Encompass
ENGINEERING & SURVEYING

DRAINAGE REPORT

For

Ski Acres Estates Lots 6-11 & 23-24

June 4, 2021

Prepared by:
Ian Dahl

Encompass Engineering Job No. 20264

Prepared For:

Bryce Phillips
Snopass SF Lofts LLC
401 North 36th Street, Suite 201
Seattle, WA 98103

Table of Contents

List of Figures:

Appendix A

I. PROJECT OVERVIEW

Project:	Ski Acres Lots 6-11 & 23-24
Site Address:	538135 Cedar Ln Snoqualmie Pass 548135 Cedar Ln Snoqualmie Pass 398135 Pine Ln Snoqualmie Pass 388135 Pine Ln Snoqualmie Pass 378135 Pine Ln Snoqualmie Pass 408135 Pine Ln Snoqualmie Pass 418135 Pine Ln Snoqualmie Pass 368135 Pine Ln Snoqualmie Pass
Kittitas County Tax Parcel:	538135, 548135, 398135, 388135, 378135, 408135, 418135, 368135
Site Area:	78,639 SF (1.81 Acres)
Zoning District:	LAMIRDs Type 1- Residential

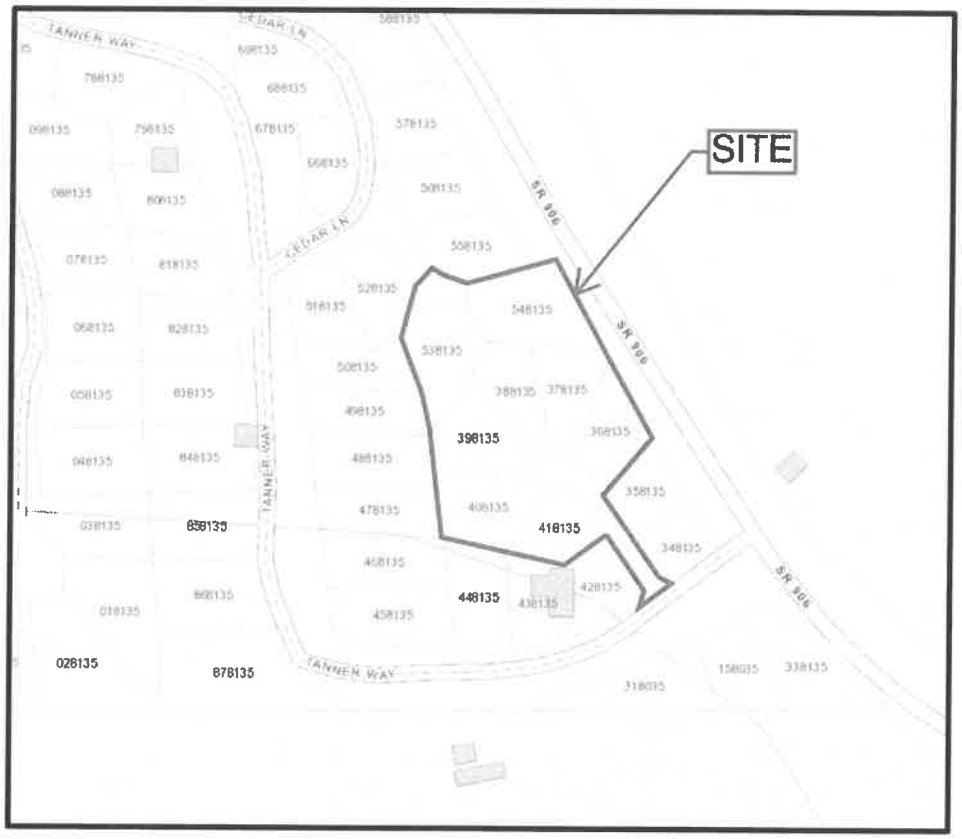


Figure 1: Vicinity Map

Existing Site Conditions:
This project is located in unincorporated Kittitas County on eight lots zoned as LAMIRDs Type 1-Residential located near Snoqualmie Pass, Washington. The site is located on the north side of Tanner Way, adjacent to a gravel parking area near the Silver Fir Lodge at the Summit at Snoqualmie ski resort. All of the lots are undeveloped, and currently in a forested condition. Slopes on the site are steep in some locations, ranging from 5-50% with a high point located in the central portion of the site.

Stormwater on the project site leaves the site in three drainage basins which converge within ¼ mile downstream. Runoff from the western portion of the site enters Tunnel Creek in a forested ravine and flows off-site to the south through two 36" culverts. Runoff from the central and northeastern portion of the site is collected in a small seasonal stream and enters a 24" concrete culvert which flows off-site to the east under SR 906 and eventually enters Coal Creek. Runoff from the southeastern portion of the site sheet flows onto a gravel parking area, and eventually enters Tunnel Creek. For more information on the existing downstream drainage patterns of the site, see Section III of this report.

Soils: The soils on site have been classified by the United States Geological Survey (USGS) Web Soils Survey as Chinkmin ashy sandy loam, 5 to 30 percent slopes (see Figure 2 below).

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
187	Chinkmin ashy sandy loam, 5 to 30 percent slopes	1.5	100.0%
Totals for Area of Interest		**1.5**	**100.0%**

Figure 2: Soils Map and Legend

Developed Site Conditions:
This project proposes the construction of single-family residences on each of the eight lots, as well as associated clearing and grading. The six lots on the southern portion of the site will be accessed by a new residential road, Pine Lane, which will connect to Tanner Way at the southern limit of the site. The two lots on the northern portion of the site will be accessed from an extension of Cedar Lane, an existing residential road just to the north of the site. Impervious surfaces include 9,856 SF of rooftop, 3,718 SF of driveway, 8,265 SF of roadway. The total proposed impervious surface is 21,839 SF.

Stormwater runoff from driveways on the six southern lots as well as the paved roadway on Pine Lane with be collected and conveyed to a water quality treatment vault, before being released into an existing 36" storm culvert near Tanner Way. Stormwater runoff from the proposed rooftop areas will be mitigated with the use of gravel filled infiltration trenches under the driplines of the residences. A Postdeveloped Basin Map is provided as Figure 4 at the end of this Chapter.

SILVER FIR

SW 1/4 OF SE 1/4 OF SECTION 9, T. 22 N., R. 11 E., W.M.
KITTITAS COUNTY, STATE OF WASHINGTON

EXISTING CONDITIONS AREAS

PERVIOUS =	78,639 SF
TOTAL SITE AREA =	78,639 SF (1.81 AC)

PREDEVELOPED MODELED AREA

PERVIOUS (WOODS) =	1.81 AC
TOTAL AREA=	1.81 AC

KITTITAS COUNTY
APPROVED FOR CONSTRUCTION
THESE PLANS HAVE BEEN REVIEWED BY KITTITAS COUNTY DEPARTMENT OF PUBLIC WORKS AND HAVE BEEN ACCEPTED FOR COMPLYING WITH THE REQUIREMENTS OF KITTITAS COUNTY.

DIRECTOR OF PUBLIC WORKS　　DATE

811
Know what's below.
Call before you dig.

REVISIONS

DESCRIPTION	BY	DATE

© THE PLANS SET FORTH ON THIS SHEET ARE AND SHALL REMAIN THE PROPERTY OF ENCOMPASS ENGINEERING & SURVEYING

COSTA PHILIPPIDES
STATE OF WASHINGTON
PROFESSIONAL ENGINEER
6/04/21

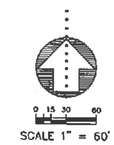
SILVER FIR
FIGURE 3
PREDEVELOPED CONDITIONS MAP

Encompass
ENGINEERING & SURVEYING
Western Washington Division
165 NE Juniper Street, Suite 201 • Issaquah, WA 98027 • Phone: (425) 392-0250
Eastern Washington Division
407 Swiftwater Blvd. • Cle Elum, WA 98922 • Phone: (509) 674-7433

JOB NO.	20264
DATE	6/04/21
SCALE	1"=60'
DESIGNED	ID
DRAWN	TNF
CHECKED	CP
APPROVED	CP
SHEET	1 OF 1

SILVER FIR

SW 1/4 OF SE 1/4 OF SECTION 9, T. 22 N., R. 11 E., W.M.
KITTITAS COUNTY, STATE OF WASHINGTON



POSTDEVELOPED CONDITIONS AREAS

ROOFTOP=	9,858 SF
DRIVEWAY=	3,718 SF
ROADWAY=	8,265 SF
PERVIOUS =	56,800 SF
TOTAL SITE AREA =	78,639 SF (1.81 AC)

POSTDEVELOPED MODELED AREA

PERVIOUS (WOODS/GRASS COMB) =	1.30 AC
ROOFTOP=	0.23 AC
DRIVEWAY=	0.09 AC
ROADWAY=	0.19 AC
TOTAL AREA=	1.81 AC

KITTITAS COUNTY
APPROVED FOR CONSTRUCTION
THESE PLANS HAVE BEEN REVIEWED BY KITTITAS COUNTY DEPARTMENT OF PUBLIC WORKS AND HAVE BEEN ACCEPTED FOR COMPLYING WITH THE REQUIREMENTS OF KITTITAS COUNTY.

DIRECTOR OF PUBLIC WORKS DATE

811 Know what's below. Call before you dig.

REVISIONS		
DESCRIPTION	BY	DATE

COSTA PHILIPPIDES, STATE OF WASHINGTON, PROFESSIONAL ENGINEER
8/04/21

SILVER FIR
FIGURE 4
POSTDEVELOPED CONDITIONS MAP

Encompass ENGINEERING & SURVEYING
Western Washington Division
165 NE Juniper Street, Suite 201 • Issaquah, WA 98027 • Phone: (425) 392-0250
Eastern Washington Division
407 Swiftwater Blvd. • Cle Elum, WA 98922 • Phone: (509) 674-7433

JOB NO.	20264
DATE	6/04/21
SCALE	1"=60'
DESIGNED	JD
DRAWN	TNF
CHECKED	CP
APPROVED	CP
SHEET	1 OF 1

II. CORE ELEMENTS

The 2019 Stormwater Management Manual for Eastern Washington (SWMMEW) was used to determine and address the eight core elements.

Core Elements

Core Element #1: Preparation of a Stormwater Site Plan

This Drainage Report, in addition to the Silver Fir Civil Plans complete the Stormwater Site Plan (SSP) in accordance with Chapter 3 of the SWMMEW.

Core Element #2: Construction Stormwater Pollution Prevention

A Construction Stormwater Pollution Prevention Plan (SWPPP) in accordance with Chapter 7 of the SWMMEW will be prepared and submitted under separate cover prior to final approval.

Core Element #3: Source Control of Pollution

Source control BMP's have been selected and included with an Operation and Maintenance Manual in accordance with Chapter 8 of the SWMMEW.

Core Element #4: Preservation of Natural Drainage Systems

Runoff from the proposed development will follow natural drainage patterns and discharge at the predeveloped locations. Stormwater on the project site leaves the site in three drainage basins which converge within ¼ mile downstream. For more information on the existing downstream drainage patterns of the site, see Section III of this report.

Core Element #5: Runoff Treatment

Runoff from 5,865 SF of proposed roadway surface on Pine Lane and 3,013 SF of driveway from the southern six lots will be conveyed to a water quality treatment vault before being released to the existing 36" storm culvert located at the intersection of Pine Ln and Tanner Way. The sizing of this vault will utilize the Water Quality Design Flow Rate as described in Section 2.7.6 of the SMMEW.

Core Element #6: Flow Control

Flow control for rooftop areas will be provided with the use of infiltration trenches located under roof driplines per BMP F6.22 of the 2019 SMMEW. As this project was previously platted for the development of Pine Lane and the extension of Cedar Lane, runoff from these road areas is proposed to discharge directly to their respective natural discharge locations. See Section IV of this Drainage Report for further discussion.

Core Element #7: Operation and Maintenance

An Operation and Maintenance manual will be included with final engineering and will be attached as Appendix A.

Core Element #8: Local Requirements

A snow storage plan is required by the Kittitas County and will been included in the Civil planset.

I. OFF-SITE ANALYSIS

An offsite analysis, per Appendix 3-A of the SWMMEW, has been prepared for the project and is included in this section. The property is located in the Keechelus Lake Drainage Basin, in the Upper Yakima Watershed, and contains three individual drainage basins on-site. A Predeveloped Basin Map is included as Figure 4.

Task 1: Define and Map the Study Area

The area of analysis extends from the site discharge points at the eastern and southern limits of the site to approximately a quarter-mile downstream where Tunnel Creek converges with Coal Creek. A Downstream Map is provided as Figure 5 below.

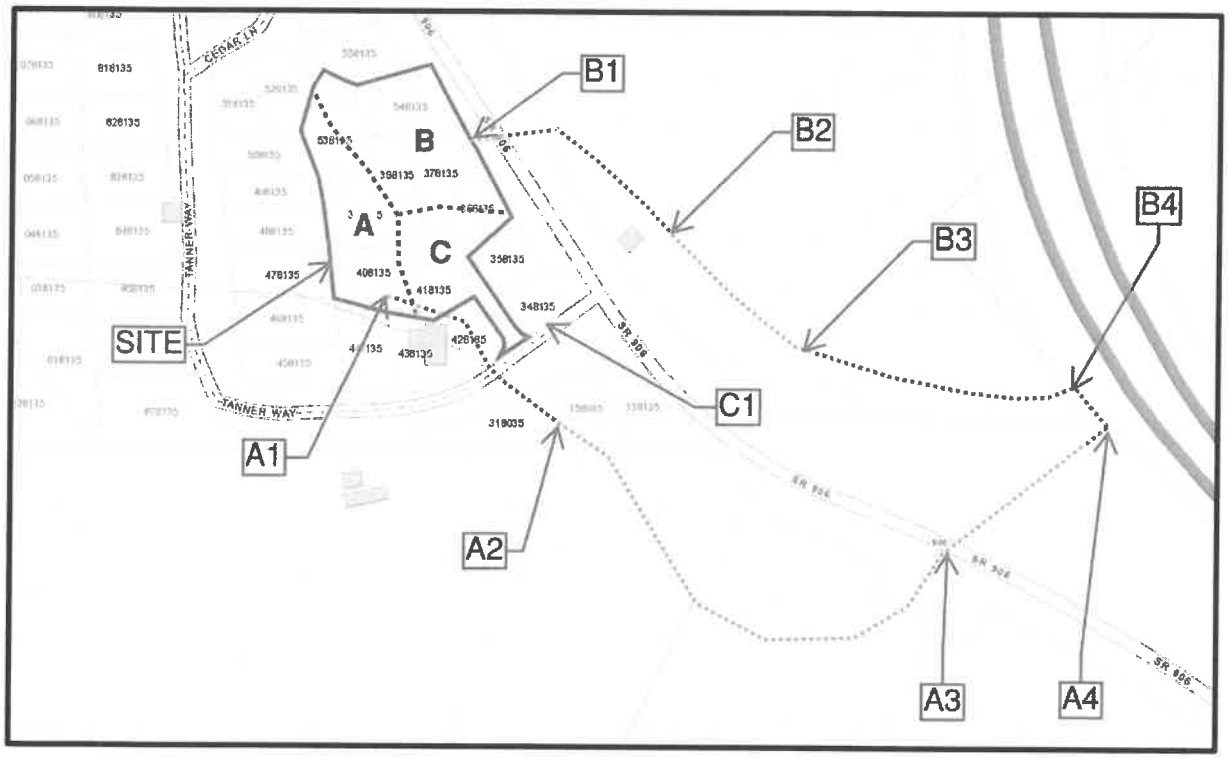


Figure 5: Downstream Map

Task 2: Review All Available Information on the Study Area

Kittitas County COMPAS as well as USGS topographic maps have been reviewed to identify downstream drainage patterns, critical areas, and other relevant information. Tunnel Creek runs through a portion of the site in its southwest corner. No other mapped critical areas were identified.

Task 3: Field Inspect the Study Area

A field inspection was performed by Encompass Engineering & Surveying on Wednesday June 2nd, 2021. The analysis was performed at approximately 9:00 AM under clear conditions with a temperature of about 75°. Soil conditions were observed to be moderately wet in spots, with some snow still remaining on the site. Information collected during this study is included in the Task 4 system description.

Task 4: Describe the Drainage System

Runoff leaves the site in three separate drainage basins, which converge in under ¼ mile downstream. Runoff from Basin A generally sheet flows to the south and west towards Tunnel Creek, which runs through the southwest corner of the site. At a low point in the topography, Tunnel Creek enters two 36" CMP culverts (A1) which conveys the creek off-site to the southeast under Tanner Way and a gravel parking area. The culverts discharge on the south side of the parking area, and the creek continues to the south (A2). At approximately 600 feet downstream of the site, Tunnel Creek converges with Hyak Creek, and the combined creek turns to the northeast and crosses under a bridge on SR 906 (A3). The creek flows to the northeast for another 300 feet before converging with Coal Creek, just to the west of I-90. This is where runoff from Basin A converges with Basin B, at just under ¼ mile downstream of the site.

Runoff from Basin B leaves the eastern portion of the site in a small seasonal stream in a forested ravine. The stream enters a 24" Concrete culvert (B1) and flows to the southeast under SR 906 where it discharges on the east side of the roadway. The stream flows to the south for approximately 250 feet, where it enters an almost completely buried 18" CMP culvert (B2) and flows to the south under a gravel parking area. The culvert discharges south of the parking area, and the stream continues to flow to the south and southeast (B3). This area was not accessible by foot, so the stream was assumed to follow natural contours and deposit into Coal Creek (B4), just upstream of its confluence with Tunnel Creek.

Runoff from Basin C sheet flows down steep slopes on the southeast portion of the site and deposits onto a gravel parking area (C1) near the intersection of SR 906 and Tanner Way, or a roadside ditch along the west side of SR 906 which deposits into the same gravel parking area. No drainage features were identified in this area, and ponding of stormwater likely occurs during storm events. Stormwater will eventually reach the southern side of the parking area, and follow natural features towards Tunnel Creek.

Off-site Analysis Drainage System Table

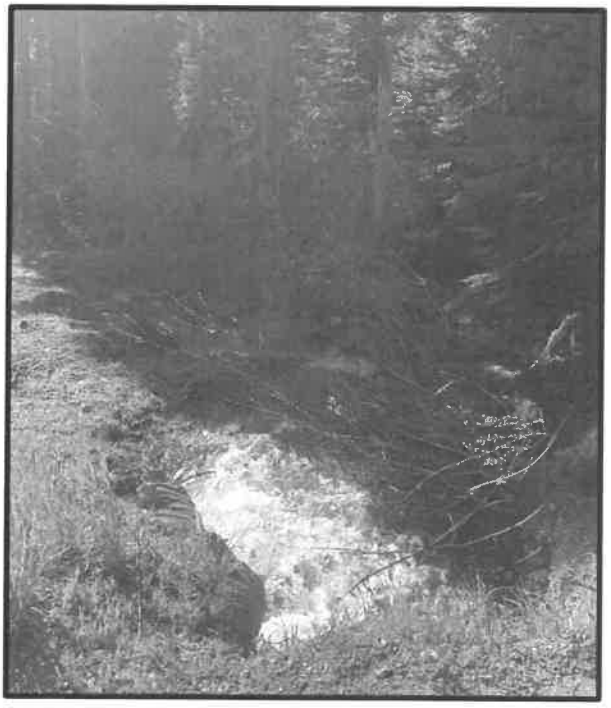
BASIN:	Keechelus Lake		**SUBBASIN NAME:**		Basin A	**SUBBASIN NUMBER:**	N/A
SYMBOL	DRAINAGE COMPONENT TYPE, NAME, AND SIZE	DRAINAGE COMPONENT DESCRIPTION	SLOPE	DISTANCE FROM SITE DISCHARGE	EXISTING PROBLEMS	POTENTIAL PROBLEMS	OBSERVATIONS OF FIELD INSPECTOR, RESOURCE REVIEWER, OR RESIDENT
(See map)	Type: sheet flow, swale, stream, channel, pipe, pond; Size: diameter, surface area	Drainage basin, vegetation, cover, depth, type of sensitive area, volume	%	1/4 Mile = 1,320 ft	Constrictions, under capacity, ponding, overtopping, flooding, habitat or organism destruction, scouring, bank sloughing, sedimentation, incision, other erosion		Tributary area, likelihood of problem, overflow pathways, potential impacts
A1	2 CULVERTS	36" CMP	3%	DISCHARGE POINT	NONE	NONE	
A2	CREEK	TUNNEL CREEK	5-25%	200'	NONE	NONE	

A3	BRIDGE	TUNNEL CREEK FLOWS UNDER SR 906	5%	1000'	NONE	NONE	
A4	CREEK	CONFLUENCE OF TUNNEL AND COAL CREEK	5%	1300'	NONE	NONE	

BASIN:	Keechelus Lake		**SUBBASIN NAME:**		Basin B	**SUBBASIN NUMBER:**	N/A
SYMBOL	DRAINAGE COMPONENT TYPE, NAME, AND SIZE	DRAINAGE COMPONENT DESCRIPTION	SLOPE	DISTANCE FROM SITE DISCHARGE	EXISTING PROBLEMS	POTENTIAL PROBLEMS	OBSERVATIONS OF FIELD INSPECTOR, RESOURCE REVIEWER, OR RESIDENT
(See map)	Type: sheet flow, swale, stream, channel, pipe, pond; Size: diameter, surface area	Drainage basin, vegetation, cover, depth, type of sensitive area, volume	%	1/4 Mile = 1,320 ft	Constrictions, under capacity, ponding, overtopping, flooding, habitat or organism destruction, scouring, bank sloughing, sedimentation, incision, other erosion		Tributary area, likelihood of problem, overflow pathways, potential impacts
B1	CULVERT	24" CONCRETE	2%	DISCHARGE POINT	NONE	NONE	
B2	CULVERT	18" CMP	5%	275'	INLET ALMOST COMPLETELY BURIED	FURTHER BLOCKAGE	
B3	STREAM	UNNAMED	5-25%	400'	NONE	NONE	
B4	CREEK	COAL CREEK	2-5%	900'	NONE	NONE	

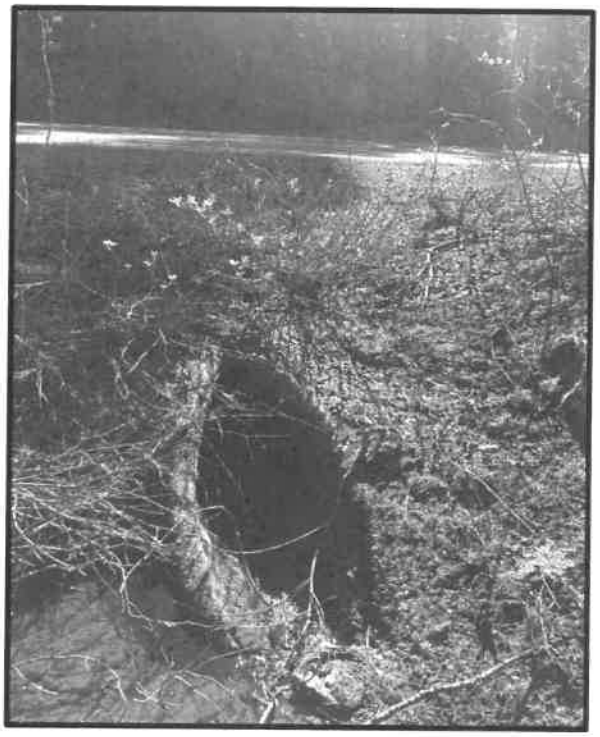
BASIN:	Keechelus Lake		**SUBBASIN NAME:**		Basin C	**SUBBASIN NUMBER:**	N/A
SYMBOL	DRAINAGE COMPONENT TYPE, NAME, AND SIZE	DRAINAGE COMPONENT DESCRIPTION	SLOPE	DISTANCE FROM SITE DISCHARGE	EXISTING PROBLEMS	POTENTIAL PROBLEMS	OBSERVATIONS OF FIELD INSPECTOR, RESOURCE REVIEWER, OR RESIDENT
(See map)	Type: sheet flow, swale, stream, channel, pipe, pond; Size: diameter, surface area	Drainage basin, vegetation, cover, depth, type of sensitive area, volume	%	1/4 Mile = 1,320 ft	Constrictions, under capacity, ponding, overtopping, flooding, habitat or organism destruction, scouring, bank sloughing, sedimentation, incision, other erosion		Tributary area, likelihood of problem, overflow pathways, potential impacts
C1	SHEET FLOW	GRAVEL DRIVEWAY	0-2%	DISCHARGE POINT	LOW POINT WITH NO OUTLET	PONDING	NO DRAINAGE FEATURES FOUND IN GRAVEL LOT

Element A1: Tunnel Creek enters two 36" CMP Culverts



Element A2: CMP culverts discharge to Tunnel Creek

Element A3: Tunnel Creek passes below SR 906 bridge



Element B1: Seasonal creek enters 24" concrete culvert under SR 906

Element B2: Creek enters partially buried 18" CMP culvert

Element C1: Flat gravel parking area at intersection of Tanner Way and SR 906

IV. FLOW CONTROL ANALYSIS AND DESIGN

Flow control for the 9,856 SF rooftop areas on the project site will be provided through the use of gravel filled infiltration trenches. As rooftops in this area do not utilize gutters or downspouts due to the large quantity of snow during winter months, runoff from roof areas will sheet flow directly onto the trench beneath the dripline of the roof overhang and infiltrate into underlying soils. The geotechnical engineering report for the site is not available at this time; therefore, infiltration trenches have not been sized with design infiltration rates. Autodesk Storm & Sanitary Sewer Analysis (SSA) stormwater modeling software will be used to size infiltration facilities for a final design.

As this project was previously platted for the development of Pine Lane and the extension of Cedar Lane, runoff from these road areas is proposed to discharge directly to their respective natural discharge locations. Runoff from Pine Lane and associated driveways will be collected and conveyed to a Type 2 Catch Basin which will discharge to an existing 36" CMP culvert after passing through a water quality vault. Site restrictions such as steep slopes and limited usable area make the installation of a flow control facility in this location infeasible. Runoff from the extension of Cedar Lane and associated driveways will be collected and conveyed to a low point in the topography, where runoff will flow towards the existing 24" concrete culvert on the eastern limit of the site. Flow control facilities for this road area are also infeasible due to site restrictions such as steep slopes and limited usable area.

Conveyance:
Conveyance calculations for proposed storm pipes will provided with Final Engineering.

Appendix A

Operation and Maintenance Manual