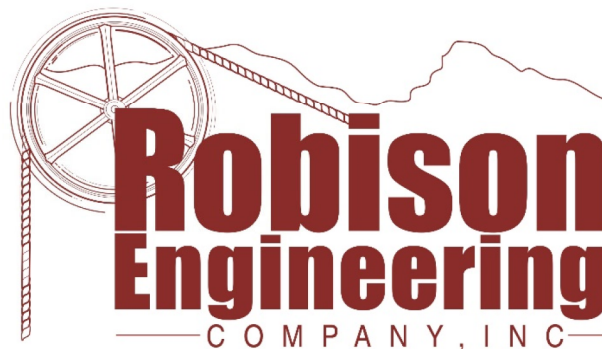


Sky Tavern Junior Ski Area Expansion SPECIAL USE PERMIT

Prepared for:

Sky Tavern
at
21130 Mt. Rose Highway
Reno, NV 89511

Prepared By:



846 Victorian Ave., Suite 20
Sparks, NV 89431
(775) 852-2251

September 2023



Submitted to:

Washoe County, Nevada

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PROPERTY LOCATION

Sky Tavern Junior Ski Area is a destination ski resort that is located in the southwest corner of Washoe County approximately 10 miles north of Carson City and 10 miles south of Reno. The ski resort is accessed via Nevada State Route 431 also known as Mt. Rose Highway. The primary access to the ski resort is a parking lot at the east side of the property which can be accessed from Mt. Rose Highway or Bum's Gulch Rd. The ski resort is contained within one PR (parks and recreation) zoned property with Washoe County Assessor's Parcel Number 048-050-03 owned by the City of Reno and with an acreage of 143.07.

SPECIAL USE PERMIT REQUESTS

A special use permit is requested for the following components:

- Allowance of a utility service within a PR zone, including 1-million & 2-million gallon snowmaking water storage tanks, approximately 11,000 linear feet of snowmaking water supply piping, and two groundwater wells to supply the system each equipped with pump assemblies enclosed in pump house structures. Electrical to be supplied from existing on-site NVE facilities and service lines will be joint-trenched with water wherever possible.
- Allowance of site lighting within a PR zone
- Allowance to vary the landscaping standards per Washoe County Development Code section 110.412.50(a) – At least one tree shall be provided for every 10 parking spaces...
 - Due to the nature of this facility, landscaping islands or trees in the parking area are impractical and would not achieve the code's intent of screening, shade, etc. The entire area is forested, and winter parking is generally on top of accumulated snow which must be aggressively managed by heavy equipment; isolated trees and curb/gutter infrastructure would be damaged or destroyed.
- Allowances for grading associated with Washoe County Grading code which require a special use permit including:
 - 110.438.35(a)(2)(ii)(A) Grading on slopes 15% or greater – excavation of one thousand (1,000) cubic yards or more whether the material intended to be permanently located on the project site or temporarily stored on a site for relocation to another, final site
 - Approximately 5,000 cubic yards of material shall be excavated on areas with existing slopes greater than 15% in order to prepare the trenches for the proposed utility lines.

A site plan is included with this application showing all proposed improvements to be constructed under this special use permit.

PROJECT PHASING

Depending on several factors including available funding of the proposed improvements, the weather/constructable windows of time of the coming years, etc. – there is no set project phasing currently. However, given the scope of the proposed improvements, a time frame longer than two years is expected to be required.

WATER RIGHTS

A permit to appropriate water was granted for this project by The State of Nevada. A maximum amount of 48.3 acre-feet per year may be appropriated for recreational use per permit no. 91279; a copy of which is included in this application.

WETLANDS DELINEATION

Portions of this property include areas defined as wetlands that cannot be constructed on per the United States Army Corps of Engineers (USACE). A wetlands delineation report was prepared by Robison Wildlife Consulting, LLC, and the results of their findings are shown on the site plan. No improvements of any kind are proposed in any wetland areas.

TRAFFIC IMPACT

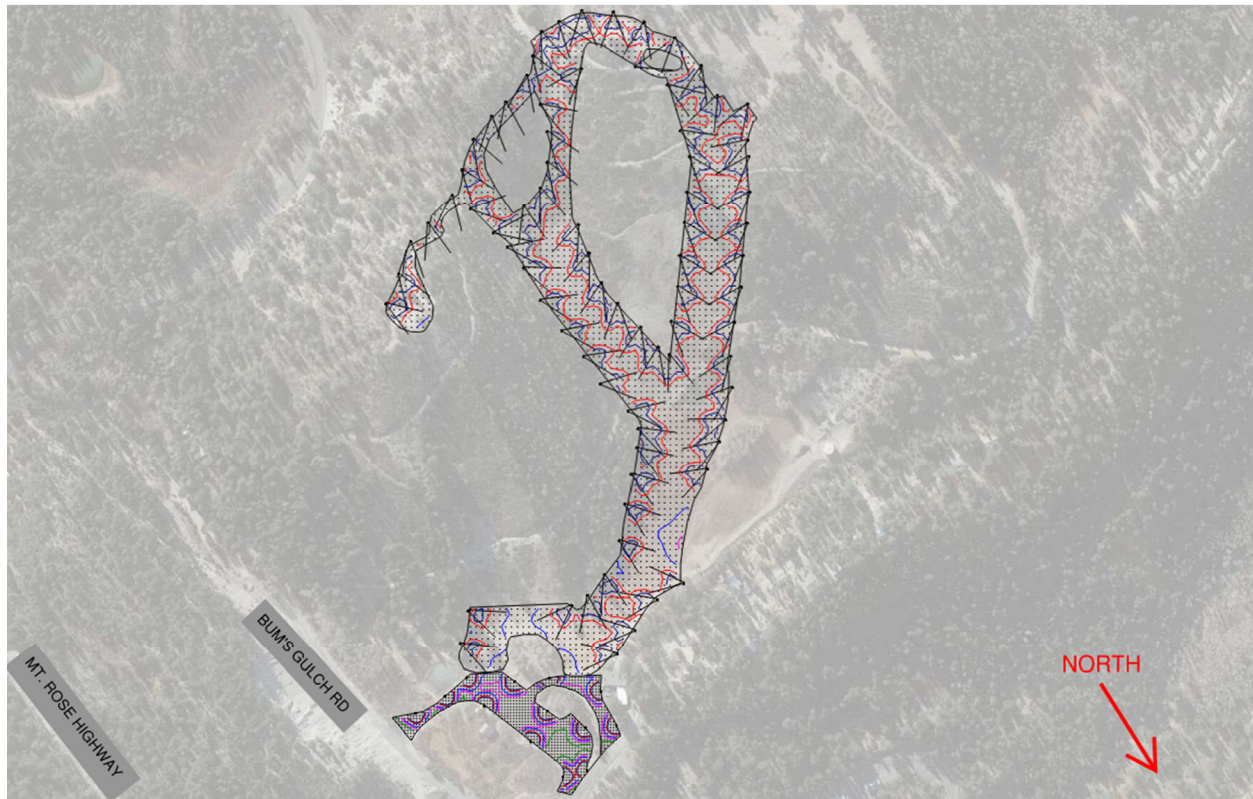
A traffic impact study was prepared for this project by Headway Transportation LLC and a copy is included with this application. Their study found that this expansion is anticipated to generate approximately 91 AM peak hour, and 43 Noon peak hour additional trips to the external roadway network,

GEOTECHNICAL INVESTIGATION

A geotechnical investigation was prepared for this project by Black Eagle Consulting, Inc. Their study found that the site is geotechnically suitable for the proposed improvements, and a copy of the report is included with this application.

SITE LIGHTING

A preliminary lighting design was prepared by Wisconsin Lighting Lab. Site lighting is proposed at the parking lot and all areas that will be served by the proposed snowmaking. Per the photometric below, the proposed lighting is not anticipated to impact neighboring properties or the adjacent streets, Mt. Rose Highway and Bum's Gulch Rd. Below is a preliminary photometric diagram excerpted from the preliminary design report by Wisconsin Lighting Lab.



The preliminary lighting design is included which details what specific lights are proposed.

LANDSCAPING AND REVEGETATION

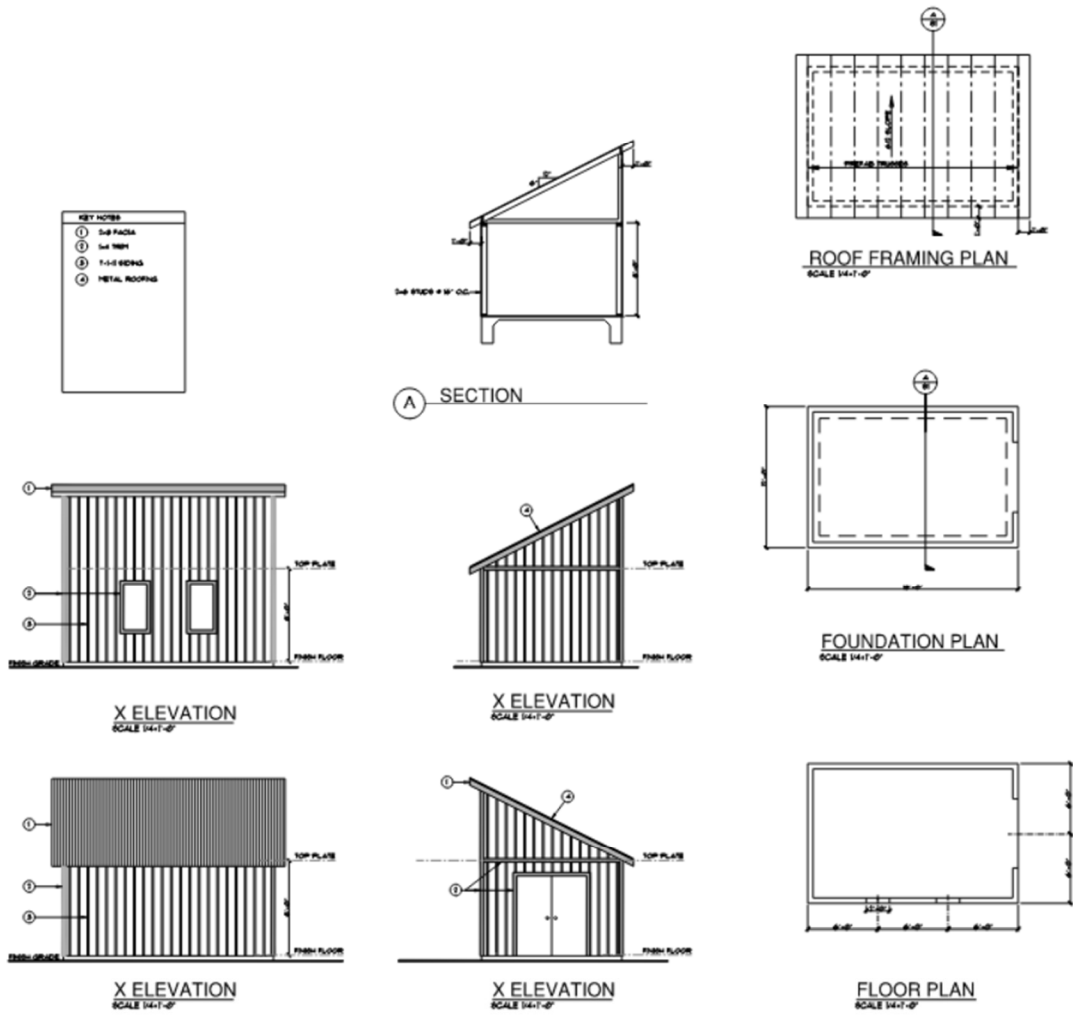
Sky Tavern has accumulated years of experience in promoting regeneration by native species and will treat all sloped areas with appropriate temporary erosion control, runoff management, and other Best Management Practices for all construction involving slopes or fresh disturbance. Revegetation with an aggressive for and native grass seed mix, followed by management of shrub and natural tree seedling regrowth, will achieve permanent stabilization consistent with the ski area operation.

PARKING

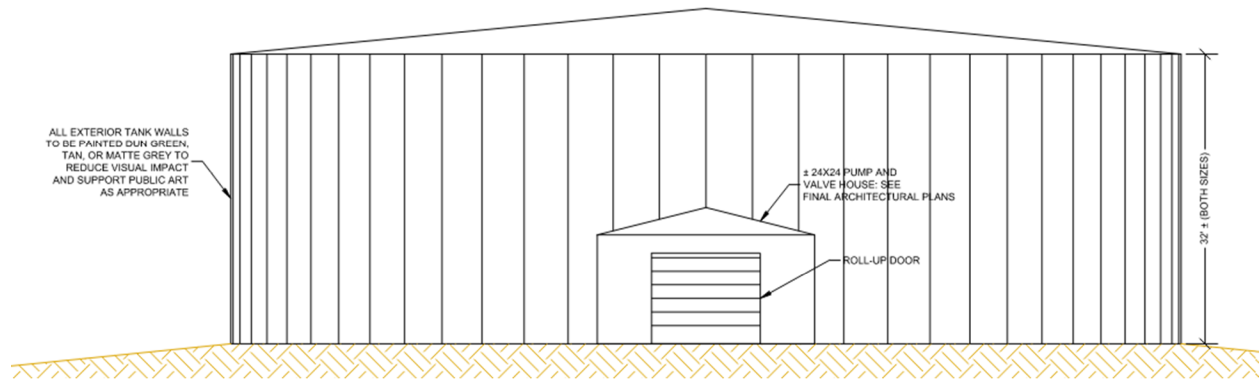
The existing parking area is proposed to be repaved and restriped. There is no specific parking requirement for a destination ski resort in Washoe County's development code, however Section 410.10.2 requires 1 parking space required per employee. A striping plan is included with this application showing 191 spaces.

PROPOSED STRUCTURES

The currently proposed structures include three pump house buildings and two water storage tanks. Architectural plans for the pump house buildings were prepared by Crom Engineering and for the water storage tanks by Robison Engineering. Below are the excerpted architectural drawings, and full sized plans are included with this application. Beyond what is shown on the plans, efforts shall be made to conceal the proposed structures so that they blend in with the surrounding aesthetic of the surrounding area, such as forest green paint, etc.



Pump House Building Plans



Water Storage Tank Elevation View

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: Sky Tavern Junior Ski Program - Expansion			
Project Description: Expansion to existing destination ski resort at Sky Tavern Junior Ski Program. Please see project narrative for detailed description of project.			
Project Address: 21130 Mount Rose Hwy			
Project Area (acres or square feet): 143.07 acres			
Project Location (with point of reference to major cross streets AND area locator): Property is southwest of the intersection of Mt. Rose Hwy and Sky Tavern Rd; directly north of Mt. Rose Ski Resort			
Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
048-050-03	143.070		
Indicate any previous Washoe County approvals associated with this application: Case No.(s). WSUP18-0009 is expired and its content is superceded by this plan			
Applicant Information (attach additional sheets if necessary)			
Property Owner:		Professional Consultant:	
Name: City of Reno		Name: Robison Engineering Company, Inc	
Address: 1 E 1st St		Address: PO Box 1505	
Reno	Zip: 89501	Sparks	Zip: 89432
Phone:	Fax:	Phone: (775) 852-2251	Fax: 852-9736
Email:		Email: nathan@robisoneng.com	
Cell:	Other:	Cell: 775-240-7652	Other:
Contact Person:		Contact Person: Nathan Earl Robison, PE	
Applicant/Developer:		Other Persons to be Contacted:	
Name: Sky Tavern Junior Ski Area - Applicant		Name:	
Address: 21130 Mt. Rose Hwy		Address:	
Reno	Zip: 89511		Zip:
Phone: (775) 323-5125	Fax:	Phone:	Fax:
Email: mike.oehlert@skytavern.com		Email:	
Cell:	Other:	Cell:	Other:
Contact Person: Mike Oehlert		Contact Person:	
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?

Sky Tavern Junior Ski Program is proposing a new snowmaking system which shall include the construction of two new water wells, pump houses and water lines to supply two large water storage tanks which shall then supply the snowmaking hydrants.

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.)

Site plan is included.

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

Depending on several factors including available funding of the proposed improvements, the weather/constructable windows of time of the coming years, etc. – there is no set project phasing currently. However, given the scope of the proposed improvements, a time frame longer than two years is expected to be required.

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 property is a functional ski resort, and all proposed improvements are appropriate additions that serve the current use. The close proximity to existing electrical and sanitary utilities will allow for new services. The previously obtained water rights will allow for the snowmaking facilities and new water wells.

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

The expansion will directly benefit the community as it will increase the facility's capacity, and extend the amount of time the ski program is operational throughout the year. More of the community will be able to take advantage of the recreational activity provided by Sky Tavern.

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

All of the new facilities are proposed onsite, and the construction phase will not negatively impact adjacent properties. Furthermore, given the seasonality of the ski resorts operations, much of construction can be completed without interrupting the typical schedule of the park.

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.

Please refer to the site plan and narrative document for specific information on landscaping, parking, lighting, etc.

Approx. total cut volume = 6,600 CY

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.)

<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
------------------------------	--

9. Utilities:

a. Sewer Service	EXISTING - SEPTIC
b. Electrical Service	EXISTING - NV ENERGY
c. Telephone Service	EXISTING - ATT & VARIOUS WIRELESS
d. LPG or Natural Gas Service	EXISTING - PROPANE
e. Solid Waste Disposal Service	EXISTING - WASTE MANAGEMENT CONTRACT
f. Cable Television Service	EXISTING - SATELLITE
g. Water Service	EXISTING - ON-SITE PUBLIC WATER SYSTEM

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 #	N/A	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).

The water storage tanks will have the largest visual impact and shall be painted to blend in with the surrounding area - see plans/narrative.

10. Community Services (provided and nearest facility):

a. Fire Station	Truckee Meadows Fire & Rescue, Station 39
b. Health Care Facility	Renown Health; Incline Village Community Hospital; Tahoe Forest Hospital
c. Elementary School	Dodson Elementary School
d. Middle School	Marce Herz Middle School
e. High School	Galena High School
f. Parks	Galena High School
g. Library	South Valleys Library
h. Citifare Bus Stop	Herz Boulevard and Mt. Rose Highway

**Special Use Permit Application
for Grading
Supplemental Information**
(All required information may be separately attached)

1. What is the purpose of the grading?

Excavation of utility trenches, grading required for the construction of two large water storage tanks - see plans.

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

Approx. total cut volume = 6,600 CY

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

Combined estimated disturbed area including paving = 6.1 acres (265,000sf)

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

No export or import is proposed. All material excavated for pipe trenches shall be replaced/recompacted. The grading associated with the construction of the water storage tanks has a balanced cut/fill.

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

No - the excavation volume for the utility trenches exceeds standards.

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.)

None of the proposed grading has been performed.

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

Yes.

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

The disturbed areas will be visible from the east, from Mt. Rose Highway

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)?

These improvements do not directly serve neighboring properties, however the fire access roads and elevated water storage are of potential regional value.

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?

All proposed graded slopes are max 3:1.

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)?

No walls are proposed.

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

The water storage tanks will have the largest visual impact and shall be painted to blend in with the surrounding area - see plans/narrative.

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

The construction of the water storage tanks is expected to remove approximately 10 trees consisting of Jeffrey Pines and White Firs, with trunk sizes ranging from 1" to 18" within the proposed earthwork areas.

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?

Dryland grass and shrubs suitable for high elevation slope stabilization and low fuel content.

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

Temporary irrigation shall be provided if required for the disturbed earthwork associated with the construction of the water storage tanks.

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

The plan will be submitted to the Washoe Storey Conservation District prior to grading permit applications.

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

Yes	No <input checked="" type="checkbox"/>	If yes, please attach a copy.
-----	--	-------------------------------



NO.	DESCRIPTION	DATE	BY
1	USGS 3DEP 2-ZPT LOAD DATA		CHKD
2	RINGS GPS MAPPING 2022-01-27		NER
3	TROSCA ELECTRICAL 2022-02-11		NER
4	TECHNOLOGY PLAN 2022-02-29		NER
5	FIELD PLAN REVIEW 2022-09-24		NER
6	FIELD PLAN REVIEW 2022-09-24		NER
7	REVISIONS		
8			

NO.	DESCRIPTION
1	FOR REVIEW - MASTER PLAN
0	WASHOE COUNTY SPECIAL USE PERMIT
3	FOR REVIEW - ELECTRICAL DESIGN
1	WASHOE COUNTY SPECIAL USE PERMIT REV2
1	2023-09-08

PROJECT AUTHORITY

APPLICANT: SKY TAVERN
 CIVIL ENGINEER: NATHAN ROBINSON, PE, NRS
 ADDRESS: 646 VICTORIAN AVE, SUITE 20
 SPARKS, NV 89431
 PHONE: (775) 325-5125
 EMAIL: nathan@robinsoneng.com

APPLICANT: MIKE DEHLERT
 ADDRESS: 2130 MT ROSE HWY
 SPARKS, NV 89431
 PHONE: (775) 325-5125
 EMAIL: mike.dehler@skytavern.com

PROJECT SUMMARY

WASHOE COUNTY PROJECT NO. 199-0170
 JURISDICTION: WASHOE COUNTY
 PROJECT NO. 199-0170
 ADDRESS: 2130 MT ROSE HWY
 SPARKS, NV 89431
 FEPA FLOOD ZONE: X
 PROJECT SUMMARY: PREPARED FOR SKI TAVERN SKI RESORT. THIS PLAN INCLUDES 64,645 SQUARE FEET OF PHASED DEVELOPMENT FOR THE SKI TAVERN SKI AREA. THE PROJECT INCLUDES THE CONSTRUCTION OF A LODGE, PUMP HOUSE, WATER STORAGE TANKS, AND ELECTRICAL INFRASTRUCTURE. ESTIMATED TRENCH EXCAVATION VOLUME = 6,276 CY. ESTIMATED TRENCH EXCAVATION AREA = 3,860 SF. ALL EXCAVATED MATERIAL SHALL BE REPLACED AND FERTILIZED TO MATCH SURROUNDING VEGETATION. FOLLOWING CONSTRUCTION OF PIPING.

SHEET LIST

SHEET NO.	SHEET LABEL	SHEET DESCRIPTION	SHEET INDEX
1	C1	SKY TAVERN SKI AREA SPECIAL USE PERMIT	1
2	C2	SKY TAVERN SKI AREA SPECIAL USE PERMIT	2
3	C3	SKY TAVERN SKI AREA SPECIAL USE PERMIT	3
4	A1	SKY TAVERN SKI AREA SPECIAL USE PERMIT	4

NOTES

- CONTRACTOR TO PROVIDE ALL TRENCHING TO MEET ALL SERVICES & BACKFILL REQUIREMENTS. ALL DISTURBED AREAS SHALL BE REVEGETATED WITH NATIVE PLANTING.
- PRELIMINARY GRADING ESTIMATE. UTILITY TRENCHES SHALL BE EXCAVATED TO THE PROPOSED FINISH GRADE. TYPICAL TRENCH CROSS SECTION = 12" x 12". ESTIMATED TRENCH EXCAVATION VOLUME = 6,276 CY. ESTIMATED TRENCH EXCAVATION AREA = 3,860 SF.

DETAIL 1 - TYPICAL JOINT TRENCH
 SCALE: 1" = 2'

REVISIONS

NO.	DESCRIPTION
1	FOR REVIEW - MASTER PLAN
0	WASHOE COUNTY SPECIAL USE PERMIT
3	FOR REVIEW - ELECTRICAL DESIGN
1	WASHOE COUNTY SPECIAL USE PERMIT REV2
1	2023-09-08

811

Call before you dig.

800-785-8377

SCALE: 1" = 80'

Call before you dig.





811
Know what's below.
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SCALE: 1"=20'

C2
SHEET 2 OF 4

NO.	DESCRIPTION	DATE	BY	CHKD
1	USGS 3DEP 2-FIT LOAD DATA	2023-03-07	LJD	NER
2	RENG GPS MAPPING 2022-01-27	2023-03-07	LJD	NER
3	TRISCA ELECTRICAL 2022-01-27	2023-03-07	LJD	NER
4	TECHNOLOGY PLAN 2022-02-29	2023-03-07	LJD	NER
5	FIELD PLAN REVIEW 2022-09-24	2023-03-07	LJD	NER
6	EMT	2023-03-07	LJD	NER

NO.	DESCRIPTION	DATE	BY	CHKD
1	USGS 3DEP 2-FIT LOAD DATA	2023-03-07	LJD	NER
2	RENG GPS MAPPING 2022-01-27	2023-03-07	LJD	NER
3	TRISCA ELECTRICAL 2022-01-27	2023-03-07	LJD	NER
4	TECHNOLOGY PLAN 2022-02-29	2023-03-07	LJD	NER
5	FIELD PLAN REVIEW 2022-09-24	2023-03-07	LJD	NER
6	EMT	2023-03-07	LJD	NER

DATE: PENDING
DRAWN: NER, LJD
PROJECT NO: 1-359-01-010
WASHOE COUNTY SPECIAL USE PERMIT
SKY TAVERN SKI AREA
TANK GRADING PLAN

PREPARED FOR: SKY TAVERN SKI RESORT
11300 MT. ROSE HWY
RENO, NV 89511
(907) 210-1818
HOBBS ENGINEERING & ARCHITECTURE
11300 MT. ROSE HWY
RENO, NV 89511
(907) 210-1818

PROJECT NO: 1-359-01-010
WASHOE COUNTY SPECIAL USE PERMIT
SKY TAVERN SKI AREA
TANK GRADING PLAN

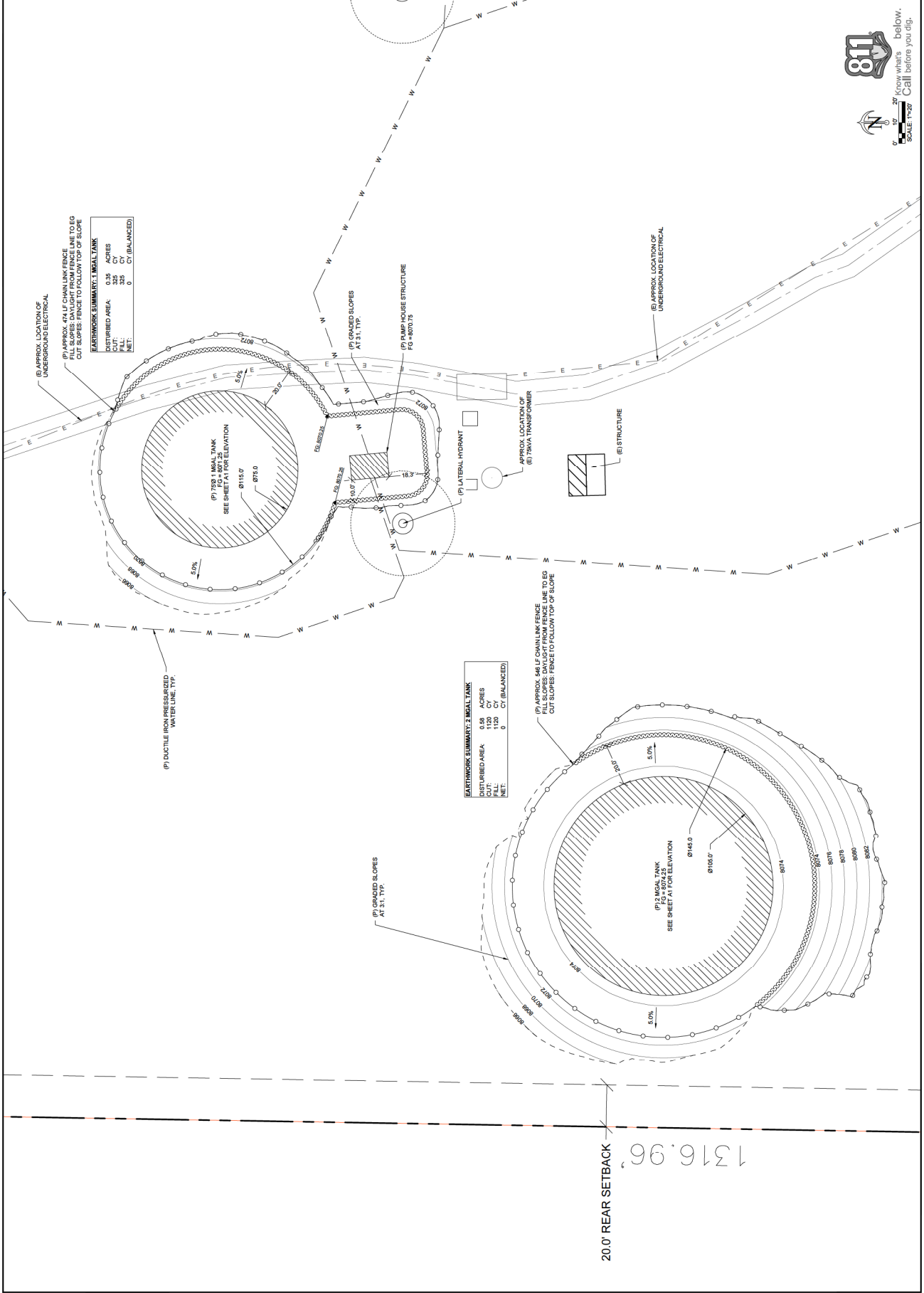


TABLE: EARTHWORK SUMMARY: 1 MGAL TANK

DISTURBED AREA	0.35 ACRES
FILL	322 CY
CUT	322 CY
NET	0 CY (BALANCED)

TABLE: EARTHWORK SUMMARY: 2 MGAL TANK

DISTURBED AREA	0.58 ACRES
FILL	1120 CY
CUT	1120 CY
NET	0 CY (BALANCED)

SKY TAVERN SKI AREA
SPECIAL USE PERMIT
PARKING AND ENTRY PAVING PLAN
WASHOE COUNTY
PROJECT NO. 1-399-01-010
NEVADA

THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF HOBBS & ASSOCIATES, INC. AND IS TO BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREIN. ANY REUSE OR MODIFICATION OF THIS INFORMATION WITHOUT THE WRITTEN CONSENT OF HOBBS & ASSOCIATES, INC. IS STRICTLY PROHIBITED.

DATE: PENNING
DRAWN: NEK, ELLJD



DATE: PENNING
DRAWN: NEK, ELLJD

NO.	DATE	BY	DESCRIPTION
1	2023-03-07	LJD	FOR REVIEW - MASTER PLAN
2	2023-03-07	LJD	FOR REVIEW - SPECIAL USE PERMIT
3	2023-03-07	LJD	FOR REVIEW - ELECTRICAL DESIGN
4	2023-03-07	LJD	WASHOE COUNTY SPECIAL USE PERMIT REV1
5	2023-03-07	LJD	WASHOE COUNTY SPECIAL USE PERMIT REV2

NO.	DATE	BY	DESCRIPTION
1	2023-03-07	LJD	USGS 3DEP 2-FT LIDAR DATA
2	2023-03-07	LJD	GENUS MAPPING 2022-01-27
3	2023-03-07	LJD	TROSCA ELECTRICAL 2022-02-11
4	2023-03-07	LJD	TECHNOPLAN PLAN 2022-07-29
5	2023-03-07	LJD	FIELD PLAN REVIEW 2022-08-24

NO.	DATE	BY	DESCRIPTION
1	2023-03-07	LJD	USGS 3DEP 2-FT LIDAR DATA
2	2023-03-07	LJD	GENUS MAPPING 2022-01-27
3	2023-03-07	LJD	TROSCA ELECTRICAL 2022-02-11
4	2023-03-07	LJD	TECHNOPLAN PLAN 2022-07-29
5	2023-03-07	LJD	FIELD PLAN REVIEW 2022-08-24

REVISIONS

NO.	DATE	BY	DESCRIPTION
1	2023-03-07	LJD	USGS 3DEP 2-FT LIDAR DATA
2	2023-03-07	LJD	GENUS MAPPING 2022-01-27
3	2023-03-07	LJD	TROSCA ELECTRICAL 2022-02-11
4	2023-03-07	LJD	TECHNOPLAN PLAN 2022-07-29
5	2023-03-07	LJD	FIELD PLAN REVIEW 2022-08-24



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NO.	DATE	BY	DESCRIPTION
1	2023-03-07	LJD	FOR REVIEW - MASTER PLAN
2	2023-05-08	LJD	WASHOE COUNTY SPECIAL USE PERMIT
3	2023-07-03	LJD	FOR REVIEW - ELECTRICAL DESIGN
4	2023-07-10	LJD	WASHOE COUNTY SPECIAL USE PERMIT REV1
5	2023-09-08	LDMN	WASHOE COUNTY SPECIAL USE PERMIT REV2

NO.	DATE	BY	DESCRIPTION
1	2023-03-07	LJD	FOR REVIEW - MASTER PLAN
2	2023-05-08	LJD	WASHOE COUNTY SPECIAL USE PERMIT
3	2023-07-03	LJD	FOR REVIEW - ELECTRICAL DESIGN
4	2023-07-10	LJD	WASHOE COUNTY SPECIAL USE PERMIT REV1
5	2023-09-08	LDMN	WASHOE COUNTY SPECIAL USE PERMIT REV2

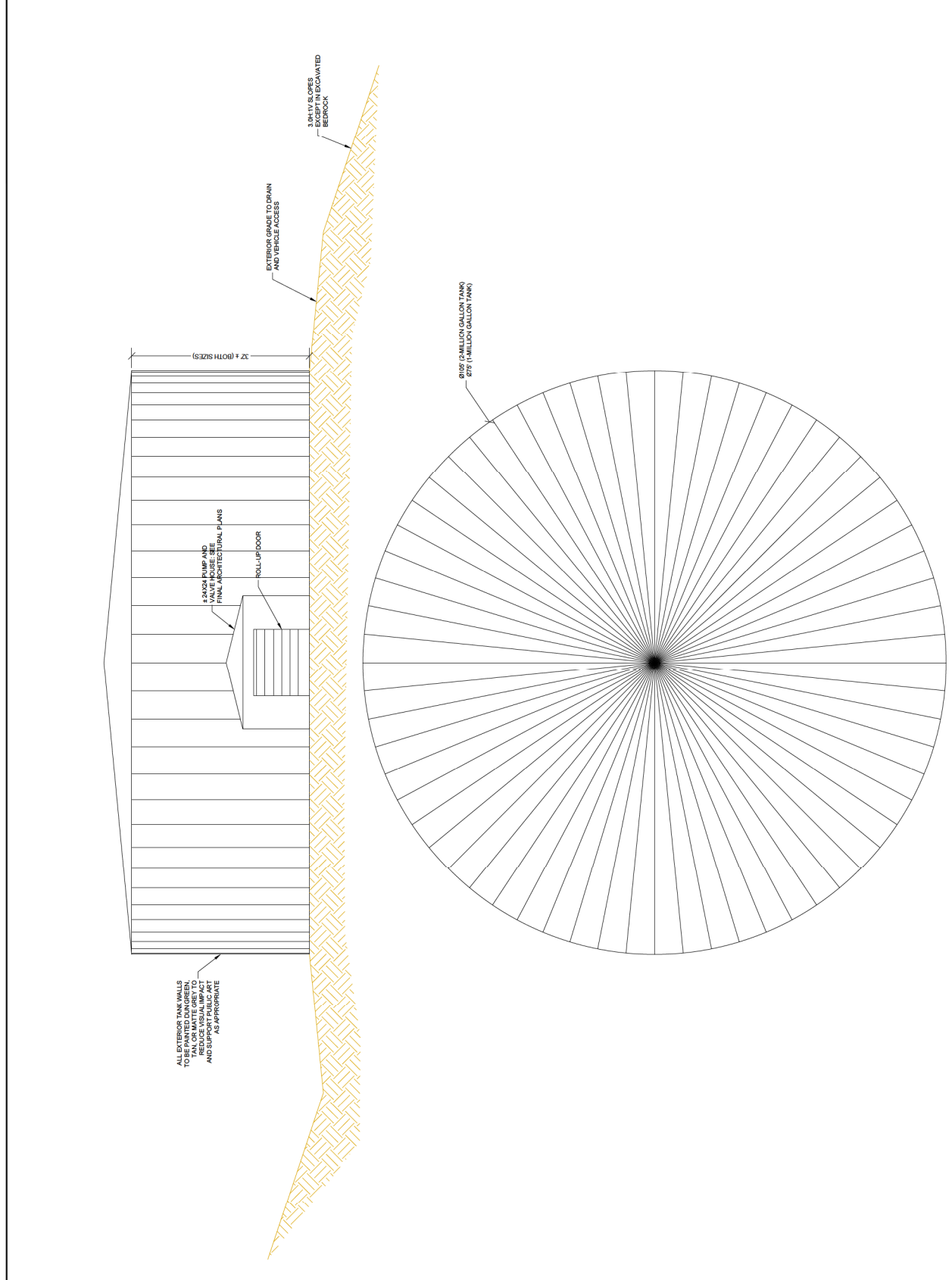
NO.	DATE	BY	DESCRIPTION
1	2023-03-07	LJD	FOR REVIEW - MASTER PLAN
2	2023-05-08	LJD	WASHOE COUNTY SPECIAL USE PERMIT
3	2023-07-03	LJD	FOR REVIEW - ELECTRICAL DESIGN
4	2023-07-10	LJD	WASHOE COUNTY SPECIAL USE PERMIT REV1
5	2023-09-08	LDMN	WASHOE COUNTY SPECIAL USE PERMIT REV2



DATE: PENNING
 DRAWN: NEK.ELJIDO
 PROJECT NO.: 1-99-01-010

PREPARED FOR:
Robinson
 SKY TAVERN
 SKI RESORT
 21130 MT. ROSE HWY
 RENO, NV 95911
 (901) 210-1816

WASHOE COUNTY
 PROJECT NO.: 1-99-01-010
 PRELIMINARY WATER TANK PLAN AND ELEVATION
 SPECIAL USE PERMIT
 SKY TAVERN SKI AREA



Mr. Nathan Robison, P.E.
Robison Engineering Co.
846 Victorian Avenue #20
Sparks, Nevada 89431

Project No.: 1674-17-1
August 24, 2023

**RE: Geotechnical Summary
Sky Tavern Ski Area; APN 048-050-03
Washoe County, Nevada**

Dear Mr. Robison:

Black Eagle Consulting, Inc. (BEC) is pleased to present this geotechnical summary of the proposed Sky Tavern Ski Resort improvements project to be constructed within the overall ski resort premises located on Mt. Rose Highway in Washoe County, Nevada. The projects are in initial planning and development, and an application for a special use permit is planned to be submitted to Washoe County. The projects will ultimately involve the design and construction of numerous proposed improvements and modifications to the existing ski area which include: new asphalt and concrete paving for parking areas adjacent to Mt. Rose highway, a new ski lift, an expansion to the existing lodge building, construction of a new Sprung® Structure building adjacent to the parking area, underground utilities for snowmaking, site lighting, a 1-million-gallon and a 2-million-gallon water storage tank, grading of new roads and pathways, a maintenance building, a ski jump and a skateboard park, and various ancillary buildings throughout the developed portions of the property. This geotechnical summary is to be used for planning and special use submittal purposes and will need to be supplemented with field exploration, laboratory testing and geotechnical analyses for the final design and construction of the specific improvements. It is our understanding that the improvements will be completed in phases.

Black Eagle Consulting, Inc. previously completed a geotechnical investigation for the existing water tank at Sky Tavern Ski Resort. Field logs and laboratory testing from the previous investigation have been used to supplement our geotechnical summary.

Project Description

As noted above, the project will involve the design and construction of numerous proposed improvements throughout the overall Sky Tavern Ski Resort site. The proposed 1- and 2-million-gallon water tanks will be of bolted steel construction which will be founded on Portland cement concrete (PCC) shallow ring foundations, and the bases will be placed on compacted aggregate base. Cuts and fills of up to 9 feet will be required to create level pads for the tanks. The proposed buildings and ancillary structures will be supported on shallow PCC foundations with PCC slab-on-grade floors. Site improvements include installation of a snowmaking system with buried water lines and aboveground snowmaking towers, a new ski lift, a new magic carpet lift, and construction of paved and unpaved access roads and pathways. Grading for these improvements will vary but is generally expected to involve less than 10 feet of cuts and fills. It is unclear if retaining walls will be necessary.



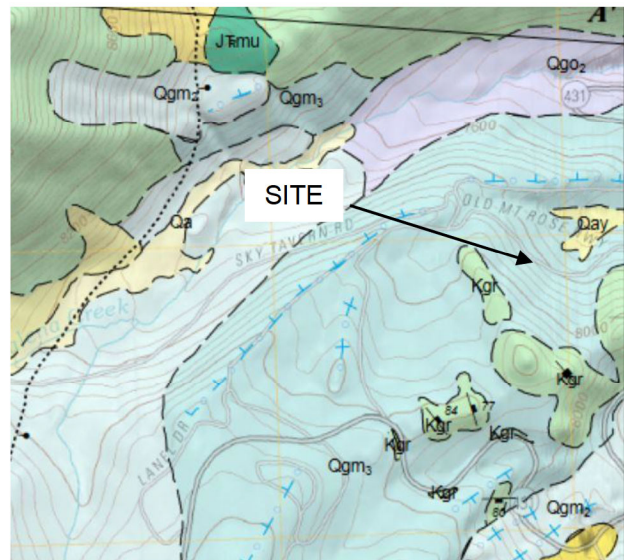
Site Conditions

The overall Sky Tavern Ski Resort site is located in the Carson Range between Reno and Lake Tahoe and consists of approximately 143 acres of mountainous terrain on Mount Rose in Washoe County, Nevada. The site is located in Sections 17 and 18, Township 17 North, Range 19 East, Mt. Diablo Meridian. The ski area is located to the west and north of Mt. Rose Highway (State Route 431).

The overall site includes steep terrain on Mount Rose sloping down to the east, towards Galena Creek, and to the south, towards Brown's Creek. Overall vertical relief is approximately 650 feet, but local relief within specific project areas is limited to less than 40 feet. The land is moderately to heavily vegetated by pine forest with native underbrush. Multiple stream drainages transect the project area, generally sloping towards the east, which are vegetated by aspen groves and alpine plants. The base area is located near the northeastern corner of the property and includes asphalt-paved parking and drives as well as multiple buildings such as the lodge building and numerous ancillary structures for maintenance and storage. Public utilities are present near the base area which include municipal water, electrical and sewer.

Geologic and General Soil Conditions

The site lies on the eastern slopes of Mount Rose in an area mapped by the Nevada Bureau of Mines and Geology (NBMG) as *Glacial Deposits (Late Pleistocene)*, *Undivided Granitic Pluton(s) (Cretaceous)*, *Young Alluvial Deposits (Late Pleistocene to Holocene)*, *Glacial Outwash Deposits (Late Pleistocene)* (Hinz et al., 2014). In general, the vast majority of the site is underlain by granitic bedrock; however, the areas where the majority of development are planned are surfaced by glacial deposits, with granitic outcroppings generally exposed at and near peaks within the site. The glacial deposits are described as *Unsorted or poorly sorted sand, gravel and boulders (till)*. *Granitic rocks typically moderately to highly weathered*. The granitic plutons are described as *granite, granodiorite, quartz monzonite, monzodiorite, and diorite*. *Locally contains abundant mafic enclaves (up to 50% by volume)*.



Hinz et al., 2014

Based on previous exploration in the area, the site materials are generally non-plastic silty sand with gravel soils in a cobble-boulder matrix. The granitic bedrock typically has a weathering rind several feet thick of grus, making it excavatable through intermediate depths (5 to 10 feet). Hard bedrock materials can be present locally.



While groundwater lies at considerable depths, seasonal snowmelt contributing to perched groundwater is common during spring and early summer and is possible through fractured rock at any time of year.

Geologic Hazards

The Sky Tavern Ski Resort lies within an area with a high potential for strong earthquake shaking. Seismic design criteria for proposed structures will be addressed in the future geotechnical investigation(s) for specific projects that will be performed by BEC.

No earthquake hazards map is available for the project location. The geologic map (Hinz et al., 2014) and the United States Geological Survey (USGS) U.S. Quaternary faults web mapping tool (USGS, 2023) identify the nearest fault lying approximately 1,200 feet to the east of the parking area and lodge. This fault, the Little Valley Fault, is mapped as being Holocene in age. Based on the available mapping, no additional fault investigation or mitigation in the form of building/structure setbacks is necessary for the structures proposed in the improvements.

The area is mapped as Zone X, or areas determined to be outside of the 500-year floodplain (Federal Emergency Management Area [FEMA], 2009a and b). However, multiple drainages exist within the site and at times may carry large volumes of water and debris flows which are able to breach the banks and any existing stormwater infrastructure.

The site should exhibit a moderate potential for dust generation during dry months. Rock slide/debris flow hazards are possible based on local terrain and can be mitigated with proper engineering. No other geologic hazards were identified.

Discussion and Conclusions

The site is geotechnically suitable for the proposed improvement projects. Soils within the site are expected to be granular sand and gravel deposits with considerable cobbles and boulders. Isolated areas (water tanks, new lift towers and water line) should expect to encounter granitic bedrock with varying degrees of weathering/hardness. The granular soils and granitic bedrock will provide excellent foundation support for the proposed improvements when properly prepared. When excavated, the native granular materials can be reused as structural fill, although removal of oversized particles may result in significant quantity shrinkage. The presence of bedrock, cobbles and boulders should be anticipated and will result in excavation difficulty. The geotechnical constraints associated with oversized cobbles and boulders or bedrock will be addressed in BEC's geotechnical investigation report(s).

Closing

This report has been prepared in general accordance with accepted geotechnical practices to provide an overall geotechnical summary and expected constraints for planning of the proposed improvements. As noted earlier, individual, project-specific geotechnical investigations will be completed with detailed geotechnical recommendations for the design and construction of the proposed improvements.



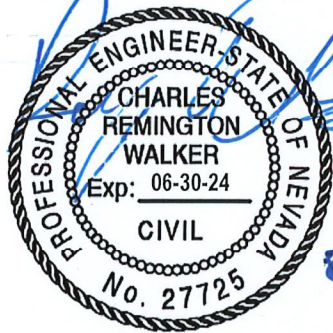
Mr. Nathan Robison, P.E.
Robison Engineering Co.
August 24, 2023

4

We appreciate having the opportunity to work with you on this project. If you have any questions regarding our findings, please contact us.

Sincerely,

Black Eagle Consulting, Inc.



C. Remington Walker, P.E.
Project Engineer

CRW:JP:cjr

Copies to: Addressee (PDF via Email)

References

Federal Emergency Management Agency (FEMA), 2009a (March 16, 2009), *Flood Insurance Rate Map 32031C3325G Washoe County, Nevada*.

FEMA, 2009b (March 16, 2009), *Flood Insurance Rate Map 32031C3350G Washoe County, Nevada*.

Hinz, N.H., Ramelli, A.R., and Faulds, J.E., 2014, *Preliminary Geologic Map of the Mt. Rose Quadrangle, Washoe County, Nevada*, Nevada Bureau of Mines and Geology, Open File Report 14-7

United States Geological Survey (USGS), 2023, *Online Quaternary Fault and Fold Database of United States, Google Earth Files* at <https://earthquake.usgs.gov/hazards/qfaults/> accessed August 2023.



Black Eagle Consulting, Inc.
Geotechnical & Construction Services

1345 Capital Boulevard, Suite A
Reno, Nevada 89502-7140

Tel: 775/359-6600

Fax: 775/359-7766

Email: mail@blackeagleconsulting.com

Quotation Details

Job Name:	Sky Tavern Ski Area-	Date Created:	6/26/23
Quote #:	972928	Exp. Date:	7/14/23

Contact Information

Prepared By:	Tyson Karcheski	Contact Name:	Mike Oehlert
Phone #:	(866) 308-9455	Phone #:	775-848-3992
E-Mail:	customer.quotes@willbrands.com	Email:	mike.oehlert@skytavern.com
Fax:	920-921-0781	Fax:	

Address Information

Bill To Name:	Sky Tavern Ski Area (1438029)	Ship To Name:	Sky Tavern Ski Resort
Bill To:	21130 MT Rose Hwy Reno, NV 89511	Ship To:	21130 Sky Tavern Rd Reno, NV 89511

Standard Products

Qty	Product	Sale Price	Ext. Price
77	[PART#] VS-RTSA-35-7324-11-AB-GV [DESCRIPTION] 35' Tall x 7.3" Base x 2.4" Top x 11ga Thick, Round Tapered Steel, Anchor Base Light Pole, Full Base Cover, Wiring Hand Hole & Cover, Standard Fixture Mounting & Durable Hot-Dip Galvanized Finish, USA Engineered & Manufactured (Includes 1" Anchor Bolts) [COMMENTS] SKI RUN POLES	\$2,199.00	\$169,323.00
77	[PART#] VS-S-BLH-R24-2-180-GV [DESCRIPTION] 2 @ 180 deg. Fixture Mount, Steel Bullhorn Bracket, Pole Top Mount, Hot-Dip Galvanized Finish, USA Engineered & Manufactured [COMMENTS] SKI RUN BULLHORNS	\$299.00	\$23,023.00
77	[PART#] VS-P2 [DESCRIPTION] Light Fixture Mounting, 2.38" OD x 4" Long, Tenon Top [COMMENTS] ALL POLES	\$0.00	\$0.00
77	[PART#] VS-PRE100 [DESCRIPTION] Pre-Shipped Anchor Bolt Kit, 1" x 36" x 4" [COMMENTS] SKI RUN PRE-SHIPPED ANCHORS	\$99.00	\$7,623.00
154	[PART#] NF-SHM-250-40-MV-45-DB-SF-WHP7NP [DESCRIPTION] 250W, NAFCO® Medium SHX Shoebox LED Light Fixture, 40000 Lumens, 4000K, 120-277V Input VAC, 45° Medium Spot Distribution [COMMENTS] [DARK BRONZE][SLIPFITTER][WHP7NP][GLARE CUPS]	\$775.00	\$119,350.00
154	[PART#] OA-SF [DESCRIPTION] Adjustable Slipfitter Mount, Fits 2.38" OD Tenon & Arm Mounts, Dark Bronze Powder Coat Standard [COMMENTS] SKI RUN SLIP FITTERS FOR FIXTURES	\$40.00	\$6,160.00
154	[PART#] OA-WHP7NP [DESCRIPTION] 6' Cord w/o Plug, Stripped Pigtail [COMMENTS] WHIP CHORD FOR SKI RUN FIXTURES	\$0.00	\$0.00
13	[PART#] VS-RSSA-18-4040-11-AB-GV-P2 [DESCRIPTION] 18' Tall x 4.0" OD x 11ga Thick, Round Straight Steel, Anchor Base Light Pole, Full Base Cover, Wiring Hand Hole & Cover, Standard Fixture Mounting & Durable Hot-Dip Galvanized Finish, USA Engineered & Manufactured (Includes 3/4" Anchor Bolts) [COMMENTS] PARKING LOT POLES	\$1,059.00	\$13,767.00
13	[PART#] VS-S-BLH-R24-2-180-GV [DESCRIPTION] 2 @ 180 deg. Fixture Mount, Steel Bullhorn Bracket, Pole Top Mount, Hot-Dip Galvanized Finish, USA Engineered & Manufactured [COMMENTS] PARKING LOT BULLHORNS	\$299.00	\$3,887.00
13	[PART#] VS-PRE075 [DESCRIPTION] Pre-Shipped Anchor Bolt Kit, 0.75" x 17" x 3" [COMMENTS] PARKING LOT PRE-SHIPPED ANCHORS	\$35.00	\$455.00
26	[PART#] NF-SHS-120-40-MV-4-DB-SF [DESCRIPTION] 120W, NAFCO® Small SHX Shoebox LED Light Fixture, 20250 Lumens, 4000K, 120-277V Input VAC, Type 4 Distribution	\$499.00	\$12,974.00

	[COMMENTS] PARKING LOT FIXTURES [DARK BRONZE][SLIPFITTER		
26	[PART#] OA-WHP3NP [DESCRIPTION] 2' Cord w/o Plug, Stripped Pigtail [COMMENTS] WHIP CHORD FOR PARKING LOT FIXTURES	\$0.00	\$0.00
26	[PART#] OA-SF [DESCRIPTION] Adjustable Slipfitter Mount, Fits 2.38" OD Tenon & Arm Mounts, Dark Bronze Powder Coat Standard [COMMENTS] PARKING LOT SLIP FITTERS FOR FIXTURES	\$40.00	\$1,040.00

- Pricing includes delivery within the contiguous USA unless otherwise noted and is based on an order release within 30 days.
- Reshipped anchor bolts at CUSTOMER'S expense.
- Sales tax calculation (if applicable) will be finalized at order entry (OE).
- If order quantity & quote quantity are different, pricing is subject to change.
- Quote is subject to Wisconsin Lighting Lab's standard terms and conditions. See website for complete details.

Grand Total:
\$357,602.00

Estimated Lead Time: 10 to 12
Weeks

Important Notes

MADE IN THE USA
 GALVANIZED POLES AND BULLHORNS
 PRE-SHIPPED ANCHORS INCLUDED
 QUOTING 120-277 VOLTS (CUSTOMER TO CONFIRM)
 CUSTOM SHORT GLARE CUP INCLUDED WITH FIXTURES
 SPEC SHEETS AND PHOTOMETRICS ATTACHED
 PRICE SHOWN IS THE DELIVERED COST MINUS TAX

- Light pole base: Assumes new install
- Loading Assumption: light poles rated for 7.1 EPA, 177 LBS at 100 MPH.
- Loading Assumption: mounting quantity [2, light fixtures]; [1, bracket] per pole.
- Lightning strikes and voltage surges can cause LED fixture damage; additional surge protection available upon request.
- Non-Standard specifications may add to the production lead time.
- Customer responsible for unloading at time of delivery; line items may ship at different times during production cycle.
- Commercial shipping location with receiving dock can be provided to void limited access delivery charges.
- Quoted Lead time is an estimate and is subject to change as business conditions change.

IMPORTANT: Do you require vibration dampeners? We recommend vibration dampeners be used when (1) light poles are being installed on a parking ramp, deck, bridge, pier, airport, train or subway hub/terminal or known problem area (2) a load of 0.75 EPA or smaller is going on the light poles and (3) light poles are being used as camera supports and/or will have non-standard appendages attached to them.

IMPORTANT: Wisconsin Lighting Lab and its vendors are not responsible for the structural adequacy of new and/or existing light pole footing designs and anchor bolts. Estimated loading capacity values and wind zone ratings are based on standard commercial design and engineering criteria, and they do not account for additional loadings from objects such as (but not limited to) signs, banners, cameras, solar panels and flags. Our light pole warranty does not cover vibration induced fatigue failure.

IMPORTANT: Wisconsin Lighting Lab and its vendors consider these quoted products as produced and supplied according to the customer's dimensional, material and/or electrical specifications. To ensure proper selection of the light pole, luminaire, accessories and/or foundation, we recommend the customer consult a qualified local engineer to analyze the loading, design and project criteria for the specific application.



P: 866-308-9455
customer.quotes@willbrands.com

308 North Brooke Street
Fond du Lac, WI 54935
US



Sky Tavern Ski Area

06/19/2023

Job Number: **972928**

Prepared by: CO

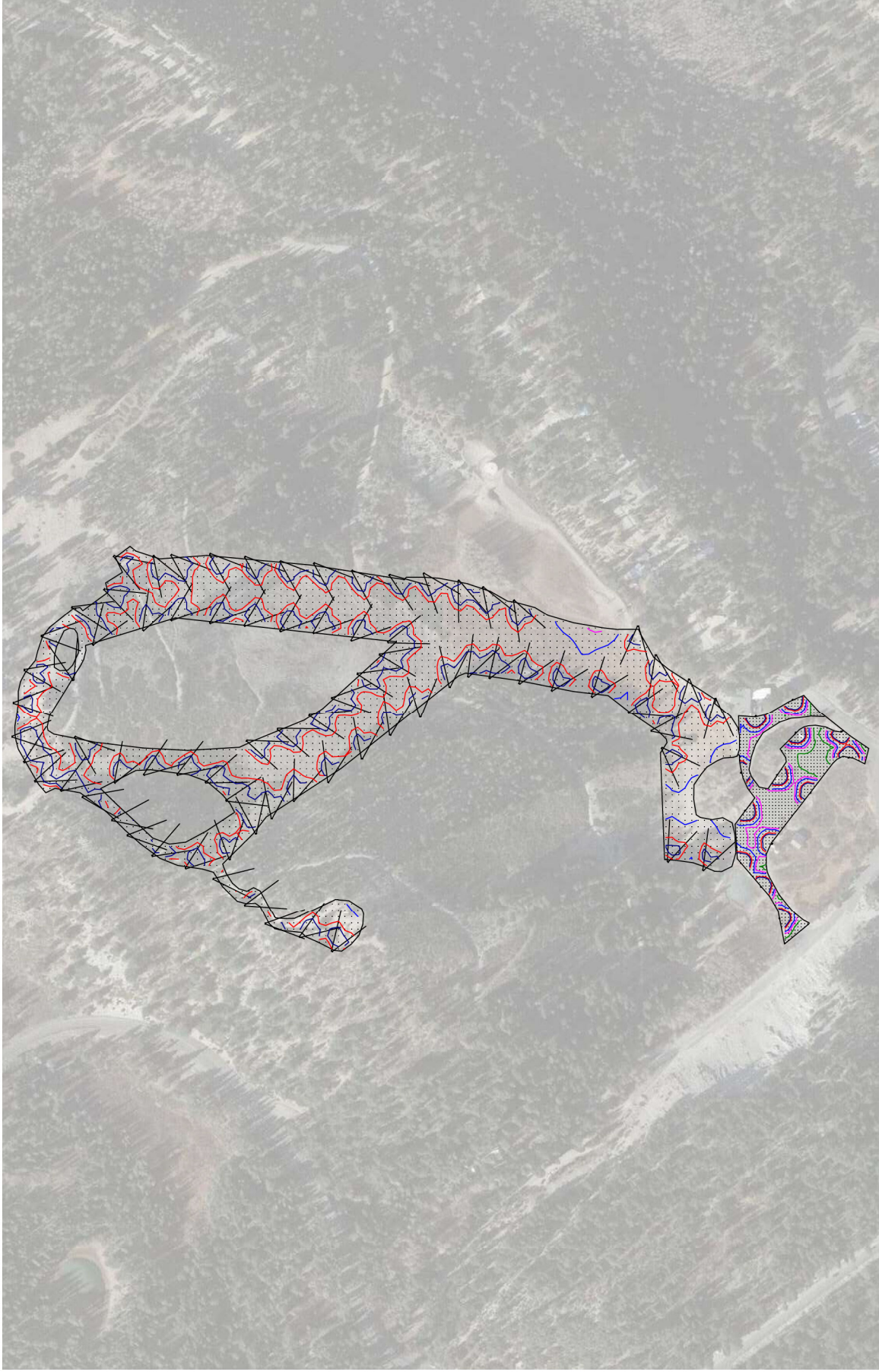
Powered by **Wisconsin Lighting Lab, Inc.**

NOTES

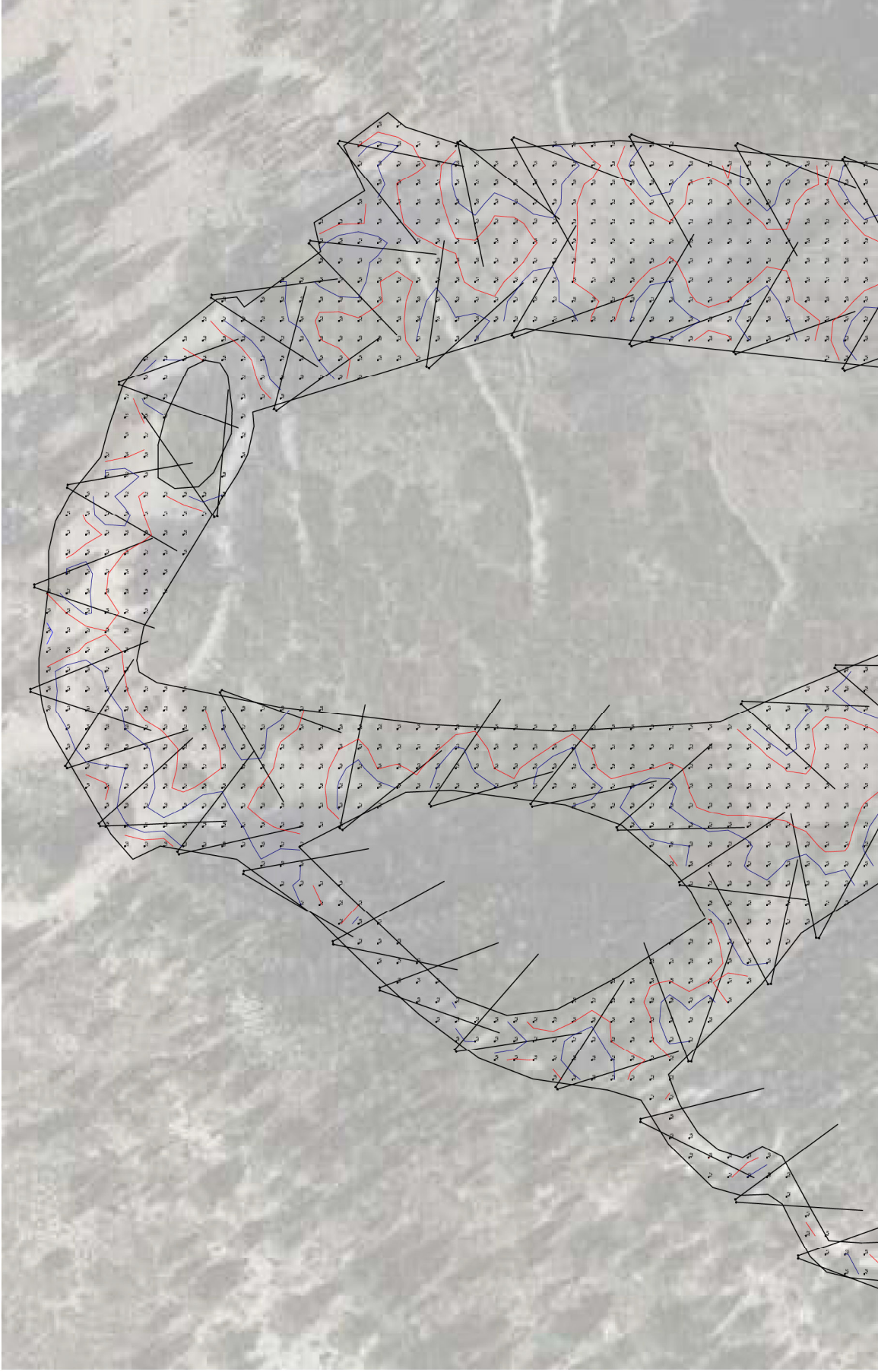
*Luminaire testing data is based on Illuminating Engineering Society (IES) standards under simulated and laboratory conditions. This design is based on information supplied by others, and individual field measurements may vary from computer-simulated calculations due to variables like (but not limited to) variation in electrical voltage, environmental conditions and other variable field characteristics. Typical field foot candle measurements may vary +/- 10%. For sports lighting, field measurements should be taken in accordance with IESNA RP-6-15. Conformance to facility and local codes is the responsibility of the owner and their representatives. This layout may not meet CA Title 24 and/or other local energy codes. If specific compliance is required, those details must be provided to your factory design representative.

**Satisfactory performance and safe use of LED sports lighting fixtures is dependent upon light poles, brackets, anchorage and other structural components being of adequate design and condition. The total combined Effective Projected Area (EPA) and weight of all fixtures, brackets and attachments mounting to a light pole cannot exceed the EPA and weight rating for a specified pole. For sports lighting retrofit applications, it is the customer's responsibility to have a qualified inspector and/or engineer confirm the structural adequacy of the existing light poles assemblies. We are happy to quote new light poles and brackets if you have concerns about your existing materials/bounded

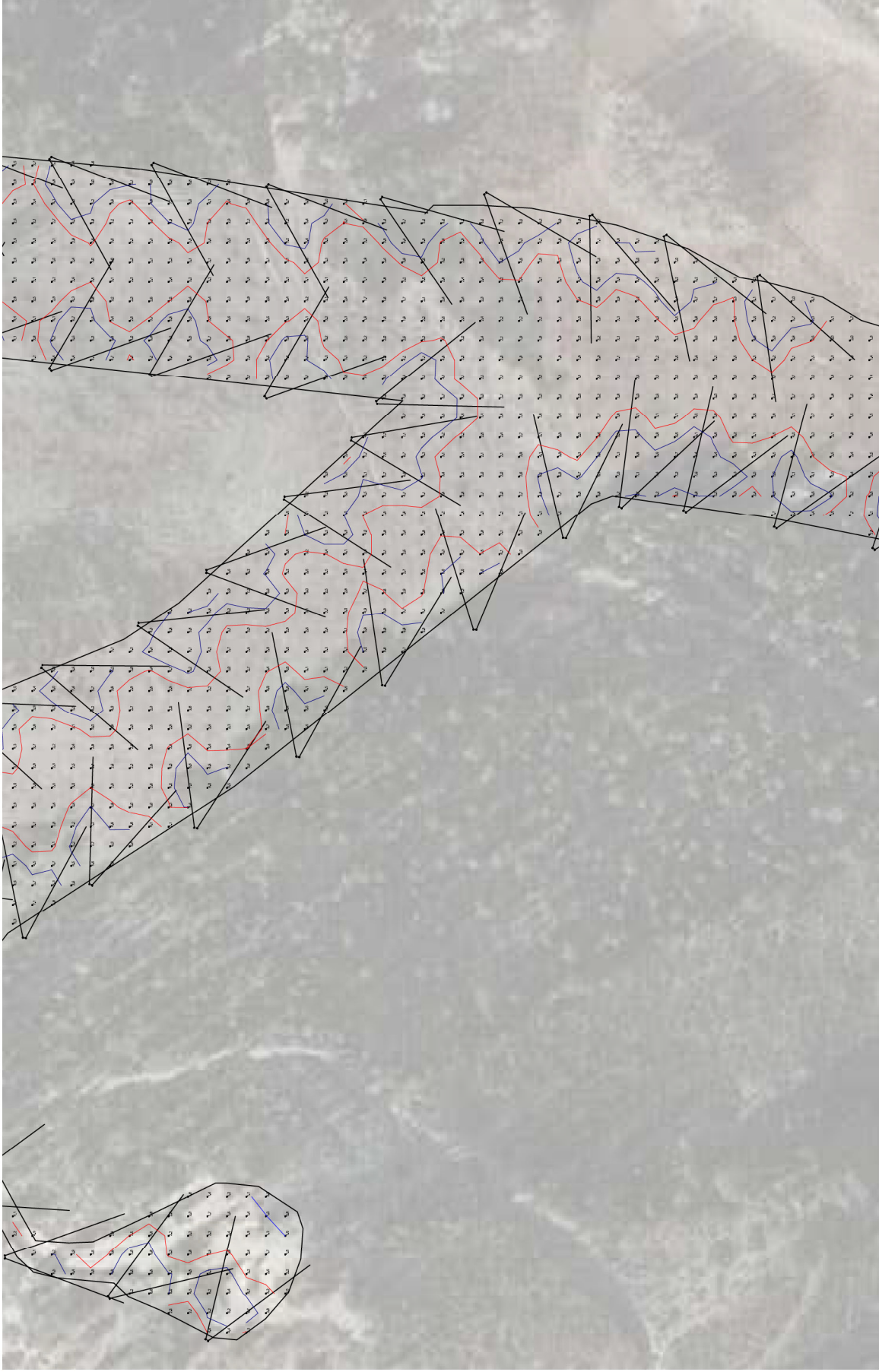
Photometrics



Photometrics



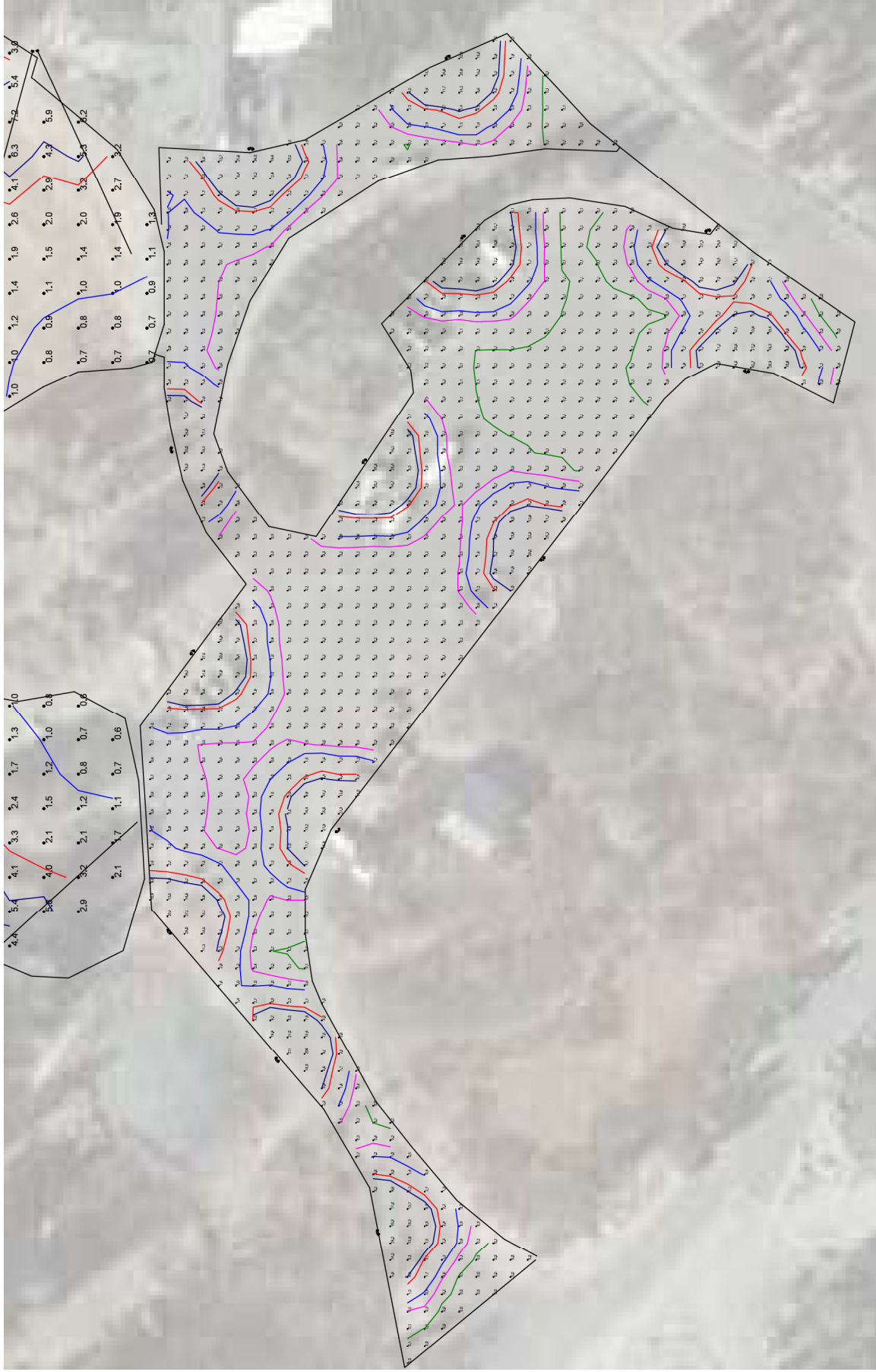
Photometrics



Photometrics





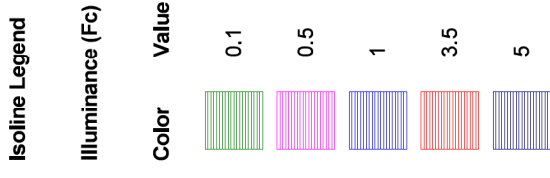
Photometrics



Calculations

Luminaire Schedule

Symbol	Qty	Label	LLF
	77	P1	0.950
	13	NF-SHS-120-40-xx-4	0.950



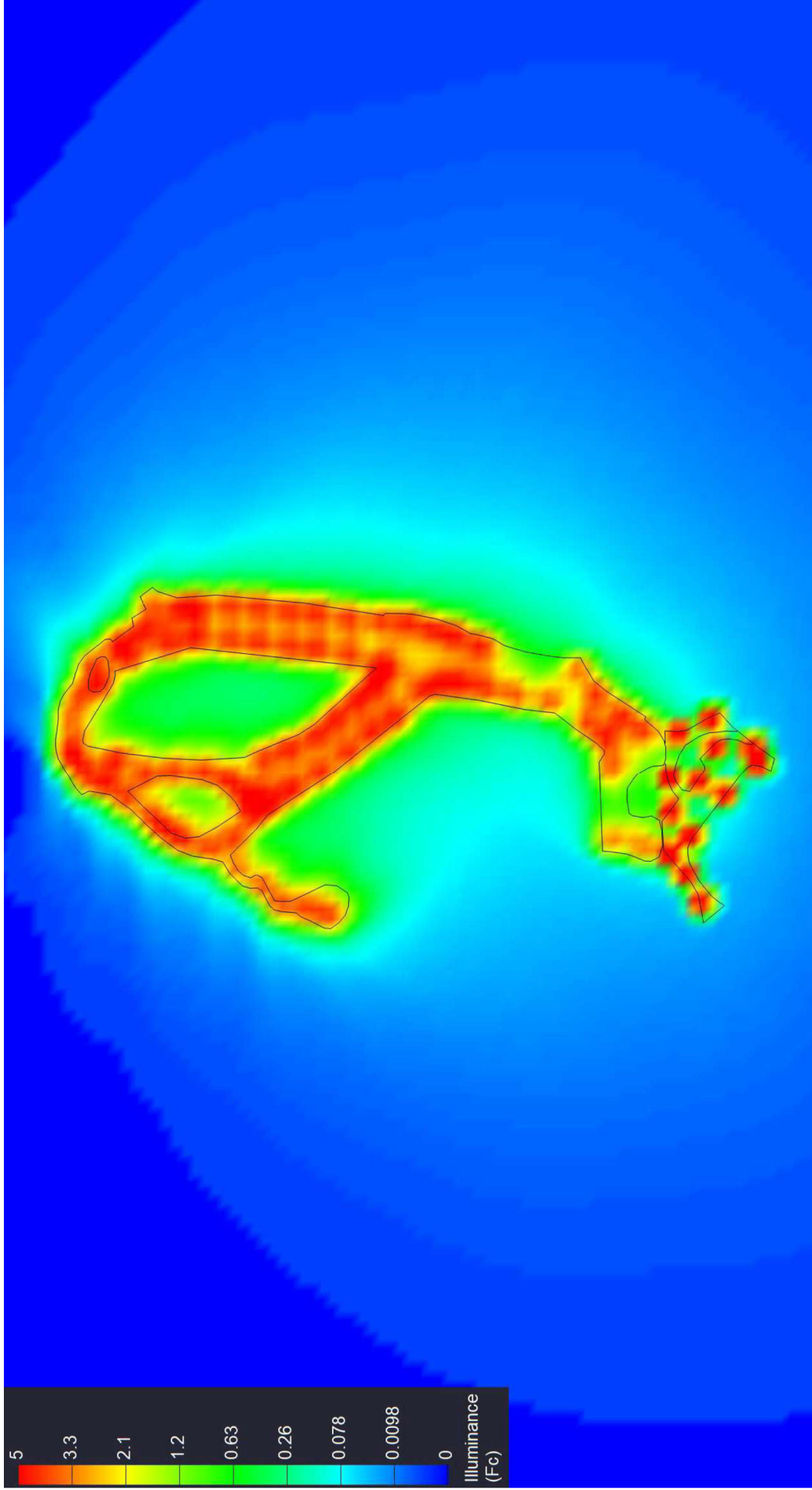
Calculation Summary

Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
Parking Lot	Illuminance	Fc	3.32	42.7	0.0	N.A.	N.A.
Phase 1 Lighting	Illuminance	Fc	3.74	9.1	0.5	7.48	18.20

■ **Renderings**



■ **Renderings**



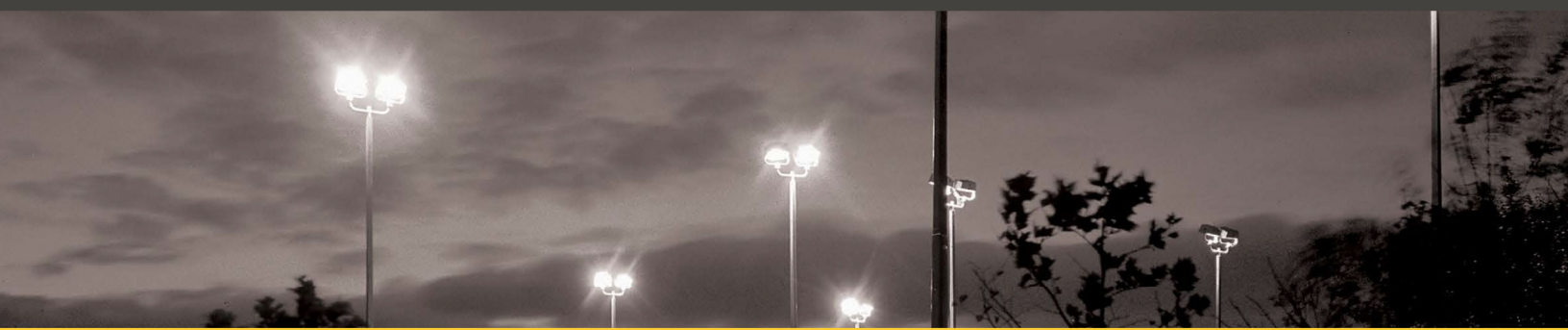
NAFCO® RTSA ROUND TAPERED STEEL ANCHOR BASE LIGHT POLES



Catalog # _____

Project _____

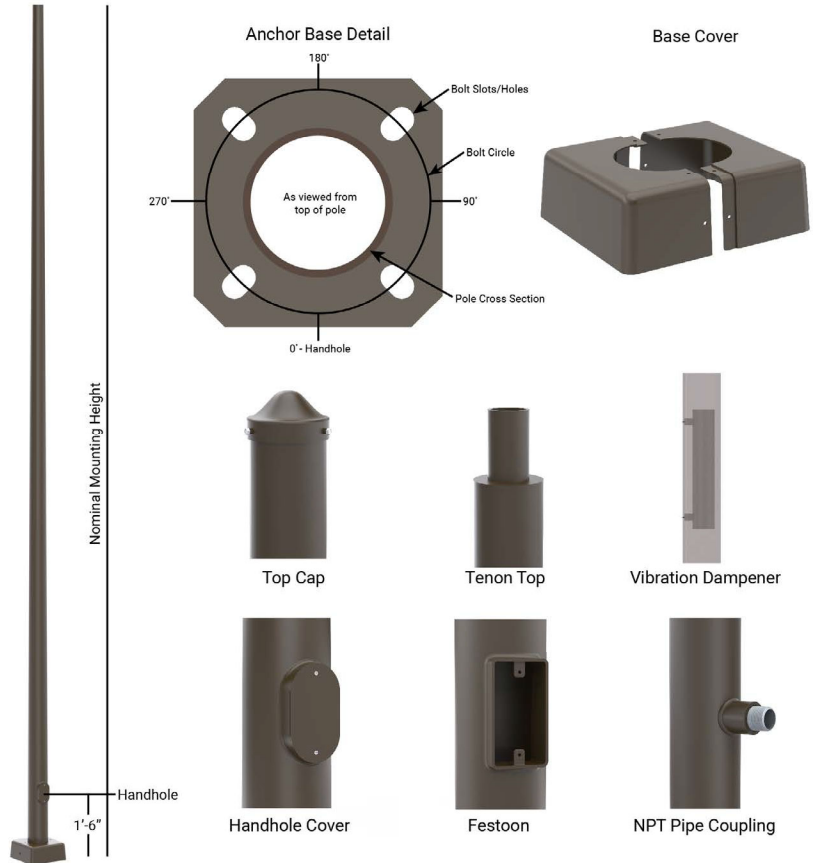
Comments _____



Proudly engineered and manufactured in the American Midwest – our NAFCO® family of professional-grade light pole products combines 50+ years of manufacturing expertise and top-notch Midwestern workmanship. Like all Will products, NAFCO® poles come supported by our unmatched design, engineering, and project support capabilities.

Specifications

- Pole Shaft** - The pole shaft is a one-piece assembly conforming to ASTM A595 Grade A or A572 Grade 55 with a constant linear taper of 0.14 in/ft. Poles greater than 50' are provided as a two-piece field assembled unit.
- Pole Top** - A removable top cap is provided for poles receiving drilling patterns for side-mount luminaire arm assemblies. Other pole top options include Tenon Top, Top Cap Only or Open Top which is typical when the pole top diameter matches the necessary slip-fit dimensions.
- Hand Hole** - A reinforced hand hole with grounding provision is provided at 1'-6" from the base end of the pole assembly. Each hand hole includes a cover and cover attachment hardware. Poles with a 5.90" base diameter are supplied with a 3" X 5" rectangular hand hole. All other pole assemblies are provided with a 4" X 6.5" oval hand hole (dimensions are nominal).
- Base Cover** - A two-piece full base cover fabricated from ABS plastic is provided with each pole assembly. Additional base cover options, including a cast aluminum and fabricated steel cover, are available upon request. A two-piece steel full base cover is required for some applications depending on the finish requirement and/or pole base diameter. Factory reserves the right to provide a two-piece steel full base cover on some applications depending upon the finish requirement and/or pole base diameter.
- Anchor Bolts** - Anchor bolts conform to ASTM F1554 Grade 55 and are provided with two hex nuts and two flat washers. Bolts have an "L" bend on one end and are galvanized a minimum of 12" on the threaded end.
- Nut Covers** - Nut covers can be substituted on most models.
- Hardware** - All structural fasteners are galvanized high strength carbon steel. All non-structural fasteners are galvanized or zinc-plated carbon steel or stainless steel.
- Finish** - Standard finishes are either Galvanized or Finish Painted. Additional finish options including Finish Paint over Galvanizing are available upon request.
- Design Criteria** - Standard EPA (Effective Projected Area) and weight values are based on Standard Commercial Criteria (with 1.3 gust factor) for top mounted fixtures only. Consult the factory on loading criteria for side mounted luminaires and/or brackets. Satisfactory performance of light poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.



EPA Loading Guide (Commercial Design Criteria)

Base Model	80mph w/ 1.3 Gust		90mph w/ 1.3 Gust		100mph w/ 1.3 Gust		110mph w/ 1.3 Gust		120mph w/ 1.3 Gust		130mph w/ 1.3 Gust		140mph w/ 1.3 Gust		150mph w/ 1.3 Gust	
	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)
VS-RTSA-20-5931-11-AB-FP	19.3	482	15.1	377	12.2	305	10.5	262	8.8	220	7.4	185	6.3	157	5.5	138
VS-RTSA-20-6537-11-AB-FP	24.2	605	19.3	482	15.6	390	13.5	335	11.2	280	9.5	238	8.1	203	6.9	173
VS-RTSA-25-5924-11-AB-FP	12.5	312	9.9	247	8	200	6.9	173	5.7	143	4.8	119	4.1	103	3.5	88
VS-RTSA-25-7035-11-AB-FP	20.3	507	16.2	405	13.1	327	11.2	280	9.4	235	7.8	194	6.7	168	5.7	143
VS-RTSA-25-7035-07-AB-FP	30.5	760	24	625	19.8	495	16.5	413	13.9	348	11.7	293	10.0	250	8.5	213
VS-RTSA-30-6624-11-AB-FP	11.7	292	9.3	232	7.5	187	6.5	163	5.4	135	4.6	115	3.9	98	3.3	83
VS-RTSA-30-8038-11-AB-FP	18.9	473	14.9	373	12	300	10.0	250	8.4	210	6.8	168	5.7	143	4.7	118
VS-RTSA-30-8038-07-AB-FP	33.5	838	27	675	22	550	18.4	460	15.3	381	13.0	325	11.0	275	9.3	233
VS-RTSA-35-7324-11-AB-FP	11.2	280	8.9	222	7.1	177	6.3	156	5.3	131	4.4	110	3.8	95	3.1	78
VS-RTSA-35-8536-11-AB-FP	18.9	472	15.1	377	12.2	305	10.5	263	8.7	218	7.2	180	5.9	148	4.8	120
VS-RTSA-35-9546-11-AB-FP	23.2	580	18.2	455	14.5	363	12.0	300	9.7	243	7.8	194	6.3	156	5.2	130
VS-RTSA-39-7824-11-AB-FP	10.7	267	8.5	212	6.6	165	5.7	143	4.5	113	3.7	93	2.9	73	2.3	58
VS-RTSA-39-9036-11-AB-FP	17.2	430	13.5	338	10.8	270	9.0	225	7.3	183	5.8	144	4.7	118	3.8	95
VS-RTSA-39-9036-07-AB-FP	28.5	715	23	575	19	475	15.8	394	13.2	330	10.8	269	9.0	225	7.7	193
VS-RTSA-45-1037-11-AB-FP	17.4	435	13.5	338	10.6	265	8.8	219	7.0	175	5.5	138	4.3	108	3.2	80
VS-RTSA-45-1037-07-AB-FP	28.5	715	23	575	19	475	16.0	400	13.3	333	11.0	275	9.0	225	7.4	185
VS-RTSA-45-1147-07-AB-FP	35.7	893	28	700	22.3	558	18.7	468	15.0	375	12.2	305	10.0	250	8.1	203
VS-RTSA-50-1030-11-AB-FP	13.2	330	10.6	265	8.3	208	6.9	173	5.4	135	4.1	103	3.1	78	2.2	55
VS-RTSA-50-1030-07-AB-FP	20.5	512	16.5	412	13.6	340	12.1	303	10.2	255	8.7	218	7.3	183	5.9	148
VS-RTSA-50-1140-07-AB-FP	29.9	748	23.5	588	18.6	465	15.6	390	12.5	313	10.0	250	8.0	200	6.5	163
VS-RTSA-50-1360-03-AB-FP	69.2	1730	55	1375	44.2	1105	26.2	655	21.1	528	17.0	425	14.0	350	11.4	285
VS-RTSA-50-1360-07-AB-FP	50.4	1260	39.7	992	31.4	785	36.0	900	29.8	745	24.6	615	20.4	510	17.0	425
VS-RTSA-55-1136-0711-AB-FP	21.6	540	17.7	442	14.7	367	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-55-1246-0711-AB-FP	32.2	805	25.9	647	21.1	527	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-55-1352-0507-AB-FP	43.8	1095	35	875	28.6	715	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-60-1240-0707-AB-FP	25.9	647	20.7	517	16.8	420	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-60-1345-0507-AB-FP	34	850	27.6	690	22.6	565	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-60-1348-0711-AB-FP	30.1	752	24.5	612	20.2	505	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-65-1343-0507-AB-FP	30.8	770	24.8	620	20.4	510	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-65-1343-0707-AB-FP	27.3	682	22	550	17.9	447	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-70-1336-0507-AB-FP	23.6	590	19.2	480	15.8	395	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-70-1336-0707-AB-FP	20.6	515	16.7	417	13.7	342	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- The total combined EPA and weight of all fixtures, brackets, and other attachments mounting to a light pole cannot exceed the EPA and weight rating for a specified pole.
- Standard EPA (Effective Projected Area) and weight values are based around standard commercial criteria (with 1.3 second gust factor) and AASHTO standards. **Specific light pole design standards are available from factory.**
- Custom products, configurations, options, and accessories available from factory.
- Satisfactory performance of light poles is dependent upon the structure being properly attached to a supporting foundation of adequate design.

+ indicates a vibration dampener is standard.

EPA Loading Guide (2017 Florida Building Code)

Base Model	110mph FBC		120mph FBC		130mph FBC		140mph FBC		150mph FBC		160mph FBC		170mph FBC		180mph FBC	
	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)
VS-RTSA-20-5931-11-AB-FP	16	400	13.5	338	11.5	288	9.9	248	8.5	213	7.5	188	6.5	163	5.8	145
VS-RTSA-20-6537-11-AB-FP	20	500	17	425	14.2	355	12.2	305	10.7	268	9.4	235	8.4	210	7.3	183
VS-RTSA-25-5924-11-AB-FP	10.5	263	9.2	130	8	200	6.7	168	5.7	143	4.8	120	4.2	105	3.5	88
VS-RTSA-25-7035-11-AB-FP	17	425	14	350	12	300	10.3	258	8.5	213	7.8	195	6.7	168	6	150
VS-RTSA-25-7035-07-AB-FP	23	575	20	500	17	425	14.5	363	12.8	320	11	275	9.5	238	8.5	213
VS-RTSA-30-6624-11-AB-FP	10	250	8.7	218	7.5	188	6.2	155	5.2	130	4.4	110	3.8	95	3.2	80
VS-RTSA-30-8038-11-AB-FP	17.2	430	14.5	363	12.3	308	10.5	263	9	225	8	200	6.7	168	5.7	143
VS-RTSA-30-8038-07-AB-FP	29	725	25.3	633	21.5	538	18.5	463	16	400	14	350	12.4	310	10.8	270
VS-RTSA-35-7324-11-AB-FP	9.7	243	8.4	210	7	175	6	150	5	125	4	100	3.3	83	2.8	70
VS-RTSA-35-8536-11-AB-FP	15	375	12.5	313	10.7	268	9.2	230	7.7	193	6.5	163	5.5	138	4.5	113
VS-RTSA-35-9546-11-AB-FP	19.4	485	16.5	413	14	350	11.3	283	9.4	235	8	200	6.5	163	5.3	133
VS-RTSA-39-7824-11-AB-FP	10	250	8.3	208	7	175	5.9	148	4.8	120	4	100	3.3	83	2.5	63
VS-RTSA-39-9036-11-AB-FP	14.4	360	12	300	10	250	8.5	213	7	175	6	150	5	125	4	100
VS-RTSA-39-9036-07-AB-FP	24.5	613	21	525	18.5	463	16	400	14	350	12	300	10.3	258	8.7	218
VS-RTSA-45-1037-11-AB-FP	12	300	9.5	238	7.7	193	6.3	158	5	125	4	100	3	75	2	50
VS-RTSA-45-1037-07-AB-FP	22.5	563	18.8	470	15.5	388	13	325	11.1	278	9.5	238	8	200	6.5	163
VS-RTSA-45-1147-07-AB-FP	9	225	7	175	5.5	138	4	100	3.3	83	2.3	58	1.4	35	1	25
VS-RTSA-50-1030-11-AB-FP	18	450	15	375	12.5	313	10	250	8.6	215	7	175	5.5	138	4.8	120
VS-RTSA-50-1030-07-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-50-1140-07-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-50-1360-03-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-50-1360-07-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-55-1136-0711-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-55-1246-0711-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-55-1352-0507-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-60-1240-0707-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-60-1345-0507-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-60-1348-0711-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-65-1343-0507-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-65-1343-0707-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-70-1336-0507-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RTSA-70-1336-0707-AB-FP	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- The total combined EPA and weight of all fixtures, brackets, and other attachments mounting to a light pole cannot exceed the EPA and weight rating for a specified pole.
- Standard EPA (Effective Projected Area) and weight values are based around Ultimate Wind Speed, Risk Category II, Exposure Category C. Specific light pole design standards are available from factory. Above data is based around the load centroid being at 2.5' above the pole top and with 2.0' eccentricity. Weight of horizontally eccentric load is capped at 100lb, all remaining weight mounted 2.5' above top of the pole.
- Custom products, configurations, options, and accessories available from factory.
- Satisfactory performance of light poles is dependent upon the structure being properly attached to a supporting foundation of adequate design.

+ indicates a vibration dampener is standard.

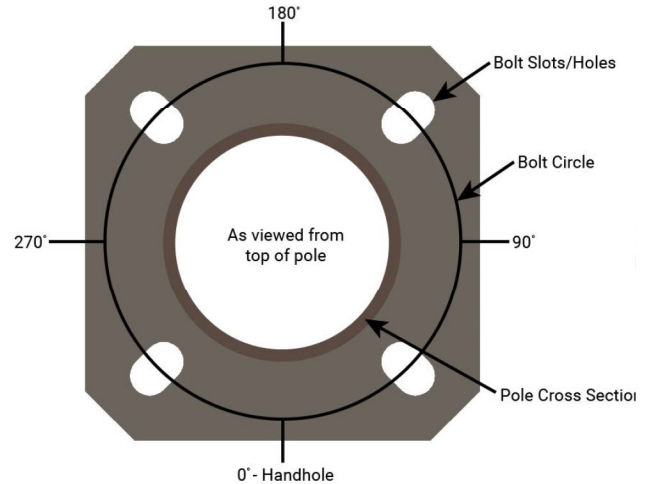
Designation & Dimensional Information

Base Model	Pole Dimensions					Base Plate		Anchor Bolts	
	Nominal Mounting Height	Top OD (in)	Base OD (in)	Wall Thick (ga)	Structural Weight (lb)	Bolt Circle Diameter (in)	Sq (in) x Thick (in)	Dia x Length x Hook (in)	Projection (in)
VS-RTSA-20-5931-11-AB-FP	20'-0"	3.1	5.9	11	140	8.5 - 9.5	10 x 0.875	1.00 x 36.00 x 4.00	3.88 - 4.38
VS-RTSA-20-6537-11-AB-FP	20'-0"	3.7	6.5	11	160	9.0 - 10.0	10.5 x 0.875	1.00 x 36.00 x 4.00	3.88 - 4.38
VS-RTSA-25-5924-11-AB-FP	25'-0"	2.4	5.9	11	155	8.5 - 9.5	10 x 0.875	1.00 x 36.00 x 4.00	3.88 - 4.38
VS-RTSA-25-7035-11-AB-FP	25'-0"	3.5	7	11	200	9.5 - 10.5	10.88 x 0.875	1.00 x 36.00 x 4.00	3.88 - 4.38
VS-RTSA-25-7035-07-AB-FP	25'-0"	3.5	7	7	280	9.5 - 10.5	10.88 x 1	1.00 x 36.00 x 4.00	4 - 4.5
VS-RTSA-30-6624-11-AB-FP	30'-0"	2.4	6.6	11	200	9.0 - 10.0	10.5 x 0.875	1.00 x 36.00 x 4.00	3.88 - 4.38
VS-RTSA-30-8038-11-AB-FP	30'-0"	3.8	8	11	265	10.5 - 11.5	11.5 x 0.875	1.00 x 36.00 x 4.00	3.88 - 4.38
VS-RTSA-30-8038-07-AB-FP	30'-0"	3.8	8	7	380	10.5 - 11.5	11.5 x 1.25	1.25 x 42.00 x 6.00	4.75 - 5.25
VS-RTSA-35-7324-11-AB-FP	35'-0"	2.4	7.3	11	250	10.0 - 11.0	11.25 x 0.875	1.00 x 36.00 x 4.00	3.88 - 4.38
VS-RTSA-35-8536-11-AB-FP	35'-0"	3.6	8.5	11	315	11.0 - 12.0	12 x 1	1.00 x 36.00 x 4.00	4 - 4.5
VS-RTSA-35-9546-11-AB-FP	35'-0"	4.6	9.5	11	370	12.5 - 13.5	13 x 1	1.00 x 36.00 x 4.00	4 - 4.5
VS-RTSA-39-7824-11-AB-FP	39'-0"	2.4	7.82	11	285	10.5 - 11.5	11.5 x 0.875	1.00 x 36.00 x 4.00	3.88 - 4.38
VS-RTSA-39-9036-11-AB-FP	39'-0"	3.58	9	11	355	12.0 - 13.0	12.38 x 1	1.00 x 36.00 x 4.00	4 - 4.5
VS-RTSA-39-9036-07-AB-FP	39'-0"	3.58	9	7	515	12.0 - 13.0	12.38 x 1.25	1.25 x 42.00 x 6.00	4.75 - 5.25
VS-RTSA-45-1037-11-AB-FP	45'-0"	3.7	10	11	450	13 - 14	14 x 1	1.00 x 36.00 x 4.00	4 - 4.5
VS-RTSA-45-1037-07-AB-FP	45'-0"	3.7	10	7	650	13 - 14	14 x 1.25	1.25 x 42.00 x 6.00	4.75 - 5.25
VS-RTSA-45-1147-07-AB-FP	45'-0"	4.7	11	7	780	14.5 - 15.5	16.5 x 1.5	1.25 x 42.00 x 6.00	5 - 5.5
VS-RTSA-50-1030-11-AB-FP	50'-0"	3	10	11	475	13 - 14	14 x 1	1.00 x 36.00 x 4.00	4 - 4.5
VS-RTSA-50-1030-07-AB-FP	50'-0"	3	10	7	680	13 - 14	14 x 1.25	1.25 x 42.00 x 6.00	4.75 - 5.25
VS-RTSA-50-1140-07-AB-FP	50'-0"	4	11	7	812	14.5 - 15.5	16.5 x 1.5	1.25 x 42.00 x 6.00	5 - 5.5
VS-RTSA-50-1360-03-AB-FP	50'-0"	6	13	3	1335	17.5	18.5 x 1.75	1.75 x 84.00 x 6.00	6.25 - 6.75
VS-RTSA-50-1360-07-AB-FP	50'-0"	6	13	7	1020	17	18 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-55-1136-0711-AB-FP	55'-0"	3.58	11	7 & 11	890	14.5 - 15.5	16.5 x 1.5	1.25 x 42.00 x 6.00	5 - 5.5
VS-RTSA-55-1246-0711-AB-FP	55'-0"	4.55	12	7 & 11	975	16	17 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-55-1352-0507-AB-FP	55'-0"	5.16	12.5	5 & 7	1225	16.5	17.5 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-60-1240-0707-AB-FP	60'-0"	4.01	12	7 & 7	1060	16	17 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-60-1345-0507-AB-FP	60'-0"	4.46	12.5	5 & 7	1275	16.5	17.5 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-60-1348-0711-AB-FP	60'-0"	4.83	13	7 & 11	1075	17	18 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-65-1343-0507-AB-FP	65'-0"	4.25	13	5 & 7	1400	17	18 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-65-1343-0707-AB-FP	65'-0"	4.25	13	7 & 7	1200	17	18 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-70-1336-0507-AB-FP	70'-0"	3.55	13	5 & 7	1440	17	18 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6
VS-RTSA-70-1336-0707-AB-FP	70'-0"	3.55	13	7 & 7	1270	17	18 x 1.5	1.50 x 54.00 x 6.00	5.5 - 6

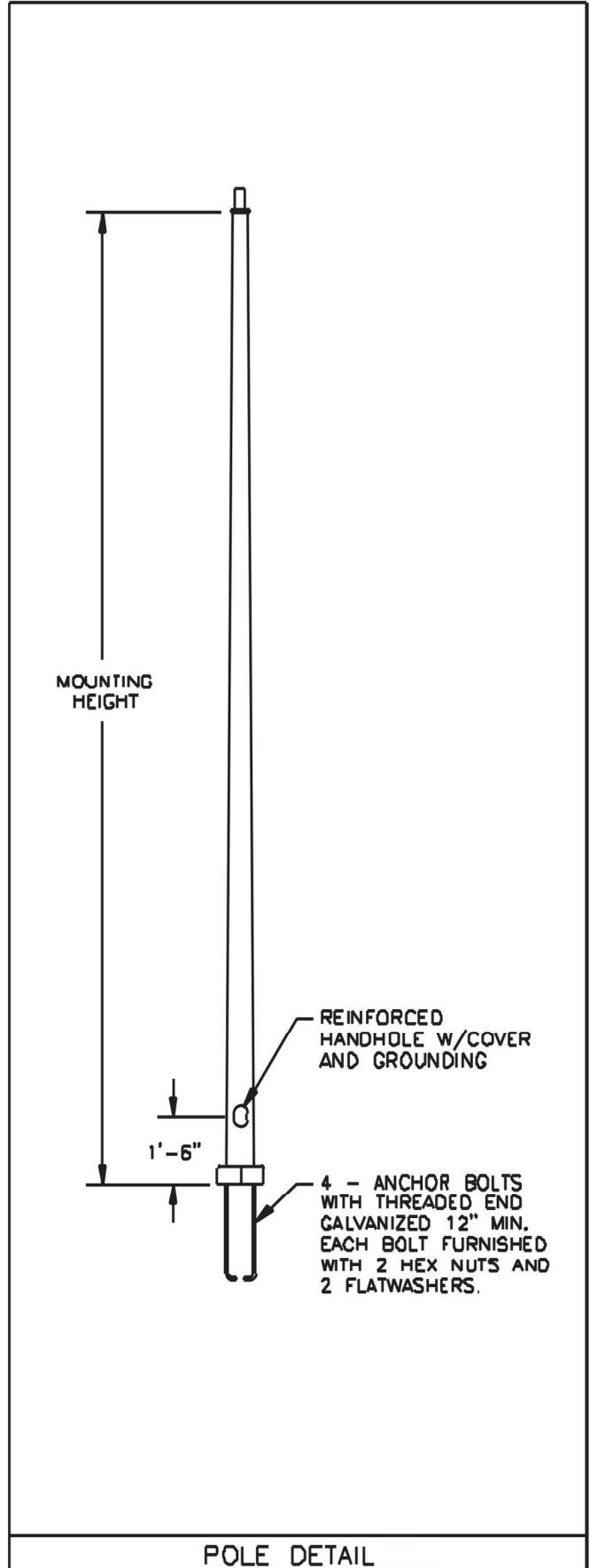
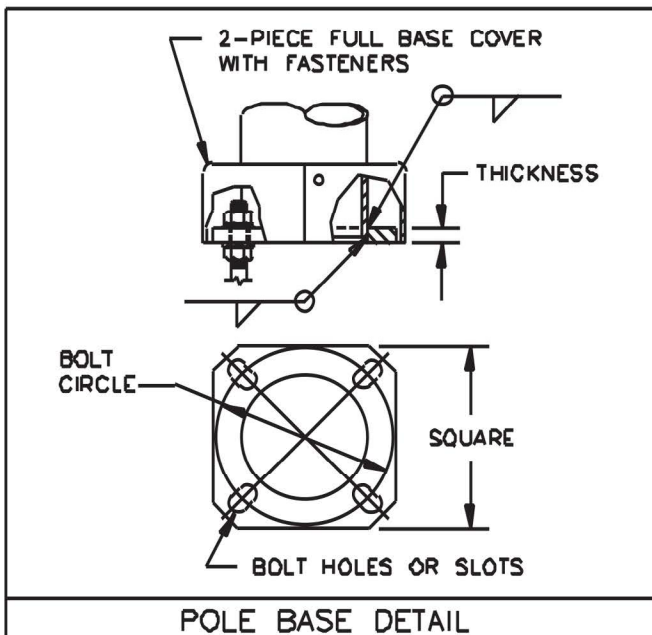
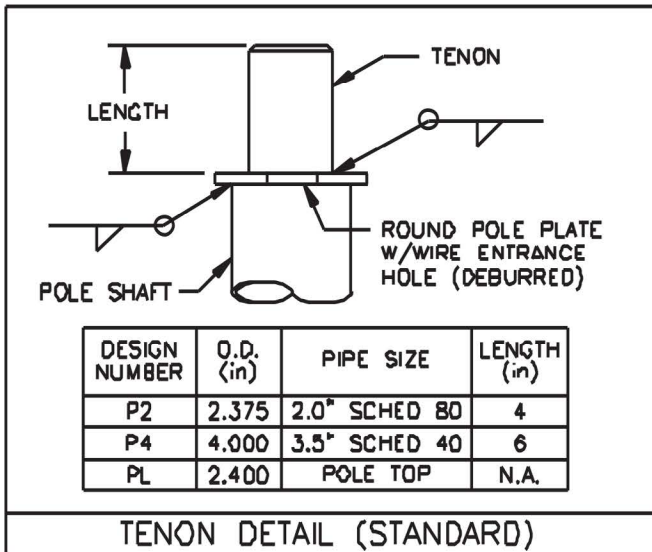
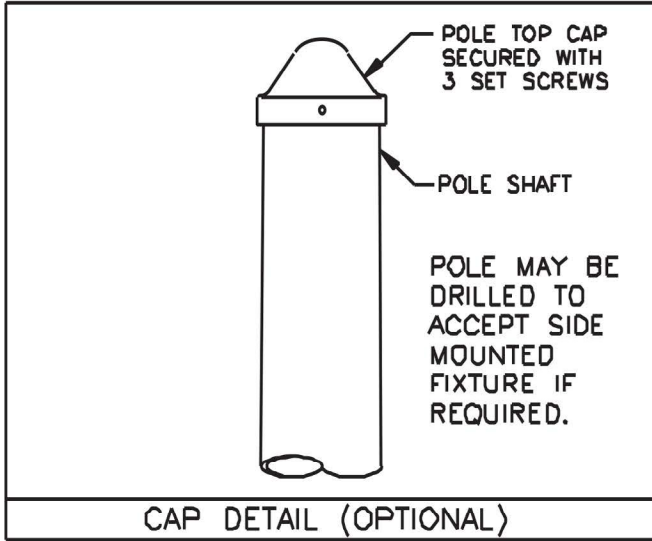
1. The total combined EPA and weight of all fixtures, brackets, and other attachments mounting to a light pole cannot exceed the EPA and weight rating for a specified pole.
2. Custom products, configurations, options, and accessories available from factory.
3. Satisfactory performance of light poles is dependent upon the structure being properly attached to a supporting foundation of adequate design.

+ indicates a vibration dampener is standard.

Anchor Base Detail



■ Dimensional Diagrams



Ordering Information

Ex: VS-RTSA-20-5931-11-AB-FP-MB-D2-FST

Product Family	Design	Length	Base OD	Top OD	Thickness	Anchor Bolts	Finish Type	Painted Color	Fixture Mounting
VS = NAFCO®	RTSA = Round Tapered Steel Anchor Base	10-30 = 10-30'	59 = 5.9"	31 = 3.1"	11 = 11ga	AB = Includes Anchor Bolts	GV = Galvanized Only (No Paint)	DB = Dark Bronze	PC = Cap Only, No Side Drilling
		C = Custom	65 = 6.5"	37 = 3.7"	7 = 7ga	LAB = Less Anchor Bolts	FP = Finish Painted	MB = Medium Bronze	PL = Open Top, No Cap or Side Drilling
			70 = 7"	24 = 2.4"	0711 = 7 & 11ga	C = Custom	FPGV = Finished Painted Over Galvanizing	BK = Black	D1 = Drill Single
			66 = 6.6"	35 = 3.5"	0507 = 5 & 7ga		C = Custom	WH = White	D2 = Drill 2@180
			80 = 8"	38 = 3.8"	0707 = 7 & 7ga			LG = Light Gray	D3 = Drill 3@120
			73 = 7.3"	36 = 3.6"	C = Custom			SG = Slate Gray	D4 = Drill 4@90
			85 = 8.5"	46 = 4.6"				DG = Dark Green	D5 = Drill 2@90
			95 = 9.5"	36 = 3.58"				SL = Silver	D6 = Drill 3@90
			78 = 7.82"	47 = 4.7"				RAL = Custom RAL Match	P1 = 4" OD x 5" Long Tenon
			90 = 9"	30 = 3"				C = Custom	P2 = 2.38" OD x 4" Long Tenon
			10 = 10"	40 = 4"					P3 = 3.50" OD x 6" Long Tenon
			11 = 11"	60 = 6"					P4 = 4" OD x 6" Long Tenon
			13 = 13"	46 = 4.55"					P5 = 2.88" OD x 4" Long Tenon
			12 = 12"	52 = 5.16"					P6 = 2.88" OD x 5" Long Tenon
			13 = 12.5"	40 = 4.01"					P7 = 2.38" OD x 5" Long Tenon
			C = Custom	48 = 4.83"					PQ = 2.38" OD x 12" Long Tenon
				45 = 4.46"					PD = 3" OD x 3" Long Tenon
				43 = 4.25"					P9 = Custom Size Tenon
				36 = 3.55"					
				C = Custom					

Options & Accessories (Add as Suffix)		
Option	Option	Accessories
SPL = Special Cut Length (Please Specify)	ULHH = UL Compliant Hand Hole	STAMP = Engineering Services, Signed & Sealed Calcs
BCSPCL = Special Base Plate to Match Existing Bolt Circle (May Add to Production Lead Time, May Require Special Base Cover)	NECHH = NEC 410.30 Compliant Hand Hole & Cover	STAMPCA = Engineering Services, CA Signed & Sealed Calcs
VDA = Internal Vibration Dampener, Factory Installed	EHH = Additional Hand Hole Opening w/ Cover Assembly (Specify Pole Height & Orientation)	PRE100 = Pre-Ship Anchor Bolts - 1.0" x 36" x 4"
VDF = Internal Vibration Dampener, Field Installable	FST = Festoon Provision, Electrical by Others (Specify Pole Height & Orientation)	PRE125 = Pre-Ship Anchor Bolts - 1.25" x 42" x 6"
FBCP = ABS Plastic Full Base Cover	CPL = NPT Pipe Coupling (Specify Pole Height, Orientation, & NPT Size)	PRE150 = Pre-Ship Anchor Bolts - 1.5" x 54" x 6"
FBCS = Steel Full Base Cover		PRE175 = Pre-Ship Anchor Bolts - 1.75" x 84" x 6"
PXDX = Side Drill + Tenon w/ Additional Hand Hole (Specify Tenon OD & Length)		

1. See previous pages for base model configurations. Consult factory or your sales rep for deviations from base models.
2. Please consult factory or your sales representative to verify options and accessories will work with your light pole part number.
3. Custom products, configurations, options, and accessories available from factory.

NAFCO® RSSA ROUND STRAIGHT STEEL ANCHOR BASE LIGHT POLES



Catalog # _____

Project _____

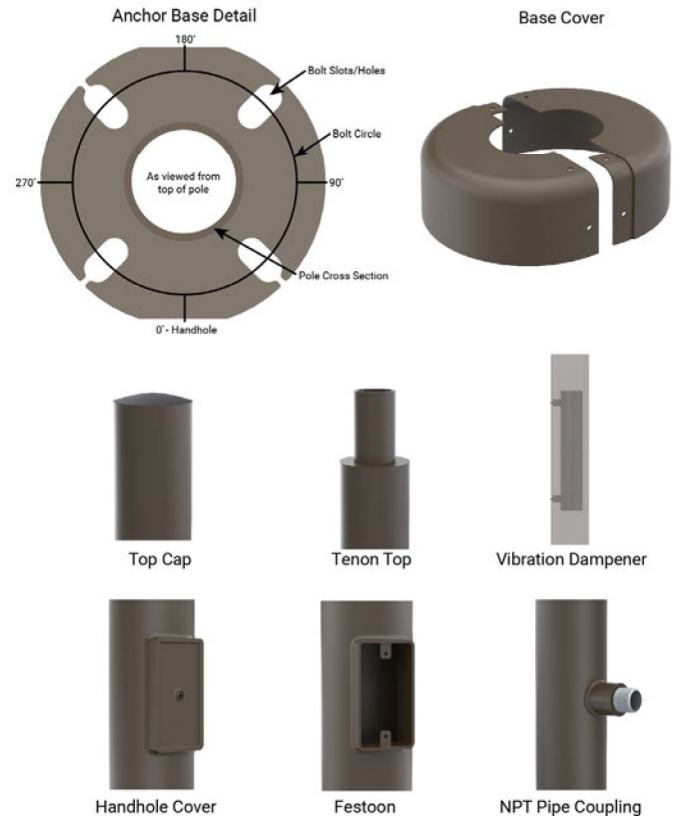
Comments _____



Proudly engineered and manufactured in the American Midwest – our NAFCO® family of professional-grade light pole products combines 50+ years of manufacturing expertise and top-notch Midwestern workmanship. Like all Will products, NAFCO® poles come supported by our unmatched design, engineering, and project support capabilities.

Specifications

- Pole Shaft** - The pole shaft is fabricated from hot rolled welded steel tubing of one-piece construction with a minimum yield strength of 42 KSI.
- Pole Top** - A removable top cap is provided for poles receiving drilling patterns for side-mount luminaire arm assemblies. Other pole top options include Tenon Top, Top Cap Only or Open Top which is typical when the pole top diameter matches the necessary slip-fit dimensions.
- Hand Hole** - A reinforced hand hole with grounding provision is provided at 1' from the base end of the pole assembly. Each hand hole includes a cover and cover attachment hardware. All pole assemblies are provided with a 2.5" x 5" rectangular hand hole (dimensions are nominal).
- Base Cover** - A two-piece full base cover fabricated from ABS plastic is provided with each pole assembly. Additional base cover options, including a cast aluminum and fabricated steel cover, are available upon request.
- Anchor Bolts** - Anchor bolts conform to ASTM F1554 Grade 55 and are provided with two hex nuts and two flat washers. Bolts have an "L" bend on one end and are galvanized a minimum of 12" on the threaded end.
- Hardware** - All structural fasteners are galvanized high strength carbon steel. All non-structural fasteners are galvanized or zinc-plated carbon steel or stainless steel.
- Finish** - Standard finishes are either Galvanized or Finish Painted. Additional finish options including Finish Paint over Galvanizing are available upon request.
- Design Criteria** - Standard EPA (Effective Projected Area) and weight values are based on Standard Commercial Criteria (with 1.3 gust factor) for side mounted fixtures only. Consult the factory on loading criteria for pole top mounted luminaires and/or brackets. Satisfactory performance of light poles is dependent upon the pole being properly attached to a supporting foundation of adequate design.



EPA Loading Guide (Commercial Design Criteria)

Base Model	70mph w/ 1.3 Gust		80mph w/ 1.3 Gust		90mph w/ 1.3 Gust		100mph w/ 1.3 Gust		110mph w/ 1.3 Gust		120mph w/ 1.3 Gust		130mph w/ 1.3 Gust		140mph w/ 1.3 Gust		150mph w/ 1.3 Gust	
	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)
VS-RSSA-10-3030-11-AB-FP	13.1	328	10	250	7.7	190	6	175	4.7	118	3.9	100	3.3	83	2.8	75	2.4	60
VS-RSSA-10-4040-11-AB-FP	25.1	630	19.1	480	15	375	12.2	305	9.9	275	8.3	225	7.0	200	6.0	175	5.2	150
VS-RSSA-10-4545-11-AB-FP	32.5	820	24.5	615	19.5	490	15.8	395	13.1	330	11.0	275	9.3	235	8.0	200	6.9	175
VS-RSSA-12-3030-11-AB-FP	10.4	260	7.7	195	5.8	145	4.4	130	3.4	90	2.8	75	2.3	75	1.9	75	1.6	75
VS-RSSA-12-4040-11-AB-FP	20.1	503	15	390	11.8	300	9.5	240	7.8	200	6.5	175	5.5	150	4.7	125	4.0	100
VS-RSSA-12-4545-11-AB-FP	26.2	655	19.8	495	15.7	395	12.7	320	10.5	263	8.7	220	7.4	200	6.3	175	5.5	150
VS-RSSA-14-3030-11-AB-FP	8.3	225	6	175	4.4	130	3.3	90	2.4	75	1.9	75	1.5	75	1.3	50	1.0	50
VS-RSSA-14-4040-11-AB-FP	16.5	425	12.2	305	9.4	250	7.6	195	6.2	175	5.1	150	4.3	125	3.6	100	3.1	100
VS-RSSA-14-4545-11-AB-FP	21.6	550	16.2	405	12.8	320	10.3	260	8.6	225	7.1	190	6.0	160	5.1	150	4.3	125
VS-RSSA-15-4040-11-AB-FP	16.5	425	9.6	250	7.4	185	5.9	150	4.8	125	3.9	125	3.3	85	2.7	85	2.3	75
VS-RSSA-15-4545-11-AB-FP	21.6	550	13.1	330	10.2	265	8.2	205	6.6	225	5.5	190	4.6	160	3.9	150	3.3	125
VS-RSSA-16-3030-11-AB-FP	6.5	175	4.6	125	3.2	100	2.3	60	1.5	50	1.2	45	0.9	45	0.7	45	0.5	45
VS-RSSA-16-4040-11-AB-FP	13.2	350	9.6	250	7.4	185	5.9	150	4.8	125	3.9	125	3.3	85	2.7	85	2.3	75
VS-RSSA-16-4545-11-AB-FP	17.5	440	13.1	330	10.2	265	8.2	205	6.7	175	5.6	150	4.7	125	4.0	120	3.4	100
VS-RSSA-18-3030-11-AB-FP	5.1	135	3.4	90	2.3	60	1.4	70	0.8	50	0.5	50	0.4	25	0.2	25	0.2	20
VS-RSSA-18-4040-11-AB-FP	10.7	275	7.6	190	5.7	180	4.5	130	3.6	100	3.0	75	2.4	75	2.0	75	1.7	50
VS-RSSA-18-4545-11-AB-FP	14.2	375	10.5	265	8.2	210	6.5	165	5.3	150	4.4	125	3.7	100	3.1	100	2.6	85
VS-RSSA-20-3030-11-AB-FP	3.9	115	2.4	100	1.4	75	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RSSA-20-4040-11-AB-FP	8.6	225	6	150	4.4	150	3.4	125	2.7	75	2.2	70	1.7	70	1.4	50	1.2	45
VS-RSSA-20-4545-11-AB-FP	11.6	300	8.5	215	6.6	165	5.2	130	4.2	125	3.4	100	2.8	100	2.4	75	1.9	75
VS-RSSA-20-5050-11-AB-FP	15.4	400	11.7	300	9.1	230	7.2	180	5.9	150	4.8	125	4.0	125	3.2	100	2.6	100
VS-RSSA-25-4040-11-AB-FP	4.8	125	2.8	100	1.9	75	1.3	75	1.0	65	0.7	50	0.4	50	N/A	N/A	N/A	N/A
VS-RSSA-25-4545-11-AB-FP	6.9	175	4.8	130	3.6	90	2.7	90	2.1	100	1.6	100	1.3	75	1.0	75	0.7	50
VS-RSSA-25-5050-11-AB-FP	9.7	100	7.2	180	5.5	150	4.2	150	3.4	125	2.7	100	2.1	100	1.6	75	1.1	75
VS-RSSA-25-5050-07-AB-FP	16.0	400	12.1	300	9.4	250	7.4	200	6.0	150	5.0	125	4.1	110	3.2	100	2.5	100
VS-RSSA-30-4545-11-AB-FP	3.7	110	2.3	80	1.5	75	1	60	0.7	60	0.4	75	N/A	N/A	N/A	N/A	N/A	N/A
VS-RSSA-30-5050-11-AB-FP	6.0	125	4.2	150	3	125	2.2	100	1.7	100	1.3	65	0.8	65	0.4	50	N/A	N/A
VS-RSSA-30-5050-07-AB-FP	10.8	275	8	200	6.5	160	4.7	125	3.8	110	3.0	100	2.3	100	1.7	70	1.1	70

- The total combined EPA and weight of all fixtures, brackets, and other attachments mounting to a light pole cannot exceed the EPA and weight rating for a specified pole.
- Standard EPA (Effective Projected Area) and weight values are based around standard commercial criteria (with 1.3 second gust factor) and AASHTO standards. Specific light pole design standards are available from factory.
- Custom products, configurations, options, and accessories available from factory.
- Satisfactory performance of light poles is dependent upon the structure being properly attached to a supporting foundation of adequate design.

*+ indicates a vibration dampener is standard.

EPA Loading Guide (2017 Florida Building Code)

Base Model	110mph FBC		120mph FBC		130mph FBC		140mph FBC		150mph FBC		160mph FBC		170mph FBC		180mph FBC	
	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)	Max EPA (sq ft)	Max Weight (lb)
VS-RSSA-10-3030-11-AB-FP	5.5	138	4.5	113	4	100	3.5	88	3	75	2.5	63	2	50	1.5	38
VS-RSSA-10-4040-11-AB-FP	12	300	10	250	8	200	7	175	6	150	5	125	5	125	4	100
VS-RSSA-10-4545-11-AB-FP	15.5	388	13	325	11	275	9	225	8.5	213	7	175	6.5	163	5.5	138
VS-RSSA-12-3030-11-AB-FP	4.5	113	3.5	88	3	75	2.5	63	2	50	1.5	38	1	25	1	25
VS-RSSA-12-4040-11-AB-FP	10	250	8	200	6.5	163	5.5	238	4.5	113	4	100	4	100	3.5	88
VS-RSSA-12-4545-11-AB-FP	13	325	10.5	263	9	225	7.5	188	7	175	6	150	5	125	4.5	113
VS-RSSA-14-3030-11-AB-FP	3.5	88	3	75	2.5	63	2	50	1.5	38	1	25	1	25	0.5	13
VS-RSSA-14-4040-11-AB-FP	9	225	7.5	188	6	150	5	125	4	100	3.5	88	3	75	3	75
VS-RSSA-14-4545-11-AB-FP	10.5	263	8.5	213	7	175	6	150	5.5	138	5	125	4	100	3.5	88
VS-RSSA-15-4040-11-AB-FP	9	225	7.5	188	6	150	5	125	4	100	3.5	88	3	75	3	75
VS-RSSA-15-4545-11-AB-FP	10.5	263	8.5	213	7	175	6	150	5.5	138	5	125	4	100	3.5	88
VS-RSSA-16-3030-11-AB-FP	3	75	2	50	1.5	38	1	25	1	25	0.5	13	0.5	13	N/A	N/A
VS-RSSA-16-4040-11-AB-FP	6.5	63	5	125	4	100	3	75	2.5	63	2	50	2	50	2	50
VS-RSSA-16-4545-11-AB-FP	9	225	7	175	5.5	138	4.5	113	4.5	113	4	100	3.5	88	3	75
VS-RSSA-18-3030-11-AB-FP	2	50	1.5	38	1	25	0.5	13	0.5	13	N/A	N/A	N/A	N/A	N/A	N/A
VS-RSSA-18-4040-11-AB-FP	5	125	4	100	3	75	2.5	63	1.5	38	1	25	1	25	1	25
VS-RSSA-18-4545-11-AB-FP	7	175	5.5	138	4.5	113	3.5	88	3.5	88	3	75	2.5	63	2	50
VS-RSSA-20-3030-11-AB-FP	1.5	38	1	25	0.5	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RSSA-20-4040-11-AB-FP	4	100	3	75	2	50	1.5	38	1	25	0.5	13	0.5	13	0.5	13
VS-RSSA-20-4545-11-AB-FP	5.5	138	4.5	113	3.5	88	2.5	63	2.5	63	2.5	63	2	50	1.5	38
VS-RSSA-20-5050-11-AB-FP	7.5	188	6	150	5	125	5	125	4	100	3.5	88	2.5	63	2	50
VS-RSSA-25-4040-11-AB-FP	2	50	1	25	0.5	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RSSA-25-4545-11-AB-FP	3	75	2	50	1	25	0.5	13	0.5	13	0.5	13	0.5	13	N/A	N/A
VS-RSSA-25-5050-11-AB-FP	4.5	113	3	75	3	75	3	75	2	50	1.5	38	1	25	0.5	13
VS-RSSA-25-5050-07-AB-FP	8	200	6	150	5.5	138	5	125	4	100	3.5	88	2.5	63	2	50
VS-RSSA-30-4545-11-AB-FP	1	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RSSA-30-5050-11-AB-FP	2	50	0.5	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
VS-RSSA-30-5050-07-AB-FP	4.5	113	3	75	3	75	3	75	2.5	63	1.5	38	1	25	0.5	13

- The total combined EPA and weight of all fixtures, brackets, and other attachments mounting to a light pole cannot exceed the EPA and weight rating for a specified pole.
- Standard EPA (Effective Projected Area) and weight values are based around Ultimate Wind Speed, Risk Category II, Exposure Category C. Specific light pole design standards are available from factory. Above data is based around the load centroid being at 2.5' above the pole top and with 2.0' eccentricity. Weight of horizontally eccentric load is capped at 100lb, all remaining weight mounted 2.5' above top of the pole.
- Custom products, configurations, options, and accessories available from factory.
- Satisfactory performance of light poles is dependent upon the structure being properly attached to a supporting foundation of adequate design.

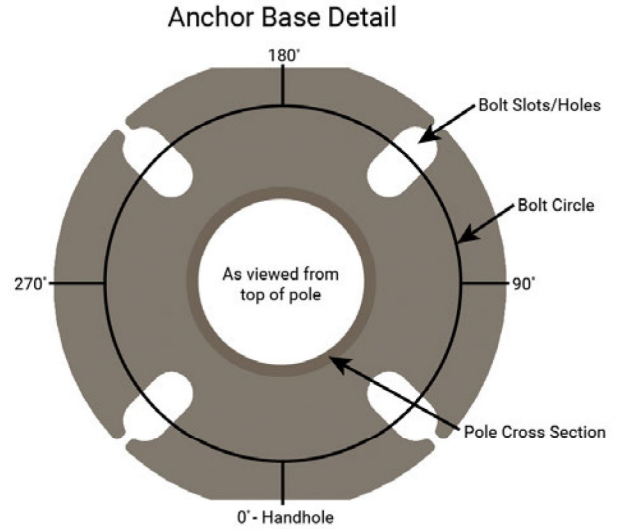
*+ indicates a vibration dampener is standard.

Designation & Dimensional Information

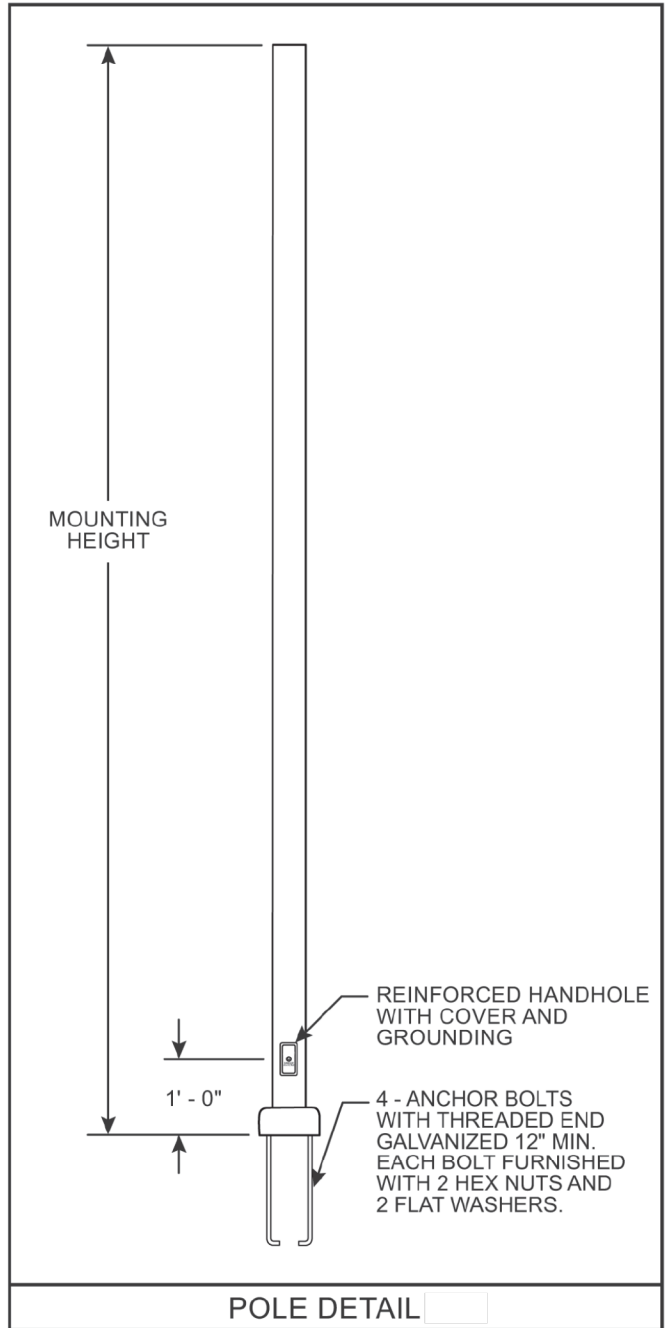
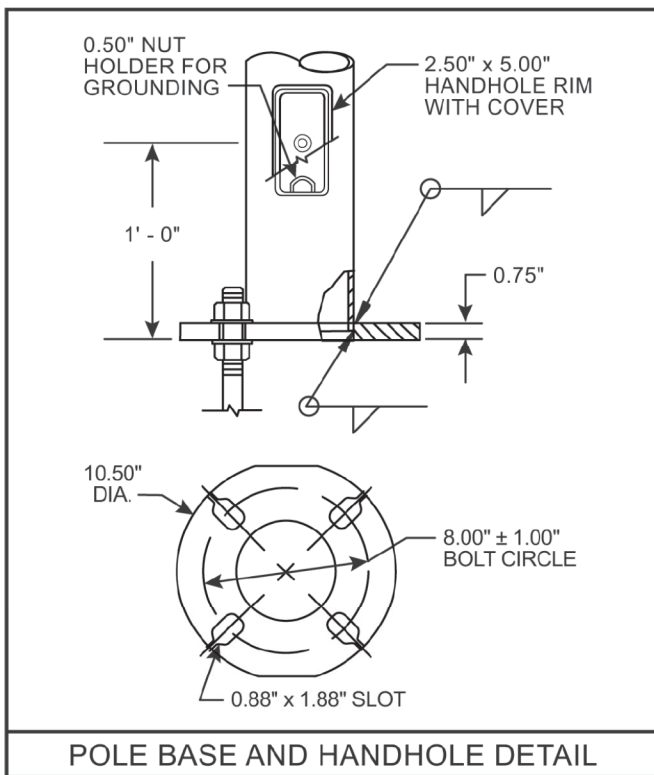
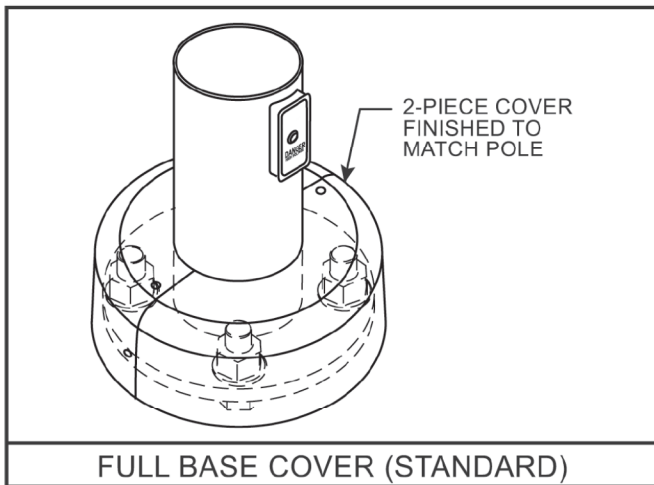
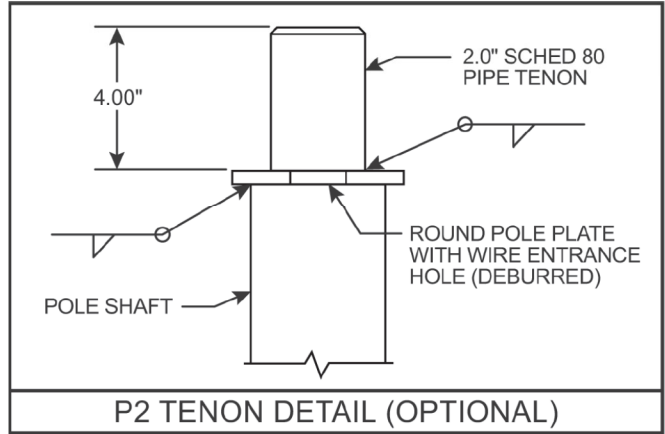
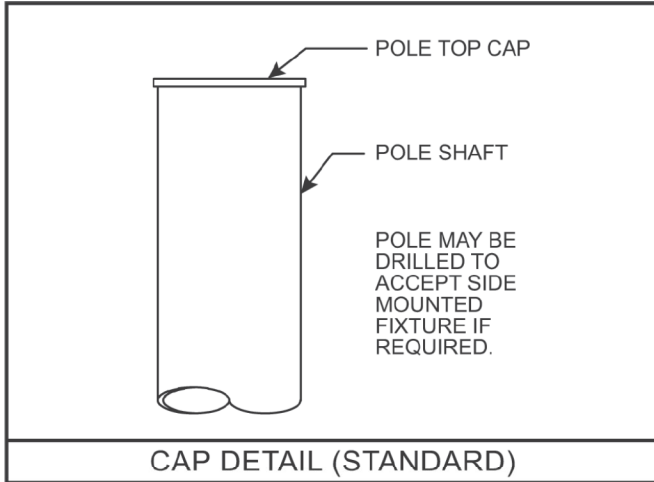
Base Model	Pole Dimensions					Base Plate		Anchor Bolts	
	Nominal Mounting Height	Top OD (in)	Base OD (in)	Wall Thick (ga)	Structural Weight (lb)	Bolt Circle Diameter (in)	Sq (in) x Thick (in)	Dia x Length x Hook (in)	Projection (in)
VS-RSSA-10-3030-11-AB-FP	10'-0"	3	3	11	55	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-10-4040-11-AB-FP	10'-0"	4	4	11	70	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-10-4545-11-AB-FP	10'-0"	4.5	4.5	11	75	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-12-3030-11-AB-FP	12'-0"	3	3	11	60	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-12-4040-11-AB-FP	12'-0"	4	4	11	80	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-12-4545-11-AB-FP	12'-0"	4.5	4.5	11	85	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-14-3030-11-AB-FP	14'-0"	3	3	11	70	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-14-4040-11-AB-FP	14'-0"	4	4	11	90	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-14-4545-11-AB-FP	14'-0"	4.5	4.5	11	95	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-15-4040-11-AB-FP	15'-0"	4	4	11	95	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-15-4545-11-AB-FP	15'-0"	4.5	4.5	11	100	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-16-3030-11-AB-FP	16'-0"	3	3	11	80	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-16-4040-11-AB-FP	16'-0"	4	4	11	100	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-16-4545-11-AB-FP	16'-0"	4.5	4.5	11	105	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-18-3030-11-AB-FP	18'-0"	3	3	11	90	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-18-4040-11-AB-FP	18'-0"	4	4	11	110	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-18-4545-11-AB-FP	18'-0"	4.5	4.5	11	115	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-20-3030-11-AB-FP	20'-0"	3	3	11	100	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-20-4040-11-AB-FP	20'-0"	4	4	11	120	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-20-4545-11-AB-FP	20'-0"	4.5	4.5	11	130	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-20-5050-11-AB-FP	20'-0"	5	5	11	145	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-25-4040-11-AB-FP	25'-0"	4	4	11	145	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-25-4545-11-AB-FP	25'-0"	4.5	4.5	11	155	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-25-5050-11-AB-FP	25'-0"	5	5	11	180	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-25-5050-07-AB-FP	25'-0"	5	5	7	260	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-30-4545-11-AB-FP	30'-0"	4.5	4.5	11	185	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-30-5050-11-AB-FP	30'-0"	5	5	11	210	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75
VS-RSSA-30-5050-07-AB-FP	30'-0"	5	5	7	305	7.0 - 9.0	10.5 x 0.75	0.75 x 17.00 x 3.00	3.25 - 3.75

1. The total combined EPA and weight of all fixtures, brackets, and other attachments mounting to a light pole cannot exceed the EPA and weight rating for a specified pole.
2. Custom products, configurations, options, and accessories available from factory.
3. Satisfactory performance of light poles is dependent upon the structure being properly attached to a supporting foundation of adequate design.

** indicates a vibration dampener is standard.



■ Dimensional Diagrams



Ordering Information

Ex: VS-RSSA-20-4040-11-AB-FP-MB-D2-FST

Product Family	Design	Length	Base OD	Top OD	Thickness	Anchor Bolts	Finish Type	Painted Color	Fixture Mounting
VS = NAFCO®	RSSA = Round Straight Steel Anchor Base	10-30 = 10-30'	30 = 3"	30 = 3"	11 = 11ga	AB = Includes Anchor Bolts	GV = Galvanized Only (No Paint)	DB = Dark Bronze	PC = Cap Only, No Side Drilling
		C = Custom	40 = 4"	40 = 4"	7 = 7ga	LAB = Less Anchor Bolts	FP = Finish Painted	MB = Medium Bronze	PL = Open Top, No Cap or Side Drilling
			45 = 4.5"	45 = 4.5"	C = Custom	C = Custom	FPGV - Finished Painted Over Galvanizing	BK = Black	D1 = Drill Single
			5 = 5"	5 = 5"			C = Custom	WH = White	D2 = Drill 2@180
			C = Custom	C = Custom				LG = Light Gray	D3 = Drill 3@120
								SG = Slate Gray	D4 = Drill 4@90
								DG = Dark Green	D5 = Drill 2@90
								SL = Silver	D6 = Drill 3@90
								RAL = Custom RAL Match	P1 = 4" OD x 5" Long Tenon
								C = Custom	P2 = 2.38" OD x 4" Long Tenon
									P3 = 3.50" OD x 6" Long Tenon
									P4 = 4" OD x 6" Long Tenon
									P5 = 2.88" OD x 4" Long Tenon
									P6 = 2.88" OD x 5" Long Tenon
									P7 = 2.38" OD x 5" Long Tenon
									PQ = 2.38" OD x 12" Long Tenon
									PD = 3" OD x 3" Long Tenon
									P9 = Custom Size Tenon

Options & Accessories (Add as Suffix)		
Option	Option	Accessories
SPL = Special Cut Length (Please Specify)	ULHH = UL Compliant Hand Hole	STAMP = Engineering Services, Signed & Sealed Calcs
BCSPCL = Special Base Plate to Match Existing Bolt Circle (May Add to Production Lead Time, May Require Special Base Cover)	NECHH = NEC 410.30 Compliant Hand Hole & Cover	STAMP/CA = Engineering Services, CA Signed & Sealed Calcs
VDA = Internal Vibration Dampener, Factory Installed	EHH = Additional Hand Hole Opening w/ Cover Assembly (Specify Pole Height & Orientation)	PRE075 = Pre-Ship Anchor Bolts - 0.75" x 17" x 3"
VDF = Internal Vibration Dampener, Field Installable	FST = Festoon Provision, Electrical by Others (Specify Pole Height & Orientation)	
FBCP = ABS Plastic Full Base Cover	CPL = NPT Pipe Coupling (Specify Pole Height, Orientation, & NPT Size)	
FBCS = Steel Full Base Cover		
PXDX = Side Drill + Tenon w/ Additional Hand Hole (Specify Tenon OD & Length)		

1. See previous pages for base model configurations. Consult factory or your sales rep for deviations from base models.
2. Please consult factory or your sales representative to verify options and accessories will work with your light pole part number.
3. Custom products, configurations, options, and accessories available from factory.

NAFCO® STEEL BULLHORN BRACKETS, ROUND POLE MOUNT



Catalog # _____

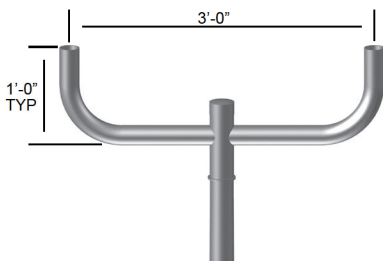
Project _____

Comments _____

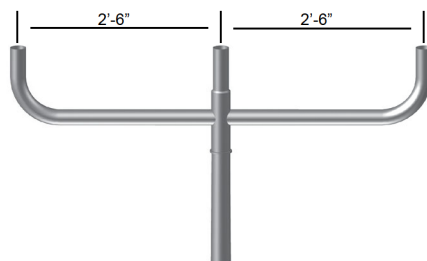
Proudly engineered and manufactured in the American Midwest – our NAFCO® family of professional-grade light pole products combines 50+ years of manufacturing expertise and top-notch Midwestern workmanship. Like all Will products, NAFCO® poles come supported by our unmatched design, engineering, and project support capabilities.

Specifications

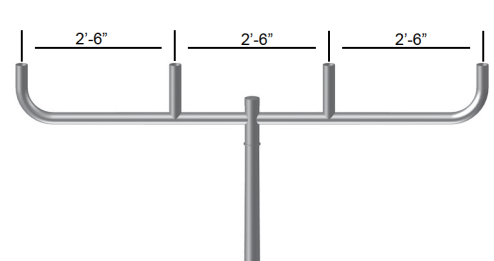
- **Center Hub (Excluding VS-S-BLH-R40-5-180-FP)** - The center hub is 2.88" OD x 0.203" wall with a minimum yield strength of 36,000 psi. **The standard hub fits a 2.38" OD x 4" pole/tenon top. Other sizes available by contacting the factory.**
- **Center Hub (VS-S-BLH-R40-5-180-FP)** - The center hub is 4.50" OD x 0.188" wall with a minimum yield strength of 36,000 psi. **The standard hub fits a 4" OD x 4" pole/tenon top. Other sizes available by contacting the factory.**
- **Arms** - Arms are 2.38" OD x 0.154" wall with a minimum yield strength of 36,000 psi. The maximum straight luminaire slipfit length is 4.63" for all arm brackets. For other tenon applications, please consult factory.
- **Main Arm Only for VS-S-BLH-R24-5-180-FP** - is 2.38" OD x 0.218" wall with a minimum yield strength of 36,000 psi.
- **Arm Attachment (VS-S-BLH-BTP-1-000-FP & VS-S-BLH-BTP-2-180-FP Only)** - Connection allows arm to be erected and held in place by gravity and secured by a single bolt.
- **Hardware** - All structural fasteners are galvanized high strength carbon steel. All non-structural fasteners are galvanized or zinc-plated carbon steel or stainless steel.
- **Finish** - Standard finishes are either Galvanized or Finish Painted. Additional finish options including Finish Paint over Galvanizing are available upon request.
- **Design Criteria** - Please reference Design Criteria Specification for appropriate design conditions.



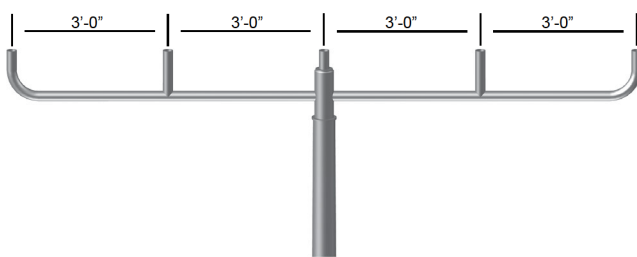
VS-S-BLH-R24-2-180-FP



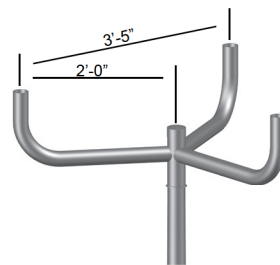
VS-S-BLH-R24-3-180-FP



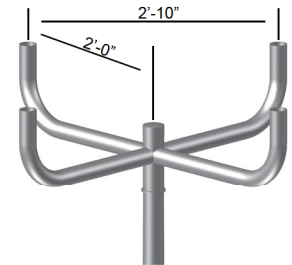
VS-S-BLH-R24-4-180-FP



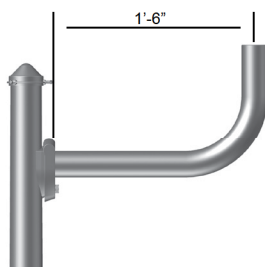
VS-S-BLH-R40-5-180-FP



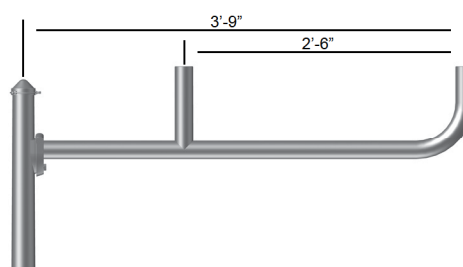
VS-S-BLH-R24-3-120-FP



VS-S-BLH-R24-4-090-FP



VS-S-BLH-BTP-1-000-FP



VS-S-BLH-BTP-2-180-FP

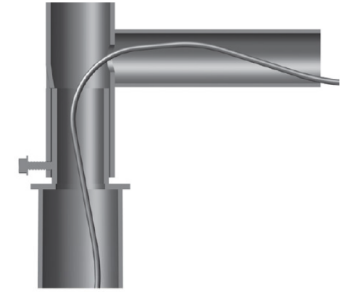
Designation & Dimensional Information

Base Model	Mounting Type	Max Qty of Luminaires	Fixture Orientation	Max Luminaire Spacing	100mph w/ 1.3 Gust		Bracket Size	
					Max Luminaire EPA (sq ft) ¹	Max Luminaire Weight (sq ft) ¹	EPA (sq ft)	Weight (lb)
VS-S-BLH-BTP-1-000-FP	Side Bolt	1	N/A	1'-6"	5	100	0.5	11
VS-S-BLH-BTP-2-180-FP	Side Bolt	2	180°	2'-6"	3	100	1.1	20
VS-S-BLH-R24-2-180-FP	Top Hub	2	180°	3'-0"	7.3	150	1	21
VS-S-BLH-R24-3-180-FP	Top Hub	3	180°	2'-6"	4.7	150	1.6	32
VS-S-BLH-R24-3-120-FP	Top Hub	3	120°	3'-5"	4.7	150	1.3	34
VS-S-BLH-R24-4-180-FP	Top Hub	4	180°	2'-6"	3.4	150	2.3	44
VS-S-BLH-R24-4-090-FP	Top Hub	4	90°	2'-10"	3.5	150	1.6	44
VS-S-BLH-R40-5-180-FP	Top Hub	5	180°	3'-0"	3	100	3.5	86

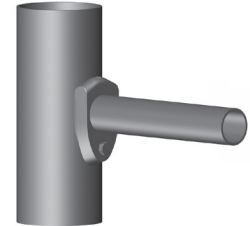
1. Maximum EPA (Effective Projected Area) and weight values are based on luminaires having a centroid 1'-0" above the bracket top and a maximum mounting height of 70'-0". Variations from sizes above are available upon inquiry at the factory.
2. Total combined weight and EPA of brackets and luminaires cannot exceed Design Information of specified pole.

Note: Additional sizes and configurations are available upon request.

Pole Top Bracket Attachment



Bolt Attachment



Ordering Information

Ex: VS-S-BLH-R24-4-090-FP

Product Family	Design	Mounting	Mounting Points	Orientation	Finish Type	Painted Color
VS = NAFCO®	S-BLH = Steel Bullhorn	BTP = Bolt Mount	1	000 = N/A	GV = Galvanized Only (No Paint)	DB = Dark Bronze
		R24 = 2.38" Round Pole/Tenon Top Mount	2	090 = 90°	FP = Finish Painted	MB = Medium Bronze
		R40 = 4" Round Pole/Tenon Top Mount (5 @180° ONLY)	3	100 = 100°	ΓPGV = Finished Painted Over Galvanizing	DK = Black
			4	120 = 120°	C = Custom	WH = White
			5			LG = Light Gray
						SG = Slate Gray
						DG = Dark Green
						SL = Silver
						RAL = Custom RAL Match
						C = Custom

1. See above for base model configurations. Consult factory or your sales rep for deviations from base models.
2. Please consult factory or your sales representative to verify options and accessories will work with your light pole part number.
3. Custom products, configurations, options, and accessories available from factory.

NAFCO® PRODUCT FAMILY

Proudly engineered and manufactured in Wisconsin, USA – our NAFCO® family of LED lighting products combines 50 years of manufacturing expertise with premium components and top-notch Midwestern workmanship. From high-output outdoor applications to extreme indoor industrial environments – NAFCO® series products drastically reduce energy consumption and maintenance costs and come supported by WILL's unmatched design, engineering, and project support capabilities.

- Classic shoebox design combined with rugged aluminum construction and cutting-edge LED lighting technology

- Output options over 40,000 lumens

- Wireless and onboard control options including motion, photo, dimming, daylight harvesting, zones, and schedules

- True Amber and Phosphor Converted (PC) Amber premium LED chip options

- Proprietary black anodized heat sink for maximum thermal dissipation and low LED junction temperature

- Flexible pole and arm mounting options with custom adapters available

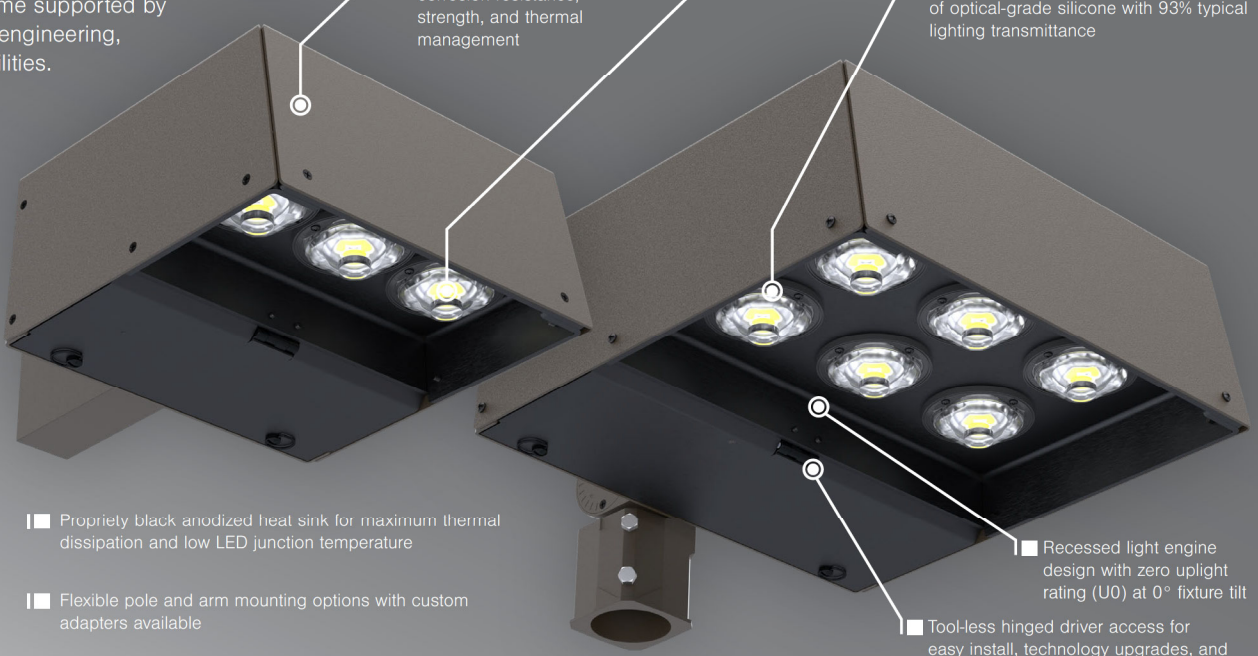
- Premium high-efficiency Chip-on-Board (COB) LEDs wired and bonded directly to circuit board to deliver compact lumen density and added reliability

- Self-sealing optical assembly constructed of optical-grade silicone with 93% typical lighting transmittance

- High-grade aluminum enclosure for superior corrosion resistance, strength, and thermal management

- Recessed light engine design with zero uplight rating (U0) at 0° fixture tilt

- Tool-less hinged driver access for easy install, technology upgrades, and maintenance



Area/Flood LED Lighting

NAFCO® SHX



WILL WISCONSIN LIGHTING LAB®

NAFCO® SHX SHOEBOX AREA/FLOOD LED LIGHTING

Catalog # _____

Project _____

Comments _____



Highlights

- Designed, engineered, and manufactured in Wisconsin, USA from premium domestic and imported components
- PPG® Commercial Performance Coatings custom color matching of RAL codes and architectural colors
- IES files, photometric reports, and lighting simulations available from factory design team
- Output options over 40,000 lumens
- Easy driver and LED module access for technology upgrades and maintenance
- Flexible mounting options with custom adapters available

Applications

- General flood and area lighting
- Parking lots, ramps, walkways, and roadways
- Car dealerships, schools, and hospitals
- Hotels and gas stations
- Retail stores and commercial buildings
- Outdoor sports facilities including tennis courts
- Amber and turtle applications
- RGB DMX color tuning applications

Construction & Finish

- Rugged aluminum chassis with excellent heat/impact resistance and hinged electrical access
- Architectural grade powder coat enclosure and black anodized heat sink
- High-grade stainless steel hardware for superior strength and corrosion resistance
- Driver components are fully encased in potting material for moisture and vibration resistance

Light Poles & Arms

- Will offers one of the most comprehensive light pole, bracket, and arm catalogs in the industry
- Aluminum, steel, fiberglass, and concrete materials
- Straight, tapered, and decorative designs
- Custom fabrication, finishing, and accessories available
- Dedicated light pole application support team

Compliance & Warranty

- ETL Certification for UL STD 1598 & CSA STD C22.2 # 250.0 for wet locations
- Meets Buy American Act requirements
- Standard 5-year limited warranty with extended factory warranties available
- Turtle and wildlife compliance options (consult factory)

Light Engine & Electrical

- Premium high-efficiency Chip-on-Board (COB) LEDs wired and bonded directly to circuit board to deliver compact lumen density and added reliability
- Self-sealing optical assembly constructed of optical-grade silicone with 93% typical lighting transmittance
- -40°C to +45°C ambient operating temperature
- Standard AC input voltage of 120-277V 50/60 Hz; up to 480V available
- Isolated 1-10V PWM/3-timer-modes dimmable (standard) and dim-to-off with standby power ≤ 0.5W (optional)
- Power factor of 0.90 min
- Total harmonic distortion of 20% max
- Drivers include integral input Surge Protection of Differential Mode 6kV, Common Mode 10kV per EN 61000-4-5
- Thermally protected secondary 10kA surge suppression available (optional)
- Always-on auxiliary power: 12VDC, 200mA (optional)
- Local specifying engineer recommended for product selection and local compliance
- Licensed electrician required for installation

Control Options

- Integral passive infrared Bluetooth® sensor for motion, photo, dimming, and daylight harvesting control
- Synapse® wireless system for large-scale control of zones, dimming, schedules, and sensors
- DMX control options available from factory

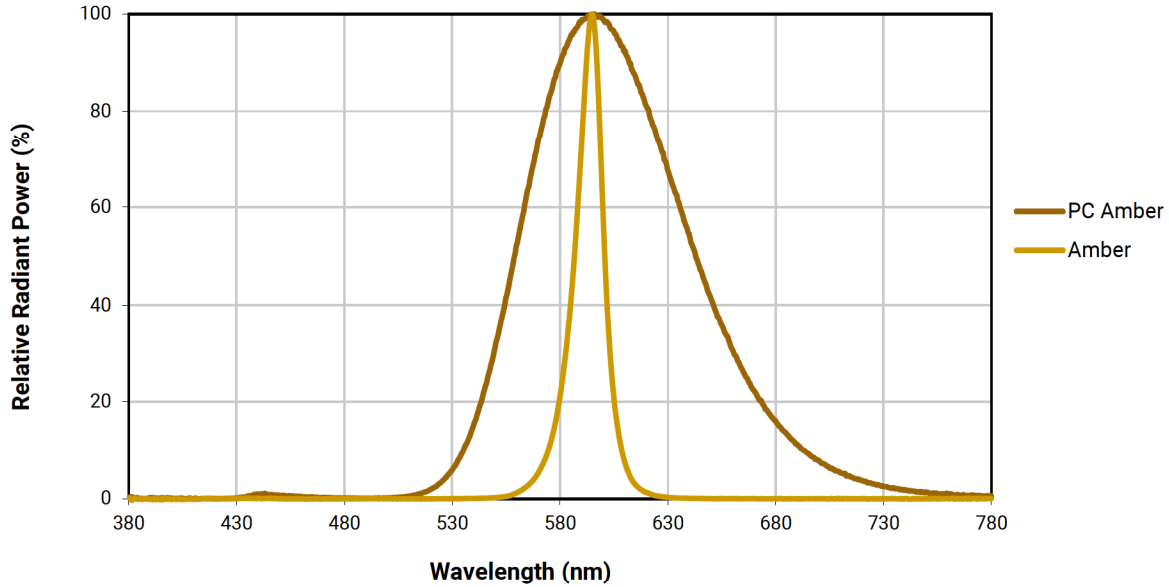
Lumen Multiplier & Maintenance (WHITE LED)

Ambient Temperature	Lumen Multiplier	TM-21 Lumen Maintenance (50,000 Hours)	Calculated L90 (hrs)	Calculated L70 (hrs)
0°C / 32°F	1.024	1.04	64,000	220,000
10°C / 50°F	1.021	1.02	64,000	220,000
25°C / 77°F	1.000	1.00	64,000	220,000
30°C / 86°F	0.993	0.99	58,000	194,000
35°C / 95°F	0.986	0.99	51,000	171,000
40°C / 104°F	0.979	0.98	45,000	151,000
45°C / 113°F	0.972	0.97	40,000	134,000

Voltage	Current (A)					
	40W	80W	120W	160W	200W	250W
Input Current @ 120V (A)	0.34	0.68	1.03	1.37	1.71	2.05
Input Current @ 208V (A)	0.20	0.39	0.59	0.79	0.99	1.18
Input Current @ 240V (A)	0.17	0.34	0.51	0.68	0.86	1.03
Input Current @ 277V (A)	0.15	0.30	0.44	0.59	0.74	0.89
Input Current @ 347V (A)	0.12	0.24	0.36	0.47	0.59	0.71
Input Current @ 480V (A)	0.09	0.17	0.26	0.34	0.43	0.51

Note: Values calculated according to IESNA TM-21-11 methodology.

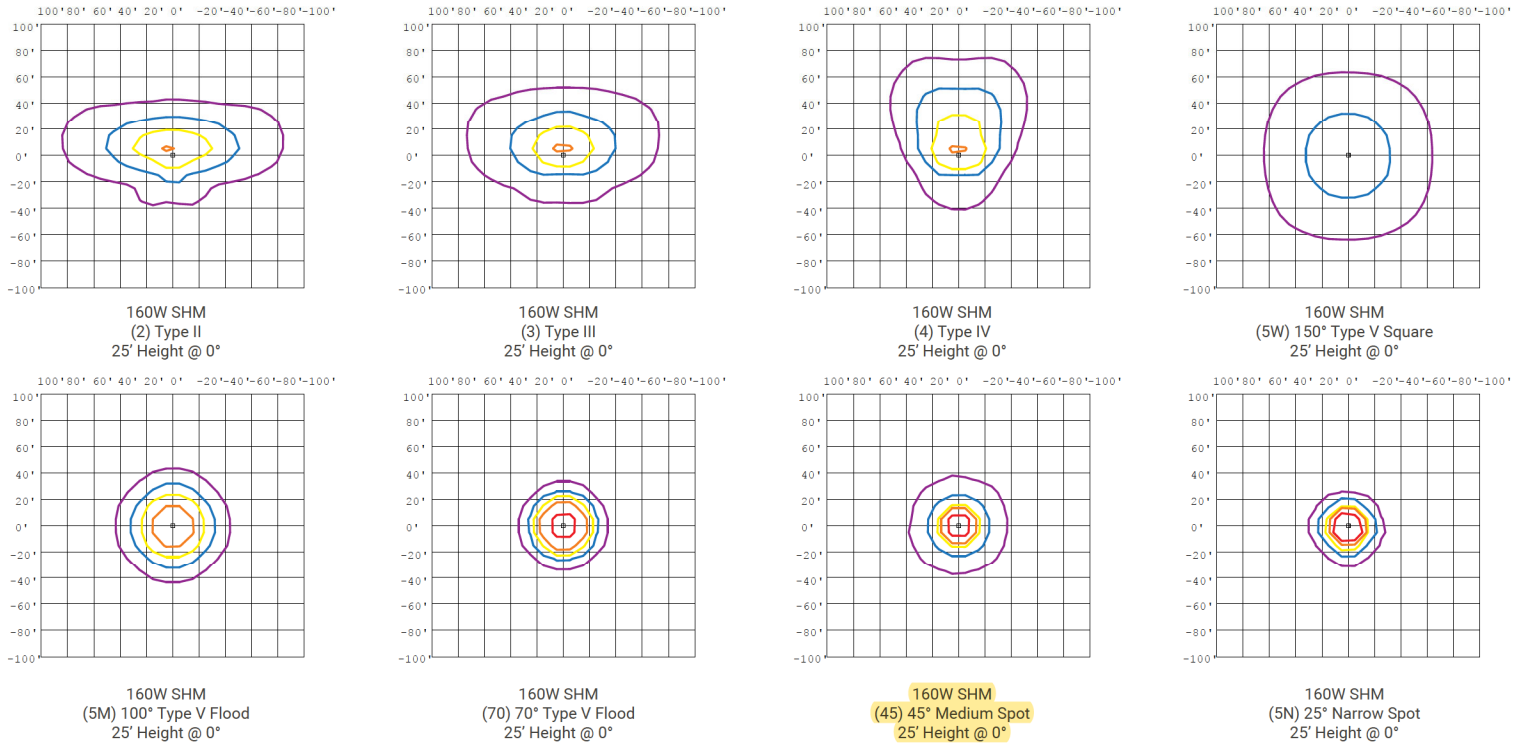
LED Chip Wavelengths



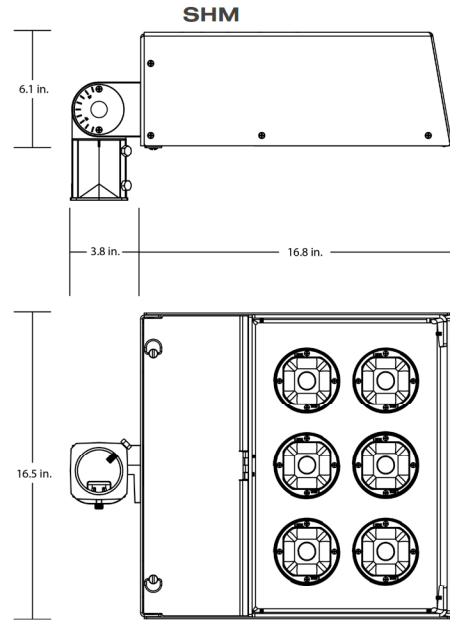
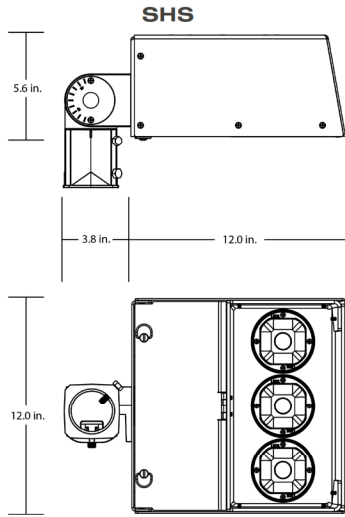
Photometric Diagrams

LEGEND
 0.5 fc (Purple), 2.0 fc (Blue), 5.0 fc (Yellow), 10 fc (Orange), 25 fc (Red)

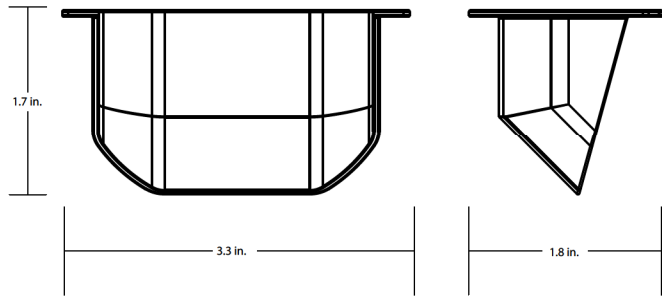
Simulated per IESNA LM-63-1995



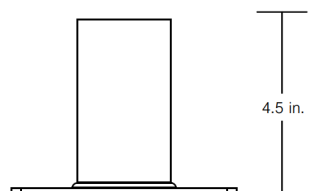
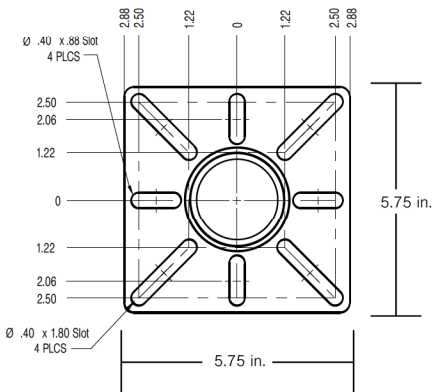
Dimensional Diagrams



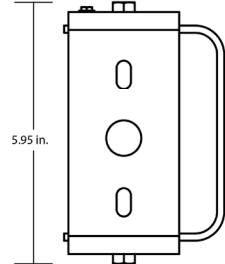
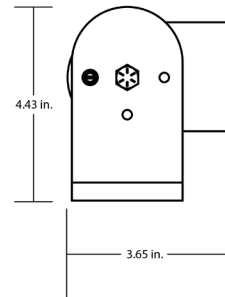
Note: Fixture diagrams shown with Slipfitter mount.



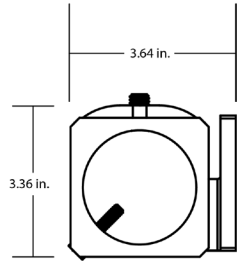
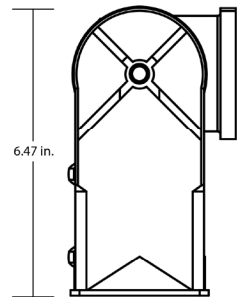
House Side Shield



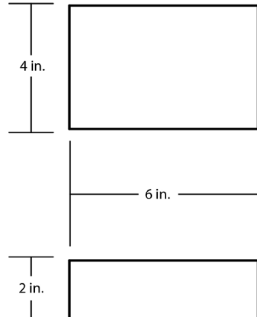
Tennis Court Davit Adapter



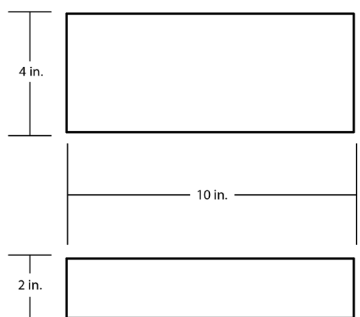
Trunnion Yoke Mount



Slipfitter Mount



6" Arm Mount



10" Arm Mount

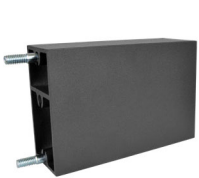
Ordering Information

Ex: NF-SHM-250-50-MV-4-BZ-6S

Product Family	Design	Performance (Watts = Nominal Lumens)	Color Temp	Voltage	Distribution	Finish Color
NF = NAFCO®	SHS = 12" Shoebox Small Chassis	40 = 6,750	27 = 2700K, 70 CRI	MV = 120-277V	2 = Type II	BZ = Bronze (Default)
	SHM = 16" Shoebox Medium Chassis	80 = 13,500	30 = 3000K, 70 CRI	HV = 277-480V	3 = Type III	BK = Black
		120 = 20,250	40 = 4000K, 70 CRI	CV = Custom	4 = Type IV	WH = White
		160 = 27,000	50 = 5000K, 70 CRI		5W = 150° Type V Square	NA = Nat Alum Silver
		200 = 34,000	57 = 5700K, 70 CRI		5M = 100° Type V Flood	LG = Light Gray
		250 = 40,000	PCA = PC Amber (590 nm)		70 = 70° Type V Flood	SG = Slate Gray
	CW = Custom, Amber, & RGB		TA = True Amber (593 nm)		45 = 45° Medium Spot	DG = Dark Green
			CT = Custom		5N = 25° Narrow Spot	DP = Dark Platinum
					CD = Custom	GM = Graphite Metallic
						RAL = Custom RAL Match

Options & Accessories (Add as Suffix)			
Mounting	Option	Option	Accessories
6S = 6" Arm (Square Pole)	WHP3NP = 2' Cord w/o Plug, Stripped Pigtail	SRG27710 = 10kA Surge Suppressor (Field Replaceable), 120-277V	TLPC1 = Twist-Lock Photocell, 120-277V (Not Installed)
6R = 6" Arm (Round Pole)	WHP7NP = 6' Cord w/o Plug, Stripped Pigtail	SRG48010 = 10kA Surge Suppressor (Field Replaceable), 347-480V	TLPC4 = Twist-Lock Photocell, 347/480V (Not Installed)
10S = 10" Arm (Square Pole)	WHP11NP = 10' Cord w/o Plug, Stripped Pigtail	BPC1 = Button Photocontrol, 120-277V	HSS4-1/2/3/4/5/6 = House Side Shield Types I, II, III, & IV (Wattage Specific)
10R = 10" Arm (Round Pole)		BPC3 = Button Photocontrol, 347V	HSS5-1/2/3/4/5/6 = House Side Shield Type V (Wattage Specific)
SF = 2.38" OD Slipfitter		BPC4 = Button Photocontrol, 480V	TCAA = Tennis Court Davit Adapter (Not Installed)
TR = Trunnion Yoke		N5P = NEMA 5pin Twist-Lock Receptacle	AFW = Area/Flood Light Wall Bracket (Black Finish) (Not Installed)
CM = Custom		MPS = Programmable Motion Sensor w/ ON/OFF + Dimming + Photocontrol, Bluetooth Settings Adjustable, maximum coverage of 100' diameter from 40' mounting height	GFX = Wireless DMX Lighting Control System (Consult Factory)
		EB12FI = 1500 lm 90 min Emergency Battery Backup, 0°C to 40°C Ambient Operating Temp, 120-277V Models Only (Consult Factory)	GFM = Wireless Mesh Lighting Control System (Consult Factory)
		EB12FIC = 1500 lm 90 min Cold Weather Emergency Battery Backup, -20°C to 40°C Ambient Operating Temp, 120-277V Models Only (Consult Factory)	

Note: Custom products, configurations, options, and accessories available from factory.



Arm Mounts



Slipfitter Mount



Trunnion Yoke Mount



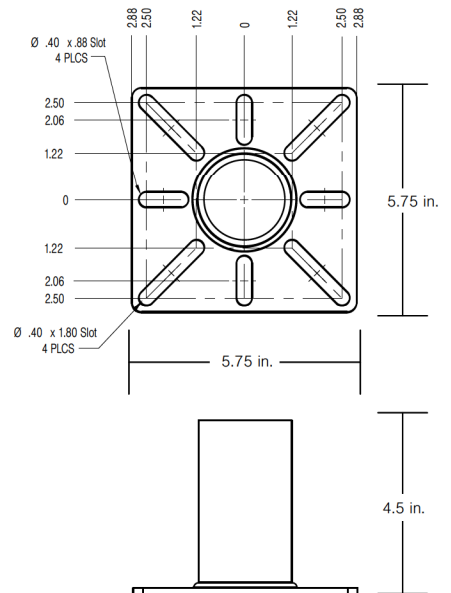
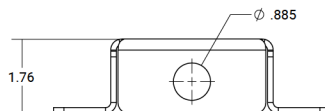
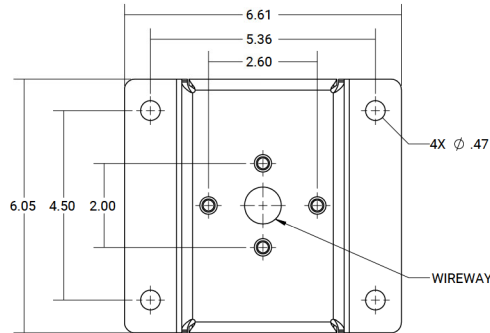
Area/Flood Light Wall Bracket



Tennis Davit Adapter



House Side Shield





Wisconsin manufacturing. Second to none.

- 10,000+ Wisconsin manufacturers employ 470,000+ workers and contributed \$56 billion to economic growth in 2016.
- Wisconsin's manufacturing concentration is 87 percent higher than the national average.
- Industrial machinery ranks first among Wisconsin manufacturing jobs.
- Increasing international recognition of Wisconsin manufacturing expertise through Haribo and Foxconn investments.

WHY WILL MATTERS

- In the highly competitive manufacturing hotbed of Wisconsin, WiLL's history of success dates to the 1970s.
- Our experience spans aluminum castings, metal fabrication and machining, electrical design and assembly, industrial finishing, and thermal testing.

Sources:

- (1) <http://reliableplant.com/Read/30986/wisconsin-manufacturing-jobs>
- (2) <https://www.wmc.org/news/manufacturing-is-strong-in-wisconsin/>
- (3) BizTimes Media, LLC (October 20, 2016)

“What is it with Wisconsin? You guys are like the Silicon Valley of Lighting!”
- Valued Customer

TRAFFIC IMPACT STUDY FOR SKY TAVERN SKI AREA EXPANSION

May 8, 2023

PREPARED FOR:

Robison Engineering Company, INC

PREPARED BY:



YOUR QUESTIONS ANSWERED QUICKLY

Why did you perform this study?

This Traffic Impact Study evaluates the potential traffic impacts associated with the proposed Sky Tavern Ski Expansion Area project located adjacent to Mt. Rose Highway (SR 431), southwest of Reno, Nevada. This study was undertaken to determine the existing and future traffic conditions, quantify traffic volumes generated by the proposed project, identify potential impacts, and develop recommendations to mitigate impacts, if any are found.

What does the project consist of?

Sky Tavern is primarily a junior ski program facility including ski areas and a lodge. The proposed project is an expansion of the Sky Tavern Ski Area including an additional ski lift, the ski lodge expansion (approximately double in size) and additional parking. The site will include other amenities typically associated with summertime including a bicycle path, an airbag drop training and entertainment areas for special events such as weddings.

How much traffic will the project generate?

The study evaluates peaks hours for traffic entering and exiting the site on a typical Saturday during ski season. The highest hours occur in the morning arrival period and around noon. The project is anticipated to generate approximately 91 AM peak hour, and 43 Noon peak hour additional trips to the external roadway network.

How will project traffic affect the roadway network?

The study intersections are expected to operate at acceptable overall levels of service under Existing Plus Project and Future Year Plus Project conditions. A right turn lane from Mt. Rose Highway entering the site at Bum's Gulch Road is warranted based on the existing volumes; the addition of project traffic entering further justifies the need.

Are any improvements recommended?

- ▶ Bum's Gulch Road serves as the primary entrance to the site, with the majority of traffic entering from the west via a right turn. It is recommended that an eastbound right-turn lane be constructed on Mt. Rose Highway for the intersection of Bum's Gulch Road / Mt. Rose Highway, based on NDOT's *Access Management System and Standards*. This will require a deviation letter since the spacing between Bums' Gulch Road and the Sky Tavern driveway does not allow for the full deceleration and taper length required. The deviation letter will be provided during the NDOT permitting process.



- ▶ It is recommended that the Sky Tavern Road approach at Mt. Rose Highway be striped to provide a separate left-turn and right-turn pockets. A stop bar and stop sign (36x36) should also be installed at this approach.
- ▶ It is recommended that the project install a stop bar / stop sign (36x36) on Bum's Gulch Road at Mt Rose Highway.
- ▶ Intersection ahead warning signs may be considered on Mt. Rose Highway as a safety improvement (see **Exhibit 3**).



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INTRODUCTION

This Traffic Impact Study (TIS) evaluates the potential traffic impacts associated with the proposed Sky Tavern Ski Area Expansion project. This study was undertaken to determine the existing and future (20-year horizon) traffic conditions, quantify traffic volumes generated by the proposed project, identify potential impacts, and develop recommendations to mitigate impacts, if any are found.

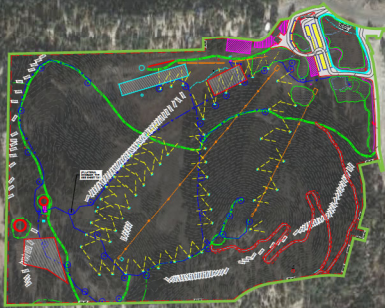
Proposed Project Expansion

Sky Tavern is a non-profit regional center owned by the City of Reno that provides summer and winter sports. Sky Tavern is primarily a junior ski program facility including ski areas and a lodge. The proposed project is an expansion of the Sky Tavern Ski Area including an additional ski lift, the ski lodge expansion (approximately double in size) and additional parking. The site will include other amenities typically associated with summertime including a bicycle path, an airbag drop training and entertainment areas for special events such as weddings. The site is located southwest of Reno NV, adjacent to Mt. Rose Highway (SR 431) at approximate mile marker (MM) 12.95 on parcel APN: (048-050-03). The regional project location can be seen in **Figure 1**, the project site location along with the study intersections are shown in **Figure 2**. A preliminary site plan is shown in **Figure 3**.



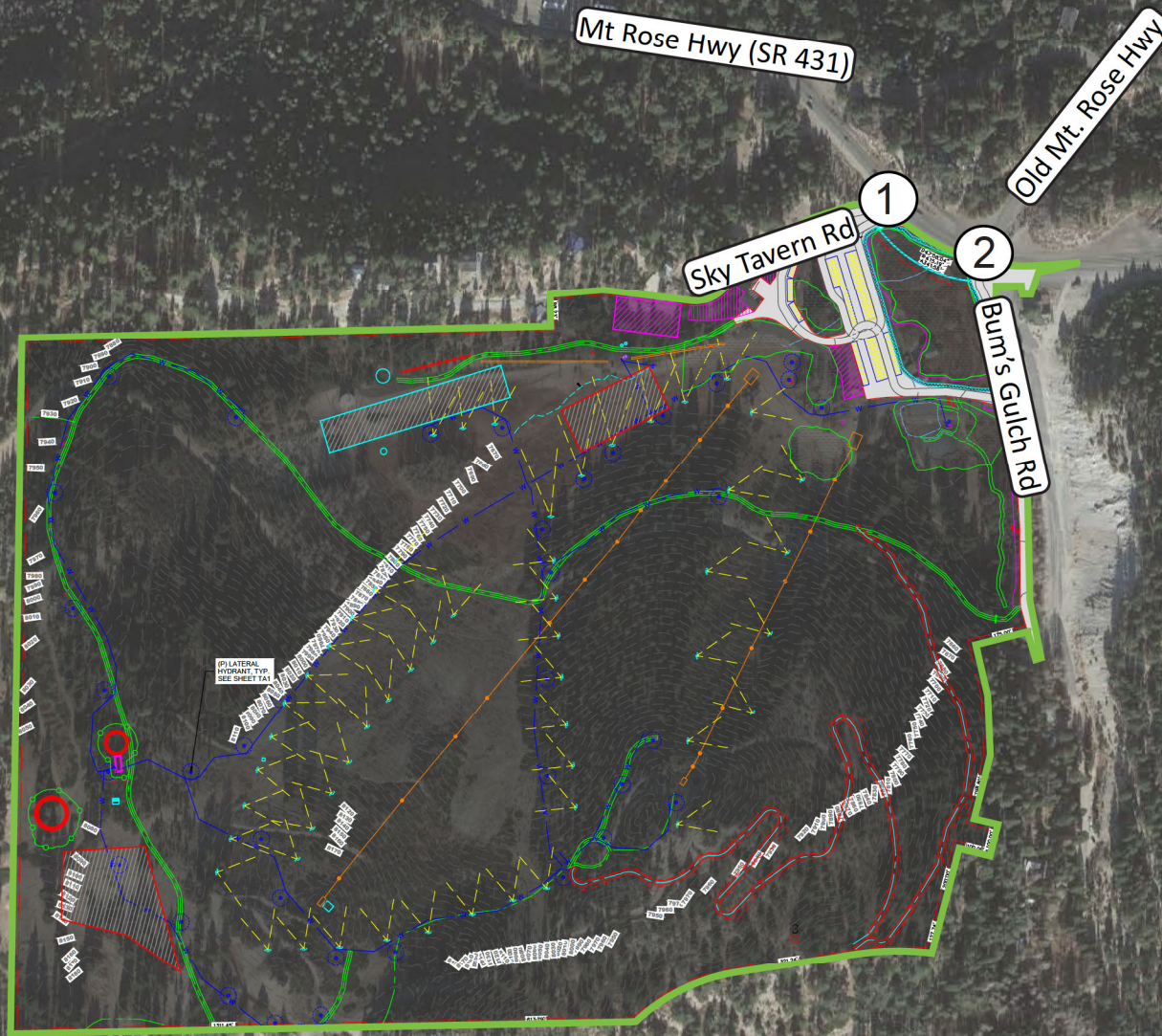
Southwest Reno / Galena

Mt. Rose Hwy (SR 431)



Study Locations

- 1 Mt. Rose Hwy (SR 431) / Sky Tavern Rd
- 2 Mt. Rose Hwy (SR 431) / Bum's Gulch Rd / Old Mt. Rose Hwy



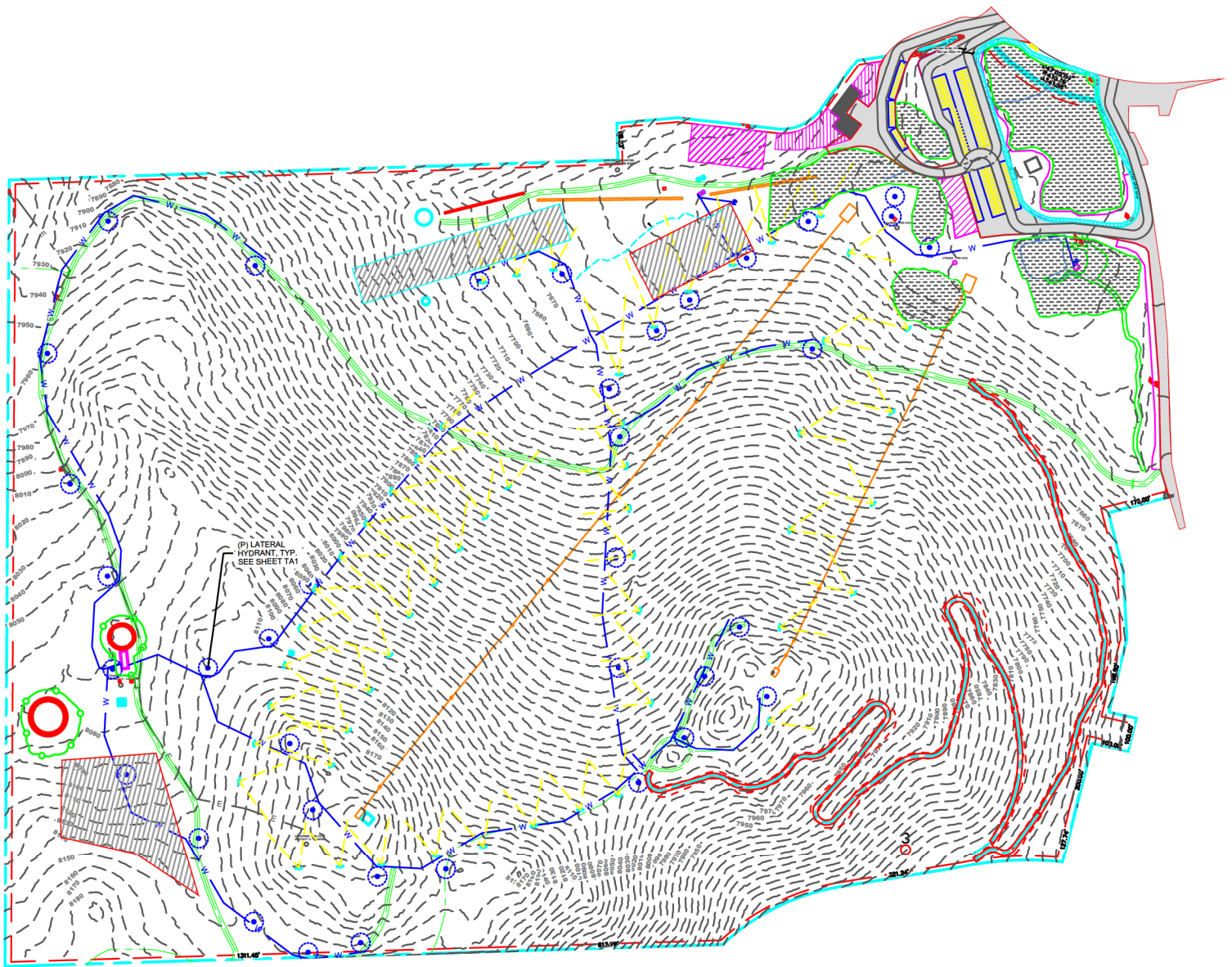
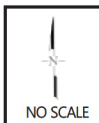


Figure 3

Sky Tavern Ski Area Expansion
 Traffic Impact Study
 Preliminary Site Plan



Study Area and Evaluated Scenarios

The following intersections are included in this study:

1. Sky Tavern Road / Mt. Rose Highway (SR 431)
2. Bum’s Gulch Road / Mt. Rose Highway (SR 431)

This study includes analysis for the typical peak ski season weekend (Saturday) AM and Noon hours as these are the periods of time in which peak traffic entering and exiting the site was observed to be the highest. The evaluated development scenarios are:

- ▶ Existing Conditions
- ▶ Existing Plus Project Conditions (representing opening year)
- ▶ Future Year Conditions (20-year horizon background) Conditions
- ▶ Future Year (20-year horizon background) Plus Project Conditions

ANALYSIS METHODOLOGY

Level of service (LOS) is a term commonly used by transportation practitioners to measure and describe the operational characteristics of intersections, roadway segments, and other facilities. This term equates seconds of delay per vehicle at intersections to letter grades “A” through “F” with “A” representing optimum conditions and “F” representing breakdown or over capacity flows.

Intersections

The complete methodology for intersection level of service analysis is established in *the Highway Capacity Manual (HCM), 6th Edition* published by the Transportation Research Board (TRB). **Table 1** presents the delay thresholds for each level of service grade at signalized and unsignalized intersections.

Table 1: Level of Service Definition for Intersections

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

Source: *Highway Capacity Manual, 6th Edition*



Level of service calculations were performed for the study intersections using the Synchro 11 software package with analysis and results reported in accordance with *HCM* methodology.

Level of Service Policy

Regional Transportation Commission

The Regional Transportation Commission's (RTC) *2050 Regional Transportation Plan (RTP)* establishes level of service criteria for regional roadway facilities in the City of Reno, City of Sparks, and Washoe County. The current Level of Service policy is:

"All regional roadway facilities projected to carry less than 27,000 ADT at the latest RTP horizon – LOS D or better."

"All regional roadway facilities projected to carry 27,000 or more ADT at the latest RTP horizon – LOS E or better."

"All intersections shall be designed to provide a level of service consistent with maintaining the policy level of service of the intersecting corridors".

The roadways within the study area are projected to carry less than 27,000 ADT at the latest *RTP* horizon.

Nevada Department of Transportation

The Nevada Department of Transportation (NDOT) *Traffic Impact Study Requirements* publication states:

Level of service "C" will be the design objective for capacity and under no circumstances will less than level of service "D" be accepted for site and non-site traffic.

Hence, LOS "D" was used as the threshold criteria for this analysis.

Traffic engineering practitioners recognize that LOS E/F conditions for the side street approach, during the peak hour(s), does not indicate an intersection failure or the need for mitigation. This condition (LOS E/F for a minor side-street approach) commonly exists throughout urban and suburban areas and is manageable in most cases.

EXISTING CONDITIONS

Roadway Facilities

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



Mt. Rose Highway (SR 431) is classified as a minor arterial that runs southwest-northeast and connects to SR 28 and the junction of US 395A / Mt. Rose Highway. In the immediate project vicinity, Mt. Rose Highway has two lanes (one lane in each direction) and has a posted speed limit of 45 mph.

Bum's Gulch Road is a local road that runs north-south and connects to Mt. Rose Highway. The road primarily serves as the access to the Sky Tavern Ski area. In the immediate project vicinity, Bum's Gulch Road has two lanes (one lane in each direction) and has a speed limit of 25 mph. The roadway changes to Old Mt. Rose Highway north of Mt. Rose Highway.

Sky Tavern Road is a local road that is primarily an access to the Sky Tavern Ski area.

Bicycle & Pedestrian Facilities

There are no bicycle / pedestrian facilities (within project vicinity) on Mt. Rose Highway, Sky Tavern Road, or Bum's Gulch Road.

Transit Facilities

There are no transit facilities (within project vicinity) on Mt. Rose Highway, Sky Tavern Road, or Bum's Gulch Road.

Crash History

Vehicle crash data was obtained from NDOT and includes information from the 2016 to 2020 five-year period (the most current data available). As shown in **Exhibit 1**, twelve crashes occurred on Mt. Rose Highway within the project vicinity during the five-year period (some crashes overlap on the image). Four crashes resulted in injury and eight resulted in property damage. The injury crashes show vehicles running off the road / driving too fast for road conditions near the intersection of Mt. Rose Highway / Sky Tavern Road. The available crash data is found in **Appendix A**.

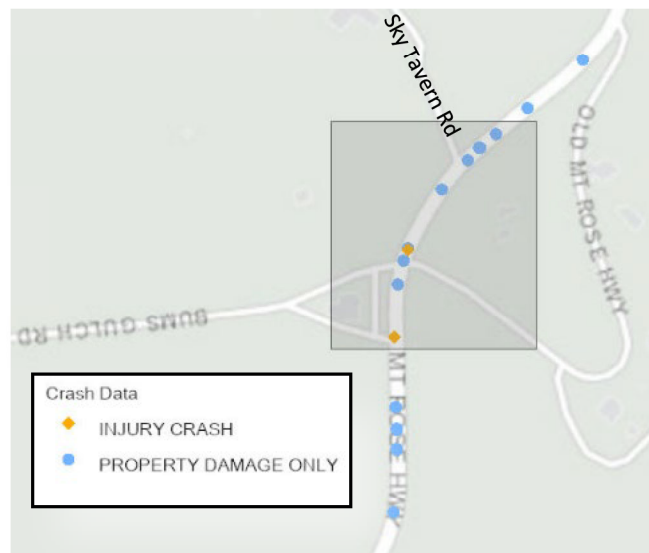


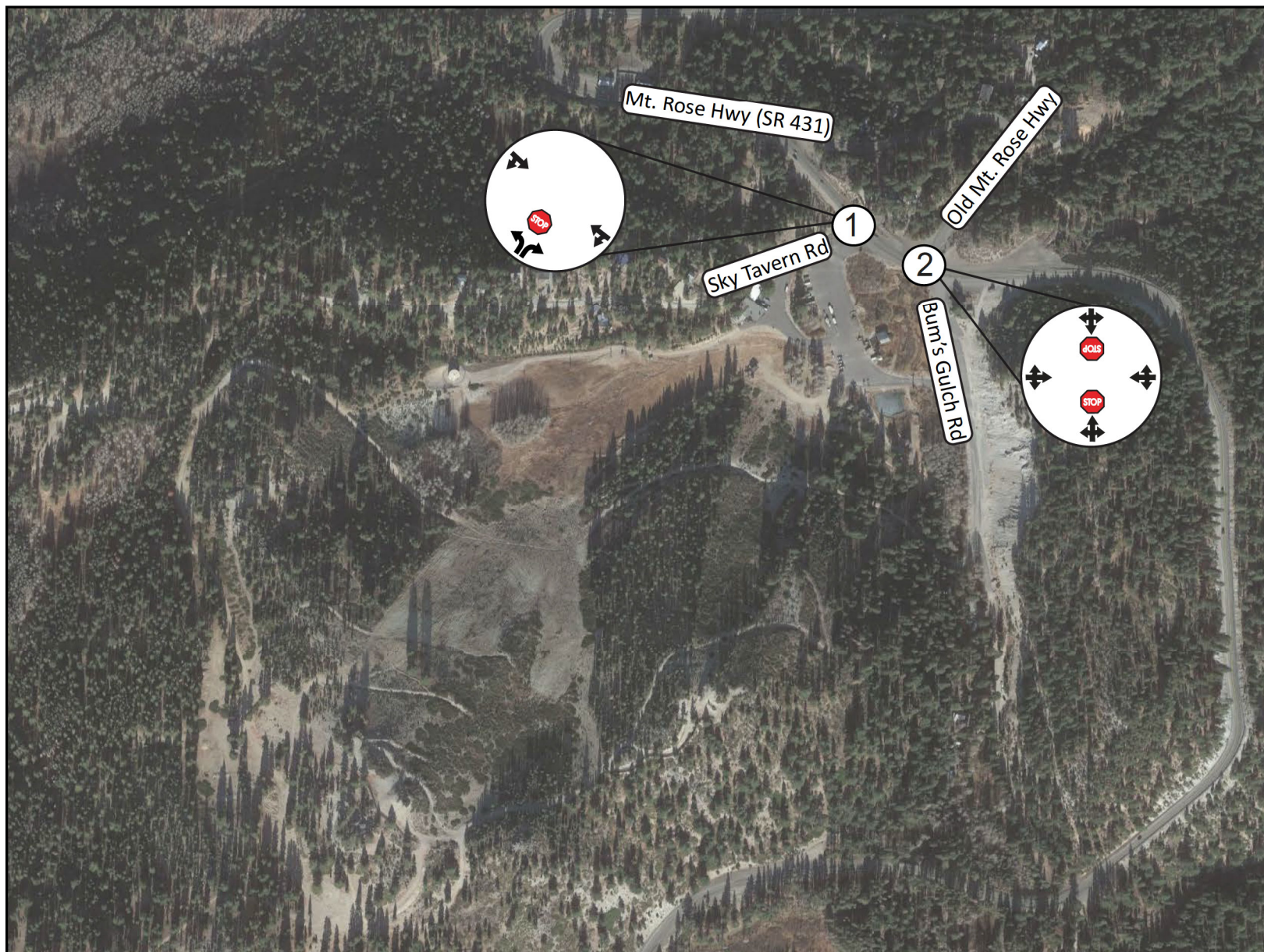
Exhibit 1: Crashes (2016-2020)

Mt. Rose Highway near the project site has horizontal curves and grades; these roadway features are associated with heightened safety concerns.

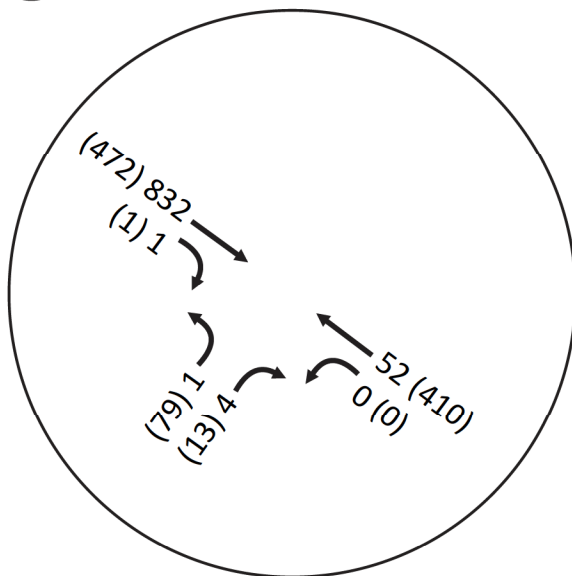
Traffic Volumes

Intersection turning movement counts were collected on a typical Saturday during peak ski season, on March 18, 2023, from 6:00 AM to 7:00 PM (13 hours). In general, a large number of vehicles arrived in the morning in a concentrated period (7:00-9:00) and departed throughout the day. Two peak hours were selected for analysis based on the highest volumes entering and exiting the ski area; these hours also corresponded with the highest volumes on Mt. Rose Highway. The selected peak hours represent AM arrival (7:15-8:15) and noon departure (11:15-12:15). Full count data is included in **Appendix B**. The existing AM and Noon peak hour intersection turning movements and mainline volumes are shown on **Figure 4**.

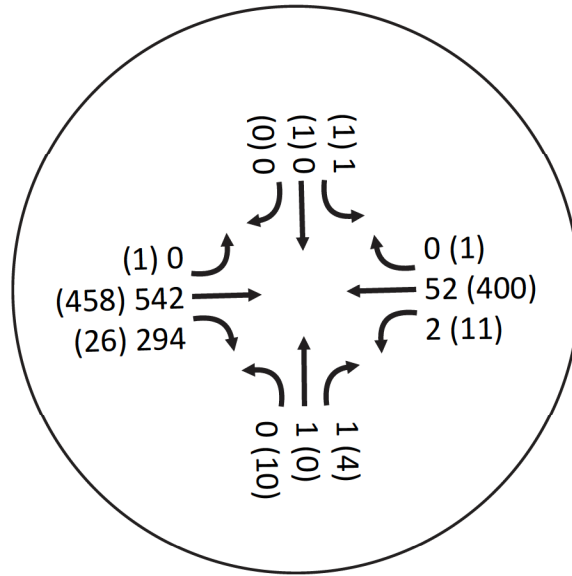




1 Mt. Rose Hwy (SR 431) / Sky Tavern Rd



2 Mt. Rose Hwy (SR 431) / Bum's Gulch Rd / Old Mt. Rose Hwy



Intersection Level of Service Analysis

Existing weekend (Saturday) AM and Noon peak hour intersection level of service analysis was performed for the study intersections using Synchro 11 analysis software. The existing intersection lane configurations and controls are shown on **Figure 4**. **Table 2** shows the existing conditions level of service results and the technical calculations are provided in **Appendix C**.

Table 2: Existing Intersection Level of Service

Int. ID	Intersection	Control	AM		Noon	
			Delay ¹	LOS	Delay ¹	LOS
1	Sky Tavern Road / Mt. Rose Hwy	Side Street Stop				
	Overall		0.1	A	1.9	A
	NB Left		18.6	C	22.0	C
	NB Right		16.6	C	11.4	B
	WB Left		0.0	A	0.0	A
2	Bum's Gulch Road / Old Mt. Rose Hwy / Mt. Rose Hwy	Side Street Stop				
	Overall		0.1	A	0.4	A
	NB Approach		20.0	C	19.7	C
	SB Approach		17.1	C	18.2	C
	EB Left		10.4	B	8.4	A
	WB Left		0.0	A	8.1	A

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for signalized and all way stop controlled intersections, and for the worst approach/movement for side street stop-controlled intersections.

Source: Headway Transportation, 2023

As shown in **Table 2**, the existing study intersections currently operate within policy level of service thresholds during the AM and Noon peak hours.

PROJECT CONDITIONS

Trip Generation

Trip generation rates for the site improvements were developed by comparing:

- ▶ Rates calculated using the institute of Transportation Engineer's (ITE) *Trip Generation Manual, 11th Edition* for land use 466 "Snow Ski Area" based on the number of lifts. ITE describes Snow Ski Area: "A snow ski area typically includes chair lifts, ski runs, and lodge facility. A snow ski area may also contain equipment rental facilities, refreshments areas, locker rooms and small commercial/office spaces." It is noted that the ITE sample size is small; therefore, data is limited.
- ▶ The degree of modification of the site and amenities added relative to the existing counts entering and exiting.



Table 3 shows the AM peak hour, and Noon peak hour ITE trip generation estimates compared to current site volumes entering and exiting. The ITE trips are lower than current counts; therefore, the trip generation was calculated as a percentage of current site traffic based on the expansion to provide a more accurate and conservative representation. The Sky Tavern Ski facility currently has two ski lifts and magic carpet lifts, the proposed expansion project will add an additional ski lift.

Table 3: Trip Generation Comparison / Estimates

ITE Trip Generation Manual					
Land Use (ITE Code)	Independent Variable	Trips			
		Saturday Peak Hour of Generator			
		AM	AM In/Out	Noon	Noon In/Out
Snow Ski Area (466)	3 Lifts (Represents Existing ¹)	229	64 / 165	N/A	N/A
	1 Lift (Proposed)	76	21 / 55	N/A	N/A
Existing Trip Counts					
Existing Counts Entering / Exiting		Saturday Peak Hour of Generator			
		AM	AM In/Out	Noon	Noon In/Out
		304	297 / 7	144	38 / 106
Calculated Trip Generation					
Calculated Trips (30% of existing entering/exiting traffic)		Trips			
		Saturday Peak Hour of Generator			
		AM	AM In/Out	Noon	Noon In/Out
		91	89 / 2	43	11 / 32

Notes: 1.

Estimated equivalent number of lifts for trip generation purposes currently on the site considering chair lifts and magic carpet lifts.

Table 3 shows that the ITE trip generation data underrepresents site traffic, with a significant variance on the in/out percentage. Therefore, the new trips to the site were estimated based on the modifications. One chair lift/magic carpet lift is being added (approximately 30% increase in ski lift facilities), along with ski lodge expansion, and additional parking. Other proposed site modifications are typically associated with summertime and do not impact the peak ski season trip generation. The existing counts into and out of the site were increased by 30% in order to accurately and conservatively represent the trip generation.

As shown in **Table 3**, the calculated trip generation rates are more conservative than the ITE manual trip generation rates. The proposed expansion project is expected to generate 91 AM peak hour, and 43 Noon peak hour additional trips.

Trip Distribution

Project trips were distributed to the adjacent roadway network based on existing traffic volumes and the proximity to the Reno areas. Project trips were distributed based on the following:



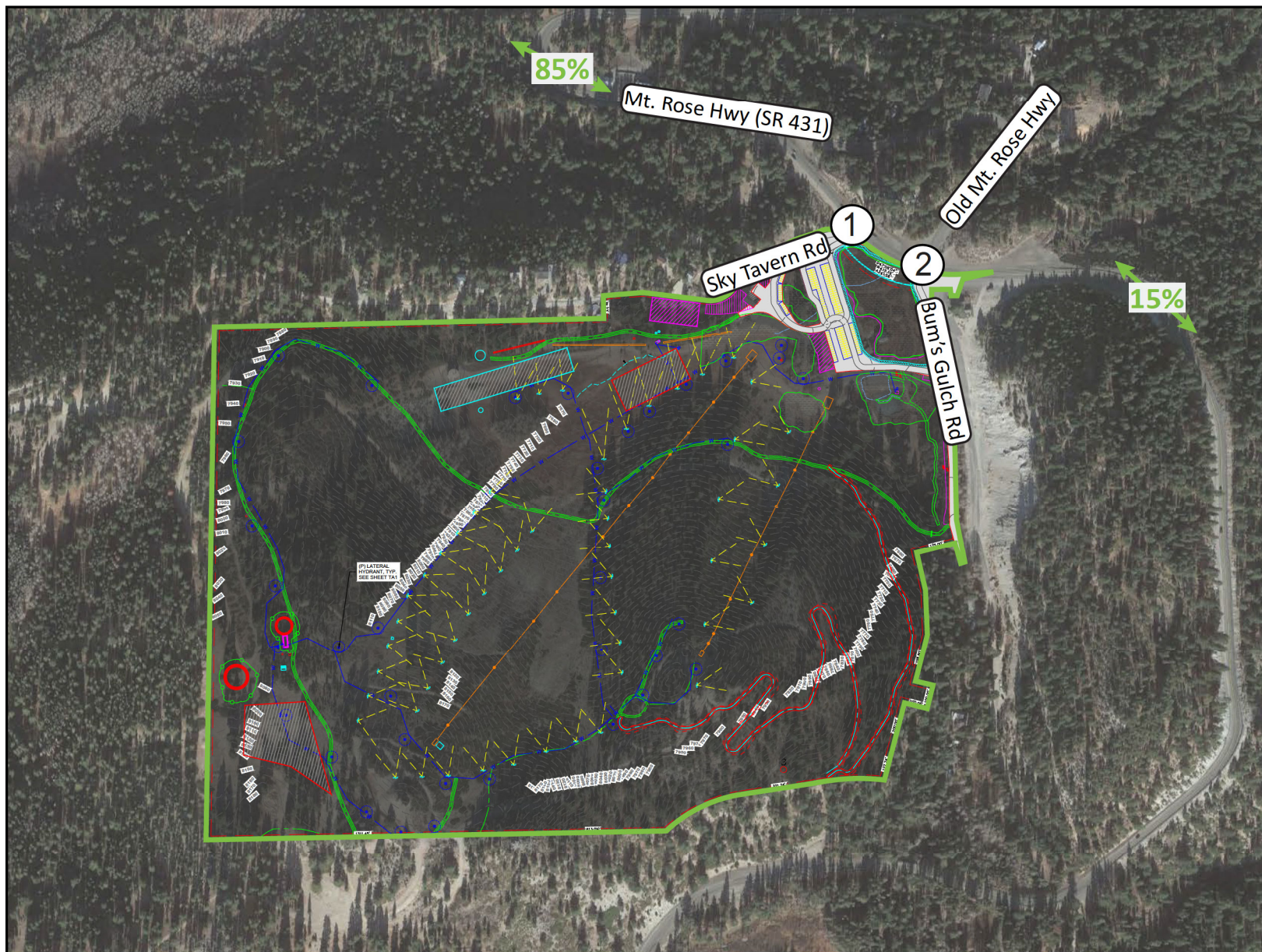
- ▶ 85% to/from the west (Reno area) via Mt. Rose Highway
- ▶ 15% to/from the east via Mt. Rose Highway

Figure 5 shows the project trip distribution and assignment.

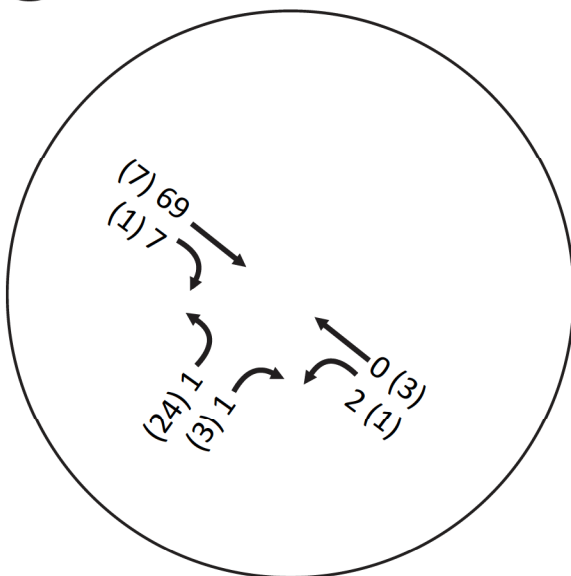
Project Access and Access Management (Turn Lane Analysis)

Two access points serve the Sky Tavern Ski area. During the ski season, the Bum's Gulch Road (Washoe County maintained) access serves as the primary entrance, and the Sky Tavern Road access serves as the primary exit.

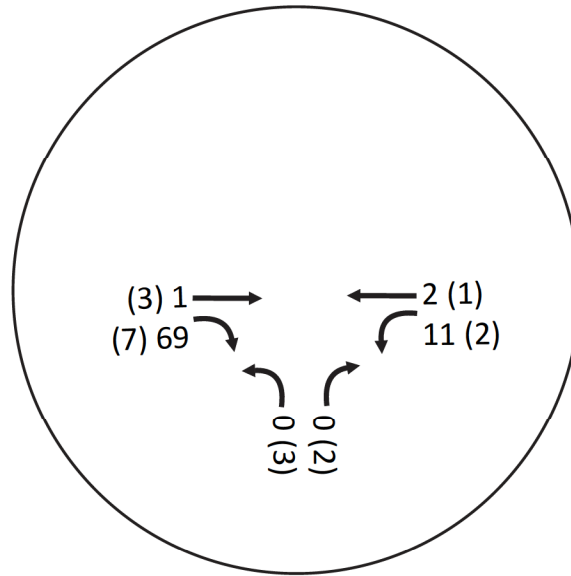
NDOT's AMSS table 4-16 provides criteria for right-turn deceleration lanes at an intersection. An eastbound right-turn lane is currently warranted on Mt. Rose Highway at the intersection of Bum's Gulch Road / Mt. Rose Highway with over 250 vehicles per hour turning right in the morning. The addition of project traffic bolsters the need for a deceleration lane.



1 Mt. Rose Hwy (SR 431) / Sky Tavern Rd



2 Mt. Rose Hwy (SR 431) / Bum's Gulch Rd / Old Mt. Rose Hwy



EXISTING PLUS PROJECT CONDITIONS

Traffic Volumes

Project trips (**Figure 5**) were added to the existing traffic volumes (**Figure 4**) to develop the Existing Plus Project conditions traffic volumes, shown on **Figure 6**.

Intersection Level of Service

AM and Noon peak hour intersection level of service analysis was performed for the study intersections based on the Existing Plus Project traffic volumes, the existing peak hour factors from the counts, and the lane configurations and controls shown on **Figure 6**. **Table 4** shows the level of service results, and the technical calculations are provided in **Appendix D**.

Table 4: Existing Plus Project Level of Service

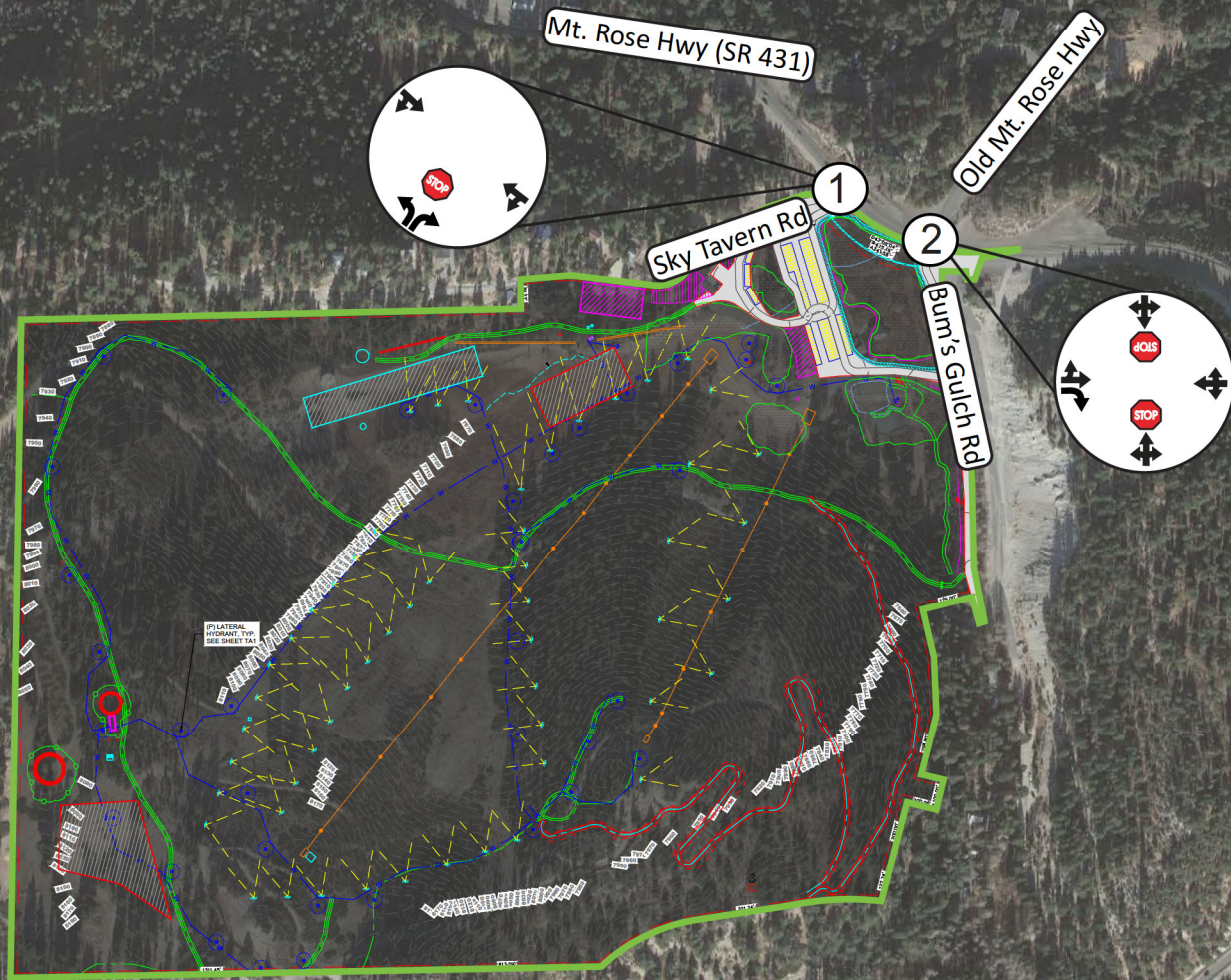
Int. ID	Intersection	Control	AM		Noon	
			Delay ¹	LOS	Delay ¹	LOS
1	Sky Tavern Road / Mt. Rose Hwy	Side Street Stop				
	Overall		0.2	A	2.7	A
	NB Left		20.5	C	24.5	C
	NB Right		18.0	C	11.5	B
	WB Left		10.4	B	8.4	A
2	Bum's Gulch Road / Old Mt. Rose Hwy / Mt. Rose Hwy	Side Street Stop				
	Overall		0.2	A	0.6	A
	NB Approach		22.1	C	20.0	C
	SB Approach		18.2	C	18.3	C
	EB Left		11.0	B	8.4	A
	WB Left		0.0	A	8.4	A
Additional analysis with the installation of a right-turn lane						
2	Bum's Gulch Road / Old Mt. Rose Hwy / Mt. Rose Hwy	Side Street Stop				
	Overall		0.2	A	0.5	A
	NB Approach		22.1	C	20.0	C
	SB Approach		14.7	B	17.9	C
	EB Left		11.0	B	8.4	A
	WB Left		0.0	A	8.1	A

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for signalized and all way stop controlled intersections, and for the worst approach/movement for side street stop-controlled intersections.

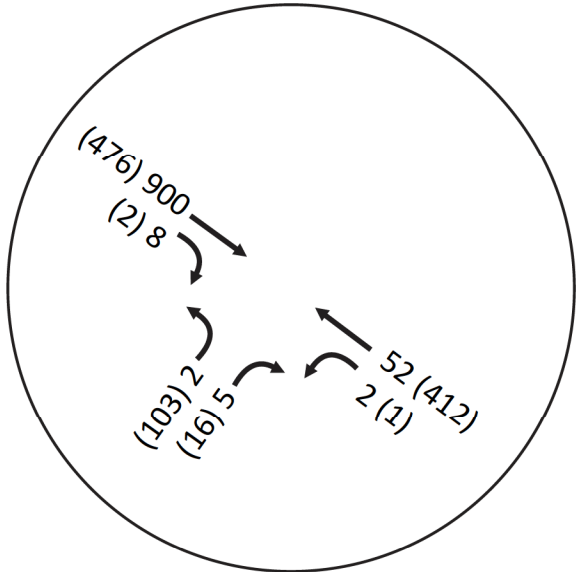
Source: Headway Transportation, 2023

As shown in **Table 4**, the study intersections will operate within the level of service policy. The addition of the right-turn lane on Mt. Rose Highway for the intersection of Bum's Gulch Road is a safety improvement and is expected to slightly improve the operation.

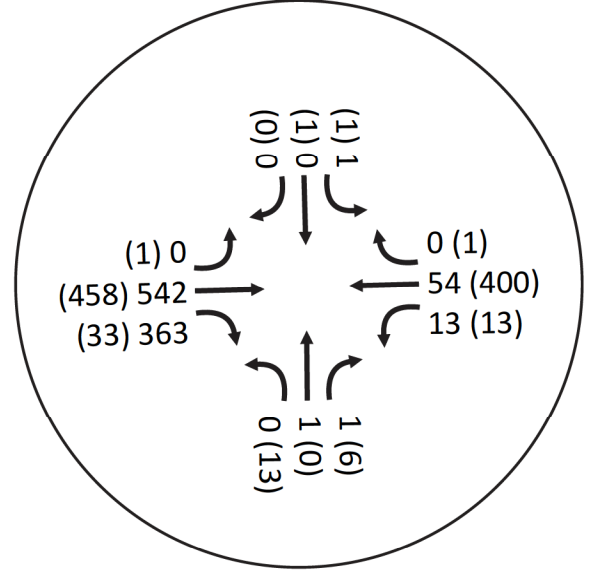




1 Mt. Rose Hwy (SR 431) / Sky Tavern Rd



2 Mt. Rose Hwy (SR 431) / Bum's Gulch Rd / Old Mt. Rose Hwy



FUTURE YEAR CONDITIONS

The Future Year analysis estimates operating conditions for the 20-year horizon.

Planned Roadway Improvements

There are no planned roadway improvements within the study area.

Traffic Volume Forecasts

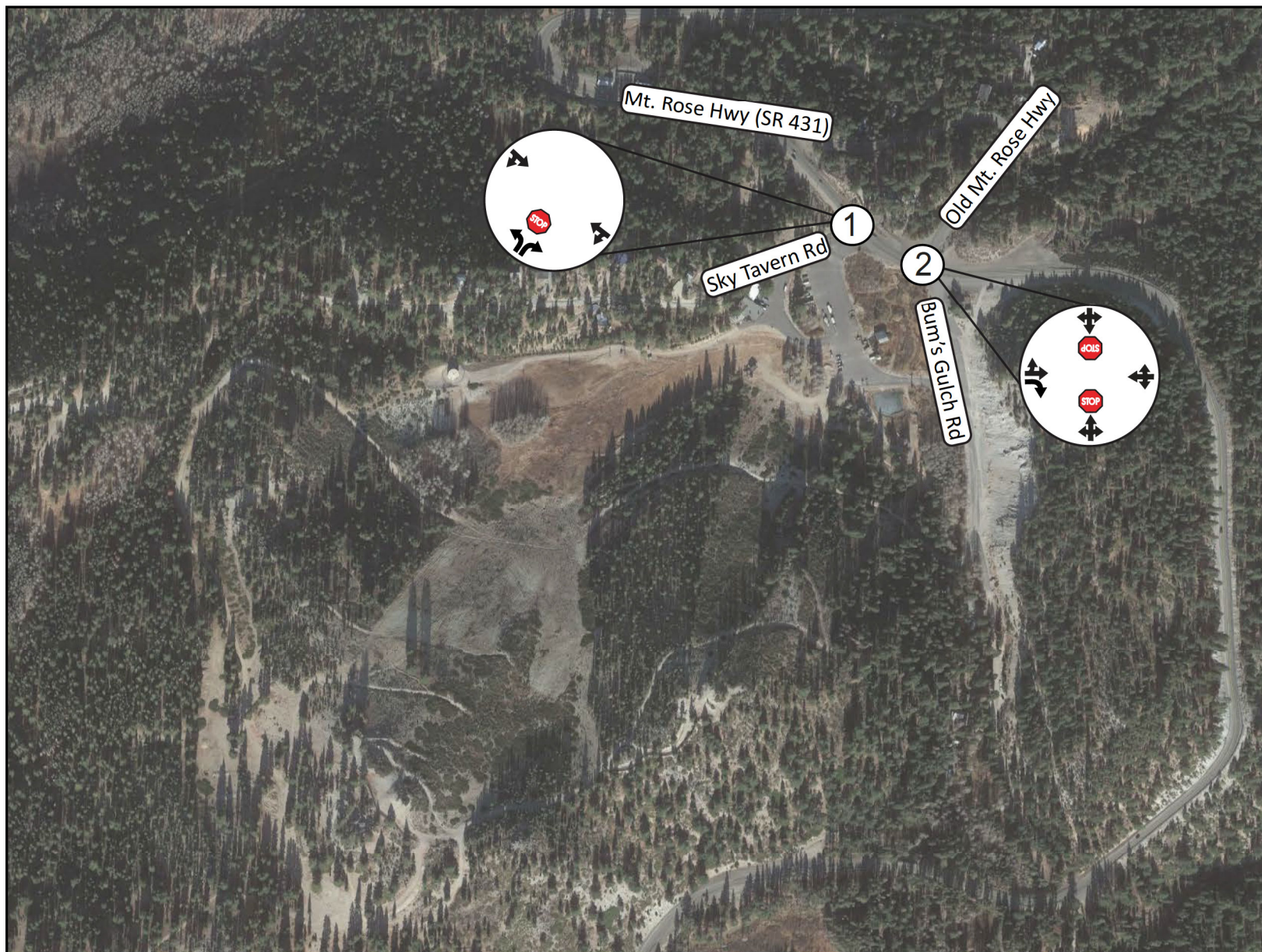
Future year (20-year horizon) traffic volumes were developed using an exponential annual growth rate to provide a baseline for assessing potential impacts on the future transportation system. The growth rate was developed using the RTC’s regional travel demand model. **Table 5** shows the projected Annual Average Daily Traffic (AADT) volumes and growth rates from the RTC Traffic Demand Model.

Table 5: RTC Model Growth Rates

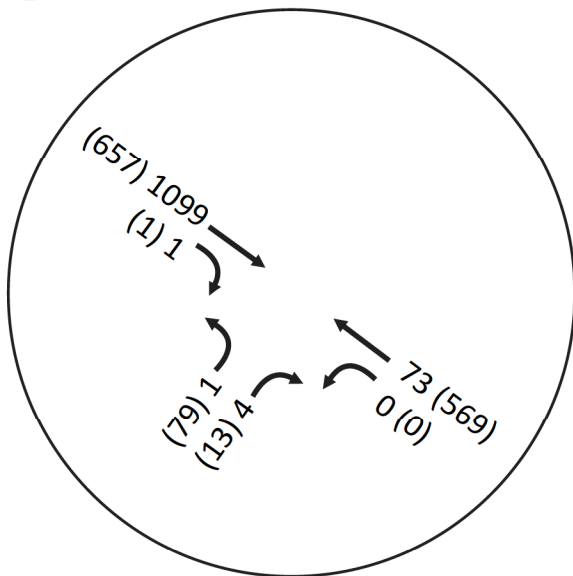
Location -->	Mt. Rose Hwy (SR 431)	Mt. Rose Hwy (SR 431)	Mt. Rose Hwy (SR 431)
	West of site	East of site	East of site
	Travel Demand Model Volumes		
2020 RTC Model	6,436	6,336	5,334
2040 RTC Model	8,168	8,135	7,063
2050 RTC Model	12,946	12,839	7,841
Model Difference (2020-2040)	1,732	1,799	1,729
Model Difference (2020-2050)	6,510	6,503	2,507
	Growth Rate Calculation		
Compounded Growth rate (2020-2040)	1.20%	1.26%	1.41%
Compounded Growth Rate (2020-2050)	2.36%	2.38%	1.29%
Average growth Rate Per Year	1.65%	1.65%	1.65%
20 Years Growth Factor	1.39	1.39	1.39

As shown in **Table 5**, the growth rate varies in the study area, with an average rate of 1.65 percent per year. An exponential growth rate of 1.65 percent per year for 20 years was applied (growth factor of 1.39) to the existing through traffic volumes on Mt. Rose Highway to develop future year traffic volume forecasts at the study intersections. **Figure 7** shows the Future Year (20-year horizon) traffic volumes at the study intersections.

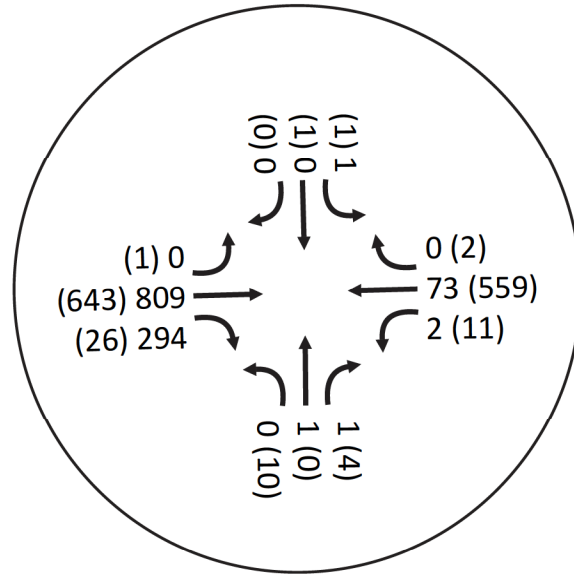




1 Mt. Rose Hwy (SR 431) / Sky Tavern Rd



2 Mt. Rose Hwy (SR 431) / Bum's Gulch Rd / Old Mt. Rose Hwy



Intersection Level of Service

AM and Noon peak hour intersection level of service analysis was performed for the study intersections using Synchro analysis software. **Table 6** shows the Future Year conditions level of service results, and the technical calculations are provided in **Appendix E**.

Table 6: Future Year Intersection Level of Service

Int. ID	Intersection	Control	AM		Noon	
			Delay ¹	LOS	Delay ¹	LOS
1	Sky Tavern Road / Mt. Rose Hwy	Side Street Stop				
	Overall		0.1	A	2.7	A
	NB Left		26.6	D	42.1	E
	NB Right		22.6	C	13.4	B
	WB Left		0.0	A	0.0	A
2	Bum's Gulch Road / Old Mt. Rose Hwy / Mt. Rose Hwy	Side Street Stop				
	Overall		0.1	A	0.5	A
	NB Approach		31.7	D	30.4	D
	SB Approach		24.5	C	28.3	D
	EB Left		12.3	B	9.0	A
	WB Left		0.0	A	8.6	A

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for signalized and all way stop controlled intersections, and for the worst approach/movement for side street stop-controlled intersections.
Source: Headway Transportation, 2023

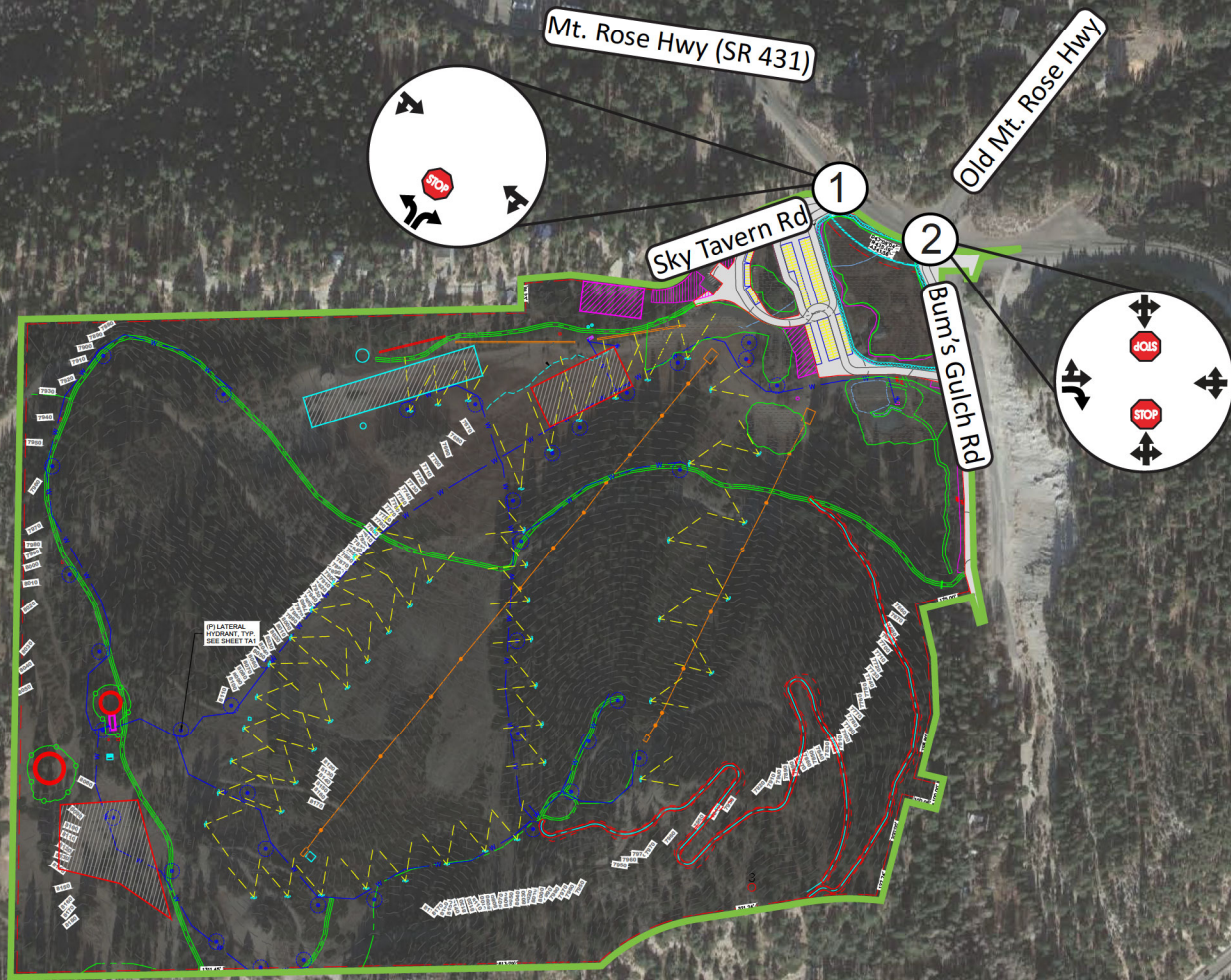
As shown in **Table 6**, the study intersections are expected to operate within the overall level of service policy. The northbound left-turn movement at the intersection of Sky Tavern Road / Mt. Rose Highway is expected to operate at a LOS E in the Noon peak hour without the expansion project. This is common for a side street approach, and reasonable for a Saturday during ski season.

FUTURE YEAR PLUS PROJECT CONDITIONS

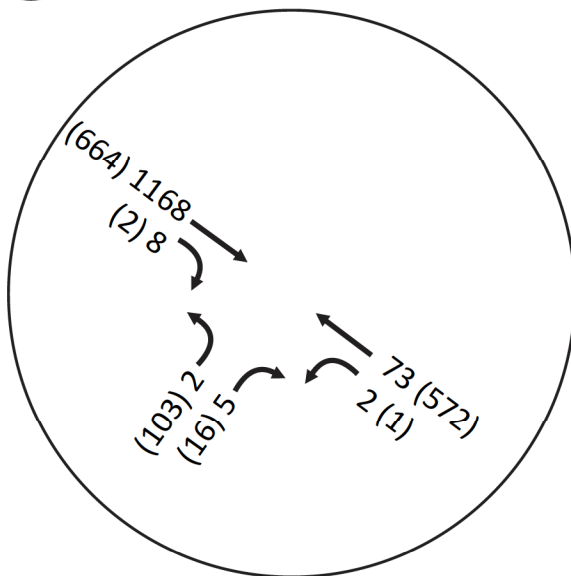
Traffic Volumes

Project trips (**Figure 5**) were added to the Future Year traffic volumes (**Figure 7**) to develop the Future Year Plus Project conditions traffic volumes, shown on **Figure 8**.

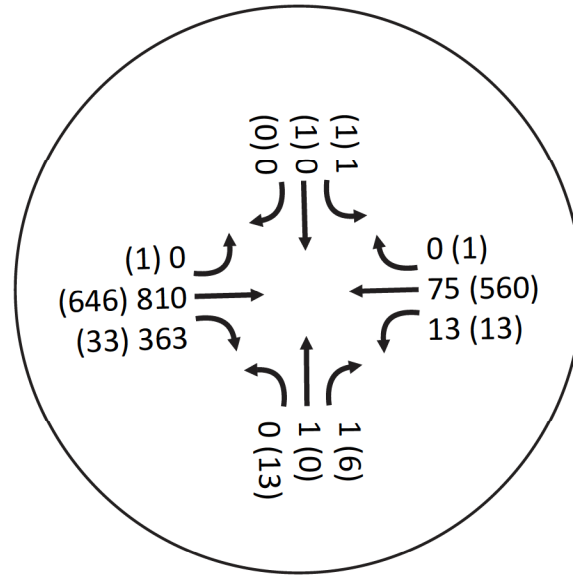




1 Mt. Rose Hwy (SR 431) / Sky Tavern Rd



2 Mt. Rose Hwy (SR 431) / Bum's Gulch Rd / Old Mt. Rose Hwy



Intersection Level of Service

AM and Noon peak hour intersection level of service analysis was performed for the study intersections based on the Future Year Plus Project traffic volumes. **Table 7** shows the level of service results, and the technical calculations are provided in **Appendix F**.

Table 7: Future Year Plus Project Intersection Level of Service

Int. ID	Intersection	Control	AM		Noon	
			Delay ¹	LOS	Delay ¹	LOS
1	Sky Tavern Road / Mt. Rose Hwy	Side Street Stop				
	Overall		0.2	A	4.3	A
	NB Left		29.7	D	54.9	F
	NB Right		25.0	D	13.5	B
	WB Left		12.0	B	9.0	A
2	Bum’s Gulch Road / Old Mt. Rose Hwy / Mt. Rose Hwy	Side Street Stop				
	Overall		0.2	A	0.6	A
	NB Approach		36.1	E	31.1	D
	SB Approach		26.8	D	28.8	D
	EB Left		13.1	B	9.1	A
	WB Left		0.0	A	8.6	A
Additional analysis with the installation of a right-turn lane						
2	Bum’s Gulch Road / Old Mt. Rose Hwy / Mt. Rose Hwy	Side Street Stop				
	Overall		0.2	A	0.6	A
	NB Approach		36.1	E	31.1	D
	SB Approach		20.8	C	28.1	D
	EB Left		13.1	B	9.1	A
	WB Left		0.0	A	8.6	A

Notes: 1. Delay is reported in seconds per vehicle for the overall intersection for signalized and all way stop controlled intersections, and for the worst approach/movement for side street stop-controlled intersections.

Source: Headway Transportation, 2023

As shown in **Table 7**, the study intersections are expected to operate within the overall level of service policy. The northbound left-turn movement at the intersection of Sky Tavern Road / Mt. Rose Highway is expected to operate at a LOS F in the Noon peak hour. The northbound approach at the intersection of Bum’s Gulch Road / Mt. Rose Highway is expected to operate at a LOS E in the AM peak hour. These LOS are common for side street approaches and are reasonable for a Saturday during ski season. The addition of the eastbound right-turn lane on Mt. Rose Highway for the intersection of Bum’s Gulch Road is a safety improvement and is expected to slightly improve the operation.



Project Access Turn Lane Lengths & Deviation Request

The NDOT standards provide minimum lengths for left-turn and right-turn deceleration lanes in Table 4-20. Deceleration lane lengths are determined based on the following:

$$\text{Minimum Length of Deceleration Lane} = \text{Deceleration Length} + \text{Queue Storage Length}$$

The deceleration length (including the taper length) for a 45-mph speed limit is 350 feet.

The eastbound right-turn is a free movement, therefore no storage length is needed.

Exhibit 2 shows the intersection spacing. The eastbound right-turn deceleration lane should be constructed to provide the maximum length available, approximately 200 feet. This will require a deviation letter which is provided separately.

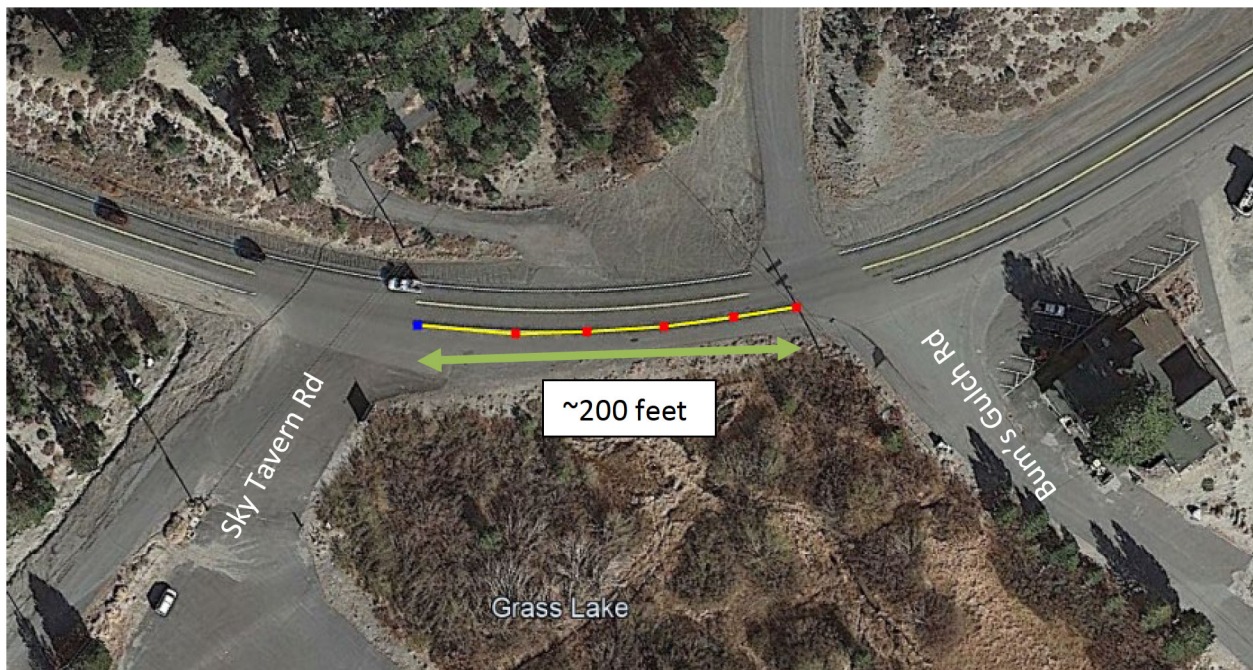


Exhibit 2: Intersection Spacing

SAFETY ENHANCEMENTS

Potential Enhancements on Mt. Rose Highway

Mt. Rose Highway near the site access roadway has horizontal curves and grades, roadway features associated with heightened safety concerns. Additional signage may be considered as a safety improvement to proactively address safety and alert motorists to be aware of the upcoming intersections.

Exhibit 3 show potential signage (either static or flashing) from the Manual on Uniform Traffic Control Devices (MUTCD):

- ▶ T-Intersection (W2-2) sign in the eastbound direction (west of Sky Tavern Road)
- ▶ Crossroad (W2-1) sign in the westbound direction (east of Bum's Gulch Road)



Exhibit 3: MUTCD Signage.

CONCLUSIONS & RECOMMENDATIONS

The following is a list of our key findings and recommendations:

- ▶ The proposed project is an expansion of the Sky Tavern Ski Area including an additional ski lift, the ski lodge expansion (approximately double in size) and additional parking. The site will include other amenities typically associated with summertime including a bicycle path, an airbag drop training and entertainment areas for special events such as weddings.
- ▶ The study is conducted for a typical weekend (Saturday traffic) during ski season. The project is anticipated to generate 91 AM peak hour, and 43 Noon peak hour additional trips on the external roadway network.
- ▶ The study intersections currently operate at overall acceptable levels of service and are expected to continue to operate acceptably under Existing Plus Project conditions and Future Year Plus Project conditions. The northbound left-turn movement at the intersection of Sky Tavern Road / Mt. Rose Highway is expected to operate at a LOS F. The northbound approach at the intersection of Bum's Gulch Road / Mt. Rose Highway is expected to operate at a LOS E in the AM peak hour. These side street delays do not indicate an exceedance of LOS policy or warrant mitigations.
- ▶ It is recommended that an eastbound right-turn lane be constructed on Mt. Rose Highway for the intersection of Bum's Gulch Road / Mt. Rose Highway, based on NDOT's *Access Management System and Standards*. A deviation letter is provided separately from this report since the AMSS requirement of 350 feet cannot be met given the intersection spacing to Sky Tavern Road (approximately 200 feet).
- ▶ It is recommended that the following improvements be installed on Sky Tavern Road at the intersection with Mt. Rose Highway:
 - » Approach lane striping configuration (left-turn and right-turn pockets)
 - » Stop Bar
 - » Stop sign (36x36)
- ▶ It is recommended that the following improvements be installed on Bum's Gulch Road at the intersection with Mt. Rose Highway:
 - » Stop Bar
 - » Stop sign (36x36)
- ▶ Intersection approaching warning signs may be considered on Mt. Rose Highway as a safety improvement (see **Exhibit 3**).



Appendix A

NDOT Crash Data



Crash Severity	Crash Date	Crash Time	Primary Street	Dir	Secondary Street	Injured	Property Damage Only	Injury Type	Crash Type	Total Vehicles
INJURY CRASH	6/9/2016, 8:25 AM	3:25:00 PM	SR431	E	MILE MARKER 13	1	No Data	B	NON-COLLISION	1
PROPERTY DAMAGE ONLY	9/4/2016, 9:30 AM	4:30:00 PM	SR431	W	SKY TAVERN RD	No Data	PDO	No Data	ANGLE	1
PROPERTY DAMAGE ONLY	11/1/2016, 2:55 PM	9:55:00 PM	SR431	E	MILE MARKER 13	No Data	PDO	No Data	NON-COLLISION	1
PROPERTY DAMAGE ONLY	12/23/2016, 4:38 AM	12:38:00 PM	SR431	E	MILE MARKER 13	No Data	PDO	No Data	HEAD-CN	2
PROPERTY DAMAGE ONLY	3/15/2017, 5:33 AM	12:33:00 PM	SR431	E	MILE MARKER 13	No Data	PDO	No Data	NON-COLLISION	1
INJURY CRASH	1/19/2018, 3:27 AM	11:27:00 AM	SR431	E	MILE MARKER 13	1	No Data	C	NON-COLLISION	1
INJURY CRASH	6/30/2018, 4:28 PM	11:28:00 PM	SR431	E	SKY TAVERN RD	1	No Data	B	NON-COLLISION	1
PROPERTY DAMAGE ONLY	9/18/2018, 6:44 AM	1:44:00 PM	SR431	E	MILE MARKER 13	No Data	PDO	No Data	NON-COLLISION	1
INJURY CRASH	1/20/2019, 3:45 AM	11:45:00 AM	SR431	E	MILE MARKER 13	1	No Data	B	ANGLE	2
PROPERTY DAMAGE ONLY	9/24/2019, 2:02 PM	9:02:00 PM	SR431	E	MILE MARKER 13	No Data	PDO	No Data	ANGLE	2
PROPERTY DAMAGE ONLY	7/20/2020, 4:26 AM	11:26:00 AM	SR431	E	SKY TAVERN RD	No Data	PDO	No Data	SIDESWIPE, MEETING	2
PROPERTY DAMAGE ONLY	9/10/2020, 2:37 PM	9:37:00 PM	SR431	E	MILE MARKER 13	No Data	PDO	No Data	NON-COLLISION	1

V1 Type	V1 Dir	V1 Driver Age	V1 Lane Num	V1 Action	V1 Driver Factors	V1 Driver Distracted	V1 Vehicle Factors
CARRY-ALL	E	26	No Data	NOT REPORTED	APPARENTLY NORMAL	No Data	RAN OFF ROAD
PICKUP	W	33	1	GOING STRAIGHT	APPARENTLY NORMAL	No Data	No Data
SEDAN, 4 DOOR	W	76	No Data	GOING STRAIGHT	APPARENTLY NORMAL	No Data	DISREGARDED TRAFFIC SIGNS, SIGNALS, ROAD MARKINGS
HARDTOP, 4 DOOR	E	21	1	GOING STRAIGHT	APPARENTLY NORMAL	No Data	DRIVING TOO FAST FOR CONDITIONS
SEDAN, 4 DOOR	W	54	1	GOING STRAIGHT	APPARENTLY NORMAL	No Data	No Data
UTILITY	E	28	1	GOING STRAIGHT	APPARENTLY NORMAL	No Data	DRIVING TOO FAST FOR CONDITIONS
HATCHBACK/FASTBACK	E	33	1	NOT REPORTED	APPARENTLY NORMAL	No Data	DRIVING TOO FAST FOR CONDITIONS
UTILITY	E	65	1	NOT REPORTED	APPARENTLY NORMAL	No Data	FAILURE TO KEEP IN PROPER LANE OR RUNNING OFF ROAD
CARRY-ALL	No Data	39	1	GOING STRAIGHT	APPARENTLY NORMAL	No Data	DRIVING TOO FAST FOR CONDITIONS
STATION WAGON	E	93	1	NEGOTIATING A CURVE	HAD BEEN DRINKING	No Data	OVER-CORRECTING/OVER-STEERING
VAN CAMPER	W	No Data	1	NEGOTIATING A CURVE	UNKNOWN	No Data	DROVE LEFT OF CENTER
SEDAN, 4 DOOR	E	No Data	1	NEGOTIATING A CURVE	UNKNOWN	No Data	MECHANICAL DEFECTS

Appendix B

Traffic Count Data Sheets



Appendix C

Existing LOS Calculations



1: Sky Tavern Rd & Mt Rose Hwy

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	1	4	832	1	0	52
Future Vol, veh/h	1	4	832	1	0	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	1	5	956	1	0	60

Major/Minor	Minor1	Major1	Major2	Major2	Major2
Conflicting Flow All	1017	957	0	0	957
Stage 1	957	-	-	-	-
Stage 2	60	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	266	315	-	-	727
Stage 1	376	-	-	-	-
Stage 2	968	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	266	315	-	-	727
Mov Cap-2 Maneuver	266	-	-	-	-
Stage 1	376	-	-	-	-
Stage 2	968	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	17	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	EBLn2	SET	SER
Capacity (veh/h)	727	-	266	315	-	-
HCM Lane V/C Ratio	-	-	0.004	0.015	-	-
HCM Control Delay (s)	0	-	18.6	16.6	-	-
HCM Lane LOS	A	-	C	C	-	-
HCM 95th %tile Q(veh)	0	-	0	0	-	-

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	542	294	2	52	0	0	1	1	1	0	0
Future Vol, veh/h	0	542	294	2	52	0	0	1	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	686	372	3	66	0	0	1	1	1	0	0
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	66	0	0	1058	0	0	944	944	872	945	1130	66
Stage 1	-	-	-	-	-	-	872	872	-	72	72	-
Stage 2	-	-	-	-	-	-	72	72	-	873	1058	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1549	-	-	666	-	-	244	264	353	244	205	1003
Stage 1	-	-	-	-	-	-	348	371	-	943	839	-
Stage 2	-	-	-	-	-	-	943	839	-	348	304	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1549	-	-	666	-	-	243	263	353	241	204	1003
Mov Cap-2 Maneuver	-	-	-	-	-	-	243	263	-	241	204	-
Stage 1	-	-	-	-	-	-	348	371	-	943	835	-
Stage 2	-	-	-	-	-	-	938	835	-	346	304	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.4			17.1			20		
HCM LOS							C			C		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	301	1549	-	-	666	-	-	241				
HCM Lane V/C Ratio	0.008	-	-	-	0.004	-	-	0.005				
HCM Control Delay (s)	17.1	0	-	-	10.4	0	-	20				
HCM Lane LOS	C	A	-	-	B	A	-	C				
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0				

1. AM Existing Conditions

1: Sky Tavern Rd & Mt Rose Hwy

Intersection

Int Delay, s/veh 1.9

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	79	13	472	1	0	410
Future Vol, veh/h	79	13	472	1	0	410
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	84	14	502	1	0	436

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	939	503	0	0	503	0
Stage 1	503	-	-	-	-	-
Stage 2	436	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	295	573	-	-	1072	-
Stage 1	612	-	-	-	-	-
Stage 2	656	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	295	573	-	-	1072	-
Mov Cap-2 Maneuver	295	-	-	-	-	-
Stage 1	612	-	-	-	-	-
Stage 2	656	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	20.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	EBLn2	SET	SER
Capacity (veh/h)	1072	-	295	573	-	-
HCM Lane V/C Ratio	-	-	0.285	0.024	-	-
HCM Control Delay (s)	0	-	22	11.4	-	-
HCM Lane LOS	A	-	C	B	-	-
HCM 95th %tile Q(veh)	0	-	1.1	0.1	-	-

2. Noon Existing Conditions

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	458	26	11	400	1	10	0	4	1	1	0
Future Vol, veh/h	1	458	26	11	400	1	10	0	4	1	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	1	482	27	12	421	1	11	0	4	1	1	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	422	0	0	509	0	0	944	944	496	946	957	422
Stage 1	-	-	-	-	-	-	498	498	-	446	446	-
Stage 2	-	-	-	-	-	-	446	446	-	500	511	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1148	-	-	1066	-	-	244	264	578	243	260	636
Stage 1	-	-	-	-	-	-	558	548	-	595	577	-
Stage 2	-	-	-	-	-	-	595	577	-	557	540	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1148	-	-	1066	-	-	240	260	578	238	256	636
Mov Cap-2 Maneuver	-	-	-	-	-	-	240	260	-	238	256	-
Stage 1	-	-	-	-	-	-	557	547	-	594	568	-
Stage 2	-	-	-	-	-	-	585	568	-	552	539	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			18.2			19.7		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	288	1148	-	-	1066	-	-	247
HCM Lane V/C Ratio	0.051	0.001	-	-	0.011	-	-	0.009
HCM Control Delay (s)	18.2	8.1	0	-	8.4	0	-	19.7
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0

Appendix D

Existing Plus Project LOS Calculations



1: Sky Tavern Rd & Mt Rose Hwy

Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	2	5	900	8	2	52
Future Vol, veh/h	2	5	900	8	2	52
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	2	6	1034	9	2	60

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1103	1039	0	0	1043	0
Stage 1	1039	-	-	-	-	-
Stage 2	64	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	236	283	-	-	675	-
Stage 1	344	-	-	-	-	-
Stage 2	964	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	235	283	-	-	675	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	344	-	-	-	-	-
Stage 2	961	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	18.7	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	EBLn2	SET	SER
Capacity (veh/h)	675	-	235	283	-	-
HCM Lane V/C Ratio	0.003	-	0.01	0.02	-	-
HCM Control Delay (s)	10.4	0	20.5	18	-	-
HCM Lane LOS	B	A	C	C	-	-
HCM 95th %tile Q(veh)	0	-	0	0.1	-	-

3. AM Existing Plus Project Conditions

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	542	363	13	54	0	0	1	1	1	0	0
Future Vol, veh/h	0	542	363	13	54	0	0	1	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	686	459	16	68	0	0	1	1	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	68	0	0	1145	0	0	1016	1016	916	1017	1245	68
Stage 1	-	-	-	-	-	-	916	916	-	100	100	-
Stage 2	-	-	-	-	-	-	100	100	-	917	1145	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1546	-	-	618	-	-	218	240	333	218	176	1001
Stage 1	-	-	-	-	-	-	329	354	-	911	816	-
Stage 2	-	-	-	-	-	-	911	816	-	329	277	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1546	-	-	618	-	-	213	234	333	212	171	1001
Mov Cap-2 Maneuver	-	-	-	-	-	-	213	234	-	212	171	-
Stage 1	-	-	-	-	-	-	329	354	-	911	794	-
Stage 2	-	-	-	-	-	-	886	794	-	327	277	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			2.1			18.2			22.1		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	275	1546	-	-	618	-	-	212
HCM Lane V/C Ratio	0.009	-	-	-	0.027	-	-	0.006
HCM Control Delay (s)	18.2	0	-	-	11	0	-	22.1
HCM Lane LOS	C	A	-	-	B	A	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0.1	-	-	0

3. AM Existing Plus Project Conditions

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↕		↕			↕			↕	
Traffic Vol, veh/h	0	542	363	13	54	0	0	1	1	1	0	0
Future Vol, veh/h	0	542	363	13	54	0	0	1	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	200	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	686	459	16	68	0	0	1	1	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	68	0	0	1145	0	0	786	786	686	1017	1245	68
Stage 1	-	-	-	-	-	-	686	686	-	100	100	-
Stage 2	-	-	-	-	-	-	100	100	-	917	1145	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1546	-	-	618	-	-	312	326	451	218	176	1001
Stage 1	-	-	-	-	-	-	441	451	-	911	816	-
Stage 2	-	-	-	-	-	-	911	816	-	329	277	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1546	-	-	618	-	-	305	317	451	212	171	1001
Mov Cap-2 Maneuver	-	-	-	-	-	-	305	317	-	212	171	-
Stage 1	-	-	-	-	-	-	441	451	-	911	794	-
Stage 2	-	-	-	-	-	-	886	794	-	327	277	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			2.1			14.7			22.1		
HCM LOS							B			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	372	1546	-	-	618	-	-	212
HCM Lane V/C Ratio	0.007	-	-	-	0.027	-	-	0.006
HCM Control Delay (s)	14.7	0	-	-	11	0	-	22.1
HCM Lane LOS	B	A	-	-	B	A	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0.1	-	-	0

1: Sky Tavern Rd & Mt Rose Hwy

Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	103	16	476	2	1	412
Future Vol, veh/h	103	16	476	2	1	412
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	110	17	506	2	1	438

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	947	507	0	0	508	0
Stage 1	507	-	-	-	-	-
Stage 2	440	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	292	570	-	-	1067	-
Stage 1	609	-	-	-	-	-
Stage 2	653	-	-	-	-	-
Platoon blocked, %			-	-	-	-
Mov Cap-1 Maneuver	292	570	-	-	1067	-
Mov Cap-2 Maneuver	292	-	-	-	-	-
Stage 1	609	-	-	-	-	-
Stage 2	652	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	22.8	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	EBLn2	SET	SER
Capacity (veh/h)	1067	-	292	570	-	-
HCM Lane V/C Ratio	0.001	-	0.375	0.03	-	-
HCM Control Delay (s)	8.4	0	24.5	11.5	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0	-	1.7	0.1	-	-

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	458	33	13	400	1	13	0	6	1	1	0
Future Vol, veh/h	1	458	33	13	400	1	13	0	6	1	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	1	482	35	14	421	1	14	0	6	1	1	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	422	0	0	517	0	0	952	952	500	955	969	422
Stage 1	-	-	-	-	-	-	502	502	-	450	450	-
Stage 2	-	-	-	-	-	-	450	450	-	505	519	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1148	-	-	1059	-	-	241	261	575	240	256	636
Stage 1	-	-	-	-	-	-	555	545	-	592	575	-
Stage 2	-	-	-	-	-	-	592	575	-	553	536	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1148	-	-	1059	-	-	237	256	575	234	251	636
Mov Cap-2 Maneuver	-	-	-	-	-	-	237	256	-	234	251	-
Stage 1	-	-	-	-	-	-	554	544	-	591	565	-
Stage 2	-	-	-	-	-	-	581	565	-	546	535	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.3			18.3			20		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	291	1148	-	-	1059	-	-	242
HCM Lane V/C Ratio	0.069	0.001	-	-	0.013	-	-	0.009
HCM Control Delay (s)	18.3	8.1	0	-	8.4	0	-	20
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕			↕			↕	
Traffic Vol, veh/h	1	458	33	13	400	1	13	0	6	1	1	0
Future Vol, veh/h	1	458	33	13	400	1	13	0	6	1	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	200	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	1	482	35	14	421	1	14	0	6	1	1	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	422	0	0	517	0	0	934	934	482	955	969	422
Stage 1	-	-	-	-	-	-	484	484	-	450	450	-
Stage 2	-	-	-	-	-	-	450	450	-	505	519	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1148	-	-	1059	-	-	248	268	588	240	256	636
Stage 1	-	-	-	-	-	-	568	555	-	592	575	-
Stage 2	-	-	-	-	-	-	592	575	-	553	536	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1148	-	-	1059	-	-	244	263	588	234	251	636
Mov Cap-2 Maneuver	-	-	-	-	-	-	244	263	-	234	251	-
Stage 1	-	-	-	-	-	-	567	554	-	591	565	-
Stage 2	-	-	-	-	-	-	581	565	-	547	535	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.3			17.9			20		
HCM LOS							C			C		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	299	1148	-	-	1059	-	-	242
HCM Lane V/C Ratio	0.067	0.001	-	-	0.013	-	-	0.009
HCM Control Delay (s)	17.9	8.1	0	-	8.4	0	-	20
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0

Appendix E

Future Year LOS Calculations



1: Sky Tavern Rd & Mt Rose Hwy

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	1	4	1099	1	0	73
Future Vol, veh/h	1	4	1099	1	0	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	1	5	1263	1	0	84

Major/Minor	Minor1	Major1	Major2	Major2	Major2
Conflicting Flow All	1348	1264	0	0	1264
Stage 1	1264	-	-	-	-
Stage 2	84	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1
Critical Hdwy Stg 1	5.4	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2
Pot Cap-1 Maneuver	168	209	-	-	557
Stage 1	268	-	-	-	-
Stage 2	944	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	168	209	-	-	557
Mov Cap-2 Maneuver	168	-	-	-	-
Stage 1	268	-	-	-	-
Stage 2	944	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	23.4	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	EBLn2	SET	SER
Capacity (veh/h)	557	-	168	209	-	-
HCM Lane V/C Ratio	-	-	0.007	0.022	-	-
HCM Control Delay (s)	0	-	26.6	22.6	-	-
HCM Lane LOS	A	-	D	C	-	-
HCM 95th %tile Q(veh)	0	-	0	0.1	-	-

3. AM Future Year Conditions

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	809	294	2	73	0	0	1	1	1	0	0
Future Vol, veh/h	0	809	294	2	73	0	0	1	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	1024	372	3	92	0	0	1	1	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	92	0	0	1396	0	0	1308	1308	1210	1309	1494	92
Stage 1	-	-	-	-	-	-	1210	1210	-	98	98	-
Stage 2	-	-	-	-	-	-	98	98	-	1211	1396	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1515	-	-	496	-	-	138	161	225	138	124	971
Stage 1	-	-	-	-	-	-	225	258	-	913	818	-
Stage 2	-	-	-	-	-	-	913	818	-	225	210	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1515	-	-	496	-	-	137	160	225	136	123	971
Mov Cap-2 Maneuver	-	-	-	-	-	-	137	160	-	136	123	-
Stage 1	-	-	-	-	-	-	225	258	-	913	813	-
Stage 2	-	-	-	-	-	-	908	813	-	223	210	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.3			24.5			31.7		
HCM LOS							C			D		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	187	1515	-	-	496	-	-	136
HCM Lane V/C Ratio	0.014	-	-	-	0.005	-	-	0.009
HCM Control Delay (s)	24.5	0	-	-	12.3	0	-	31.7
HCM Lane LOS	C	A	-	-	B	A	-	D
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0

3. AM Future Year Conditions

1: Sky Tavern Rd & Mt Rose Hwy

Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	79	13	657	1	0	569
Future Vol, veh/h	79	13	657	1	0	569
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	84	14	699	1	0	605

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1305	700	0	0	700	0
Stage 1	700	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	178	443	-	-	906	-
Stage 1	496	-	-	-	-	-
Stage 2	549	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	178	443	-	-	906	-
Mov Cap-2 Maneuver	178	-	-	-	-	-
Stage 1	496	-	-	-	-	-
Stage 2	549	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	38	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	EBLn2	SET	SER
Capacity (veh/h)	906	-	178	443	-	-
HCM Lane V/C Ratio	-	-	0.472	0.031	-	-
HCM Control Delay (s)	0	-	42.1	13.4	-	-
HCM Lane LOS	A	-	E	B	-	-
HCM 95th %tile Q(veh)	0	-	2.3	0.1	-	-

4. Noon Future Year Conditions

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	643	26	11	559	2	10	0	4	1	1	0
Future Vol, veh/h	1	643	26	11	559	2	10	0	4	1	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	1	677	27	12	588	2	11	0	4	1	1	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	590	0	0	704	0	0	1307	1307	691	1308	1319	589
Stage 1	-	-	-	-	-	-	693	693	-	613	613	-
Stage 2	-	-	-	-	-	-	614	614	-	695	706	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	995	-	-	903	-	-	138	161	448	138	158	512
Stage 1	-	-	-	-	-	-	437	448	-	483	486	-
Stage 2	-	-	-	-	-	-	483	486	-	436	442	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	995	-	-	903	-	-	135	157	448	134	155	512
Mov Cap-2 Maneuver	-	-	-	-	-	-	135	157	-	134	155	-
Stage 1	-	-	-	-	-	-	436	447	-	482	476	-
Stage 2	-	-	-	-	-	-	472	476	-	431	441	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			28.3			30.4		
HCM LOS							D			D		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	169	995	-	-	903	-	-	144
HCM Lane V/C Ratio	0.087	0.001	-	-	0.013	-	-	0.015
HCM Control Delay (s)	28.3	8.6	0	-	9	0	-	30.4
HCM Lane LOS	D	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.3	0	-	-	0	-	-	0

4. Noon Future Year Conditions

Appendix F
Future Year Plus Project LOS
Calculations



1: Sky Tavern Rd & Mt Rose Hwy

Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	2	5	1168	8	2	73
Future Vol, veh/h	2	5	1168	8	2	73
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	2	6	1343	9	2	84

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1436	1348	0	0	1352	0
Stage 1	1348	-	-	-	-	-
Stage 2	88	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	149	186	-	-	516	-
Stage 1	244	-	-	-	-	-
Stage 2	940	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	148	186	-	-	516	-
Mov Cap-2 Maneuver	148	-	-	-	-	-
Stage 1	244	-	-	-	-	-
Stage 2	936	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	26.3	0	0.3
HCM LOS	D		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	EBLn2	SET	SER
Capacity (veh/h)	516	-	148	186	-	-
HCM Lane V/C Ratio	0.004	-	0.016	0.031	-	-
HCM Control Delay (s)	12	0	29.7	25	-	-
HCM Lane LOS	B	A	D	D	-	-
HCM 95th %tile Q(veh)	0	-	0	0.1	-	-

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	810	363	13	75	0	0	1	1	1	0	0
Future Vol, veh/h	0	810	363	13	75	0	0	1	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	1025	459	16	95	0	0	1	1	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	95	0	0	1484	0	0	1382	1382	1255	1383	1611	95
Stage 1	-	-	-	-	-	-	1255	1255	-	127	127	-
Stage 2	-	-	-	-	-	-	127	127	-	1256	1484	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1512	-	-	459	-	-	122	145	211	122	105	967
Stage 1	-	-	-	-	-	-	212	245	-	882	795	-
Stage 2	-	-	-	-	-	-	882	795	-	212	190	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1512	-	-	459	-	-	119	140	211	117	101	967
Mov Cap-2 Maneuver	-	-	-	-	-	-	119	140	-	117	101	-
Stage 1	-	-	-	-	-	-	212	245	-	882	766	-
Stage 2	-	-	-	-	-	-	849	766	-	210	190	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			1.9			26.8			36.1		
HCM LOS							D			E		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	168	1512	-	-	459	-	-	117	
HCM Lane V/C Ratio	0.015	-	-	-	0.036	-	-	0.011	
HCM Control Delay (s)	26.8	0	-	-	13.1	0	-	36.1	
HCM Lane LOS		D	A	-	-	B	A	-	E
HCM 95th %tile Q(veh)		0	0	-	-	0.1	-	-	0

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕			↕			↕	
Traffic Vol, veh/h	0	810	363	13	75	0	0	1	1	1	0	0
Future Vol, veh/h	0	810	363	13	75	0	0	1	1	1	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	200	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	79	79	79	79	79	79	79	79	79	79	79	79
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	0	1025	459	16	95	0	0	1	1	1	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	95	0	0	1484	0	0	1152	1152	1025	1383	1611	95
Stage 1	-	-	-	-	-	-	1025	1025	-	127	127	-
Stage 2	-	-	-	-	-	-	127	127	-	1256	1484	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1512	-	-	459	-	-	176	199	288	122	105	967
Stage 1	-	-	-	-	-	-	286	315	-	882	795	-
Stage 2	-	-	-	-	-	-	882	795	-	212	190	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1512	-	-	459	-	-	171	192	288	117	101	967
Mov Cap-2 Maneuver	-	-	-	-	-	-	171	192	-	117	101	-
Stage 1	-	-	-	-	-	-	286	315	-	882	766	-
Stage 2	-	-	-	-	-	-	849	766	-	210	190	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			1.9			20.8			36.1		
HCM LOS							C			E		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	230	1512	-	-	459	-	-	117	
HCM Lane V/C Ratio	0.011	-	-	-	0.036	-	-	0.011	
HCM Control Delay (s)	20.8	0	-	-	13.1	0	-	36.1	
HCM Lane LOS		C	A	-	-	B	A	-	E
HCM 95th %tile Q(veh)		0	0	-	-	0.1	-	-	0

1: Sky Tavern Rd & Mt Rose Hwy

Intersection

Int Delay, s/veh 4.3

Movement	EBL	EBR	SET	SER	NWL	NWT
Lane Configurations						
Traffic Vol, veh/h	103	16	664	2	1	572
Future Vol, veh/h	103	16	664	2	1	572
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	0	1	0	0	1
Mvmt Flow	110	17	706	2	1	609

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1318	707	0	0	708	0
Stage 1	707	-	-	-	-	-
Stage 2	611	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.1	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	175	439	-	-	900	-
Stage 1	493	-	-	-	-	-
Stage 2	546	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	175	439	-	-	900	-
Mov Cap-2 Maneuver	175	-	-	-	-	-
Stage 1	493	-	-	-	-	-
Stage 2	545	-	-	-	-	-

Approach	EB	SE	NW
HCM Control Delay, s	49.3	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NWL	NWT	EBLn1	EBLn2	SET	SER
Capacity (veh/h)	900	-	175	439	-	-
HCM Lane V/C Ratio	0.001	-	0.626	0.039	-	-
HCM Control Delay (s)	9	0	54.9	13.5	-	-
HCM Lane LOS	A	A	F	B	-	-
HCM 95th %tile Q(veh)	0	-	3.5	0.1	-	-

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	1	646	33	13	560	1	13	0	6	1	1	0
Future Vol, veh/h	1	646	33	13	560	1	13	0	6	1	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	1	680	35	14	589	1	14	0	6	1	1	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	590	0	0	715	0	0	1318	1318	698	1321	1335	590
Stage 1	-	-	-	-	-	-	700	700	-	618	618	-
Stage 2	-	-	-	-	-	-	618	618	-	703	717	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	995	-	-	895	-	-	136	159	444	135	155	511
Stage 1	-	-	-	-	-	-	433	444	-	480	484	-
Stage 2	-	-	-	-	-	-	480	484	-	431	437	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	995	-	-	895	-	-	133	155	444	131	151	511
Mov Cap-2 Maneuver	-	-	-	-	-	-	133	155	-	131	151	-
Stage 1	-	-	-	-	-	-	432	443	-	479	473	-
Stage 2	-	-	-	-	-	-	468	473	-	424	436	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			28.8			31.1		
HCM LOS							D			D		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	171	995	-	-	895	-	-	140
HCM Lane V/C Ratio	0.117	0.001	-	-	0.015	-	-	0.015
HCM Control Delay (s)	28.8	8.6	0	-	9.1	0	-	31.1
HCM Lane LOS	D	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0

2: Bum's Gulch Rd/Old Mt Rose Hwy & Mt Rose Hwy

Intersection												
Int Delay, s/veh	0.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↕		↕			↕			↕	
Traffic Vol, veh/h	1	646	33	13	560	1	13	0	6	1	1	0
Future Vol, veh/h	1	646	33	13	560	1	13	0	6	1	1	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	200	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	1	0	0	1	0	0	0	0	0	0	0
Mvmt Flow	1	680	35	14	589	1	14	0	6	1	1	0
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	590	0	0	715	0	0	1300	1300	680	1321	1335	590
Stage 1	-	-	-	-	-	-	682	682	-	618	618	-
Stage 2	-	-	-	-	-	-	618	618	-	703	717	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	995	-	-	895	-	-	140	163	454	135	155	511
Stage 1	-	-	-	-	-	-	443	453	-	480	484	-
Stage 2	-	-	-	-	-	-	480	484	-	431	437	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	995	-	-	895	-	-	137	159	454	131	151	511
Mov Cap-2 Maneuver	-	-	-	-	-	-	137	159	-	131	151	-
Stage 1	-	-	-	-	-	-	442	452	-	479	473	-
Stage 2	-	-	-	-	-	-	468	473	-	424	436	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			28.1			31.1		
HCM LOS							D			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	176	995	-	-	895	-	-	140				
HCM Lane V/C Ratio	0.114	0.001	-	-	0.015	-	-	0.015				
HCM Control Delay (s)	28.1	8.6	0	-	9.1	0	-	31.1				
HCM Lane LOS	D	A	A	-	A	A	-	D				
HCM 95th %tile Q(veh)	0.4	0	-	-	0	-	-	0				

91279

Application No. _____

APPLICATION FOR PERMIT TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF NEVADA

THIS SPACE FOR OFFICE USE ONLY

NOV 18 2021

Date of Filing in State Engineer's Office _____

Returned to applicant for correction _____

Corrected Application filed _____ Map filed MAR 4 2021 UNDER 90473

The applicant Washoe County and City of Reno as to 50% Each

1001 E. Ninth Street of Reno

Street Address or P.O. Box City or Town

Nevada, 89512 vbehmaram@washoecounty.us

State and ZIP Code E-mail Address

hereby make(s) application for permission to appropriate the public waters of the State of Nevada, as hereinafter stated. (If applicant is a corporation, give date and place of incorporation; if a copartnership or association, give names of members.)

-
1. The source of water is Grass Lake and Tributaries, all being tributary to Browns Creek
Name of the stream, lake, underground, spring or other sources.
 2. The amount of water applied for is 0.11487 CFS and 0.0 AFA (net of 48.3 AFA returned to drainage)
Give diversion rate in cubic feet per second (CFS) AND duty in acre-feet annually (AFA).
 - (a) If stored in a reservoir give the number of acre-feet 9.2 (up to 3 MG of temporary tank storage)
 3. The water is to be used for Recreational (Snowmaking)
Irrigation, power, mining, commercial, domestic or other use. Must be limited to one major use.
 4. If use is for:
 - (a) Irrigation, state number of acres to be irrigated _____
 - (b) Stockwater, state number and kind of animals _____
 - (c) Other use (describe fully in No. 12) _____
 - (d) Power:
 - (1) Horsepower developed _____
 - (2) Point of return of water to stream _____

E-88
Wa

5. The water is to be diverted from its source at the following point: (Describe as being within a 40-acre subdivision of public survey, and by course and distance to a found section corner. If on unsurveyed land, it should be so stated.)

A concrete sump within the NW 1/4 of the SE 1/4 of Section 17, T17N, R19 E, MDM, or at a point from which the South 1/4 corner of said Section 17 bears S 06°00'58" W, 1949.48' feet, more or less. Please refer to map on file with Permit No. 90473.

6. Place of use: (Describe by legal subdivision. If on unsurveyed land, it should be so stated)

Washoe County Assessor's Parcel No. 048-050-03, being portions of the SW 1/4, and portions of the W 1/2 of the SE 1/4 of Section 17, T17N, R19E, MDM. Please refer to map on file with Permit No. 90473.

7. Use will begin about October 1st and end about May 1st of each year.
Month and Day Month and Day

8. Description of proposed works. (Under the provisions of NRS 535.010 you may be required to submit plans and specifications of your diversion or storage works.) (State manner in which water is to be diverted, i.e. diversion structure, ditches and flumes, drilled well with a pump and motor, etc.)

No new works are proposed; all infrastructure is associated with Decreed Permit V02748 / Permit No. 90473

9. Estimated cost of works: n/a

10. Estimated time required to construct works: 5 years

(If the well is complete, describe works.)

11. Estimated time required to complete the application of water to beneficial use: 10 years

12. Provide a detailed description of the proposed project and its water usage (use attachments if necessary): (Failure to provide a detailed description may cause a delay in processing.)

The proposed project will store the non-consumptive portion of a total of to 57.5 acre feet of total water removed from Browns Creek, of which 48.3 or 84 percent will be returned via snowmelt runoff and infiltration to the source. Storage is anticipated to consist of up to 3 million gallons of tank capacity, thereafter in frozen water in approximately 2 feet of manmade snow within the Place of Use.

13. Miscellaneous remarks:

Evidence of snowmaking non-consumptive use is well documented, and includes a determination by the New Mexico State Engineer that 9.8 percent of diverted water is consumed, and Nevada Permit No. 85945 requires that only 20 percent of diverted water may be consumptively used. This application is based on 16 percent consumptive use.

permits@robisoneng.com

E-mail Address

775-852-2251

700

Phone No.

Ext.

APPLICATION MUST BE SIGNED
BY THE APPLICANT OR AGENT

Nathan Earl Robison, PE, WRS

Type or print name clearly



Signature, applicant or agent

Robison Engineering Company, Inc

Company Name

PO Box 1505

Street Address or PO Box

Sparks, NV 89432

City, State, ZIP Code



THE STATE OF NEVADA
PERMIT TO APPROPRIATE WATER

Name of Permittee: WASHOE COUNTY AND CITY OF RENO
Source: STREAM (BROWNS CREEK)
Basin: PLEASANT VALLEY
Manner of Use: RECREATIONAL
Period of Use: OCTOBER 1ST THROUGH MAY 1ST
Priority Date: 11/18/2021

APPROVAL OF STATE ENGINEER

This is to certify that I have examined the foregoing application, and do hereby grant the same, subject to the following limitations and conditions:

This permit is issued subject to existing rights. The amount of water herein granted is only a temporary allowance, and the final water right obtained under this permit will be dependent upon the amount of water actually placed to beneficial use. A suitable measuring device must be installed and measurements of water use kept. The State retains the right to regulate the use of the water herein granted at any and all times.

Monthly records shall be kept of the amount of water pumped from this well and shall be submitted to the State Engineer on a quarterly basis within 15 days after the end of each calendar quarter.

This permit does not extend the permittee the right of ingress and egress on public, private, or corporate lands.

The issuance of this permit does not waive the requirements that the permit holder obtain other permits from State, Federal, and local agencies. The place of use of this permit is limited to that area lying totally within the Pleasant Valley Hydrographic Basin.

The total combined duty of water under Permits 90473 and 91279 shall not exceed 57.5 acre-feet per season.

The consumptive use of water under Permits 90473 and 91279 shall not exceed 9.2 acre-feet per season. A 16% consumptive use factor was assigned to be consistent with the Truckee-River Operating Agreement. The State Engineer reserves the right to modify the terms of this permit if it is found that the consumptive use of water under these permits for snowmaking purposes exceeds this percentage.

(Continued on Page 2)

The point of diversion and place of use are as described on the submitted application to support this permit.

The amount of water to be appropriated shall be limited to the amount that can be placed to beneficial use and **shall neither exceed a diversion rate of 0.11487 cubic feet per second nor exceed a seasonal duty of 48.3 acre-feet.**

Work must be prosecuted with reasonable diligence and proof of completion of work shall be filed on or before:

July 21, 2024

Water must be placed to beneficial use and proof of the application of water to beneficial use shall be filed on or before:

July 21, 2026

Map in support of proof of beneficial use shall be filed on or before:

N/A

IN TESTIMONY WHEREOF, I, ADAM SULLIVAN, P.E.,

State Engineer of Nevada, have hereunto set my hand and the seal of my office, this 5th day of December, 2022


State Engineer

Sky Tavern Ski Area

Wetland Enhancement Project

Aquatic Resources Delineation Report

Draft December 2021

Sky Tavern Ski Area

Wetland Enhancement Project

Aquatic Resources Delineation Report

Draft
DECEMBER 2021

Prepared for:

Sky Tavern Board of Directors
21130 Mount Rose Highway
Reno, Nevada 89511

Submitted to:

U.S. Army Corps of Engineers
Sacramento District
Reno Regulatory Field Office
300 Booth Street, Room 3050
Reno, Nevada 89509-1361

Prepared by:



Reno:
5890 Mitra Way
Reno, Nevada 89523
Phone: (775) 225-5548

**SKY TAVERN SKI AREA
WETLAND ENHANCEMENT PROJECT
AQUATIC RESOURCE DELINEATION REPORT**

EXECUTIVE SUMMARY

This report presents the results of a delineation of wetlands and other waters that would likely be subject to regulation by the United States Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act. The delineation was conducted at the Sky Tavern Ski Area (Sky Tavern) Wetland Enhancement Project (Project) located in Washoe County, Nevada. The Project is bordered to the north by a paved entrance to Sky Tavern, to the east by Bums Gulch Road, to the south by a short dirt access road, and to the west by a small pond and the Project Discovery Leadership upland ropes course at Sky Tavern. There are multiple small buildings or ropes courses within the Project Area. The Project Area encompasses 2.09 acres on land owned by the City of Reno.

Field work for the delineation was conducted by Michael Robison and Daniel Robison, botanist for Robison Wildlife Consulting, LLC (RWC) in August 2021 using the routine on site determination method described in the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and, where applicable, in accordance with methods identified in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual for the Western Mountains, Valleys, and Coast Region* (USACE 2010). Other waters were mapped and delineated in the field in accordance with the methodology presented in *A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States* (Mersel and Lichvar 2014).

Based on online mapping found at the USFWS National Wetlands Inventory Map program (<https://www.fws.gov/wetlands/data/mapper.HTML>) analysis, 2.09 acres of potentially jurisdictional wetland are located within the Project Area. Based on Field Analysis there are no wetlands and 0.15 acres of other waters located within the Project Area. All wetland boundaries and jurisdictional determinations presented in this report are preliminary and subject to verification by the USACE, Sacramento District.

**SKY TAVERN SKI AREA
WETLAND ENHANCEMENT PROJECT
AQUATIC RESOURCE DELINEATION REPORT**

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**SKY TAVERN SKI AREA
WETLAND ENHANCEMENT PROJECT
AQUATIC RESOURCE DELINEATION REPORT**

1 INTRODUCTION

1.1 Project Description

RWC was retained by Robison Engineering to conduct an aquatic resource delineation on a portion of the Sky Tavern property that is approximately 2.09 acres in size. The area consists of a natural drainage with approximately 40 feet of elevation loss from the south to the north end. The soils consist largely of decomposed granite that has eroded into the Project Area. The northern end is a low, gradually sloped area that leads to a culvert under the parking entrance and to a depression west of the Project Area. The depression has been deepened in the past to create a pond that collects water that is lower than the culvert.

The property is owned by the City of Reno and leased long-term by Sky Tavern, home to the non-profit Sky Tavern Junior Ski Program. The City of Reno tasked Sky Tavern with increasing recreational use of the area and improving the facilities. To this end, Sky Tavern is proposing to increase snowmaking capacity, which would allow the area to open sooner, and add additional parking. Water for snowmaking would be stored in the historical location of Grassy Lake. A portion of the area would be dredged, and the equipment building would be removed.

The purpose of this report is to identify and describe aquatic resources that would be affected by the Project. The aquatic resource delineation and this report have been completed and prepared in accordance with the USACE Sacramento District *Minimum Standards for Acceptance of Aquatic Resource Delineation Reports* (USACE 2016).

1.2 Contact Information

Contact information for the applicant and agent is provided below.

Applicant:

Bill Henderson
Executive Director/General Manager
Sky Tavern
21130 Mount Rose Highway
Reno, Nevada 89511
(775) 323-5125

Agent:

Michael Robison, Principle Manager
and Biologist
Robison Wildlife Consulting, LLC
5890 Mitra Way
Reno, Nevada 89523
(775) 225-5548

2 LOCATION

The Project is located at 21130 Mount Rose Highway, Reno, Nevada 89511, on the eastern slope of Mount Rose in Washoe County. The Project is located entirely within Section 17, Township 17 North, Range 19 East (T17N R19E) Mount Diablo Base and Meridian (Project Area). It is bordered to the north by the parking lot, to the east by Bums Gulch Road, to the south by a dirt access road, and to the west by a pond and Project Discovery Rope course. The Project Area encompasses 2.09 acres.

The Project Area can be reached from the City of Reno by traveling 5.4 miles south on Interstate 580, exiting onto Nevada State Route 431/Mount Rose Highway, and traveling approximately 11 miles to Sky Tavern. Figure 2 shows the Project Area, location and access. All supporting maps are included in Appendix A with the exception of the aquatic resource delineation map which is included in Appendix B.

3 METHODS

Field work for the delineation was conducted on August 5 and 14, 2021, by Michael Robison and Daniel Robison, botanists for RWC. The relatively small size of the Project Area, and its position within the landscape allowed for the collection of three-parameter data (vegetation, soils, and hydrology) across the Project Area as a whole, rather than at discreet pairs of data points. The delineation was performed in accordance with the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and, where applicable, in accordance with methods identified in the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual for the Western Mountains, Valleys, and Coast Region* (USACE 2010). Other waters of the United States were mapped and delineated in the field in accordance with the 2014 *A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States* (Mersel and Lichvar 2014).

All Geographic Information System (GIS) data were recorded in the Universal Transverse Mercator (UTM) coordinate system in the North American Datum of 1983 (NAD 83) for Zone 11 North (meters) with a Garmin 64st unit (Garmin).

This report was prepared in accordance with the Sacramento District's *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports* (USACE 2016). The most recent *National Wetland Plant List* (Lichvar et al. 2016) was used to determine the wetland indicator status of plants observed in the Project Area. The PLANTS database (United States Department of Agriculture [USDA], National Resource Conservation Service [NRCS] 2018) was used for plant nomenclature, except where it conflicted with the nomenclature in the National Wetland Plant List, which was given priority.

4 EXISTING CONDITIONS

4.1 Landscape Setting and Climate

The Project Area is located at between 7,560 and 7,600 feet above mean sea level (amsl). According to the Western Regional Climate Center (WRCC), the average maximum temperature recorded at the Mount Rose Bowl, Nevada field station, which is located approximately 0.8 mile north of the Project Area, is approximately 75.3 degrees Fahrenheit (°F) in August, and the average temperature is approximately 21.1 °F in February. The average annual precipitation is 6.7 inches and tends to peak in December (WRCC 2016).

4.2 Vegetation

Two vegetation communities were identified within the Project Area and described below. All communities are mapped in Figure 3.

4.2.1 **Sierra Nevada Willow Scrub-Shrub**

Approximately 0.41 acres of the Project Area consists of a scrub-shrub plant community of dense stands of Lemmon's willow (*Salix lemmonii*) interspersed with grasses and barren areas. Other shrub species observed within this plant community included shining willow (*Salix lucida*), Coyote willow (*Salix exigua*), gray alder (*Alnus incana*), and sparse quaking aspen (*Populus tremuloides*). Forbs observed within this plant community included common yarrow (*Achillea millefolium*), streambank arnica (*Arnica lanceolata*), bull thistle (*Cirsium vulgare*), common pussypaws (*Cistanthe monosperma*), fringed willowherb (*Epilobium ciliatum*), common horsetail (*Equisetum arvense*), racemed groundsmoke (*Gayophytum racemosum*), western marsh cudweed (*Gnaphalium palustre*), red-stem stork's bill (*Erodium cicutarium*), garden babysbreath (*Gypsophila scorzonifolia*), seep monkeyflower (*Mimulus guttatus*), slender cinquefoil (*Potentilla gracilis*), curly dock (*Rumex crispus*), common dandelion (*Taraxicum officinale*), common mullein (*Verbascum thapsus*), and American speedwell (*Veronica americana*). Grasses observed within this plant community included rough bentgrass (*Agrostis scabra*), creeping bentgrass (*Agrostis stolonifera*), slender wheatgrass (*Elymus trachycaulus*), Baltic rush (*Juncus balticus*), toad rush (*Juncus bufonius*), swordleaf rush (*Juncus ensifolius*), foxtail barley (*Hordeum jubatum*), mat muhly (*Muhlenbergia richardsonii*), timothy (*Phleum pratense*), Nebraska sedge (*Carex nebrascensis*), Northwest Territory sedge (*Carex utriculata*), and Kentucky bluegrass (*Poa pratense*). Grasses were generally sparse and patchy with no meadow formation. The edges of the community near the paved road had rubber rabbitbrush (*Ericameria nauseosa*) and other upland plants such as desert Indian paintbrush (*Castilleja angustifolia*) and cushion buckwheat (*Eriogonum ovalifolium*).

4.2.2 **Rocky Mountain Subalpine-Montane Riparian Woodland**

Approximately 1.67 acres of the Project Area consists of Rocky Mountain Subalpine-Montane Riparian

Woodland plant community consisting of Quaking aspen, grey alder, Jeffery pine (*Pinus jeffreyi*), and white fir (*Abies concolor*). This community occurs in upland areas along the eastern boundary of the Project Area and all of the southern 2/3rds of the Project Area. Forbs observed in this community included common yarrow, mealy goosefoot (*Chenopodium incanum*), poison hemlock (*Conium maculatum*), pinnate tansy mustard (*Descurainia pinnata*), racemed groundsmoke, garden babysbreath, false Solomon's seal (*Maianthemum racemosum*), woodland pinedrops (*Pterospora andromedea*), sheep sorrel (*Rumex acetosella*), and common cocklebur (*Xanthium strumarium*).

4.3 Soils

The entirety of the Project Area, 2.09 acres, is mapped by the NRCS as wetland (Figure 4). The Project Area is composed of two soil types: Tallac very bouldery sandy loam, four to 30 percent slopes; and Graylock-Temo-Rock outcrop complex, 30 to 70 percent slopes.

4.3.1 Tallac Sandy Loam Series

The Tallac sandy loams are a series of well-drained soils with a moderately low to moderately high available water capacity. Profiles range from 42 to 65 inches deep to cemented material. These soils do not flood, do not pond, and the depth to the water table is greater than 80 inches. Where mapped, the Tallac and similar soils compose 85 percent of the soil makeup, while other minor components make up the remaining 15 percent. The Tallac series are composed primarily of weathered glaciomarine deposits (NRCS 2018). This soil series is not hydric.

4.3.2 Graylock-Temo-Rock Outcrop Complex

The Graylock series of soils are somewhat excessively drained soils with a very low available water capacity. Profiles range from 56 to 66 inches deep to bedrock. These soils do not flood, do not pond, and the depth to the water table is greater than 80 inches. The Graylock series are composed primarily of residuum and colluvium derived from granitic rocks. This soil series is not hydric. The Temo series of soils are excessively drained soils with a very low to moderately low available water capacity. Profiles range from 16 to 60 inches deep to bedrock. These soils do not flood, do not pond, and the depth to the water table is greater than 80 inches. The Temo series are composed primarily of residuum and colluvium derived from granitic rocks. This soil series is not hydric.

Where mapped, the Graylock-Temo-Rock outcrop complex is composed of 50 percent Graylock and similar soils, 25 percent Temo and similar soils, ten percent Rock outcrop, while other minor components make up the remaining 15 percent (NRCS 2018).

4.4 Geology

Geologic maps from the United States Geologic Survey (USGS) indicate that the majority of the Project Area is underlain by lake and stream deposits. Lake deposits include gravel, sand,

and silt laid down by higher lakes nearly contemporaneous with Lake Lahontan and in post-Lake Lahontan lakes. These deposits are of Pleistocene to Recent age. Small amounts of Tahoe Till, a type of glacial deposit, and water are also mapped within the Project Area (Figure 5) (USGS 1950).

4.5 Hydrology

The National Hydrography Dataset (NHD) reports that there are no drainages mapped within the Project Area. The nearest mapped water is an ephemeral drainage approximately 1000 feet northeast of the Project Area (Figure 6). NHD flowline data shows this ephemeral drainage connecting with Browns Creek approximately one mile east-southeast from the Project Area. Browns Creek flows into Steamboat Creek, which flows into the Truckee River, the nearest traditional navigable water (TNW), approximately 16 linear miles northeast of the Project Area (USGS 2018).

The National Wetland Inventory (NWI) maps two types of wetlands within the Project Area (Figure 6):

1. PSS1B (Palustrine, Scrub-shrub, Broad-Leaved Deciduous, Seasonally Saturated); and
2. PFO1C (Palustrine, Forested, Broad-Leaved Deciduous, Seasonally Flooded) (United States Fish and Wildlife Service [USFWS] 1999).

No seasonally flooded wetland areas were observed during field studies.

4.6 Aquatic Resources

Aquatic resources within the Project Area consist of one ephemeral stream channel (Channel A). Photographs of the resource are included in Appendix C, OHWM data sheets are included in Appendix D, and Wetland delineation data sheets are included in Appendix E.

4.6.1 Channel A

Channel A enters the Project Area from a culvert on the south side of the Project Area and flows north through an incised drainage (not mapped in NHD) until it reaches the north west corner and flows outside of the Project Area in two locations. The channel splits in two. The first place the channel leaves the Project Area leads to the existing pond to the west of the Project Area. The second leads to a culvert that flows under the parking lot entrance and into the old grassy lake area. Water pools in a wider channel before flowing out of a culvert on the north side of the Project Area. After passing into the grassy lake wetland area, the channel passes through another culvert under Mount Rose Highway, where the stream channel re-emerges on the north side of the highway. The stream channel then continues to flow north-northeast for approximately 765 linear feet, where it reaches the ephemeral drainage mapped by the NHD and discussed in Section 4.5. Channel A has bed and bank, as well as OHWM indicators including a break in slope, change in vegetation, and sediment sorting (Appendix C, Photo Plates 2 and 3). Average OHWM width for Channel 1 was 4 feet.

Table 1. Aquatic Resources within the Project Area

Aquatic Resource Name	Aquatic Resources Classification		Acres	Linear Feet
	Cowardin	Location (UTM)*		
Channel A	R4SB	0252492E 4357943N	0.15	714
Total			0.15	714

*NAD83

5 REFERENCES

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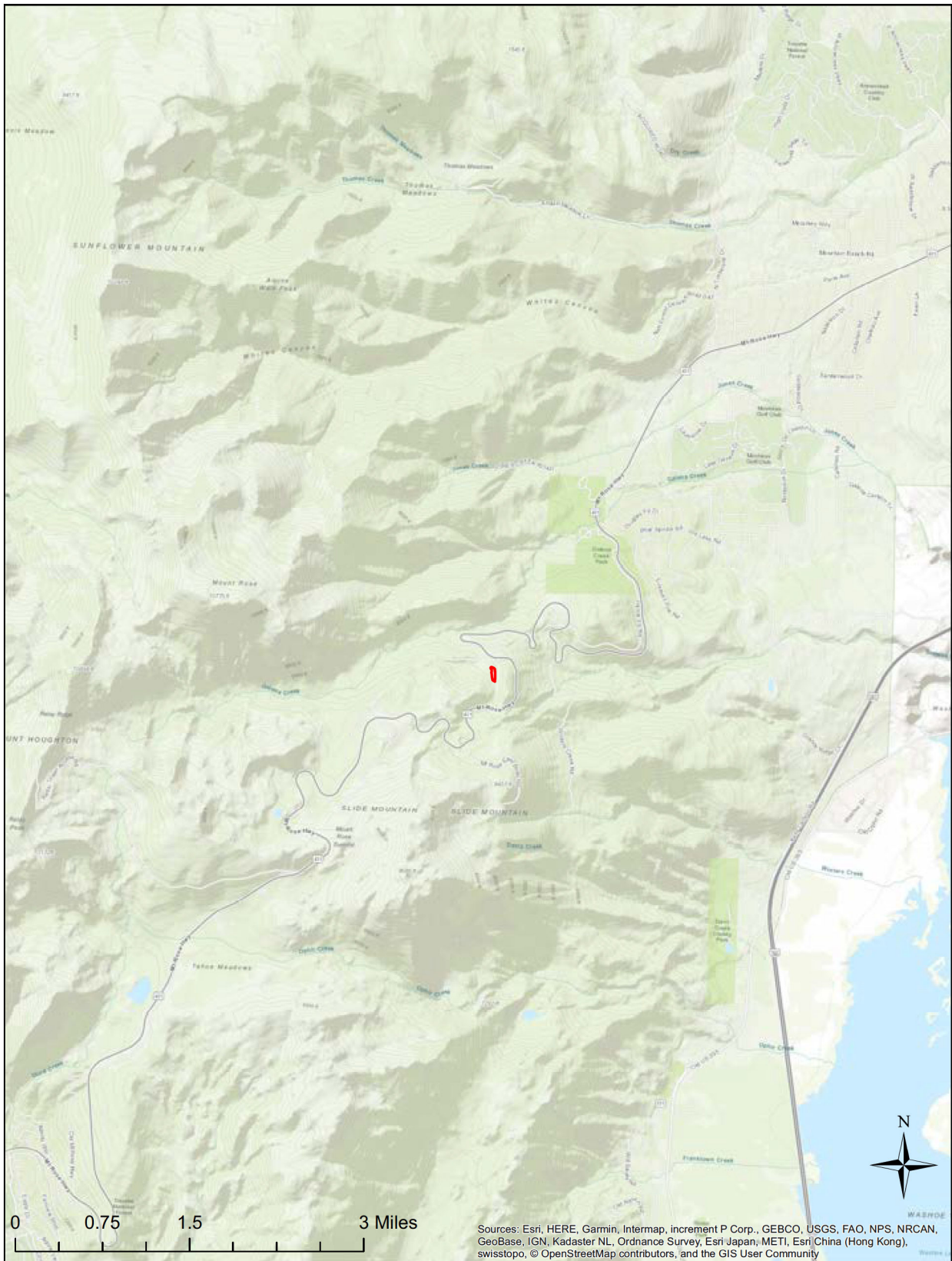
Interior.

_____. 2018. National Hydrography Geodatabase: The National Map viewer available online at: <https://www.usgs.gov/core-science-systems/ngp/national-hydrography>. Accessed November 2018.

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APPENDIX A

Supporting Maps



Legend

Biological Survey Area

City of Reno

Sky Tavern Wetland Enhancement Project

Project Location and Access
Figure 1

Date: December 17, 2021

Drawn By: DR

Project Number: 1110

Filename: 1110_Figure1_Location



Legend

Biological Survey Area

Vegetation Communities

Rocky Mountain Subalpine-Montane Riparian Woodland

Sierra Nevada Willow Scrub-Shrub

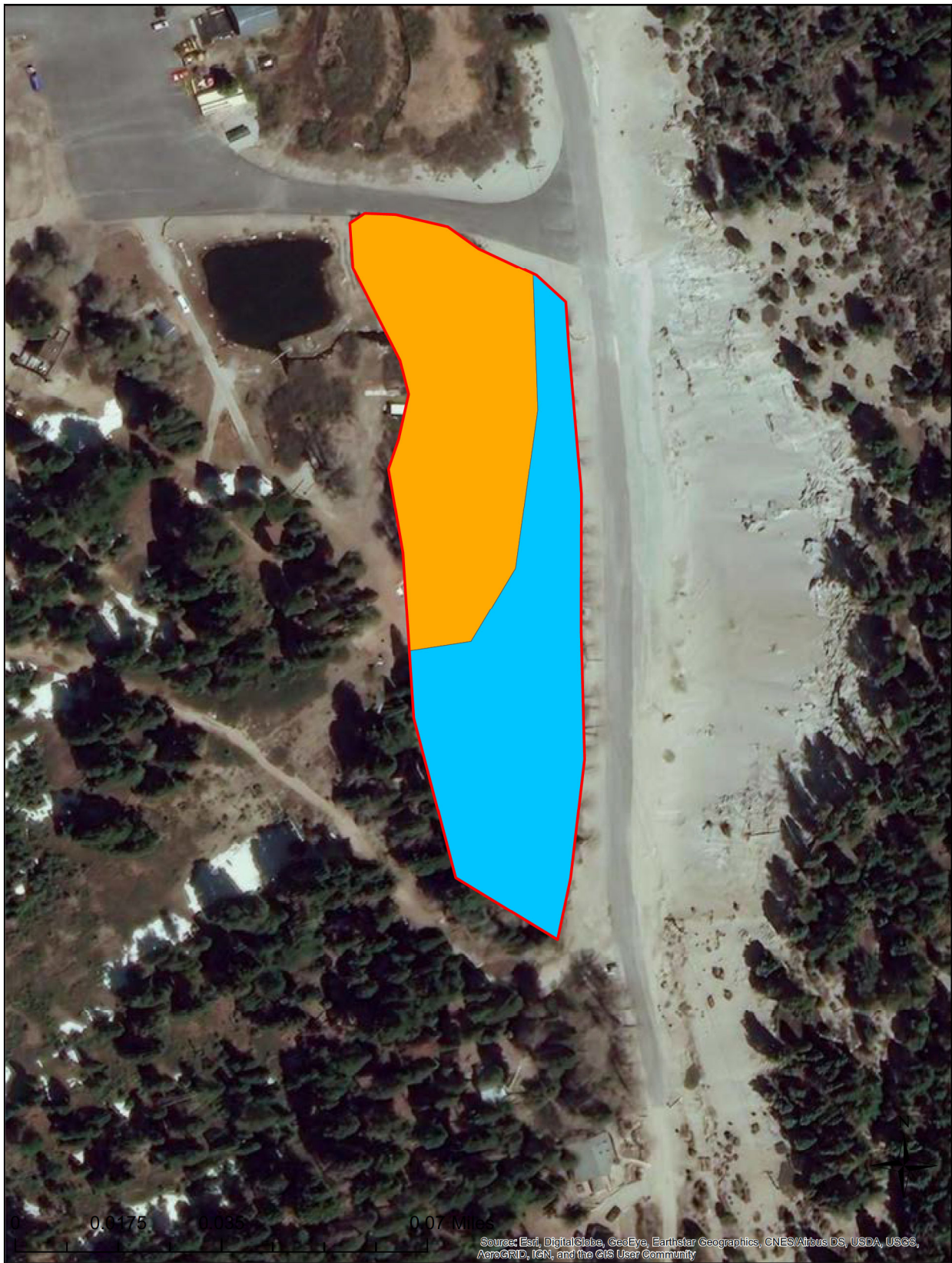
City of Reno




Sky Tavern

Wetland Enhancement Project

Vegetation Communities
Figure 2

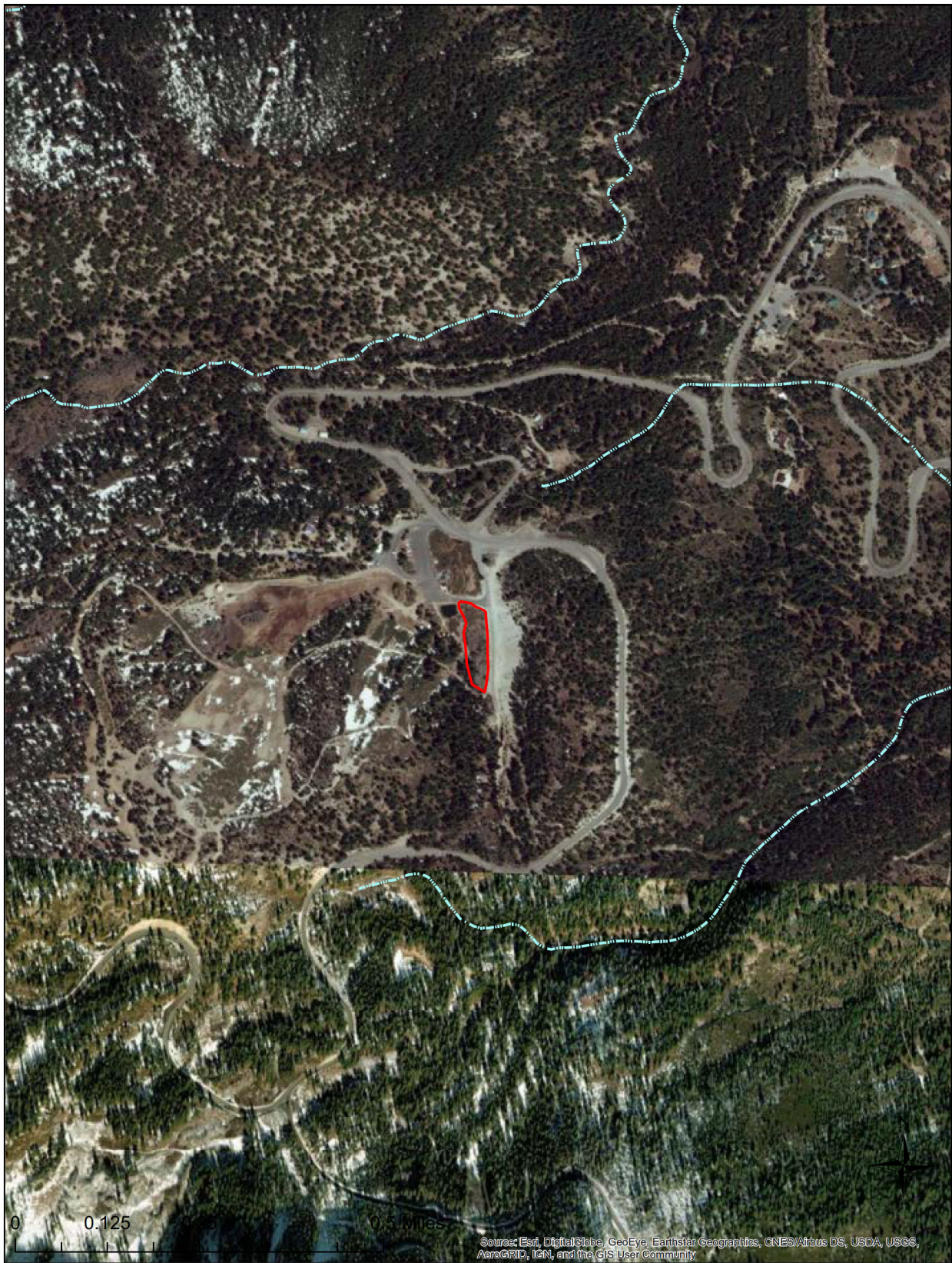
Date: December 17, 2021	Drawn By: DR
Project Number: 1110	
Filename: 1110_Figure2_Vegetation	



Legend	
	Biological Survey Area
Soil Association	
	Graylock-Temo-Rock outcrop
	Tallac very bouldery sandy loam

City of Reno
Sky Tavern
Wetland Enhancement Project
 NRCS Soils
 Figure 3

Date: December 17, 2021	Drawn By: DR
Project Number: 1110	
Filename: 1110_Figure3_Soils	



Legend	
	Biological Survey Area
	Intermittent Streams

City of Reno

Sky Tavern

Wetland Enhancement Project

Hydrology
Figure 4

Date: December 17, 2021	Drawn By: DR
Project Number: 1110	
Filename: 1110_Figure4_Hydro	

APPENDIX B

Aquatic Resources Delineation Map



Legend

- Biological Survey Area
- Channel A

City of Reno

**Sky Tavern
Wetland Enhancement Project**

Aquatic Resources Delineation
Figure 5

Date: December 17, 2021

Drawn By: DR

Project Number: 1110

Filename: 1110_Figure5_Delineation

APPENDIX C

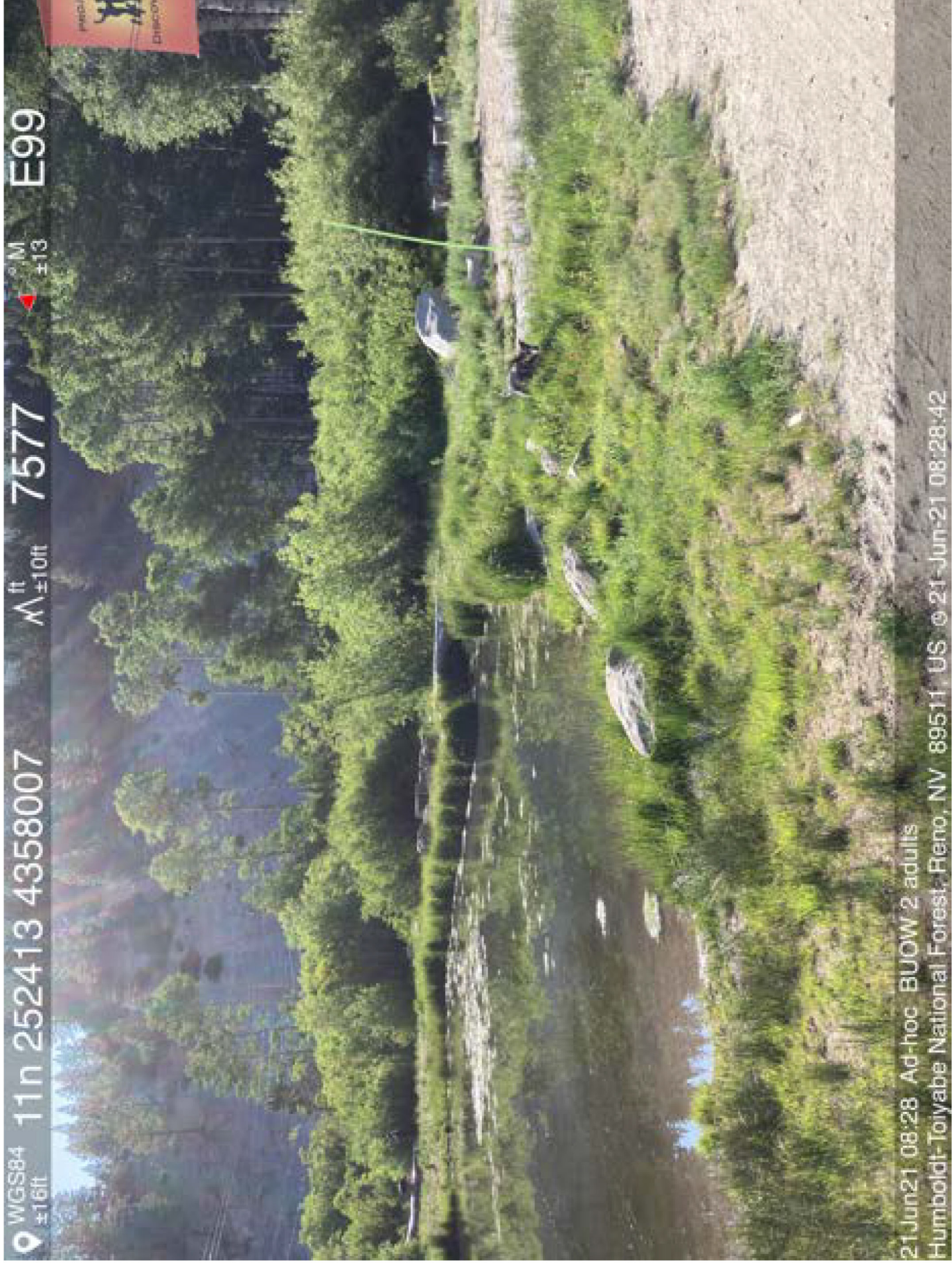
On-Site Photographs

Sky Tavern Wetland Delineation 2021 – Photo Log



Google Earth view from the North facing South.

Sky Tavern Wetland Project Area 2021 as seen from the West overlooking the pond.



Channel Bank Cut Observations



Southern edge as channel comes out of the culvert.



Midway Point in the Channel



Channel transition area of upland and willow shrub



Drainage culvert at the northern end of the project area.

Vegetation Communities



Rocky Mountain Subalpine-Montane Riparian Woodland



Rocky Mountain Subalpine-Montane Riparian Woodland



Sierra Nevada Willow Scrub-Shrub



Sierra Nevada Willow Scrub-Shrub

Soil Pit Observations



Pit about 4 ft from the stream channel.
Approximately 2 ft deep. No ground water
Found at the stream depth.



Fine to course sand in the pit. Slight color change in the soil. Little to no oxidation observed.

APPENDIX D

OHWM Data Sheets

Project: Sky Tavern Wetland Enhancement Date: 8/5/2021

Location: 2130 Mount Rose Hwy Reno NV 89511 Investigator(s): Michael Robison

Project Description: The Sky Tavern board of directors proposes to use this area as a wetland enhancement project as mitigation for another project on site.

Describe the river or stream's condition (disturbances, in-stream structures, etc.):

The stream enters the project area at the southern edge through a culvert and exits through a culvert on the north edge and a gate that feeds into a pond just west of the project.

Off-site Information

Remotely sensed image(s) acquired? Yes No [If yes, attach image(s) to datasheet(s) and indicate approx. locations of transects, OHWM, and any other features of interest on the image(s); describe below] Description:

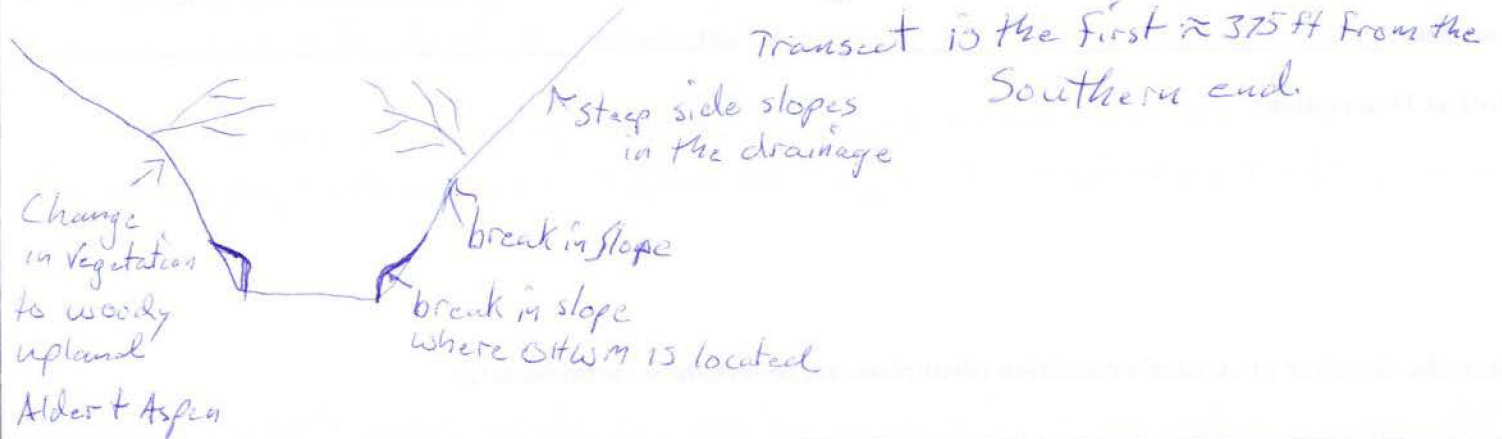
Hydrologic/hydraulic information acquired? Yes No [If yes, attach information to datasheet(s) and describe below.] Description:

List and describe any other supporting information received/acquired:

Information for the project was compiled through database searches from the USGS, USFWS Wetland Mapper, ^(NWI) Google Earth, ESRI and location history from the proponent.

Instructions: Complete one cover sheet and one or more datasheets for each project site. Each datasheet should capture the dominant characteristics of the OHWM along some length of a given stream. Complete enough datasheets to adequately document up- and/or downstream variability in OHWM indicators, stream conditions, etc. Transect locations can be marked on a recent aerial image or their GPS coordinates noted on the datasheet.

Transect (cross-section) drawing: (choose a location that is representative of the dominant stream characteristics over some distance; label the OHWM and other features of interest along the transect; include an estimate of transect length)



Break in Slope at OHWM: Sharp ($> 60^\circ$) | Moderate ($30-60^\circ$) | Gentle ($< 30^\circ$) | None

Notes/Description: During this segment of the stream there is a continuous drop in elevation and a narrow, sometimes deep cut (3ft) in the normal slope,

Sediment Texture: Estimate percentages to describe the general sediment texture above and below the OHWM

	Clay/Silt <0.05mm	Sand 0.05 – 2mm	Gravel 2mm – 1cm	Cobbles 1 – 10cm	Boulders >10cm	Developed Soil Horizons (Y/N)
Above OHWM	20	60	20			Y
Below OHWM	10	30	60			N

Notes/Description: Within the channel there is sediment sorting and collection of erosion sediment. There is little to no sign of oxidation within the wall cuts in the channel. Lots of woody debris is found in the channel.

Vegetation: Estimate absolute percent cover to describe general vegetation characteristics above and below the OHWM

	Tree (%)	Shrub (%)	Herb (%)	Bare (%)
Above OHWM	75	15	40	
Below OHWM	5	0	25	70

Notes/Description: This segment of the stream has very little vegetation within the active channel. There is nearly 100% canopy cover from the surrounding trees.

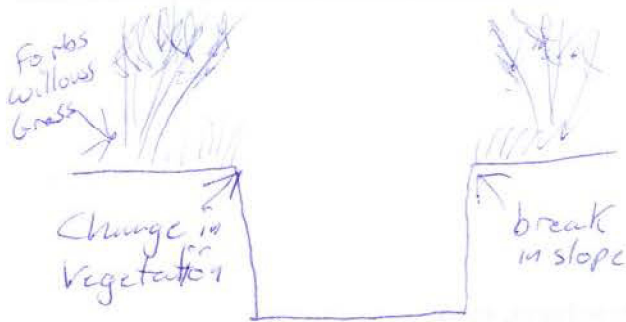
Other Evidence: List/describe any additional field evidence and/or lines of reasoning used to support your delineation

Project: SKy Tavern Wetland EnhancementDate: 8/5/2021Location: 21130 Mount Rose Hwy, Reno NV 89511Investigator(s): Michael Robinson**Project Description:****Describe the river or stream's condition (disturbances, in-stream structures, etc.):****Off-site Information****Remotely sensed image(s) acquired?** Yes No [If yes, attach image(s) to datasheet(s) and indicate approx. locations of transects, OHWM, and any other features of interest on the image(s); describe below] Description:**Hydrologic/hydraulic information acquired?** Yes No [If yes, attach information to datasheet(s) and describe below.] Description:**List and describe any other supporting information received/acquired:**

Instructions: Complete one cover sheet and one or more datasheets for each project site. Each datasheet should capture the dominant characteristics of the OHWM along some length of a given stream. Complete enough datasheets to adequately document up- and/or downstream variability in OHWM indicators, stream conditions, etc. Transect locations can be marked on a recent aerial image or their GPS coordinates noted on the datasheet.

Transect (cross-section) drawing: (choose a location that is representative of the dominant stream characteristics over some distance; label the OHWM and other features of interest along the transect; include an estimate of transect length)

This section is the northern 326ft of the project area. This section is almost level with a gentle slope that leads to continuous flows through the narrow 2-4ft channel.



Break in Slope at OHWM: Sharp (> 60°) | Moderate (30-60°) | Gentle (< 30°) | None

Notes/Description: The channel has nearly vertical edges, with some areas undercut.

Sediment Texture: Estimate percentages to describe the general sediment texture above and below the OHWM

	Clay/Silt <0.05mm	Sand 0.05 - 2mm	Gravel 2mm - 1cm	Cobbles 1 - 10cm	Boulders >10cm	Developed Soil Horizons (Y/N)
Above OHWM	20	60	20			
Below OHWM	10	40	50			

Notes/Description: In this section a lot of the erosion sediment gets trapped during high runoff events. The area around the channel consists mostly of sand and gravel mix. It is highly draining soil.

Vegetation: Estimate absolute percent cover to describe general vegetation characteristics above and below the OHWM

	Tree (%)	Shrub (%)	Herb (%)	Bare (%)
Above OHWM	15	30	40	15
Below OHWM	0	0	30	70

Notes/Description: Some vegetation is observed within the stream in this section

Other Evidence: List/describe any additional field evidence and/or lines of reasoning used to support your delineation

APPENDIX E

Wetland Delineation Data Sheet

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Sky Tavern City/County: Rego Sampling Date: 8/5/2021
 Applicant/Owner: Sky Tavern State: NV Sampling Point: _____
 Investigator(s): M. Robison, D. Robison Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): _____
 Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____
 Soil Map Unit Name: _____ NWI classification: _____
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No _____ (If no, explain in Remarks.)
 Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes N No _____
 Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No _____	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No _____
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No _____	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No _____	
Remarks: <u>Wetland conditions present within the stream channel. Outside of channel is uplands.</u>			

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>Populus tremuloides</u>	<u>60</u>	<u>Y</u>	<u>FACUP</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>5</u> (A)
2. <u>Salix lemmonii</u>	<u>5</u>	<u>N</u>	<u>FACW</u>	Total Number of Dominant Species Across All Strata: <u>6</u> (B)
3. <u>Salix lucida</u>	<u>25</u>	<u>Y</u>	<u>FACW</u>	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>83%</u> (A/B)
4. <u>Alnus incana incana</u>	<u>10</u>	<u>Y</u>	<u>FACW</u>	
	<u>90</u>	= Total Cover		
Sapling/Shrub Stratum (Plot size: _____)				
1. _____				Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <u>30</u> x 1 = <u>30</u> FACW species <u>20</u> x 2 = <u>140</u> FAC species <u>10</u> x 3 = <u>30</u> FACU species <u>65</u> x 4 = <u>260</u> UPL species <u>0</u> x 5 = _____ Column Totals: <u>175</u> (A) <u>460</u> (B) Prevalence Index = B/A = <u>2.6</u>
2. _____				
3. _____				
4. _____				
5. _____				
		= Total Cover		
Herb Stratum (Plot size: _____)				
1. <u>Equisetum arvense</u>	<u>10</u>	<u>Y</u>	<u>FAC</u>	Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> 2 - Dominance Test is >50% <input checked="" type="checkbox"/> 3 - Prevalence Index is ≤3.0' _____ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) _____ 5 - Wetland Non-Vascular Plants ¹ _____ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
2. <u>Juncus acrotrichus</u>	<u>5</u>	<u>N</u>	<u>FACW</u>	
3. <u>Carex nebrascensis</u>	<u>25</u>	<u>Y</u>	<u>OBL</u>	
4. <u>Carex utriculata</u>	<u>5</u>	<u>N</u>	<u>OBL</u>	
5. <u>Agrostis stolonifera</u>	<u>25</u>	<u>Y</u>	<u>FACW</u>	
6. <u>Phleum pratense</u>	<u>5</u>	<u>N</u>	<u>FACUP</u>	
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
	<u>75</u>	= Total Cover		
Woody Vine Stratum (Plot size: _____)				
1. _____				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No _____
2. _____				
		= Total Cover		
% Bare Ground in Herb Stratum _____				
Remarks: _____				

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 7/1	90	Red	10	RM	PL	sand	Redox crand roots

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

<input type="checkbox"/> Histosol (A1)	<input checked="" type="checkbox"/> Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/> Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)	
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)	
<input checked="" type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)	

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:
 Soil test done in stream channel next to actively running stream
 Soil sand and decomposed granite that appears to cycle regularly with flood events.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)
<input checked="" type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input checked="" type="checkbox"/> Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input checked="" type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)
<input checked="" type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input checked="" type="checkbox"/> Saturation Visible on Aerial Imagery (C9)
<input checked="" type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)
<input checked="" type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)		

Field Observations:

Surface Water Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): 2-4	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Water Table Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): _____	
Saturation Present? (includes capillary fringe)	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches): _____	

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
 Stream present, Hydric vegetation and soils present within stream channels.

APPENDIX F

Plant List

Species Observed within and in the Vicinity of the Sky Tavern Project Area

Scientific Name	Common Name
Trees	
<i>Abies concolor</i>	White fir
<i>Alnus incana</i>	Grey alder
<i>Pinus jeffreyi</i>	Jeffrey pine
<i>Populus tremuloides</i>	Quaking aspen
<i>Salix exigua</i>	Coyote willow
<i>Salix lemmonii</i>	Lemmon's willow
<i>Salix lucida</i>	Shining willow
Shrubs	
<i>Ericameria nauseosa</i>	Rubber rabbitbrush
Forbs	
<i>Achillea millefolium</i>	Common yarrow
<i>Arnica lanceolata</i>	Streambank arnica
<i>Castilleja angustifolia</i>	Desert Indian paintbrush
<i>Chenopodium incanum</i>	Mealy goosefoot
<i>Cirsium vulgare</i> ¹	Bull thistle
<i>Cistanthe monosperma</i>	Common pussypaws
<i>Conium maculatum</i>	Poison hemlock
<i>Descurainia pinanta</i>	Pinnate tansy mustard
<i>Epilobium ciliatum</i>	Fringed willowherb
<i>Eriogonum ovalifolium</i>	Cushion buckwheat
<i>Equisetum arvense</i>	Common horsetail
<i>Gayophytum racemosum</i>	Racemed groundsmoke
<i>Gnaphalium palustre</i>	Western marsh cudweed
<i>Erodium cicutarium</i>	Red-stem stork's bill
<i>Gypsophila scorzonifolia</i>	Garden babysbreath
<i>Maianthemum racemosum</i>	False Solomon's seal
<i>Mimulus guttatus</i>	Seep monkeyflower
<i>Potentilla gracilis</i>	Slender cinquefoil
<i>Pterospora andromedea</i>	Woodland pinedrops
<i>Rumex acetosella</i>	Sheep sorrel
<i>Rumex crispus</i>	Curly dock
<i>Taraxicum officinale</i>	Common dandelion
<i>Verbascum thapsus</i>	Common mullein
<i>Veronica americana</i>	American speedwell
<i>Xanthium strumarium</i>	Common cocklebur
Grass	
<i>Agrostis scabra</i>	Rough bentgrass
<i>Agrostis stolonifera</i>	Creeping bentgrass
<i>Carex nebrascensis</i>	Nebraska sedge
<i>Carex utriculata</i>	Northwest Territory sedge

Species Observed within and in the Vicinity of the Sky Tavern Project Area

Scientific Name	Common Name
<i>Elymus trachycaulus</i>	Slender wheatgrass
<i>Juncus arcticus</i>	Baltic rush
<i>Juncus bufonius</i>	Toad rush
<i>Juncus ensifolius</i>	Swordleaf rush
<i>Hordeum jubatum</i>	Foxtail barley
<i>Muhlenbergia richardsonii</i>	Mat muhly
<i>Phleum pratense</i>	Timothy
<i>Poa pratensis</i>	Kentucky bluegrass

¹ Nevada noxious weed species