	WCSD ARROW CREEK EXIST 100YR.SPF
Description	
	WASHOE COUNTY SCHOOL DISTRICT
	ARROW CREEK MIDDLE SCHOOL
	PRELIMINARY HYDROLOGIC ANALYSIS
	100-YR EXISTING CONDITIONS

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Apr 05, 2018	00:00:00
End Analysis On	Apr 06, 2018	00:00:00
Start Reporting On	Apr 05, 2018	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	7
Nodes	9
Junctions	4
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	0
Links	4
Channels	2
Pipes	2
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	100 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	X-01	11.83	0.5700	0.82	0.47	5.55	19.20	0 00:17:23
2	X-02	9.81	0.5400	0.81	0.44	4.28	15.55	0 00:16:30
3	X-03	13.98	0.5200	1.02	0.53	7.44	15.47	0 00:28:50
4	X-04	16.16	0.5000	0.84	0.42	6.76	22.73	0 00:17:45
5	X-05	22.98	0.5000	0.73	0.37	8.41	37.42	0 00:13:29
6	X-06	13.53	0.5000	0.75	0.38	5.09	21.55	0 00:14:09
7	X-07	10.62	0.5000	0.75	0.37	3.97	17.04	0 00:13:55

APPENDIX C

PROPOSED HYDROLOGIC ANALYSIS

Project Description

File Name	WCSD ARROW CREEK PROP 5YR.SPF
Description	
	WASHOE COUNTY SCHOOL DISTRICT
	ARROW CREEK MIDDLE SCHOOL
	PRELIMINARY HYDROLOGIC ANALYSIS
	5-YR PROPOSED CONDITIONS

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Apr 05, 2018	00:00:00
End Analysis On	Apr 06, 2018	00:00:00
Start Reporting On	Apr 05, 2018	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	9
Nodes	17
Junctions	11
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	1
Links	12
Channels	7
Pipes	5
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	5 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	P-01	11.83	0.3100	0.34	0.11	1.24	4.31	0 00:17:23
2	P-02	9.81	0.2600	0.33	0.09	0.85	3.09	0 00:16:30
3	P-03	13.98	0.2400	0.42	0.10	1.41	2.95	0 00:28:50
4	P-04	7.11	0.2000	0.28	0.06	0.41	2.02	0 00:12:01
5	P-05	9.19	0.2000	0.26	0.05	0.48	2.85	0 00:10:00
6	P-06	26.94	0.5500	0.30	0.17	4.45	20.00	0 00:13:24
7	P-07	10.01	0.2000	0.30	0.06	0.60	2.72	0 00:13:14
8	P-08	2.28	0.2000	0.26	0.05	0.12	0.71	0 00:10:00
9	P-09	7.76	0.2000	0.29	0.06	0.44	2.21	0 00:11:59

Project Description

File Name	WCSD ARROW CREEK PROP 100YR.SPF
Description	
	WASHOE COUNTY SCHOOL DISTRICT
	ARROW CREEK MIDDLE SCHOOL
	PRELIMINARY HYDROLOGIC ANALYSIS
	100-YR PROPOSED CONDITIONS

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Apr 05, 2018	00:00:00
End Analysis On	Apr 06, 2018	00:00:00
Start Reporting On	Apr 05, 2018	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	9
Nodes	17
Junctions	11
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	1
Links	12
Channels	7
Pipes	5
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	100 year(s)

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Runoff Coefficient	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	P-01	11.83	0.5700	0.82	0.47	5.55	19.20	0 00:17:23
2	P-02	9.81	0.5400	0.81	0.44	4.28	15.55	0 00:16:30
3	P-03	13.98	0.5200	1.02	0.53	7.44	15.47	0 00:28:50
4	P-04	7.11	0.5000	0.69	0.34	2.44	12.21	0 00:12:01
5	P-05	9.19	0.5000	0.62	0.31	2.87	17.19	0 00:10:00
6	P-06	26.94	0.7200	0.73	0.52	14.06	63.33	0 00:13:24
7	P-07	10.01	0.5000	0.72	0.36	3.60	16.44	0 00:13:14
8	P-08	2.28	0.5000	0.62	0.31	0.71	4.26	0 00:10:00
9	P-09	7.76	0.5000	0.69	0.34	2.67	13.34	0 00:11:59

APPENDIX D

DETENTION FACILITY ANALYSIS

Project Description

File Name	WCSD ARROW CREEK PROP 100YR.SPF
Description	WASHOE COUNTY SCHOOL DISTRICT ARROW CREEK MIDDLE SCHOOL PRELIMINARY HYDROLOGIC ANALYSIS 100-YR PROPOSED CONDITIONS

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	Rational
Time of Concentration (TOC) Method	SCS TR-55
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Apr 05, 2018	00:00:00
End Analysis On	Apr 06, 2018	00:00:00
Start Reporting On	Apr 05, 2018	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	0
Subbasins	9
Nodes	17
Junctions	11
Outfalls	5
Flow Diversions	0
Inlets	0
Storage Nodes	1
Links	12
Channels	7
Pipes	5
Pumps	0
Orifices	0
Weirs	0
Outlets	0
Pollutants	0
Land Uses	0

Rainfall Details

Return Period	100 year(s)

Storage Nodes

Storage Node : Stor-01

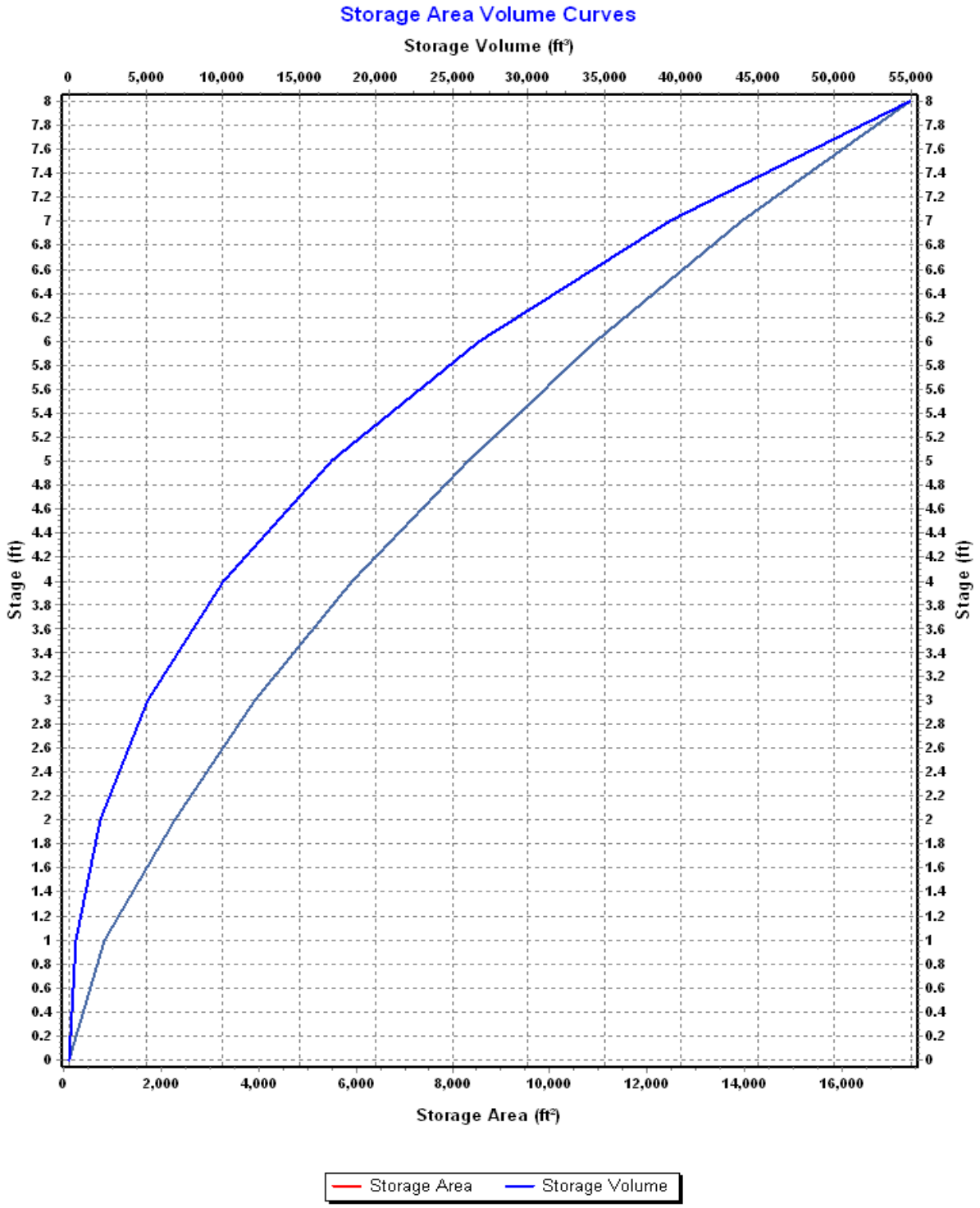
Input Data

Invert Elevation (ft)	5064.00
Max (Rim) Elevation (ft)	5072.00
Max (Rim) Offset (ft)	8.00
Initial Water Elevation (ft)	5064.00
Initial Water Depth (ft)	0.00
Ponded Area (ft²)	17602.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : Storage-01

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	109	0.000
1	843	476.00
2	2269	2032.00
3	3928	5130.50
4	5917	10053.00
5	8322	17172.50
6	10931	26799.00
7	13963	39246.00
8	17404	54929.50


Storage Area Volume Curves
Storage Volume (ft³)
0
5,000
10,000
15,000
20,000
25,000
30,000
35,000
40,000
45,000
50,000
55,000
Stage (ft)
Stage (ft)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
3.8
4
4.2
4.4
4.6
4.8
5
5.2
5.4
5.6
5.8
6
6.2
6.4
6.6
6.8
7
7.2
7.4
7.6
7.8
8
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
Storage Area (ft²)
Storage Area
Storage Volume

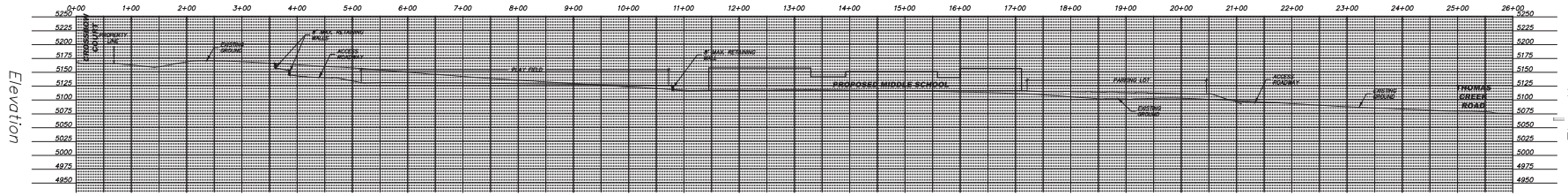
Storage Node : Stor-01 (continued)

Output Summary Results

Peak Inflow (cfs)	37.20
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	19.95
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	5070.03
Max HGL Depth Attained (ft)	6.03
Average HGL Elevation Attained (ft)	5064.24
Average HGL Depth Attained (ft)	0.24
Time of Max HGL Occurrence (days hh:mm)	0 00:39
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

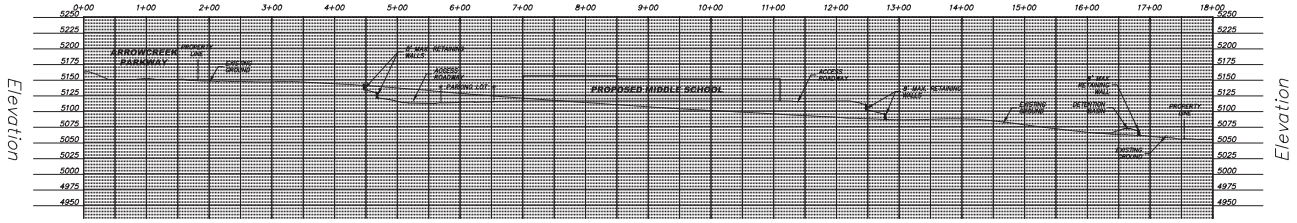
PROFILE VIEW "SECTION A"

"SECTION A" 0+00.00 TO "SECTION A" 26+00.00



PROFILE VIEW "SECTION B"

"SECTION B" 0+00.00 TO "SECTION B" 18+00.00



H:\WCSD ARROW CREEK MIDDLE SCHOOL\SOURCE DRAWINGS\PRELIMINARY SITE PLAN 5.DWG

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drawn: F.B.
checked: F.B.

Revision Schedule		
#	Date	Description

Arrowcreek Middle School
Washoe County School District

Preliminary Drawings

drawing title

Arrow Creek Middle School
Preliminary Cross Sections

job number

1701

date

12 February 2018

drawing number

C2.0