Special Use Permit Application
Bishop Manogue High School Expansion

Submitted to Washoe County
February 8, 2024

Prepared for

Bishop Manogue High School
110 Bishop Manogue Drive
Reno, NV 89511

Prepared by

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
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Section 1

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: **Bishop Manogue Catholic High School Expansion**

Project Description: Bishop Manogue Catholic High School is planning to expand their facility to add additional classrooms, cafeteria, theater, and common areas to increase the student population from 800 students to 1200 students.

Project Address: 110 Bishop Manogue Drive

Project Area (acres or square feet): 48.11 acres

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

Project site is located west of South Virginia Street with access from either Bishop Manogue Drive or McCabe Drive.

Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
162-010-28	48.11		

Indicate any previous Washoe County approvals associated with this application:

Case No.(s). SPW8-41-97

Applicant Information (attach additional sheets if necessary)

Property Owner:		**Professional Consultant:**	
Name: Bishop Manogue Catholic High School		Name: Wood Rodgers, Inc	
Address: 110 Bishop Manogue Drive		Address: 1361 Corporate Boulevard	
Reno, NV	Zip: 89511	Reno, NV	Zip: 89502
Phone: 775-336-6000	Fax:	Phone: 775-250-8213	Fax:
Email: matthew.schambari@bishopmanogue.org		Email: shuggins@woodrodgers.com	
Cell:	Other:	Cell:	Other:
Contact Person: Matthew Schambari		Contact Person: Stacie Huggins	
Applicant/Developer:		**Other Persons to be Contacted:**	
Name: SAME AS ABOVE		Name: H&K Architects	
Address:		Address: 5485 Reno Corporate Drive, Suite 100	
	Zip:	Reno, NV	Zip: 89511
Phone:	Fax:	Phone: 775-870-4877	Fax:
Email:		Email: jeff@hkarchitects.com	
Cell:	Other:	Cell:	Other:
Contact Person:		Contact Person: Jeff Klippenstein	

For Office Use Only

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

Special Use Permit Application
Supplemental Information

(All required information may be separately attached)

1. What is the project being requested?

Bishop Manogue Catholic High School (BMCHS) is planning to expand their existing facility by 160,200 sqft in order to increase student population from 800 to 1,200 students. The expansion will include new classrooms, a larger cafeteria, a theater, and a gymnasium.

2. Provide a site plan with all existing and proposed structures (e.g. new structures, roadway improvements, utilities, sanitation, water supply, drainage, parking, signs, etc.)

Noted. Refer to civil plan set included with application packet.

3. What is the intended phasing schedule for the construction and completion of the project?

Full build out of the proposed expansion is planned over 4 phases that could take up to 10 years. Phase 1 - cafeteria/parking lot to begin within 2 years of SUP approval and be complete by 2026; Phase 2 - weight room and practice gym, Phase 3 - STEM building, and Phase 4 - performing arts theater. All phases are anticipated to be complete by 2036.

4. What physical characteristics of your location and/or premises are especially suited to deal with the impacts and the intensity of your proposed use?

The project site is already mostly developed with an existing high school. The proposed expansion includes buildings in undeveloped areas primarily adjacent to the existing building.

5. What are the anticipated beneficial aspects or affects your project will have on adjacent properties and the community?

Bishop Manogue already serves as a community partner to a number of different entities in need of facilities like theirs. The proposed expansion will make them an even greater community resource for events, the arts and STEM initiatives.

6. What are the anticipated negative impacts or affect your project will have on adjacent properties? How will you mitigate these impacts?

There are no anticipated negative impacts on adjacent properties since all of the new development is proposed adjacent to the existing building(s).

7. Provide specific information on landscaping, parking, type of signs and lighting, and all other code requirements pertinent to the type of use being purposed. Show and indicate these requirements on submitted drawings with the application.

Refer to civil and landscape plans included with this application packet.

8. Are there any restrictive covenants, recorded conditions, or deed restrictions (CC&Rs) that apply to the area subject to the special use permit request? (If so, please attach a copy.)

❑ Yes	■ No

9. Utilities:

a. Sewer Service	South Truckee Meadows Water Reclamation Facility
b. Electrical Service	NV Energy
c. Telephone Service	AT&T
d. LPG or Natural Gas Service	NV Energy
e. Solid Waste Disposal Service	Waste Management
f. Cable Television Service	Charter
g. Water Service	TMWA

For most uses, Washoe County Code, Chapter 110, Article 422, Water and Sewer Resource Requirements, requires the dedication of water rights to Washoe County. Please indicate the type and quantity of water rights you have available should dedication be required.

h. Permit #		acre-feet per year	
i. Certificate #		acre-feet per year	
j. Surface Claim #		acre-feet per year	
k. Other #		acre-feet per year	

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

10. Community Services (provided and nearest facility):

a. Fire Station	TMFD Station 33 (.9 miles)
b. Health Care Facility	Renown Medical Group (.53 miles)
c. Elementary School	Elizabeth Lenz Elementary School (.79 miles)
d. Middle School	Picollo Middle School (.64 miles)
e. High School	Manogue High School
f. Parks	South Hills Park (.24 miles)
g. Library	South Valleys Library (1.36 miles)
h. Citifare Bus Stop	S. Virginia/McCabe (.24 miles)

Special Use Permit Application
for Grading
Supplemental Information

(All required information may be separately attached)

1. What is the purpose of the grading?

Grading is required to accommodate the proposed building expansions and associated site improvements such as accessible sidewalks and parking areas.

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

Approximately 20,000 cy of material will be excavated for the project.

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

The proposed project will disturb approximately 280,000 square feet of the property.

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 project is anticipated to export approximately 18,000 cy of material.

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

No. The proposed building expansion is greater than 4 acres. Additionally, the majority of the proposed development is comprised of the building footprint expansion that no only needs to be flat but also match the existing building finish floor elevation. The building expansion results in an earthwork volume greater than 5,000 cy, also requiring an SUP.

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.)

The property was previously graded in the early 2000's when the existing school facilities were built. All proposed grading associated with this SUP is new in support of the school expansion.

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

Yes. Building and hardscape limits are shown on the civil plans and limits of landscape improvements are shown on the landscape plans.

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

Disturbed areas will be screened from view by existing commercial/civic uses east of the site and mature landscaping along the property boundary. It is not anticipated that the disturbed areas behind the school will be visible due to existing topography, ballfield fencing, and existing landscaping/trees.

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)?

No. The proposed improvements include expanding the existing building and adding a parking lot, neither of which will accessible to neighboring 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 preliminary design includes slopes that are 3(H):1(V) or less. Fiber rolls and slope tracking will be provided with each phase of development to prevent erosion until landscape improvements are installed for each phase.

11. Are you planning any berms?

Yes	No X	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, varying in height from small landscape walls to 8 foot retaining walls will be provided as shown on the civil plans. The construction materials will vary from keystone block and rockery to case-in-place concrete or masonry.

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

Existing and proposed landscape treatments, including trees and shrubs, will provide visual mitigation.

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

Yes, approximately 14 trees (greater than 6" caliper) will be removed within the improvement area. Trees will be replaced with a tree of similar caliper at a 1:1 ratio to offset the caliper loss. Refer to grading plan and landscape plan for additional details.

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?

Only areas to be developed will be disturbed, therefore revegetation is not anticipated. All disturbance will be covered in either hardscape, building, or landscape. Mulch within landscape areas will include rock blends, DG, and other materials complimentary to the exiting landscaping and the proposed improvements.

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

If needed, temporary irrigation will either be provided by water truck or through the use of the existing private irrigation system extending throughout the site.

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

N/A

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

Yes	No X	If yes, please attach a copy.

Section 2

Executive Summary

Applicant:	Bishop Manogue Catholic High School
APN:	162-010-28
Request:	A request to allow Bishop Manogue Catholic High School to expand its building footprint in the Medium Density Suburban zoning district per Table 110.302.52 of the Washoe County Development Code.
Location	The 48-acre project site is located west of South Virgina Street via Bishop Manogue Drive and McCabe Drive in south Reno.

Project Request

This application package contains the required Washoe County application and supporting information for the following request:

- A **Special Use Permit (SUP)** to allow an existing *Private School Facility* to expand its building footprint within the current school campus located in south Reno.

Background

In 1997, the Washoe County Planning Commission approved a special use permit (SPW8-41-97) to develop the Bishop Manogue Catholic High School (BMCHS) campus on a 48-acre parcel. The campus would consist of 186,350 square foot building to include classrooms, an auditorium, gymnasium, library, cafeteria, chapel, as well as athletic fields. After several years of fundraising, in 2004, the 140,000± square foot new high school campus and associated facilities officially opened their doors. This new school was designed to accommodate approximately 800 students but given the size of the parcel, the school had the ability to expand the facilities when the time was right.

Over the last 10 years, with increased residential development throughout the Truckee Meadows, BMCHS has seen an increase is applications for new students. However, due to the current size of the facility, the school cannot physically accommodate more students resulting in a need to expand by utilizing the remaining undeveloped portions of the campus property and adding new wings to the existing building.

Physically, from the southwest portion of the project site, the site slopes downward to the northeast at approximately 2-percent. The existing school is situated at approximately the center of the parcel and is surrounded by athletic fields to the south, west and north. The majority of the area impacted by the school addition is occupied by landscaping and/or rough graded zones capped with aggregate (*refer to Preliminary Geotechnical Letter in Section 4 of this submittal package).*

The project site has a master plan designation of Suburban Residential (SR) and a zoning designation of Medium Density Suburban (MDS). The zoning designation of MDS conforms with the master plan designation and a high school (Private School Facility) is a permitted use in the MDS zoning category. The project site is adjacent to existing single family residential, existing commercial and existing church. The current land use and zoning designations are conforming with the surrounding land uses and in conformance with the goals and policies of the Master Plan (*refer to Vicinity Map, Existing Master Plan and Existing Zoning exhibits in Section 3 of this submittal package*).

ADJACENT PROPERTY DESCRIPTION			
	Land Use Designation	**Zoning**	**Use**
North	Suburban Mixed Use (SMU)	Mixed Use Suburban (MS)	Retail Commercial
South	Open Space (OS)	Open Space (OS)	Whites Creek Drainage
East	Suburban Mixed Use (SMU) Commercial (C)	Mixed Use Suburban (MS) Neighborhood Commercial (NC)	Post Office Auto Dealership Catholic Church
West	Suburban Residential (SR)	Medium Density Suburban (MDS)	Single Family Residential

Project Details

The project consists of approximately 162,000± square feet of new building added on to the existing building, creating a campus with approximately 300,597 square feet of building area. The expansion will include additional classrooms to increase the student enrollment from 800 students to approximately 1,200 students, additional space for cafeteria, theater, and gymnasium. As part of the expansion, two new parking areas will be constructed/improved providing a total of 695 parking spaces (138 (new) spaces) to serve the campus.

On-site circulation will provide access around the entire project site utilizing the existing access points at the north (McCabe Drive) and south (Bishop Manogue Drive) ends of the site which are accessible via South Virginia Street (US 395). Parking will be provided throughout the site and include safe pedestrian access from parking lots to the high school buildings.

Off-site, pedestrians will be able to use existing sidewalks to access the Project site on foot and bicycle. Specifically, the Project site frontage has sidewalks and pedestrian access curb ramps. In addition, the signalized intersection at Virginia Street & McCabe Drive includes pedestrian crosswalks with push buttons and curb ramps on all legs. The unsignalized intersection at Virginia Street & Bishop Manogue Drive also has a pedestrian crosswalk with signage and curb ramps along the west leg of the intersection. The roundabouts of Bishop Manogue HS Access have curb ramps on all legs and a pedestrian crosswalk on the Bishop Manogue HS Access & McCabe Drive south leg.

In terms of phasing, the project is anticipated to be constructed in multiple phases over approximately 10 years. While phases and specific additions are subject to change, below is an estimated phasing schedule for build out of the project:

Phase 1 - Cafeteria and South Parking Lot - The expansion of the cafeteria building, new storage outbuilding, and south parking lot will begin within two years of the approval of the SUP, with a target completion date of July 2026.

Phase 2 - Weight Room and Practice Gym - The expansion of the weight room and practice gym, should begin after the completion of Phase 1 with a target completion date of July 2030.

Phase 3 - Science and Engineering Building - The Science and Engineering building expansion should begin after the completion of Phase 2 with a target completion date of July 2033.

Phase 4- Performing Arts Theater - The Theater is anticipated to be the last phase of the program with an anticipated completion of July 2036.

Building Architecture and Floor Plan

The new additions for BMCHS will add a total of +/- 162,000 square feet to the existing building. This includes approximately 14,000 square feet of mechanical space. This expansion will allow the school to increase enrollment from 800 students to approximately 1,200 students.

The additions will relate to the exterior design language of the existing building by using similar materials such as concrete masonry units (CMU). Metal panel cladding will be used as a secondary material to complement the existing metal roofs and aid in elevation articulation. Roofs will be primarily flat with parapet walls. An abundance of natural light will be provided to interior spaces through large windows, skylights, and clerestories. Interior hallways will be generously wide to accommodate the busy class changes. Stairwells will also be extra wide and have exterior views to aid in wayfinding. Exterior heights of the additions will not surpass the existing chapel's steeple to maintain the chapel's centrality to the overall composition of the building.

It is anticipated for the total construction to be split into four phases: a Cafeteria wing, STEM/Classroom wing, Athletics wing, and a Theater/Art wing.

The cafeteria wing will extend the existing cafeteria, add a new kitchen, and add 8 classrooms between two stories. The expanded cafeteria will feature double height space with a mezzanine and clerestory windows. The cafeteria wing will be the first phase of construction as the existing cafeteria is not meeting the needs of current enrollment.

The STEM/Classroom wing will consist of a large double height STEM lab space with mezzanine and a two-story wing with 14 classrooms. The design of the STEM/Classroom wing exterior will take a more industrial approach to relate to its function and provide visual separation from the rest of the building. The cafeteria wing and STEM wing will be connected to each other as well as the existing building via corridors on both levels. This will allow for easy circulation between buildings and creates two large outdoor courtyards.

The new athletics addition will include a half-court practice gym, expanded weight room, and athletic offices. The weight room expansion will nearly triple the existing weight room space and include dedicated space for cardio and stretching.

The Theater/Art wing will include a partial fly, ~400 seat theater, a digital art classroom, and offices for campus ministry. An approximately 9,000 square foot outbuilding will be constructed adjacent to the tennis courts to provide much needed storage for facilities. Lastly, an approximately 500 square foot secure-entry lobby will be added to the main entrance to enhance the campus' security.

Traffic and Site Circulation

Wood Rodgers prepared a Traffic Impact Study to identify potential impacts from the project and develop recommendations if necessary. According to the study, the Project site currently generates approximately 1,693 daily trips (ADT), with 515 AM Peak Hour Trips and 312 afternoon peak trips. New trips generated by the proposed Project were estimated using rates from the Institute of Transportation Engineers Trip Generation Manual, 11th Edition (ITE). With the Project, site traffic is estimated to increase generation by 911 daily trips, 277 AM Peak Hour Trips (164 Inbound, 114 Outbound), and 168 Afternoon Peak Hour Trips (66 Inbound, 102 Outbound) under typical weekday traffic demand conditions.

In terms of on-site circulation, the Project trips will circulate through one of four existing Project driveways. According to the study, all four intersections and driveways are projected to operate at acceptable level of service (LOS) or better under existing pls project future peak hour conditions. As a result, the Project was found to have negligible impact on all four study intersections under all future study conditions (*refer to Traffic Impact Study in Section 4 of this submittal package)*.

Parking

As noted previously, the proposed Project adds approximately 160,200 square feet of new building area and increased enrollment up to 1,200 students. As a result of the expansion, the number of employees is also expected to increase, up to a total of 160 (with maximum enrollment). The existing Project site has 557 parking spaces which includes 25 accessible spaces.

In accordance with Washoe County Development Code, off-street parking spaces shall be provided for all new development. The parking space requirements for "Civic Use Types," which includes the "Education" category is provided in Table 110.410.10.2. Specifically, the parking space requirements for an "*Elementary/Secondary School*" are as follows:

- 1 space per employee during peak employee shift
- 0.25 spaces per student of driving age

Assuming 160 employees and projected 900 students of driving age (assuming 75% of the 1,200 students are of driving age), 385 parking spaces would be required for the Project per Washoe County Development Code. As designed, the proposed Project includes 695 total parking spaces, including a minimum of 14 ADA accessible spaces (per Table 110.410.15.1), which is anticipated to be adequate to meet the Project parking demand.

Landscaping

New landscaping will be provided as part of the Project. Washoe County Development Code requires that a minimum of 20% of the improvement area is required to be landscaped. As designed, the project includes 104,683 sqft (37%) of new landscape area which includes a mix of ornamental plantings and ornamental hardscape. The project will also include a minimum of 189 new trees that will be strategically planted throughout the project area (*refer to Color Site Plan in Section 3 or Landscape Plan in map pocket).*

Lighting

The project site includes existing light poles throughout the parking areas and around the athletic fields. As part of this expansion project, new light poles, typical of a high school, will be provided in the new parking areas. New light poles will not exceed a maximum height of 30-feet in parking areas and 12-feet if within 100 feet of residential neighborhoods. Any new light poles will be consistent in style with existing on-site poles and will promote "dark sky's" by including covers that prevent spillover and reflect away from adjoining properties.

Note that where lights may be located adjacent to the existing ballfields, the fields are several feet above the parking lot and therefore will provide some natural screening from neighborhood properties due to topography.

Utilities

Utilities that will serve the project site are summarized as follows:

- Water – The project site is currently served by TMWA. There is a 10-inch water main loop on site that surrounds the existing building. It is anticipated that the existing water main is sufficient to serve the proposed building expansions and their associated new services. Based on initial information, the existing water main may be located outside the drive aisle at the southwest corner of the building. In anticipation of this possibility, the proposed plan shows relocation of the water main into the drive aisle. Reference the utility plan for locations of the proposed services and relocated water main.

- Sewer – The site is currently being served by Washoe County at the South Truckee Meadows Water Reclamation Facility. The project is anticipated to generate 18,900 gallons per day (gpd) more flow as a result of the proposed building expansions. Sewer will connect to existing facilities serving the site. Reference the sewer study for detailed calculations and new sewer service locations.

Neighborhood Meeting

As required the applicant hosted a Neighborhood Meeting to discuss the project prior to this application. Post cards were mailed to over 245 property owners within 750 feet of the project site. The virtual meeting was held on Wednesday, January 10, 2024 from 6:00 – 7:00 pm in the Bishop Manogue High School cafeteria. An overview of the project including preliminary site plans and project details were presented. Four people attended the meeting and asked questions related to traffic during construction, project phasing, and next steps. The pre-application meeting materials including a recording of the neighborhood meeting presentation was uploaded to the Washoe County HUB website.

Development Statistics

Total Parcel Area:	48± acres
Proposed Project Area:	6.5± acres (283,140 sqft.)
Existing Building Area:	153,000± sqft.
Proposed Building Area:	161,500 ± sqft.
Proposed Parking/Paved Area:	78,100± sqft.
Proposed Landscape Area:	104,683± sqft.
Landscape Area Required:	56,628± sqft (20%)
Landscape Area Provided:	104,683 ± sqft. (37%)
Trees Required:	189 trees
Trees Provided:	189 trees
Parking Required:	385 stalls
Parking Provided:	695 stalls
Accessible Parking Required:	14 stalls
Accessible Parking Provided:	14 stalls

Special Use Permit Findings

Section 110.810.30 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:

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

Response: According to the Envision Washoe 2040 Master Plan adopted in November 2023, the subject properties are in the Southwest Truckee Meadows planning area which identifies the parcels as having a master plan designation of Suburban Residential (SR). There are no specific Principles or Policies in the planning area that are applicable to the proposed school expansion. The granting of this special use permit is consistent with the policies and maps of the Master Plan and Southwest Truckee Meadows area.

(b) 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;

Response: As detailed on the attached engineering plans and reports, all infrastructure and services needed to serve the project are in place or can be extended to serve the building expansion areas.

(c) Site Suitability. The site is physically suitable for the type of development and for the intensity of development;

Response: As previously noted, from the southwest portion of the project site, the site slopes downward to the northeast at approximately 2-percent. The existing school is situated at approximately the center of the parcel and is surrounded by athletic fields to the south, west and north. The majority of the area impacted by the proposed school expansion is currently either landscaped and/or rough graded with aggregate making these area well suited for the intensity of the use.

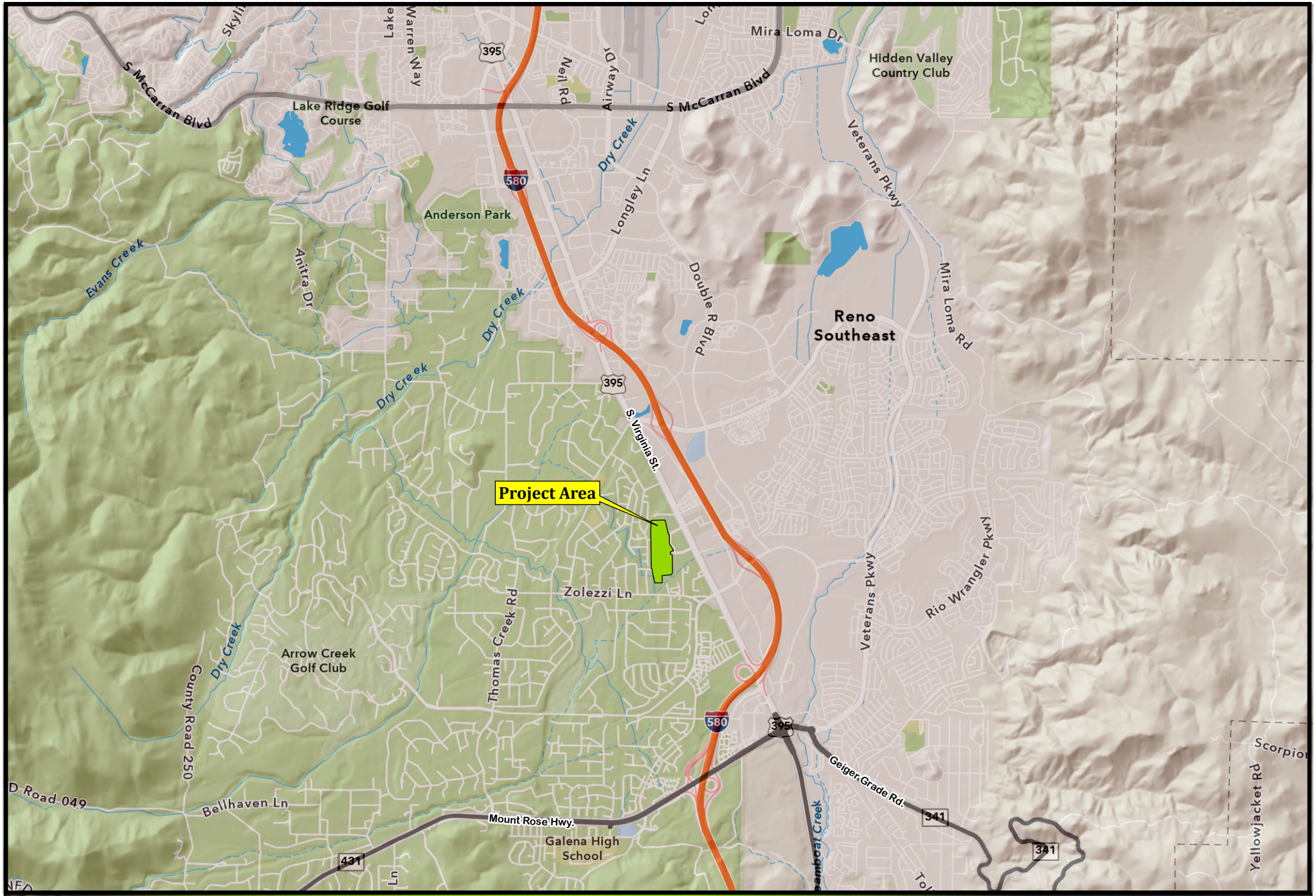
(d) Issuance Not Detrimental. Issuance of the permit will not be significantly detrimental to the public health, safety or welfare; injurious to the property or improvements of adjacent properties; or detrimental to the character of the surrounding area; and

Response: Given that the site already developed with a high school campus and athletic fields, issuance of this special use permit to allow the school to expand within its current footprint will not be significantly detrimental to the public health, safety or welfare of the surrounding area. Consideration has been given to the neighboring properties through the overall site design and additional landscaping to help mitigate grading impacts and screen the development from public view.

(e) 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.

Response: N/A.

Section 3



Vicinity Map

Manogue High School

January 2024

0 ½ 1 MILES

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Tel: 775.823.4068
Fax: 775.823.4066

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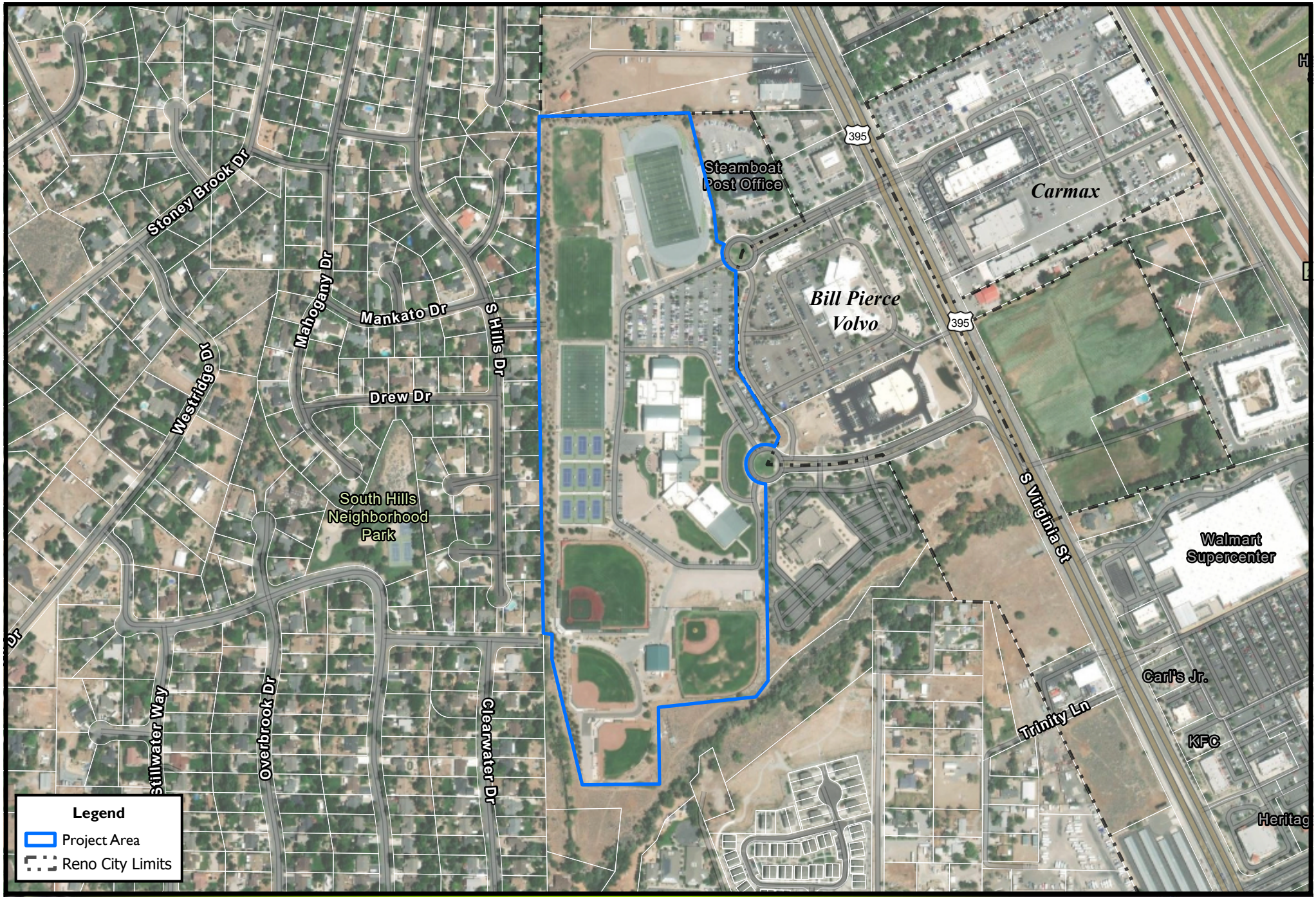

Aerial Map

Manogue High School

January 2024

0 300 600
Feet

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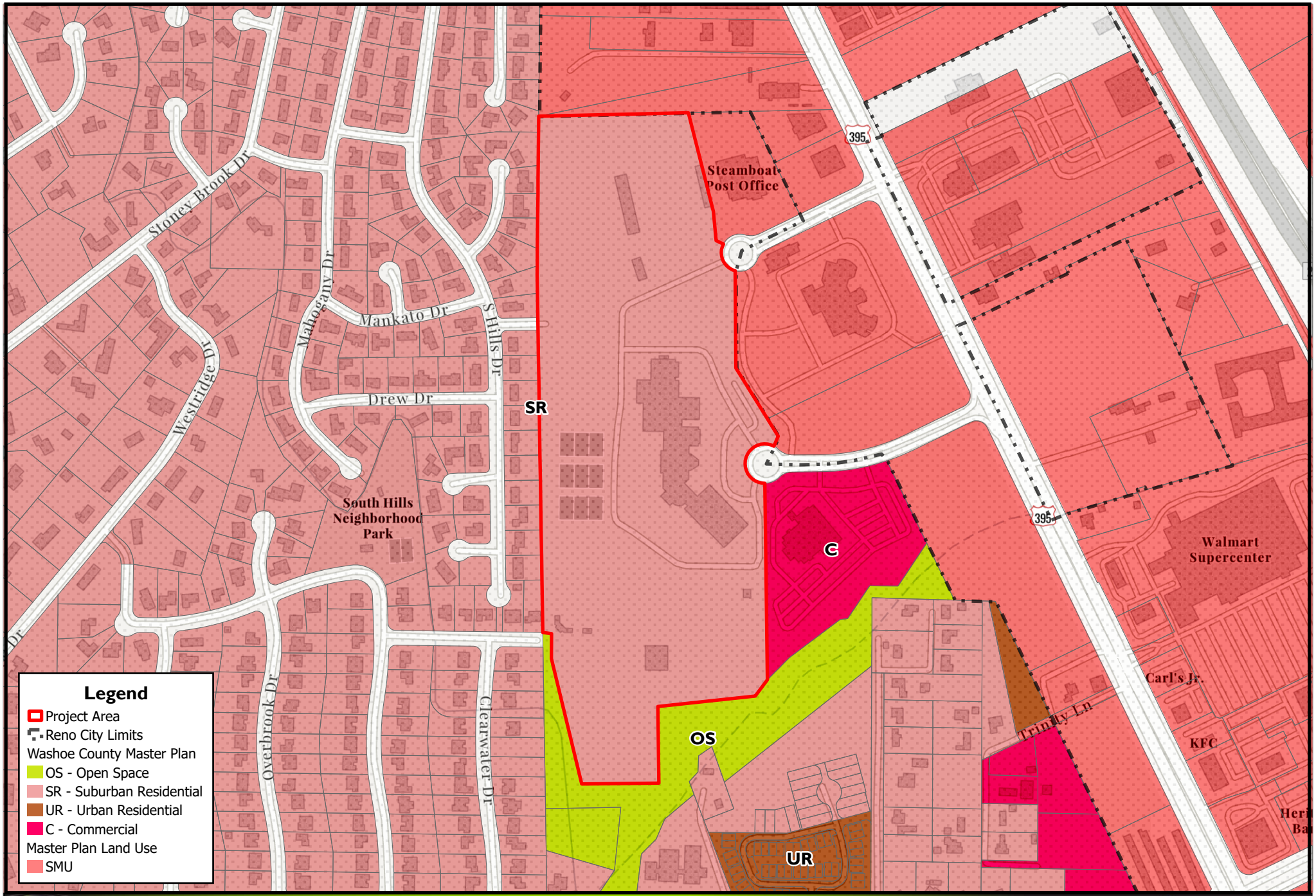

Master Plan

Manogue High School

January 2024

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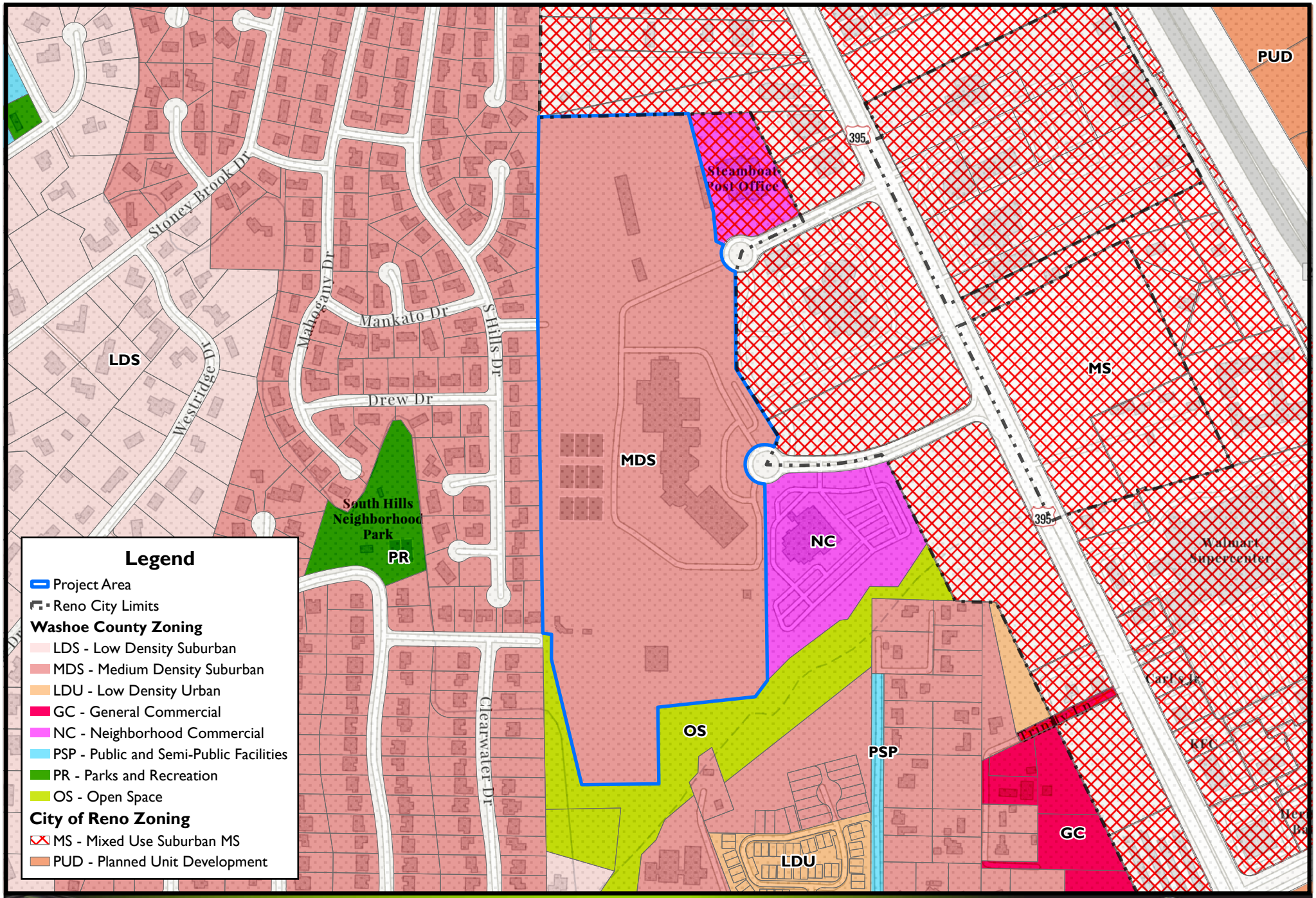

Zoning

Manogue High School

January 2024

0 355 710
Feet

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LANDSCAPE DATA

TOTAL SITE (BISHOP MANOGUE HIGH SCHOOL CAMPUS) AREA = 48.11 ACRES
JURISDICTION: WASHOE COUNTY
APN: 162-010-28
ZONING: MDS (MEDIUM DENSITY SUBURBAN)

TOTAL IMPROVEMENT AREA = 283,140 SQ FT (6.5 ACRES)

REQUIRED LANDSCAPE (BASED ON IMPROVEMENT AREA) = 56,628 SQ FT (20%)

PROVIDED LANDSCAPE AREA = 104,683 SQ FT
- ORNAMENTAL PLANTING AREA: 90,094 SQ FT
- ORNAMENTAL HARDSCAPE = 14,589 SQ FT

REQUIRED TREES IN IMPROVEMENT AREA = 189
- 189 (ONE TREE PER 300 SQ FT OF REQUIRED LANDSCAPE AREA)
- SIGNIFICANT TREES (GREATER THAN SIX-INCH CALIPER) WITHIN THE IMPROVEMENT AREA THAT REQUIRE REMOVAL SHALL BE REPLACED WITH A TREE OF THE SAME SPECIES AT A 1:1 CALIPER RATIO.
- 14 EXISTING "SIGNIFICANT" TREES WILL BE REMOVED WITH A TOTAL CALIPER LOSS OF 123 INCHES. PROPOSED TREES WILL BE UP-SIZED AS NEEDED TO OFFSET THE CALIPER LOSS.

REQUIRED SHRUBS IN IMPROVEMENT AREA = 1,134 (6 SHRUBS PER TREE)

TREES PROVIDED: 189
SHRUBS PROVIDED: 1,134

GENERAL NOTES

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

2) TREES
- DECIDUOUS TREES SHALL HAVE A MINIMUM CALIPER OF 2 INCHES.
- EVERGREEN TREES SHALL HAVE A MINIMUM HEIGHT OF 6 FEET.

3) 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 THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-1990).

4) ALL SHRUB BEDS WILL RECEIVE COVER OF MULCH WITH WEED CONTROL.

5) ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED. CONTAINER PLANTINGS WILL BE DRIP IRRIGATED BASED ON THE SPECIFIC HORTICULTURAL REQUIREMENTS OF EACH SPECIES. A REDUCED-PRESSURE-TYPE BACKFLOW PREVENTOR WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.

6) PLAN IS CONCEPTUAL. PLANT QUANTITIES INDICATED ARE PER WASHOE COUNTY CODE REQUIREMENTS. PLANT LOCATIONS, FINAL SPECIES SELECTION, AND SIZE AT PLANTING SHALL BE DETERMINED DURING DEVELOPMENT OF THE FINAL CONSTRUCTION DOCUMENTS.

PLANT LEGEND

- PROPOSED ORNAMENTAL TREES
- PROPOSED DECIDUOUS SHADE TREES
- PROPOSED EVERGREEN TREES
- EXISTING TREES
- LANDSCAPE AREA
- (E) LAWN

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

REGISTERED LANDSCAPE ARCHITECT
RYAN HANSEN
440
02/06/2024
Expires: 6/30/2024
STATE OF NEVADA

Preliminary Landscape Plan

BISHOP MANOGUE CATHOLIC HIGHSCHOOL UPGRADE

Wood Rodgers
Reno

Washoe Co. Nevada

No.	Revision Date

LA No:	022-BII-04-23
Designed:	AMH
Drawn:	AMH
Checked:	RMH
Date:	02/06/2024

Sheet L1 of 1

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

TITLE SHEET

OWNER/DEVELOPER:

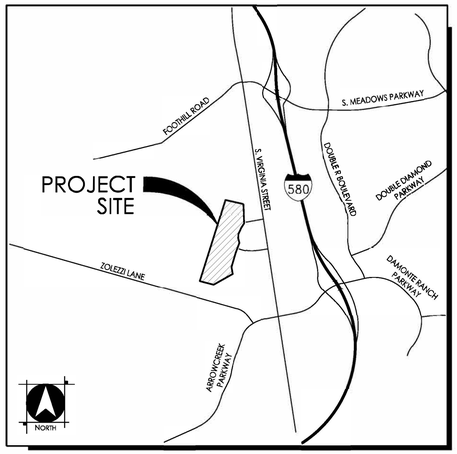
BISHOP MANOGUE CATHOLIC HIGH SCHOOL
110 BISHOP MANOGUE DRIVE
RENO, NV 89511

BASIS OF BEARINGS

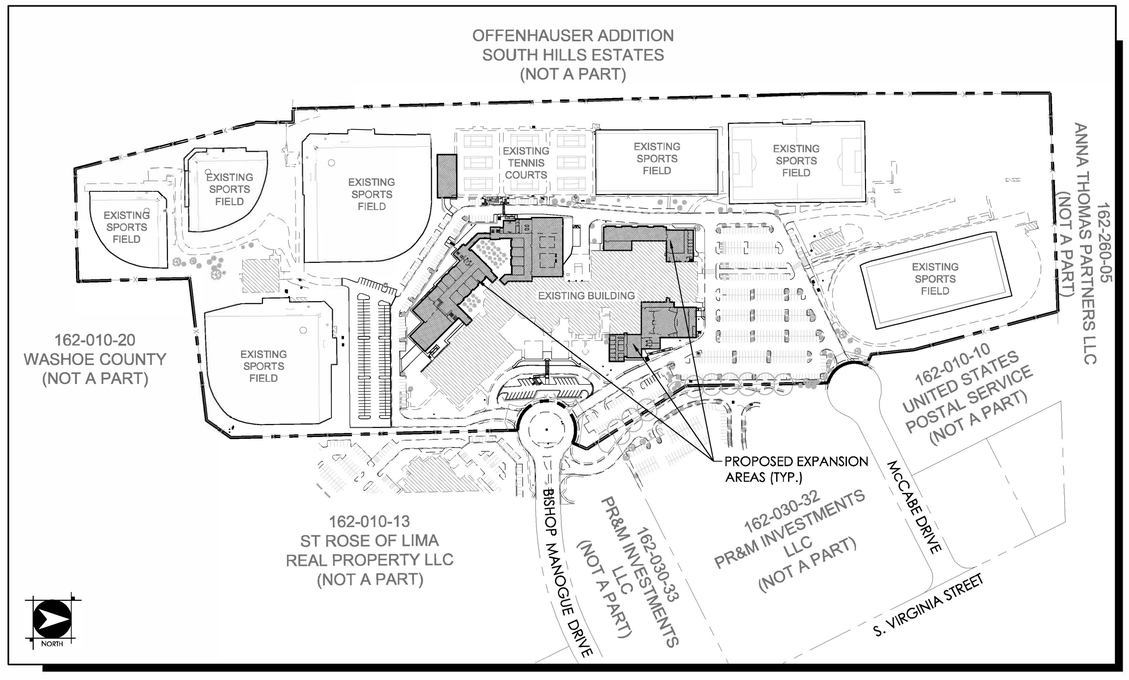
NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983/1994, HIGH ACCURACY REFERENCE NETWORK (NAD 83/94-HARN), AS DETERMINED USING REAL TIME KINEMATIC (RTK) GPS OBSERVATIONS WITH CORRECTIONS TRANSMITTED BY THE NEVADA GPS NETWORK. THE BEARING BETWEEN GPS REFERENCE STATION "RNW RENO"-N745M01028 AND "WWRF"-S115M15000 IS TAKEN AS NORTH 82°06'23" WEST. ALL DIMENSIONS SHOWN ARE GROUND DISTANCES. GRID TO GROUND COMBINED FACTOR = 1.000197939

BASIS OF ELEVATION

BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AS TAKEN FROM CITY OF RENO BENCHMARK 2891, WITH A PUBLISHED ELEVATION OF 4518.49 FT. BENCHMARK 12891 IS DESCRIBED AS BEING 1.5" STEEL RIVET CAP IN THE TOP OF CURB A THE SOUTHERLY ENTRANCE TO A SHELL GAS STATION (10850 SOUTH VIRGINIA STREET) 1' NORTHERLY OF A HANDICAP RAMP.



VICINITY MAP
NOT TO SCALE



SITE PLAN
NOT TO SCALE

SITE INFORMATION:

SITE PLAN STATISTICS
- PARCEL AREA: 48.1 AC
- PROJECT AREA: 6.5 AC
- EX. BUILDING SQUARE FOOTAGE: 153,000 SF
- PROPOSED BUILDING ADDITIONS: 161,500± SF
- NEW PARKING/PAVING AREA: 78,100± SF
- NEW LANDSCAPE AREA: 104,683± SF

PARKING STATISTICS
- TOTAL PARKING REQUIRED (WASHOE COUNTY): 385 STALLS
  - 1 PER EMPLOYEE: 160 EMPLOYEES=160 STALLS
  - 0.25 PER DRIVING AGE STUDENT: 0.25*(1200 STUDENTS*75%)=225 STALLS
- TOTAL PARKING REQUIRED (ITE: PRIVATE HIGH SCHOOL): 408 STALLS
  - 0.34 PER STUDENT: 0.34*1200 STUDENTS=408 STALLS
- TOTAL PARKING PROVIDED: 695 STALLS
- TOTAL ACCESSIBLE PARKING REQUIRED: 14 STALLS
- TOTAL ACCESSIBLE PARKING PROVIDED: 14 STALLS

LANDSCAPING STATISTICS (ADDITION ONLY)
- PROJECT AREA: 283,140± SF (6.5 AC)
- REQUIRED LANDSCAPE AREA: 56,628 SF (20%)
- PROVIDED LANDSCAPE AREA: 104,683± SF
- REQUIRED NUMBER OF TREES: 189
- PROVIDED NUMBER OF TREES: 189

ASSESSOR PARCEL NUMBER
- 162-010-28

ENGINEERS STATEMENT:

I, MEGAN OVERTON, DO HEREBY CERTIFY THAT THIS PLAN HAS BEEN PREPARED BY ME OR UNDER MY SUPERVISION AND WAS COMPLETED ON THE 8th DAY OF FEBRUARY, 2024.

MEGAN OVERTON, P.E. #18689

02/08/24

SHEET INDEX

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
TITLE SHEET

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
1361 Corporate Boulevard
Reno, NV 89502
Tel 775.823.4068
Fax 775.823.4066

4412001 FEBRUARY, 2024

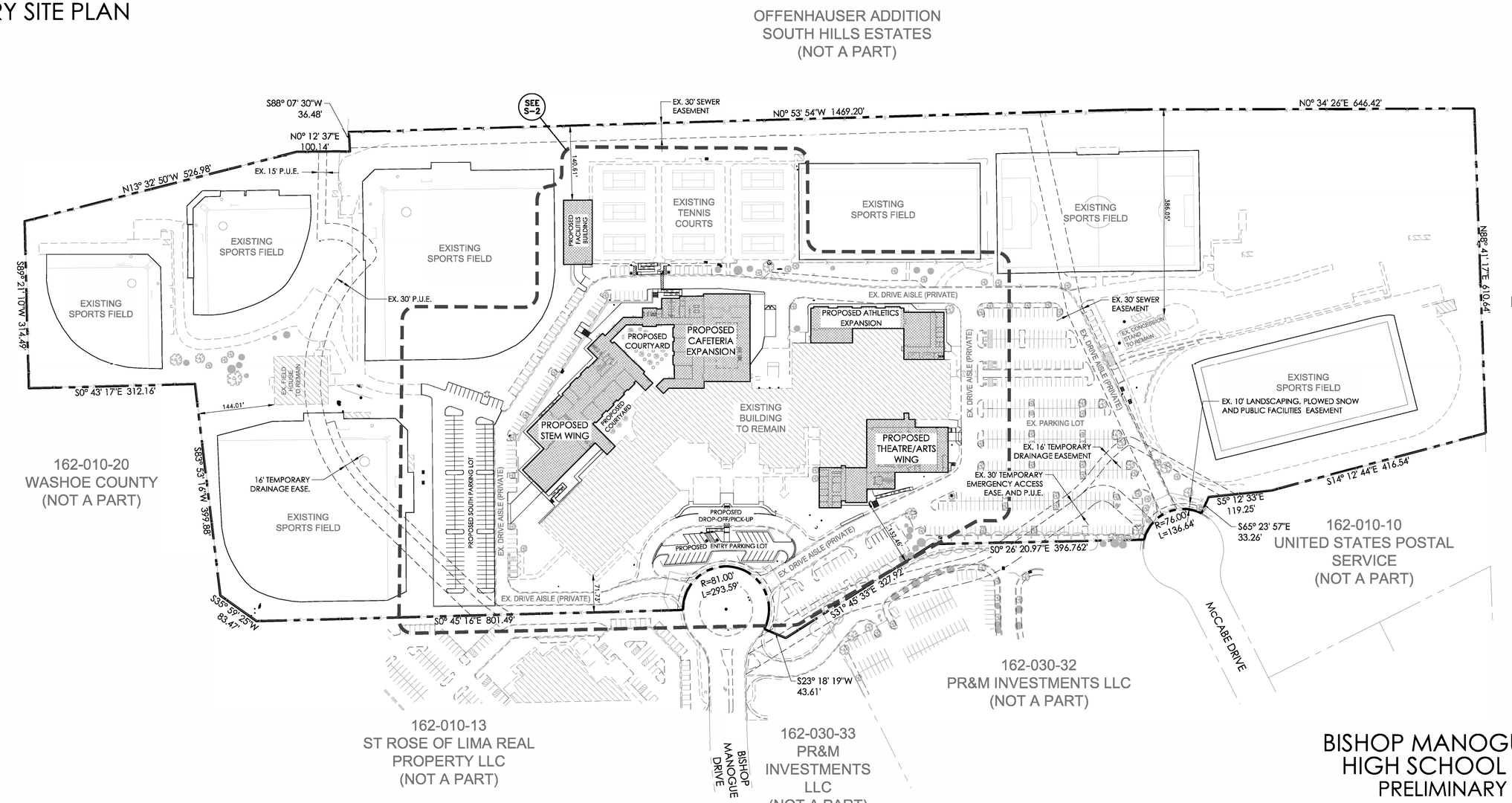
SHEET T-1 OF 9

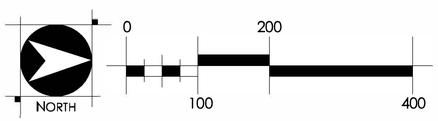
J:\Jobs\4412_Manogue_High_School\Manogue_High_School_DA\Planning\Dwg\SUP\TM_01_BMCHS_SUP_T01.dwg 2/8/2024 9:44 AM Megan Overton

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY SITE PLAN





02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY SITE PLAN

WOOD RODGERS
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1361 Corporate Boulevard
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4412001 FEBRUARY, 2024

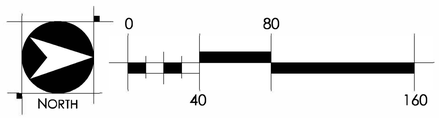
SHEET S-1 OF 9

J:\Jobs\4412_Manogue_High_School\Manogue_High_School_DA\Planning\Dwg\SUP\TM_02_BMCHS_SUP_S01.dwg 2/8/2024 7:30 AM Megan Overton

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY SITE PLAN



KEY NOTES:

1. PROPOSED TYPE 1 PCC MEDIAN CURB (TYP.)
2. PROPOSED TYPE 1 CURB AND GUTTER
3. PROPOSED P.C.C. SIDEWALK
4. PROPOSED ACCESSIBLE CURB RAMP
5. PROPOSED STRIPED ACCESSIBLE PATH
6. PROPOSED STRIPED ACCESSIBLE SYMBOL AND SIGNAGE (TYP.)
7. PROPOSED RETAINING WALL (SEE GRADING PLANS FOR HEIGHT)
8. PROPOSED TRASH ENCLOSURE
9. PROPOSED STAIRS (SEE GRADING PLANS FOR NUMBER)
10. REMOVE EX. ACCESSIBLE PARKING STALLS AND RESTRIPE AS STANDARD STALLS
11. PROPOSED ACCESSIBLE RAMP WITH HANDRAILS
12. PROPOSED RETAINING CURB (SEE GRADING PLANS FOR HEIGHT)
13. PROPOSED THEATRE BACKSTAGE DRIVEWAY
14. PROPOSED 3' P.C.C. VALLEY GUTTER
15. PROPOSED STEM LAB DRIVEWAY
16. PROPOSED FACILITIES BUILDING DRIVEWAY
17. PROPOSED FLUSH CURB

LEGEND:

PROPOSED A.C. PAVING

PROPOSED P.C.C. CONCRETE

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY SITE PLAN

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4412001

FEBRUARY, 2024

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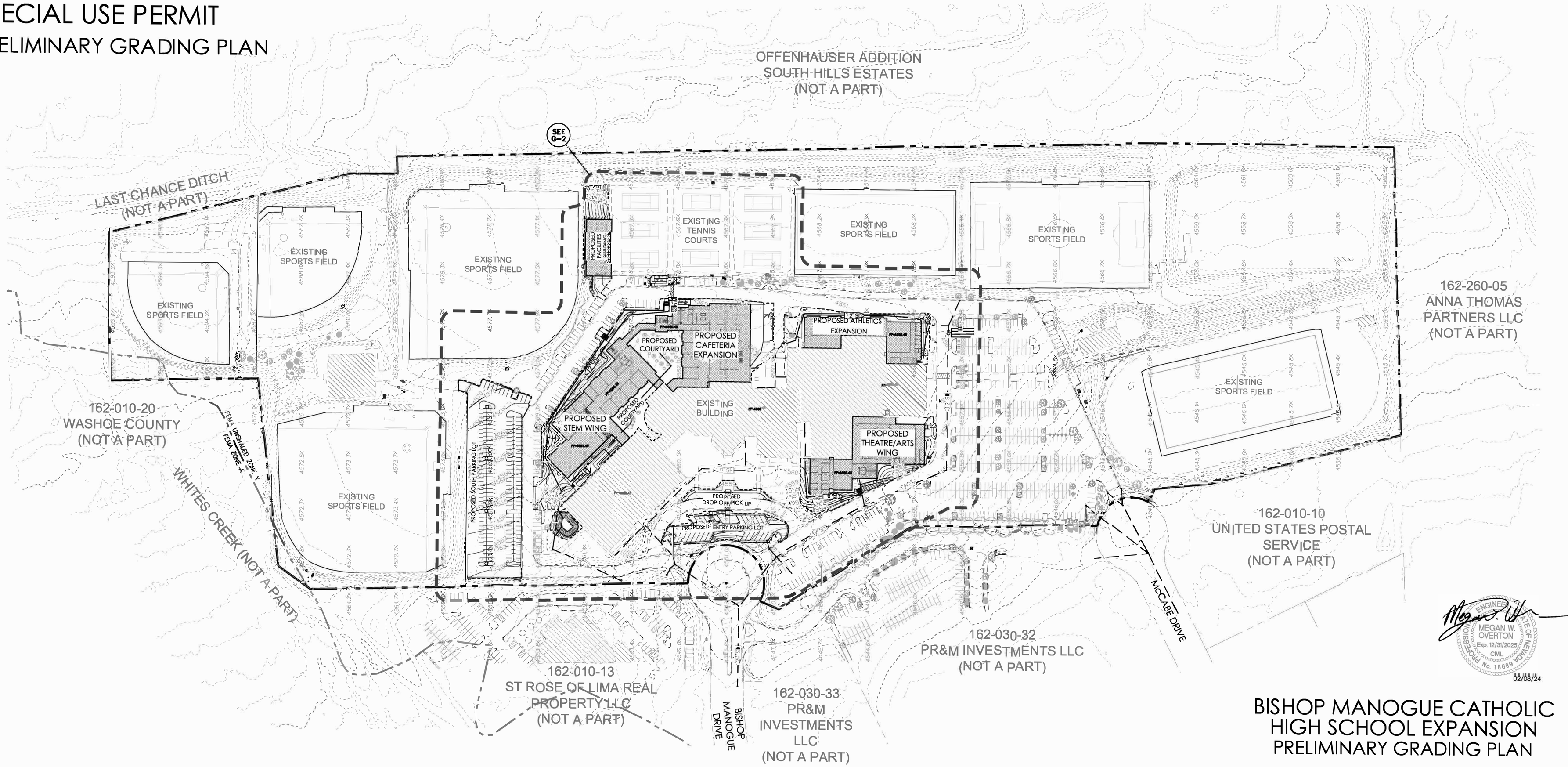
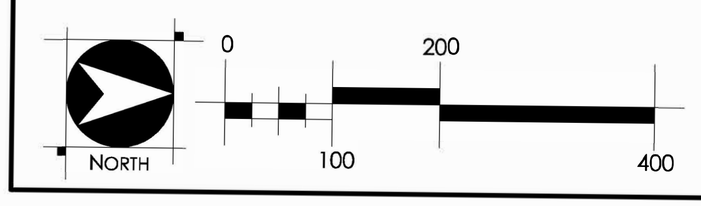
BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY GRADING PLAN





GRADING NOTES:

GRADING AREA: 5.7 AC.
CUT/FILL EARTHWORK: 20,000 CY
EXPORT: 18,000 CY

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY GRADING PLAN

WOOD RODGERS
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4412001

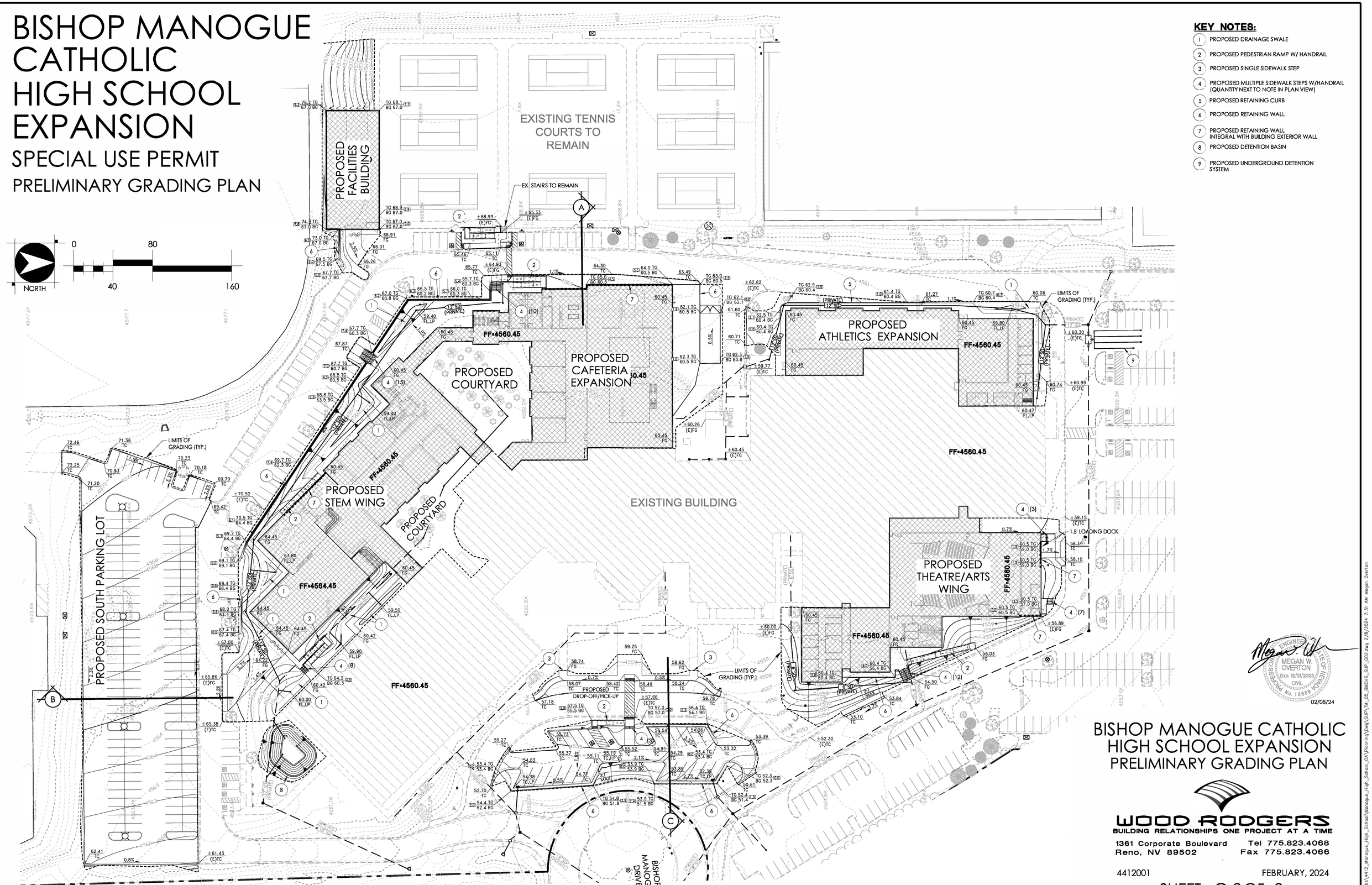
FEBRUARY, 2024

SHEET G-1 OF 9

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY GRADING PLAN



KEY NOTES:

1. PROPOSED DRAINAGE SWALE
2. PROPOSED PEDESTRIAN RAMP W/ HANDRAIL
3. PROPOSED SINGLE SIDEWALK STEP
4. PROPOSED MULTIPLE SIDEWALK STEPS W/HANDRAIL (QUANTITY NEXT TO NOTE IN PLAN VIEW)
5. PROPOSED RETAINING CURB
6. PROPOSED RETAINING WALL
7. PROPOSED RETAINING WALL INTEGRAL WITH BUILDING EXTERIOR WALL
8. PROPOSED DETENTION BASIN
9. PROPOSED UNDERGROUND DETENTION SYSTEM

PROFESSIONAL ENGINEER STATE OF NEVADA MEGAN W. OVERTON Exp. 12/31/2025 CIVIL No. 18659

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

PRELIMINARY GRADING PLAN

WOOD RODGERS
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FEBRUARY, 2024

SHEET G-2 OF 9

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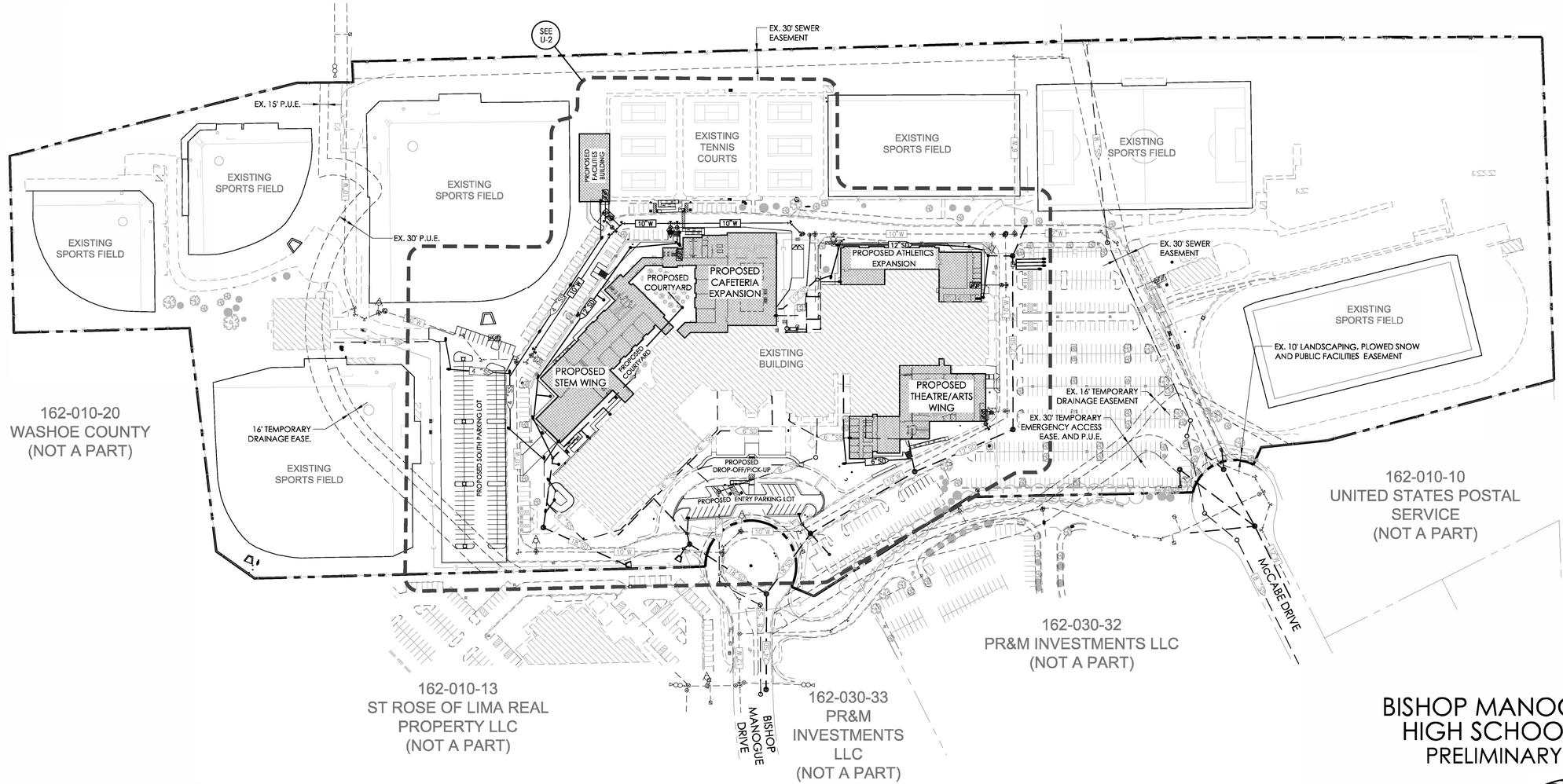
BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMIINARY UTILITY PLAN

OFFENHAUSER ADDITION
SOUTH HILLS ESTATES
(NOT A PART)



NORTH
0 200
100 400

MEGAN W. OVERTON
STATE OF NEVADA
PROFESSIONAL ENGINEER
Exp. 12/31/2025
CIVIL
No. 18669
02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY UTILITY PLAN

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4412001 FEBRUARY, 2024

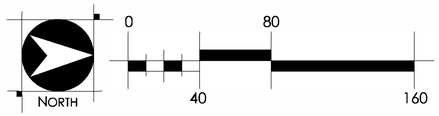
SHEET U-1 OF 9

J:\Jobs\4412_Manogue_High_School\Manogue_High_School_DA\Planning\Dwg\SUP\TM_06_BMCHS_SUP_U01.dwg 2/8/2024 7:32 AM Megan Overton

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY UTILITY PLAN



KEY NOTES:

1. PROPOSED DOMESTIC WATER SERVICE
2. PROPOSED FIRE HYDRANT
3. PROPOSED SEWER SERVICE
4. PROPOSED SEWER CLEANOUT (TYP.)
5. PROPOSED CATCH BASIN (TYP.)
6. PROPOSED DRAIN CLEANOUT (TYP.)
7. PROPOSED LANDSCAPE DRAIN/AREA DRAIN (TYP.)
8. PROPOSED FIRE SERVICE
9. PROPOSED PARKING LOT LIGHT (TYP.)
10. PROPOSED DETENTION BASIN OUTLET STRUCTURE
11. PROPOSED UNDERGROUND DETENTION SYSTEM
12. PROPOSED DETENTION SYSTEM OUTLET STRUCTURE

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

PRELIMINARY UTILITY PLAN

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FEBRUARY, 2024

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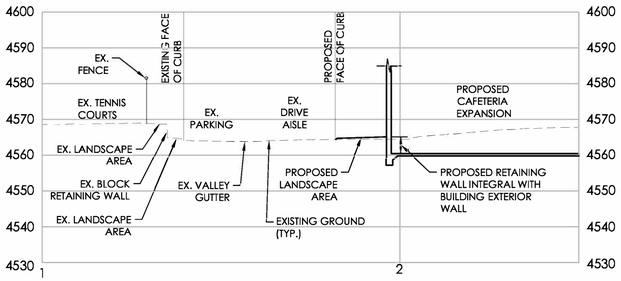
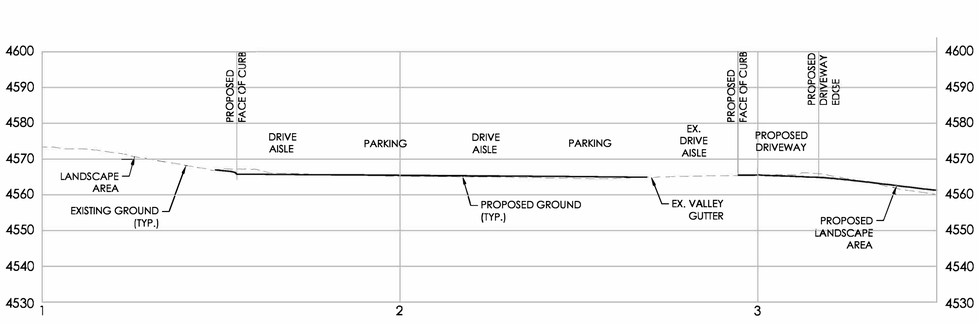
BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

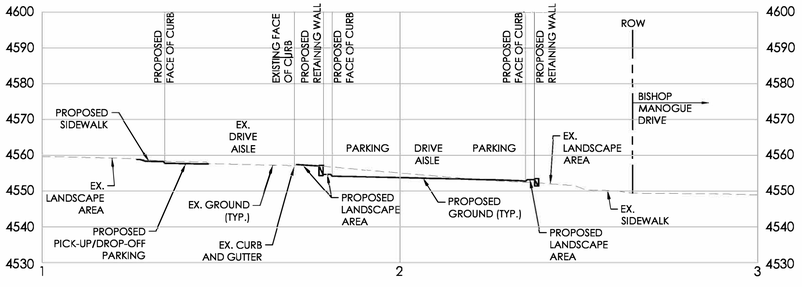
PRELIMINARY CROSS SECTIONS



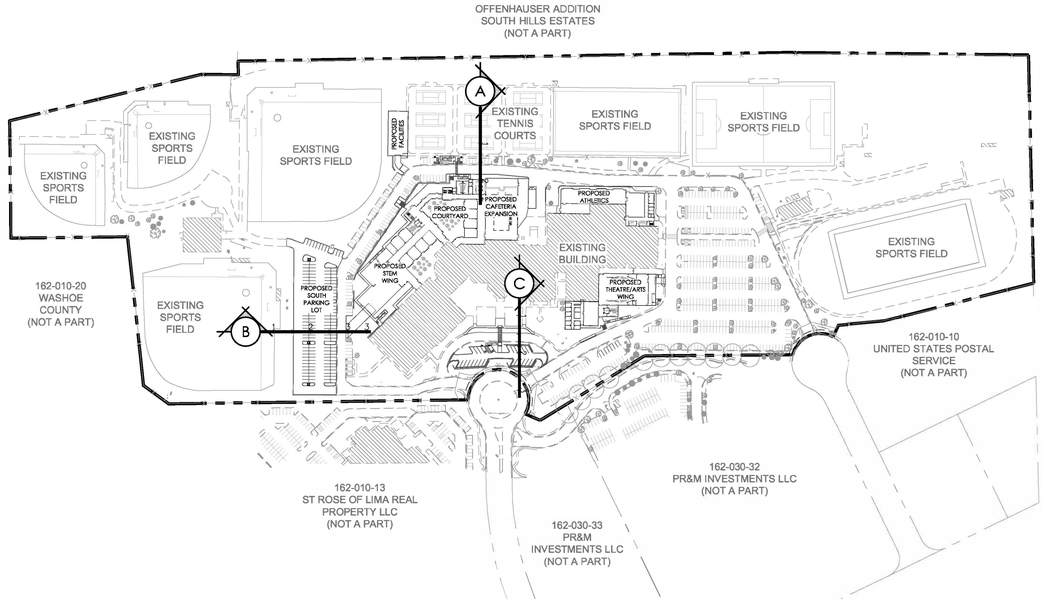
A CROSS SECTION
1"=20' HORIZ.
1"=20' VERT.



B CROSS SECTION
1"=20' HORIZ.
1"=20' VERT.



C CROSS SECTION
1"=20' HORIZ.
1"=20' VERT.



SITE PLAN
NO SCALE

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY CROSS SECTIONS

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4412001 FEBRUARY, 2024

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LANDSCAPE DATA

TOTAL SITE (BISHOP MANOGUE HIGH SCHOOL CAMPUS) AREA = 48.11 ACRES
JURISDICTION: WASHOE COUNTY
APN: 162-010-28
ZONING: MDS (MEDIUM DENSITY SUBURBAN)

TOTAL IMPROVEMENT AREA = 283,140 SQ FT (6.5 ACRES)

REQUIRED LANDSCAPE (BASED ON IMPROVEMENT AREA) = 56,628 SQ FT (20%)

PROVIDED LANDSCAPE AREA = 104,683 SQ FT
- ORNAMENTAL PLANTING AREA: 90,094 SQ FT
- ORNAMENTAL HARDSCAPE = 14,589 SQ FT

REQUIRED TREES IN IMPROVEMENT AREA = 189
- 189 (ONE TREE PER 300 SQ FT OF REQUIRED LANDSCAPE AREA)
- SIGNIFICANT TREES (GREATER THAN SIX-INCH CALIPER) WITHIN THE IMPROVEMENT AREA THAT REQUIRE REMOVAL SHALL BE REPLACED WITH A TREE OF THE SAME SPECIES AT A 1:1 CALIPER RATIO.
- 14 EXISTING "SIGNIFICANT" TREES WILL BE REMOVED WITH A TOTAL CALIPER LOSS OF 123 INCHES. PROPOSED TREES WILL BE UP-SIZED AS NEEDED TO OFFSET THE CALIPER LOSS.

REQUIRED SHRUBS IN IMPROVEMENT AREA = 1,134 (6 SHRUBS PER TREE)

TREES PROVIDED: 189
SHRUBS PROVIDED: 1,134

GENERAL NOTES

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

2) TREES
- DECIDUOUS TREES SHALL HAVE A MINIMUM CALIPER OF 2 INCHES.
- EVERGREEN TREES SHALL HAVE A MINIMUM HEIGHT OF 6 FEET.

3) 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 THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-1990).

4) ALL SHRUB BEDS WILL RECEIVE COVER OF MULCH WITH WEED CONTROL.

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PLANT LEGEND

- PROPOSED ORNAMENTAL TREES
- PROPOSED DECIDUOUS SHADE TREES
- PROPOSED EVERGREEN TREES
- EXISTING TREES
- LANDSCAPE AREA
- (E) LAWN

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

REGISTERED LANDSCAPE ARCHITECT
RYAN HANSEN
440
02/06/2024
Expires: 6/30/2024
STATE OF NEVADA

Preliminary Landscape Plan

BISHOP MANOGUE CATHOLIC HIGHSCHOOL UPGRADE

Wood Rodgers
Reno

Washoe Co. Nevada

No.	Revision Date

LA No:	022-BII-04-23
Designed:	AMH
Drawn:	AMH
Checked:	RMH
Date:	02/06/2024

Sheet L1 of 1

Existing Square Footage:

Level 1: 120,202 sf

Level 2: 19, 200 sf

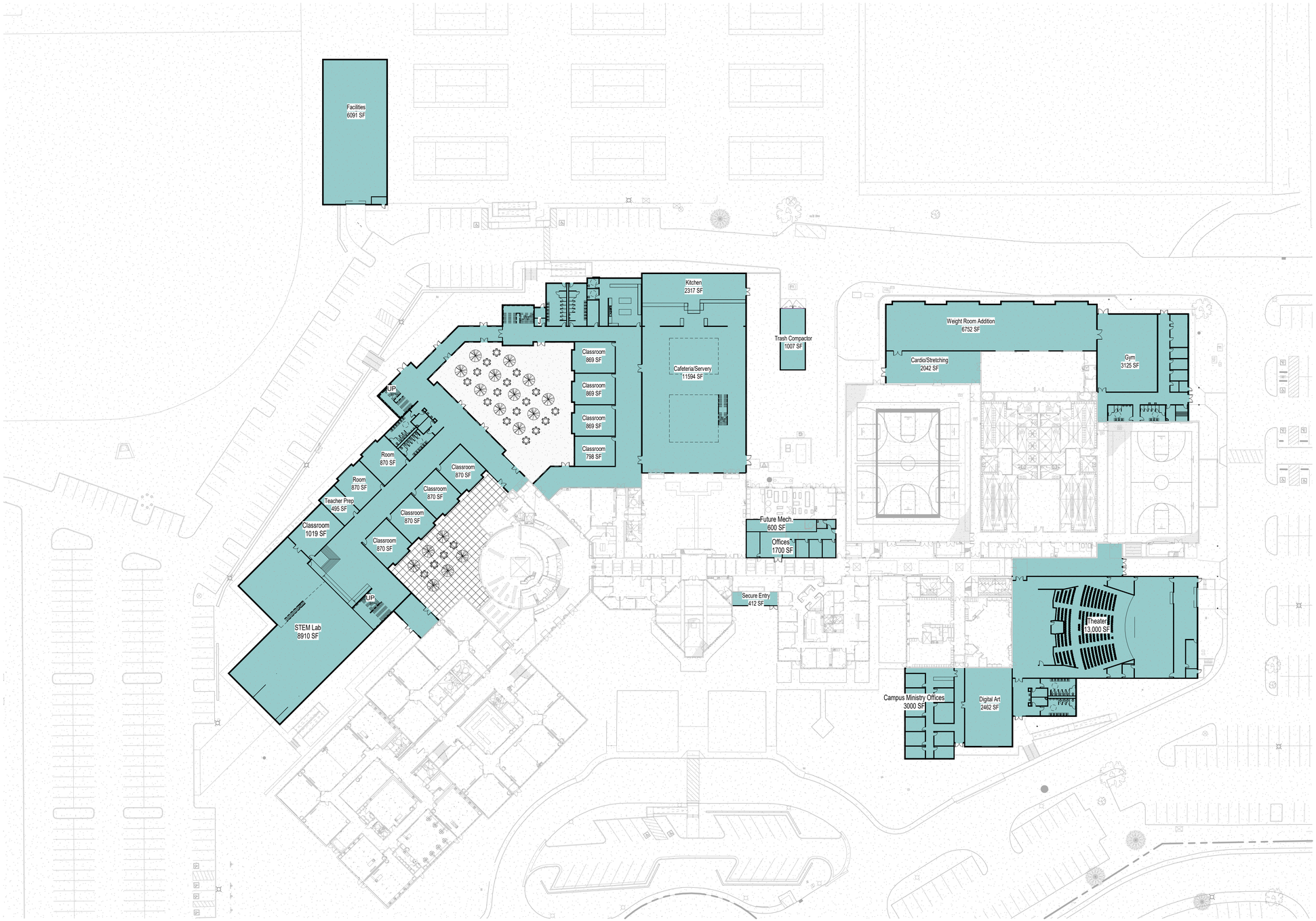
Football Out Buildings: 4,680 sf

Baseball Out Building: 9,000 sf

Total: 153, 082 sf

Added Square Footage:

Classroom Wing / STEM Dept:	Level 1 = +/- 29,000 sf Level 2 = +/- 22,000 sf
	Sub Total = +/- 51,000 sf
Cafeteria Wing:	Level 1 = +/- 28,000 sf Level 2 = +/- 24,000 sf
	Sub Total = +/- 52,000 sf
Weight Room/Athletics Offices	= +/- 16,000 sf
Theater/Ministry Offices/Art Wing	= +/- 22,000 sf
Facilities Out Buildings	= +/- 6,000 sf
Mechanical+ Mech. Penthouse	= +/- 14,000 sf
Secure Entry	= +/- 500 sf
	Total = +/- 161,500 sf



1 Floor Plan

1" = 40'-0"

Autodesk Docs://2326 Manogue HS Expansion SUP/2326 BMCHS Expansion SUP.rvt

2/6/2024 3:48:05 PM

Professional Seal

PRELIMINARY
Not For Construction

	Date	Revision

Consultant

H+K ARCHITECTS
5485 Reno Corporate Drive, Suite 100
Reno, Nevada 89511-2262
P 775+332+6640
F 775+332+6642
hkarchitects.com

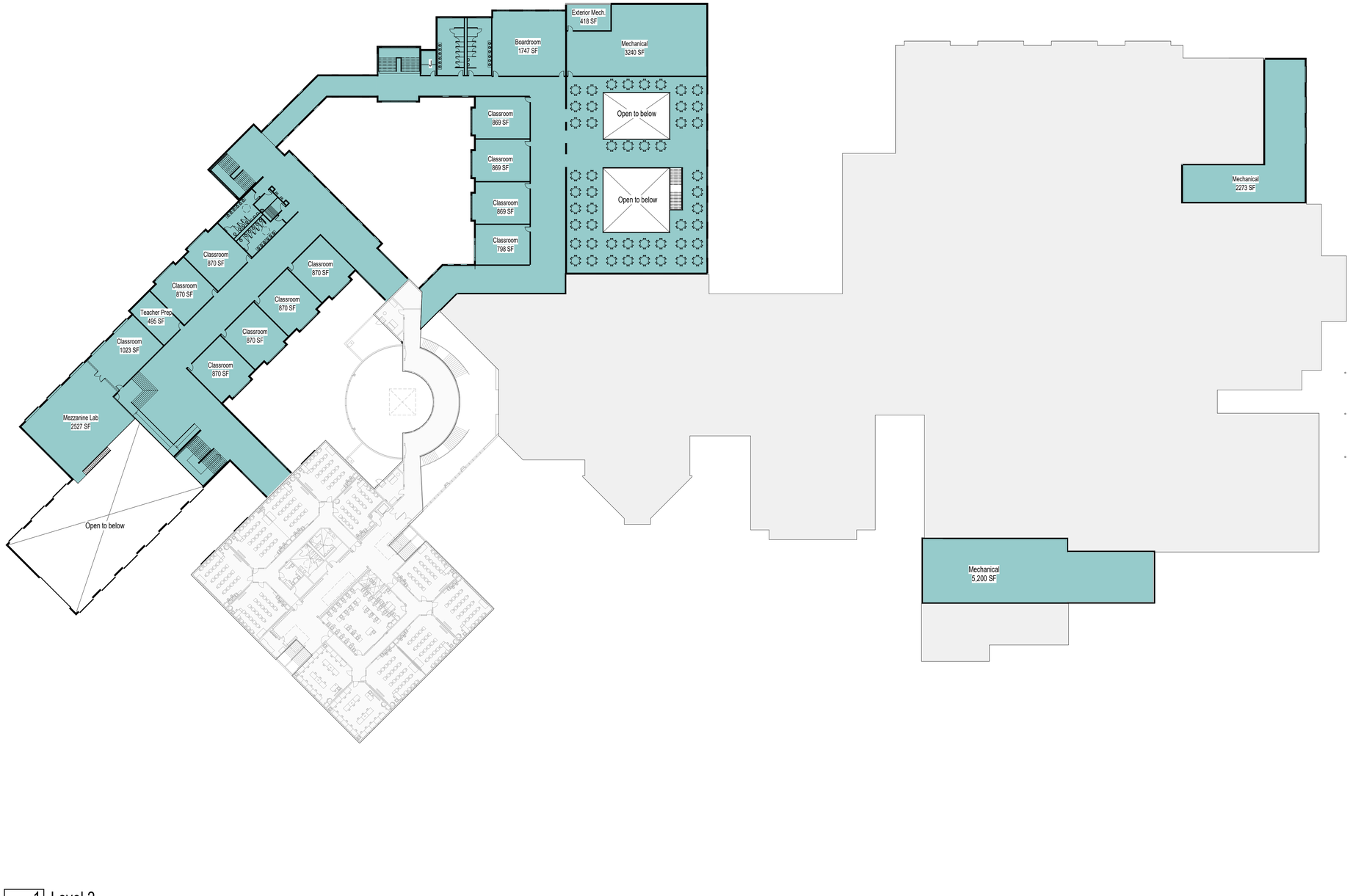
BMCHS Expansion SUP

110 Bishop Manogue Drive
Reno, NV 89511

Floor Plan

Issue Date
H+K Project No: 2326

A101



1 Level 2

1/32" = 1'-0"

Autodesk Docs://2326 Manogue HS Expansion SUP/2326 BMCHS Expansion SUP.rvt

2/6/2024 3:48:11 PM

Professional Seal

	Date	Revision

PRELIMINARY
Not For Construction

Consultant

H+K ARCHITECTS
5485 Reno Corporate Drive, Suite 100
Reno, Nevada 89511-2262
P 775+332+6640
F 775+332+6642
hkarchitects.com

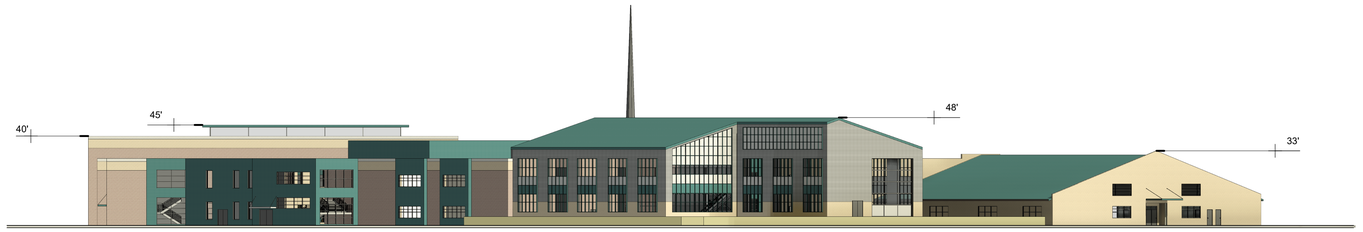
BMCHS Expansion SUP

110 Bishop Manogue Drive
Reno, NV 89511

Floor Plan Level 2

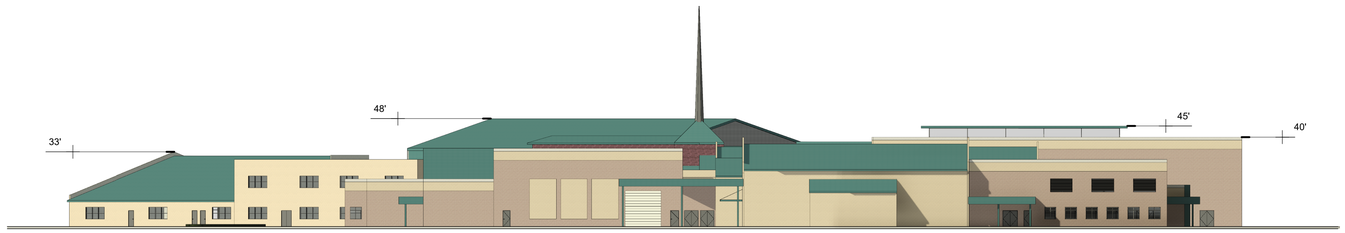
Issue Date
H+K Project No: 2326

A102



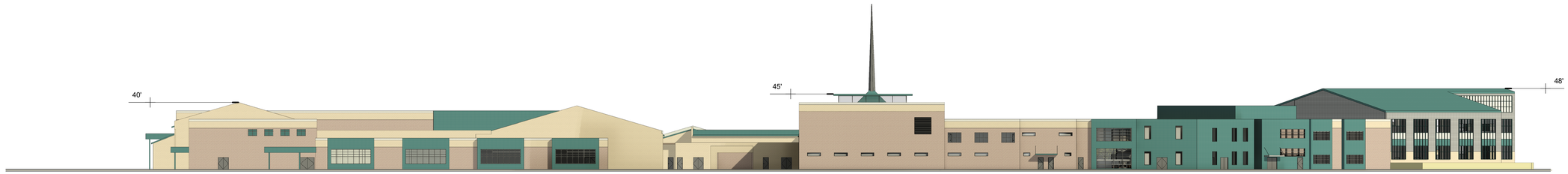
4 South Elevation

1/32" = 1'-0"



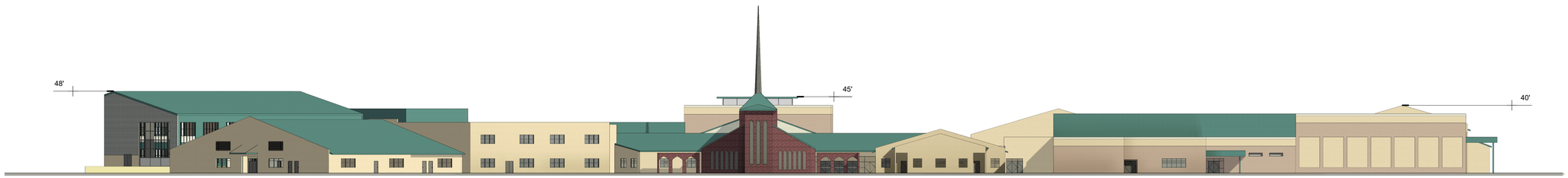
2 North Elevation

1/32" = 1'-0"



3 West Elevation

1/32" = 1'-0"



1 East Elevation

1/32" = 1'-0"

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Professional Seal

△ Date Revision

PRELIMINARY
Not For Construction

Consultant

H+K ARCHITECTS
5485 Reno Corporate Drive, Suite 100
Reno, Nevada 89511-2262
P 775+332+6640
F 775+332+6642
hkarchitects.com

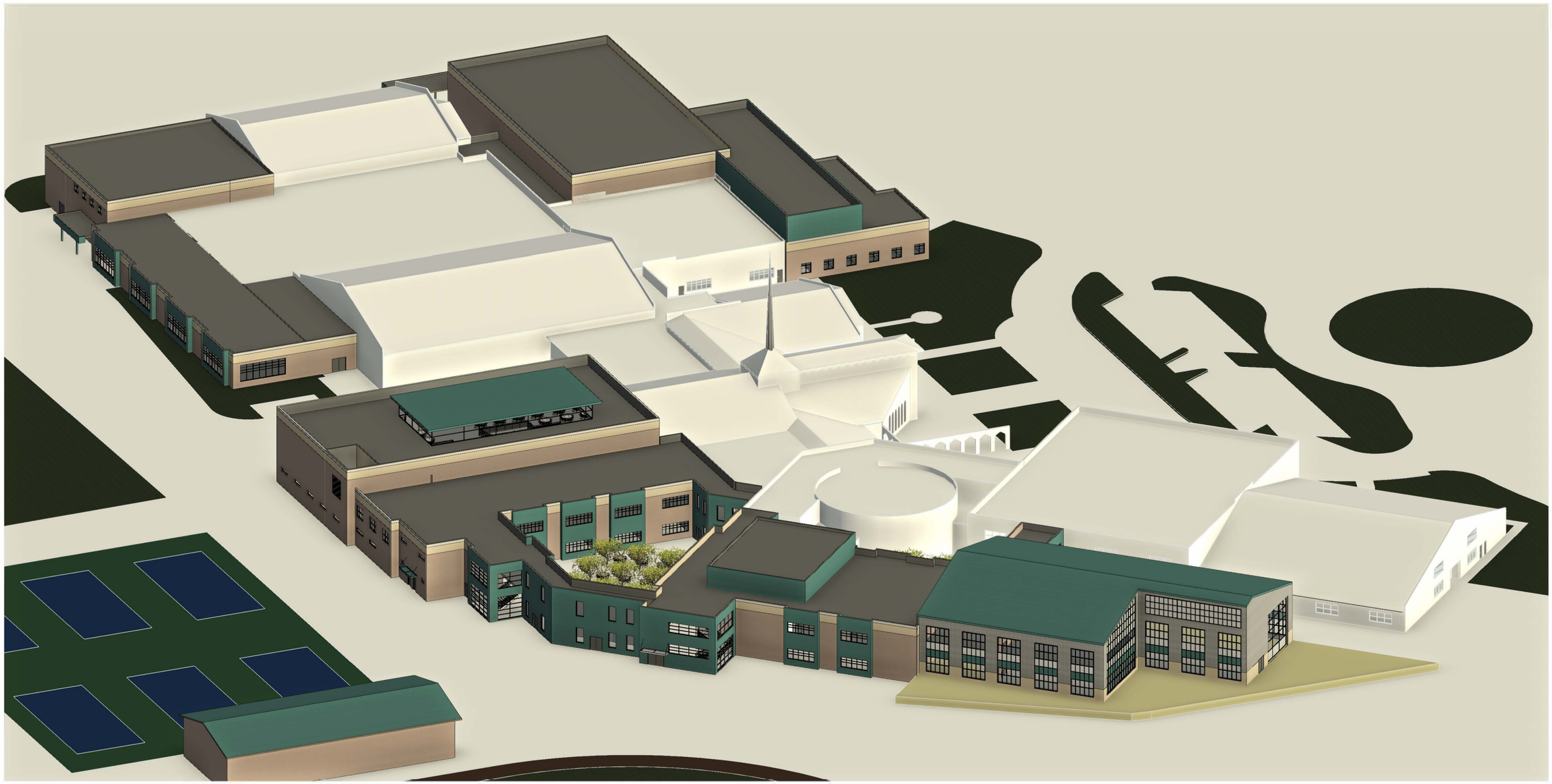
BMCHS Expansion SUP

110 Bishop Manogue Drive
Reno, NV 89511

Exterior Elevations

Issue Date
H+K Project No: 2326

A301



Section 4

PRELIMINARY SANITARY SEWER REPORT

FOR

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

Prepared for:

Bishop Manogue Catholic High School
c/o H&K Architects
5485 Reno Corporate Drive, Suite 100
Reno, NV 89511

February 8, 2024

Prepared by:

Wood Rodgers Inc.
1361 Corporate Boulevard
Reno, Nevada 89502
(775) 823-4068

2/8/24
Megan Overton, P.E.

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

TABLE OF CONTENTS

APPENDIX

INTRODUCTION

This study shall serve as the preliminary sanitary sewer report for expansion of the existing Bishop Manogue Catholic High School. The purpose of this report is to address the sewerage issues that result from further development of the project site in accordance with the Washoe County development standards and sound design and engineering practices. This report describes existing conditions, quantifies the estimated sanitary sewer flows to be generated from the proposed expansion project, describes the proposed on-site private sewer network, and analyzes the impacts of this development on downstream facilities.

PROJECT AREA AND DESCRIPTION

The proposed School Expansion project is located on a developed 48.1-acre site (APN: 162-010-28). It is located within Section 17 of T18N, R20E, MDB&M, Washoe County, Nevada. The property is surrounded by developed land to the west (residential), north (commercial), east (commercial), and by Whites Creek to the south. Access to the site is provided by two public roads to the east, McCabe Drive and Bishop Manogue Drive that dead-end in roundabouts at the project entrances. A Vicinity Map is included in the Appendix of this report for reference.

The property was previously developed with a 780-student high school in the early 2000's along with associated outdoor athletic facilities, parking, landscaping, and utilities.

The proposed school expansion will add about 162,000 sf of new building area allowing student capacity to increase to 1,200. The building expansion is anticipated to be a multi-phase project that adds a new wing or expands an existing wing of the building with each phase. The proposed expansions include the following four wings: Cafeteria, STEM, Athletics, and Theater/Art. A Facilities Building is also proposed, which is anticipated to be constructed with the Cafeteria phase. The project will include added parking, landscaping, and utilities to support the proposed phases of further development. (Reference the Preliminary Sanitary Sewer Layout in the appendix for a layout of the proposed improvements.)

EXISTING CONDITION

McCabe Drive and Bishop Manogue Drive were constructed with 8-inch public sewer mains extending from the 10-inch public interceptor in Virginia Street, to the east, to the subject property. In the case of the 8-inch public sewer main in McCabe Drive, the sewer main was extended through the subject property toward the residential subdivision to the west. (Existing public sewer main information was found on the record drawings *Bishop Manogue Phase 1 – Infrastructure Construction Plans* prepared by Jeff Codega, dated 1999.) The sewer main originating in McCabe Drive serves the football field

concession stand and bathrooms while the sewer main originating in Bishop Manogue Drive serves the main part of the campus including the school and baseball field concession stand and bathrooms. (Reference the Existing Sewer Map in the appendix for public main locations.)

Proposed improvements will not impact the sewer main extending from McCabe Drive. Therefore, the remainder of this report will focus on the sewer main extending from Bishop Manogue Drive and the service laterals connecting to this line.

Construction of Bishop Manogue Catholic High School in the early 2000's included extension of sewer laterals to the building with several connection points all around the building. The sewer laterals were installed using both 4-inch and 6-inch pipes with cleanouts. An existing grease interceptor is located in the back of the building on the east side to serve the existing cafeteria. (Existing private sewer lateral information was found on the *New Bishop Manogue High School Plans* prepared by Jeff Codega, dated 2001.) (Reference the Preliminary Sanitary Sewer Layout in the appendix showing existing laterals around the building.)

PROPOSED SEWER SYSTEM

Expansion of the School will include rerouting some existing sewer laterals and running new laterals to the proposed building additions. A Preliminary Sanitary Sewer Layout is included in the Appendix showing the proposed relocations and additions. Included in the lateral relocations is the northern-most line currently located under the future Theater/Arts Wing and the southern-most line extending to the concession stand at the baseball fields, which conflicts with the future STEM Wing.

Proposed sewer extensions include a lateral to the future Athletics Wing expansion, one to the future STEM Wing, one to the future Facilities Building, and an extension to the future Cafeteria expansion. It is anticipated that the future Theater/Arts Wing will be able to utilize the existing sewer lateral that is located within it's building footprint.

All lines have been preliminarily sized based on the existing laterals and uses. Final sewer design including verifying existing service capacity will be provided with final design of the project.

At the time of final design, the existing grease interceptor will be checked for adequate size and location. If it is not adequate to serve the new cafeteria, a new grease interceptor will be proposed.

There will not be any non-domestic waste introduced into the sanitary sewer system with development of this project.

PROJECT SEWER CONTRIBUTION

The project peak daily flow rate was calculated using a preliminary average sewage contribution rate of 15 gallons per day per student with a 3.0 peaking factor. The existing flow from the site using this calculation is (780 students * 15 gpd/student * 3) = 35,100 gpd peak flow. The future flow from the site is estimated to be (1200 students * 15gpd/student * 3) = 54,000 gpd peak flow. (The estimated flow rate contribution for a school was taken from the *North Carolina Administrative Code 15A NCAC 02T.0114 Wastewater Design Flow Rates,* which estimates 15 gallons per day per student for schools with a cafeteria, gym, and showers.) (Construction-level design flow rates will be calculated based on proposed fixture counts at the time of final design.)

The proposed private sanitary sewer system located within the project has been preliminarily laid out to meet the requirements outlined in the *Washoe County Community Services Department Design Standards*. Specifically, the multiple laterals extending to the building are at least 4 inches in diameter and are separated from water pipes. At the time of final design for each stage of construction, the private sewer network will be evaluated for depth of cover, capacity, and velocity based on design flow rates and a final design report will be prepared.

DOWNSTREAM SEWER CAPACITY EVALUATION

The existing 8-inch public sewer main in Bishop Manogue Drive, which provides service to the proposed project expansion areas, has been preliminarily evaluated for flow capacity. The 8-inch public sewer main collects flow from the subject site, Saint Rose of Lima Church, and the Porsche dealership before transferring flow to a 10-inch public interceptor at the intersection with South Virginia Street.

In the future condition, the existing 8-inch main in Bishop Manogue Drive is anticipated to collect flow from all of the properties listed above plus the school expansion as well as one remaining undeveloped commercial property at the southwest corner of Bishop Manogue Drive and South Virginia Street.

Preliminary evaluation of the existing 8-inch public main is shown on the Existing Sewer Map in the appendix. The map includes tables summarizing the existing and future design flows from each property, the existing pipe sizes, slopes, and capacities, and the estimated design peak flow in each section of pipe. FlowMaster was used to calculate pipe capacities for the existing 8-inch main. FlowMaster calculation sheets are included in the appendix.

In summary, the 8-inch public sewer main in Bishop Manogue Drive has an 80% flow depth capacity of about one million gallons per day and the peak flow in the future condition is about 100,000 gallons per day. Therefore, the preliminary analysis shows that the existing 8-inch public sewer main in Bishop Manogue Drive has capacity to convey flow from the proposed expansion project.

CONCLUSION

The existing and proposed sanitary sewer system discussed in this report was preliminarily evaluated and laid out to sufficiently serve the proposed Bishop Manogue Catholic High School Expansion project at build-out. No adverse effects to the downstream infrastructure are anticipated. All proposed private sanitary sewer facilities shall be owned and maintained by the school.

REFERENCES

Bentley Systems, Incorporated, FlowMaster V8i (SELECTseries 1), Copyright 2009.

Bishop Manogue Phase 1 – Infrastructure Construction Plans, Jeff Codega Planning/Design, Inc., November 17, 1999.

New Bishop Manogue High School Plans, Jeff Codega Planning/Design, Inc., July 12, 2001.

North Carolina Administrative Code 15A NCAC 02T.0114 Wastewater Design Flow Rates.

Washoe County Community Services Department, Gravity Sewer Collection Design Standards, March 2016.

APPENDIX

VICINITY MAP

EXISTING SEWER MAP

PRELIMINARY SANITARY SEWER LAYOUT

EXISTING 8" MAIN SS FLOWMASTER CALCULATIONS

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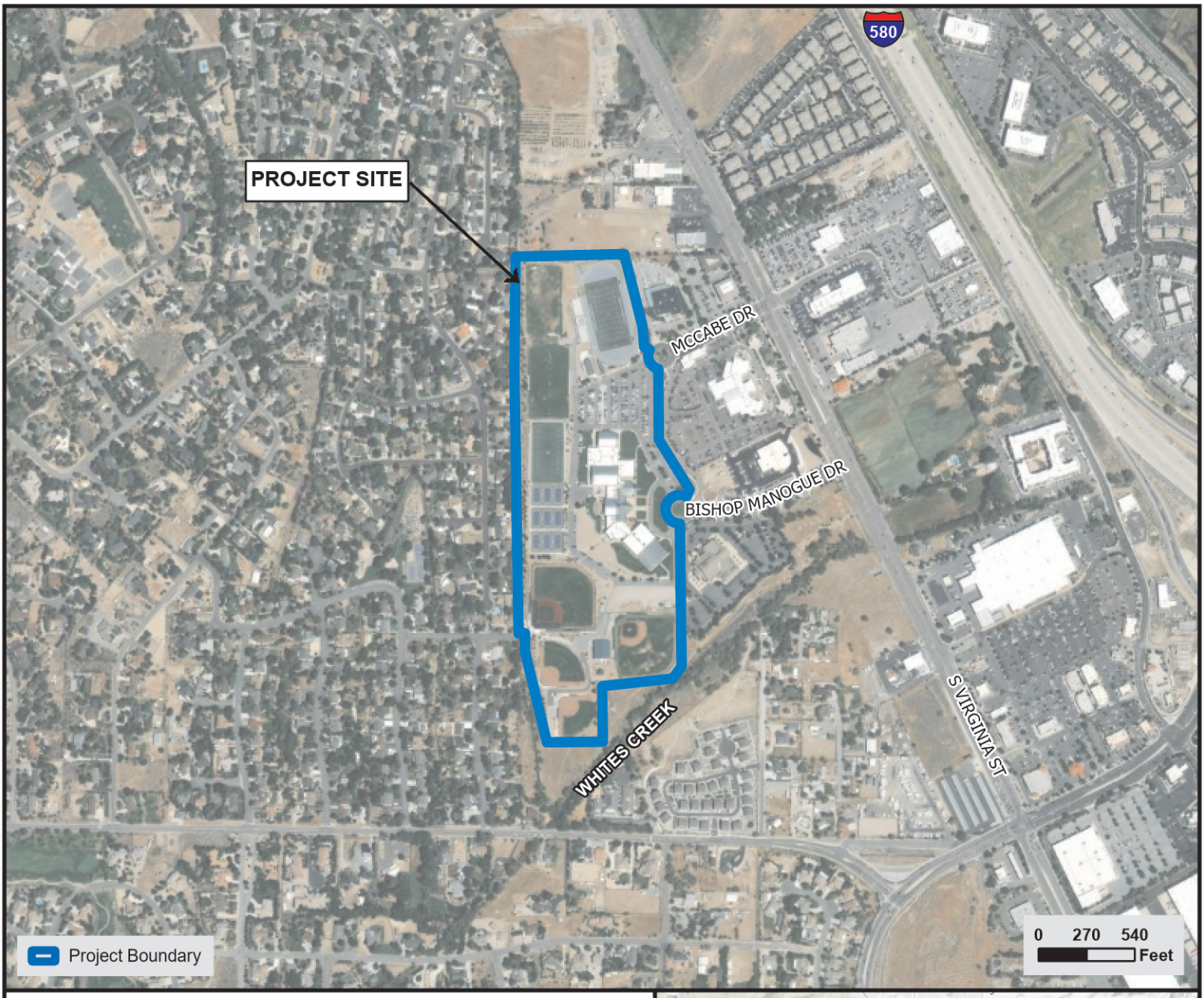
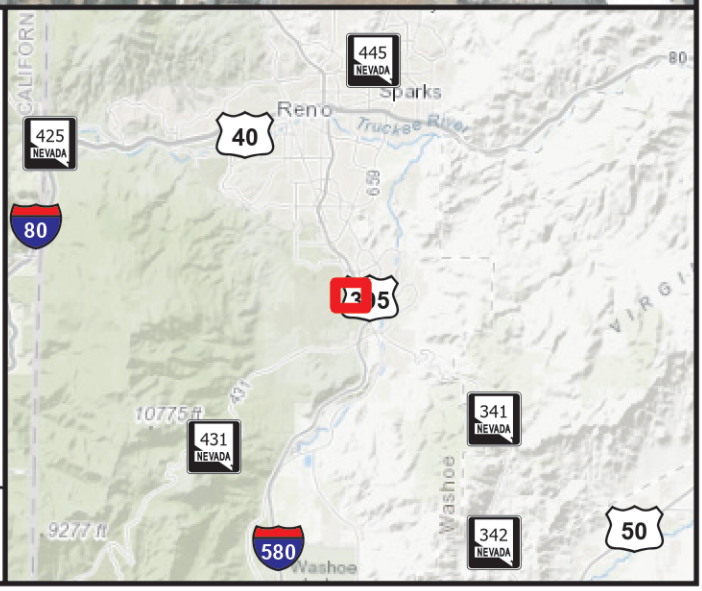


Vicinity Map

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

WASHOE COUNTY, NEVADA

FEBRUARY 2024



Prepared By: MWO

Checked By: MWO

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Bishop Manogue Catholic High School

EXISTING SEWER MAP

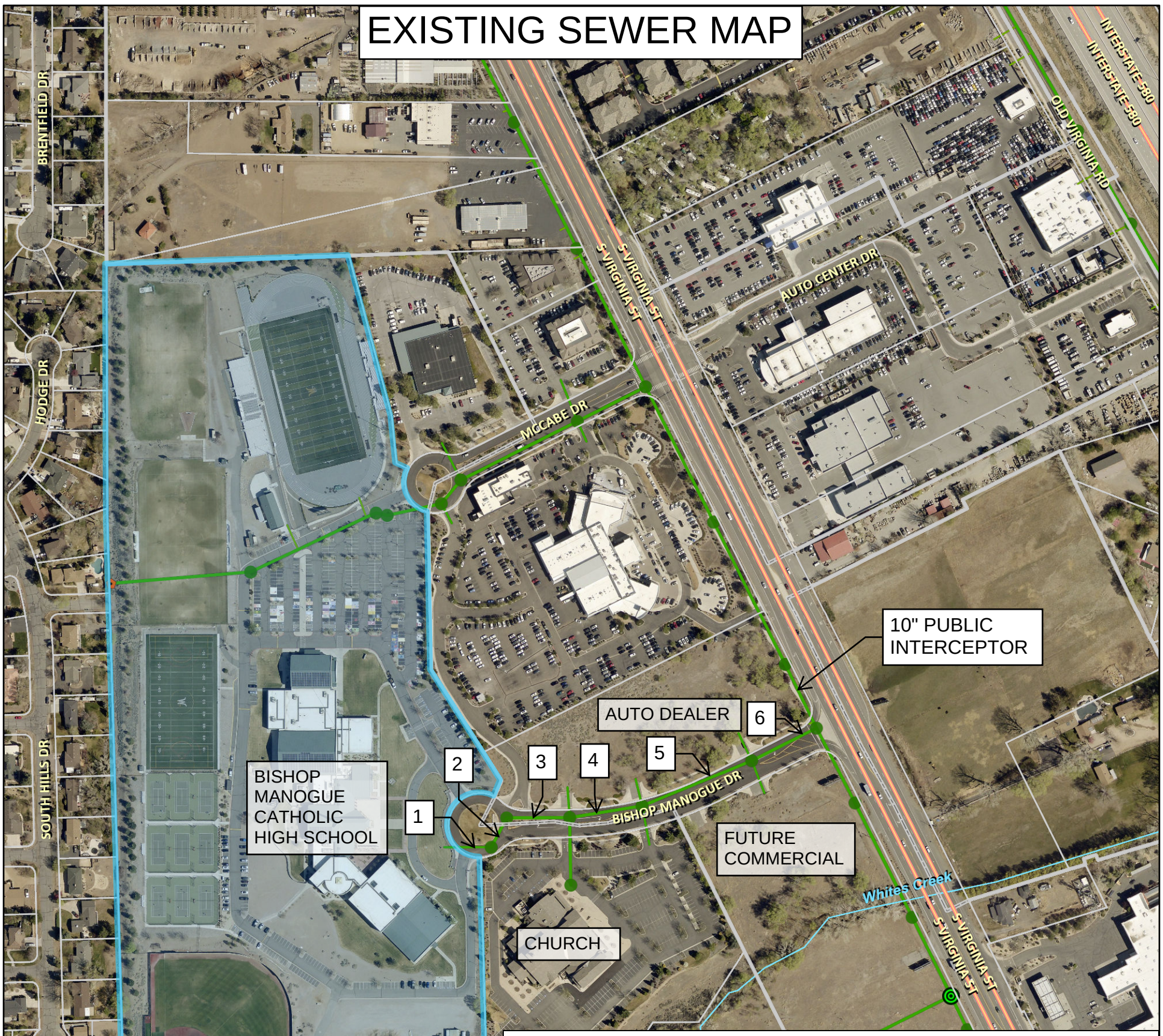


TABLE 1: DESIGN SEWER FLOW RATE PER PROPERTY

PROPERTY USE	UNITS	QUANTITY	UNIT FLOW RATE*	PEAKING FACTOR	PEAK FLOW RATE
CHURCH	ACRES	8.4	780 gpd/acre	3	19,656 gpd
AUTO DEALER	ACRES	5.0	780 gpd/acre	3	11,700 gpd
MANOGUE H.S.	STUDENTS	780	15 gpd/student	3	35,100 gpd
EXISTING TOTAL					**66,456 gpd**
FUTURE MANOGUE H.S.	STUDENTS	1,200	15 gpd/student	3	54,000 gpd
FUTURE COMMERCIAL	ACRES	4	780 gpd/acre	3	9,360 gpd
FUTURE TOTAL					**94,716 gpd**

*Washoe County Community Services Department Gravity Sewer Collection Design Standards, Section 2.1.02 Sewer Design Criteria, General Commercial Use: 780 gallons/day/acre (9.9 employees per acre). *North Carolina Administrative Code 15A NCAC 02T.0114 Wastewater Design Flow Rates, Section C, Schools with cafeteria, gym and showers: 15 gal/student.

TABLE 2: EXISTING SEWER CAPACITY, EXISTING DESIGN FLOW, & FUTURE DESIGN FLOW

PIPE NO.	SIZE*	OWNER	SLOPE*	0.8D Q_{CAP}	EXISTING PEAK FLOW	FUTURE PEAK FLOW
1	8"	PRIVATE	1.5%	1,012,854 gpd	35,100 gpd	54,000 gpd
2	8"	PUBLIC	1.0%	826,992 gpd	35,100 gpd	54,000 gpd
3	8"	PUBLIC	1.5%	1,012,854 gpd	35,100 gpd	54,000 gpd
4	8"	PUBLIC	1.54%	1,026,270 gpd	54,756 gpd	73,656 gpd
5	8"	PUBLIC	1.5%	1,012,854 gpd	54,756 gpd	73,656 gpd
6	8"	PUBLIC	2.6%	1,333,485 gpd	66,456 gpd	94,716 gpd

*Pipe sizes and slopes from record drawings "BISHOP MANOGUE PHASE 1 – INFRASTRUCTURE CONSTRUCTION PLANS" dated 11/17/99.

January 30, 2024

Sewer_Clean_Out
Sewer_Manhole
All Other
III

Sewer_Main
Active Main
Sewer_Stub
Sewer_Lateral
Reclaimed_Reducer

Reclaimed_Air_Vac
Reclaimed_Valve
Reclaimed_Water_Service
Reclaimed_Auxiliary
Reclaimed_Water_Main

1:4,514

0 215 430 860 ft

0 65 130 260 m

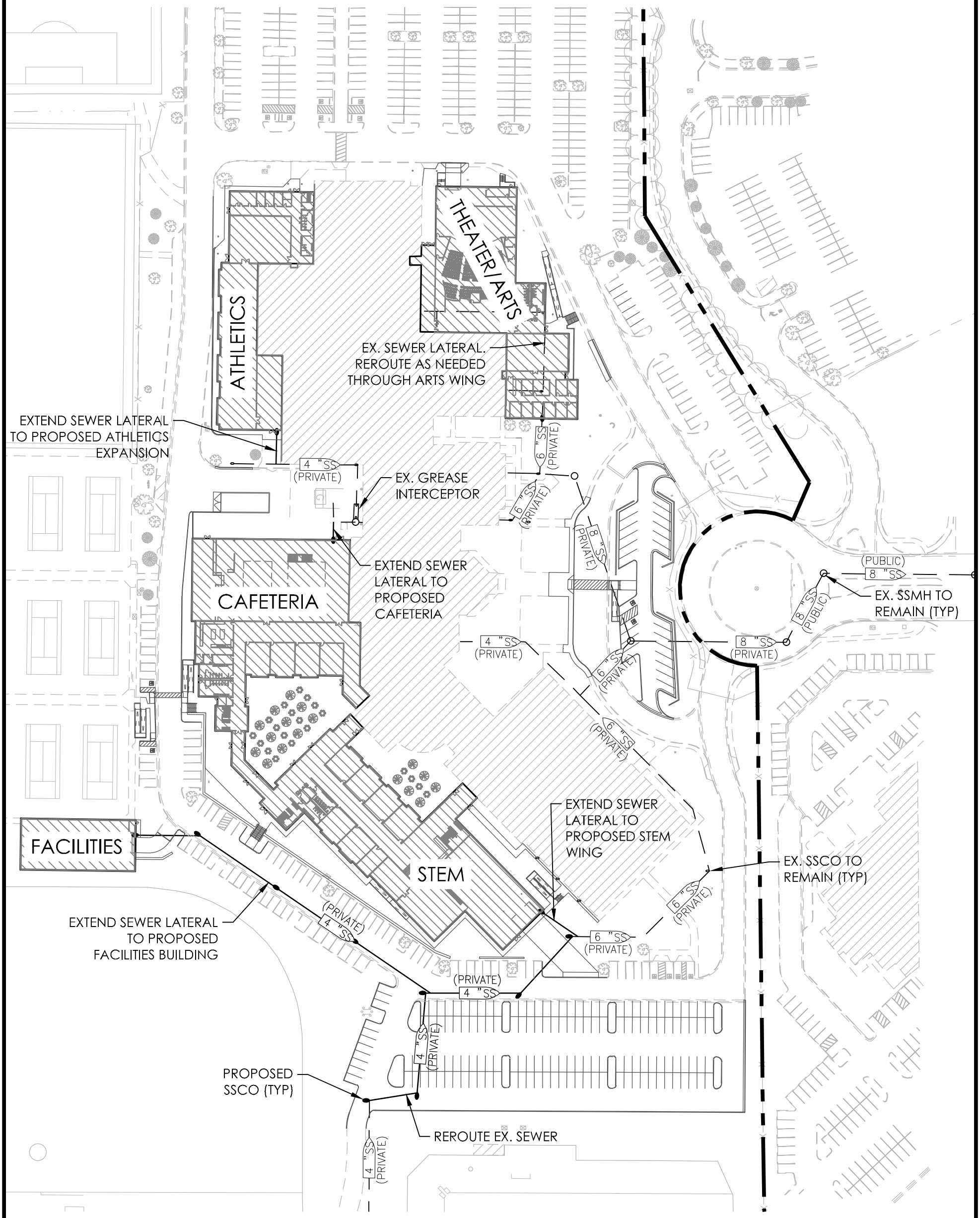
Washoe County
Washoe County GIS
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

PRELIMINARY SANITARY SEWER LAYOUT

BISHOP MANOGUE CATHOLIC H.S.

WASHOE COUNTY, NEVADA

FEBRUARY, 2024



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Fax 775.823.4066

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Worksheet for Ex. 8" SS Main 1% Slope

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01000	ft/ft
Normal Depth	6.40	in
Diameter	8.00	in

Results

Discharge	826991.98	gal/day
Flow Area	0.30	ft²
Wetted Perimeter	1.48	ft
Hydraulic Radius	2.43	in
Top Width	0.53	ft
Critical Depth	0.53	ft
Percent Full	80.0	%
Critical Slope	0.00995	ft/ft
Velocity	4.27	ft/s
Velocity Head	0.28	ft
Specific Energy	0.82	ft
Froude Number	1.01	
Maximum Discharge	1.41	ft³/s
Discharge Full	1.31	ft³/s
Slope Full	0.00955	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	80.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.40	in
Critical Depth	0.53	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00995	ft/ft

Worksheet for Ex. 8" SS Main 1.5% Slope

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01500	ft/ft
Normal Depth	6.40	in
Diameter	8.00	in

Results

Discharge	1012854.19	gal/day
Flow Area	0.30	ft²
Wetted Perimeter	1.48	ft
Hydraulic Radius	2.43	in
Top Width	0.53	ft
Critical Depth	0.58	ft
Percent Full	80.0	%
Critical Slope	0.01301	ft/ft
Velocity	5.23	ft/s
Velocity Head	0.43	ft
Specific Energy	0.96	ft
Froude Number	1.23	
Maximum Discharge	1.72	ft³/s
Discharge Full	1.60	ft³/s
Slope Full	0.01433	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	80.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.40	in
Critical Depth	0.58	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.01301	ft/ft

Worksheet for Ex. 8" SS Main 1.54% Slope

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.01540	ft/ft
Normal Depth	6.40	in
Diameter	8.00	in

Results

Discharge	1026270.06	gal/day
Flow Area	0.30	ft²
Wetted Perimeter	1.48	ft
Hydraulic Radius	2.43	in
Top Width	0.53	ft
Critical Depth	0.59	ft
Percent Full	80.0	%
Critical Slope	0.01328	ft/ft
Velocity	5.30	ft/s
Velocity Head	0.44	ft
Specific Energy	0.97	ft
Froude Number	1.25	
Maximum Discharge	1.75	ft³/s
Discharge Full	1.62	ft³/s
Slope Full	0.01471	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	80.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.40	in
Critical Depth	0.59	ft
Channel Slope	0.01540	ft/ft
Critical Slope	0.01328	ft/ft

Worksheet for Ex. 8" SS Main 2.6% Slope

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.012	
Channel Slope	0.02600	ft/ft
Normal Depth	6.40	in
Diameter	8.00	in

Results

Discharge	1333484.50	gal/day
Flow Area	0.30	ft²
Wetted Perimeter	1.48	ft
Hydraulic Radius	2.43	in
Top Width	0.53	ft
Critical Depth	0.63	ft
Percent Full	80.0	%
Critical Slope	0.02149	ft/ft
Velocity	6.89	ft/s
Velocity Head	0.74	ft
Specific Energy	1.27	ft
Froude Number	1.62	
Maximum Discharge	2.27	ft³/s
Discharge Full	2.11	ft³/s
Slope Full	0.02484	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	80.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.40	in
Critical Depth	0.63	ft
Channel Slope	0.02600	ft/ft
Critical Slope	0.02149	ft/ft

PRELIMINARY TECHNICAL DRAINAGE STUDY

FOR

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

Prepared for:

Bishop Manogue Catholic High School
c/o H&K Architects
5485 Reno Corporate Drive, Suite 100
Reno, NV 89511

February 8, 2024

Prepared by:

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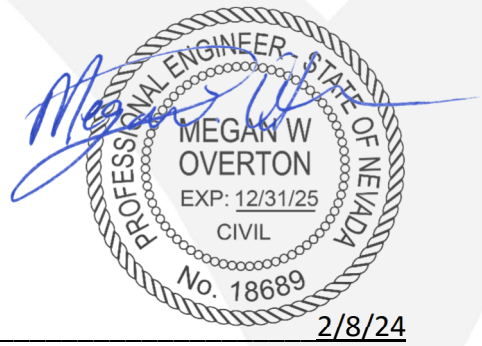

2/8/24
Megan Overton, P.E.

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TABLE OF CONTENTS

INTRODUCTION

This report represents the Preliminary Technical Drainage Study for expansion of the existing Bishop Manogue Catholic High School. The purpose of this report is to preliminarily address drainage issues that result from development of the proposed project in accordance with Washoe County's development standards, the *Truckee Meadows Regional Design Manual* (TMRDM), and sound design and engineering practices. This report includes the overall hydrologic analysis for existing and proposed conditions and the preliminary design parameters for on-site storm water management facilities.

GENERAL LOCATION AND DEVELOPMENT DESCRIPTION

LOCATION OF PROJECT

The proposed School expansion project is located on a developed 48.1-acre site (APN: 162-010-28). It is located within Section 17 of T18N, R20E, MDB&M, Washoe County, Nevada. The property is surrounded by developed land to the west (residential), north (commercial), east (commercial), and by Whites Creek to the south. Access to the site is provided by two public roads to the east, McCabe Drive and Bishop Manogue Drive, that dead-end in roundabouts at the project entrances. The proposed project will expand the existing high school building and parking lot in the center of the campus. The proposed expansion area covers approximate 6.5 acres. (Reference the Vicinity Map in Appendix A of this report for the property location.)

PROPERTY DESCRIPTION & HISTORY

The property consists of an existing 780-student high school that was built in the early 2000's along with associated outdoor athletic facilities, parking, landscaping, and utilities. It was originally part of a much larger site (~86 acres) that included the land between the school and South Virginia Street known as the Bishop Manogue Business Park.

During development, McCabe Drive and Bishop Manogue Drive were built in conjunction with storm drain networks that tied to detention basins on the downstream edge of the property parallel to South Virginia Street. The detention basins were sized for full development of the 86-acre business park based on a 100-year storm event. There are several storm drain networks extending from the existing detention basins to the property. One is located along the northern property line, another extends from McCabe Drive into the northern parking lot, and the last network extends from Bishop Manogue Drive into the center of the campus.

Proposed improvements will not negatively impact either of the two northern storm drain networks. Therefore, the remainder of this report will focus on the storm drain system extending into the property from Bishop Manogue Drive. The area draining to this system is referred to as the Southern Basin.

Within the Southern Basin there are two existing private storm drain networks surrounding the existing building. They are referred to as the North Drain Network and the South Drain Network. They are made up of roof drain connections, landscape drain lines, catch basin laterals, and storm drain mains. The North and South private storm drain networks converge at a public manhole east of the campus at the roundabout on Bishop Manogue Drive. From this convergence point a 24-inch public storm drain pipe conveys flows east within Bishop Manogue Drive. The main increases to a 36-inch pipe before outletting to the master-planned detention basin adjacent to South Virginia Street.

PROJECT DESCRIPTION

The proposed school expansion will add about 162,000 sf of new building area allowing student capacity to increase to 1,200. The building expansion is anticipated to be a multi-phase project that adds a new wing or expands an existing wing of the building with each phase. The proposed expansions include the following four wings: Cafeteria, STEM, Athletics, and Theater/Art. A Facilities Building is also proposed, which is anticipated to be constructed with the Cafeteria expansion phase. The project will include added parking, landscaping, and utilities to support the proposed phases of further development.

New storm drainage infrastructure is proposed to support expansion of the building by relocating and extending the existing private storm drain networks around and to the improvements. Reference Appendix A, Preliminary Storm Drain Layout map for a plan of the project site.

PREVIOUS STUDIES

Jeff Codega Planning and Design prepared a study titled, “Hydraulic Report for Bishop Manogue Business Park, Road A and Road B” dated September 1998. (Road A and Road B are now known as McCabe Drive and Bishop Manogue Drive.) The report was followed up with a review of the study and additional evaluation by Nimbus Engineers in a report titled, “Flood Control Master Plan for Bishop Manogue” dated April 1999 (’99 Nimbus Study). The two studies reviewed the pre-developed condition for the Bishop Manogue Business Part and calculated flows for full build-out of the 86-acre site in order to size/confirm-sizing of the detention basins along South Virginia Street.

Wood Rodgers, Inc. prepared a drainage report titled, “Drainage Study Bill Pearce Motors” dated April 27, 2007, which was followed up with an addendum letter on September 13, 2007. Another letter was issued on April 20, 2008 as a result of a design change. The study and update letters describe the existing detention basin along South Virginia Street with a capacity of 1.97 +/- acre-feet. Development of Bill Pearce Motors resulted in a pond volume increase of 0.13 acre-feet, creating a new total storage volume of 2.10 acre-feet.

Soils on the site were preliminarily characterized by Wood Rodgers, Inc. in a geotechnical review letter summarizing the site condition. The letter, which is dated December 13, 2023, summarizes the site soils

as fine-grained low plasticity silts and sands, and high plasticity gravelly clays.

Master Drainage Study Plan Revision

As mentioned previously, the property was master planned for development. The area proposed for expansion is included in basin EC-1E of the '99 Nimbus Study. Per the study, the developed site has a Curve Number of 92. Based on soil conditions provided in the USDA NRCS Web Soil Survey, (see Appendix A) the proposed expansion area of the site is split between Hydrologic Soil Groups C and D. A curve number of 92 with a Hydrologic Soil Group designation between C and D corresponds to an "Industrial" hydrologic condition with a 72% impervious area, per Table 702 of the TMRDM.

The proposed building expansion and site improvements will increase the impervious area creating an impervious area that covers 83% of the EC-1E drainage basin. The increase in runoff will require additional detention as detailed in this report.

Drainage Basin Description

On-Site Drainage Description

Topography of the site generally trends downhill from southwest to northeast and the site is split into three main basin areas. As mentioned previously, this study will focus on the Southern Basin that drains to the storm drain network in Bishop Manogue Drive.

9 subbasins form the Southern Basin in the existing condition, whereas there are 10 subbasins in the proposed condition. Their limits are shown on the Existing Hydrologic Basins Exhibit and Proposed Hydrologic Basins Exhibit in Appendix B. Some of the subbasins drain to the North Drain Network, some to the South Drain Network, and one subbasin in the existing condition sheet drains directly to Bishop Manogue Drive where it is collected in the public storm drain system. The following table summarizes which subbasins are directly connected to each of the three networks.

Table 1: Pipe Network – Subbasin Correlation

	North Drain Network	**South Drain Network**	**Direct to Public Network**
Existing Subbasins	X-2, X-7, X-8, X-9, X-10	X-1, X-3, X-4	X-5
Proposed Subbasins	P-2, P-6, P-7, P-8, P-9, P-10	P-1, P-3, P-4, P-5	

Both the North and South Drain Networks connect to the Public Network in Bishop Manogue Drive.

Offsite Drainage Description

Storm water falling on land outside the property and adjacent to the Southern Basin is directed away from the Southern Basin in either cutoff ditches or natural topography flowing away from the property. Little to no run-on enters the property from offsite. The residential lots to the west are separated from the Southern Basin by the Last Chance Ditch, whereas the land to the south, where White Creek runs,

and to the east is downhill of the property. Reference Appendix B for existing drainage boundary limits.

Floodplain Information

The project site is located on FEMA Flood Insurance Rate Map (FIRM) number 32031C3245G. The majority of the site is located within FEMA Flood Zone X, defined as areas outside the 0.2% (500-year) annual chance floodplain. The southern tip of the property extends into FEMA Flood Zone A; however, no improvements are proposed within this area. As the proposed development area of the site is designated Zone X, there are no base flood elevations for the site. The FEMA FIRM Panel Firmette showing the project site is provided in Appendix A.

Proposed Drainage Facilities

General Description

The proposed expansion project limits are located within the Southern Basin, which includes subbasins P-1 through P-10. The remainder of the site will remain unchanged.

The proposed expansion project storm drainage system generally consists of sheet flow from the proposed parking lots, building roofs, driveways, sidewalks, and landscape areas into gutters and drainage swales in which the water is conveyed to either the North or South Drain System and ultimately to the public storm drain line in Bishop Manogue Drive.

Both the existing North and South Drain Networks include pipe relocations and extensions in order to service the proposed improvements. The North Drain Network includes relocation of a 6-inch drain line around the proposed Theater/Arts Wing, relocation of a 12-inch drain line around the proposed Athletics Expansion, and extension of a catch basin lateral to the proposed entry parking lot in front of the school.

The South Drain Network, similar to the North Drain Network, includes extension of a catch basin lateral to the proposed entry parking lot in front of the school as well as extension of a storm drain line around the new Stem Wing and through the two proposed courtyards.

Hydrologic Analysis

5-year and 100-year storm event runoff flow rates for the existing and proposed hydrologic basins were preliminarily analyzed using the Rational Method, per the *TMRDM*. Rational Method flow rate calculation input includes rainfall intensity, runoff coefficients, and drainage areas. Rainfall input was generated from the NOAA Atlas 14 Point Precipitation Frequency Estimates at the site (Latitude 39.4226, Longitude -119.7647). A copy of the intensity table is included in Appendix B of this report. Runoff coefficients (C-values) were estimated using standard C-values published in the *TMRDM* based on surface characteristics. A copy of the Runoff Coefficient table is included in Appendix B of this report. Tables summarizing percentages of different surface types per subbasin that were used to calculate

composite C-values are included on the Existing and Proposed Hydrologic Basins maps.

Rational Method spreadsheets were used to preliminarily calculate runoff from each subbasin during the design storm events. Spreadsheets are included in Appendix B for the 5-year and 100-year events for both the existing and proposed conditions. The spreadsheets include calculations for each subbasin Time of Concentration that determined the rainfall intensity.

Results from the calculations are summarized in the following table:

Table 2: Existing versus Proposed Flow Rates

	North Drain Network		South Drain Network	
	5-Year Flow Rate (cfs)	**100-Year Flow Rate (cfs)**	**5-Year Flow Rate (cfs)**	**100-Year Flow Rate (cfs)**
Existing	5.4	17.1	4.5	20.8
Proposed	7.1	19.9	7.1	25.9
Difference	1.7 Increase	2.8 Increase	2.6 Increase	5.1 Increase

The proposed expansion project increases impervious area on the site and results in an increase in runoff within the subbasins. The impact of the proposed flow rates on the existing site have been preliminarily evaluated and mitigated as described below.

FACILITY DESIGN

The proposed expansion project storm drain system is preliminarily designed to intercept the 5-year and 100-year storm events in order to carry them within the pipe networks until discharged into the existing public storm drain system.

In order to limit the impact of increased impervious area in a majority of the existing private system as well as all of the downstream public storm drain system, detention systems are proposed in both the North and South Drain Networks near the upstream end of the existing private pipe networks, but downstream of the proposed expansion projects.

The North Drain Network detention basin is an underground system that is proposed on the north side of the future Athletics Expansion within the existing north parking lot. The proposed detention system will capture and meter flow from subbasins P-2 and P-9 before releasing it downstream. The combined flow from these two subbasins in the 100-year storm is 11.2 cfs, which is more than the required detention flow rate of 2.8 cfs per Table 2; therefore, no additional subbasins need to be routed to the detention basin. The pipes upstream of the North Drain Network detention basin will be evaluated more thoroughly in the final design report. However, for the purpose of this report the flattest section of pipe with the greatest flow was checked for capacity using FlowMaster V8i. The FlowMaster output

report is included in Appendix C. In summary, the flattest pipe with the largest flow in the North Drain Network upstream of the proposed detention basin is a 12-inch line with 6.5 cfs of flow during the 100-year storm at the downstream end of subbasin P-9. The 12-inch line will be able to convey the 100-year flow rate with 1.3 feet of head on the upstream end of the pipe, which maintains the hydraulic grade line below ground level.

The South Drain Network detention basin is proposed as a pond at the downstream end of subbasin P-3. Subbasin P-3 has a 100-year flow rate of 6.6 cfs, which is more than the required detention flow rate of 5.1 cfs for the South Drain Network per Table 2; therefore, no additional subbasins need to be routed to the detention basin. Similar to the North Drain Network, the pipes upstream of the South Drain Network detention basin will be evaluated more thoroughly in the final design report. However, for the purpose of this report the flattest section of pipe with the greatest flow was checked for capacity using FlowMaster V8i. The FlowMaster output report is included in Appendix C. In summary, the flattest pipe with the largest flow in the South Drain Network upstream of the proposed detention basin is a 12-inch line with 6.6 cfs of flow during the 100-year storm at the downstream end of subbasin P-3. The 12-inch line will be able to convey the 100-year flow rate with 3.3 feet of head on the upstream end of the pipe. This section of pipe is more than 4 feet underground, so the hydraulic grade line will be below ground level in a 100-year storm.

DETENTION

The two proposed detention basin minimum volumes were preliminarily calculated using the Rational Formula Method from the *TMRDM*, which states the volume is equal to the time of concentration in minutes, times a conversion factor of 60, times the detained flow rate in cfs. The following table summarizes the results of this calculation for the 100-year storm event.

Table 3: Detention Basin Volumes

System	Tc (min)	Detained Q (cfs)	Volume (cf)
North Detention	13.2	2.8	2,218
South Detention	9.8	5.1	2,999

Each of the proposed detention basins will include an outlet control structure. The outlet control structure will include a low flow orifice to release the 5-year storm event flow rate, a higher orifice to release the 100-year storm event flow rate, and an emergency overflow. Detailed design of the two detention systems, including outlet control structures, will be provided in final design.

MAINTENANCE PLAN

Sediment transport and erosion will be controlled through landscape measures as well as sizing of outlet and inlet protection and through conformance with the Storm Water Pollution Prevention Plan (SWPPP) prepared for this site. The SWPPP includes Best Management Practices (BMP's), a maintenance

schedule, and a list of the responsible parties for maintenance to insure the storm drain system operates correctly and prevents excessive sediment transport. The SWPPP will be prepared prior to construction and will be maintained on the project site throughout construction duration.

Post-construction management of the private storm drain system will be the responsibility of the property owner.

CONCLUSION

The drainage facilities that will be constructed with the Bishop Manogue Catholic High School Expansion project have been preliminarily designed to capture and perpetuate the design storm event flows with the use of storm drain pipes and detention systems to the existing downstream drain pipe networks. The proposed project is in compliance with State of Nevada drainage statutes, the Washoe County development standards, the *Truckee Meadows Regional Drainage Manual*, and FEMA requirements and development standards. There will not be negative impacts to adjacent or downstream properties as a result of development due to the implementation of the proposed storm water management system.

REFERENCES

Bentley Systems, Incorporated, FlowMaster V8i (SELECTseries 1), Copyright 2009.

Bishop Manogue Phase 1 – Infrastructure Construction Plans, Jeff Codega Planning/Design, Inc., November 17, 1999.

Drainage Study Bill Pearce Motors, Wood Rodgers, Inc., April 27, 2007, First Addendum, September 13, 2007, Second Addendum, April 20, 2008.

Federal Emergency Management Agency, Flood Insurance Rate Map for Washoe County, Nevada, Exported December 12, 2023.

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New Bishop Manogue High School Plans, Jeff Codega Planning/Design, Inc., July 12, 2001.

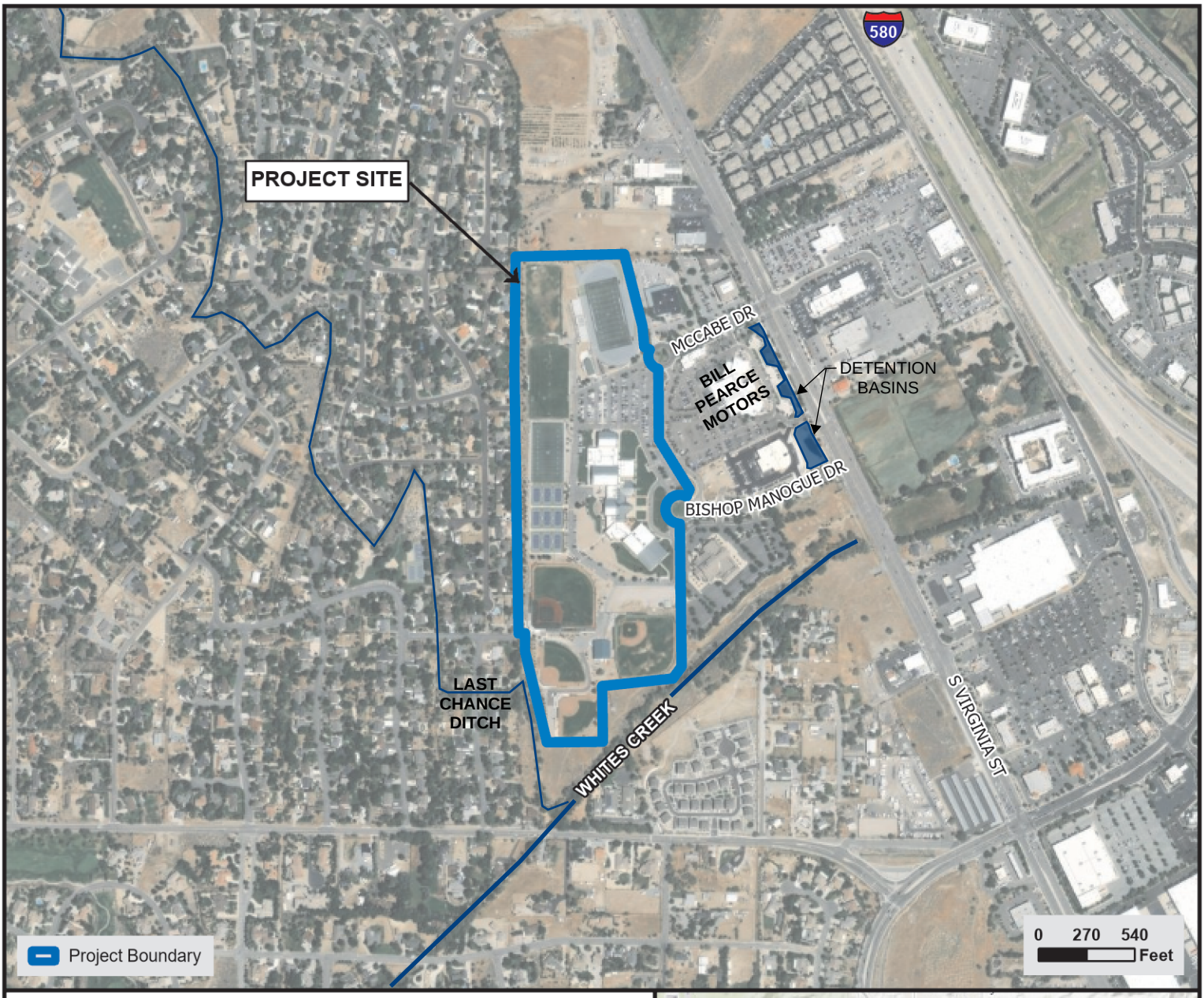
NOAA Atlas 14, Volume 1, Version 5. Downloaded February 2024.

Truckee Meadows Regional Drainage Manual, April 30, 2009.

USDA Natural Resources Conservation Service Web Soil Survey, Web Soil Survey - Home (usda.gov), Referenced January 31, 2024.

APPENDIX A

WOOD RODGERS

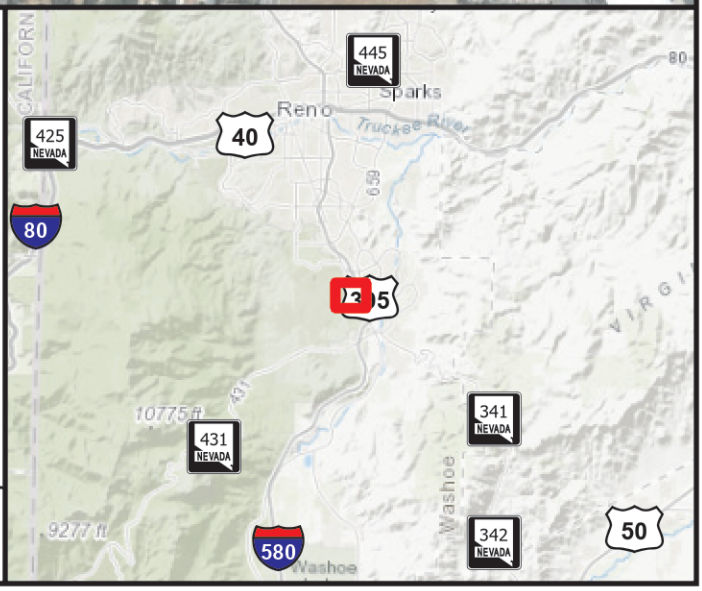


Vicinity Map

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

WASHOE COUNTY, NEVADA

FEBRUARY 2024



Prepared By: MWO

Checked By: MWO

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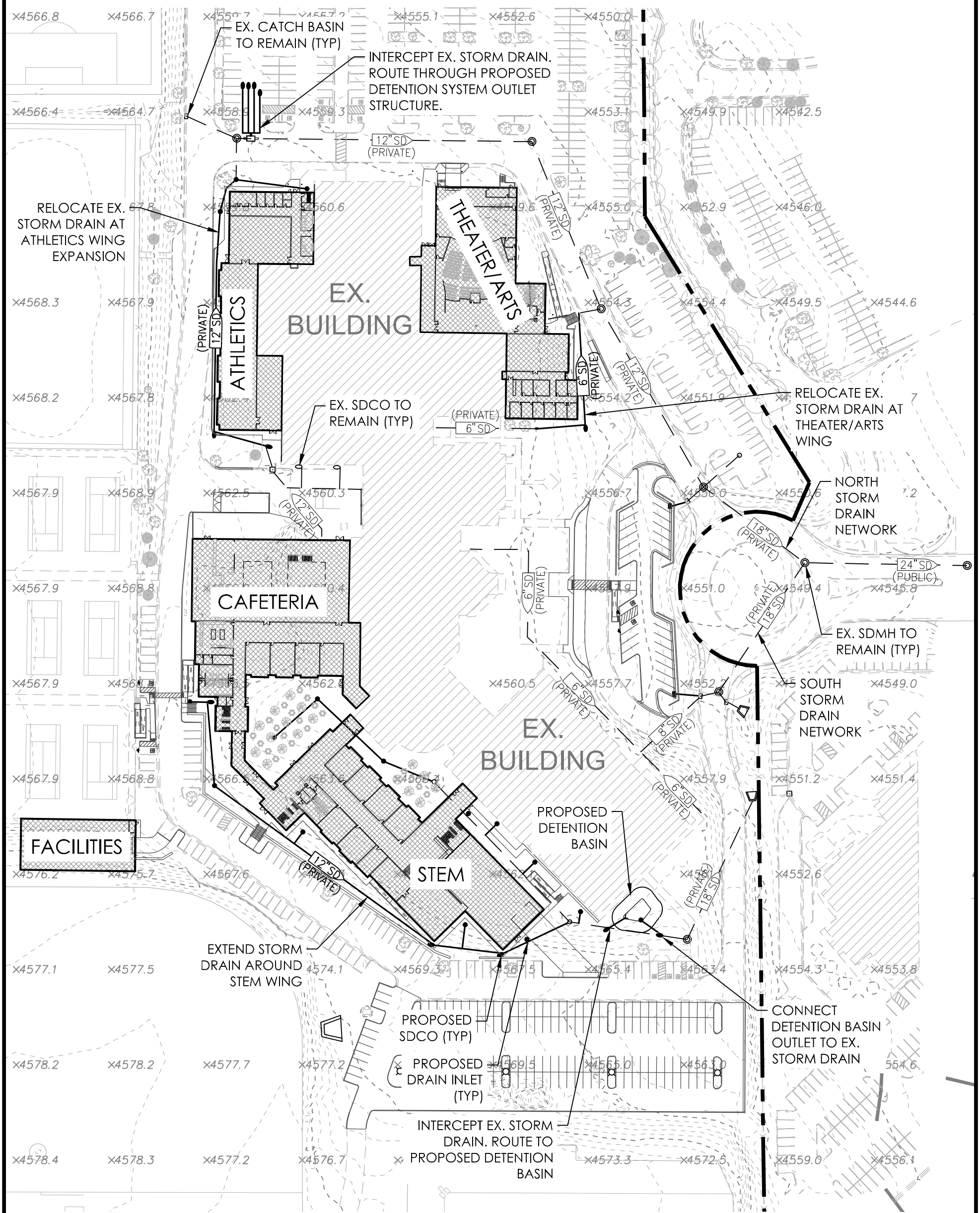
PRELIMINARY STORM DRAIN LAYOUT

BISHOP MANOGUE CATHOLIC H.S.

WASHOE COUNTY, NEVADA

FEBRUARY, 2024



NORTH

100' 50' 0 100'

SCALE: 1" = 100'

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
1361 Corporate Boulevard
Reno, NV 89502
Tel 775.823.4068
Fax 775.823.4066

J: \Jobs\4412_Manogue_High_School\Manogue_High_School_OA\Planning\Studies\Drainage\PRELIMINARY SD LAYOUT.dwg 2/8/2024 10:51 AM Megan Overton

National Flood Hazard Layer FIRMette

FEMA

119°46'12"W 39°25'40"N

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

1:6,000

119°45'34"W 39°25'12"N

Basemap Imagery Source: USGS National Map 2023

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 *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

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
- 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

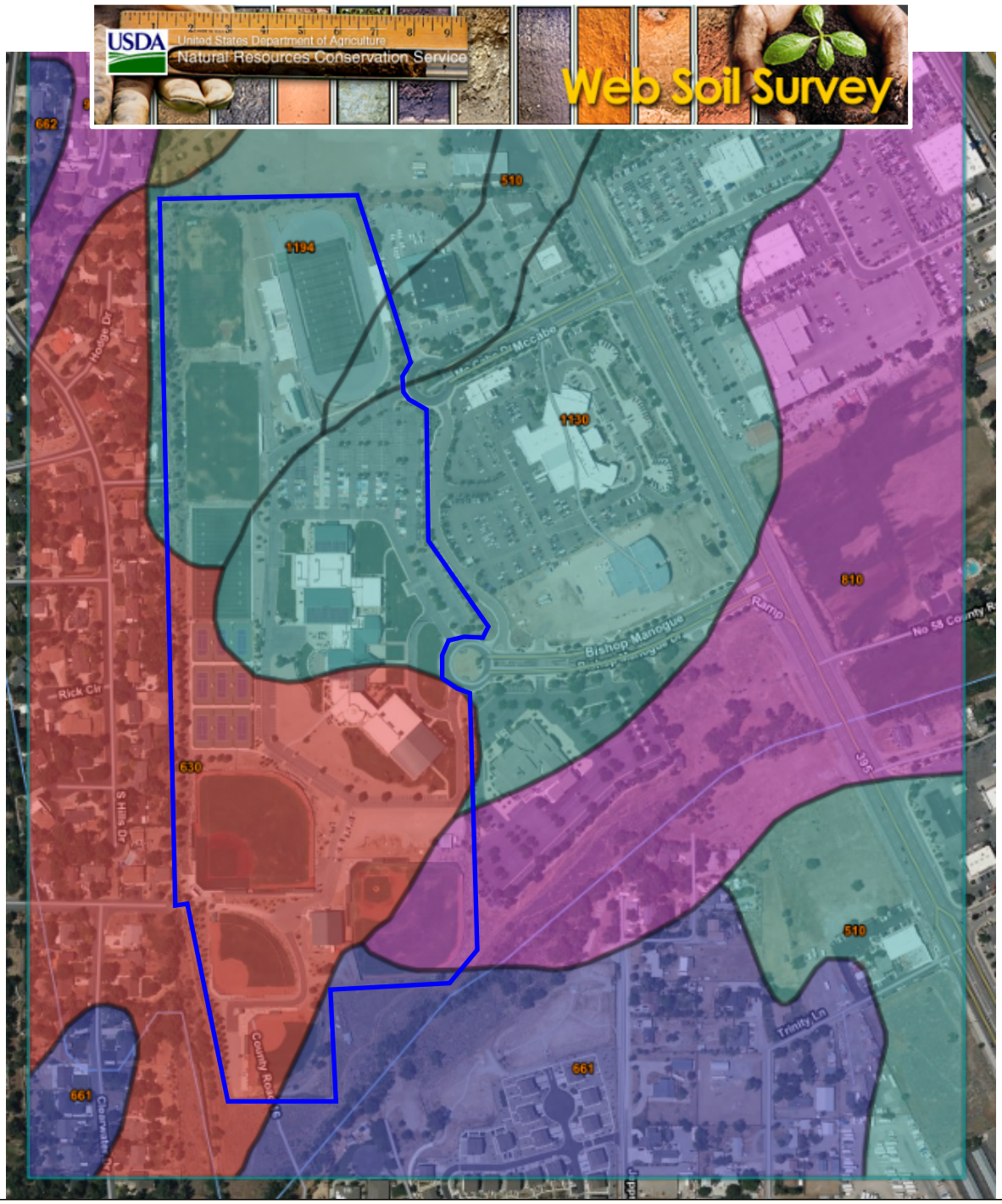
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/12/2023 at 12:32 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: basemap 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.



Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Washoe County, Nevada, South Part (NV628)

Summary by Map Unit — Washoe County, Nevada, South Part (NV628)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
230	Cradlebaugh loam	C/D	4.3	1.7%
510	Settlemeyer fine sandy loam, 0 to 2 percent slopes	C	24.5	9.9%
630	Fleischmann gravelly clay loam, 2 to 4 percent slopes	D	47.8	19.4%
661	Oest bouldery sandy loam, 2 to 8 percent slopes	B	30.8	12.5%
662	Oest extremely stony sandy loam, 2 to 8 percent slopes	B	1.4	0.6%
810	Rose Creek fine sandy loam, drained	A	48.3	19.6%
991	Xeric Torriorthents-Urban land complex	A	7.9	3.2%
1130	Dithod sandy loam	C	55.7	22.6%
1194	Spasprey stony sandy loam, 4 to 8 percent slopes	C	25.6	10.4%
Totals for Area of Interest			**246.3**	**100.0%**

APPENDIX B

NOAA Atlas 14, Volume 1, Version 5
Location name: Reno, Nevada, USA*
Latitude: 39.4226°, Longitude: -119.7647°
Elevation: m/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	**1.08** (0.936-1.27)	**1.34** (1.15-1.60)	**1.81** (1.55-2.16)	**2.27** (1.91-2.69)	**3.01** (2.46-3.60)	**3.71** (2.93-4.48)	**4.52** (3.46-5.53)	**5.52** (4.03-6.90)	**7.14** (4.88-9.16)	**8.59** (5.60-11.2)
10-min	**0.822** (0.708-0.972)	**1.03** (0.876-1.22)	**1.38** (1.18-1.64)	**1.72** (1.45-2.05)	**2.29** (1.88-2.74)	**2.82** (2.23-3.41)	**3.44** (2.63-4.22)	**4.21** (3.07-5.25)	**5.43** (3.72-6.97)	**6.53** (4.27-8.56)
15-min	**0.680** (0.584-0.804)	**0.848** (0.724-1.00)	**1.14** (0.972-1.36)	**1.42** (1.20-1.69)	**1.89** (1.55-2.27)	**2.33** (1.84-2.82)	**2.85** (2.17-3.48)	**3.47** (2.54-4.34)	**4.49** (3.08-5.76)	**5.40** (3.52-7.07)
30-min	**0.458** (0.394-0.540)	**0.570** (0.488-0.676)	**0.770** (0.654-0.914)	**0.958** (0.808-1.14)	**1.28** (1.04-1.53)	**1.57** (1.24-1.90)	**1.92** (1.46-2.35)	**2.34** (1.71-2.92)	**3.02** (2.07-3.88)	**3.64** (2.37-4.76)
60-min	**0.284** (0.243-0.334)	**0.353** (0.302-0.419)	**0.476** (0.404-0.565)	**0.592** (0.500-0.705)	**0.789** (0.646-0.944)	**0.971** (0.767-1.17)	**1.19** (0.905-1.45)	**1.45** (1.06-1.81)	**1.87** (1.28-2.40)	**2.25** (1.47-2.95)
2-hr	**0.189** (0.167-0.219)	**0.235** (0.208-0.272)	**0.302** (0.264-0.349)	**0.360** (0.310-0.416)	**0.449** (0.376-0.523)	**0.529** (0.431-0.624)	**0.620** (0.491-0.743)	**0.734** (0.562-0.912)	**0.940** (0.687-1.21)	**1.14** (0.796-1.49)
3-hr	**0.149** (0.133-0.170)	**0.186** (0.167-0.213)	**0.235** (0.208-0.267)	**0.273** (0.240-0.312)	**0.328** (0.283-0.376)	**0.375** (0.318-0.435)	**0.431** (0.357-0.507)	**0.505** (0.409-0.613)	**0.636** (0.499-0.815)	**0.764** (0.579-1.00)
6-hr	**0.103** (0.092-0.116)	**0.129** (0.115-0.146)	**0.161** (0.143-0.182)	**0.186** (0.164-0.210)	**0.218** (0.189-0.248)	**0.242** (0.207-0.278)	**0.267** (0.225-0.310)	**0.297** (0.245-0.350)	**0.345** (0.277-0.413)	**0.396** (0.311-0.507)
12-hr	**0.066** (0.059-0.074)	**0.083** (0.074-0.093)	**0.105** (0.093-0.118)	**0.122** (0.107-0.137)	**0.144** (0.125-0.163)	**0.161** (0.138-0.184)	**0.178** (0.151-0.207)	**0.196** (0.162-0.230)	**0.219** (0.176-0.263)	**0.239** (0.188-0.292)
24-hr	**0.040** (0.037-0.045)	**0.051** (0.046-0.056)	**0.064** (0.058-0.071)	**0.075** (0.067-0.083)	**0.089** (0.080-0.099)	**0.101** (0.090-0.113)	**0.113** (0.100-0.127)	**0.126** (0.110-0.142)	**0.143** (0.122-0.163)	**0.156** (0.132-0.181)
2-day	**0.023** (0.021-0.026)	**0.030** (0.026-0.033)	**0.037** (0.033-0.042)	**0.044** (0.039-0.049)	**0.052** (0.046-0.059)	**0.059** (0.052-0.067)	**0.066** (0.058-0.076)	**0.074** (0.063-0.085)	**0.084** (0.071-0.099)	**0.092** (0.076-0.110)
3-day	**0.017** (0.015-0.019)	**0.021** (0.019-0.024)	**0.027** (0.024-0.031)	**0.032** (0.029-0.036)	**0.039** (0.034-0.044)	**0.044** (0.039-0.050)	**0.050** (0.043-0.057)	**0.056** (0.048-0.064)	**0.064** (0.054-0.075)	**0.071** (0.058-0.084)
4-day	**0.014** (0.012-0.015)	**0.017** (0.016-0.019)	**0.022** (0.020-0.025)	**0.026** (0.024-0.029)	**0.032** (0.028-0.036)	**0.037** (0.032-0.041)	**0.041** (0.036-0.047)	**0.047** (0.040-0.053)	**0.054** (0.045-0.063)	**0.060** (0.050-0.071)
7-day	**0.009** (0.008-0.010)	**0.011** (0.010-0.013)	**0.015** (0.013-0.017)	**0.018** (0.016-0.020)	**0.021** (0.019-0.024)	**0.024** (0.021-0.028)	**0.028** (0.024-0.032)	**0.031** (0.027-0.036)	**0.036** (0.030-0.042)	**0.039** (0.033-0.046)
10-day	**0.007** (0.006-0.008)	**0.009** (0.008-0.010)	**0.011** (0.010-0.013)	**0.014** (0.012-0.015)	**0.017** (0.015-0.019)	**0.019** (0.017-0.021)	**0.021** (0.018-0.024)	**0.024** (0.020-0.027)	**0.027** (0.023-0.032)	**0.030** (0.025-0.035)
20-day	**0.004** (0.003-0.004)	**0.005** (0.004-0.006)	**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)	**0.014** (0.012-0.016)	**0.015** (0.013-0.018)	**0.017** (0.014-0.020)
30-day	**0.003** (0.003-0.003)	**0.004** (0.003-0.004)	**0.005** (0.004-0.006)	**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** (0.009-0.012)	**0.011** (0.010-0.013)	**0.012** (0.010-0.014)
45-day	**0.002** (0.002-0.002)	**0.003** (0.003-0.003)	**0.004** (0.003-0.004)	**0.005** (0.004-0.005)	**0.005** (0.005-0.006)	**0.006** (0.005-0.007)	**0.007** (0.006-0.008)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.009** (0.007-0.010)
60-day	**0.002** (0.002-0.002)	**0.002** (0.002-0.003)	**0.003** (0.003-0.004)	**0.004** (0.003-0.004)	**0.004** (0.004-0.005)	**0.005** (0.004-0.006)	**0.005** (0.005-0.006)	**0.006** (0.005-0.007)	**0.006** (0.006-0.007)	**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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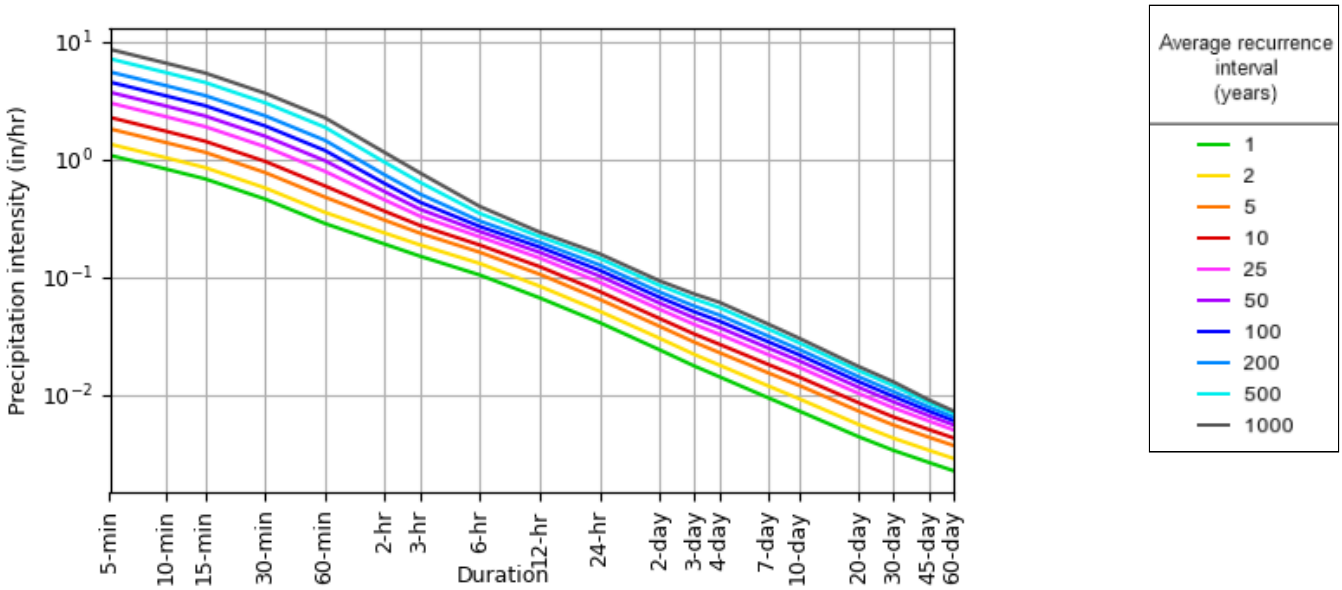
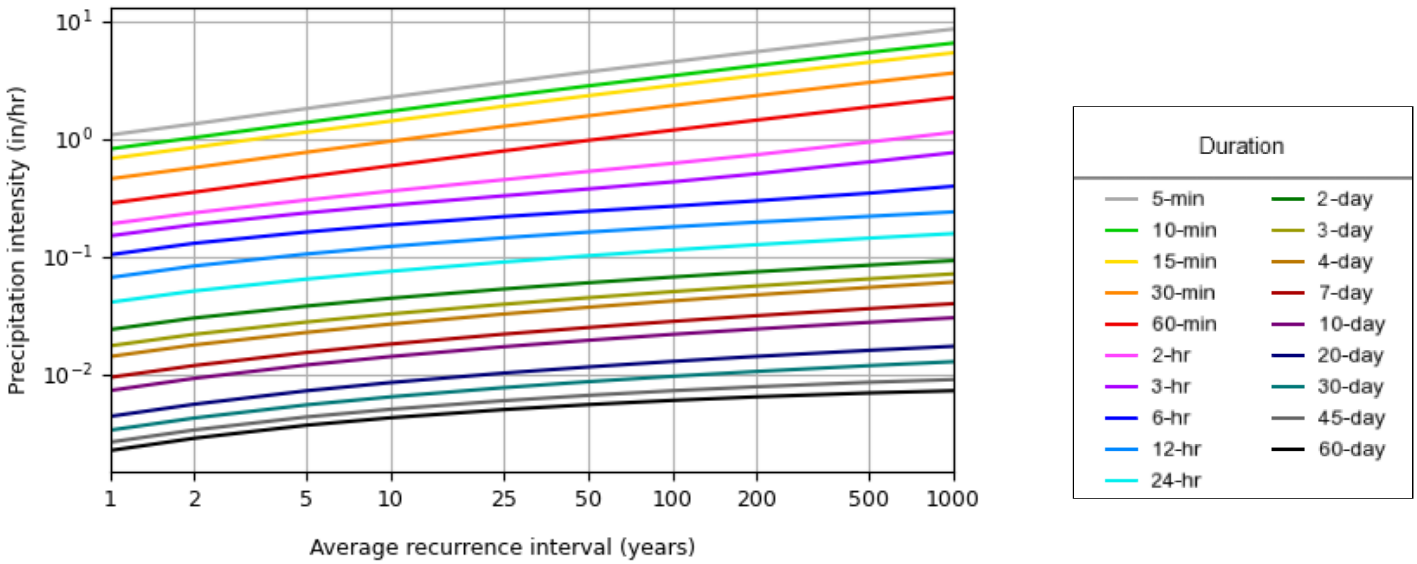
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 39.4226°, Longitude: -119.7647°





NOAA Atlas 14, Volume 1, Version 5

Created (GMT): Thu Feb 8 19:17:59 2024

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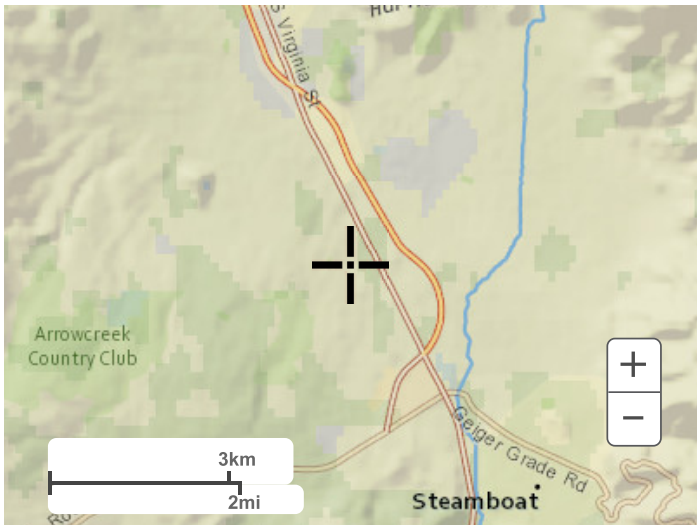
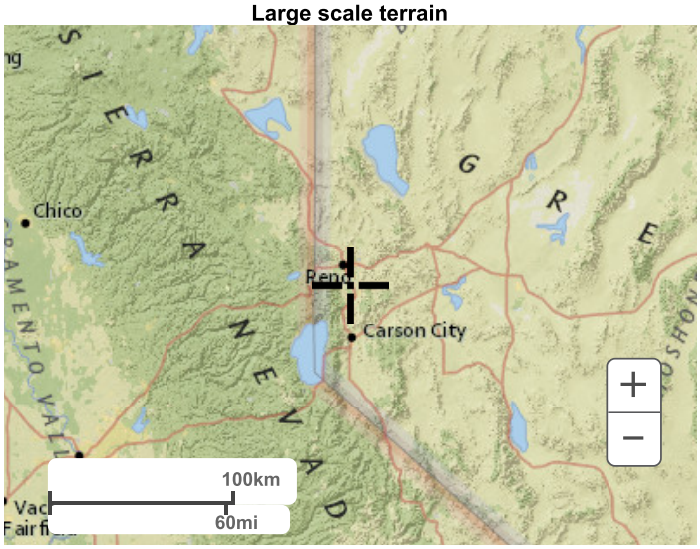
Maps & aerials

Small scale terrain



Large scale terrain



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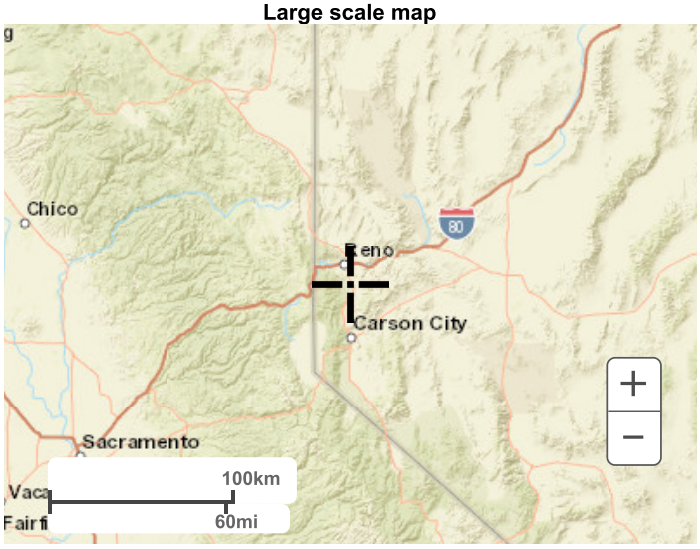
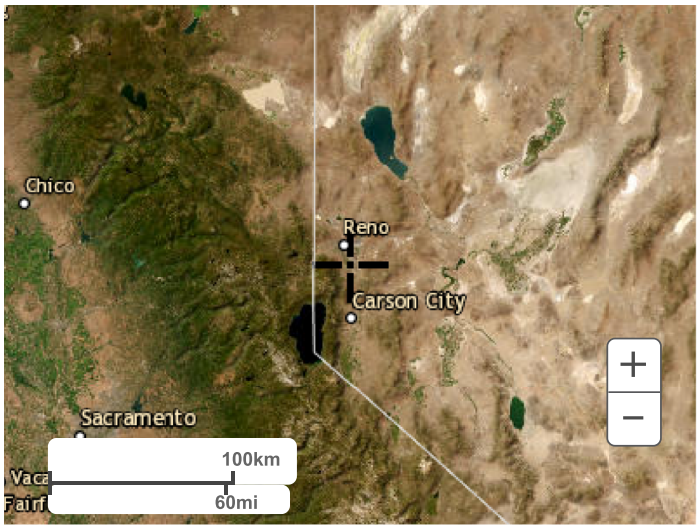


Large scale aerial



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

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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.

RUNOFF CURVE NUMBERS FOR URBAN AREAS[1]

Cover Type and Hydrologic Condition	Aver. % Impervious Area[2]	Runoff Curve Numbers: Soil Comp A	Soil Comp B	Soil Comp C	Soil Comp D
Fully developed urban area (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50 to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious only, no vegetation)[5]		77	86	91	94
Idle lands (CNs are determined using cover types similar to those Table 702 - 3 of 4)					

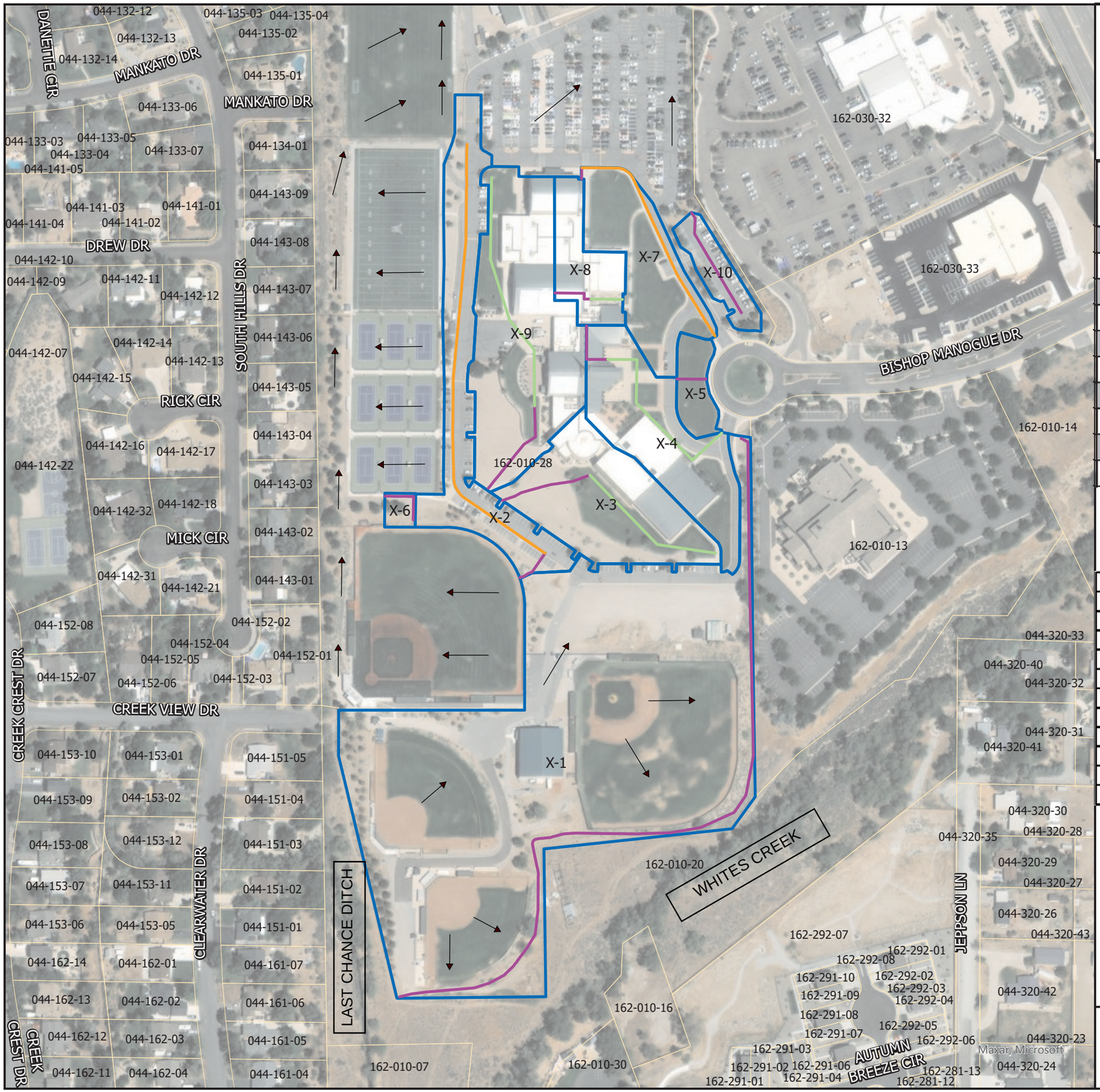
[1]Average runoff condition, and $I_a = 0.2S$

[2]The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CNs for other combinations of conditions may be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986).

[3]CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space cover type.

[4]Composite CNs for natural desert landscaping should be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986) based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.

[5]Composite CNs to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 in TR-55 (SCS, 1986) based on the degree of development (impervious area percentage) and the CNs for the newly graded pervious areas.



Existing Hydrologic Basins
BMCHS Expansion
Reno NV
February 2024

Basin
FlowType
Gutter
Sheet
Channel

Basin Name	Area (ac.)	C_{5yr}	C_{100yr}	I_{5yr}	I_{100yr}	Q_{5yr}	Q_{100yr}
X-1	11.62	0.20	0.46	1.02	2.55	2.3	13.5
X-2	2.01	0.51	0.69	1.29	3.22	1.3	4.5
X-3	1.87	0.35	0.55	1.24	3.10	0.8	3.2
X-4	1.69	0.64	0.74	1.32	3.30	1.4	4.1
X-5	0.35	0.05	0.30	1.64	4.08	0.0	0.4
X-6	0.11	0.23	0.52	1.50	3.74	0.0	0.2
X-7	1.37	0.32	0.51	1.64	4.09	0.7	2.9
X-8	0.69	0.85	0.87	1.81	4.52	1.1	2.7
X-9	2.77	0.54	0.68	1.19	2.97	1.8	5.6
X-10	0.40	0.76	0.86	1.60	4.00	0.5	1.4

BASIN SURFACE TYPE RATIOS	
BASIN NAME	
X-1:	46% RANGE, 34% OPEN SPACE, 14% GRAVEL, 3% PAVEMENT, 3% ROOF
X-2:	55% RANGE, 45% PAVEMENT
X-3:	40% RANGE, 30% ROOF, 30% OPEN SPACE
X-4:	38% ROOF, 35% PAVEMENT, 27% OPEN SPACE
X-5:	100% OPEN SPACE
X-6:	95% RANGE, 5% PAVEMENT
X-7:	67% OPEN SPACE, 33% PAVEMENT
X-8:	93% ROOF, 7% PAVEMENT
X-9:	34% ROOF, 24% RANGE, 22% PAVEMENT, 20% OPEN SPACE
X-10:	83% PAVEMENT, 17% RANGE

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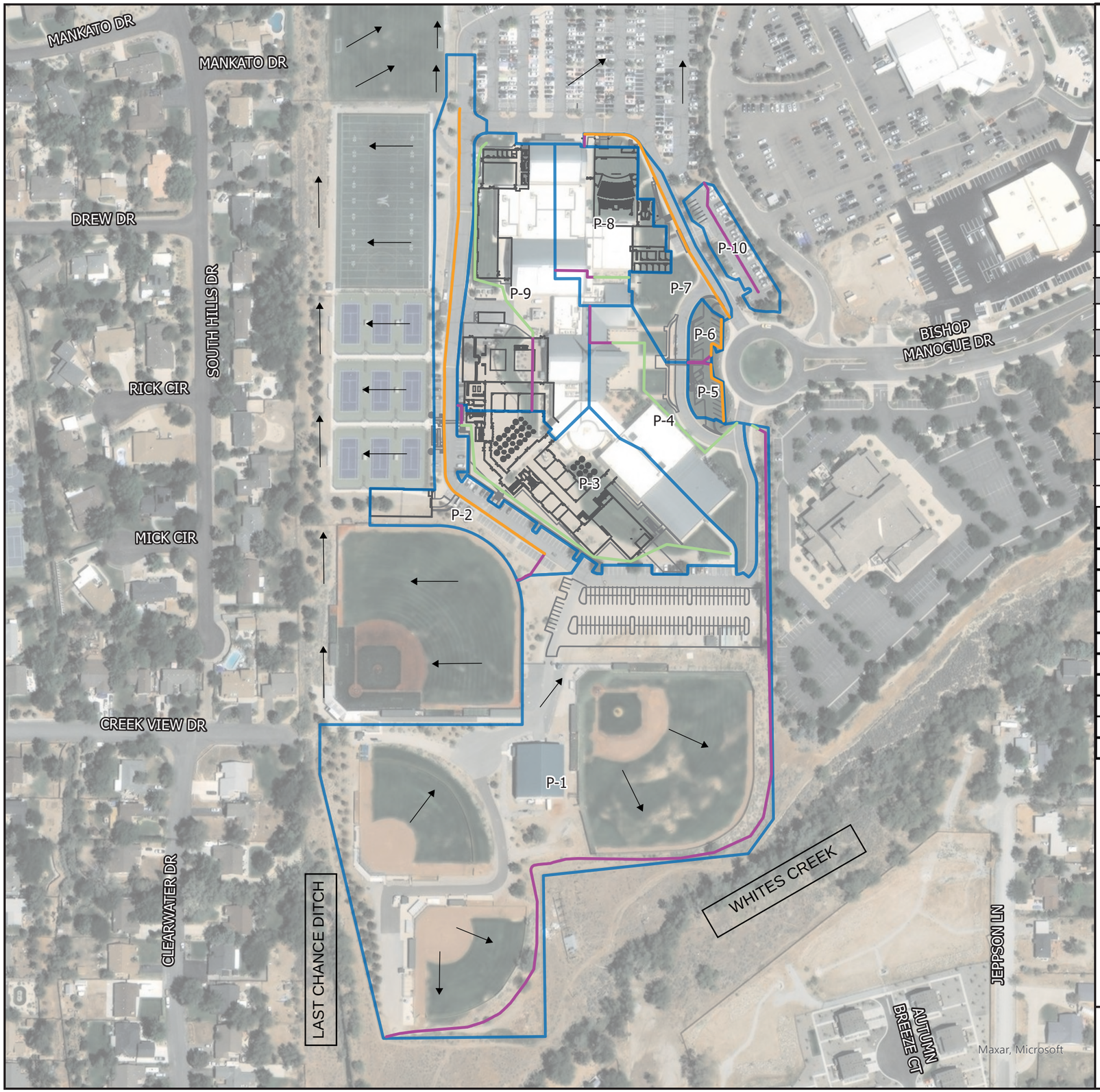
0 100 200
Feet

NORTH



Proposed Hydrologic Basins
BMCHS Expansion
Reno NV
February 2024

Basin
FlowType
Gutter
Sheet
Channel

Basin Name	Area (ac.)	C_{5yr}	C_{100yr}	I_{5yr}	I_{100yr}	Q_{5yr}	Q_{100yr}
P-1	11.60	0.25	0.49	1.02	2.54	3.0	14.6
P-2	1.99	0.56	0.72	1.31	3.26	1.4	4.7
P-3	2.30	0.74	0.82	1.40	3.49	2.4	6.6
P-4	1.70	0.64	0.74	1.32	3.30	1.5	4.2
P-5	0.15	0.66	0.76	1.81	4.52	0.2	0.5
P-6	0.14	0.62	0.73	1.81	4.52	0.2	0.5
P-7	0.82	0.43	0.59	1.69	4.21	0.6	2.0
P-8	1.22	0.85	0.87	1.81	4.52	1.9	4.8
P-9	2.50	0.81	0.85	1.22	3.06	2.5	6.5
P-10	0.40	0.76	0.86	1.60	4.00	0.5	1.4

BASIN SURFACE TYPE RATIOS	
BASIN NAME	
P-1:	46% RANGE, 34% OPEN SPACE, 12% PAVEMENT, 5% GRAVEL, 3% ROOF
P-2:	47% RANGE, 45% PAVEMENT, 8% ROOF
P-3:	53% ROOF,29% PAVEMENT, 18% RANGE
P-4:	38% ROOF, 25% PAVEMENT, 27% OPEN SPACE
P-5:	73% PAVEMENT, 27% OPEN SPACE
P-6:	69% PAVEMENT, 31% OPEN SPACE
P-7:	54% OPEN SPACE, 46% PAVEMENT
P-8:	95% ROOF, 5% PAVEMENT
P-9:	77% ROOF, 17% PAVEMENT, 6% OPEN SPACE
P-10	83% PAVEMENT, 17% RANGE

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0 100 200
FEET

NORTH

Project: BMCHS Expansion
Project Location: Reno NV

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

Time of Concentration Table, Existing 5-year storm event

Drainage Basin	Drainage Area (AC)	Weighted Average C-Factor 5-Year	Overland			Channelized Flow				Gutter Flow				Total (Ti+Tt)	Urbanized Basins Check	Final	NOAA ATLAS 14 Rainfall Intensity	Rational Flow
			Li (ft)	S (ft/ft)	Ti (min)	Ls (ft)	S (ft/ft)	V (ft/s)	Tt1 (min)	Lt (ft)	S (ft/ft)	V (ft/s)	Tt2 (min)	Tc (min)	Tc*(min)	Tc (min)	(in/hour)	Q5-year (cfs)
X-1	11.62	0.20	1779.3	0.028	49.0									49.0	19.9	19.9	1.02	2.3
X-10	0.40	0.76	241.0	0.021	7.4									7.4	11.3	7.4	1.60	0.5
X-2	2.01	0.51	77.2	0.113	4.2					962.5	0.011	2.1	7.7	11.9	15.8	11.9	1.29	1.3
X-3	1.87	0.35	193.3	0.048	11.2	329.3	0.005	1.2	4.7					15.8	12.9	12.9	1.24	0.8
X-4	1.69	0.64	115.5	0.010	8.8	407.3	0.032	2.9	2.3					11.2	12.9	11.2	1.32	1.4
X-5	0.35	0.05	61.2	0.095	7.0									7.0	10.3	7.0	1.64	0.0
X-6	0.11	0.23	110.5	0.070	8.6									8.6	10.6	8.6	1.50	0.0
X-7	1.37	0.32	23.6	0.051	4.0					492.9	0.018	2.7	3.0	7.0	12.9	7.0	1.64	0.7
X-8	0.69	0.85	88.5	0.010	4.2	66.6	0.010	1.6	0.7					4.9	10.9	5.0	1.81	1.1
X-9	2.77	0.54	214.0	0.035	9.7	507.6	0.007	1.4	6.3					16.0	14.0	14.0	1.19	1.8

Prepared: 2/7/2024

Project: BMCHS Expansion
Project Location: Reno NV

Time of Concentration Table, Existing 100-year storm event

Drainage Basin	Drainage Area (AC)	Weighted Average C-Factor 100-Year	Overland			Channelized Flow				Gutter Flow				Total (Ti+Tt)	Urbanized Basins Check	Final	NOAA ATLAS 14 Rainfall Intensity	Rational Flow
			Li (ft)	S (ft/ft)	Ti (min)	Ls (ft)	S (ft/ft)	V (ft/s)	Tt1 (min)	Lt (ft)	S (ft/ft)	V (ft/s)	Tt2 (min)	Tc (min)	Tc*(min)	Tc (min)	(in/hour)	Q100-year (cfs)
X-1	11.62	0.46	1779.3	0.028	49.0									49.0	19.9	19.9	2.55	13.5
X-10	0.40	0.86	241.0	0.021	7.4									7.4	11.3	7.4	4.00	1.4
X-2	2.01	0.69	77.2	0.113	4.2					962.5	0.011	2.1	7.7	11.9	15.8	11.9	3.22	4.5
X-3	1.87	0.55	193.3	0.048	11.2	329.3	0.005	1.2	4.7					15.8	12.9	12.9	3.10	3.2
X-4	1.69	0.74	115.5	0.010	8.8	407.3	0.032	2.9	2.3					11.2	12.9	11.2	3.30	4.1
X-5	0.35	0.30	61.2	0.095	7.0									7.0	10.3	7.0	4.08	0.4
X-6	0.11	0.52	110.5	0.070	8.6									8.6	10.6	8.6	3.74	0.2
X-7	1.37	0.51	23.6	0.051	4.0					492.9	0.018	2.7	3.0	7.0	12.9	7.0	4.09	2.9
X-8	0.69	0.87	88.5	0.010	4.2	66.6	0.010	1.6	0.7					4.9	10.9	5.0	4.52	2.7
X-9	2.77	0.68	214.0	0.035	9.7	507.6	0.007	1.4	6.3					16.0	14.0	14.0	2.97	5.6

Prepared: 2/7/2024

Project: BMCHS Expansion
Project Location: Reno NV

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BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

Time of Concentration Table, Proposed 5-year storm event

Drainage Basin	Drainage Area (AC)	Weighted Average C-Factor 5-Year	Overland			Channelized Flow				Gutter Flow				Total (Ti+Tt)	Urbanized Basins Check	Final	NOAA ATLAS 14 Rainfall Intensity	Rational Flow
			Li (ft)	S (ft/ft)	Ti (min)	Ls (ft)	S (ft/ft)	V (ft/s)	Tt1 (min)	Lt (ft)	S (ft/ft)	V (ft/s)	Tt2 (min)	Tc (min)	Tc*(min)	Tc (min)	(in/hour)	Q5-year (cfs)
P-1	11.60	0.25	1779.3	0.028	45.9	12.7	0.107	5.3	0.0					46.0	20.0	20.0	1.02	3.0
P-10	0.40	0.76	241.0	0.021	7.4									7.4	11.3	7.4	1.60	0.5
P-2	1.99	0.56	77.2	0.113	3.9					962.5	0.011	2.1	7.7	11.5	15.8	11.5	1.31	1.4
P-3	2.30	0.74	46.0	0.051	2.6	666.2	0.009	1.5	7.2					9.8	14.0	9.8	1.40	2.4
P-4	1.70	0.64	115.5	0.010	8.8	407.3	0.032	2.9	2.3					11.2	12.9	11.2	1.32	1.5
P-5	0.15	0.66	44.7	0.057	3.0					121.3	0.006	1.5	1.3	4.4	10.9	5.0	1.81	0.2
P-6	0.14	0.62	49.1	0.059	3.3					98.1	0.023	3.1	0.5	3.9	10.8	5.0	1.81	0.2
P-7	0.82	0.43	23.6	0.051	3.4					492.9	0.018	2.7	3.0	6.4	12.9	6.4	1.69	0.6
P-8	1.22	0.85	88.5	0.010	4.2	66.6	0.010	1.6	0.7					4.9	10.9	5.0	1.81	1.9
P-9	2.50	0.81	144.2	0.010	6.3	440.6	0.003	0.9	8.3					14.6	13.2	13.2	1.22	2.5

Prepared: 2/7/2024

Project: BMCHS Expansion
Project Location: Reno NV

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

Time of Concentration Table, Proposed 100-year storm event

Drainage Basin	Drainage Area (AC)	Weighted Average C-Factor 100-Year	Overland			Channelized Flow				Gutter Flow				Total (Ti+Tt)	Urbanized Basins Check	Final	NOAA ATLAS 14 Rainfall Intensity	Rational Flow
			Li (ft)	S (ft/ft)	Ti (min)	Ls (ft)	S (ft/ft)	V (ft/s)	Tt1 (min)	Lt (ft)	S (ft/ft)	V (ft/s)	Tt2 (min)	Tc (min)	Tc*(min)	Tc (min)	(in/hour)	Q100-year (cfs)
P-1	11.60	0.49	1779.3	0.028	45.9	12.7	0.107	5.3	0.0					46.0	20.0	20.0	2.54	14.6
P-10	0.40	0.86	241.0	0.021	7.4									7.4	11.3	7.4	4.00	1.4
P-2	1.99	0.72	77.2	0.113	3.9					962.5	0.011	2.1	7.7	11.5	15.8	11.5	3.26	4.7
P-3	2.30	0.82	46.0	0.051	2.6	666.2	0.009	1.5	7.2					9.8	14.0	9.8	3.49	6.6
P-4	1.70	0.74	115.5	0.010	8.8	407.3	0.032	2.9	2.3					11.2	12.9	11.2	3.30	4.2
P-5	0.15	0.76	44.7	0.057	3.0					121.3	0.006	1.5	1.3	4.4	10.9	5.0	4.52	0.5
P-6	0.14	0.73	49.1	0.059	3.3					98.1	0.023	3.1	0.5	3.9	10.8	5.0	4.52	0.5
P-7	0.82	0.59	23.6	0.051	3.4					492.9	0.018	2.7	3.0	6.4	12.9	6.4	4.21	2.0
P-8	1.22	0.87	88.5	0.010	4.2	66.6	0.010	1.6	0.7					4.9	10.9	5.0	4.52	4.8
P-9	2.50	0.85	144.2	0.010	6.3	440.6	0.003	0.9	8.3					14.6	13.2	13.2	3.06	6.5

Prepared: 2/7/2024

APPENDIX C

Worksheet for Pressurized North 12"

Project Description	
Friction Method	Manning Formula
Solve For	Pressure at 1

Input Data	
Pressure 2	0.00 psi
Elevation 1	4,552.50 ft
Elevation 2	4,552.38 ft
Length	44.0 ft
Roughness Coefficient	0.013
Diameter	12.0 in
Discharge	6.50 cfs

Results	
Pressure 1	0.58 psi
Headloss	1.46 ft
Energy Grade 1	4,554.91 ft
Energy Grade 2	4,553.44 ft
Hydraulic Grade 1	4,553.84 ft
Hydraulic Grade 2	4,552.38 ft
Flow Area	0.8 ft²
Wetted Perimeter	3.1 ft
Velocity	8.28 ft/s
Velocity Head	1.06 ft
Friction Slope	3.329 %

Worksheet for Pressurized South 12"

Project Description	
Friction Method	Manning Formula
Solve For	Pressure at 1

Input Data	
Pressure 2	0.00 psi
Elevation 1	4,555.03 ft
Elevation 2	4,554.18 ft
Length	120.0 ft
Roughness Coefficient	0.013
Diameter	12.0 in
Discharge	6.60 cfs

Results	
Pressure 1	1.42 psi
Headloss	4.12 ft
Energy Grade 1	4,559.40 ft
Energy Grade 2	4,555.28 ft
Hydraulic Grade 1	4,558.30 ft
Hydraulic Grade 2	4,554.18 ft
Flow Area	0.8 ft^2
Wetted Perimeter	3.1 ft
Velocity	8.40 ft/s
Velocity Head	1.10 ft
Friction Slope	3.432 %

APPENDIX D

BISHOP MANOGUE BUSINESS PARK
FLOOD CONTROL MASTER PLAN

Washoe County, Nevada

Nimbus Job No. 9905
April 1999

Nimbus Engineers
3785 Baker Ln., Suite 201 • Reno, NV 89509
Mail: P.O. Box 10220 • Reno, NV 89510
(702) 689-8630 • Fax (702) 689-8614

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APPENDIX B (1996 HEC-1 Existing Conditions)

APPENDIX C (1996 HEC-2 Existing Conditions)

Bishop Manogue Business Park
Flood Control Master Plan
Washoe County, Nevada

The Bishop Manogue Business Park Flood Control Master Plan was developed in order to provide a framework and guidance for future development of the Bishop Manogue property. This property is located west of US 395 and approximately two miles north of the US 395/Mount Rose highway intersection.

This Flood Control Master Plan is intended to:

1. Quantify flow of Whites Creek drainage which originates off-site, with branch 1A flowing through the proposed development site.
2. Provide conceptual design of a storm water detention basin located between the two main roads entering into the property off of US 395, and
3. Include hydrologic and hydraulic analyses which will be performed in accordance with currently accepted engineering practices.

The Flood Control Master Plan was prepared by Nimbus Engineers at the request of Jeff Codega Planning/Design, Inc. The plan has been developed to meet all of the requirements of Washoe County for the overall project development. The on-site hydrology for the property has been done in keeping with the master planning effort; however, this should not be construed to mean that individual hydrologic and hydraulic analyses are not needed for development of individual properties and phases of the overall program.

1.0 INTRODUCTION

The Bishop Manogue Business Park property lies adjacent to US 395 (South Virginia Street) along its west side, and north of the Zolezzi Lane intersection with US 395. The Business Park parcel is comprised of approximately 86 acres (Figure 1).

This Flood Control Master Plan has been prepared to address the issues of incorporating the Bishop Manogue Business Park on-site detention facilities into the overall development plan for the property. This plan was developed to ensure that under developed conditions the amount of surface water leaving the site will not exceed the amount of flow which occurs under existing conditions. Under existing conditions, the amount of flow leaving the property at its northeast corner was calculated to be 87 cubic feet per second (cfs) by Nimbus Engineers. This amount was determined using a HEC-1 hydrologic model for the previously approved Eccles Subdivision originally proposed for this property in 1996. The HEC-1 model is included in Appendix B. The purpose of the Master Plan is to provide a workable approach to storm water and flood control for the proposed property development.

Plates 1 and 2, contained within the report, show the existing and the proposed development conditions addressing the surface water flow from Whites Creek Branch 1A.

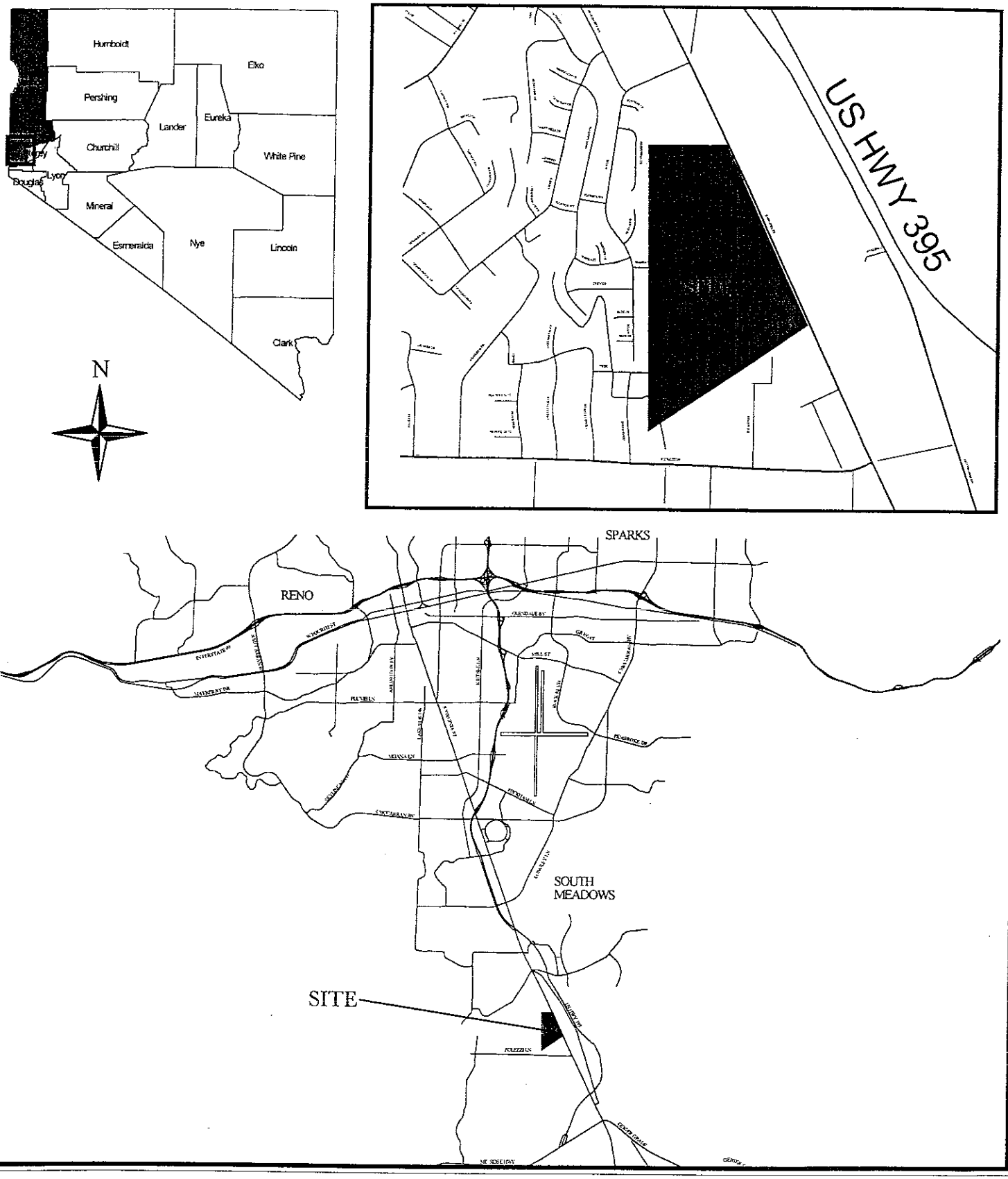

FIGURE 1
Vicinity Map

Nimbus Engineers
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Nimbus Job #9905

Date: April 1999

2.0 PHYSICAL DESCRIPTION OF THE STUDY AREA

The approximate 86 acre Bishop Manogue Business Park lies within the Whites Creek Drainage Basin. Figure 1 shows its location within respect to the rest of the valley and its proximity to the City of Reno. The entire parcel is located within Section 17, Township 18 North, Range 20 East.

The majority of the property is covered with native grasses, with some small trees alongside of Whites Creek Branch 1A. Branch 1A is the main surface water feature found within the boundaries of the Bishop Manogue Business Park. This branch enters the property at the southwest corner and flows in a northeasterly direction until coming into contact with US 395. At US 395, there is a 2 x 7-foot box culvert and a 24-inch diameter circular culvert which convey the water underneath the highway. These two culverts are capable of handling approximately 100 cfs during a 100-year, 24-hour storm event. The remaining water flows either northward or southward in drainage ditches that parallel the highway. This water eventually crosses underneath US 395 via other culverts and flows eastward until it enters Steamboat Creek.

3.0 MASTER PLAN CONCEPT

The following Master Plan Concept, which shows developed conditions, is a follow-on to the existing conditions report for Eccles Ranch Subdivision which was prepared and submitted by Nimbus Engineers to Washoe County in November 1996. This Master Plan will provide information regarding new development plans for the Bishop Manogue Business Park since the 1996 existing conditions report.

During the 100-year, 24-hour storm event, the existing conditions hydrologic model calculates a surface water flow entering the property at its southwest corner of 200 cfs and 87 cfs leaving the property at the northeast corner. The remaining portion of the flow will either go underneath US 395 via a 2 x 7 foot box culvert and a 24-inch culvert, or flow northward or southward through drainage ditches which parallel the highway. The amount of water that goes under the highway via the two culverts was calculated to be 100 cfs. The amount that flows southward in the drainage ditch was calculated to be approximately 40-50 cfs, and the amount that flows northward was calculated to be 46 cfs.

Under proposed conditions, at the end of total property build-out, the HEC-1 model calculated the exit flow from a 100-year, 24-hour storm event to be 82 cfs. This is the amount of water which will exit the property in the northeast corner.

4.0 MASTER PLAN APPLICATION

As noted earlier and throughout the document, *this Master Plan is a plan and concept document.* The technical analyses which were performed for the document were done in sufficient detail to develop the peak flows. The on-site hydrology for Bishop Manogue has been done in keeping with the master planning effort. The technical analyses which support this Flood Control Master Plan are based upon methodologies which are currently acceptable to Washoe County.

The major components of this Flood Control Master Plan have been sufficiently evaluated for the purposes of preliminary design and conceptual designs. It is not envisioned that any of the "regional" features of this project will be significantly modified. However, the structures which were used in the analysis are only one approach to the actual design which may be used in the ultimate configuration. It will be the responsibility of the design engineer to utilize current standards of practice and to perform final analysis on any proposed improvements, prior to submitting plans or specifications for any of the improvements.

5.0 PREVIOUS STUDIES

In 1994 Cella Barr Associates prepared a report for Washoe County entitled Preliminary Whites Creek Basin Management Study. This report is used by Washoe County as a basis for drainage design within the Whites Creek drainage basin.

In October 1995, Nimbus Engineers completed a HEC-1 hydrologic model for the Wedge Meadows sub-division which is located south of Zolezzi Lane and west of US 395. Where Branch 1A enters the Bishop Manogue property in the southwest corner, the HEC-1 model calculated a flow of 200 cfs from the 100-year, 24-hour storm event.

In November 1996, Nimbus Engineers completed an existing conditions HEC-1 hydrologic and HEC-2 hydraulic model for the Eccle's Ranch Subdivision. This property is the same as the Bishop Manogue Business Park property. The surface water model which was developed for Branch 1A (200 cfs) indicated that 154 cfs exits the property either at the Branch 1A/US 395 culvert, or as flow which flows either southward or northward in drainage ditches which parallel the highway. At the exit point in the northeast corner of the property, where water which flows northward from Branch 1A and the surface water runoff from the property commingle, the model calculates that 87 cfs will flow northward at this point.

6.0 HYDROLOGIC ANALYSES

The hydrologic analyses which were performed for this project were developed using the U.S. Army Corps of Engineer's Flood Hydrograph HEC-1 program 4.0. The base model which was used for the hydrologic analysis for this report was the Nimbus HEC-1 model which was developed in support of the Eccles Ranch Sub-Division Report (reference 3).

6.1 Methodology

The HEC-1 model, version 4.0 was utilized to estimate the peak flow of a 100-year, 24-hour storm event for developed conditions. The following hydrologic parameters were used within the HEC-1 model for the Whites Creek Hydrographic Basin.

Rainfall Depth and Distribution

The rainfall depths used in the HEC-1 model were obtained from the National Weather Service's Southwest Semi-arid Precipitation Frequency Study Group (SSPFS, 1997). This precipitation data was incorporated into the Department of Water Resources, Washoe County Precipitation Frequency map for the 24-hour, 100-year storm event. The actual data used in the model was developed from the base model and was not modified for this model and report.

Drainage Basin Delineation

All of the basins used within the model are the same as those used for the existing conditions Nimbus model with exceptions to reflect Bishop Manogue development drainage patterns. The drainage basins within and adjacent to the Bishop Manogue property are shown on Plate 1 for existing conditions and on Plate 2 for proposed conditions.

Runoff Curve Number

To calculate the curve number, the types of soil contained within each of the sub-basins were identified by soil hydrologic groups. Soils in the U.S. have been classified by the U.S. Soil Conservation Service (SCS) into four hydrologic soil groups: A, B, C, and D. Group A soils have a rapid infiltration rate and include very porous soils such as sandy soils. Group D soils have a very slow infiltration rate which results in a larger percentage of the rainfall expressed as runoff. Water infiltration rates decrease from soil groups A through D. The soil groups were obtained from the Soil Survey of Washoe County, South Part, Nevada.

Relative soil moisture content is described in the SCS methodology by a term identified as "antecedent moisture condition" (AMC). Three different relative conditions are described by the SCS: 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 and AMC II is an average condition. AMC II is the condition that is used for hydrologic analyses in the western states and was used in the present analysis.

Basin Lag Time

Basin lag time, is the time between the center of mass of rainfall excess and the peak of the unit

hydrograph. Methodologies outlined in the Washoe County's Hydrologic Criteria and Drainage Design Manual (reference 5) were used to calculate basin lag time for the new sub-basins added as part of the development phase.

Hydrograph Routing

Channel routing and overland flow routing were performed mostly with the Muskingum method in the original base model. In the constructed channels that were modeled as part of the developed phase, the Muskingum-Cunge Routing method was used. The routing parameters for the reaches modeled included channel and overbank characteristics, lengths, slopes, and typical roughness. The Modified Puls Routing Method was used to route the hydrograph through the proposed detention basins.

Table 1 highlights the existing and the proposed sub-basin parameters with regard to surface-water flow, which include basin area, curve number, and lag time. Total flow at the northeast property corner is 87 cfs under existing conditions, and 82 cfs under proposed conditions.

Table 1 HEC-1 Sub-basin Modeling Parameters for Existing and Proposed Conditions

Sub-basin (No.)		Basin Area (sq. mi)		Curve Number		Lag Time (hours)	
Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
EC-1		0.148		80		0.58	
	EC-1A		0.0191		79		0.20
	EC-1B		0.0128		94		0.12
	EC-1C		0.0232		94		0.09
	EC-1D		0.023		94		0.14
	EC-1E		0.0172		92		0.05
	EC-1H		0.0112		74		0.14
	EC-1G		0.0235		80		0.18
EC-2	EC-2	0.149	0.104	73	77	0.16	0.22

7.0 HYDRAULIC ANALYSES

Under developed conditions, the 100-year, 24-hour storm event peak flow will overflow the banks of Whites Creek Branch 1A and travel across the proposed Bishop Manogue Business Park property in a northeasterly direction. At the intersection of the creek branch with US 395, approximately 100 cfs will flow eastward underneath the highway via two culverts. One of the culverts is 24 inches in diameter, while the second is a 2 x 7-foot box culvert. Not all of the water will flow eastward through these two culverts. Some water will flow southward via a drainage ditch and go underneath the highway near the US 395/Zolezzi lane intersection. The remaining portion (46 cfs) will flow northward via a drainage ditch, until coming into contact with Cara Blanca Drive. At this street, the water will flow through two 24-inch culverts capable of handling 60 cfs. The capacity of the culverts allows all of the water to flow through the culverts and not overtop Cara Blanca Drive. After flowing past Cara Blanca, the water will flow into the 50 foot wide by 840 foot long detention basin. This detention basin will be constructed to a depth of approximately 3 feet, contain 3 to 1 side slopes and have a storage capacity of approximately 3 acre-feet. As the water is flowing northward out of the detention basin, the water will flow through two elliptical 30 x 19-inch culverts at Sierra Nevada Drive. At peak flow, the water will overtop Sierra Nevada drive and flow through a designed dip section in the road. The depth of the water flowing through the dip section will be approximately 0.6 feet. The surface water will then flow through a channel that is 285 feet long and has a bottom width of 12-feet. This channel will be constructed approximately 2 feet deep with 3 to 1 side slopes. This channel will convey all of the surface water and will exit the property in the northeast corner.

Commingling with the surface water flow from Branch 1A will be the surface runoff which is generated from development of the seven on-site sub-basins. Total flow leaving the site was calculated to be 82 cfs under developed conditions.

A HEC-2 model was developed by Nimbus to better define the existing conditions for the Whites Creek Branch 1A channel flow. A print-out of the HEC-2 existing conditions model is included in Appendix D.

Flow diversion and detention facilities will be utilized to safely convey the 100-year, 24-hour storm event peak flow through the proposed Bishop Manogue Business Park development and limit the amount of water leaving the property via the northeast corner to not greater than the existing conditions flow of 87 cfs, flow diversions and detention facilities will be utilized. The three detention facilities which will be constructed on-site, are described as follows.

Within the northwest property corner, the football practice field with a capacity of 9.73 acre-feet will serve as a detention facility for the surface flow which originates from on-site sub-basin EC-1A, and sub-basins EC-3, EC-4, EC-5, and EC-6 which originate off-site to the west. By holding the surface runoff within the practice field detention basin and allowing it to slowly drain through an 18-inch culvert, the water arrives at the northeast corner exit point after the peak flow and does not add or contribute to the peak flow amount of 82 cfs.

A second detention facility (South Virginia Detention Basin) was constructed between two streets (Sierra Nevada and Cara Blanca). These two streets serve as entrance points to the property from the east, off US 395. The detention facility was developed by widening the proposed drainage ditch from 12 feet to 50 feet over its entire length of 840 feet. This increased the storage capacity to approximately 3 acre-feet. The actual capacity is dependent upon depth of water prior to flowing northward through the culverts and overtopping Sierra Nevada Drive. By installing the detention basin along this reach, the surface water is held for a longer period of time, which allows for a lower peak flow at the exit point.

The third on-site detention facility is located in the northeast corner of the US Post Office parcel. This site is the second parcel west of US 395 and is located along the northern property boundary. All surface water runoff which is generated on-site is conveyed to the 0.214 acre-feet detention facility. For modeling purposes, no water from this parcel was considered to be conveyed off-site.

Surface water from EC-7 will be collected and conveyed down-gradient along the northern property boundary in a storm drain. Surface water from the practice field detention basin outlet, and water from EC-1H are both added, to the storm drain further down-gradient. All of this water will be conveyed via an 18-inch storm drain to the northeast corner were it will daylight into the open channel at the exit point. It is anticipated that an energy dissipater will be required at the storm drain exit point.

8.0 CONCLUSIONS

Given the current data available, its interpretation, and the results of the HEC-1 modeling runs, the following conclusions have been arrived at for development of the Flood Control Master Plan at the proposed Bishop Manogue Business Park.

- For existing conditions, the HEC-1 model calculated the surface water flow exiting the property in the northeast corner to be 87 cfs. This flow amount was submitted to Washoe County and approved as the accepted amount.

- For developed conditions, the HEC-1 model calculated the surface runoff water which exited the property in the northeast corner to be 82 cfs.

- Under developed conditions, sub-basin EC-1 was divided into 7 smaller sub-basins which were categorized by grading plans, parking lots, building structures, and open areas.

- The amount of surface water runoff from sub-basin EC-2 was also evaluated. This evaluation of EC-2 was completed because some of the Bishop Manogue Business Park development is proposed to take place in this sub-basin, in addition to EC-1. Under proposed conditions for the development, the amount of runoff for EC-2 was calculated to be 49 cfs. Under existing conditions the flow for EC-2 was calculated to be 66 cfs. The flow reduction occurred because the basin area was reduced from 0.149 square miles to 0.099 square miles. This reduction in size of EC-2 occurred because the grading and development of EC-1 caused some of the surface water to drain towards EC-1 instead of EC-2.

- Three on-site detention facilities will be required to enable the developed conditions runoff peak flow not to exceed the existing conditions limit of 87 cfs.

9.0 REFERENCES

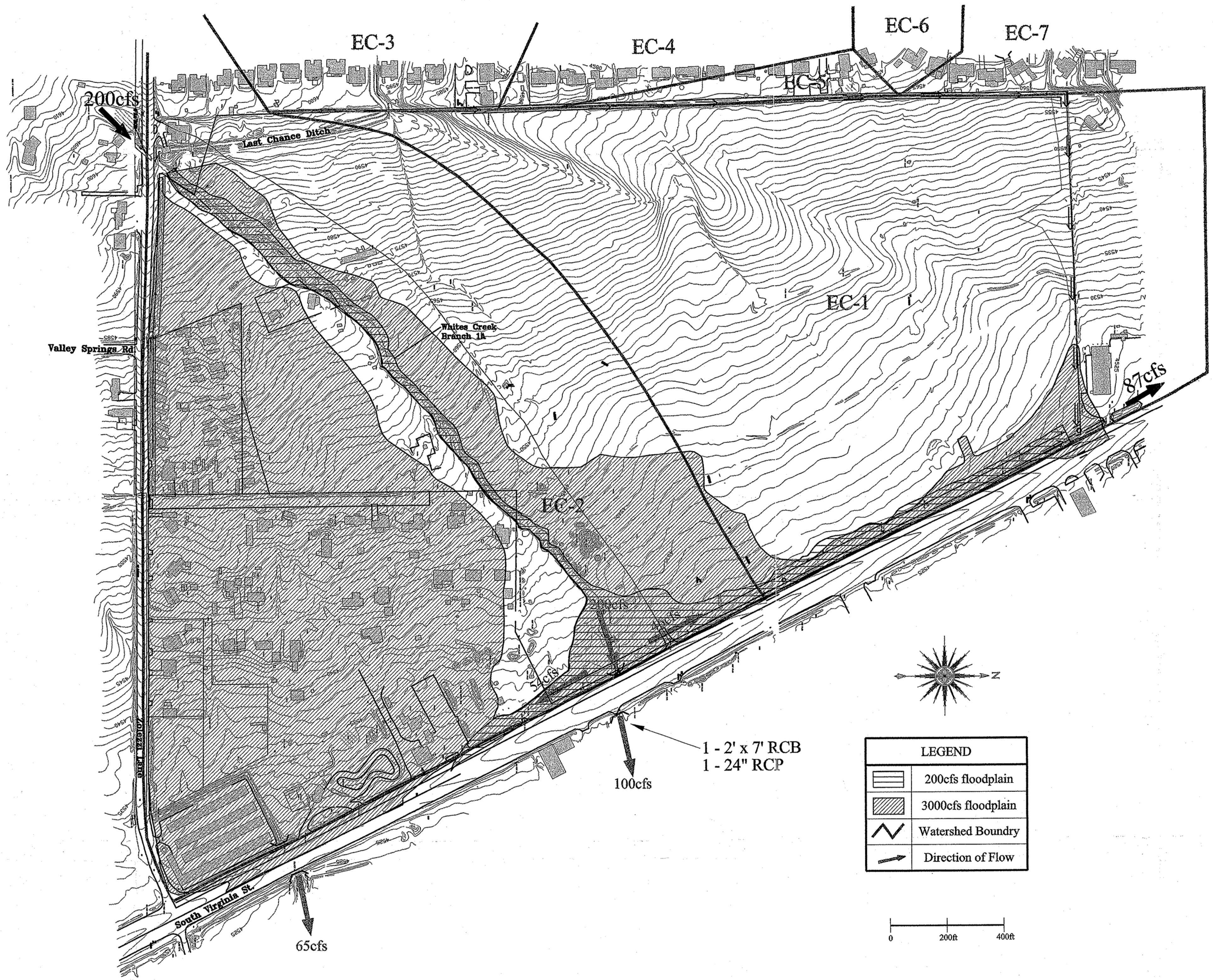
1. Cell Barr Associates, Preliminary Whites Creek Basin Management Study, April 4, 1994.

2. Nimbus Engineers, Hydrologic and Hydraulic Analysis for Wedge Meadows Subdivision, October 1995.

3. Nimbus Engineers, Hydrologic and Hydraulic Analysis and Master Drainage Plan for Eccle's Ranch Subdivision, November 1996.

4. Jeff Codega Planning\Design, Hydraulic Report for Bishop Manogue Business Park, Road A and Road B, September 1998

5. Washoe County, Hydrologic Criteria and Drainage Design Manual, December 1996



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Revisions:

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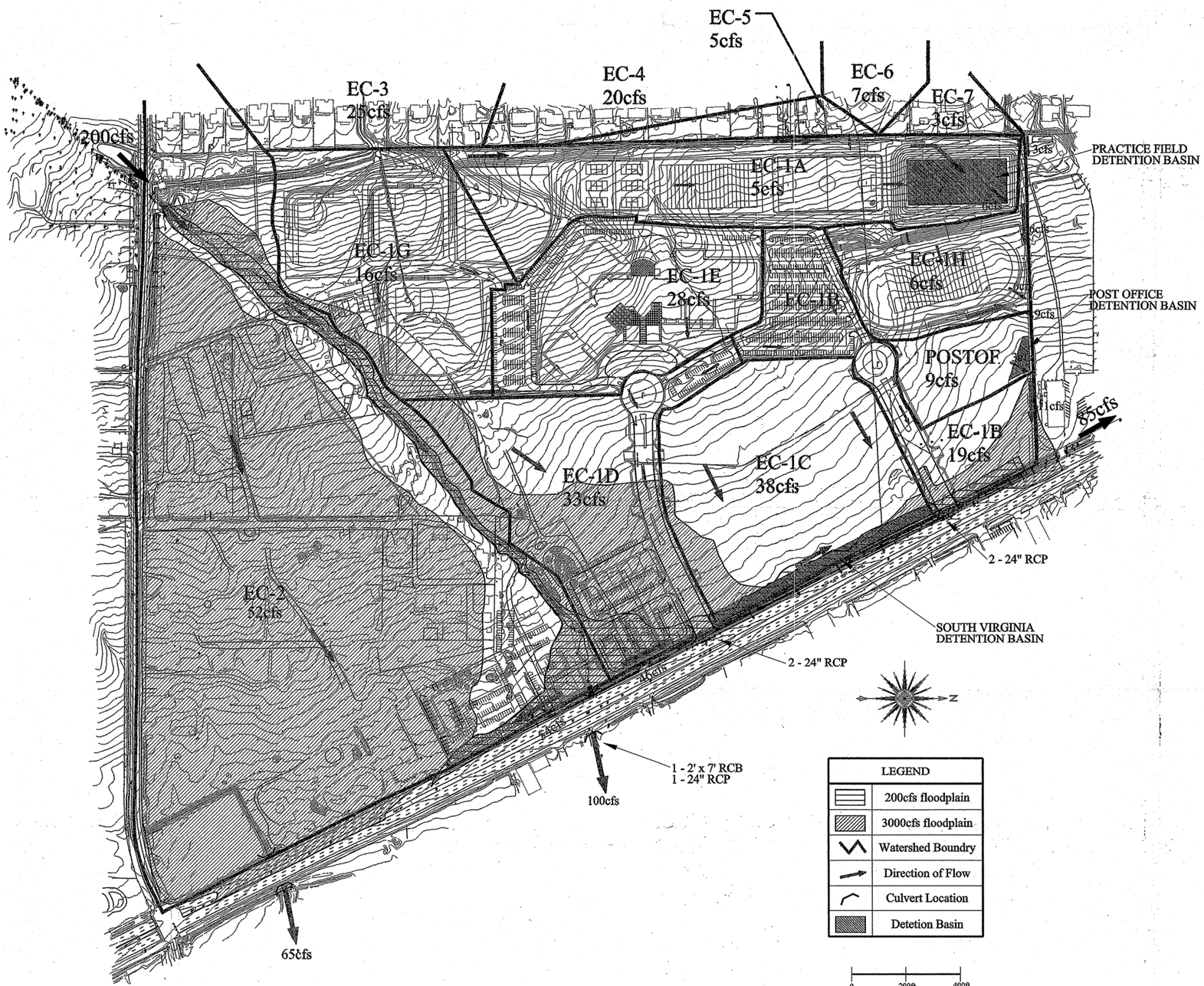
Drawn By:	KK
Designed By:	RJ

PLATE 1
EXISTING CONDITIONS
Bishop Manogue Business Park

Washoe County *Nevada* *Reno*

Sheet 1 of 1
Nimbus Job #
9905
Date: May 1999



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Drawn By:	KK
Designed By:	RJ

PLATE 2
PROPOSED CONDITIONS
Bishop Manogue Business Park
Washoe County
Nevada
Reno

WOOD RODGERS

December 13, 2023
Project No. 4412001

Mr. Jeff Klippenstein
H+K Architects
5485 Reno Corporate Drive, Suite 100
Reno, NV 89511

Re: Geotechnical Review Letter
Bishop Manogue Catholic High School Expansion
APN 162-010-28 – 110 Bishop Manogue Drive
Reno, Washoe County, Nevada

Ref: International Building Code (IBC) 2018

Dear Mr. Klippenstein:
Wood Rodgers is pleased to present our geotechnical letter for the special use permit process specific to proposed additions to Bishop Manogue Catholic High School (BMCHS). The purpose of this review is to develop a summary of geotechnical considerations that could influence design for the planned improvements to the property.

PROJECT DESCRIPTION
The campus is located within the south suburban area of Washoe County. The project consists of extending the central portion of the two-story school to the west to increase the size of the cafeteria, and extending the theater, digital art, music, gymnasium and weight rooms, while adding additional classrooms (FIGURE A). Total improvement area approaches 140,000 square feet.

CODE CONSIDERATIONS
Based on a construction window of 2003 to 2004, BMCHS would have been originally designed under the 1997 Uniform Building Code. Contemporary code, as adopted by Washoe County, is the 2018 International Building Code (IBC). The most significant change between codes is specific to seismic design. Attached with this report is the ASCE 7 seismic hazard report based on Site Class D and Risk Category III, which presents a PGA_M of 0.918 g for the project.

It has been assumed the property has been vetted for fault structures regarding potential activity, recency of movement, and potential for surface rupture. The original geotechnical report should be reviewed (if available), or seismic surveys performed during the performance of a design level report, to vet seismic risk with regard to liquefaction potential.

SITE CONDITIONS

The BMCHS campus encompasses an area of approximately 48 acres with a central latitude and longitude of 39.4238°N and -119.7647°E, respectively. Site access from the east off South Virginia Street onto Bishop Manogue Drive. The property is bordered by residential developments to the west and the south, and commercial developments to the north and east. The project area is comprised of one parcel, Washoe County APN 162-010-28.

From the southwest portion of project area, the site slopes downward to the northeast at approximately 2-percent. The school is situated at approximately the center of the parcel, and is surrounded by baseball fields, tennis courts and football and soccer fields to the south, west and north. The bulk of the addition area is occupied by landscaping and/or rough graded zones capped with aggregate.

GEOLOGIC AND SOIL AND GROUNDWATER CONDITIONS

Based on the United States Geologic Survey (USGS), Preliminary Geologic Map of the Reno Urban Area, Nevada, Southern Half, the site is mapped in Holocene aged alluvial deposits. Natural Resource Conservation Services' (NRCS) Soil Survey Maps indicate that most of the site soils consist of fine-grained soils characterized as low plasticity silts and sands, and high plasticity gravelly clays. It is anticipated that during initial development the site was graded to mitigate the presence of near surface clay soils. However, the extent of that mitigation likely did not extend throughout the footprint of the proposed additions. Therefore, selective site grading is likely to be required.

Proximate to the project area, Nevada Division of Water Resources (NDWR) well logs indicate static water level approximately 25-feet below the existing ground surface.

CORROSION POTENTIAL FOR CONCRETE AND STEEL

NRCS maps present a low to moderate corrosion potential to concrete and a high corrosion potential for steel. Type II cement is anticipated to be suitable for all sitework and structural concrete.

SITE GRADING AND DEVELOPMENT

As site development progresses and existing improvements are removed from within the footprint of the proposed additions, any exposed fine-grained soils (soils presenting more than 15-percent passing the #200 sieve and a plasticity index greater than 15) should be removed and replaced with structural fill. Structural fill should be placed in 12-inch loose lifts (maximum) and compacted to not less than 90-percent of the soil's maximum dry density. Where existing fill is encountered, the fill should be verified to be

structural quality and compacted (as indicated herein) prior to allowing the construction of footings, structural improvements, or placement of aggregate base for slab support.
Concrete slabs-on-grade, subject solely to foot traffic, should be underlain by at least 6-inches of compacted aggregate base. In addition to the base course, a moisture vapor barrier should be installed as part of the overall slab-on-grade system.

FOUNDATIONS

Based on NRCS mapping, it is anticipated standard spread foundations will perform adequately for the planned improvements.

SUMMARY

We appreciate the opportunity to provide this review. Please note that this document has been prepared based on published data. Varying conditions, and conditions not yet identified, may come to light or may be encountered during development of a design-level geotechnical report. Please contact our office if you have any related questions.

Sincerely,
WOOD RODGERS, INCORPORATED

DocuSigned by:
Mischelle J. Smith
3A03CA8CE235407...

PROFESSIONAL ENGINEER - STATE OF NEVADA
MISCHELLE J. SMITH
EXP: 06/30/24
CIVIL
No. 6972

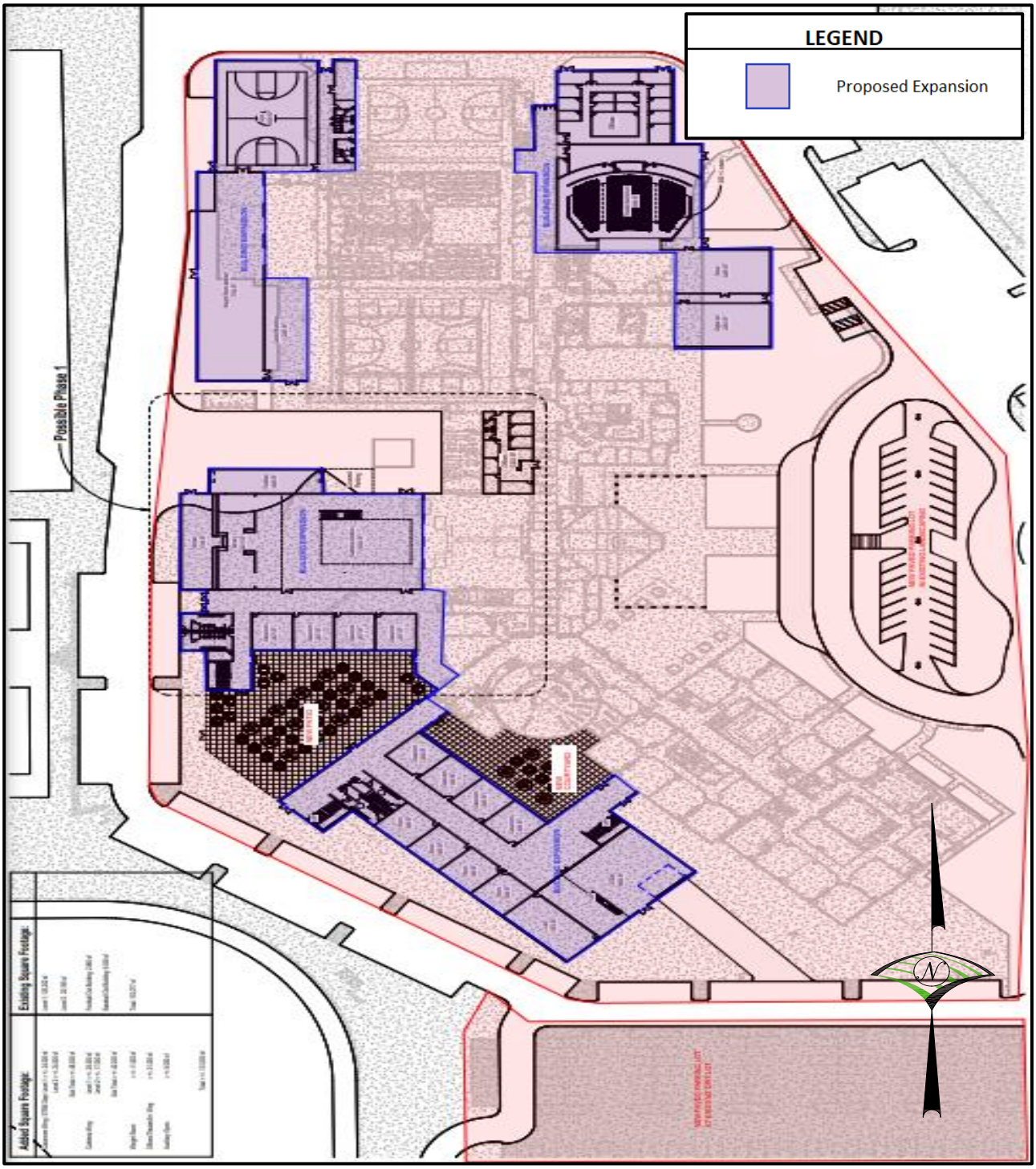
Mischelle J. Smith, PE
Principal Engineer
RE Number 6972
Expires 06/30/2024

12/14/2023

Hunter S. Beadell, EI
Engineering Assistant

Attachments

Attachment A – Proposed Expansion & Improvement Map
Attachment B – ASCE 7 Hazards Report

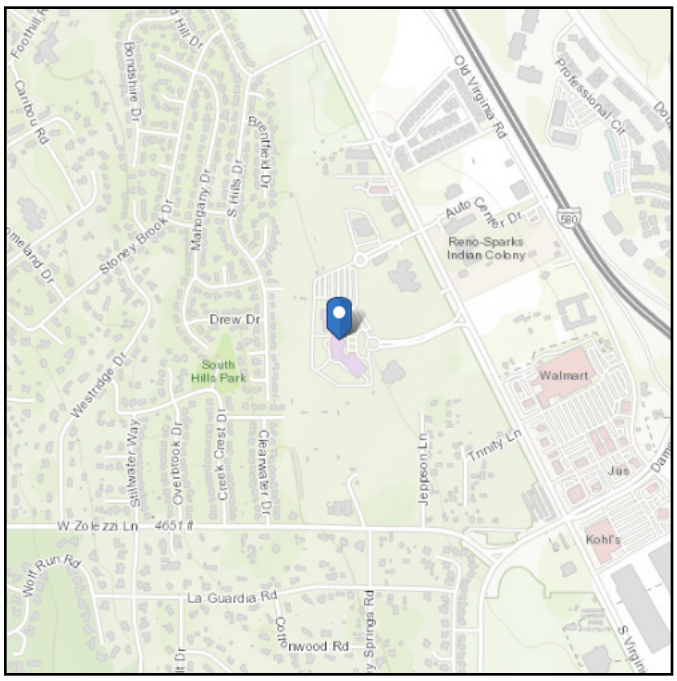


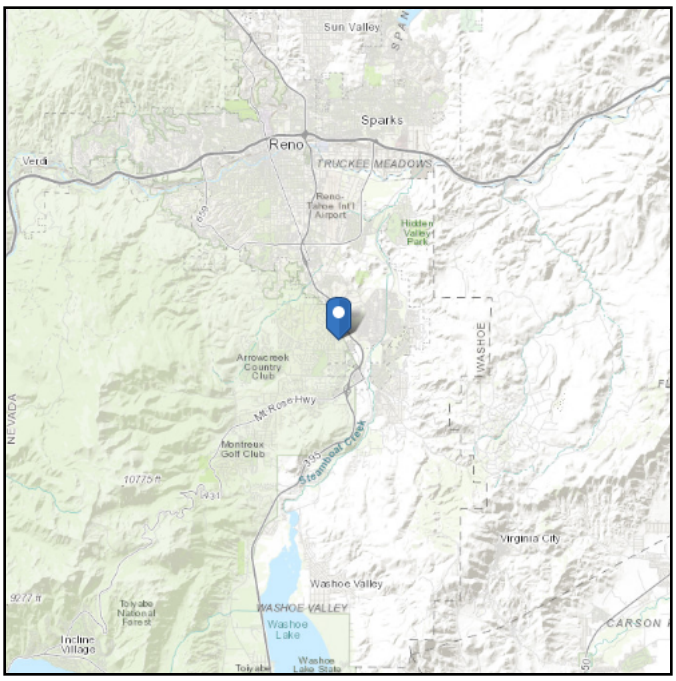
BCMHS Expansion Study PROJECT NO. 4412001	Proposed Expansion & Improvement Map	Attachment A

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Latitude:**	39.4238
Risk Category:	III	**Longitude:**	-119.7647
Soil Class:	D - Stiff Soil	**Elevation:**	4560.47453167337 ft (NAVD 88)





Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.921	S_{D1} :	N/A
S_1 :	0.67	T_L :	6
F_a :	1	PGA :	0.834
F_v :	N/A	PGA_M :	0.918
S_{MS} :	1.921	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1.25
S_{DS} :	1.281	C_v :	1.484

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Wed Dec 13 2023

Date Source: USGS Seismic Design Maps

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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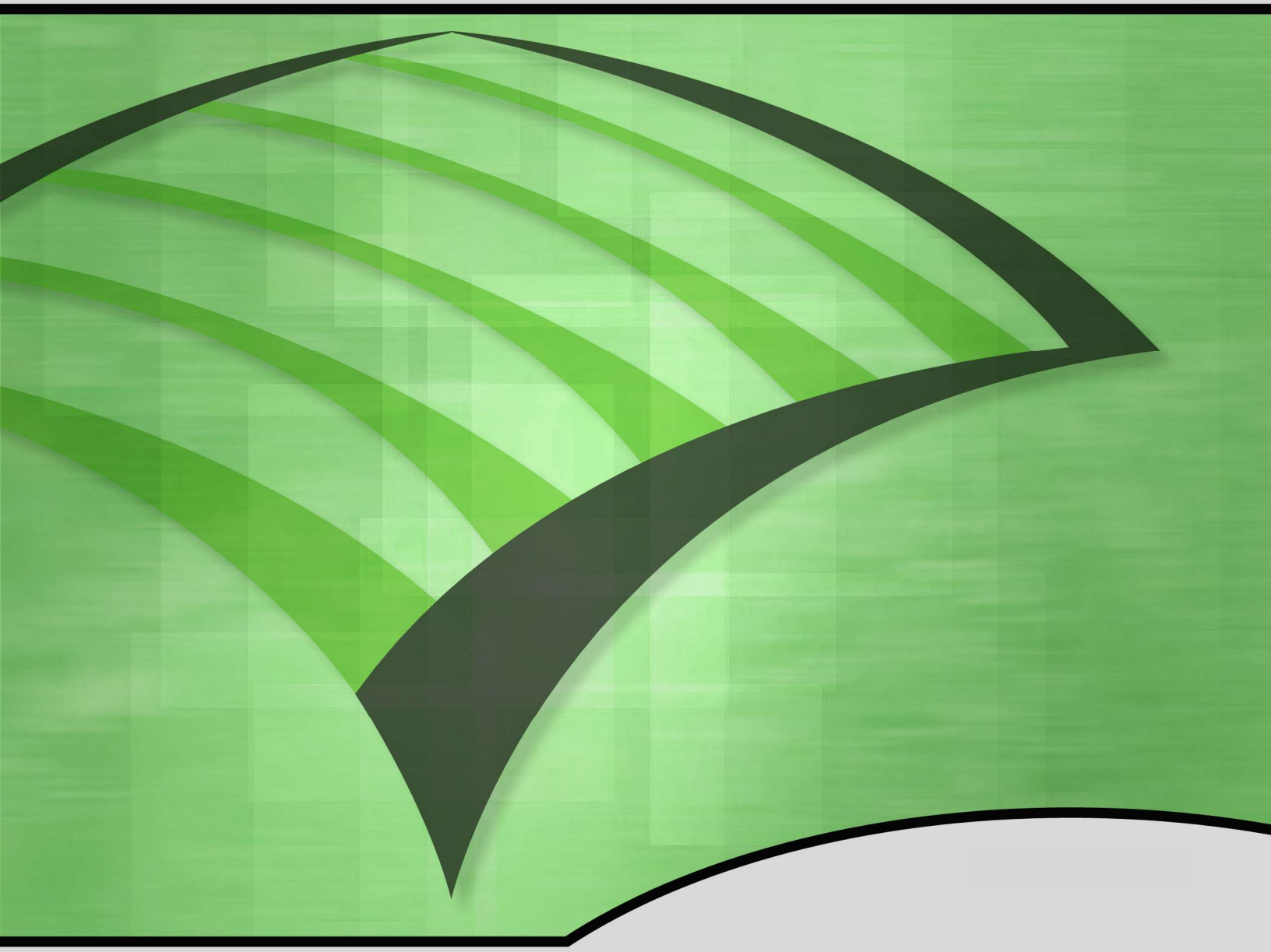
Bishop Manogue High School Expansion, Transportation Operations Analysis



PREPARED FOR

Bishop Manogue HS, c/o H&K

5485 Reno Corporate Dr.

Reno, Nevada 89511

February 6, 2024

Prepared By

WOOD RODGERS

BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

Bishop Manogue High School Expansion, Reno, NV

Bishop Manogue High School Expansion Transportation Operations Analysis

Prepared For:
Jeff Klippenstein, H & K Architects

Prepared By

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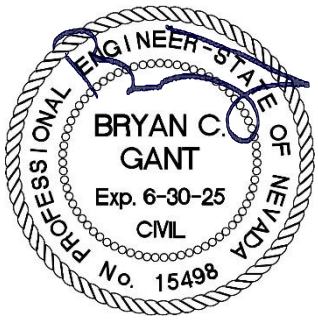
February 2024



2/7/2024

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EXECUTIVE SUMMARY

This report has been prepared to present the results of a Transportation Operations Analysis (TOA) performed by Wood Rodgers, Inc. for the proposed Bishop Manogue High School Expansion Project (Project) located at 110 Bishop Manogue Drive within unincorporated Washoe County (County), Nevada. This analysis has been performed to determine any impacts the proposed Project may have on surrounding transportation facilities and identify potential mitigation measures that could be implemented to address any significant impacts. This TOA report was prepared in accordance with the City of Reno Development Code and traffic study guidelines.

1 INTRODUCTION AND BACKGROUND

1.1 Project Description

The Project proposes to add 157,000 square feet in building expansion and expand enrollment up to 1,200 students from the existing 780 students. The Project is located west of Virginia Street between McCabe Drive and Bishop Manogue Drive.

The Project would maintain the existing access points at the north and south end of the site, at McCabe Drive and Bishop Manogue Drive respectively.

1.2 Project Generated Trips

New trips generated by the proposed Project were estimated using rates from the *Institute of Transportation Engineers Trip Generation Manual, 11th Edition* (ITE). The Project site currently generates a total of 1,693 daily trips, 515 AM Peak Hour Trips (304 Inbound, 211 Outbound) and 312 Afternoon Peak Hour Trips (122 Inbound, 190 Outbound) under typical traffic demand conditions. With the Project, site traffic is estimated to increase generation by 911 daily trips, 277 AM Peak Hour Trips (164 Inbound, 114 Outbound), and 168 Afternoon Peak Hour Trips (66 Inbound, 102 Outbound) under typical weekday traffic demand conditions.

1.3 Intersection Operations

The TOA analyzed four (4) existing study intersections, including two (2) roundabouts, during weekday AM and weekday Afternoon site peak hour time periods under Existing, Existing Plus Project, Background, and Background Plus Project scenarios, respectively, using Synchro 11 software and HCM 6th Edition methodologies. Peak hour queue lengths were checked using SimTraffic methodology. All study intersections and roadway segments are projected to operate at acceptable LOS under all study scenarios.

1.4 Pedestrian, Bicycle, Transit Facility Impacts

Pedestrians will be able to use the existing sidewalks to access the Project site on foot and bicycle. The Project is not projected to have any adverse effects on existing or planned pedestrian, bicycle, or transit facilities.

1.5 Safety Impacts

The Project proposes land uses consistent with other existing land uses in the vicinity. The Project is projected to operate similarly to the existing land uses and driveways in the area. Crash data did not display any areas of specific concern along Virginia Street or in the vicinity of the Project site that are likely associated with the Project.

1.6 Driveway Access

The Project would continue to access the surrounding roadway network via Virginia Street (US 395) at McCabe Drive and Bishop Manogue Drive. The Project trips are distributed between McCabe Drive and Bishop Manogue Drive. Project buildings and parking lots could be accessed by emergency vehicles via the existing Project driveway and internal drive aisles.

2 INTRODUCTION AND BACKGROUND

This report has been prepared to present the results of a TOA performed by Wood Rodgers, Inc. for the proposed Bishop Manogue High School Expansion Project (Project) located in unincorporated Washoe County, Nevada. This analysis has been performed to determine any impacts the proposed Project may have on surrounding intersections and identify potential mitigation measures that could be implemented to address any significant impacts. This analysis focuses on typical weekday operating conditions in and around the Project site.

The purpose of this TOA is to address the Project's impacts under Washoe County, City of Reno and Nevada Department of Transportation (NDOT) requirements and evaluate the Project's potential off-site and on-site traffic operations. A traffic operations analysis was conducted to evaluate the Project's potential traffic operational deficiencies and identify improvements as needed.

2.1 Project Description

The Project is located at 110 Bishop Manogue Drive, west of Virginia Street (US 395 Alt), between McCabe Drive and Bishop Manogue Drive, and consists of an existing approximately 152,300 square foot private high school with 780 students. The Project site is zoned as Medium Density Suburban (MDS).

The Project would maintain access to the existing roadway network via access at Virginia Street at McCabe Drive and Bishop Manogue Drive. The Project proposes to develop approximately 157,000 square feet in various building space to expand the student population from 780 students to 1,200 students.

The TOA analyzes full enrollment which would be able to accommodate up to 1,200 students, however the Project is projected to gradually gain the 320 students over the course of 10 years. The current location is shown in **Figure 1.** The Project Site Plan is included in **Appendix A**.

Project Location and Study Location

Bishop Manogue Catholic High School Expansion TIS

Reno, NV

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Figure 1.1

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2.2 Study Area

Study facilities include the intersections and roadway segments described below.

2.2.1 Intersections

Study intersections and roadway segments were selected based on the Project trip generation estimate and distribution, and input from County staff. The following four (4) study intersections were analyzed in this TOA:

1. Virginia Street & McCabe Drive
2. Virginia Street & Bishop Manogue Drive
3. Bishop Manogue HS Access & McCabe Drive (roundabout)
4. Bishop Manogue HS Access & Bishop Manogue Drive (roundabout)

Note that the Virginia Street and Bishop Manogue Drive intersection is a channelized right-in, right-out access. The locations of the above study intersections are shown **Figure 1**

2.2.2 Pedestrian, Bicycle, Transit Facilities

This TOA analyzes Project impacts on pedestrian, bicycle and transit facilities located in the vicinity of the study area intersections listed above and which would be used to gain access to the Project site.

2.3 Analysis Scenarios

The study facilities were evaluated under weekday AM peak hour (highest hour of traffic between 7 AM and 9 AM) and Afternoon Project peak hour (highest hour of traffic between 2 PM and 4 PM) conditions. All study intersections were evaluated under the following scenarios:

- **Existing Conditions:** Existing traffic volumes from collected traffic counts.
- **Existing Plus Project Conditions:** Existing traffic volumes plus traffic projected to be generated by the proposed Project.
- **Background Conditions:** Background condition volumes based on historical data found in the *Nevada Department of Transportation (NDOT) Traffic Records Information Access (TRINA) Application Data (2022)*.
- **Background Plus Project Conditions:** Background projected traffic volumes plus traffic projected to be generated by the proposed Project.

2.4 Analysis Methods

Traffic operations in this TOA have been quantified through the determination of "Level of Service" (LOS). Level of Service is a qualitative measure of traffic operating conditions, whereby a letter grade "A" through "F" is assigned to an intersection or roadway segment, representing progressively worsening traffic operations. LOS “A” represents free-flow conditions with little to no delays, while LOS “F” represents jammed or grid-lock conditions.

2.4.1 Intersections

Intersection LOS has been calculated for all intersection control types using methods documented in the Transportation Research Board Publication *Highway Capacity Manual, 6th Edition* (HCM 6th Edition) (Transportation Research Board, 2016). For one-way-stop-controlled (OWSC) and two-way-stop-controlled (TWSC) intersections, the “worst-case” movement delays and LOS are reported. For signalized intersections, the intersection delays and LOS reported are the “average” values for the whole intersection, similarly all-way-stop-controlled (AWSC) intersection LOS is expressed in terms of the average vehicle delay of all of the movements. The calculated intersection delays correspond to the LOS designations shown in **Table 1**, which were derived from Exhibits 19-8 and 20-2 of the HCM 6th Edition.

Table 1. HCM 6th Edition Based Intersection LOS Thresholds

Level of Service	Description	Intersection Control Delay (seconds/vehicle)	
		Unsignalized	Signalized
A	Free-flow conditions with negligible to minimal delays.	delay ≤ 10.0	delay ≤ 10.0
B	Good progression with slight delays.	10.0 < delay ≤ 15.0	10.0 < delay ≤ 20.0
C	Relatively higher delays.	15.0 < delay ≤ 25.0	20.0 < delay ≤ 35.0
D	Somewhat congested conditions with longer but tolerable delays.	25.0 < delay ≤ 35.0	35.0 < delay ≤ 55.0
E	Congested conditions with significant delays.	35.0 < delay ≤ 50.0	55.0 < delay ≤ 80.0
F	Jammed or grid-lock type operating conditions.	delay > 50.0	delay > 80.0

Source: HCM 6th Edition Exhibit 19-8 and 20-2.

HCM 6th Edition reports were generated to determine the delay and LOS at the study intersections in Synchro 11 software.

Because of the channelized free right on the eastbound turn at Bishop Manogue Drive, HCM 6 does not analyze the Virginia Street & Bishop Manogue Drive intersection. LOS is determined utilizing microsimulation models of the study network using *Sim Traffic 11*. Ten (10) 1 hour model runs (with a 10-minute warm-up period) were run and averaged to obtain the movement delay for the intersection.

2.5 Level of Service Standards

The signalized intersection of Virginia Street and McCabe Drive is located within the City of Reno jurisdiction. Except for certain overlay districts, the City of Reno utilizes LOS "D" as the minimum LOS threshold for intersections during the AM and PM peak periods per the *RTC 2040 Regional Transportation Plan*. The Project is not located within one of these districts; therefore, this study uses LOS "D" as the minimum threshold at the signalized study intersections for traffic impact purposes.

The rest of the Project study intersections are considered to be part of unincorporated Washoe County. The Washoe County *Development Code Division Four - Development Standards Contents* (June 2023) Section 110.436.20 states that all major intersections and roadway segments should maintain LOS C or better. Therefore, this study uses LOS "C" as the minimum threshold at all non-signalized study intersections for traffic impact purposes.

2.6 Report Organization

The remainder of this report is divided into the following chapters:

- **Chapter 2: Existing Conditions** – Describes existing conditions and operations of the study area intersections, transit system, pedestrian facilities, and bicycle facilities.
- **Chapter 3: Existing Plus Project Conditions** – Describes the methods used to estimate and distribute Project generated traffic and the resulting study area operations under Existing Plus Project conditions.
- **Chapter 4: Background Conditions** – Describes projected conditions and operations of study area facilities under future growth Background conditions.
- **Chapter 5: Background Plus Project Conditions** – Describes projected conditions and operations of study area facilities under future Background Plus Project conditions.
- **Chapter 6**: **Queueing Analysis**– Describes the 95th Percentile of vehicle queueing at the study intersections for all stop-controlled movements and movements with turn pockets.
- **Chapter 7: Safety Evaluation**– Describes the collision history at study facilities.

3 EXISTING CONDITIONS

This chapter describes the Existing roadway network, transit services, pedestrian facilities, and bicycle facilities within the study area. It also presents Existing traffic volumes at study intersections and traffic operations under Existing weekday AM and Afternoon peak hour conditions.

3.1 Existing Roadway Network

This section provides descriptions of the study area roadways.

Virginia Street, also known as US 395 Alt, is a north-south highway that provides connectivity to Interstate 580 1.6 miles north of the Project and 1.25 miles south of the Project. Within the Project area, Virginia Street is currently classified as a principal arterial by the NDOT *Roadway Functional Classification* map. The posted speed limit is 55 mph.

McCabe Drive/Auto Center Drive is an east-west 2-lane local roadway with the western limit in the Bishop Manogue High School parking lot and the eastern limit at Old Virginia Road. The speed limit is assumed to be 25 mph.

Bishop Manogue Drive is an east-west 2-lane local roadway with the western limit in the Bishop Manogue High School parking lot and the eastern limit at Virgina Street. The posted speed limit is 25 mph.

The Bishop Manogue HS Access is a north-south 2-lane semi-private roadway that runs along Bishop Manogue High School with two 1-lane roundabouts between McCabe Drive and Bishop Manogue Drive. The speed limit is assumed to be 25 mph.

3.2 Existing Pedestrian, Bicycle, and Transit Facilities

Sidewalks exist along the eastern side of Virginia Street approximately 1,000 feet north of McCabe Drive to 400 feet north of Bishop Manogue Drive, and western side of Virgina Street 250 feet north of McCabe Drive to Bishop Manogue Drive. The Project site frontage currently has sidewalks and pedestrian access curb ramps. The signalized intersection of Virginia Street & McCabe Drive has pedestrian crosswalks with push buttons and curb ramps on all legs. The unsignalized intersection of Virginia Street & Bishop Manogue Drive has a pedestrian crosswalk with signage and curb ramps along the west leg of the intersection. The roundabouts of Bishop Manogue HS Access have curb ramps on all legs and a pedestrian crosswalk on the Bishop Manogue HS Access & McCabe Drive south leg.

3.3 Bicycle Facilities

The Regional Transportation Commission of Washoe County (RTC) *Bicycle & Pedestrian Master Plan* (June 2017), classifies bikeway facilities as follows:

- Shared-Use Path – Shared use paths are facilities separated from the roadway, for the exclusive use of bicyclists and pedestrians, with minimal cross flow by motor vehicles.
- Bicycle Lane – A bicycle lane is within the paved street and are identified with striping, stencils, and signs for semi-exclusive use by bicyclists. Vehicle cross flow is generally permitted at intersections and driveways.
- Buffered Bike Lane – A buffered bike lane can be provided on roadways with sufficient width providing cyclists with a greater sense of security as they can travel farther away from vehicle traffic.
- Shared Lanes – Shared roadways provide right-of-way for bicycles in the vehicle travel lane with signs and pavement markings designating the shared travel way. A Shared Lane Marking (or “sharrow”) can be marked in the outside lane of a shared roadway to show the suggested path of travel for bicyclists.

- Cycle Track – A cycle track is an exclusive bicycle facility that combines the user experience of a separated path with the on-street infrastructure of a conventional bike lane. A cycle track is physically separated from motor traffic distinct from the sidewalk.

Study area bicycle facilities have been identified using information from the latest aerial images and field visits. Within or near the Project study area, bicycle lanes were marked and identified along Virginia Street.

3.4 Transit Facilities

Existing transit service in the Project study area is provided by the RTC. The RTC operates transit service along fixed Route 56 and the Carson Express.

Route 56 travels through Sierra Center Parkway; Huffaker Lane; Bluestone Drive; Offenhauser Drive; Gateway Drive; Prototype Drive; Double Diamond Parkway; South Meadows Parkway; Double R Boulevard; Damonte Ranch Parkway; and Virginia Street, nearby the Project study area. Route 56 has stops located on Virginia Street north-south of the Project site. The location of the Virginia Street and Auto Center Drive transit stop is approximately 175 feet north of the Virginia Street & McCabe Drive intersection. The location of the Virginia Street and McCabe Drive transit stop is approximately 155 feet south of the Virginia Street and McCabe Drive intersection. The location of the South Virginia Street and Damonte Ranch Parkway transit stop is approximately 0.2 miles south of the Virginia Street & Bishop Manogue Drive intersection. A summary of the local route is provided below:

Route 56 (South Meadowood) is a route service that runs northbound-westbound from Meadowood Mall at Sierra Center Parkway to the Walmart Supercenter at Virginia Street and Damonte Ranch Parkway. Near the Project study area, Route 56 primarily runs northbound along Virginia Street. On weekdays, Route 56 operates between 5:30 AM and 11:00 PM on 30-minute to one hour headways. On Saturdays and Sundays, Route 56 operates between 6:00 AM and 9:00 PM on approximately one hour headways.

Carson Express travels through 4th Street; Vassar Street; McCarran Boulevard; Virginia Street; Mt Rose Highway; Interstate 580; Hot Springs Road; Carson Street; and Stewart Street, nearby the Project study area. Carson Express has stops located both north and south of the Project site. The location of the Virginia Street and McCabe Drive transit stops are approximately 200 feet north-south of the Virginia Street & McCabe Drive intersection. The location of the Virginia Street and Damonte Ranch Parkway transit stops are approximately 0.7 miles south of the Virginia Street & Bishop Manogue Drive intersection.

Carson Express is a route service that runs northbound-southbound from RTC 4th Street Station at 4th Street to the Nevada Department of Transportation in Carson City, Nevada. Near the Project study area, Carson Express primarily runs northbound-southbound along Virginia Street. On weekdays, Carson Express operates on 30-minute headways between 5:45 AM and 7:45 AM and approximately one hour headways between 3:00 PM and 6:30 PM. Carson Express does not operate on weekends.

3.5 Existing Traffic Volumes and Intersection Lane Geometrics

Project study intersection traffic operations were evaluated for the weekday AM and Afternoon peak hours. The AM peak hour is defined as the highest one hour of traffic flow counted between 7:00 AM and 9:00 AM on a typical weekday. The Afternoon peak hour was determined as the highest one-hour flow counted between 2:00 PM and 4:00 PM on a typical weekday. Wood Rodgers obtained AM and Afternoon peak hour vehicular, pedestrian and bicycle traffic counts at four study intersections (one signalized intersection and three unsignalized intersections/roundabouts) on Thursday, November 2nd, 2023.

Bishop Manogue Drive is a channelized right-in, right-out only access, and all northbound left and eastbound left Project traffic was distributed to the Virginia Street & McCabe Drive intersection.

Figure 2 on the following page illustrates Existing intersection lane geometrics and control. **Figure 3** on the following pages illustrates Existing conditions weekday AM and Afternoon peak hour intersection turning movement volumes. Intersection raw count sheets are included in **Appendix B**.

3.6 Existing Intersection Operations

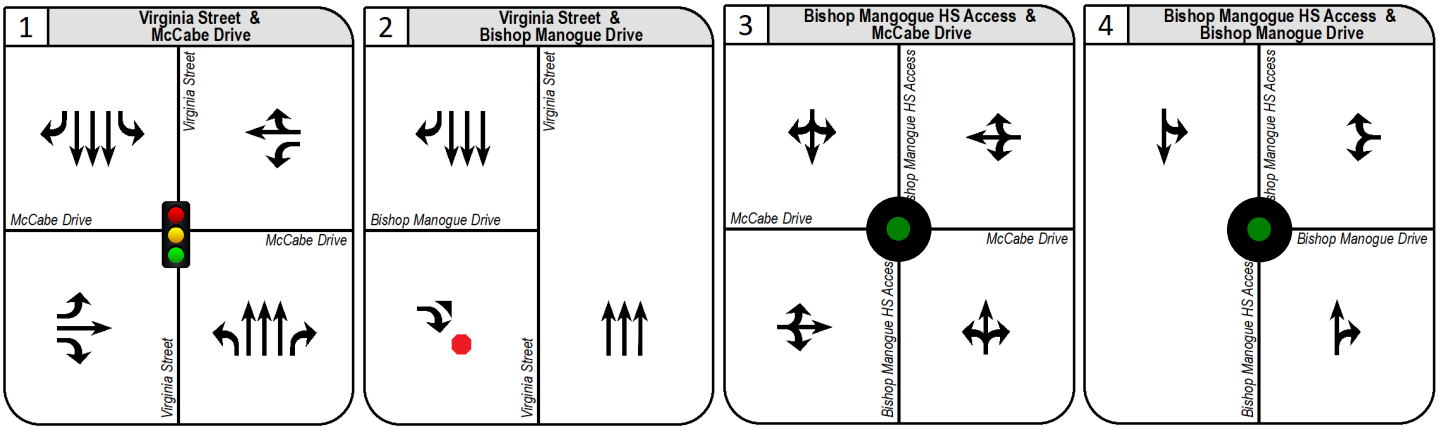
Table 2 presents existing study intersection traffic operations analysis under Existing intersection geometrics and control (illustrated in **Figure 2**) and Existing intersection traffic volumes (illustrated in **Table 3**). All study intersection traffic operations were calculated using Synchro 11 software. Because the stop-controlled intersection is a right-in, right-out with a free channelized right turn, HCM 6 does not analyze the Virginia Street & Bishop Manogue Drive intersection and LOS is determined utilizing microsimulation models of the study network using *Sim Traffic 11*. Ten (10) 1 hour model runs (with a 10-minute warm-up period) were run and averaged to obtain the movement delay for the intersection.

Table 2. Existing Intersection Operations

#	Intersection	Control Type	LOS Criteria	Peak Hour	Delay (sec/veh)[4]	LOS
1	Virginia Street & McCabe Drive	Signal	D[1]	AM	23.4	C
				AFT	23.2	C
2	Virginia Street & Bishop Manogue Drive[2]	OWSC[3]	C	AM	2.5	A
				AFT	1.1	A
3	Bishop Manogue HS Access & McCabe Drive	Roundabout	C	AM	16.0	C
				AFT	8.3	A
4	Bishop Manogue HS Access & Bishop Manogue Drive	Roundabout	C	AM	5.0	A
				AFT	4.6	A

*Notes: **Bold** values indicate unacceptable LOS.*
[1]Virginia Street & McCabe Street is located within City of Reno limits, and has a Level of Service standard of D
[2]The Virginia Street & Bishop Manogue Drive intersection is determined by Sim Traffic 11 movement delay
[3]OWSC = One-Way Stop-Controlled (i.e., minor street stop-controlled)
[4] For OWSC, the worst approach/movement delay and LOS is reported.

*As shown in **Table 2**, all study intersections currently operate at acceptable or better LOS conditions during the weekday AM and Afternoon peak hours. Synchro software intersection LOS output reports are included in **Appendix C**.*



Existing Conditions Lane Geometrics and Control

Bishop Manogue High School Expansion - Traffic Operations Analysis

Reno, NV

December 2023

Figure 2

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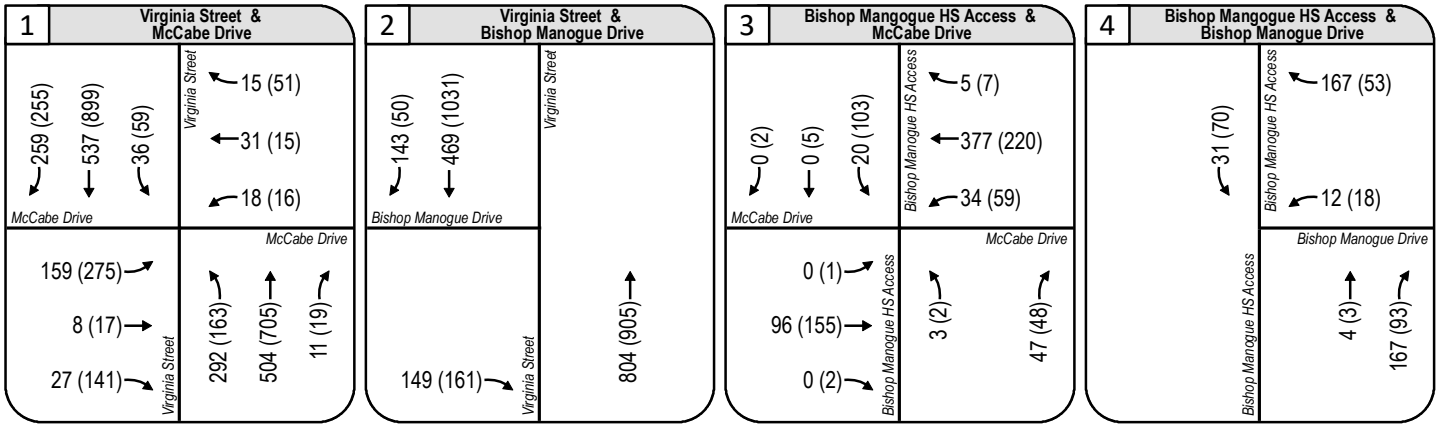

Existing Conditions Traffic Volumes

Bishop Manogue High School Expansion - Traffic Operations Analysis

Reno, NV

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Figure 3

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4 EXISTING PLUS PROJECT CONDITIONS

This chapter provides a description of the proposed Project, a discussion of the trip generation and distribution/assignment methods used to assign Project trips to study intersections, and an analysis of projected traffic operations once the proposed Project is completed.

4.1 Project Site

The Project site consists of an existing private high school located at 110 Bishop Manogue Drive, west of Virginia Street between McCabe Drive and Bishop Manogue Drive, and consists of an existing approximately 152,300 square feet. The Project site is currently zoned as Medium Density Suburban (MDS).

The Project would propose to expand approximately 157,000 square feet of building space to expand the student population from 780 students to 1,200 students. The site would maintain its current parking and circulation to provide access to Virginia Street at McCabe Drive and Bishop Manogue Drive. The current Project land use plan is illustrated in **Figure 1**.

This TOA analyzes the existing conditions and maximum full enrollment with the proposed expansion.

4.2 Project Generated Trips

4.2.1 Trip Generation

The trip generation data contained in the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition,* was used to approximate the number of trips generated by the Project. **Table 3** summarizes the trip generation rates used for the proposed Project and **Table 4** summarizes the trip generation volumes for the proposed Project.

Table 3. Project Trip Generation Rates

Land Use	Source	ITE Code	Units	Weekly Daily Trip Rate/Unit[1]	Weekday AM Peak Hour Rate/Unit			Weekday Afternoon Peak Hour Rate/Unit[2]		
					Total	In	Out	Total	In	Out
Private High School	ITE	534	Students	2.17	.66	59%	41%	.40	39%	61%

Notes:
[1] *The daily trip rate and peak hour trip rates are based on the average rates for the proposed land use consistent with information contained in the ITE Trip Generation Manual, 11th Edition*
[2] *Afternoon Peak Hour is calculated based on the Weekday PM Peak Hour Generator.*

Table 4. Project Trip Generation Volumes

Land Use	ITE Code	Quantity[1]	Units	Daily Trips	AM Peak Hour Trips			Afternoon Peak Hour Trips[3]		
					Total	In	Out	Total	In	Out
Private High School	534	1,200	Students	2,604	792	467	325	480	187	293
Existing Private High School Occupancy	534	780	Students	1,693	515	304	211	312	122	190
Net Total Primary Trips[2]				**911**	**277**	**164**	**114**	**168**	**66**	**102**

Notes:
[1] Quantities provided by Project Applicant in the Project Description.
[2] Net Total Primary Trips calculates the Project volumes based on the increase of students due to Project expansion from existing traffic under Existing Students.
[3] Afternoon Peak Hour is calculated based on the Weekday PM Peak Hour Generator.

*As illustrated in **Table 4**, the proposed Project is anticipated to generate a total of 911 new daily trips, 277 AM Peak Hour Trips (164 Inbound, 114 Outbound), and 168 Afternoon Peak Hour Trips (66 Inbound, 102 Outbound) under typical weekday traffic demand conditions in addition to existing traffic for an enrollment of 1,200 students. The trip generation analysis did not include any reductions for transit availability, bus drop-off, or bicycle/pedestrian trips as part of the variables used to determine the trips generated to provide a conservative analysis.*

4.2.2 Trip Distribution and Assignment

The Project trip distribution was determined based on existing traffic volumes and travel patterns, knowledge of the area, and engineering judgement. Project generated trips were assigned to the study area network based on the Project trip distribution derived from existing and anticipated travel patterns based on the study area access points. Project trip distribution and assignment is shown in **Figure 4**.

Figure 4 on the following page illustrates the estimated weekday Project directional trip distribution and assignment patterns projected to be generally applicable for the Project under Plus Project conditions on an annualized average usage basis and the estimated weekday Project Only traffic volumes.

Project Only traffic volumes were added on top of Existing conditions traffic volumes at study intersections and roadway segments to create Existing Plus Project conditions traffic volumes. **Figure 5** on the following pages illustrates the estimated weekday Existing Plus Project conditions traffic volumes at study intersections.

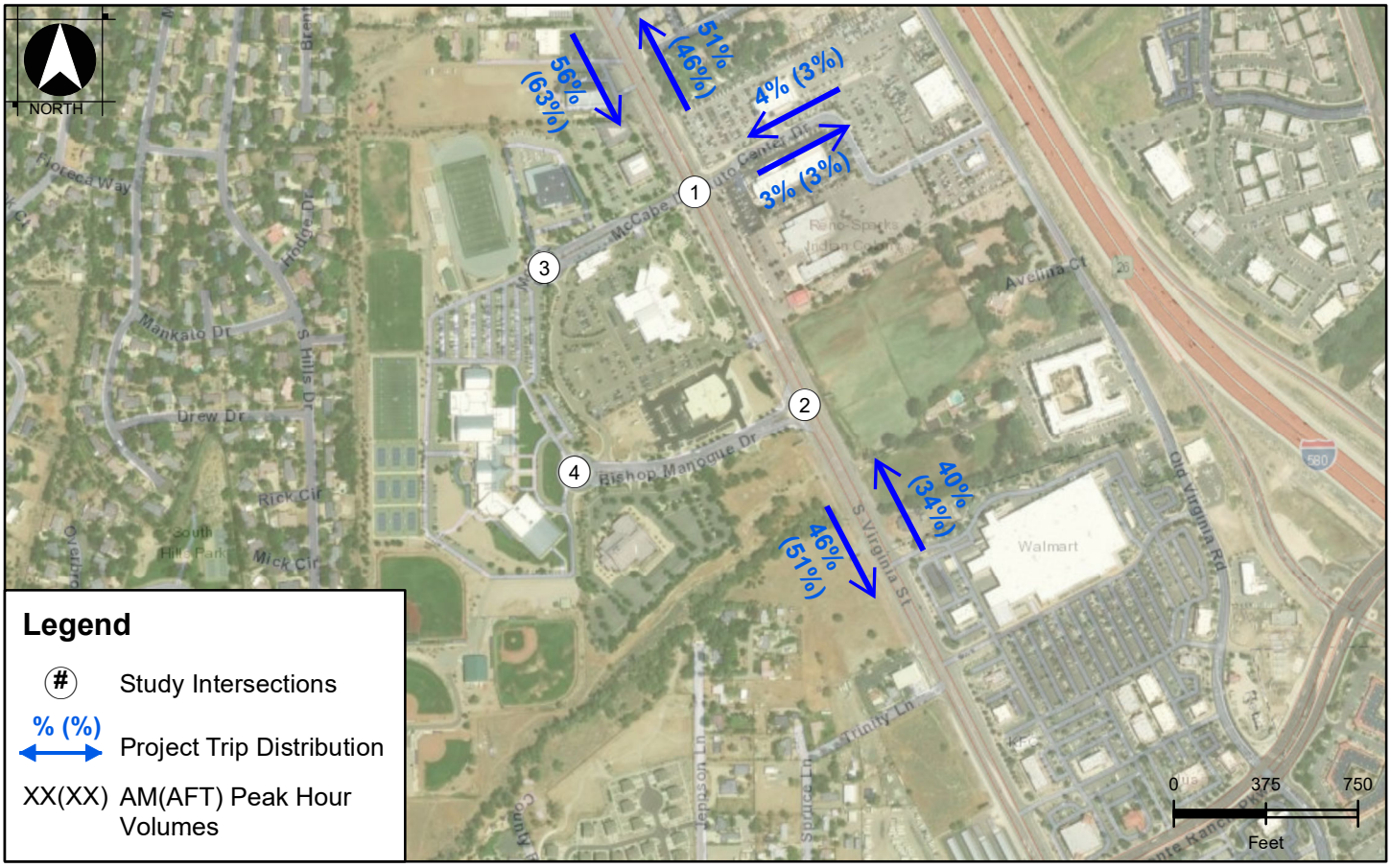
The Project trips circulate through the Project driveways as follows, based on information provided by the Project applicant:

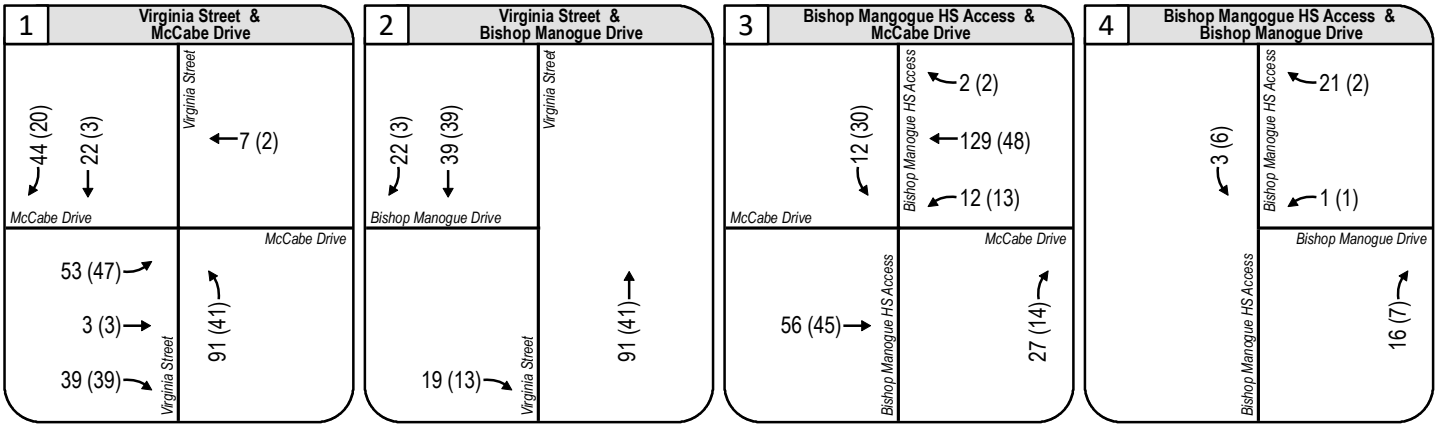
Virginia Street & McCabe Drive: This intersection is signalized full access, utilized by Project trips access Bishop Manogue HS and other developments including USPS office and Bill Pearce Volvo Car dealership.

Bishop Manogue HS Access & McCabe Drive: This roundabout provides access to the USPS office, Bill Pearce Volvo Car parking lot, and northern Bishop Manogue HS parking lot. The south leg of the roundabout connects to Bishop Manogue Drive.

Virginia Street & Bishop Manogue Drive: This intersection is channelized right-in, right-out access only for access to Bishop Manogue HS and St Rose of Lima Catholic Church.

Bishop Manogue Access & Bishop Manogue Drive: This roundabout provides access to the Bishop Manogue HS pick-up/drop-off queue and southern Bishop Manogue HS parking lot.





Primary Project Trips and Distribution

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Figure 4

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4.3 Existing Plus Project Conditions Intersection Level of Service

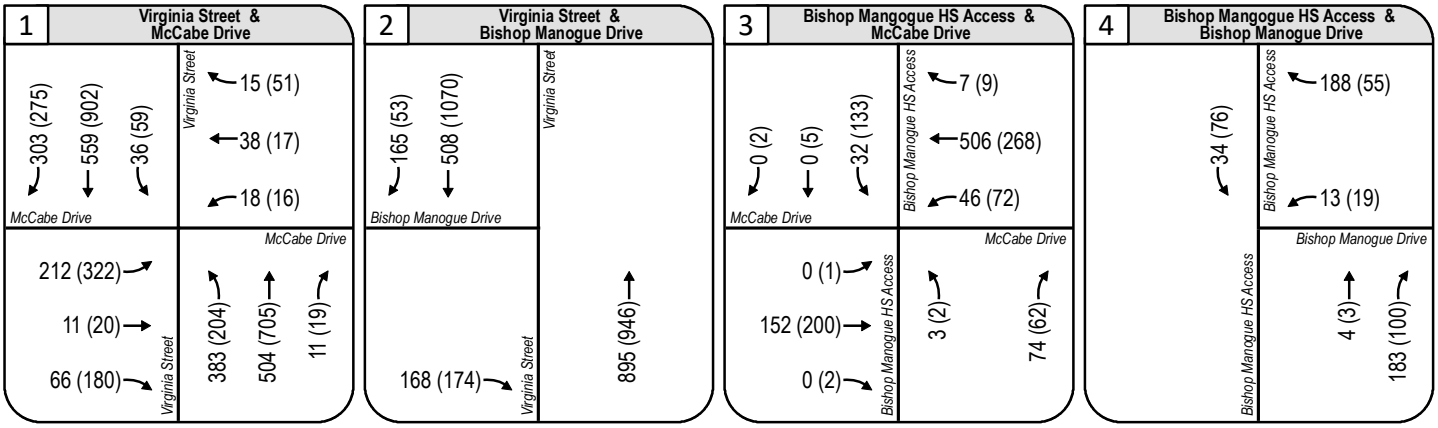
Project trips were added to Existing conditions traffic volumes to obtain Existing Plus Project conditions traffic volumes, shown in **Figure 5. Table 5** presents Existing Plus Project study intersection traffic operations under Existing intersection lane geometrics and control (illustrated in **Figure 2**) and Existing Plus Project traffic volumes (**Figure 3**). **Table 5** also shows operations under Existing conditions for comparison purposes. All study intersection traffic operations were calculated using Synchro 11 software.

Table 5. Existing Plus Project Intersection Operations

#	Intersection	Control Type	LOS Criteria	Peak Hour	Existing Conditions		Existing Plus Project	
					Delay[2]	LOS	Delay	LOS
1	Virginia Street & McCabe Drive	Signal	D[1]	AM	23.2	C	37.1	D
				AFT	23.4	C	33.3	C
2	Virginia Street & Bishop Manogue Drive[2]	OWSC[3]	C	AM	2.5	A	2.5	A
				AFT	1.1	A	1.2	A
3	Bishop Manogue HS Access & McCabe Drive	Roundabout	C	AM	16.0	C	19.7	C
				AFT	8.3	A	10.2	B
4	Bishop Manogue HS Access & Bishop Manogue Drive	Roundabout	C	AM	5.0	A	5.4	A
				AFT	4.6	A	4.8	A

*Notes: **Bold** values indicate unacceptable LOS.*
[1]Virginia Street & McCabe Street is located within City of Reno limits, and has a Level of Service standard of D
[2]The Virginia Street & Bishop Manogue Drive intersection is determined by Sim Traffic 11 movement delay
[3]OWSC = One-Way Stop-Controlled (i.e., minor street stop-controlled)
[4] For OWSC, the worst approach/movement delay and LOS is reported.

*As shown in **Table 5**, all study intersections are projected to operate at acceptable LOS conditions. Synchro software intersection LOS output reports are included in **Appendix C**.*



Existing Plus Project Conditions Traffic Volumes

Bishop Manogue High School Expansion - Traffic Operations Analysis

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Figure 5

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5 20 YEAR HORIZON BACKGROUND (NO PROJECT) CONDITIONS

This chapter presents the study area intersection traffic operations results under Background conditions without Project generated trips. Background conditions traffic volumes were obtained by applying a 0.64 percent (0.64%) per year growth rate to existing volumes over 20 years. Background conditions are a long-term future condition that could reasonably represent study area conditions approximately 20 years after Project completion.

5.1 Background Volumes and Roadway Network

Future Background conditions traffic volumes were developed by applying an annual average growth rate of 0.64-percent to Existing traffic volumes. A historical trend projection analysis was performed to provide a method of guidance for forecasting future volumes. The applied growth rate was obtained and derived from the Washoe County RTC website that provides basic traffic modeling data to the general public based on the official Travel Demand Model (TMD). The information pulled from the online tool comes from the base model, which includes roadway projects from the 2050 Regional Transportation Plan (RTP) and incorporates population and employment projections from the latest Consensus Forecast. Based on years 2025 to 2050 projected trends in the study area, the growth rate was applied, resulting in an estimated growth rate of 0.64-percent per year.

Background (No Project) study intersection turning movement volumes are presented **Figure 6** on the following page.

5.2 Background (No Project) Intersection Operations

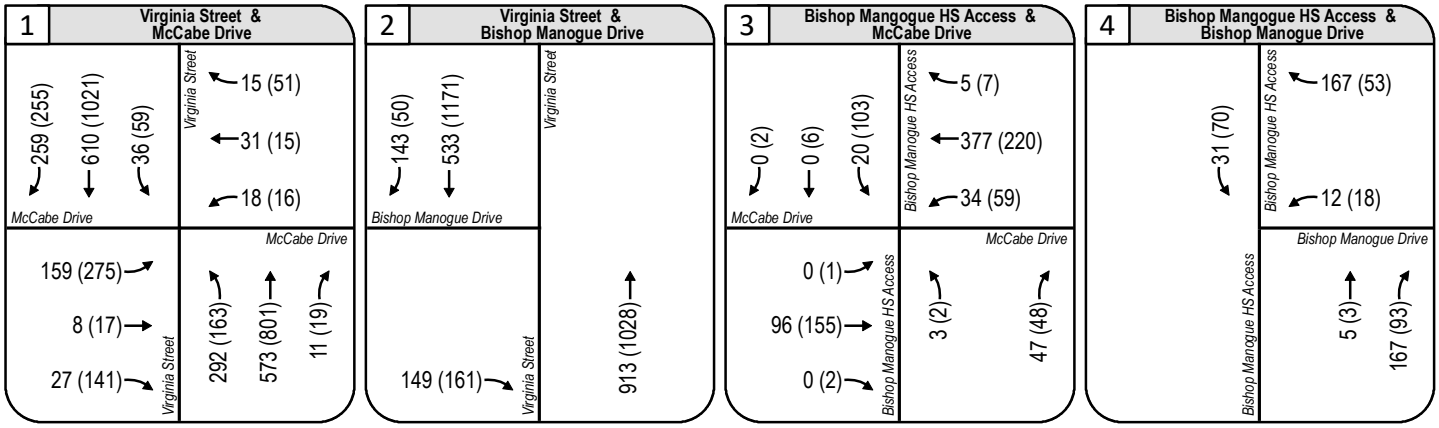
Background intersection operations were quantified under Background traffic volumes (shown in **Figure 6**). **Table 6** illustrates the for the 20-year horizon intersection LOS operations. All study intersection traffic operations were calculated using Synchro 11 software under optimized signal timing.

Table 6. Background (No Project) Intersection Operations

#	Intersection	Control Type	LOS Criteria	Peak Hour	Background (No Project)	
					Delay (sec/veh)[2]	LOS
1	Virginia Street & McCabe Drive	Signal	D	AM	25.1	C
				AFT	27.2	C
2	Virginia Street & Bishop Manogue Drive[3]	OWSC[1]	D	AM	2.5	A
				AFT	1.1	A
3	Bishope Manogue HS Access & McCabe Drive	Roundabout	D	AM	6.5	A
				AFT	5.6	A
4	Marysville Boulevard & Bishop Manogue Drive	Roundabout	D	AM	3.7	A
				AFT	3.3	A

*Notes: **Bold** values indicate unacceptable LOS.*
[1] OWSC = One-Way Stop-Controlled
[2] For OWSC, the worst approach/movement delay and LOS is reported.
[3] HCM 6 does not analyze channelized right at Virginia Street & Bishope Manogue Drive, so Level of Service was determined per Sim Movement,

*As shown in **Table 6** all study intersections are projected to operate at acceptable LOS conditions under Background conditions. Synchro software intersection LOS output reports are included in **Appendix C**.*



Background Without Project Conditions Traffic Volumes

Bishop Manogue High School Expansion - Traffic Operations Analysis

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Figure 6

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6 BACKGROUND PLUS PROJECT CONDITIONS INTERSECTION LOS

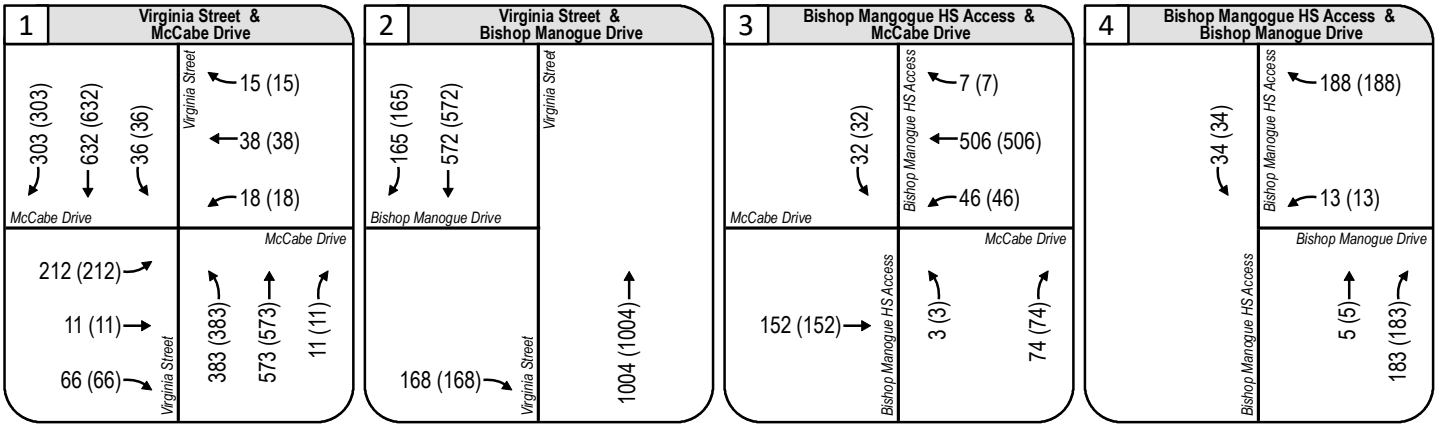
Project trips were added to Background conditions traffic volumes to obtain Background Plus Project conditions traffic volumes, shown in **Figure 7**. **Table 7** presents Background Plus Project study intersection traffic operations under Background Plus Project traffic volumes. All study intersection traffic operations were calculated using Synchro 11 software under optimized signal conditions.

Table 7. Background and Background Plus Project Intersection Operations

#	Intersection	Control Type	LOS Criteria	Peak Hour	Background Conditions		Background Plus Project	
					Delay[2]	LOS	Delay[2]	LOS
1	Virginia Street & McCabe Drive	Signal	D	AM	25.1	C	30.1	C
				AFT	26.7	C	30.0	C
2	Virginia Street & Bishop Manogue Drive[3]	OWSC[1]	C	AM	2.6	A	2.5	A
				AFT	1.1	A	1.1	A
3	Bishope Manogue HS Access & McCabe Drive	Roundabout	C	AM	5.1	A	6.1	A
				AFT	4.6	A	5.1	A
4	Marysville Boulevard & Bishop Manogue Drive	Roundabout	C	AM	3.8	A	3.9	A
				AFT	3.3	A	3.4	A

*Notes: **Bold** values indicate unacceptable LOS.*
[1] OWSC = One-Way Stop-Controlled
[2] For OWSC, the worst approach/movement delay and LOS is reported.
[3] HCM 6 does not analyze channelized right at Virginia Street & Bishope Manogue Drive, so Level of Service was determined per Sim Movement,

*As shown in **Table 7,** all study intersections are projected to operate at acceptable LOS conditions under Background and Background Plus Project conditions. Synchro software intersection LOS output reports are included in **Appendix C**.*



Background Plus Project Conditions Traffic Volumes

Bishop Manogue High School Expansion - Traffic Operations Analysis
Reno, NV
December 2023

Figure 7

WOOD RODGERS

7 QUEUEING ANALYSIS

Vehicle queueing was analyzed at the study intersections for all stop-controlled movements and movements with turn pockets that the Project would add trips to. For the purposes of this analysis, a Project-related deficiency is considered to occur when the addition of Project trips causes a queue to exceed available storage or causes a queue that already exceeds storage to increase by 100 feet (i.e., five or more vehicle lengths). **Table 8** shows the available storage lengths and 95th percentile queues under all scenarios.

Table 8. 95th Percentile Intersection Queueing

Intersection	Movement	Available Storage (ft)[1]	Peak Hour	95th Percentile Queue (ft)			
				Existing	Existing Plus Project	Background Without Project	Background Plus Project
#1 Virginia Street & McCabe Drive	NBL	400	AM	238	364	236	317
			AFT	164	202	157	157
	NB	--	AM	117	227	140	133
			AFT	157	161	173	182
	NBR	200	AM	<20	<20	<20	<20
			AFT	<20	<20	<20	<20
	SBL	200	AM	72	75	70	73
			AFT	89	88	87	88
	SB	--	AM	211	241	200	204
			AFT	237	231	238	246
	SBR	200	AM	150	**221**	139	169
			AFT	129	133	127	120
	EBL	150	AM	**177**	**217**	**150**	**169**
			AFT	**222**	**242**	**179**	**179**
	EB	500	AM	73	120	80	125
			AFT	102	199	180	175
	EBR	120	AM	48	80	38	76
			AFT	100	**131**	**122**	**121**
	WBL	55	AM	39	37	34	35
			AFT	31	31	31	34
	WB	55	AM	**68**	**74**	**66**	**61**
			AFT	**50**	**61**	**56**	**59**
#2 Virginia Street & Bishop Manogue Drive	SBR	200	AM	<20	<20	<20	<20
			AFT	<20	<20	<20	<20
	EBR	800	AM	<20	<20	<20	<20
			AFT	<20	<20	<20	<20
#3 Bishop Manogue HS Access & McCabe Drive	NB	--	AM	21	34	<20	30
			AFT	36	41	29	26
	SB	--	AM	25	28	<20	28
			AFT	54	57	47	44
	EB	--	AM	<20	35	25	33
			AFT	71	55	40	42
	WB	--	AM	44	70	20	39
			AFT	49	22	<20	<20
#4 Bishop Manogue HS Access & Bishop Manogue Drive	NB	--	AM	33	43	<20	24
			AFT	33	40	21	20
	SB	--	AM	<20	<20	<20	20
			AFT	36	31	30	27
	WB	--	AM	41	50	25	30
			AFT	<20	<20	<20	<20

*Notes: **Bold** values indicate queue exceeds storage length. **Highlighted** values indicate queue exceeds storage length by greater than 100 feet. | [1] Storage reported is available queueing length within a turn pocket. Storage reported for through movements is the distance to the nearest major cross-street.*

*As shown in **Table 8**, two (2) movements are found to exceed available storage in the Existing AM Peak Hour and two (2) movements are found to exceed available storage in the Existing Afternoon Peak Hour. With the Existing Plus Project conditions, three (3) movements in the AM Peak Hour and three (3) movements in the Afternoon Peak Hour are found to exceed available storage. Under both Background and Background Plus Project conditions, two (2) movements are found to exceed available storage in the AM Peak Hour and three (3) movements are found to exceed available storage in the Afternoon Peak Hour. None of these movements are found to exceed the storage lane at a significant level under any conditions, and all queues are projected to be cleared within one cycle length of the traffic signal. SimTraffic intersection queueing reports are included in **Appendix D**.*

8 PROJECT IMPACTS

This chapter of the TOA evaluates the study intersection operations results presented in **Table 5** (Existing plus Project conditions) and **Table 7** (Background plus Project conditions) against the LOS impact criteria.

8.1 Existing plus Project Impacts

All study intersections are currently operating at and projected to operate at acceptable LOS or better under Existing and Existing plus Project conditions. Therefore, the Project was found to have minimal impact on all four study intersections.

8.2 Background plus Project Impacts and Mitigation Measures

As illustrated in **Table 6** and **Table 7**, all four intersections and driveways, respectively, are projected to operate at acceptable LOS or better under Background and Background plus Project AM and/or Afternoon future peak hour conditions. As a result, the Project was found to have negligible impact on all four study intersections under all future Background study conditions.

8.3 Queueing Analysis

Queueing analysis for AM and Afternoon peak hour movements was performed at all study intersection approaches under Existing, Existing plus Project, Background, and Background plus Project conditions. **Table 8** shows total available storage length and total projected 95th percentile queues for each approach. Although some queues were found exceed available storage for a short duration, the queues are not found to exceed the storage lane at a significant level under any conditions, and all queues are projected to be cleared within one cycle length of the traffic signal.

8.4 Crash Data Evaluation

The Project proposes land uses consistent with other land uses in the vicinity. The Project is projected to operate similarly to the other land uses and driveways in the area.

Crash data has been provided by NDOT for the five-year period from January 1st, 2016 to January 1st, 2021 (see **Appendix E**), and is summarized in **Table 9**.

Table 9 summarizes collisions within the Project area and describes the collision severity (fatal, injury, and PDO). The NDOT data indicates that a total 12 collisions occurred within the Project area over five years.

Table 9. Collision Rates Within the Project Area (5-Year Crash Data)

Roadway	Total No. of Collisions	Severity		
		Fatal	Fatal + Injury	PDO[1]
Roadway Segment: Virginia Street between McCabe Drive and Bishop Manogue Drive	2	0	1	1
Study Intersection: Virginia Street & McCabe Drive	9	0	5	4
Study Intersection: Virginia Street & Bishop Manogue Drive	1	0	1	0
Total	12	0	7	5

Notes:
[1] PDO= Property Damage Only

*As shown in **Table 9**, the data reports that the study area including study intersections and the roadway along the Project site, had 12 crashes over the five-year period within 500 feet of the study intersections. The majority of the crashes were angle crashes (42%), rear-end crashes (25%), and non-collision crashes (25%), mainly due to failure to yield right of way. NDOT's crash data is provided in **Appendix E**.*

No pedestrian or bicycle involved fatalities were reported over the five-year period within 500-feet of the signalized intersection or within the other study intersection or driveways.

The Project is not expected to measurably increase crash rates and improvements should be constructed to appropriate standards.

8.5 Project Impacts To Pedestrian, Bicyclist and Transit Facilities

Bicycle users will be able to access the Project site via the existing driveway access point within the Project site vicinity. The Project is not projected to have any adverse effect on existing or planned bicycle facilities and no improvements are recommended.

Pedestrians will be able to use the existing sidewalks at Project intersections within the Project site vicinity to access the Project site on foot. The Project is not projected to have any adverse effect on existing or planned pedestrian or transit facilities.

8.6 On-Site Circulation Access Analysis

The Project would access the surrounding roadway network via the McCabe Drive and Bishop Manogue Drive intersections along Virginia Street. Access at the intersections are anticipated to operate as follows:

Virginia Street & McCabe Drive: This intersection is signalized full access, utilized by Project trips access Bishop Manogue HS and other developments including USPS office and Bill Pearce Volvo Car dealership.

Bishop Manogue HS Access & McCabe Drive: This roundabout provides access to the USPS office, Bill Pearce Volvo Car parking lot, and northern Bishop Manogue HS parking lot. The south leg of the roundabout connects to Bishop Manogue Drive.

Virginia Street & Bishop Manogue Drive: This intersection is channelized right-in, right-out access only for access to Bishop Manogue HS and St Rose of Lima Catholic Church.

Bishop Manogue Access & Bishop Manogue Drive: This roundabout provides access to the Bishop Manogue High School pick-up/drop-off queue and southern Bishop Manogue HS parking lot.

School queueing was observed at both roundabouts at Bishop Manogue HS access via drone footage in both the AM and Afternoon pick-up and drop-off times (November 27, 2023). These processing times were incorporated into the observation of the SimTraffic microsimulation. In these observations, queue lengths were observed to exceed storage lengths for a few minutes during peak pick-up and drop-off times but were found to dissipate within one cycle length of traffic signal.

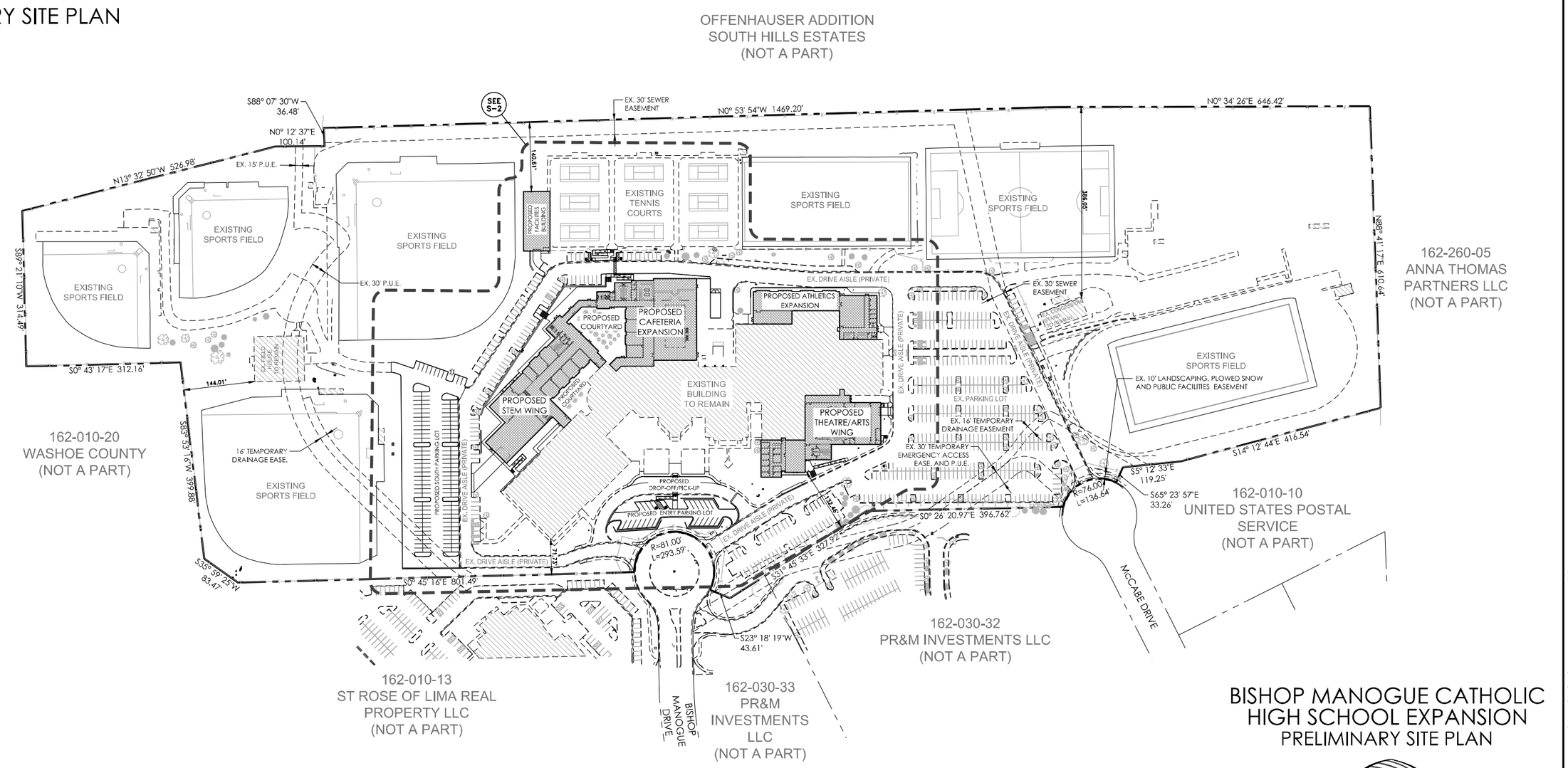
Emergency vehicle access to the school is provided via either Virginia Street & McCabe Drive or Virginia Street & Bishop Manogue Drive. The site currently provides adequate emergency vehicle access and is anticipated to remain accessible.

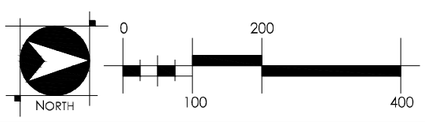
APPENDIX A | SITE PLAN

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY SITE PLAN





BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY SITE PLAN

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
1361 Corporate Boulevard
Reno, NV 89502
Tel 775.823.4068
Fax 775.823.4066

4412001 FEBRUARY, 2024

SHEET S-1 OF 9

J:\Jobs\4412_Manogue_High_School\Manogue_High_School_DA\Planning\Dwg\SUP\TM_02_BMCHS_SUP_S01.dwg 2/6/2024 12:35 PM Megan Overton

APPENDIX B | TRAFFIC COUNTS

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

County of Washoe
N/S: Virginia Street (US Route 395)
E/W: McCabe Drive/Auto Center Drive
Weather: Clear

File Name : 02_CWS_Vir_McC AM
Site Code : 231026
Start Date : 11/2/2023
Page No : 1

Groups Printed- Total Volume

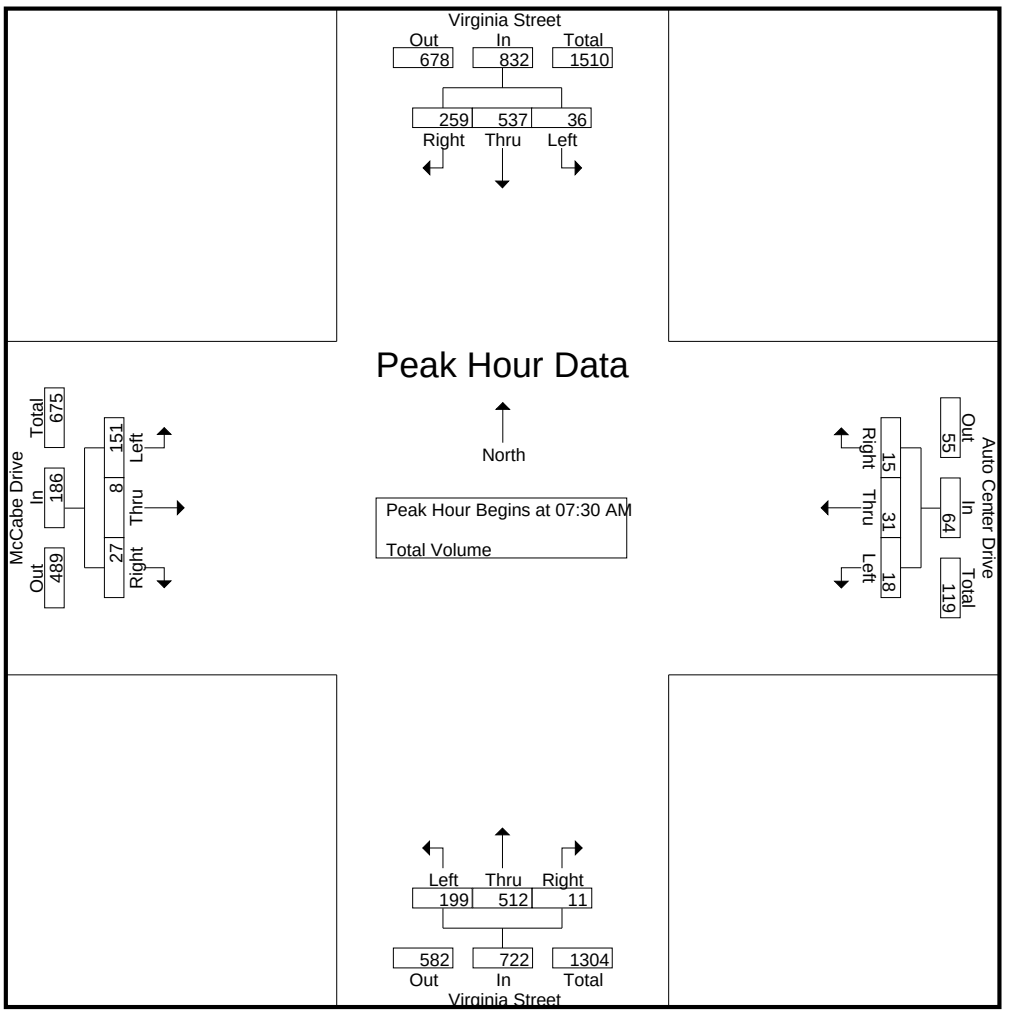
	Virginia Street Southbound				Auto Center Drive Westbound				Virginia Street Northbound				McCabe Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	5	86	23	114	1	0	3	4	12	61	2	75	2	0	3	5	198
07:15 AM	3	73	64	140	0	5	2	7	24	81	2	107	17	0	7	24	278
07:30 AM	7	146	88	241	5	7	1	13	60	137	3	200	34	1	7	42	496
07:45 AM	12	166	116	294	6	21	4	31	95	138	5	238	73	6	6	85	648
Total	27	471	291	789	12	33	10	55	191	417	12	620	126	7	23	156	1620
08:00 AM	10	94	37	141	2	2	6	10	21	120	2	143	33	0	7	40	334
08:15 AM	7	131	18	156	5	1	4	10	23	117	1	141	11	1	7	19	326
08:30 AM	10	118	23	151	2	0	4	6	24	113	1	138	16	0	8	24	319
08:45 AM	9	133	22	164	0	1	3	4	19	118	3	140	15	0	5	20	328
Total	36	476	100	612	9	4	17	30	87	468	7	562	75	1	27	103	1307
Grand Total	63	947	391	1401	21	37	27	85	278	885	19	1182	201	8	50	259	2927
Apprch %	4.5	67.6	27.9		24.7	43.5	31.8		23.5	74.9	1.6		77.6	3.1	19.3		
Total %	2.2	32.4	13.4	47.9	0.7	1.3	0.9	2.9	9.5	30.2	0.6	40.4	6.9	0.3	1.7	8.8	

	Virginia Street Southbound				Auto Center Drive Westbound				Virginia Street Northbound				McCabe Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	7	146	88	241	5	7	1	13	60	137	3	200	34	1	**7**	42	496
07:45 AM	**12**	**166**	**116**	**294**	**6**	**21**	4	**31**	**95**	**138**	**5**	**238**	**73**	**6**	6	**85**	**648**
08:00 AM	10	94	37	141	2	2	**6**	10	21	120	2	143	33	0	7	40	334
08:15 AM	7	131	18	156	5	1	4	10	23	117	1	141	11	1	7	19	326
Total Volume	36	537	259	832	18	31	15	64	199	512	11	722	151	8	27	186	1804
% App. Total	4.3	64.5	31.1		28.1	48.4	23.4		27.6	70.9	1.5		81.2	4.3	14.5		
PHF	.750	.809	.558	.707	.750	.369	.625	.516	.524	.928	.550	.758	.517	.333	.964	.547	.696

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
(951) 268-6268

County of Washoe
N/S: Virginia Street (US Route 395)
E/W: McCabe Drive/Auto Center Drive
Weather: Clear

File Name : 02_CWS_Vir_McC AM
Site Code : 231026
Start Date : 11/2/2023
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM				07:30 AM				07:30 AM				07:15 AM			
+0 mins.	7	146	88	241	5	7	1	13	60	137	3	200	17	0	**7**	24
+15 mins.	**12**	**166**	**116**	**294**	**6**	**21**	4	**31**	**95**	**138**	**5**	**238**	34	1	7	42
+30 mins.	10	94	37	141	2	2	**6**	10	21	120	2	143	**73**	**6**	6	**85**
+45 mins.	7	131	18	156	5	1	4	10	23	117	1	141	33	0	7	40
Total Volume	36	537	259	832	18	31	15	64	199	512	11	722	157	7	27	191
% App. Total	4.3	64.5	31.1		28.1	48.4	23.4		27.6	70.9	1.5		82.2	3.7	14.1	
PHF	.750	.809	.558	.707	.750	.369	.625	.516	.524	.928	.550	.758	.538	.292	.964	.562

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County of Washoe
N/S: Virginia Street (US Route 395)
E/W: McCabe Drive/Auto Center Drive
Weather: Clear

File Name : 02_CWS_Vir_McC PM
Site Code : 231026
Start Date : 11/2/2023
Page No : 1

Groups Printed- Total Volume

	Virginia Street Southbound				Auto Center Drive Westbound				Virginia Street Northbound				McCabe Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
02:00 PM	14	189	51	254	6	3	18	27	43	178	7	228	39	1	34	74	583
02:15 PM	15	215	75	305	3	9	13	25	52	161	1	214	44	3	29	76	620
02:30 PM	17	222	86	325	5	2	13	20	46	196	9	251	108	8	54	170	766
02:45 PM	17	235	55	307	3	1	14	18	25	170	8	203	52	4	31	87	615
Total	63	861	267	1191	17	15	58	90	166	705	25	896	243	16	148	407	2584
03:00 PM	10	227	39	276	5	3	11	19	31	203	1	235	46	2	27	75	605
03:15 PM	12	237	55	304	1	1	14	16	37	162	4	203	40	1	26	67	590
03:30 PM	12	229	46	287	9	5	22	36	36	182	7	225	47	3	32	82	630
03:45 PM	12	258	45	315	3	0	12	15	24	202	5	231	37	1	24	62	623
Total	46	951	185	1182	18	9	59	86	128	749	17	894	170	7	109	286	2448
Grand Total	109	1812	452	2373	35	24	117	176	294	1454	42	1790	413	23	257	693	5032
Apprch %	4.6	76.4	19		19.9	13.6	66.5		16.4	81.2	2.3		59.6	3.3	37.1		
Total %	2.2	36	9	47.2	0.7	0.5	2.3	3.5	5.8	28.9	0.8	35.6	8.2	0.5	5.1	13.8	

	Virginia Street Southbound				Auto Center Drive Westbound				Virginia Street Northbound				McCabe Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:15 PM																	
02:15 PM	15	215	75	305	3	**9**	13	**25**	**52**	161	1	214	44	3	29	76	620
02:30 PM	**17**	222	**86**	**325**	**5**	2	13	20	46	196	**9**	**251**	**108**	**8**	**54**	**170**	**766**
02:45 PM	17	**235**	55	307	3	1	**14**	18	25	170	8	203	52	4	31	87	615
03:00 PM	10	227	39	276	5	3	11	19	31	**203**	1	235	46	2	27	75	605
Total Volume	59	899	255	1213	16	15	51	82	154	730	19	903	250	17	141	408	2606
% App. Total	4.9	74.1	21		19.5	18.3	62.2		17.1	80.8	2.1		61.3	4.2	34.6		
PHF	.868	.956	.741	.933	.800	.417	.911	.820	.740	.899	.528	.899	.579	.531	.653	.600	.851

Counts Unlimited, Inc.
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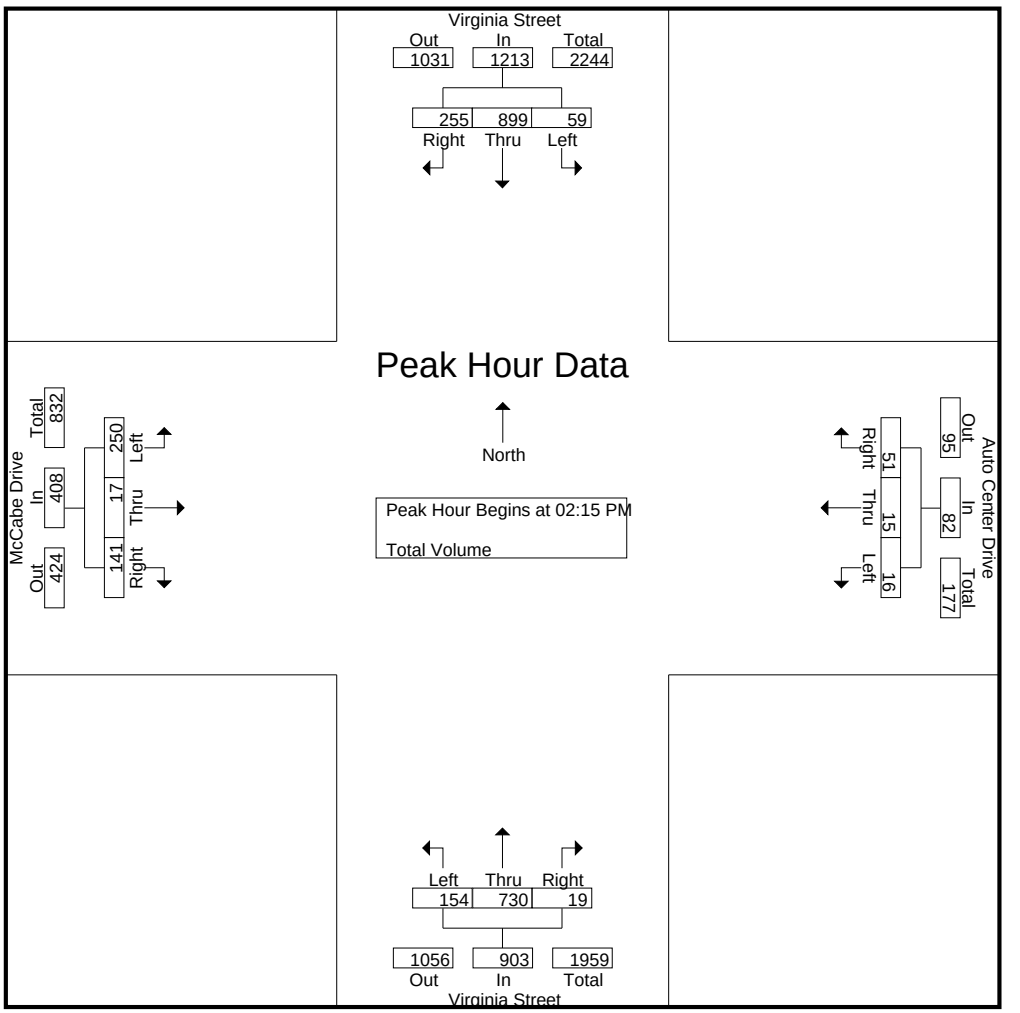
County of Washoe
N/S: Virginia Street (US Route 395)
E/W: McCabe Drive/Auto Center Drive
Weather: Clear

File Name : 02_CWS_Vir_McC PM
Site Code : 231026
Start Date : 11/2/2023
Page No : 2



Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	02:15 PM				02:00 PM				02:15 PM				02:15 PM			
+0 mins.	15	215	75	305	**6**	3	**18**	**27**	**52**	161	1	214	44	3	29	76
+15 mins.	**17**	222	**86**	**325**	3	**9**	13	25	46	196	**9**	**251**	**108**	**8**	**54**	**170**
+30 mins.	17	**235**	55	307	5	2	13	20	25	170	8	203	52	4	31	87
+45 mins.	10	227	39	276	3	1	14	18	31	**203**	1	235	46	2	27	75
Total Volume	59	899	255	1213	17	15	58	90	154	730	19	903	250	17	141	408
% App. Total	4.9	74.1	21		18.9	16.7	64.4		17.1	80.8	2.1		61.3	4.2	34.6	
PHF	.868	.956	.741	.933	.708	.417	.806	.833	.740	.899	.528	.899	.579	.531	.653	.600

Location: County of Washoe
N/S: Virginia Street
E/W: McCabe Drive

Date: 11/2/2023
Day: Thursday

PEDESTRIANS

	North Leg Virginia Street	East Leg Auto Center Drive	South Leg Virginia Street	West Leg McCabe Drive	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
8:00 AM	0	1	1	0	2
8:15 AM	0	1	0	1	2
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	0	2	1	1	4

	North Leg Virginia Street	East Leg Auto Center Drive	South Leg Virginia Street	West Leg McCabe Drive	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
2:00 PM	0	0	0	0	0
2:15 PM	0	0	0	0	0
2:30 PM	0	0	0	0	0
2:45 PM	0	0	0	0	0
3:00 PM	0	0	0	0	0
3:15 PM	1	0	0	0	1
3:30 PM	0	0	0	0	0
3:45 PM	0	1	0	0	1
TOTAL VOLUMES:	1	1	0	0	2

Counts Unlimited, Inc.
PO Box 1178
Corona, CA 92878
951-268-6268

Location: County of Washoe
N/S: Virginia Street
E/W: McCabe Drive

Date: 11/2/2023
Day: Thursday

BICYCLES

	Southbound Virginia Street			Westbound Auto Center Drive			Northbound Virginia Street			Eastbound McCabe Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	2	0	0	0	0	2

	Southbound Virginia Street			Westbound Auto Center Drive			Northbound Virginia Street			Eastbound McCabe Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
2:45 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
TOTAL VOLUMES:	0	3	0	0	0	0	0	1	0	0	0	0	4

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Counts Unlimited, Inc.
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County of Washoe
N/S: Virginia Street (US Route 395)
E/W: Bishop Manogue Drive
Weather: Clear

File Name : 03_CWS_Vir_BM AM
Site Code : 231026
Start Date : 11/2/2023
Page No : 1

Groups Printed- Total Volume

	Virginia Street Southbound			Virginia Street Northbound			Bishop Manogue Drive Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
07:00 AM	80	6	86	3	70	73	0	0	0	159
07:15 AM	73	6	79	8	122	130	1	9	10	219
07:30 AM	126	36	162	14	210	224	1	31	32	418
07:45 AM	127	68	195	63	231	294	6	101	107	596
Total	406	116	522	88	633	721	8	141	149	1392
08:00 AM	95	13	108	5	137	142	1	14	15	265
08:15 AM	121	26	147	11	133	144	0	3	3	294
08:30 AM	124	8	132	5	142	147	0	0	0	279
08:45 AM	134	8	142	6	143	149	0	6	6	297
Total	474	55	529	27	555	582	1	23	24	1135
Grand Total	880	171	1051	115	1188	1303	9	164	173	2527
Apprch %	83.7	16.3		8.8	91.2		5.2	94.8		
Total %	34.8	6.8	41.6	4.6	47	51.6	0.4	6.5	6.8	

	Virginia Street Southbound			Virginia Street Northbound			Bishop Manogue Drive Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	126	36	162	14	210	224	1	31	32	418
07:45 AM	**127**	**68**	**195**	**63**	**231**	**294**	**6**	**101**	**107**	**596**
08:00 AM	95	13	108	5	137	142	1	14	15	265
08:15 AM	121	26	147	11	133	144	0	3	3	294
Total Volume	469	143	612	93	711	804	8	149	157	1573
% App. Total	76.6	23.4		11.6	88.4		5.1	94.9		
PHF	.923	.526	.785	.369	.769	.684	.333	.369	.367	.660

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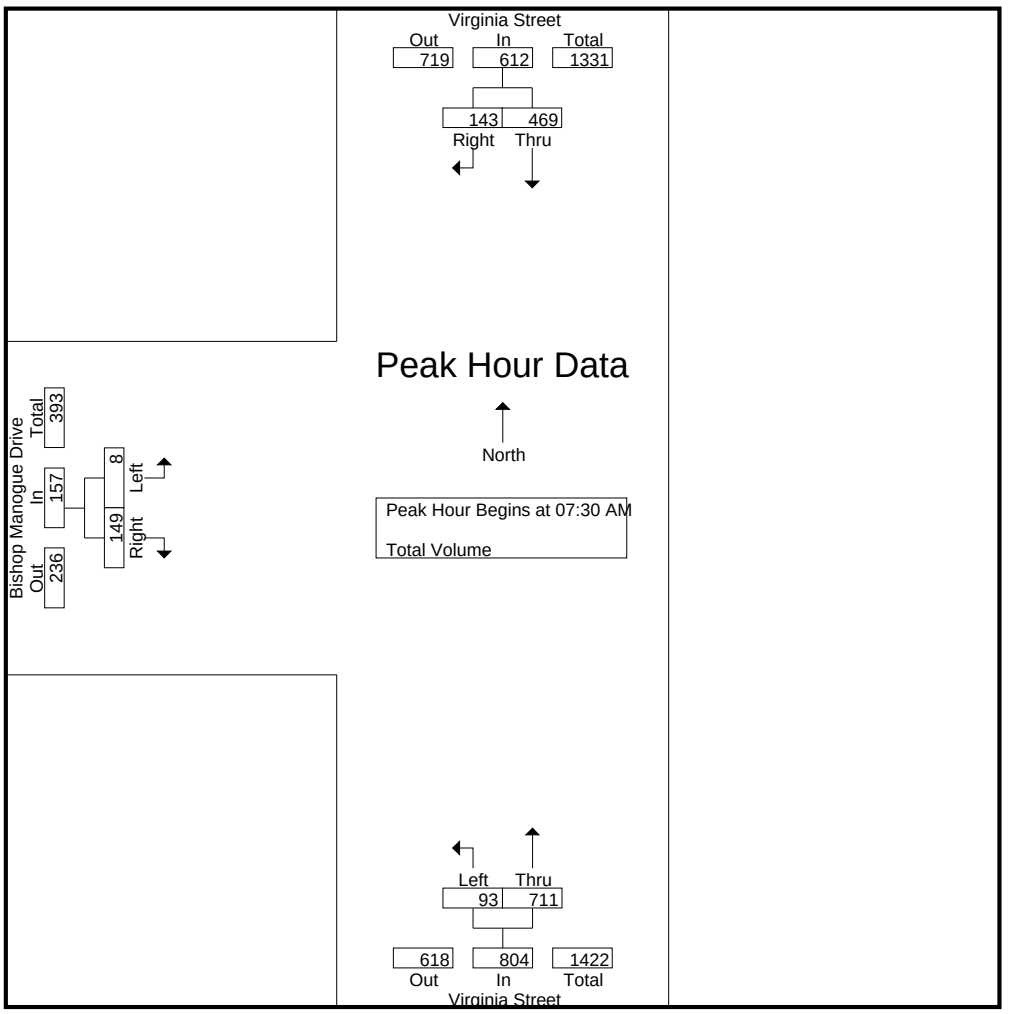
County of Washoe
N/S: Virginia Street (US Route 395)
E/W: Bishop Manogue Drive
Weather: Clear

File Name : 03_CWS_Vir_BM AM
Site Code : 231026
Start Date : 11/2/2023
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:30 AM			07:30 AM			07:15 AM		
+0 mins.	126	36	162	14	210	224	1	9	10
+15 mins.	**127**	**68**	**195**	**63**	**231**	**294**	1	31	32
+30 mins.	95	13	108	5	137	142	**6**	**101**	**107**
+45 mins.	121	26	147	11	133	144	1	14	15
Total Volume	469	143	612	93	711	804	9	155	164
% App. Total	76.6	23.4		11.6	88.4		5.5	94.5	
PHF	.923	.526	.785	.369	.769	.684	.375	.384	.383

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County of Washoe
N/S: Virginia Street (US Route 395)
E/W: Bishop Manogue Drive
Weather: Clear

File Name : 03_CWS_Vir_BM PM
Site Code : 231026
Start Date : 11/2/2023
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Groups Printed- Total Volume

	Virginia Street Southbound			Virginia Street Northbound			Bishop Manogue Drive Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
02:00 PM	251	7	258	1	237	238	0	10	10	506
02:15 PM	237	18	255	11	208	219	0	4	4	478
02:30 PM	251	21	272	4	257	261	17	117	134	667
02:45 PM	263	5	268	0	215	215	4	25	29	512
Total	1002	51	1053	16	917	933	21	156	177	2163
03:00 PM	258	13	271	5	213	218	4	14	18	507
03:15 PM	259	11	270	0	211	211	0	5	5	486
03:30 PM	294	10	304	3	231	234	3	13	16	554
03:45 PM	274	4	278	2	219	221	1	6	7	506
Total	1085	38	1123	10	874	884	8	38	46	2053
Grand Total	2087	89	2176	26	1791	1817	29	194	223	4216
Apprch %	95.9	4.1		1.4	98.6		13	87		
Total %	49.5	2.1	51.6	0.6	42.5	43.1	0.7	4.6	5.3	

	Virginia Street Southbound			Virginia Street Northbound			Bishop Manogue Drive Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 02:30 PM										
02:30 PM	251	**21**	**272**	4	**257**	**261**	**17**	**117**	**134**	**667**
02:45 PM	**263**	5	268	0	215	215	4	25	29	512
03:00 PM	258	13	271	**5**	213	218	4	14	18	507
03:15 PM	259	11	270	0	211	211	0	5	5	486
Total Volume	1031	50	1081	9	896	905	25	161	186	2172
% App. Total	95.4	4.6		1	99		13.4	86.6		
PHF	.980	.595	.994	.450	.872	.867	.368	.344	.347	.814

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County of Washoe
N/S: Virginia Street (US Route 395)
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Weather: Clear

File Name : 03_CWS_Vir_BM PM
Site Code : 231026
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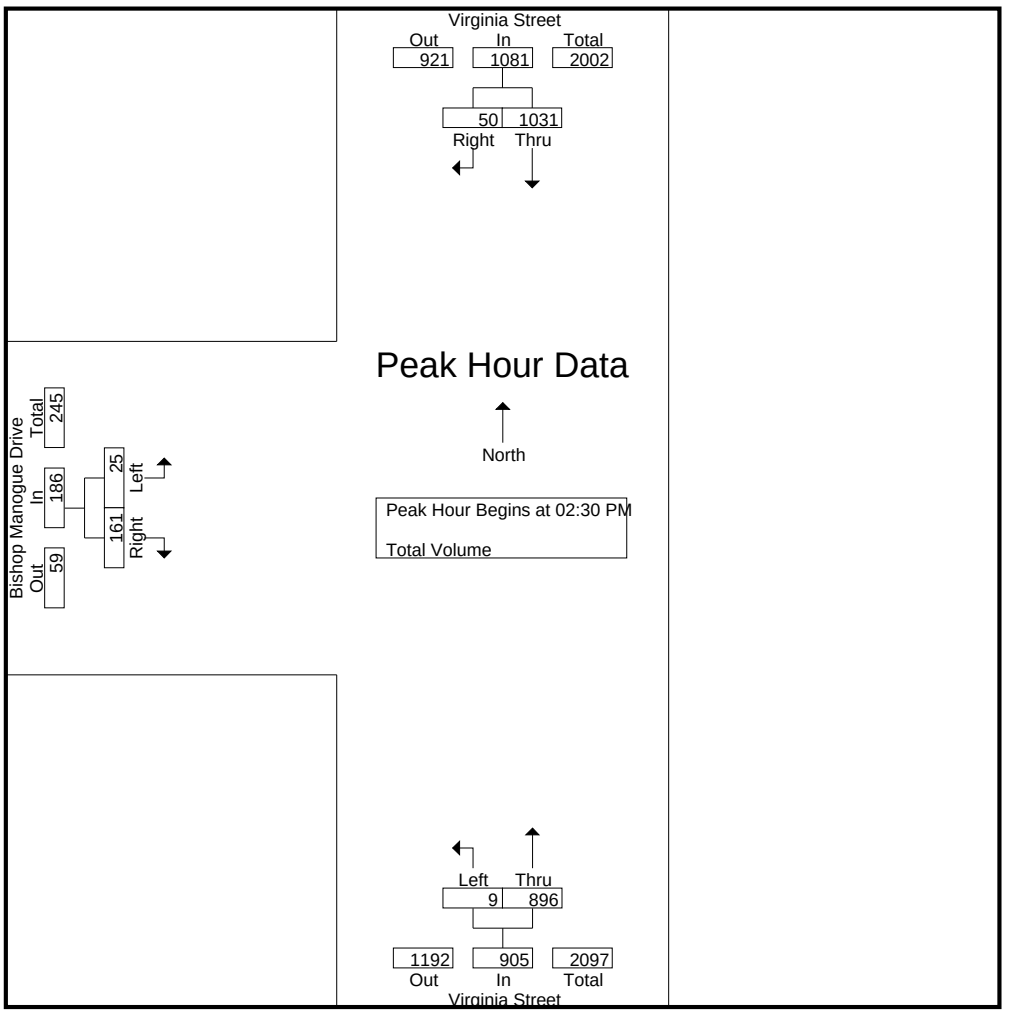

Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	03:00 PM			02:00 PM			02:30 PM		
+0 mins.	258	**13**	271	1	237	238	**17**	**117**	**134**
+15 mins.	259	11	270	**11**	208	219	4	25	29
+30 mins.	**294**	10	**304**	4	**257**	**261**	4	14	18
+45 mins.	274	4	278	0	215	215	0	5	5
Total Volume	1085	38	1123	16	917	933	25	161	186
% App. Total	96.6	3.4		1.7	98.3		13.4	86.6	
PHF	.923	.731	.924	.364	.892	.894	.368	.344	.347

Location: County of Washoe
N/S: Virginia Street
E/W: Bishop Manogue Drive

Date: 11/2/2023
Day: Thursday

PEDESTRIANS

	North Leg Virginia Street	East Leg Dead End	South Leg Virginia Street	West Leg Bishop Manogue Drive	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	1	1
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	1	1

	North Leg Virginia Street	East Leg Dead End	South Leg Virginia Street	West Leg Bishop Manogue Drive	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
2:00 PM	0	0	0	0	0
2:15 PM	0	0	0	0	0
2:30 PM	0	0	0	0	0
2:45 PM	0	0	0	0	0
3:00 PM	0	0	0	0	0
3:15 PM	0	0	0	1	1
3:30 PM	0	0	0	0	0
3:45 PM	0	0	0	1	1
TOTAL VOLUMES:	0	0	0	2	2

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Location: County of Washoe
N/S: Virginia Street
E/W: Bishop Manogue Drive

Date: 11/2/2023
Day: Thursday

BICYCLES

	Southbound Virginia Street			Westbound Dead End			Northbound Virginia Street			Eastbound Bishop Manogue Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	1	0	0	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	1	0	0	0	0	1
8:30 AM	0	0	0	0	0	0	0	1	0	0	0	0	1
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	1	2	0	0	0	0	3

	Southbound Virginia Street			Westbound Dead End			Northbound Virginia Street			Eastbound Bishop Manogue Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	1	0	0	0	0	0	0	0	0	0	0	1
2:45 PM	0	1	0	0	0	0	0	1	0	0	0	0	2
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	1	1
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	2	0	0	0	0	0	1	0	0	0	1	4

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County of Washoe
N/S: School Access Road
E/W: McCabe Drive
Weather: Clear

File Name : 05_CWS_SAR_McC AM
Site Code : 231026
Start Date : 11/2/2023
Page No : 1

Groups Printed- Total Volume

	USPS Driveway Southbound				McCabe Drive Westbound				School Access Road Northbound				McCabe Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	4	0	0	4	6	13	1	20	0	0	1	1	0	1	0	1	26
07:15 AM	8	0	0	8	11	59	2	72	0	0	3	3	0	8	0	8	91
07:30 AM	3	0	0	3	8	124	1	133	0	0	9	9	0	25	0	25	170
07:45 AM	4	0	0	4	9	178	0	187	3	0	28	31	0	61	0	61	283
Total	19	0	0	19	34	374	4	412	3	0	41	44	0	95	0	95	570
08:00 AM	5	0	0	5	6	16	2	24	0	0	7	7	0	2	0	2	38
08:15 AM	7	0	0	7	12	0	1	13	0	0	3	3	0	0	0	0	23
08:30 AM	8	0	0	8	11	0	0	11	0	0	2	2	0	0	0	0	21
08:45 AM	10	0	0	10	8	0	0	8	0	0	4	4	0	0	0	0	22
Total	30	0	0	30	37	16	3	56	0	0	16	16	0	2	0	2	104
Grand Total	49	0	0	49	71	390	7	468	3	0	57	60	0	97	0	97	674
Apprch %	100	0	0		15.2	83.3	1.5		5	0	95		0	100	0		
Total %	7.3	0	0	7.3	10.5	57.9	1	69.4	0.4	0	8.5	8.9	0	14.4	0	14.4	

	USPS Driveway Southbound				McCabe Drive Westbound				School Access Road Northbound				McCabe Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:15 AM																	
07:15 AM	**8**	0	0	**8**	**11**	59	**2**	72	0	0	3	3	0	8	0	8	91
07:30 AM	3	0	0	3	8	124	1	133	0	0	9	9	0	25	0	25	170
07:45 AM	4	0	0	4	9	**178**	0	**187**	**3**	0	**28**	**31**	0	**61**	0	**61**	**283**
08:00 AM	5	0	0	5	6	16	2	24	0	0	7	7	0	2	0	2	38
Total Volume	20	0	0	20	34	377	5	416	3	0	47	50	0	96	0	96	582
% App. Total	100	0	0		8.2	90.6	1.2		6	0	94		0	100	0		
PHF	.625	.000	.000	.625	.773	.529	.625	.556	.250	.000	.420	.403	.000	.393	.000	.393	.514

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County of Washoe
N/S: School Access Road
E/W: McCabe Drive
Weather: Clear

File Name : 05_CWS_SAR_McC AM
Site Code : 231026
Start Date : 11/2/2023
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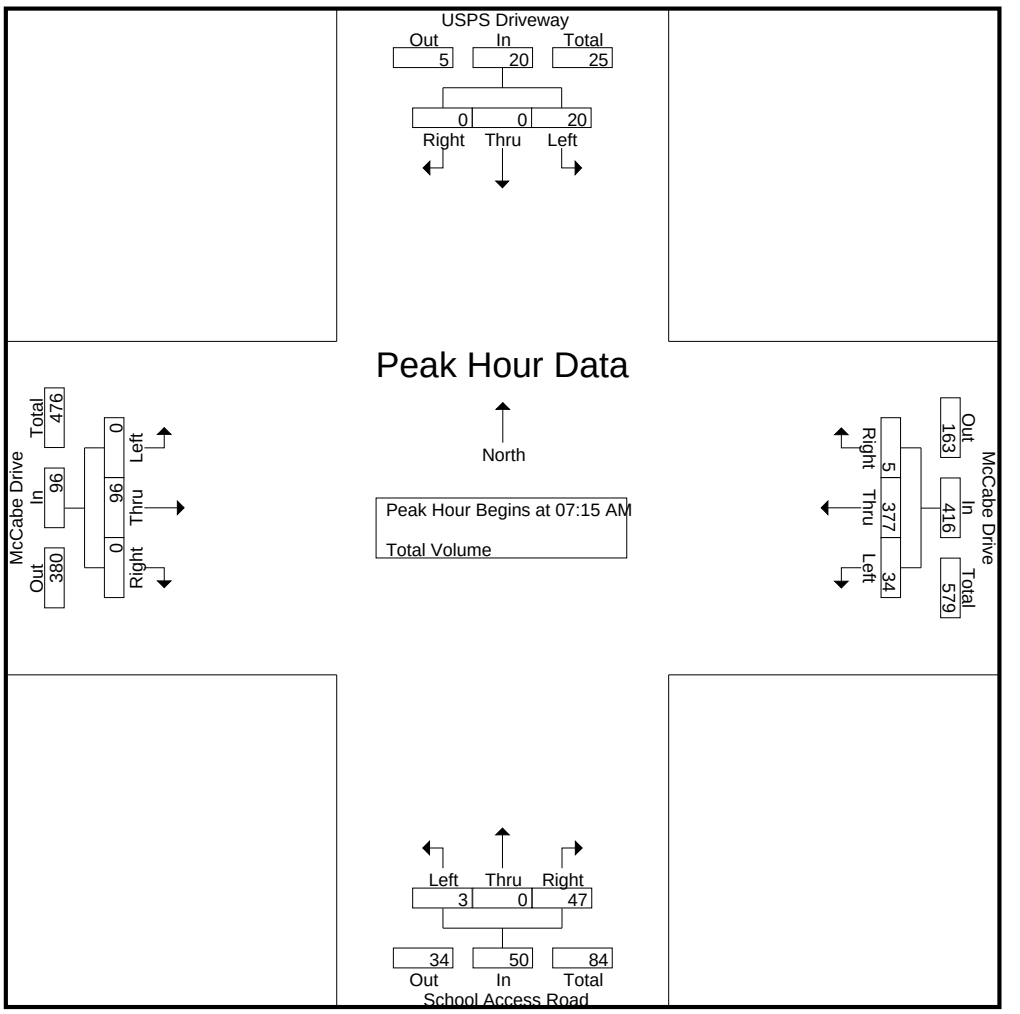

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:15 AM				07:15 AM				07:15 AM			
+0 mins.	5	0	0	5	**11**	59	**2**	72	0	0	3	3	0	8	0	8
+15 mins.	7	0	0	7	8	124	1	133	0	0	9	9	0	25	0	25
+30 mins.	8	0	0	8	9	**178**	0	**187**	**3**	0	**28**	**31**	0	**61**	0	**61**
+45 mins.	**10**	0	0	**10**	6	16	2	24	0	0	7	7	0	2	0	2
Total Volume	30	0	0	30	34	377	5	416	3	0	47	50	0	96	0	96
% App. Total	100	0	0		8.2	90.6	1.2		6	0	94		0	100	0	
PHF	.750	.000	.000	.750	.773	.529	.625	.556	.250	.000	.420	.403	.000	.393	.000	.393

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County of Washoe
N/S: School Access Road
E/W: McCabe Drive
Weather: Clear

File Name : 05_CWS_SAR_McC PM
Site Code : 231026
Start Date : 11/2/2023
Page No : 1

Groups Printed- Total Volume

	USPS Driveway Southbound				McCabe Drive Westbound				School Access Road Northbound				McCabe Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
02:00 PM	28	0	0	28	18	37	1	56	0	0	5	5	0	11	0	11	100
02:15 PM	23	1	0	24	17	80	0	97	0	0	8	8	0	16	0	16	145
02:30 PM	27	4	1	32	13	69	4	86	1	0	29	30	1	93	2	96	244
02:45 PM	25	0	1	26	11	34	2	47	1	0	6	7	0	35	0	35	115
Total	103	5	2	110	59	220	7	286	2	0	48	50	1	155	2	158	604
03:00 PM	22	0	0	22	11	34	0	45	2	0	9	11	0	11	0	11	89
03:15 PM	26	0	0	26	10	45	1	56	1	0	7	8	0	17	0	17	107
03:30 PM	26	0	1	27	13	21	3	37	0	0	6	6	0	13	0	13	83
03:45 PM	23	0	0	23	14	15	2	31	0	0	4	4	0	2	0	2	60
Total	97	0	1	98	48	115	6	169	3	0	26	29	0	43	0	43	339
Grand Total	200	5	3	208	107	335	13	455	5	0	74	79	1	198	2	201	943
Apprch %	96.2	2.4	1.4		23.5	73.6	2.9		6.3	0	93.7		0.5	98.5	1		
Total %	21.2	0.5	0.3	22.1	11.3	35.5	1.4	48.3	0.5	0	7.8	8.4	0.1	21	0.2	21.3	

	USPS Driveway Southbound				McCabe Drive Westbound				School Access Road Northbound				McCabe Drive Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 02:00 PM																	
02:00 PM	**28**	0	0	28	**18**	37	1	56	0	0	5	5	0	11	0	11	100
02:15 PM	23	1	0	24	17	**80**	0	**97**	0	0	8	8	0	16	0	16	145
02:30 PM	27	**4**	**1**	**32**	13	69	**4**	86	**1**	0	**29**	**30**	**1**	**93**	**2**	**96**	**244**
02:45 PM	25	0	1	26	11	34	2	47	1	0	6	7	0	35	0	35	115
Total Volume	103	5	2	110	59	220	7	286	2	0	48	50	1	155	2	158	604
% App. Total	93.6	4.5	1.8		20.6	76.9	2.4		4	0	96		0.6	98.1	1.3		
PHF	.920	.313	.500	.859	.819	.688	.438	.737	.500	.000	.414	.417	.250	.417	.250	.411	.619

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County of Washoe
N/S: School Access Road
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File Name : 05_CWS_SAR_McC PM
Site Code : 231026
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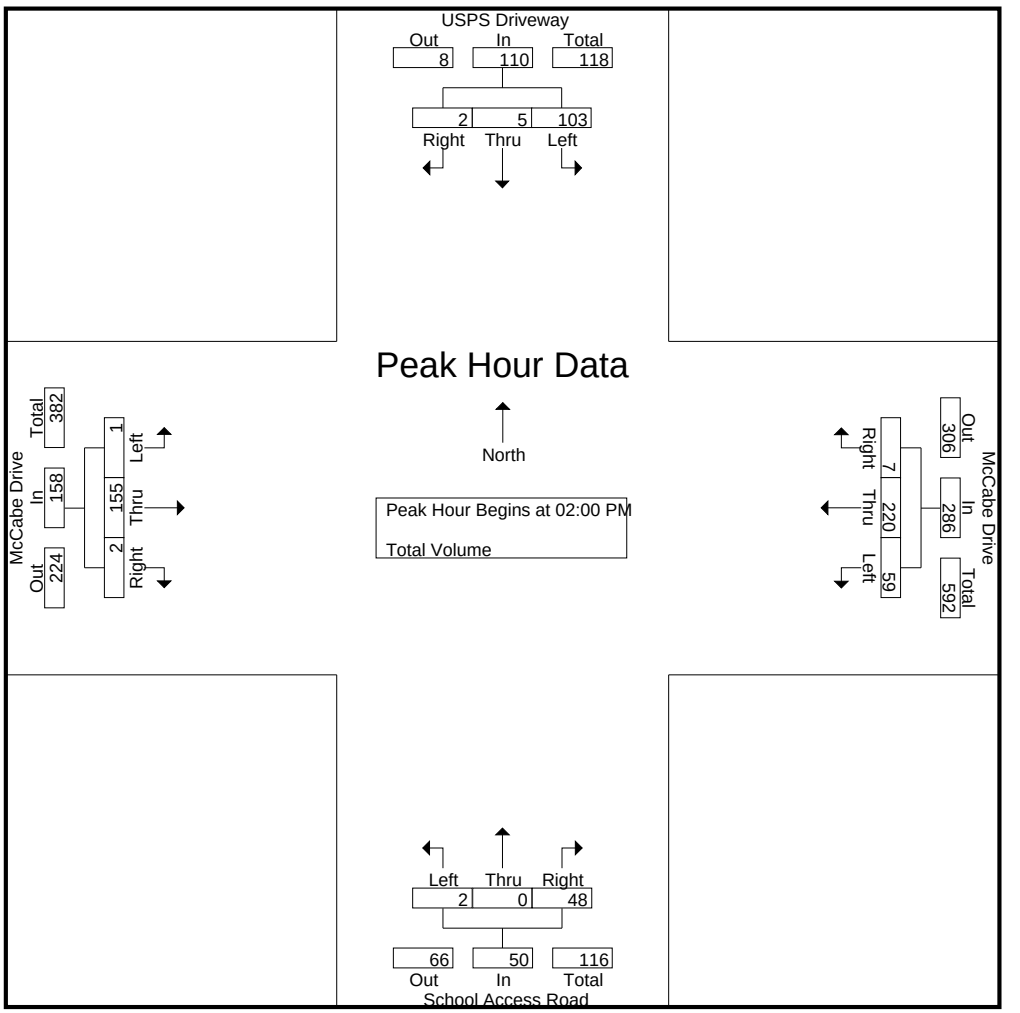

Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	02:00 PM				02:00 PM				02:15 PM				02:30 PM			
+0 mins.	**28**	0	0	28	**18**	37	1	56	0	0	8	8	**1**	**93**	**2**	**96**
+15 mins.	23	1	0	24	17	**80**	0	**97**	1	0	**29**	**30**	0	35	0	35
+30 mins.	27	**4**	**1**	**32**	13	69	**4**	86	1	0	6	7	0	11	0	11
+45 mins.	25	0	1	26	11	34	2	47	**2**	0	9	11	0	17	0	17
Total Volume	103	5	2	110	59	220	7	286	4	0	52	56	1	156	2	159
% App. Total	93.6	4.5	1.8		20.6	76.9	2.4		7.1	0	92.9		0.6	98.1	1.3	
PHF	.920	.313	.500	.859	.819	.688	.438	.737	.500	.000	.448	.467	.250	.419	.250	.414

Location: County of Washoe
N/S: School Access Road
E/W: McCabe Drive

Date: 11/2/2023
Day: Thursday

PEDESTRIANS

	North Leg USPS Driveway Pedestrians	East Leg McCabe Drive Pedestrians	South Leg School Access Road Pedestrians	West Leg McCabe Drive Pedestrians	
7:00 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:30 AM	0	0	2	0	2
7:45 AM	1	0	0	0	1
8:00 AM	1	0	0	2	3
8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
TOTAL VOLUMES:	2	0	2	2	6

	North Leg USPS Driveway Pedestrians	East Leg McCabe Drive Pedestrians	South Leg School Access Road Pedestrians	West Leg McCabe Drive Pedestrians	
2:00 PM	1	0	1	0	2
2:15 PM	0	0	2	1	3
2:30 PM	1	0	0	1	2
2:45 PM	0	0	1	0	1
3:00 PM	3	0	0	3	6
3:15 PM	0	0	0	0	0
3:30 PM	0	0	0	0	0
3:45 PM	1	0	0	0	1
TOTAL VOLUMES:	6	0	4	5	15

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Location: County of Washoe
N/S: School Access Road
E/W: McCabe Drive

Date: 11/2/2023
Day: Thursday

BICYCLES

	Southbound USPS Driveway			Westbound McCabe Drive			Northbound School Access Road			Eastbound McCabe Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	0	0	0	0	0	0

	Southbound USPS Driveway			Westbound McCabe Drive			Northbound School Access Road			Eastbound McCabe Drive			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	0	0	0	0	0	0

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County of Washoe
N/S: School Access Road
E/W: Bishop Manogue Drive
Weather: Clear

File Name : 06_CWS_SAR_BM AM
Site Code : 231026
Start Date : 11/2/2023
Page No : 1

Groups Printed- Total Volume

	School Access Road Southbound			Bishop Manogue Drive Westbound			School Access Road Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	0	0	0	5	4	9	0	1	1	10
07:15 AM	1	0	1	3	7	10	1	13	14	25
07:30 AM	6	0	6	3	40	43	2	35	37	86
07:45 AM	23	0	23	6	115	121	1	106	107	251
Total	30	0	30	17	166	183	4	155	159	372
08:00 AM	1	0	1	0	5	5	0	13	13	19
08:15 AM	0	0	0	3	7	10	0	5	5	15
08:30 AM	0	0	0	2	3	5	0	1	1	6
08:45 AM	0	0	0	1	16	17	0	2	2	19
Total	1	0	1	6	31	37	0	21	21	59
Grand Total	31	0	31	23	197	220	4	176	180	431
Apprch %	100	0		10.5	89.5		2.2	97.8		
Total %	7.2	0	7.2	5.3	45.7	51	0.9	40.8	41.8	

	School Access Road Southbound			Bishop Manogue Drive Westbound			School Access Road Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	1	0	1	3	7	10	1	13	14	25
07:30 AM	6	0	6	3	40	43	**2**	35	37	86
07:45 AM	**23**	0	**23**	**6**	**115**	**121**	1	**106**	**107**	**251**
08:00 AM	1	0	1	0	5	5	0	13	13	19
Total Volume	31	0	31	12	167	179	4	167	171	381
% App. Total	100	0		6.7	93.3		2.3	97.7		
PHF	.337	.000	.337	.500	.363	.370	.500	.394	.400	.379

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County of Washoe
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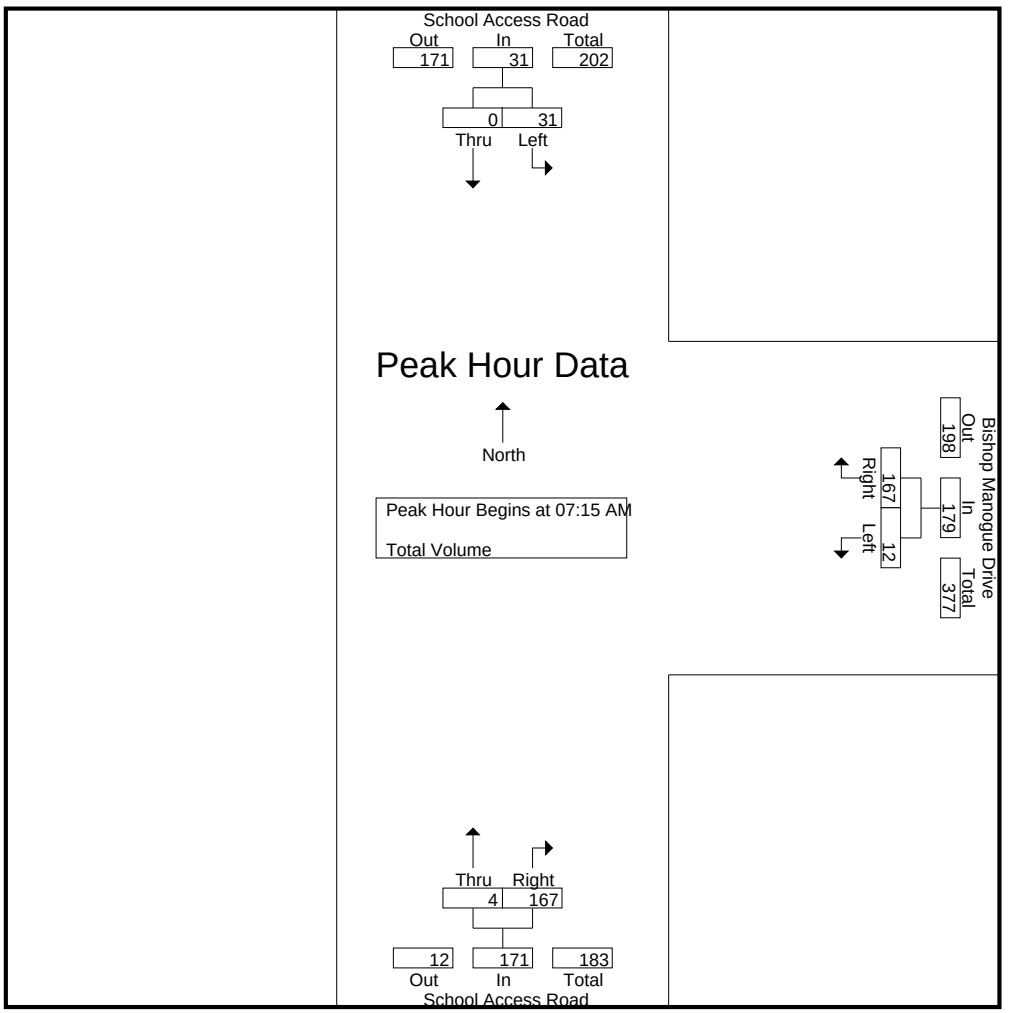
File Name : 06_CWS_SAR_BM AM
Site Code : 231026
Start Date : 11/2/2023
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:15 AM			07:00 AM			07:15 AM		
+0 mins.	1	0	1	5	4	9	1	13	14
+15 mins.	6	0	6	3	7	10	**2**	35	37
+30 mins.	**23**	0	**23**	3	40	43	1	**106**	**107**
+45 mins.	1	0	1	**6**	**115**	**121**	0	13	13
Total Volume	31	0	31	17	166	183	4	167	171
% App. Total	100	0		9.3	90.7		2.3	97.7	
PHF	.337	.000	.337	.708	.361	.378	.500	.394	.400

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County of Washoe
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E/W: Bishop Manogue Drive
Weather: Clear

File Name : 06_CWS_SAR_BM PM
Site Code : 231026
Start Date : 11/2/2023
Page No : 1

Groups Printed- Total Volume

	School Access Road Southbound			Bishop Manogue Drive Westbound			School Access Road Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
02:00 PM	4	0	4	1	9	10	1	6	7	21
02:15 PM	0	0	0	7	14	21	2	3	5	26
02:30 PM	62	0	62	6	27	33	0	69	69	164
02:45 PM	6	0	6	3	0	3	1	11	12	21
Total	72	0	72	17	50	67	4	89	93	232
03:00 PM	2	0	2	2	12	14	0	10	10	26
03:15 PM	1	0	1	0	8	8	0	3	3	12
03:30 PM	7	0	7	0	11	11	0	9	9	27
03:45 PM	1	0	1	5	2	7	0	4	4	12
Total	11	0	11	7	33	40	0	26	26	77
Grand Total	83	0	83	24	83	107	4	115	119	309
Apprch %	100	0		22.4	77.6		3.4	96.6		
Total %	26.9	0	26.9	7.8	26.9	34.6	1.3	37.2	38.5	

	School Access Road Southbound			Bishop Manogue Drive Westbound			School Access Road Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 02:15 PM										
02:15 PM	0	0	0	**7**	14	21	**2**	3	5	26
02:30 PM	**62**	0	**62**	6	**27**	**33**	0	**69**	**69**	**164**
02:45 PM	6	0	6	3	0	3	1	11	12	21
03:00 PM	2	0	2	2	12	14	0	10	10	26
Total Volume	70	0	70	18	53	71	3	93	96	237
% App. Total	100	0		25.4	74.6		3.1	96.9		
PHF	.282	.000	.282	.643	.491	.538	.375	.337	.348	.361

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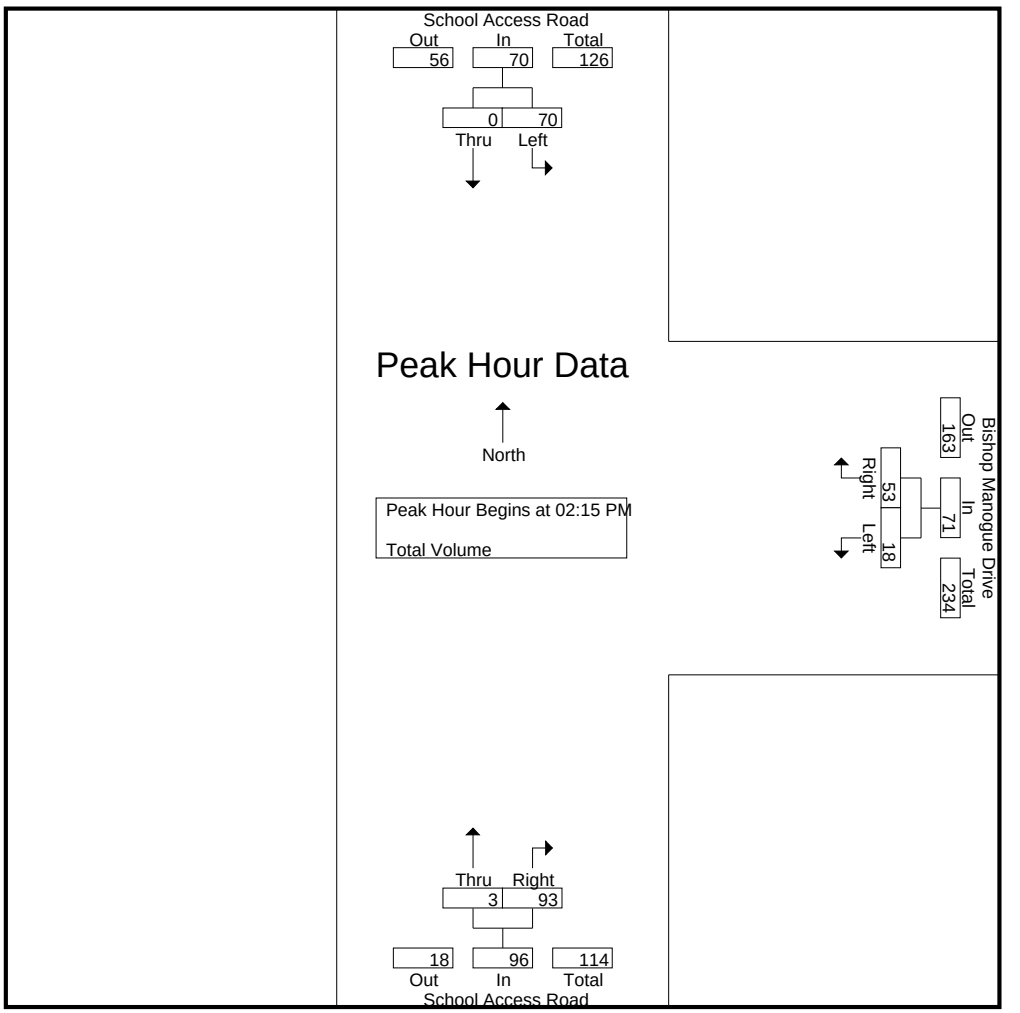
File Name : 06_CWS_SAR_BM PM
Site Code : 231026
Start Date : 11/2/2023
Page No : 2



Peak Hour Analysis From 02:00 PM to 03:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	02:00 PM			02:15 PM			02:15 PM		
+0 mins.	4	0	4	**7**	14	21	**2**	3	5
+15 mins.	0	0	0	6	**27**	**33**	0	**69**	**69**
+30 mins.	**62**	0	**62**	3	0	3	1	11	12
+45 mins.	6	0	6	2	12	14	0	10	10
Total Volume	72	0	72	18	53	71	3	93	96
% App. Total	100	0		25.4	74.6		3.1	96.9	
PHF	.290	.000	.290	.643	.491	.538	.375	.337	.348

Location: County of Washoe
N/S: School Access Road
E/W: Bishop Manogue Drive

Date: 11/2/2023
Day: Thursday

PEDESTRIANS

	North Leg School Access Road	East Leg Bishop Manogue Drive	South Leg School Access Road	West Leg Dead End	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
7:00 AM	1	0	0	0	1
7:15 AM	5	0	0	0	5
7:30 AM	15	0	0	0	15
7:45 AM	11	0	0	0	11
8:00 AM	2	1	0	0	3
8:15 AM	2	0	0	0	2
8:30 AM	0	0	0	0	0
8:45 AM	2	0	0	0	2
TOTAL VOLUMES:	38	1	0	0	39

	North Leg School Access Road	East Leg Bishop Manogue Drive	South Leg School Access Road	West Leg Dead End	
	Pedestrians	Pedestrians	Pedestrians	Pedestrians	
2:00 PM	2	0	0	0	2
2:15 PM	6	0	0	0	6
2:30 PM	12	0	0	0	12
2:45 PM	10	0	0	0	10
3:00 PM	11	0	0	0	11
3:15 PM	7	0	0	0	7
3:30 PM	9	0	0	0	9
3:45 PM	0	0	0	0	0
TOTAL VOLUMES:	57	0	0	0	57

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Location: County of Washoe
N/S: School Access Road
E/W: Bishop Manogue Drive

Date: 11/2/2023
Day: Thursday

BICYCLES

	Southbound School Access Road			Westbound Bishop Manogue Drive			Northbound School Access Road			Eastbound Dead End			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
7:30 AM	0	0	0	0	0	1	0	0	0	0	0	0	1
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	1	0	0	0	0	0	0	1

	Southbound School Access Road			Westbound Bishop Manogue Drive			Northbound School Access Road			Eastbound Dead End			
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
2:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
2:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	1
3:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
3:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL VOLUMES:	0	0	0	0	0	0	0	0	1	0	0	0	1

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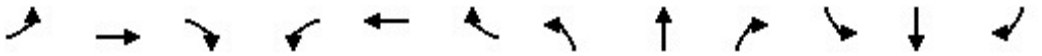
APPENDIX C | SYNCHRO LOS REPORTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	8	27	18	31	15	292	504	11	36	537	259
Future Volume (veh/h)	159	8	27	18	31	15	292	504	11	36	537	259
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	227	11	39	26	44	21	417	720	16	51	767	227
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	375	442	374	412	283	135	475	2408	730	65	1234	383
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.27	0.47	0.47	0.04	0.24	0.24
Sat Flow, veh/h	1337	1870	1583	1353	1197	571	1781	5106	1548	1781	5106	1585
Grp Volume(v), veh/h	227	11	39	26	0	65	417	720	16	51	767	227
Grp Sat Flow(s),veh/h/ln	1337	1870	1583	1353	0	1768	1781	1702	1548	1781	1702	1585
Q Serve(g_s), s	11.9	0.3	1.4	1.1	0.0	2.1	16.4	6.3	0.4	2.1	9.8	9.3
Cycle Q Clear(g_c), s	14.0	0.3	1.4	1.4	0.0	2.1	16.4	6.3	0.4	2.1	9.8	9.3
Prop In Lane	1.00		1.00	1.00		0.32	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	375	442	374	412	0	418	475	2408	730	65	1234	383
V/C Ratio(X)	0.60	0.02	0.10	0.06	0.00	0.16	0.88	0.30	0.02	0.79	0.62	0.59
Avail Cap(c_a), veh/h	1027	1354	1146	943	0	1111	852	2790	846	365	2790	866
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.7	21.5	21.9	22.0	0.0	22.2	25.7	11.9	10.3	35.0	24.8	24.6
Incr Delay (d2), s/veh	1.6	0.0	0.1	0.1	0.0	0.2	5.4	0.1	0.0	18.5	0.5	1.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	0.1	0.5	0.4	0.0	0.9	6.6	1.9	0.1	1.2	3.5	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	29.3	21.5	22.0	22.1	0.0	22.3	31.1	12.0	10.3	53.5	25.3	26.0
LnGrp LOS	C	C	C	C	A	C	C	B	B	D	C	C
Approach Vol, veh/h		277			91			1153			1045	
Approach Delay, s/veh		27.9			22.3			18.9			26.8	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.9	42.1		22.2	25.7	25.3		22.2				
Change Period (Y+Rc), s	6.2	7.6		4.9	6.2	7.6		4.9				
Max Green Setting (Gmax), s	15.0	40.0		53.0	35.0	40.0		46.0				
Max Q Clear Time (g_c+I1), s	4.1	8.3		16.0	18.4	11.8		4.1				
Green Ext Time (p_c), s	0.1	4.7		0.9	1.1	5.7		0.5				

Intersection Summary												
HCM 6th Ctrl Delay			23.2									
HCM 6th LOS			C									

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	188	816	98	39
Demand Flow Rate, veh/h	192	832	100	40
Vehicles Circulating, veh/h	108	6	232	828
Vehicles Exiting, veh/h	760	326	68	10
Ped Vol Crossing Leg, #/h	2	0	2	2
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.3	9.7	4.2	7.0
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	192	832	100	40
Cap Entry Lane, veh/h	1236	1371	1089	593
Entry HV Adj Factor	0.980	0.981	0.980	0.975
Flow Entry, veh/h	188	816	98	39
Cap Entry, veh/h	1211	1345	1067	578
V/C Ratio	0.155	0.607	0.092	0.067
Control Delay, s/veh	4.3	9.7	4.2	7.0
LOS	A	A	A	A
95th %tile Queue, veh	1	4	0	0

Intersection	
Intersection Delay, s/veh	5.9
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	471	450	82
Demand Flow Rate, veh/h	481	459	84
Vehicles Circulating, veh/h	11	84	33
Vehicles Exiting, veh/h	532	33	459
Ped Vol Crossing Leg, #/h	1	0	38
Ped Cap Adj	1.000	1.000	0.995
Approach Delay, s/veh	5.9	6.4	3.3
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	481	459	84
Cap Entry Lane, veh/h	1364	1267	1334
Entry HV Adj Factor	0.979	0.980	0.976
Flow Entry, veh/h	471	450	82
Cap Entry, veh/h	1336	1241	1296
V/C Ratio	0.353	0.362	0.063
Control Delay, s/veh	5.9	6.4	3.3
LOS	A	A	A
95th %tile Queue, veh	2	2	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	17	141	16	15	51	163	723	19	59	899	255
Future Volume (veh/h)	275	17	141	16	15	51	163	723	19	59	899	255
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	324	20	78	19	18	60	192	851	22	69	1058	153
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	467	593	503	495	120	400	240	1988	604	90	1558	472
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.13	0.39	0.39	0.05	0.31	0.31
Sat Flow, veh/h	1320	1870	1585	1297	379	1263	1781	5106	1552	1781	5106	1548
Grp Volume(v), veh/h	324	20	78	19	0	78	192	851	22	69	1058	153
Grp Sat Flow(s),veh/h/ln	1320	1870	1585	1297	0	1642	1781	1702	1552	1781	1702	1548
Q Serve(g_s), s	17.9	0.6	2.7	0.8	0.0	2.6	8.0	9.4	0.7	2.9	14.0	5.9
Cycle Q Clear(g_c), s	20.6	0.6	2.7	1.4	0.0	2.6	8.0	9.4	0.7	2.9	14.0	5.9
Prop In Lane	1.00		1.00	1.00		0.77	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	467	593	503	495	0	521	240	1988	604	90	1558	472
V/C Ratio(X)	0.69	0.03	0.16	0.04	0.00	0.15	0.80	0.43	0.04	0.77	0.68	0.32
Avail Cap(c_a), veh/h	959	1289	1093	860	0	982	811	2657	807	348	2657	805
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.2	18.1	18.9	18.6	0.0	18.8	32.3	17.2	14.5	36.1	23.4	20.6
Incr Delay (d2), s/veh	1.9	0.0	0.1	0.0	0.0	0.1	6.1	0.1	0.0	12.9	0.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.2	1.0	0.2	0.0	1.0	3.5	3.1	0.2	1.5	4.9	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.0	18.1	19.0	18.6	0.0	19.0	38.4	17.3	14.6	49.0	23.9	21.0
LnGrp LOS	C	B	B	B	A	B	D	B	B	D	C	C
Approach Vol, veh/h		422			97			1065			1280	
Approach Delay, s/veh		25.9			18.9			21.1			24.9	
Approach LOS		C			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.1	37.5		29.3	16.5	31.1		29.3				
Change Period (Y+Rc), s	6.2	7.6		4.9	6.2	7.6		4.9				
Max Green Setting (Gmax), s	15.0	40.0		53.0	35.0	40.0		46.0				
Max Q Clear Time (g_c+I1), s	4.9	11.4		22.6	10.0	16.0		4.6				
Green Ext Time (p_c), s	0.1	5.6		1.5	0.5	7.5		0.6				

Intersection Summary			
HCM 6th Ctrl Delay		23.4	
HCM 6th LOS		C	

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	5.9
Intersection LOS	A

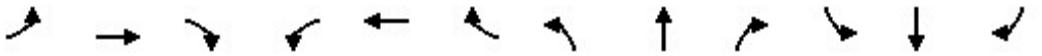
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	255	461	80	177
Demand Flow Rate, veh/h	260	470	82	180
Vehicles Circulating, veh/h	274	5	426	462
Vehicles Exiting, veh/h	368	503	108	13
Ped Vol Crossing Leg, #/h	5	0	4	6
Ped Cap Adj	0.999	1.000	0.999	0.999
Approach Delay, s/veh	5.9	5.8	5.0	6.4
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	260	470	82	180
Cap Entry Lane, veh/h	1043	1373	894	861
Entry HV Adj Factor	0.981	0.981	0.976	0.982
Flow Entry, veh/h	255	461	80	177
Cap Entry, veh/h	1023	1346	871	846
V/C Ratio	0.249	0.342	0.092	0.209
Control Delay, s/veh	5.9	5.8	5.0	6.4
LOS	A	A	A	A
95th %tile Queue, veh	1	2	0	1

Intersection	
Intersection Delay, s/veh	4.6
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	197	266	194
Demand Flow Rate, veh/h	201	271	198
Vehicles Circulating, veh/h	8	198	51
Vehicles Exiting, veh/h	461	51	158
Ped Vol Crossing Leg, #/h	0	0	57
Ped Cap Adj	1.000	1.000	0.992
Approach Delay, s/veh	3.9	5.5	4.1
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	201	271	198
Cap Entry Lane, veh/h	1369	1128	1310
Entry HV Adj Factor	0.980	0.981	0.980
Flow Entry, veh/h	197	266	194
Cap Entry, veh/h	1341	1106	1273
V/C Ratio	0.147	0.240	0.152
Control Delay, s/veh	3.9	5.5	4.1
LOS	A	A	A
95th %tile Queue, veh	1	1	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	212	11	66	18	38	15	383	504	11	36	559	303
Future Volume (veh/h)	212	11	66	18	38	15	383	504	11	36	559	303
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	303	16	94	26	54	21	547	720	16	51	799	290
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	390	523	443	412	359	139	601	2719	824	66	1185	368
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.34	0.53	0.53	0.04	0.23	0.23
Sat Flow, veh/h	1325	1870	1583	1282	1282	499	1781	5106	1548	1781	5106	1585
Grp Volume(v), veh/h	303	16	94	26	0	75	547	720	16	51	799	290
Grp Sat Flow(s),veh/h/ln	1325	1870	1583	1282	0	1781	1781	1702	1548	1781	1702	1585
Q Serve(g_s), s	26.3	0.7	5.4	1.8	0.0	3.7	34.7	9.1	0.6	3.4	16.8	20.3
Cycle Q Clear(g_c), s	30.1	0.7	5.4	2.5	0.0	3.7	34.7	9.1	0.6	3.4	16.8	20.3
Prop In Lane	1.00		1.00	1.00		0.28	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	390	523	443	412	0	498	601	2719	824	66	1185	368
V/C Ratio(X)	0.78	0.03	0.21	0.06	0.00	0.15	0.91	0.26	0.02	0.77	0.67	0.79
Avail Cap(c_a), veh/h	457	618	523	477	0	588	601	2719	824	137	1185	368
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.3	30.9	32.5	31.8	0.0	32.0	37.4	15.0	13.0	56.3	41.2	42.6
Incr Delay (d2), s/veh	7.1	0.0	0.2	0.1	0.0	0.1	20.3	0.1	0.0	17.3	3.1	15.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	0.3	2.1	0.6	0.0	1.7	17.4	3.2	0.2	1.8	7.0	9.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.4	30.9	32.8	31.8	0.0	32.1	57.7	15.1	13.0	73.7	44.3	58.2
LnGrp LOS	D	C	C	C	A	C	E	B	B	E	D	E
Approach Vol, veh/h		413			101			1283			1140	
Approach Delay, s/veh		45.6			32.0			33.2			49.2	
Approach LOS		D			C			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.6	69.3		38.1	46.0	33.9		38.1				
Change Period (Y+Rc), s	6.2	6.5		5.1	6.2	6.5		5.1				
Max Green Setting (Gmax), s	9.1	58.1		39.0	39.8	27.4		39.0				
Max Q Clear Time (g_c+I1), s	5.4	11.1		32.1	36.7	22.3		5.7				
Green Ext Time (p_c), s	0.0	4.8		0.9	0.6	2.6		0.5				

Intersection Summary												
HCM 6th Ctrl Delay			41.1									
HCM 6th LOS			D									

Intersection	
Intersection Delay, s/veh	13.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	314	1094	159	39
Demand Flow Rate, veh/h	320	1116	162	40
Vehicles Circulating, veh/h	132	6	360	1112
Vehicles Exiting, veh/h	1020	516	92	10
Ped Vol Crossing Leg, #/h	2	0	2	2
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.5	17.2	5.5	9.6
Approach LOS	A	C	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	320	1116	162	40
Cap Entry Lane, veh/h	1206	1371	956	444
Entry HV Adj Factor	0.980	0.980	0.981	0.975
Flow Entry, veh/h	314	1094	159	39
Cap Entry, veh/h	1182	1345	938	433
V/C Ratio	0.265	0.814	0.170	0.090
Control Delay, s/veh	5.5	17.2	5.5	9.6
LOS	A	C	A	A
95th %tile Queue, veh	1	10	1	0

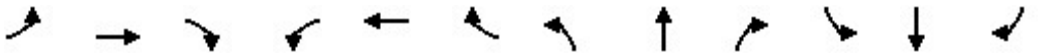
Intersection	
Intersection Delay, s/veh	6.4
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	529	493	89
Demand Flow Rate, veh/h	540	503	91
Vehicles Circulating, veh/h	11	91	35
Vehicles Exiting, veh/h	583	35	516
Ped Vol Crossing Leg, #/h	1	0	38
Ped Cap Adj	1.000	1.000	0.995
Approach Delay, s/veh	6.4	6.9	3.3
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	540	503	91
Cap Entry Lane, veh/h	1364	1258	1331
Entry HV Adj Factor	0.980	0.980	0.978
Flow Entry, veh/h	529	493	89
Cap Entry, veh/h	1336	1232	1295
V/C Ratio	0.396	0.400	0.069
Control Delay, s/veh	6.4	6.9	3.3
LOS	A	A	A
95th %tile Queue, veh	2	2	0

3: Virginia Street & Bishop Manogue Drive Performance by movement

Movement	EBT	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.0
Total Del/Veh (s)	0.1	1.2	0.4	2.5	1.7	1.2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	322	20	180	16	17	51	204	705	19	59	902	275
Future Volume (veh/h)	322	20	180	16	17	51	204	705	19	59	902	275
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	379	24	124	19	20	60	240	829	22	69	1061	177
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	479	645	547	485	142	426	392	2247	683	89	1380	418
Arrive On Green	0.35	0.35	0.35	0.35	0.35	0.35	0.22	0.44	0.44	0.05	0.27	0.27
Sat Flow, veh/h	1318	1870	1585	1240	412	1235	1781	5106	1552	1781	5106	1547
Grp Volume(v), veh/h	379	24	124	19	0	80	240	829	22	69	1061	177
Grp Sat Flow(s),veh/h/ln	1318	1870	1585	1240	0	1647	1781	1702	1552	1781	1702	1547
Q Serve(g_s), s	29.3	0.9	5.9	1.1	0.0	3.5	12.8	11.5	0.8	4.0	20.2	10.0
Cycle Q Clear(g_c), s	32.9	0.9	5.9	2.0	0.0	3.5	12.8	11.5	0.8	4.0	20.2	10.0
Prop In Lane	1.00		1.00	1.00		0.75	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	479	645	547	485	0	568	392	2247	683	89	1380	418
V/C Ratio(X)	0.79	0.04	0.23	0.04	0.00	0.14	0.61	0.37	0.03	0.78	0.77	0.42
Avail Cap(c_a), veh/h	597	814	690	597	0	716	392	2439	741	176	1820	551
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.1	22.9	24.6	23.6	0.0	23.8	37.1	19.7	16.8	49.5	35.5	31.7
Incr Delay (d2), s/veh	5.7	0.0	0.2	0.0	0.0	0.1	7.0	0.1	0.0	13.3	1.5	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.1	0.4	2.3	0.3	0.0	1.4	6.0	4.1	0.3	2.0	8.0	3.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.8	22.9	24.8	23.6	0.0	23.9	44.1	19.8	16.8	62.8	37.0	32.4
LnGrp LOS	D	C	C	C	A	C	D	B	B	E	D	C
Approach Vol, veh/h		527			99			1091			1307	
Approach Delay, s/veh		36.2			23.8			25.1			37.7	
Approach LOS		D			C			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.1	52.9		41.5	29.0	35.0		41.5				
Change Period (Y+Rc), s	5.8	6.5		5.1	5.8	6.5		5.1				
Max Green Setting (Gmax), s	10.4	50.4		45.9	23.2	37.6		45.9				
Max Q Clear Time (g_c+I1), s	6.0	13.5		34.9	14.8	22.2		5.5				
Green Ext Time (p_c), s	0.0	5.7		1.5	0.4	6.3		0.6				

Intersection Summary			
HCM 6th Ctrl Delay		32.5	
HCM 6th LOS		C	

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	7.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	328	563	103	226
Demand Flow Rate, veh/h	334	574	105	230
Vehicles Circulating, veh/h	345	5	550	562
Vehicles Exiting, veh/h	447	650	129	17
Ped Vol Crossing Leg, #/h	5	0	4	6
Ped Cap Adj	0.999	1.000	0.999	0.999
Approach Delay, s/veh	7.5	6.7	6.0	8.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	334	574	105	230
Cap Entry Lane, veh/h	971	1373	787	778
Entry HV Adj Factor	0.981	0.981	0.981	0.982
Flow Entry, veh/h	328	563	103	226
Cap Entry, veh/h	951	1347	772	763
V/C Ratio	0.344	0.418	0.133	0.296
Control Delay, s/veh	7.5	6.7	6.0	8.2
LOS	A	A	A	A
95th %tile Queue, veh	2	2	0	1

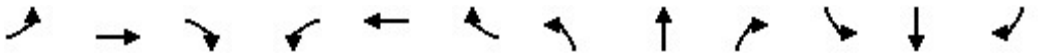
Intersection	
Intersection Delay, s/veh	4.8
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	206	286	211
Demand Flow Rate, veh/h	210	292	215
Vehicles Circulating, veh/h	8	215	54
Vehicles Exiting, veh/h	499	54	164
Ped Vol Crossing Leg, #/h	0	0	57
Ped Cap Adj	1.000	1.000	0.992
Approach Delay, s/veh	3.9	5.8	4.2
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	210	292	215
Cap Entry Lane, veh/h	1369	1108	1306
Entry HV Adj Factor	0.981	0.979	0.981
Flow Entry, veh/h	206	286	211
Cap Entry, veh/h	1343	1085	1272
V/C Ratio	0.153	0.264	0.166
Control Delay, s/veh	3.9	5.8	4.2
LOS	A	A	A
95th %tile Queue, veh	1	1	1

3: Virginia Street & Bishop Manogue Drive Performance by movement

Movement	EBT	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	0.1	1.2	1.1	1.2	0.8	1.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	159	8	27	18	31	15	292	610	11	36	610	259
Future Volume (veh/h)	159	8	27	18	31	15	292	610	11	36	610	259
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	173	9	29	20	34	16	317	663	12	39	663	173
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	277	330	280	307	212	100	624	3147	955	58	1525	473
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.35	0.62	0.62	0.03	0.30	0.30
Sat Flow, veh/h	1355	1870	1582	1368	1203	566	1781	5106	1549	1781	5106	1585
Grp Volume(v), veh/h	173	9	29	20	0	50	317	663	12	39	663	173
Grp Sat Flow(s),veh/h/ln	1355	1870	1582	1368	0	1768	1781	1702	1549	1781	1702	1585
Q Serve(g_s), s	12.7	0.4	1.6	1.3	0.0	2.4	14.4	5.8	0.3	2.2	10.7	8.8
Cycle Q Clear(g_c), s	15.1	0.4	1.6	1.7	0.0	2.4	14.4	5.8	0.3	2.2	10.7	8.8
Prop In Lane	1.00		1.00	1.00		0.32	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	277	330	280	307	0	312	624	3147	955	58	1525	473
V/C Ratio(X)	0.62	0.03	0.10	0.07	0.00	0.16	0.51	0.21	0.01	0.67	0.43	0.37
Avail Cap(c_a), veh/h	567	731	618	599	0	691	624	3147	955	136	1525	473
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.0	34.8	35.3	35.5	0.0	35.6	26.2	8.6	7.6	48.9	28.9	28.2
Incr Delay (d2), s/veh	2.3	0.0	0.2	0.1	0.0	0.2	2.9	0.0	0.0	12.4	0.9	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	0.2	0.6	0.4	0.0	1.1	6.1	1.8	0.1	1.1	4.2	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.3	34.8	35.4	35.6	0.0	35.9	29.1	8.7	7.6	61.2	29.8	30.4
LnGrp LOS	D	C	D	D	A	D	C	A	A	E	C	C
Approach Vol, veh/h		211			70			992			875	
Approach Delay, s/veh		42.7			35.8			15.2			31.3	
Approach LOS		D			D			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.5	69.5		23.1	42.0	37.0		23.1				
Change Period (Y+Rc), s	6.2	6.5		5.1	6.2	6.5		5.1				
Max Green Setting (Gmax), s	7.8	58.5		39.9	35.8	30.5		39.9				
Max Q Clear Time (g_c+I1), s	4.2	7.8		17.1	16.4	12.7		4.4				
Green Ext Time (p_c), s	0.0	4.4		0.6	0.8	4.2		0.3				

Intersection Summary			
HCM 6th Ctrl Delay		25.1	
HCM 6th LOS		C	

Intersection	
Intersection Delay, s/veh	5.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	104	452	54	22
Demand Flow Rate, veh/h	106	461	55	22
Vehicles Circulating, veh/h	60	3	128	459
Vehicles Exiting, veh/h	421	180	38	5
Ped Vol Crossing Leg, #/h	2	0	2	2
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.5	5.7	3.4	4.4
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	106	461	55	22
Cap Entry Lane, veh/h	1298	1376	1211	864
Entry HV Adj Factor	0.980	0.980	0.982	1.000
Flow Entry, veh/h	104	452	54	22
Cap Entry, veh/h	1272	1348	1189	864
V/C Ratio	0.082	0.335	0.045	0.025
Control Delay, s/veh	3.5	5.7	3.4	4.4
LOS	A	A	A	A
95th %tile Queue, veh	0	1	0	0

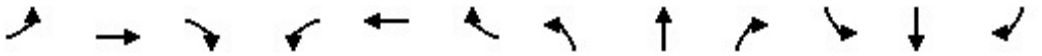
Intersection	
Intersection Delay, s/veh	3.8
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	195	187	34
Demand Flow Rate, veh/h	199	191	35
Vehicles Circulating, veh/h	5	35	13
Vehicles Exiting, veh/h	221	13	191
Ped Vol Crossing Leg, #/h	1	0	38
Ped Cap Adj	1.000	1.000	0.995
Approach Delay, s/veh	3.9	3.9	2.9
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	199	191	35
Cap Entry Lane, veh/h	1373	1331	1362
Entry HV Adj Factor	0.980	0.979	0.971
Flow Entry, veh/h	195	187	34
Cap Entry, veh/h	1345	1303	1316
V/C Ratio	0.145	0.143	0.026
Control Delay, s/veh	3.9	3.9	2.9
LOS	A	A	A
95th %tile Queue, veh	1	1	0

3: Virginia Street & Bishop Manogue Drive Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.2	0.2	2.6	1.4	1.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	275	17	141	16	15	51	163	801	19	59	1021	255
Future Volume (veh/h)	275	17	141	16	15	51	163	801	19	59	1021	255
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	299	18	71	17	16	55	177	871	21	64	1110	141
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	413	534	453	441	106	363	420	2467	750	83	1500	455
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.24	0.48	0.48	0.05	0.29	0.29
Sat Flow, veh/h	1328	1870	1585	1308	370	1270	1781	5106	1552	1781	5106	1547
Grp Volume(v), veh/h	299	18	71	17	0	71	177	871	21	64	1110	141
Grp Sat Flow(s),veh/h/ln	1328	1870	1585	1308	0	1640	1781	1702	1552	1781	1702	1547
Q Serve(g_s), s	20.4	0.7	3.2	0.9	0.0	3.0	7.9	10.0	0.7	3.3	18.5	6.7
Cycle Q Clear(g_c), s	23.5	0.7	3.2	1.5	0.0	3.0	7.9	10.0	0.7	3.3	18.5	6.7
Prop In Lane	1.00		1.00	1.00		0.77	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	413	534	453	441	0	469	420	2467	750	83	1500	455
V/C Ratio(X)	0.72	0.03	0.16	0.04	0.00	0.15	0.42	0.35	0.03	0.77	0.74	0.31
Avail Cap(c_a), veh/h	667	892	756	691	0	782	420	2798	851	193	2147	651
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.9	24.3	25.2	24.8	0.0	25.1	30.5	15.2	12.8	44.4	30.0	25.8
Incr Delay (d2), s/veh	2.4	0.0	0.2	0.0	0.0	0.1	3.1	0.1	0.0	14.1	0.8	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	0.3	1.2	0.3	0.0	1.2	3.5	3.3	0.2	1.7	6.9	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	36.3	24.3	25.3	24.9	0.0	25.3	33.6	15.3	12.8	58.5	30.8	26.2
LnGrp LOS	D	C	C	C	A	C	C	B	B	E	C	C
Approach Vol, veh/h		388			88			1069			1315	
Approach Delay, s/veh		33.7			25.2			18.2			31.7	
Approach LOS		C			C			B			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	52.0		32.0	28.0	34.2		32.0				
Change Period (Y+Rc), s	5.8	6.5		5.1	5.8	6.5		5.1				
Max Green Setting (Gmax), s	10.2	51.6		44.9	22.2	39.6		44.9				
Max Q Clear Time (g_c+I1), s	5.3	12.0		25.5	9.9	20.5		5.0				
Green Ext Time (p_c), s	0.0	6.1		1.3	0.3	7.2		0.5				

Intersection Summary			
HCM 6th Ctrl Delay		26.7	
HCM 6th LOS		C	

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	4.6
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	171	311	54	119
Demand Flow Rate, veh/h	174	317	55	121
Vehicles Circulating, veh/h	184	3	286	311
Vehicles Exiting, veh/h	248	338	72	9
Ped Vol Crossing Leg, #/h	5	0	4	6
Ped Cap Adj	0.999	1.000	0.999	0.999
Approach Delay, s/veh	4.5	4.6	4.0	4.8
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	174	317	55	121
Cap Entry Lane, veh/h	1144	1376	1031	1005
Entry HV Adj Factor	0.981	0.982	0.982	0.983
Flow Entry, veh/h	171	311	54	119
Cap Entry, veh/h	1121	1351	1011	987
V/C Ratio	0.152	0.230	0.053	0.121
Control Delay, s/veh	4.5	4.6	4.0	4.8
LOS	A	A	A	A
95th %tile Queue, veh	1	1	0	0

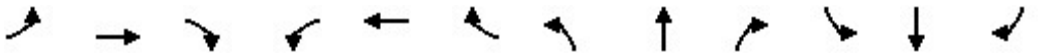
Intersection	
Intersection Delay, s/veh	3.3
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	78	104	76
Demand Flow Rate, veh/h	79	106	78
Vehicles Circulating, veh/h	3	78	20
Vehicles Exiting, veh/h	181	20	62
Ped Vol Crossing Leg, #/h	0	0	57
Ped Cap Adj	1.000	1.000	0.992
Approach Delay, s/veh	3.1	3.6	3.2
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	79	106	78
Cap Entry Lane, veh/h	1376	1274	1352
Entry HV Adj Factor	0.987	0.981	0.974
Flow Entry, veh/h	78	104	76
Cap Entry, veh/h	1358	1250	1307
V/C Ratio	0.057	0.083	0.058
Control Delay, s/veh	3.1	3.6	3.2
LOS	A	A	A
95th %tile Queue, veh	0	0	0

3: Virginia Street & Bishop Manogue Drive Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.1	1.1	1.1	0.7	1.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	212	11	66	18	38	15	383	573	11	36	632	303
Future Volume (veh/h)	212	11	66	18	38	15	383	573	11	36	632	303
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	230	12	72	20	41	16	416	623	12	39	687	220
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	329	413	350	350	283	110	591	2973	902	57	1443	448
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.33	0.58	0.58	0.03	0.28	0.28
Sat Flow, veh/h	1346	1870	1583	1312	1281	500	1781	5106	1549	1781	5106	1585
Grp Volume(v), veh/h	230	12	72	20	0	57	416	623	12	39	687	220
Grp Sat Flow(s),veh/h/ln	1346	1870	1583	1312	0	1780	1781	1702	1549	1781	1702	1585
Q Serve(g_s), s	17.9	0.5	4.0	1.3	0.0	2.8	22.0	6.3	0.4	2.3	12.0	12.5
Cycle Q Clear(g_c), s	20.7	0.5	4.0	1.9	0.0	2.8	22.0	6.3	0.4	2.3	12.0	12.5
Prop In Lane	1.00		1.00	1.00		0.28	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	329	413	350	350	0	393	591	2973	902	57	1443	448
V/C Ratio(X)	0.70	0.03	0.21	0.06	0.00	0.14	0.70	0.21	0.01	0.69	0.48	0.49
Avail Cap(c_a), veh/h	530	691	585	545	0	658	591	2973	902	129	1443	448
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.2	33.0	34.3	33.7	0.0	33.8	31.5	10.7	9.5	51.7	32.1	32.3
Incr Delay (d2), s/veh	2.7	0.0	0.3	0.1	0.0	0.2	6.9	0.0	0.0	13.6	1.1	3.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.2	0.3	1.6	0.4	0.0	1.2	9.8	2.0	0.1	1.2	4.8	4.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.8	33.0	34.6	33.8	0.0	34.0	38.4	10.8	9.5	65.3	33.2	36.1
LnGrp LOS	D	C	C	C	A	C	D	B	A	E	C	D
Approach Vol, veh/h		314			77			1051			946	
Approach Delay, s/veh		42.0			33.9			21.7			35.2	
Approach LOS		D			C			C			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.6	69.4		29.0	42.0	37.0		29.0				
Change Period (Y+Rc), s	6.2	6.5		5.1	6.2	6.5		5.1				
Max Green Setting (Gmax), s	7.8	58.5		39.9	35.8	30.5		39.9				
Max Q Clear Time (g_c+I1), s	4.3	8.3		22.7	24.0	14.5		4.8				
Green Ext Time (p_c), s	0.0	4.1		0.9	1.0	4.3		0.4				

Intersection Summary												
HCM 6th Ctrl Delay			30.1									
HCM 6th LOS			C									

Intersection	
Intersection Delay, s/veh	6.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	174	606	88	22
Demand Flow Rate, veh/h	177	618	90	22
Vehicles Circulating, veh/h	73	3	199	616
Vehicles Exiting, veh/h	565	286	51	5
Ped Vol Crossing Leg, #/h	2	0	2	2
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	4.0	7.1	4.0	5.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	177	618	90	22
Cap Entry Lane, veh/h	1281	1376	1126	736
Entry HV Adj Factor	0.980	0.981	0.978	1.000
Flow Entry, veh/h	174	606	88	22
Cap Entry, veh/h	1255	1349	1101	736
V/C Ratio	0.138	0.449	0.080	0.030
Control Delay, s/veh	4.0	7.1	4.0	5.2
LOS	A	A	A	A
95th %tile Queue, veh	0	2	0	0

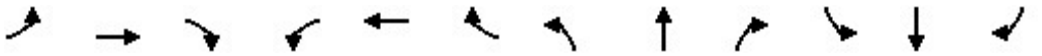
Intersection	
Intersection Delay, s/veh	3.9
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	218	204	37
Demand Flow Rate, veh/h	222	208	38
Vehicles Circulating, veh/h	5	38	14
Vehicles Exiting, veh/h	241	14	213
Ped Vol Crossing Leg, #/h	1	0	38
Ped Cap Adj	1.000	1.000	0.995
Approach Delay, s/veh	4.0	4.1	3.0
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	222	208	38
Cap Entry Lane, veh/h	1373	1327	1360
Entry HV Adj Factor	0.982	0.980	0.974
Flow Entry, veh/h	218	204	37
Cap Entry, veh/h	1348	1301	1318
V/C Ratio	0.162	0.157	0.028
Control Delay, s/veh	4.0	4.1	3.0
LOS	A	A	A
95th %tile Queue, veh	1	1	0

3: Virginia Street & Bishop Manogue Drive Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.1	0.2	2.5	1.5	1.1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	322	20	180	16	17	51	204	801	19	59	1024	275
Future Volume (veh/h)	322	20	180	16	17	51	204	801	19	59	1024	275
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	350	22	114	17	18	55	222	871	21	64	1113	163
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	456	601	510	464	130	399	390	2350	714	83	1468	445
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.22	0.46	0.46	0.05	0.29	0.29
Sat Flow, veh/h	1326	1870	1585	1253	406	1240	1781	5106	1552	1781	5106	1547
Grp Volume(v), veh/h	350	22	114	17	0	73	222	871	21	64	1113	163
Grp Sat Flow(s),veh/h/ln	1326	1870	1585	1253	0	1646	1781	1702	1552	1781	1702	1547
Q Serve(g_s), s	25.8	0.8	5.3	1.0	0.0	3.2	11.3	11.2	0.7	3.6	20.1	8.5
Cycle Q Clear(g_c), s	29.0	0.8	5.3	1.8	0.0	3.2	11.3	11.2	0.7	3.6	20.1	8.5
Prop In Lane	1.00		1.00	1.00		0.75	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	456	601	510	464	0	529	390	2350	714	83	1468	445
V/C Ratio(X)	0.77	0.04	0.22	0.04	0.00	0.14	0.57	0.37	0.03	0.77	0.76	0.37
Avail Cap(c_a), veh/h	617	829	703	617	0	730	390	2602	791	179	1997	605
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	34.7	23.6	25.1	24.2	0.0	24.4	35.3	17.8	15.0	47.8	32.9	28.7
Incr Delay (d2), s/veh	4.0	0.0	0.2	0.0	0.0	0.1	5.9	0.1	0.0	14.1	1.2	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.7	0.4	2.0	0.3	0.0	1.3	5.2	3.9	0.2	1.8	7.8	3.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.7	23.6	25.3	24.2	0.0	24.5	41.2	17.9	15.0	61.9	34.0	29.2
LnGrp LOS	D	C	C	C	A	C	D	B	B	E	C	C
Approach Vol, veh/h		486			90			1114			1340	
Approach Delay, s/veh		34.9			24.5			22.5			34.8	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.5	53.1		37.7	28.0	35.6		37.7				
Change Period (Y+Rc), s	5.8	6.5		5.1	5.8	6.5		5.1				
Max Green Setting (Gmax), s	10.2	51.6		44.9	22.2	39.6		44.9				
Max Q Clear Time (g_c+I1), s	5.6	13.2		31.0	13.3	22.1		5.2				
Green Ext Time (p_c), s	0.0	6.0		1.5	0.4	7.0		0.5				

Intersection Summary		
HCM 6th Ctrl Delay		30.0
HCM 6th LOS		C

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Intersection Delay, s/veh	5.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	245	379	77	121
Demand Flow Rate, veh/h	250	387	78	123
Vehicles Circulating, veh/h	201	3	362	381
Vehicles Exiting, veh/h	303	437	89	9
Ped Vol Crossing Leg, #/h	5	0	4	6
Ped Cap Adj	0.999	1.000	0.999	0.999
Approach Delay, s/veh	5.3	5.1	4.6	5.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	250	387	78	123
Cap Entry Lane, veh/h	1124	1376	954	936
Entry HV Adj Factor	0.981	0.980	0.987	0.983
Flow Entry, veh/h	245	379	77	121
Cap Entry, veh/h	1102	1348	941	919
V/C Ratio	0.223	0.281	0.082	0.132
Control Delay, s/veh	5.3	5.1	4.6	5.2
LOS	A	A	A	A
95th %tile Queue, veh	1	1	0	0

Intersection	
Intersection Delay, s/veh	3.4
Intersection LOS	A

Approach	WB	NB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	81	112	83
Demand Flow Rate, veh/h	82	114	85
Vehicles Circulating, veh/h	3	85	21
Vehicles Exiting, veh/h	196	21	64
Ped Vol Crossing Leg, #/h	0	0	57
Ped Cap Adj	1.000	1.000	0.992
Approach Delay, s/veh	3.1	3.6	3.3
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	LR	TR	LT
Assumed Moves	LR	TR	LT
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	82	114	85
Cap Entry Lane, veh/h	1376	1265	1351
Entry HV Adj Factor	0.988	0.982	0.976
Flow Entry, veh/h	81	112	83
Cap Entry, veh/h	1359	1242	1309
V/C Ratio	0.060	0.090	0.063
Control Delay, s/veh	3.1	3.6	3.3
LOS	A	A	A
95th %tile Queue, veh	0	0	0

3: Virginia Street & Bishop Manogue Drive Performance by movement

Movement	EBR	NBT	SBT	SBR	All
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.0
Total Del/Veh (s)	1.1	1.1	1.1	0.8	1.1

APPENDIX D | SIMTRAFFIC QUEUEING REPORTS

Intersection: 2: Virginia Street & McCabe Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	T	R	L	T
Maximum Queue (ft)	184	92	45	43	76	289	150	152	132	16	97	148
Average Queue (ft)	83	7	11	11	24	143	35	42	44	2	30	59
95th Queue (ft)	153	46	31	34	58	259	102	103	101	11	67	115
Link Distance (ft)		264			903		448	448	448	448		4983
Upstream Blk Time (%)		0										
Queuing Penalty (veh)		0										
Storage Bay Dist (ft)	150		125	50		400					200	
Storage Blk Time (%)	2	0		1	2	0						0
Queuing Penalty (veh)	1	0		1	0	0						0

Intersection: 2: Virginia Street & McCabe Drive

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	169	260	210
Average Queue (ft)	60	95	71
95th Queue (ft)	124	192	147
Link Distance (ft)	4983	4983	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)		1	0
Queuing Penalty (veh)		3	1

Intersection: 3: Virginia Street & Bishop Manogue Drive

Movement	NB	NB	SB
Directions Served	T	T	R
Maximum Queue (ft)	23	7	2
Average Queue (ft)	1	0	0
95th Queue (ft)	11	7	2
Link Distance (ft)	105	105	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			125
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Bishop Manogue HS Access/USPS Access & McCabe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	43	64	37	42
Average Queue (ft)	4	4	3	5
95th Queue (ft)	24	39	19	26
Link Distance (ft)	527	196	468	464
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Bishop Managoe HS Access/Bishop Manogue HS School Access & Bishop Manogue HS

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	50	59	38
Average Queue (ft)	5	6	3
95th Queue (ft)	27	31	18
Link Distance (ft)	387	356	487
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 6

Intersection: 2: Virginia Street & McCabe Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	T	R	L	T
Maximum Queue (ft)	227	167	143	47	75	223	192	180	183	20	106	212
Average Queue (ft)	129	14	39	13	26	92	73	70	72	4	44	89
95th Queue (ft)	206	74	93	38	58	165	143	142	147	16	85	172
Link Distance (ft)		264			903		448	448	448	448		4983
Upstream Blk Time (%)		0										
Queuing Penalty (veh)		0										
Storage Bay Dist (ft)	150		125	50		400					200	
Storage Blk Time (%)	7		0	2	2							0
Queuing Penalty (veh)	11		0	1	0							0

Intersection: 2: Virginia Street & McCabe Drive

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	215	220	142
Average Queue (ft)	95	111	56
95th Queue (ft)	179	195	110
Link Distance (ft)	4983	4983	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)		1	0
Queuing Penalty (veh)		2	0

Intersection: 3: Virginia Street & Bishop Manogue Drive

Movement	NB	SB
Directions Served	T	R
Maximum Queue (ft)	6	3
Average Queue (ft)	0	0
95th Queue (ft)	6	3
Link Distance (ft)	105	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		125
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Bishop Manogue HS Access/USPS Access & McCabe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	64	31	45	65
Average Queue (ft)	14	1	7	15
95th Queue (ft)	46	14	30	50
Link Distance (ft)	527	196	468	464
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Bishop Managoe HS Access/Bishop Manogue HS School Access & Bishop Manogue HS

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	31	59	45
Average Queue (ft)	2	7	7
95th Queue (ft)	16	33	31
Link Distance (ft)	387	356	487
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 16

Intersection: 2: Virginia Street & McCabe Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	B7	B7
Directions Served	L	T	R	L	TR	L	T	T	T	R	T	T
Maximum Queue (ft)	225	204	170	52	101	392	300	210	170	17	40	14
Average Queue (ft)	132	23	26	12	31	200	64	59	55	2	5	1
95th Queue (ft)	217	120	80	37	74	364	227	150	127	11	60	17
Link Distance (ft)		264			903		448	448	448	448	417	417
Upstream Blk Time (%)		0				1	1					
Queuing Penalty (veh)		1				0	3					
Storage Bay Dist (ft)	150		125	50		400						
Storage Blk Time (%)	10	0	0	2	4	2	0					
Queuing Penalty (veh)	10	0	0	1	1	5	1					

Intersection: 2: Virginia Street & McCabe Drive

Movement	SB	SB	SB	SB	SB
Directions Served	L	T	T	T	R
Maximum Queue (ft)	85	179	213	304	273
Average Queue (ft)	33	86	93	139	113
95th Queue (ft)	75	150	167	241	221
Link Distance (ft)		4983	4983	4983	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	200				200
Storage Blk Time (%)		0		2	1
Queuing Penalty (veh)		0		9	3

Intersection: 3: Virginia Street & Bishop Manogue Drive

Movement	NB	NB	NB
Directions Served	T	T	T
Maximum Queue (ft)	30	10	8
Average Queue (ft)	1	0	0
95th Queue (ft)	15	7	8
Link Distance (ft)	105	105	105
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Bishop Manogue HS Access/USPS Access & McCabe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	54	129	59	42
Average Queue (ft)	8	12	7	6
95th Queue (ft)	35	70	34	28
Link Distance (ft)	527	196	468	464
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Bishop Managoe HS Access/Bishop Manogue HS School Access & Bishop Manogue HS

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	97	85	30
Average Queue (ft)	9	7	2
95th Queue (ft)	50	43	16
Link Distance (ft)	387	356	487
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 35

Intersection: 2: Virginia Street & McCabe Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	T	R	L	T
Maximum Queue (ft)	239	276	184	45	82	240	214	193	194	25	98	229
Average Queue (ft)	162	48	53	9	28	112	85	80	83	5	44	113
95th Queue (ft)	242	199	131	31	61	202	170	160	161	18	88	206
Link Distance (ft)		264			903		448	448	448	448		4983
Upstream Blk Time (%)		1										
Queuing Penalty (veh)		6										
Storage Bay Dist (ft)	150		125	50		400					200	
Storage Blk Time (%)	14		0	1	2							1
Queuing Penalty (veh)	29		1	1	0							1

Intersection: 2: Virginia Street & McCabe Drive

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	246	252	200
Average Queue (ft)	124	139	65
95th Queue (ft)	223	231	133
Link Distance (ft)	4983	4983	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)		3	0
Queuing Penalty (veh)		7	1

Intersection: 3: Virginia Street & Bishop Manogue Drive

Movement	NB	SB	B7
Directions Served	T	R	T
Maximum Queue (ft)	6	3	36
Average Queue (ft)	0	0	1
95th Queue (ft)	6	3	37
Link Distance (ft)	105		448
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		125	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Bishop Manogue HS Access/USPS Access & McCabe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	70	48	61	78
Average Queue (ft)	19	2	12	21
95th Queue (ft)	55	22	41	57
Link Distance (ft)	527	196	468	464
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Bishop Managoe HS Access/Bishop Manogue HS School Access & Bishop Manogue HS

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	28	66	51
Average Queue (ft)	2	8	7
95th Queue (ft)	14	40	31
Link Distance (ft)	387	356	487
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 46

Intersection: 2: Virginia Street & McCabe Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	T	R	L	T
Maximum Queue (ft)	160	147	66	44	83	272	156	170	187	17	79	153
Average Queue (ft)	97	15	13	11	28	140	36	49	57	2	32	80
95th Queue (ft)	150	80	38	34	66	236	106	124	140	11	70	129
Link Distance (ft)		174			903		447	447	447	447		4983
Upstream Blk Time (%)	1	0	0									
Queuing Penalty (veh)	0	0	0									
Storage Bay Dist (ft)	150		125	50		400					200	
Storage Blk Time (%)	1	0		2	4							0
Queuing Penalty (veh)	0	0		1	1							0

Intersection: 2: Virginia Street & McCabe Drive

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	171	233	188
Average Queue (ft)	89	124	74
95th Queue (ft)	146	200	139
Link Distance (ft)	4983	4983	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)		1	0
Queuing Penalty (veh)		2	0

Intersection: 3: Virginia Street & Bishop Manogue Drive

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 5: Bishop Manogue HS Access/USPS Access & McCabe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	40	34	25	30
Average Queue (ft)	5	2	3	3
95th Queue (ft)	25	20	17	18
Link Distance (ft)	527	286	468	464
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Bishop Managoe HS Access/Bishop Manogue HS School Access & Bishop Manogue HS

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	41	32	30
Average Queue (ft)	5	2	2
95th Queue (ft)	25	17	15
Link Distance (ft)	385	356	487
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 5

Intersection: 2: Virginia Street & McCabe Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	T	R	L	T
Maximum Queue (ft)	172	204	167	41	72	176	199	196	207	21	102	230
Average Queue (ft)	129	55	49	9	24	86	79	80	83	4	42	113
95th Queue (ft)	179	180	122	31	56	157	173	169	171	17	87	216
Link Distance (ft)		174			903		447	447	447	447		4983
Upstream Blk Time (%)	2	2	0									
Queuing Penalty (veh)	0	8	0									
Storage Bay Dist (ft)	150		125	50		400					200	
Storage Blk Time (%)	8	0	0	1	1							1
Queuing Penalty (veh)	12	1	0	1	0							1

Intersection: 2: Virginia Street & McCabe Drive

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	241	248	180
Average Queue (ft)	123	140	61
95th Queue (ft)	223	238	127
Link Distance (ft)	4983	4983	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)		3	0
Queuing Penalty (veh)		8	0

Intersection: 3: Virginia Street & Bishop Manogue Drive

Movement	SB	B7
Directions Served	R	T
Maximum Queue (ft)	3	5
Average Queue (ft)	0	0
95th Queue (ft)	3	5
Link Distance (ft)		447
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	125	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Bishop Manogue HS Access/USPS Access & McCabe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	51	31	47	58
Average Queue (ft)	12	2	6	15
95th Queue (ft)	40	16	29	47
Link Distance (ft)	527	286	468	464
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Bishop Managoe HS Access/Bishop Manogue HS School Access & Bishop Manogue HS

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	28	36	42
Average Queue (ft)	2	4	7
95th Queue (ft)	14	21	30
Link Distance (ft)	385	356	487
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 31

Intersection: 2: Virginia Street & McCabe Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	B7	SB
Directions Served	L	T	R	L	TR	L	T	T	T	R	T	L
Maximum Queue (ft)	168	191	137	44	73	338	202	172	173	14	4	85
Average Queue (ft)	117	28	26	13	26	192	45	51	60	2	0	32
95th Queue (ft)	169	125	76	35	61	317	159	121	133	9	4	73
Link Distance (ft)		174			903		447	447	447	447	417	
Upstream Blk Time (%)	2	1	0			0	0					
Queuing Penalty (veh)	0	2	0			0	0					
Storage Bay Dist (ft)	150		125	50		400						200
Storage Blk Time (%)	5	0	0	2	3	0						
Queuing Penalty (veh)	4	0	0	1	0	1						

Intersection: 2: Virginia Street & McCabe Drive

Movement	SB	SB	SB	SB
Directions Served	T	T	T	R
Maximum Queue (ft)	150	166	236	213
Average Queue (ft)	85	92	131	91
95th Queue (ft)	131	146	204	169
Link Distance (ft)	4983	4983	4983	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				200
Storage Blk Time (%)	0		1	0
Queuing Penalty (veh)	0		3	0

Intersection: 3: Virginia Street & Bishop Manogue Drive

Movement	SB
Directions Served	R
Maximum Queue (ft)	6
Average Queue (ft)	0
95th Queue (ft)	4
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	125
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: Bishop Manogue HS Access/USPS Access & McCabe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	51	80	49	34
Average Queue (ft)	7	6	6	7
95th Queue (ft)	33	39	30	28
Link Distance (ft)	527	286	468	464
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Bishop Managoe HS Access/Bishop Manogue HS School Access & Bishop Manogue HS

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	56	38	37
Average Queue (ft)	6	5	3
95th Queue (ft)	30	24	20
Link Distance (ft)	385	356	487
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 12

Intersection: 2: Virginia Street & McCabe Drive

Movement	EB	EB	EB	WB	WB	NB	NB	NB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	T	T	T	R	L	T
Maximum Queue (ft)	171	201	164	47	83	203	218	216	224	20	106	216
Average Queue (ft)	126	51	51	10	26	85	84	83	83	4	43	115
95th Queue (ft)	179	175	121	34	59	157	182	181	179	15	88	214
Link Distance (ft)		174			903		447	447	447	447		4983
Upstream Blk Time (%)	2	1	0									
Queuing Penalty (veh)	0	6	0									
Storage Bay Dist (ft)	150		125	50		400					200	
Storage Blk Time (%)	7	0		1	2							1
Queuing Penalty (veh)	11	1		1	0							1

Intersection: 2: Virginia Street & McCabe Drive

Movement	SB	SB	SB
Directions Served	T	T	R
Maximum Queue (ft)	239	260	164
Average Queue (ft)	128	145	57
95th Queue (ft)	231	246	120
Link Distance (ft)	4983	4983	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			200
Storage Blk Time (%)		4	
Queuing Penalty (veh)		10	

Intersection: 3: Virginia Street & Bishop Manogue Drive

Movement	B7
Directions Served	T
Maximum Queue (ft)	3
Average Queue (ft)	0
95th Queue (ft)	3
Link Distance (ft)	447
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: Bishop Manogue HS Access/USPS Access & McCabe Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	54	30	31	50
Average Queue (ft)	13	2	6	16
95th Queue (ft)	42	17	26	44
Link Distance (ft)	527	286	468	464
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Bishop Managoe HS Access/Bishop Manogue HS School Access & Bishop Manogue HS

Movement	WB	NB	SB
Directions Served	LR	TR	LT
Maximum Queue (ft)	29	30	42
Average Queue (ft)	1	3	6
95th Queue (ft)	12	20	27
Link Distance (ft)	385	356	487
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 30

Appendix E
Crash Data

Virgina Street near Bishop Manogue HS Crash Data
Reno, NV

Year	Primary Rd	Sec Rd	Fatal	Injury	PDO	Crash Type
2016	Virginia St	McCabe Dr			1	Angle
2016	McCabe Dr	Virginia St			1	Angle
2017	Virginia St	McCabe Dr		1		Non-Collision
2017	Virginia St	McCabe Dr		1		Sideswipe
2017	Virginia St	McCabe Dr			1	Non-Collision
2018	Virginia St	McCabe Dr			1	Angle
2018	Virginia St	McCabe Dr		1		Non-Collision
2018	Virginia St	McCabe Dr		1		Angle
2018	Virginia St	Bishop Manogue Dr			1	Angle
2019	Virginia St	McCabe Dr		1		Rear-End
2020	Virginia St	McCabe Dr		1		Rear-End
2020	Virginia St	Bishop Manogue Dr		1		Rear-End

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

TITLE SHEET

OWNER/DEVELOPER:

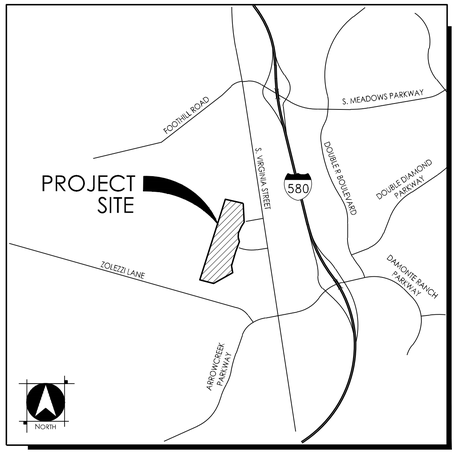
BISHOP MANOGUE CATHOLIC HIGH SCHOOL
110 BISHOP MANOGUE DRIVE
RENO, NV 89511

BASIS OF BEARINGS

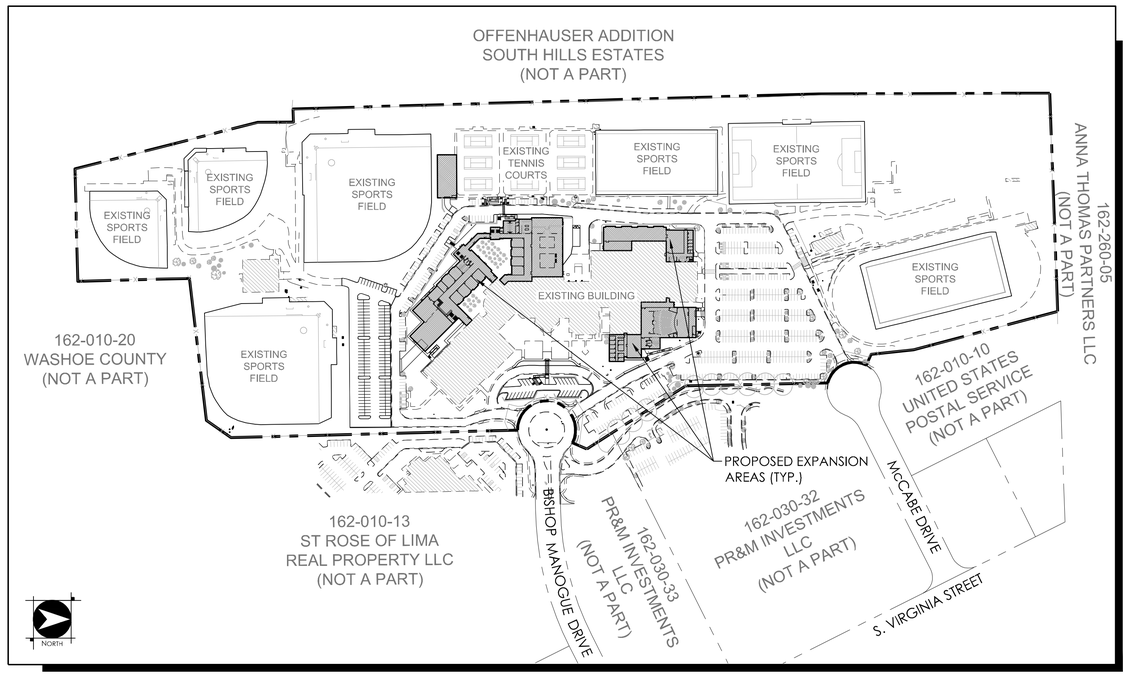
NEVADA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM OF 1983/1994, HIGH ACCURACY REFERENCE NETWORK (NAD 83/94-HARN), AS DETERMINED USING REAL TIME KINEMATIC (RTK) GPS OBSERVATIONS WITH CORRECTIONS TRANSMITTED BY THE NEVADA GPS NETWORK. THE BEARING BETWEEN GPS REFERENCE STATION "RNW RENO"-N74SM01028 AND "WWRF"-S11SM15000 IS TAKEN AS NORTH 82°06'23" WEST. ALL DIMENSIONS SHOWN ARE GROUND DISTANCES. GRID TO GROUND COMBINED FACTOR = 1.000197939

BASIS OF ELEVATION

BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) AS TAKEN FROM CITY OF RENO BENCHMARK 2891, WITH A PUBLISHED ELEVATION OF 4518.49 FT. BENCHMARK 12891 IS DESCRIBED AS BEING 1.5' STEEL RIVET CAP IN THE TOP OF CURB A THE SOUTHERLY ENTRANCE TO A SHELL GAS STATION (10850 SOUTH VIRGINIA STREET) 1' NORTHERLY OF A HANDICAP RAMP.



VICINITY MAP
NOT TO SCALE



SITE PLAN
NOT TO SCALE

SITE INFORMATION:

SITE PLAN STATISTICS
- PARCEL AREA: 48.1 AC
- PROJECT AREA: 6.5 AC
- EX. BUILDING SQUARE FOOTAGE: 153,000 SF
- PROPOSED BUILDING ADDITIONS: 161,500± SF
- NEW PARKING/PAVING AREA: 78,100± SF
- NEW LANDSCAPE AREA: 104,683± SF

PARKING STATISTICS
- TOTAL PARKING REQUIRED (WASHOE COUNTY): 385 STALLS
  - 1 PER EMPLOYEE: 160 EMPLOYEES=160 STALLS
  - 0.25 PER DRIVING AGE STUDENT: 0.25*(1200 STUDENTS*75%)=225 STALLS
- TOTAL PARKING REQUIRED (ITE: PRIVATE HIGH SCHOOL): 408 STALLS
  - 0.34 PER STUDENT: 0.34*1200 STUDENTS=408 STALLS
- TOTAL PARKING PROVIDED: 695 STALLS
- TOTAL ACCESSIBLE PARKING REQUIRED: 14 STALLS
- TOTAL ACCESSIBLE PARKING PROVIDED: 14 STALLS

LANDSCAPING STATISTICS (ADDITION ONLY)
- PROJECT AREA: 283,140± SF (6.5 AC)
- REQUIRED LANDSCAPE AREA: 56,628 SF (20%)
- PROVIDED LANDSCAPE AREA: 104,683± SF
- REQUIRED NUMBER OF TREES: 189
- PROVIDED NUMBER OF TREES: 189

ASSESSOR PARCEL NUMBER
- 162-010-28

ENGINEERS STATEMENT:

I, MEGAN OVERTON, DO HEREBY CERTIFY THAT THIS PLAN HAS BEEN PREPARED BY ME OR UNDER MY SUPERVISION AND WAS COMPLETED ON THE 8th DAY OF FEBRUARY, 2024.

MEGAN OVERTON, P.E. #18689

02/08/24

SHEET INDEX

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
TITLE SHEET

WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
1361 Corporate Boulevard
Reno, NV 89502
Tel 775.823.4068
Fax 775.823.4066

4412001 FEBRUARY, 2024

SHEET T-1 OF 9

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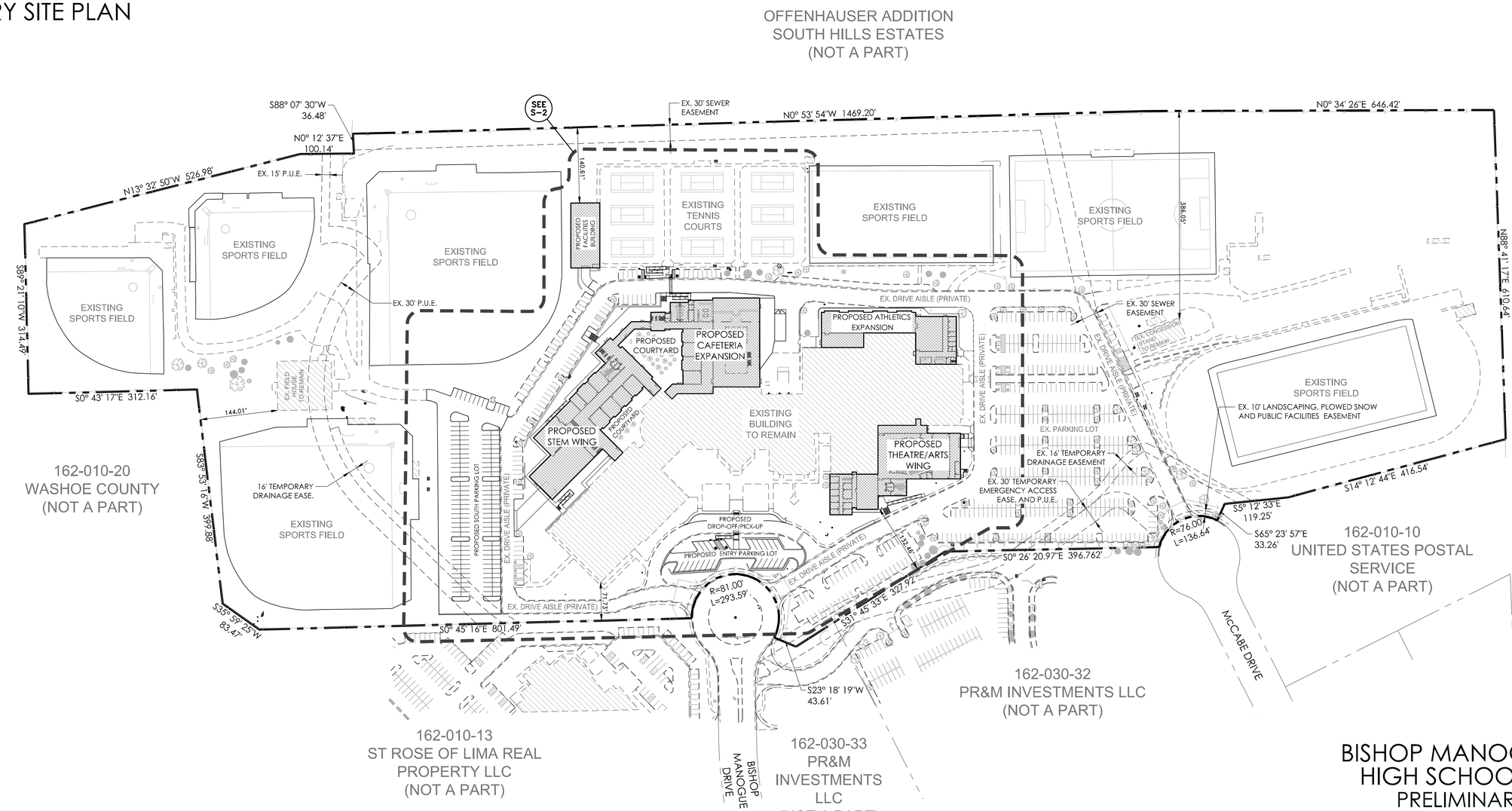
BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY SITE PLAN



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BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY SITE PLAN

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1361 Corporate Boulevard
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SHEET S-1 OF 9

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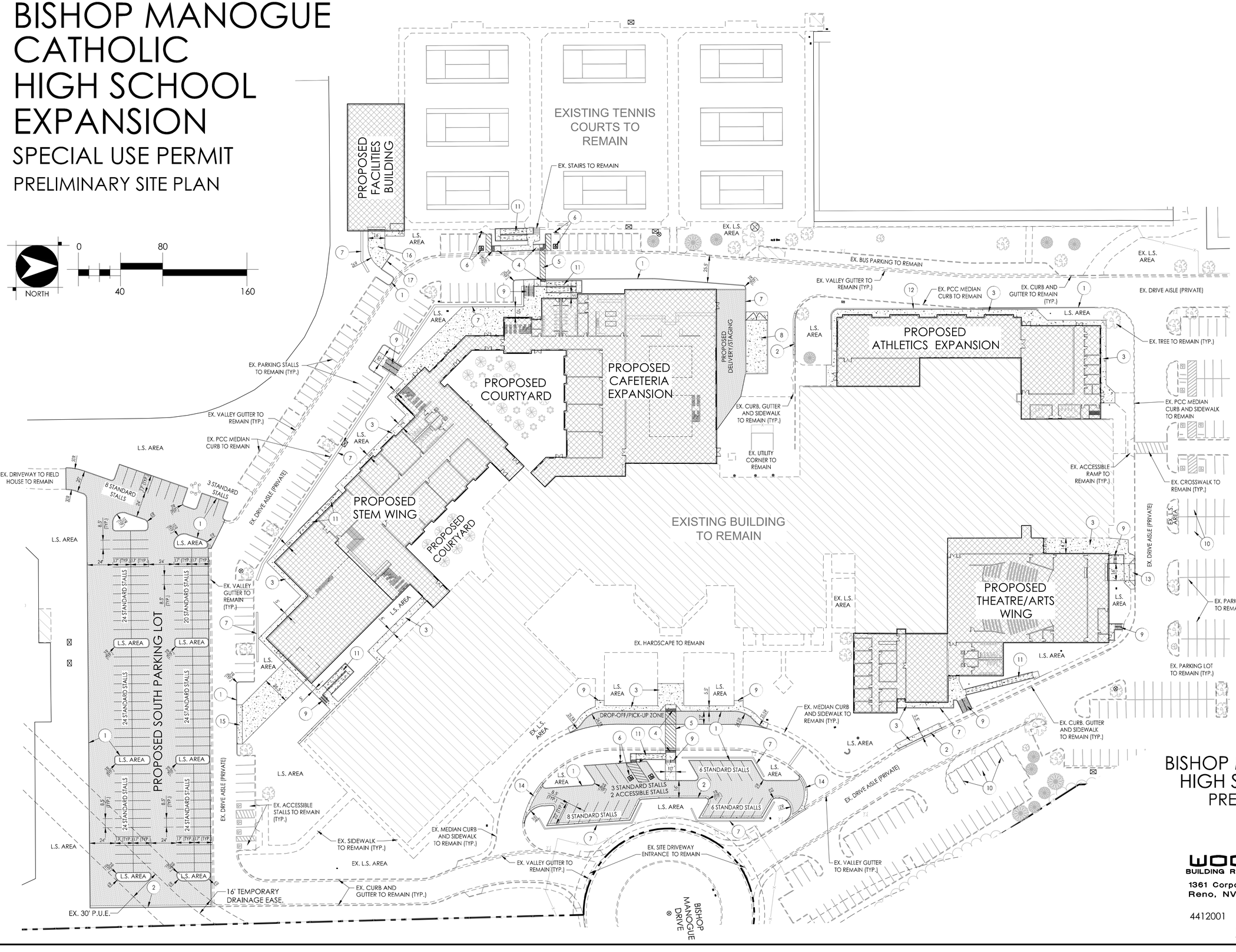
SPECIAL USE PERMIT

PRELIMINARY SITE PLAN



KEY NOTES:

1. PROPOSED TYPE 1 PCC MEDIAN CURB (TYP.)
2. PROPOSED TYPE 1 CURB AND GUTTER
3. PROPOSED P.C.C. SIDEWALK
4. PROPOSED ACCESSIBLE CURB RAMP
5. PROPOSED STRIPED ACCESSIBLE PATH
6. PROPOSED STRIPED ACCESSIBLE SYMBOL AND SIGNAGE (TYP.)
7. PROPOSED RETAINING WALL (SEE GRADING PLANS FOR HEIGHT)
8. PROPOSED TRASH ENCLOSURE
9. PROPOSED STAIRS (SEE GRADING PLANS FOR NUMBER)
10. REMOVE EX. ACCESSIBLE PARKING STALLS AND RESTRIPE AS STANDARD STALLS
11. PROPOSED ACCESSIBLE RAMP WITH HANDRAILS
12. PROPOSED RETAINING CURB (SEE GRADING PLANS FOR HEIGHT)
13. PROPOSED THEATRE BACKSTAGE DRIVEWAY
14. PROPOSED 3' P.C.C. VALLEY GUTTER
15. PROPOSED STEM LAB DRIVEWAY
16. PROPOSED FACILITIES BUILDING DRIVEWAY
17. PROPOSED FLUSH CURB

LEGEND:

PROPOSED A.C. PAVING

PROPOSED P.C.C. CONCRETE

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY SITE PLAN

WOOD RODGERS
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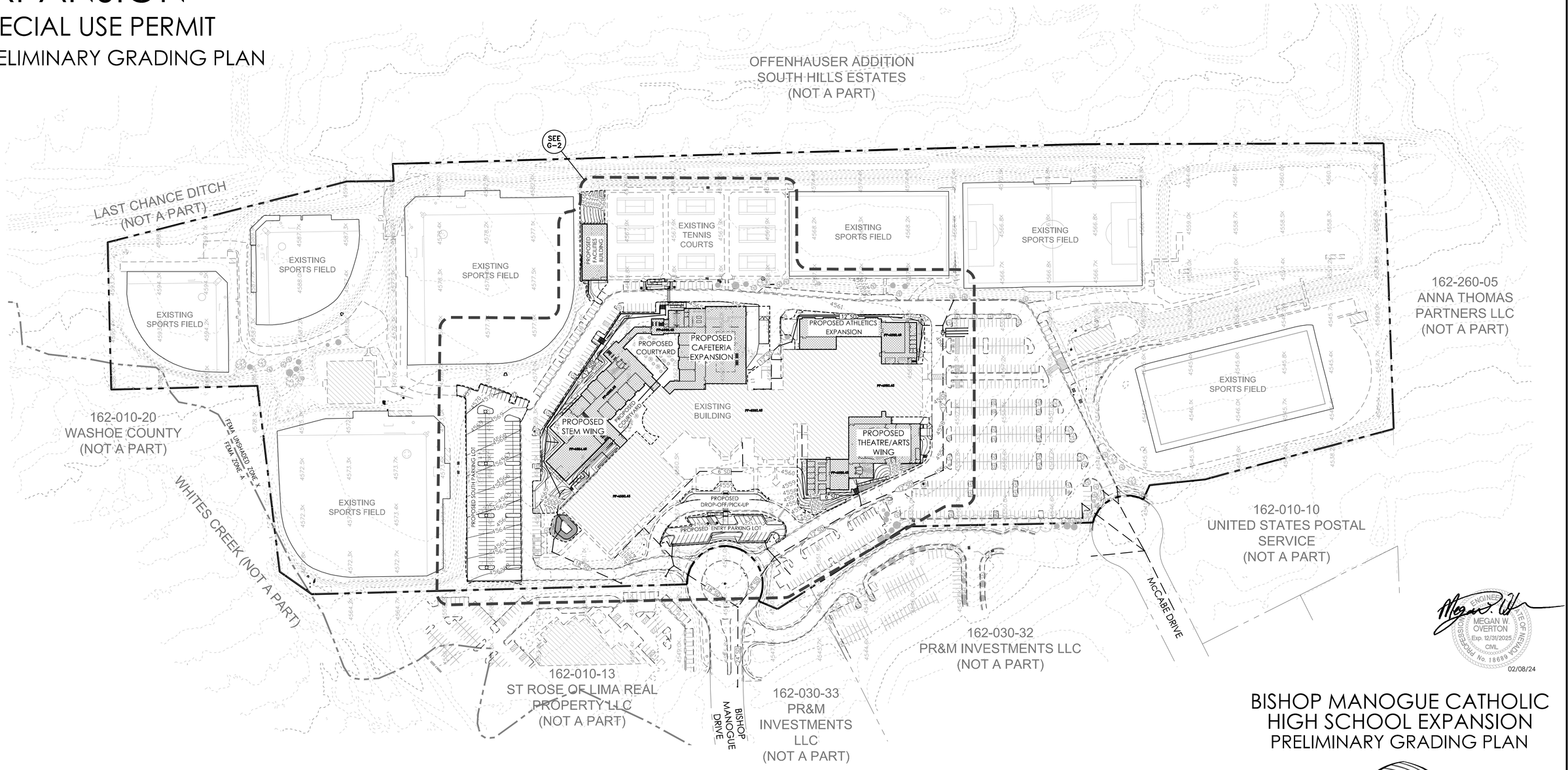
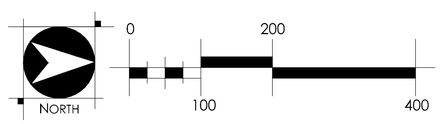
BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY GRADING PLAN





GRADING NOTES:

GRADING AREA: 5.7 AC.
CUT/FILL EARTHWORK: 20,000 CY
EXPORT: 18,000 CY

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY GRADING PLAN

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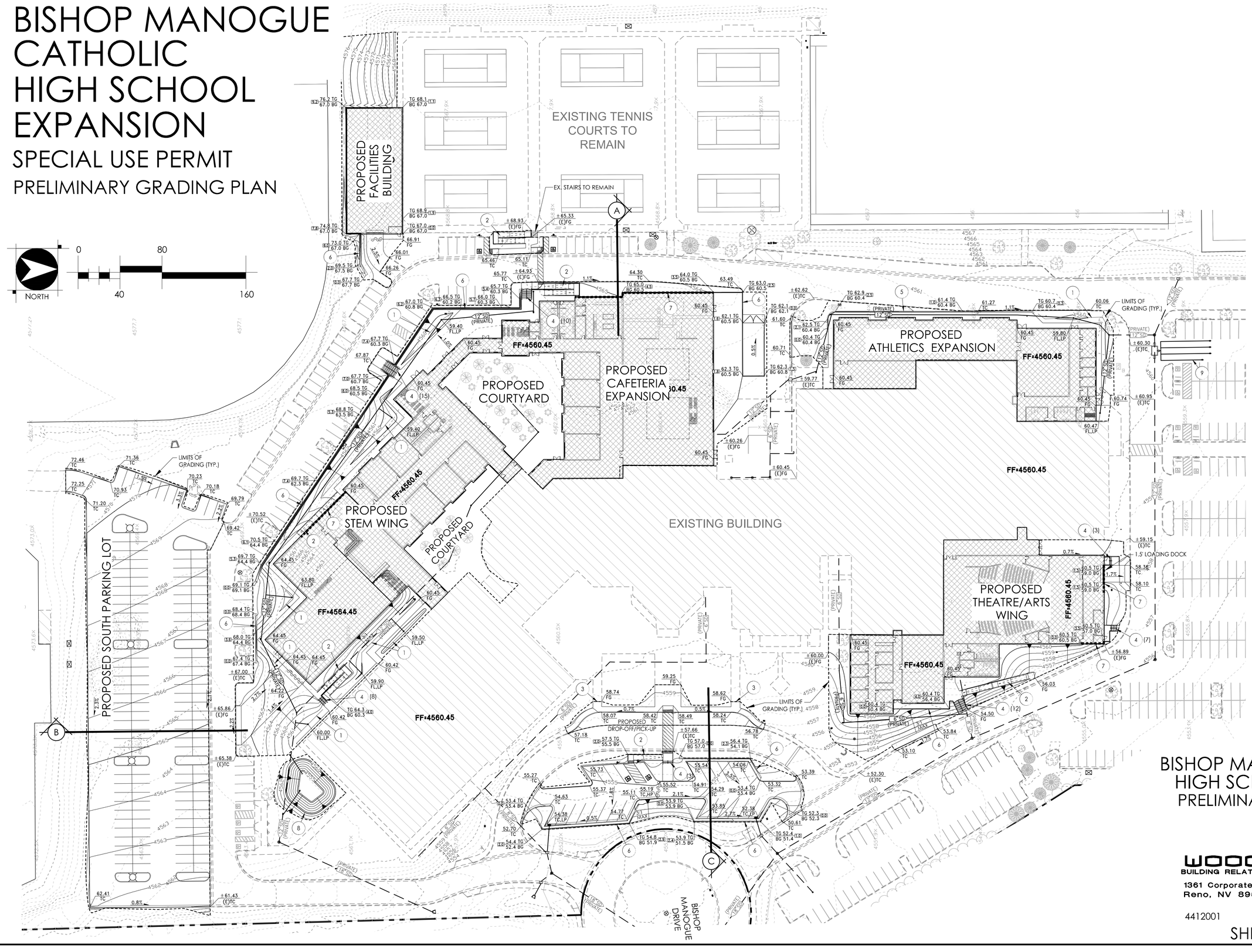
FEBRUARY, 2024

SHEET G-1 OF 9

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY GRADING PLAN



KEY NOTES:

1. PROPOSED DRAINAGE SWALE
2. PROPOSED PEDESTRIAN RAMP W/ HANDRAIL
3. PROPOSED SINGLE SIDEWALK STEP
4. PROPOSED MULTIPLE SIDEWALK STEPS W/HANDRAIL (QUANTITY NEXT TO NOTE IN PLAN VIEW)
5. PROPOSED RETAINING CURB
6. PROPOSED RETAINING WALL
7. PROPOSED RETAINING WALL INTEGRAL WITH BUILDING EXTERIOR WALL
8. PROPOSED DETENTION BASIN
9. PROPOSED UNDERGROUND DETENTION SYSTEM

PROFESSIONAL ENGINEER STATE OF NEVADA MEGAN W. OVERTON Exp. 12/31/2025 CIVIL No. 18689

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

PRELIMINARY GRADING PLAN

WOOD RODGERS

BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

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Fax 775.823.4066

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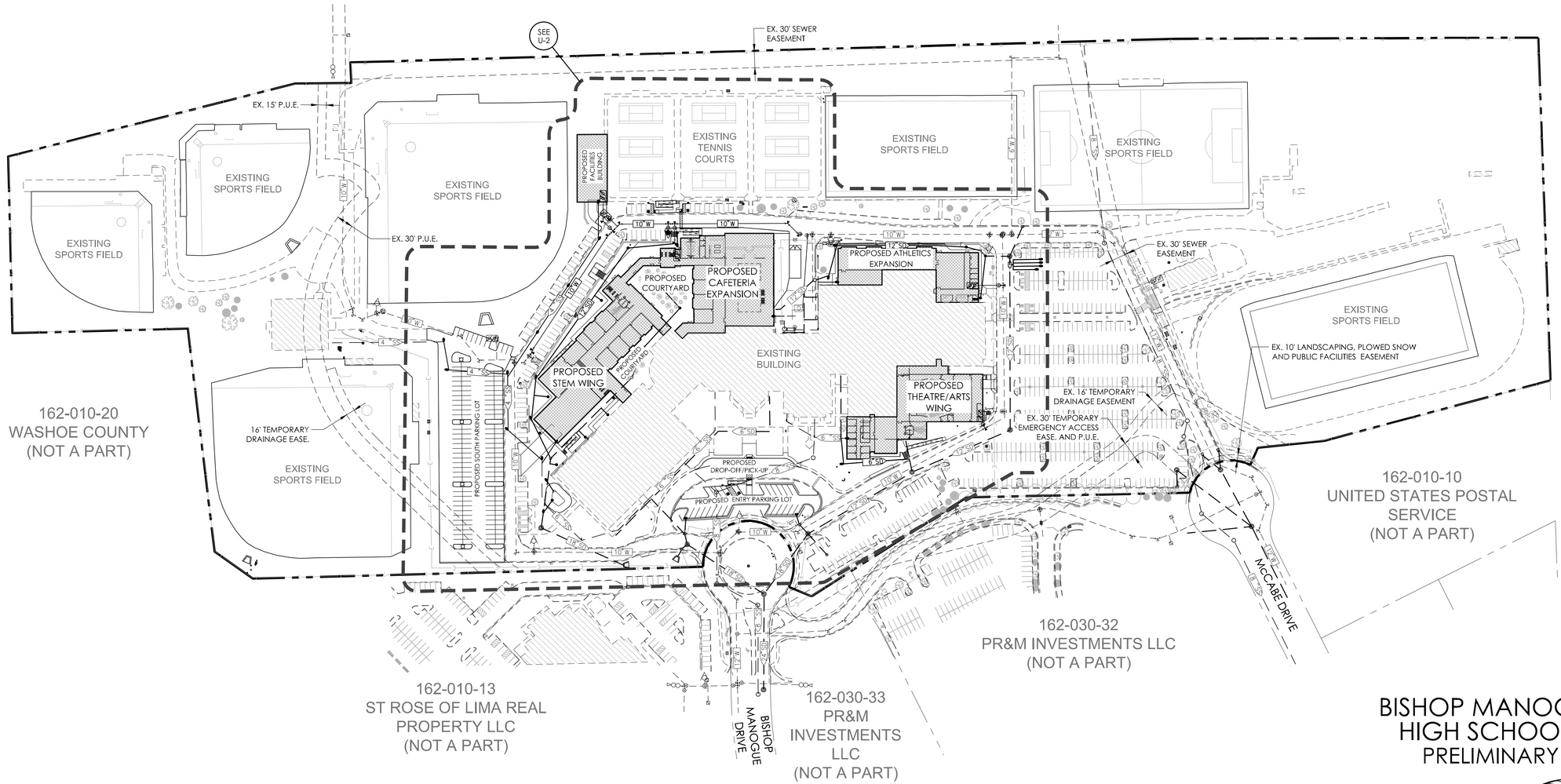
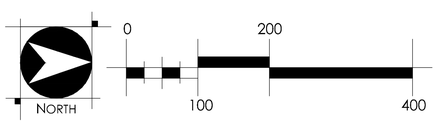
BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMIINARY UTILITY PLAN





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BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY UTILITY PLAN

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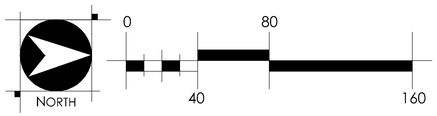
SHEET U-1 OF 9

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

PRELIMINARY UTILITY PLAN



KEY NOTES:

1. PROPOSED DOMESTIC WATER SERVICE
2. PROPOSED FIRE HYDRANT
3. PROPOSED SEWER SERVICE
4. PROPOSED SEWER CLEANOUT (TYP.)
5. PROPOSED CATCH BASIN (TYP.)
6. PROPOSED DRAIN CLEANOUT (TYP.)
7. PROPOSED LANDSCAPE DRAIN/AREA DRAIN (TYP.)
8. PROPOSED FIRE SERVICE
9. PROPOSED PARKING LOT LIGHT (TYP.)
10. PROPOSED DETENTION BASIN OUTLET STRUCTURE
11. PROPOSED UNDERGROUND DETENTION SYSTEM
12. PROPOSED DETENTION SYSTEM OUTLET STRUCTURE

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY UTILITY PLAN

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FEBRUARY, 2024

SHEET U-2 OF 9

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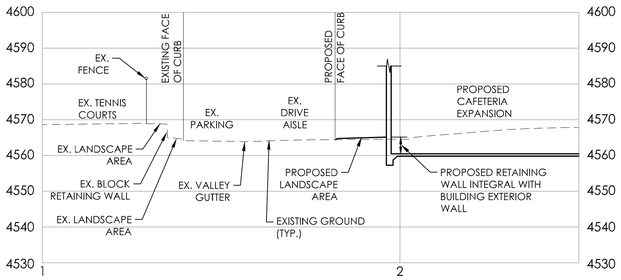
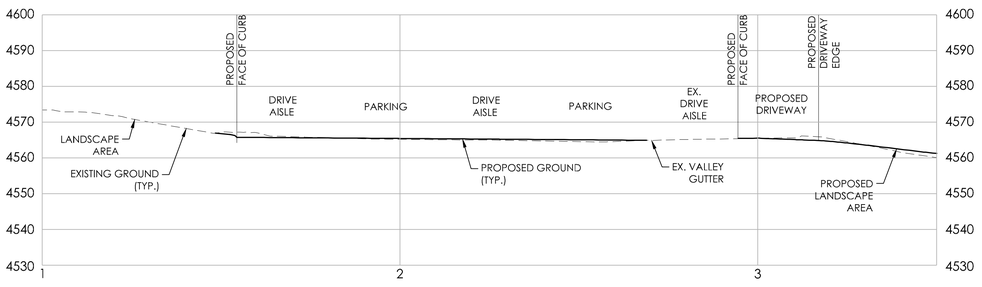
BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION

SPECIAL USE PERMIT

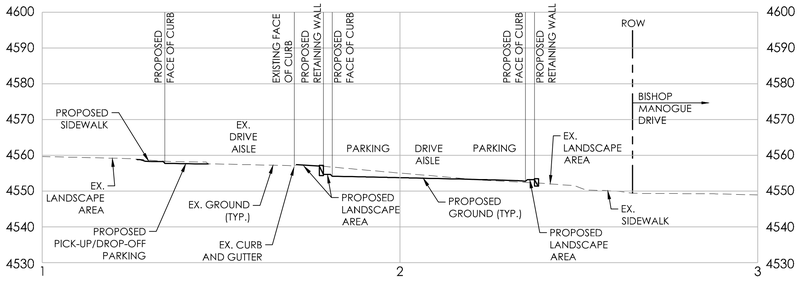
PRELIMINARY CROSS SECTIONS



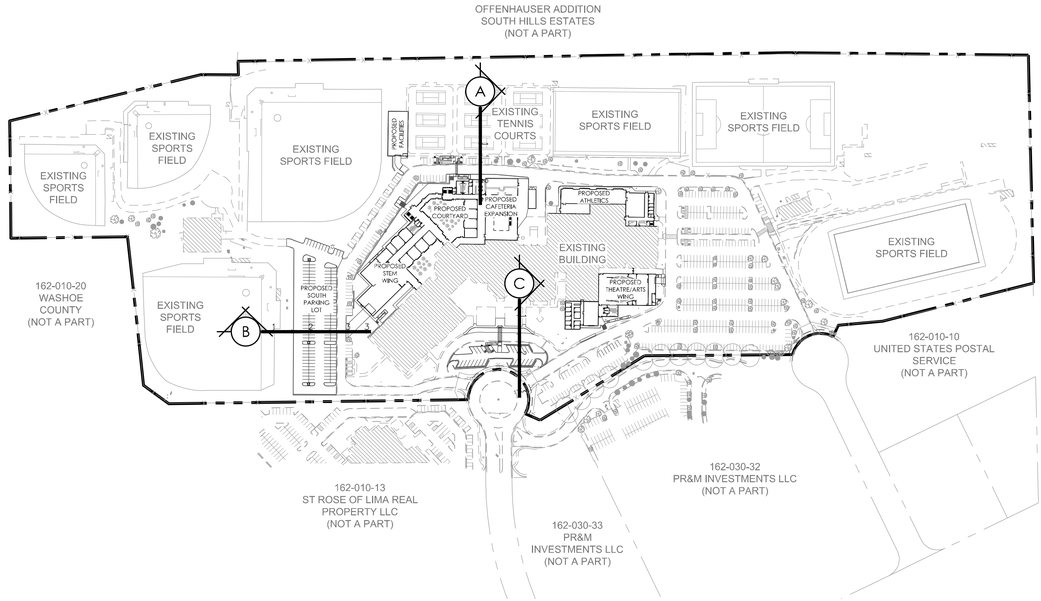
A CROSS SECTION
1"=20' HORIZ.
1"=20' VERT.



B CROSS SECTION
1"=20' HORIZ.
1"=20' VERT.



C CROSS SECTION
1"=20' HORIZ.
1"=20' VERT.



SITE PLAN
NO SCALE

02/08/24

BISHOP MANOGUE CATHOLIC HIGH SCHOOL EXPANSION
PRELIMINARY CROSS SECTIONS

WOOD RODGERS
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LANDSCAPE DATA

TOTAL SITE (BISHOP MANOGUE HIGH SCHOOL CAMPUS) AREA = 48.11 ACRES
JURISDICTION: WASHOE COUNTY
APN: 162-010-28
ZONING: MDS (MEDIUM DENSITY SUBURBAN)

TOTAL IMPROVEMENT AREA = 283,140 SQ FT (6.5 ACRES)

REQUIRED LANDSCAPE (BASED ON IMPROVEMENT AREA) = 56,628 SQ FT (20%)

PROVIDED LANDSCAPE AREA = 104,683 SQ FT
- ORNAMENTAL PLANTING AREA: 90,094 SQ FT
- ORNAMENTAL HARDSCAPE = 14,589 SQ FT

REQUIRED TREES IN IMPROVEMENT AREA = 189
- 189 (ONE TREE PER 300 SQ FT OF REQUIRED LANDSCAPE AREA)
- SIGNIFICANT TREES (GREATER THAN SIX-INCH CALIPER) WITHIN THE IMPROVEMENT AREA THAT REQUIRE REMOVAL SHALL BE REPLACED WITH A TREE OF THE SAME SPECIES AT A 1:1 CALIPER RATIO.
- 14 EXISTING "SIGNIFICANT" TREES WILL BE REMOVED WITH A TOTAL CALIPER LOSS OF 123 INCHES. PROPOSED TREES WILL BE UP-SIZED AS NEEDED TO OFFSET THE CALIPER LOSS.

REQUIRED SHRUBS IN IMPROVEMENT AREA = 1,134 (6 SHRUBS PER TREE)

TREES PROVIDED: 189
SHRUBS PROVIDED: 1,134

GENERAL NOTES

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

2) TREES
- DECIDUOUS TREES SHALL HAVE A MINIMUM CALIPER OF 2 INCHES.
- EVERGREEN TREES SHALL HAVE A MINIMUM HEIGHT OF 6 FEET.

3) 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 THE AMERICAN STANDARD FOR NURSERY STOCK (ANSI Z60.1-1990).

4) ALL SHRUB BEDS WILL RECEIVE COVER OF MULCH WITH WEED CONTROL.

5) ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED. CONTAINER PLANTINGS WILL BE DRIP IRRIGATED BASED ON THE SPECIFIC HORTICULTURAL REQUIREMENTS OF EACH SPECIES. A REDUCED-PRESSURE-TYPE BACKFLOW PREVENTOR WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.

6) PLAN IS CONCEPTUAL. PLANT QUANTITIES INDICATED ARE PER WASHOE COUNTY CODE REQUIREMENTS. PLANT LOCATIONS, FINAL SPECIES SELECTION, AND SIZE AT PLANTING SHALL BE DETERMINED DURING DEVELOPMENT OF THE FINAL CONSTRUCTION DOCUMENTS.

PLANT LEGEND

- PROPOSED ORNAMENTAL TREES
- PROPOSED DECIDUOUS SHADE TREES
- PROPOSED EVERGREEN TREES
- EXISTING TREES
- LANDSCAPE AREA
- (E) LAWN

(E) TENNIS COURTS
BUILDING EXPANSION
(E) BASEBALL FIELD
BUILDING EXPANSION
COURTYARD
BUILDING EXPANSION
COURTYARD
(E) MANOGUE HIGHSCHOOL
BUILDING EXPANSION
BUILDING EXPANSION
(E) LAWN
(E) LAWN
(E) BASEBALL FIELD

0' 40' 80' 120'
Scale in Feet

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REGISTERED LANDSCAPE ARCHITECT
RYAN HANSEN
440
02/06/2024
Expires: 6/30/2024
STATE OF NEVADA

Preliminary Landscape Plan
BISHOP MANOGUE CATHOLIC HIGHSCHOOL UPGRADE
Wood Rodgers
Washoe Co. Nevada
Reno

No.	Revision Date

LA No: 022-811-04-23
Designed: AMH
Drawn: AMH
Checked: RMH
Date: 02/06/2024

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