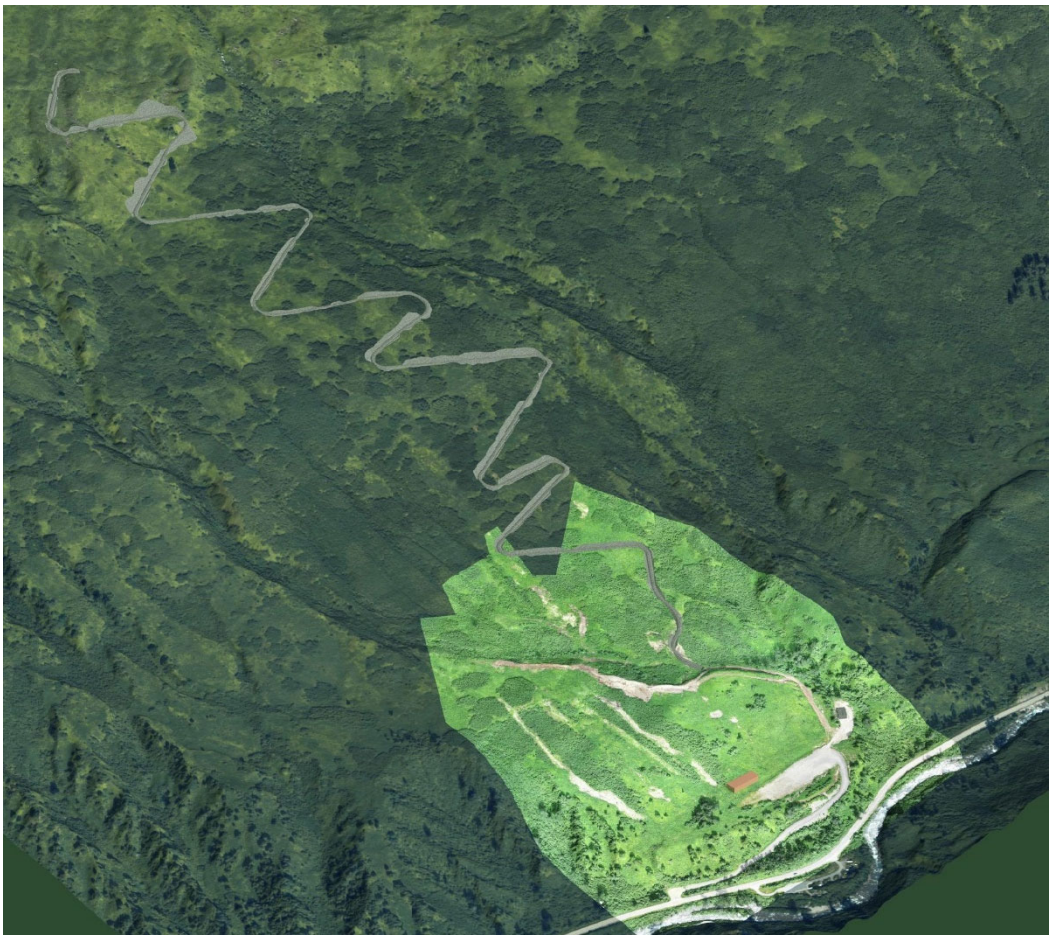
HATCHER ALPINE XPERIENCE
SKEETAWK SKI AREA PROJECT



Apex Engineering

ENGINEERING REPORT

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Table of Contents

Introduction

The Skeetawk Ski Area Project is a proposed ski area and lodge at milepost 10.6 of Palmer-Fishhook Road. Hatcher Alpine Xperience (HAX) is a non-profit that was formed with the goal to bring skiing to the Wasilla and Palmer, Alaska area. Skeetawk Ski Area (SSA) will be constructed per the permission of the land owner, Matanuska-Susitna Borough. When it is complete, the new ski area will have three chair lifts; a triple chair serving beginner runs (phase 1A), a high-speed quad chair with more intermediate runs (phase 1B), and a peak chair with intermediate-to-advanced runs (phase 2). The maintenance road for the "beginner" chair was constructed in 2018 and is approximately 1,250 feet long with 300 feet of vertical gain. The triple chair lift is expected to be completed by the fall of 2019 in time for the winter 2019-20 season. Initial facilities for the first season will consist of standalone restrooms and a yurt acting as a day lodge. The high-speed quad chair lift covering approximately 1200 feet of vertical gain is expected to be constructed during summer 2020 in time for the 2020-21 winter season. Additionally, HAX is in the early planning stages for a three-story lodge that will include administrative offices, a mechanical room, ski tuning shop, restaurant, rentals, and a bar. This report includes the design for the maintenance road for the intermediate chair phase 1B of construction, and a water and wastewater system for patrons of the future lodge.

Water

Unlike the yurt, the future lodge will require running water, so a water source to supply potable water to patrons and other operations needs to be determined. Because the ski area is located outside of any public water distribution service areas, an onsite source is required. A surface water system would provide water using nearby creeks or lakes, while a well water system would be drilled into the ground, tapping a natural aquifer and lastly the least preferred option would be hauling water from the nearest filling station. At the request of HAX, the preferred water system serving the future three-story lodge was designed based on a ground water (well) source.

A ground water well works by locating an aquifer on site by drilling test wells. The wells are sampled for water quality, depth, pressure, and recharge rate, so finding an ideal well can be a daunting task depending on the project location. Drilling wells also requires constant monitoring of the material being removed to ensure a possible aquifer isn't contaminated by layers above it. To avoid contamination wells are usually sealed at the varying layers with an impermeable material like bentonite clay. A successful well meeting drinking water standards or at least reasonable for treatment is needed to design a well system. In a traditional well system, a well is drilled into an acceptable aquifer, a well casing is installed for the depth of the well and sealed with the bentonite clay, and a submersible pump is dropped down with a stainless-steel screen. Just below the frost line begins the underground service line at the pitiless adapter at the well and piped to the building. Assuming there is adequate pressure and water quality the water can be distributed into the building plumbing systems, if not storage tanks, filters, and other means of treatment may be necessary as well. A flow meter inside the building also ensures the health of an aquifer as well as providing consumption data for use with sizing a wastewater system.

Wastewater

The construction of the lodge will increase the wastewater being generated at SSA thus means for handling the increased volume of wastewater is required. Again, since the ski area is outside of the public sewer collection service area, an onsite wastewater system is required. Onsite systems include anywhere from a traditional septic tank companioned with a gravity (or pumped) absorption field or a stacking system, an expensive prepackaged treatment system, or the least favored option being a sewage holding tank to be hauled off site. Any onsite wastewater system not being hauled off site requires treatment before discharging it into the environment. Per the request of HAX, a conventional onsite system is preferred, with a septic tank for pretreatment and a gravity fed bed-type absorption field for final treatment, was designed to process wastewater for a 150-person restaurant/bar. Conventional onsite systems have two main components: the multi-chambered septic tank and the absorption field. The wastewater exits the building below grade and enters the septic tank for primary treatment. Residence time of wastewater in the septic tank is typically 1-3 days, but varies based on septic tank characteristics and wastewater flows. The septic tank serves to allow solids to settle out of the wastewater, forming a sludge, and oils and greases to rise to the surface of the wastewater as scum. The clarified effluent then exits the septic tank and is conveyed to the absorption bed, where it is distributed throughout the bed by perforated pipes. As the effluent seeps downward through the absorption bed, physical, biological, and chemical processes occur, reducing the microbial and organic components of the wastewater to acceptable levels. The absorption bed completes the final treatment and disposal of the wastewater.

Due to the seasonal high-water table in vicinity of the proposed wastewater treatment area, a curtain drain is required to keep surface water and water runoff outside of the area of the absorption field, and to maintain applicable vertical separation distances from the bottom of the absorption bed to the seasonal high-water table. A curtain drain works by constructing a trench around the area intended to lower the water table and filling it with a course gravel just above the expected ground water level, the water then enters a perforated pipe and carried around the desired area. A permeable layer usually consisting of a geotextile fabric lines the water side of the trench, whereas an impermeable layer such as plastic is lined on the intended dry side of the trench to ensure water stays in the curtain drain. The curtain drain must be constructed at the beginning of the season and checked throughout the summer until the fall to verify its success prior to constructing the absorption bed in the dry area.

Maintenance Road

The primary reason for the maintenance road is to allow for the construction of the high-speed quad chair lift. Upon construction of the high-speed quad chair, the road will serve as a chair lift maintenance access road. Many of the ski trails for the Skeetawk Ski Area have already been cleared and grubbed. Due to SSA high elevation there are no large trees in the area, thus there exist no protected tree zones in the proximity of the maintenance road. The maintenance road is located between ridgelines and avoids areas of streams and water runoff. Skeetawk Ski Area has a current Stormwater Pollution Prevention Plan (SWPPP) for general construction that will need to be updated after the maintenance road design is approved by the Matanuska-Susitna Borough.

Design Basis

Water

The potable water source is a proposed onsite groundwater well, to be located just to the north of the preferred future lodge location. Test wells and well logs for areas within the vicinity of the future lodge were unavailable or have not yet been performed. Assumptions were made as to the location of the well for purposes of this proposed design and applicable separation distances must be verified prior-to and upon construction of the well.

The water system is designed based on the assumed number of fixtures for a three-story lodge consisting of a 50ft x 150ft ground floor with administrative offices, mechanical room, and ski tuning shop; a 50ft x 150ft second floor with restaurant and rentals; and a 50ft x 75ft third floor bar. Fire protection was not accounted for in this design, but a third story by code warrants a sprinkler system and will need to be considered in the design of the lodge. The calculations for the peak instantaneous demand (PID) of the system were calculated using the AWWA M22 Sizing Water Service Lines and Meters Second Edition fixture unit analysis, which can be found in Appendix D - Calculations. The water system constructed must conform to the Alaska Department of Environmental Conservation (ADEC) 18-AAC-80 standards for water quality.

Wastewater

The proposed wastewater treatment is a conventional gravity fed onsite system, with a septic tank for pretreatment and a bed-type absorption field for final treatment. Alaska Department of Environmental Conservation (ADEC) 18-AAC- 72.205 (b) (2) (B) (ii), requires that the system must obtain plan approval before construction, installation, or modification of the system may be carried out, and that it must be prepared and sealed by a registered engineer. DEC 18-AAC-72.020 (j) (1) specifies that the vertical separation between the lowest part of the absorption system and the maximum water table must be at least four feet. The depth of the water table was observed by HAX to be 3 ft below the original grade during seasonal runoff when trenching underground power. In order to construct this absorption system, the system must be mounded above existing grade and a waiver must be obtained for ADEC 18-AAC-72.020 (j) (1) for 2 ft to groundwater table if a curtain drain is not used. ADEC communicated that receiving a waiver can be difficult, so a curtain drain was designed to redirect subsurface water around the absorption field to meet the groundwater table separation requirement.

Daily wastewater flows were estimated from the Onsite Wastewater Treatment Systems (OWTS) Manual by the United States Environmental Protection Agency (USEPA) for a 150-seat restaurant/bar with a maximum of 675 people per day. It was determined that wastewater flows would most closely correlate to those for a bar/cocktail lounge as given in the USEPA, Table 3-4 Typical wastewater flow rates from commercial sources of 3 gal/customer/day. The peak wastewater flow was estimated at 14 gallons per minute by assuming the daily flow occurs in a 12-hour period of operation and applying a peaking factor of 5 to the average flow per minute. Using DEC 18-AAC-72.260 Table B, the application rate was selected to be 0.45 based on soil composition of nearby soil samples in the Subsurface Exploration and Geotechnical Recommendations Report prepared by DOWL HKM in 2010. Soil liquefaction was also

considered in the location of the septic tank and absorption field. Liquefaction occurs when the soil strength decreases partially or fully during an earthquake. Soil liquefaction occurs in areas with high groundwater tables and loose uniform sands. The proposed area of the septic tank and absorption field indicate the likelihood of soil liquefaction to be low. The absorption field and septic tank size calculations were based on the above criteria, which can be found in Appendix D. Buoyancy calculations ensuring the septic tank does not erupt out of the ground during a flooding event or an unusually high seasonal water table were also performed and can also be found in Appendix D.

Maintenance Road

The proposed maintenance road is considered private and not for public use, limiting the construction and design requirements. As a basis for the road design, the design vehicle is a concrete truck (as shown in Appendix E, Design Vehicle). The road was designed to support the design vehicle at ultimate weight (full payload) and the road inclined limited to a maximum grade of 15%. Temporary pull outs will need to be constructed under the lift run areas to create a platform for erecting towers and pumping concrete up or down the slope as well as provide means for the truck to turn around without having to drive the full length. To aid with the roads design the AASHTO – Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT <=400) was utilized. The turning radius was established as 50 foot minimum, 10-foot wide single lane roadway, a minimum 1.5 to 1 side slope dimension, and a speed limit of 15 miles per hour. The vegetation along the road will be cleared and grubbed. At the request of HAX, excavations will generally be limited to 12-24 inches in order to reduce cut and fill volumes. Suitable excavated material containing organics and free of large rocks will be spread along the roadway side slopes and track walked with heavy equipment. All side slopes will be seeded upon completion of the maintenance road for slope stability.

The roadway structural section will include a 12-foot wide geotextile for structural support and to permit the free flow of water. The subbase and surface course will be sourced from a quarry within the Matanuska Susitna Borough and materials will conform to the State of Alaska Department of Transportation and Public Facilities (ADOT&PF) material specifications. One inch minus pit run will be utilized as the roadway subbase and 1” minus E1 material will be used as surface course. To ensure the maintenance road can support the design vehicle, calculations were completed and can be found in Appendix F.

References

AASHTO – Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT <=400)

ADEC - Onsite Wastewater Treatment Systems Manual (OWSIM)

ADEC – 18 AAC 72 Wastewater Disposal Standards 2017

ADEC – 18 AAC 80 Drinking Water Standards 2017

AKDOT&PF Standard Specifications for Highway Construction 2017

AWWA M22 Sizing Water Service Lines and Meters Second Edition

USEPA Onsite Wastewater Treatment Systems Manual 2002

Appendix A: Drawings

HATCHER ALPINE XPERIENCE

HATCHER PASS — ALASKA

PHASE 1B IMPROVEMENTS

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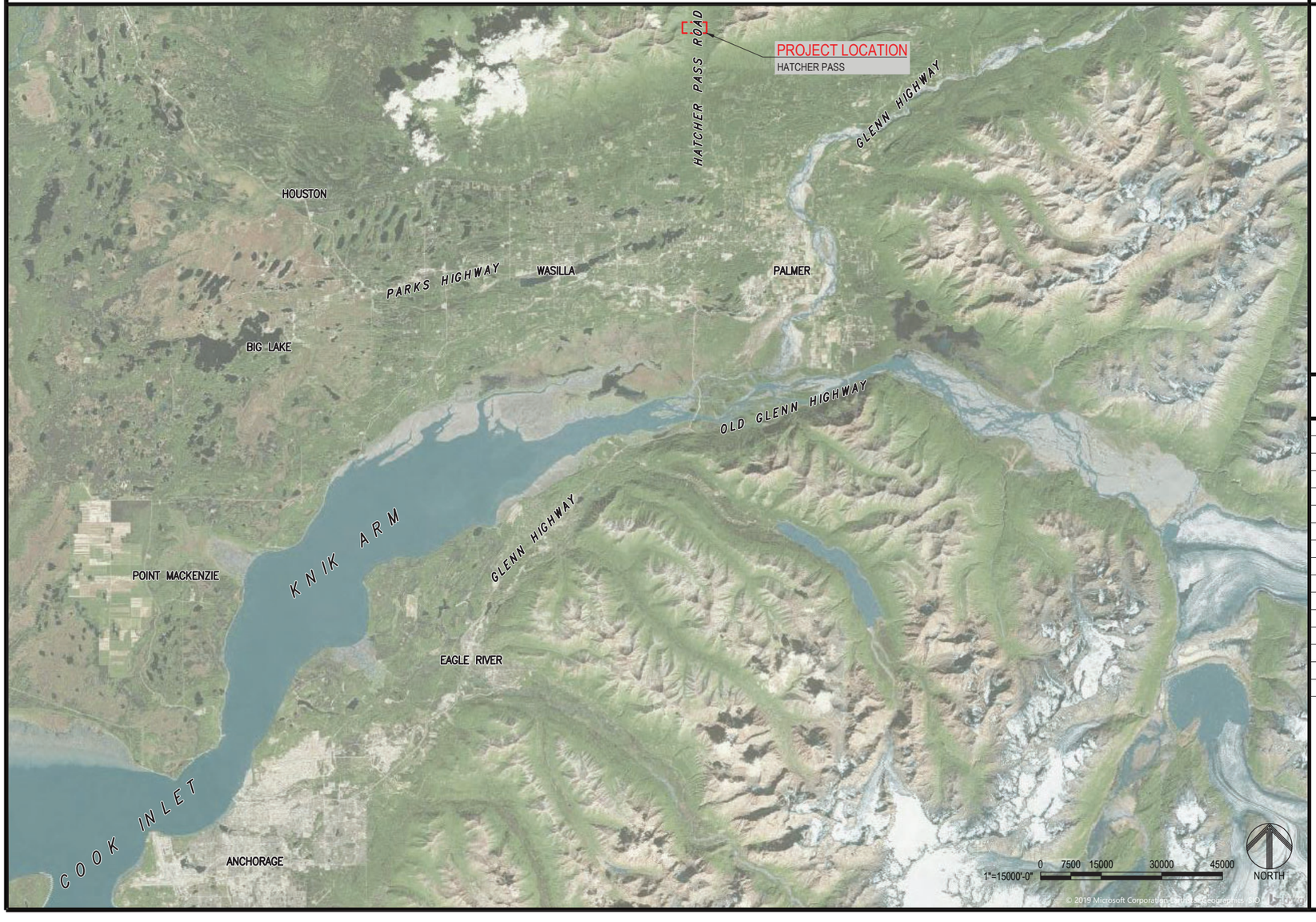
VICINITY MAP



SCOPE OF WORK

EACH OF THE FOLLOWING SCOPE ITEMS ARE PART OF THE HATCHER PASS ALPINE XPERIENCE PROJECT PHASE 1B.

1. DESIGN PRIVATE SINGLE LANE MAINTENANCE ROAD FROM PREVIOUSLY CLEARED ROAD TO THE TOP OF THE PLANNED PHASE 1B HIGH SPEED LIFT. ROAD WILL PROVIDE ACCESS TO THE UPPER LIFT HOUSE FOR MAINTENANCE AS WELL AS PROVIDE CONSTRUCTION ACCESS FOR CONCRETE TRUCKS TO PLACE CONCRETE FOR THE SKI LIFT TOWERS.
   - 1.1. MAINTENANCE ROAD TO BE SINGLE 10FT LANE AND RESTRICTED TO CONCRETE TRUCK AS THE DESIGN VEHICLE.
   - 1.2. MAINTENANCE ROAD TO CONFORM TO AASHTO GEOMETRIC DESIGN GUIDELINES FOR VERY LOW-VOLUME LOCAL ROADS (ADT<400).
   - 1.3. BACKFILL MATERIAL TO UTILIZE AS MUCH EXISTING NATIVE MATERIAL POSSIBLE. ADDITIONAL STRUCTURAL FILL MATERIAL TO BE SOURCES FROM LOCAL QUARRY.
2. DESIGN WELL WATER SERVICE & SEWER COLLECTION SYSTEM FOR FUTURE SKI LODGE CONTAINING A BAR/RESTARAUNT AND ADMINISTRATIVE SPACE.
   - 2.1. BAR/RESTARAUNT SEATS 150 AND ADMIN SPACE AND SERVE 675 PEOPLE PER DAY.
   - 2.2. TEST WELLS AND OTHER WELL LOG INFORMATION WAS UNAVAILABLE FOR PROJECT SITE, PROPOSED WELL LOCATIONS AND ASSUMED VIA OWNER.
   - 2.3. HIGH WATER TABLE IS A CONCERN, SUBSURFACE WATER DATA IS UNAVAILABLE FOR PROJECT SITE. PERCOLATION WAS OBSERVED VIA OWNER DURING INSTALLATION OF ELECTRICAL SERVICE TRENCHING DURING CONSTRUCTION OF SNOWCAT SHELTER AT DEPTHS OF 4FT. WATER TABLE IS ASSUMED AT A DEPTH OF 4 FT FOR PROJECT SITE.
   - 2.4. WELL WATER SERVICE TO CONFORM TO STATE OF ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION (ADEC) 18 AAC 80.
   - 2.5. SEWER COLLECTION SYSTEM TO CONFORM TO STATE OF ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION (ADEC) ONSITE WASTEWATER SYSTEM INSTALLATION MANUAL (OWSIM) AND 18 AAC 72.

SHEET INDEX

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Revisions

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UAA College of Engineering — University of Alaska Anchorage

HATCHER ALPINE XPERIENCE
PHASE 1B IMPROVEMENT PLANS
HATCHER PASS ROAD
COVER SHEET

Date	04/22/19
Design	DICH
Drawn	APEX
Solicitation No.	CED 201902
Sheet No.	T-001

LEGEND:

EXISTING	NEW	
		CENTERLINE
		STRUCTURE
	W	WATERLINE W/ VALVE
	S	SEWERLINE
		EDGE OF GRAVEL
		EDGE OF CUT/FILL SLOPE
		CULVERT
150.00		EDGE OF ASPHALT
	150.00 XX	SPOT GRADE ELEVATION
		CURTAIN DRAIN
		CLEANOUT
		TRANSFORMER
204	140	ELEVATION CONTOUR
		DRAINAGE ARROW
		WATER LEVEL

ABBREVIATIONS:

&	AND
@	AT
℄	CENTERLINE
Ø	DIAMETER
#	NUMBER
%	PERCENT
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ABS	ABSORPTION
AC	ASPHALT CONCRETE
ACP	ASPHALT CONCRETE PAVEMENT
AD	AREA DRAIN
ADA	AMERICANS WITH DISABILITIES ACT
ADEC	ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION
APPROX	APPROXIMATE
BLDG	BUILDING
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BVC	BEGIN VERTICAL CURVE
CB	CATCH BASIN
CIP	CAST IRON PIPE
CIRC	CIRCULATION
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
COMM	UNDERGROUND COMMUNICATION
CONC	CONCRETE
CONT	CONTINUOUS
CPEP	CORRUGATED POLYETHYLENE PIPE
DCW	DOMESTIC COLD WATER
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DL	DRAIN LINE
E	EAST, EASTING
(E)	EXISTING
EA.	EACH
EG	EXISTING GRADE
EJ	EXPANSION JOINT
EL, ELEV	ELEVATION
ELEC	ELECTRICAL
ELL	ELBOW
EOC	EDGE OF CONCRETE
EP	EDGE OF PAVEMENT
EPA	ENVIRONMENTAL PROTECTION AGENCY
EVC	END VERTICAL CURVE
EW	EACH WAY
(F)	FUTURE
FOC	FACE OF CURB
FL	FLOW LINE
FH	FIRE HYDRANT
FF	FINISH FLOOR
FDC	FIRE DEPARTMENT CONNECTION
FG	FINISH GRADE
FP	FIRE PROTECTION
FT	FEET
FW	FIRE WATER
G	GAS
GA	GALVANIZED
GB	GRADE BREAK
G.V.	GATE VALVE
H	HEIGHT
HDPE	HIGH DENSITY POLYETHYLENE
HORIZ	HORIZONTAL
HP	HIGH POINT
HSS	HOLLOW STRUCTURAL SECTION
IFC	INTERNATIONAL FIRE CODE
IN	INCH
INV	INVERT
L	LENGTH
LONG	LONGITUDINAL
LP	LOW POINT
MAX	MAXIMUM
ME	MATCH EXISTING
MECH	MECHANICAL
MH	MANHOLE
MIN	MINIMUM
N	NORTH, NORTHING
NE	NORTHEAST
NIC	NOT IN CONTRACT
NW	NORTHWEST
OHE	OVERHEAD ELECTRIC
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
OWSIM	ONSITE WATER SYSTEM INSTALLATION MANUAL
PC	POINT OF CONNECTION
PCC	PORTLAND CEMENT CONCRETE
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
PT	POINT OF TANGENCT
POL	PETROLEUM, OIL, LUBRICANTS
POV	PRIVATELY OWNED VEHICLE
PRC	POINT OF REPEATING CURVE
PSI	POUNDS PER SQUARE INCH
PVI	POINT OF VERTICAL INTERSECTION
R	RADIUS
RC	REINFORCED CONCRETE
REC	RECORD
REINF	REINFORCING
REQ'D	REQUIRED
RL	RAIN LEADER
S	SEWER, SOUTH
SD	STORM DRAIN
SE	SOUTHEAST
SEC	SECTION
SF	SQUARE FEET
SIM	SIMILAR
SS	SANITARY SEWER
SSCO	SANITARY SEWER CLEANOUT
SSMH	SANITARY SEWER MANHOLE
STA	STATION
STL	STEEL
SW	SOUTHWEST
TB	TEST BORING
TBC	TOP BACK OF CURB
TC	TOP OF CONCRETE
TH	TEST HOLE
TP	TOP OF PAVEMENT
TYP	TYPICAL
UGC	UNDERGROUND COMMUNICATION
UGE	UNDERGROUND ELECTRIC
V.B.	VALVE BOX
VERT	VERTICAL
W	WATER, WEST
W/	WITH

GENERAL NOTES:

1) NO FORMAL SURVEY HAS BEEN PERFORMED AS PART OF THIS PROJECT. EXISTING INFORMATION WAS PROVIDED BY HATCHER PASS ALPINE XPERIENCE AND SOURCED FROM MATANUSKA SUSITNA BOROUGH GIS SERVICES. COORDINATE SYSTEM IS NAD83 ALASKA STATE PLANE ZONE 4 IN FEET.

2) ALL NON- TOPSOIL FILL MATERIAL SHALL BE PLACED IN LIFTS NO THICKER THAN 12 INCHES, AND COMPACTED TO 95% UNLESS INDICATED OTHERWISE.

3) SUBGRADE INSULATION BOARD SHALL MEET AASHTO-M-230, 60 PSI COMPRESSION STRENGTH MINIMUM, MAXIMUM WATER ABSORPTION 0.30 PERCENT BY VOLUME, THERMAL RESISTANCE MINIMUM R-VALUE AT 75° F-SF-HR/BTU PER ASTM C-177.

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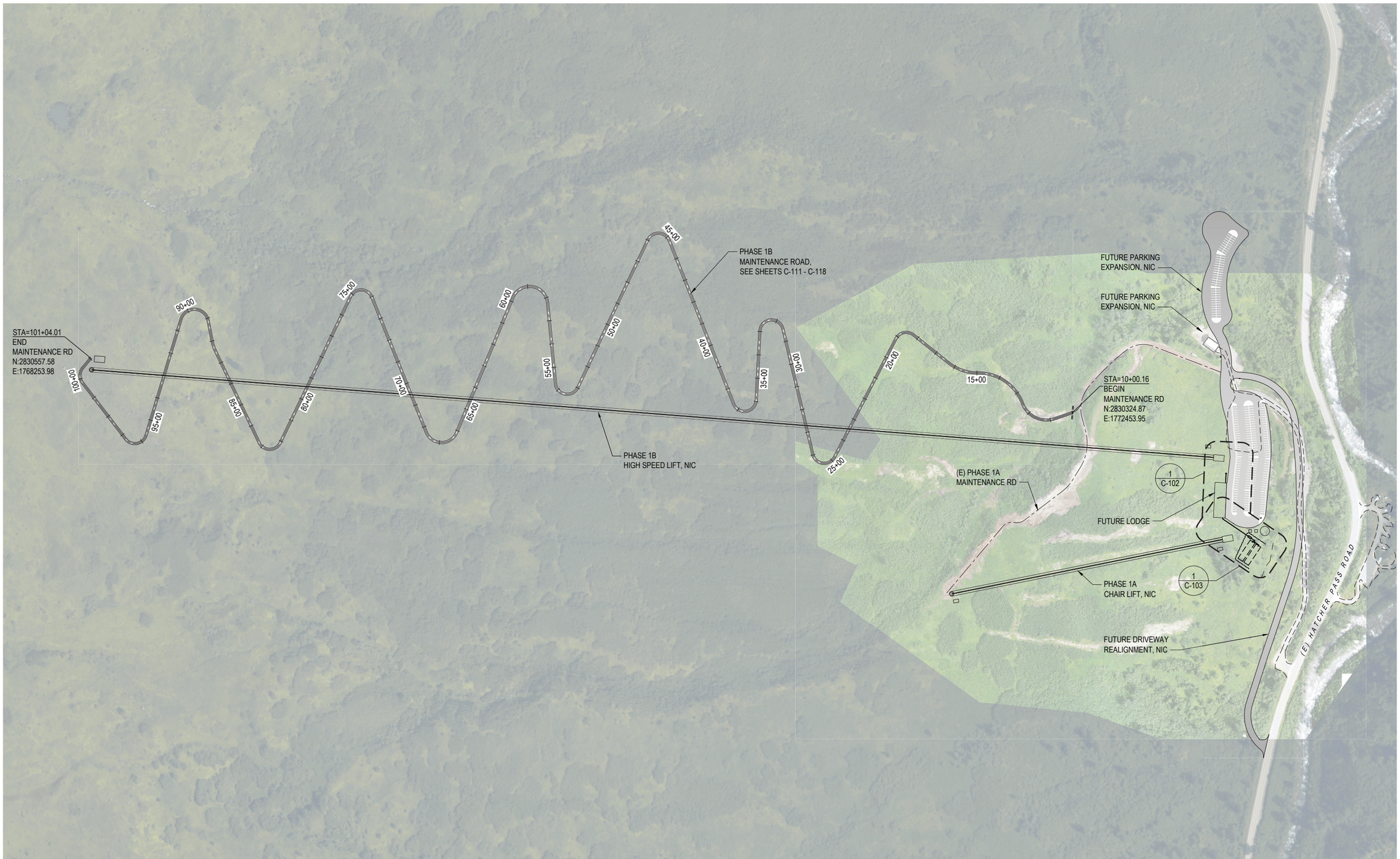
HATCHER ALPINE XPERIENCE
PHASE 1B IMPROVEMENT PLANS
HATCHER PASS ROAD

NOTES, LEGEND, & ABBREVIATIONS

Date 04/22/19
Design APEX
Drawn DICH
Solicitation No. CED 201902
Sheet No. C-001



1 OVERALL SITE PLAN
SCALE: 1" = 200'-0"

PLAN NORTH

1"=200'-0" 0 100 200 400 600

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HATCHER ALPINE XPERIENCE
PHASE 1B IMPROVEMENT PLANS
HATCHER PASS ROAD
OVERALL SITE PLAN

Date	04/22/19
Design	APEX
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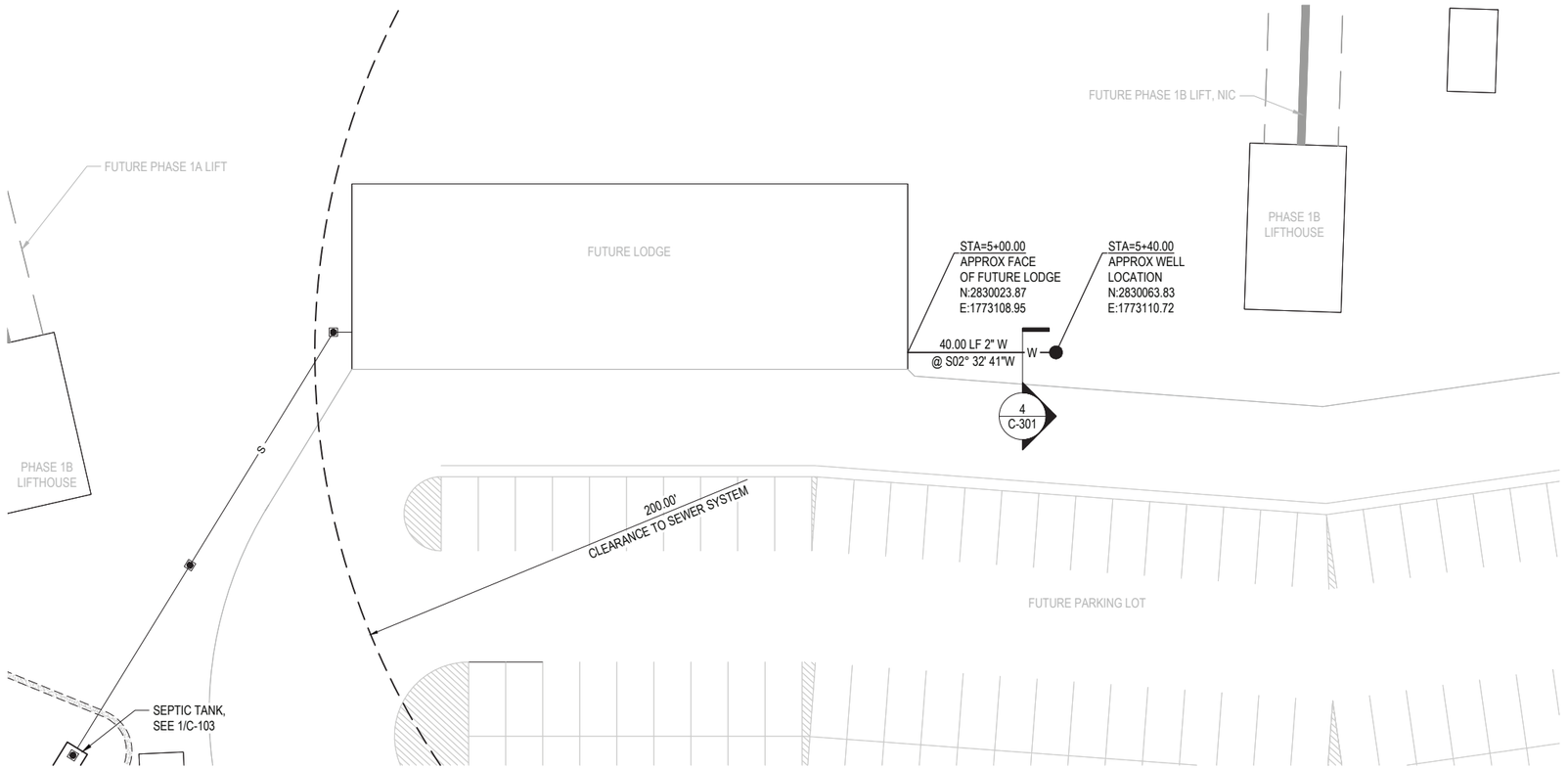
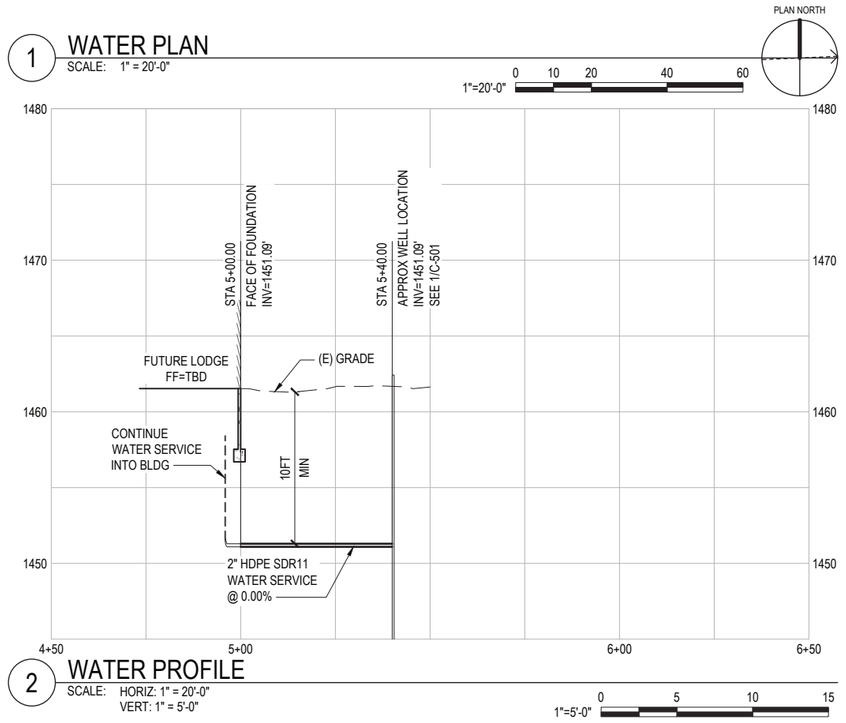
Solicitation No.	CED 201902
Sheet No.	C-101





1 WATER PLAN
SCALE: 1" = 20'-0"

1"=20'-0" 0 10 20 40 60

2 WATER PROFILE
SCALE: HORIZ: 1" = 20'-0"
VERT: 1" = 5'-0"

1"=5'-0" 0 5 10 15

GENERAL NOTES:

1) LOCATION OF PROPOSED WATER WELL AND ASSOCIATED PIPING IS APPROXIMATE. FINAL PLAN AND PROFILE CONTINGENT UPON COMPLETION OF SUCCESSFUL TEST WELL.

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PHASE 1B IMPROVEMENT PLANS
HATCHER PASS ROAD

WATER PLAN & PROFILE

Date	04/22/19
Design	APEX
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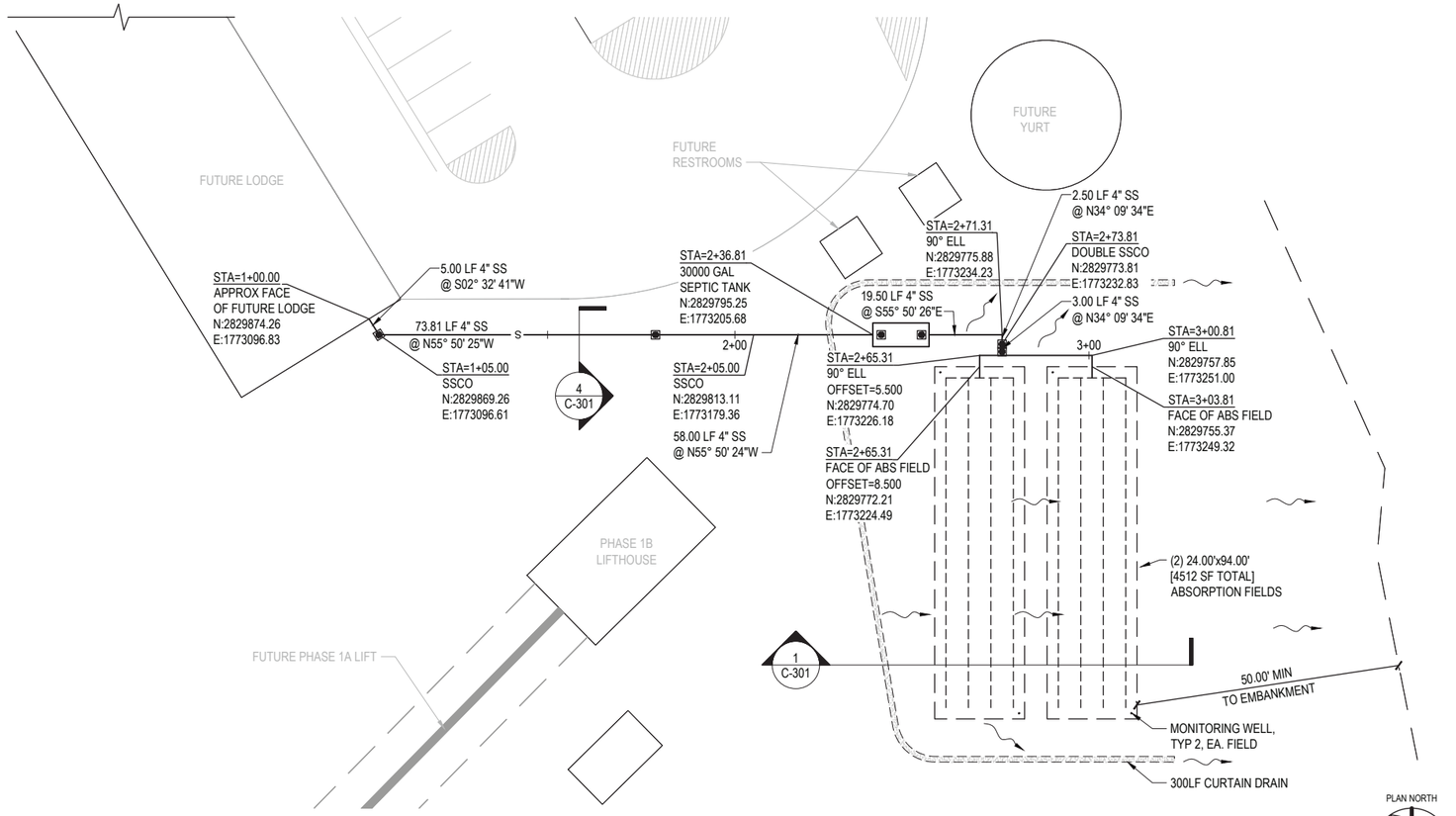
Solicitation No.	CED 201902
Sheet No.	C-102



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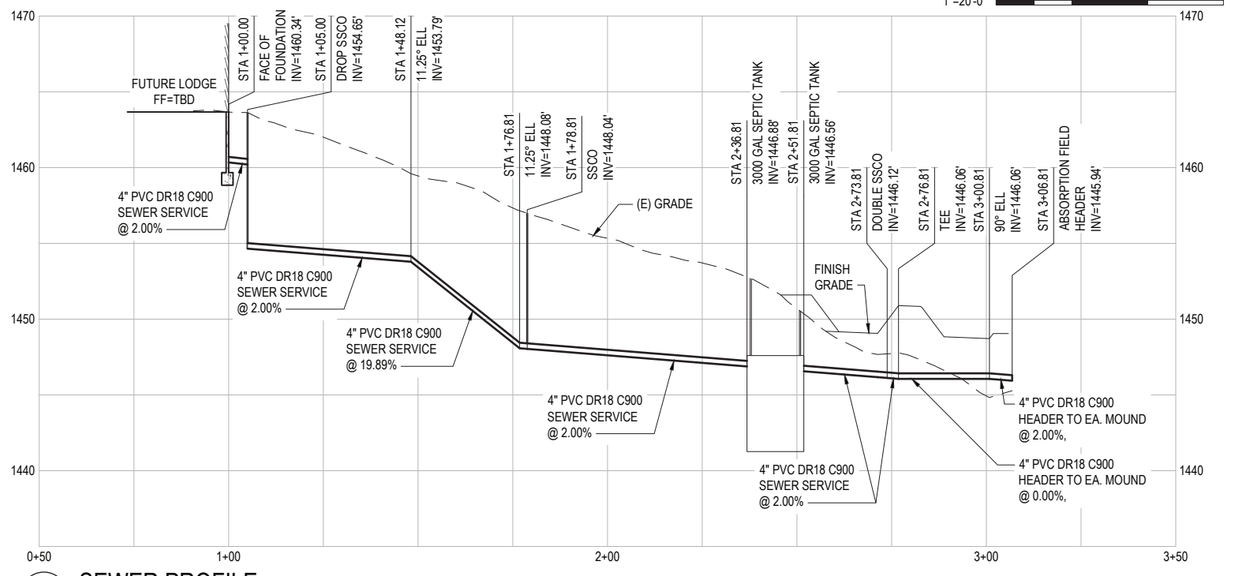

2 SEWER PROFILE
SCALE: HORIZ: 1" = 20'-0"
VERT: 1" = 5'-0"

0 5 10 15
1"=5'-0"

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SEWER PLAN & PROFILE

Date 04/22/19
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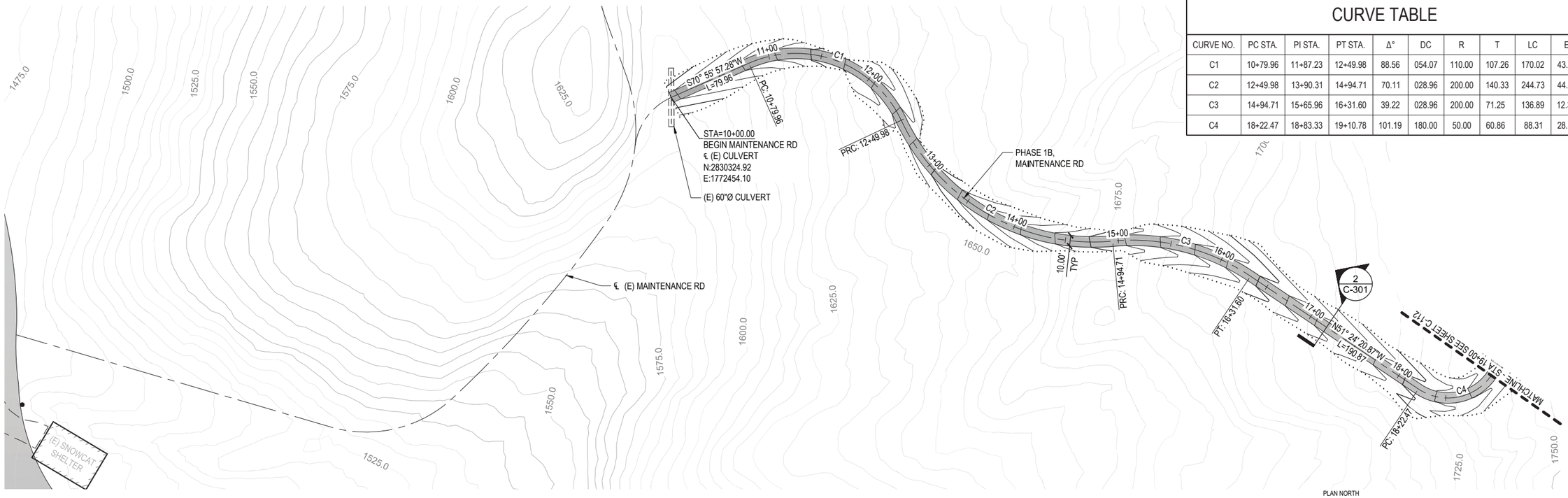
Sheet No. C-103

CURVE TABLE

CURVE NO.	PC STA.	PI STA.	PT STA.	Δ°	DC	R	T	LC	E
C1	10+79.96	11+87.23	12+49.98	88.56	054.07	110.00	107.26	170.02	43.64
C2	12+49.98	13+90.31	14+94.71	70.11	028.96	200.00	140.33	244.73	44.32
C3	14+94.71	15+65.96	16+31.60	39.22	028.96	200.00	71.25	136.89	12.31
C4	18+22.47	18+83.33	19+10.78	101.19	180.00	50.00	60.86	88.31	28.77



1 PLAN
SCALE: 1" = 50'-0"

PLAN NORTH

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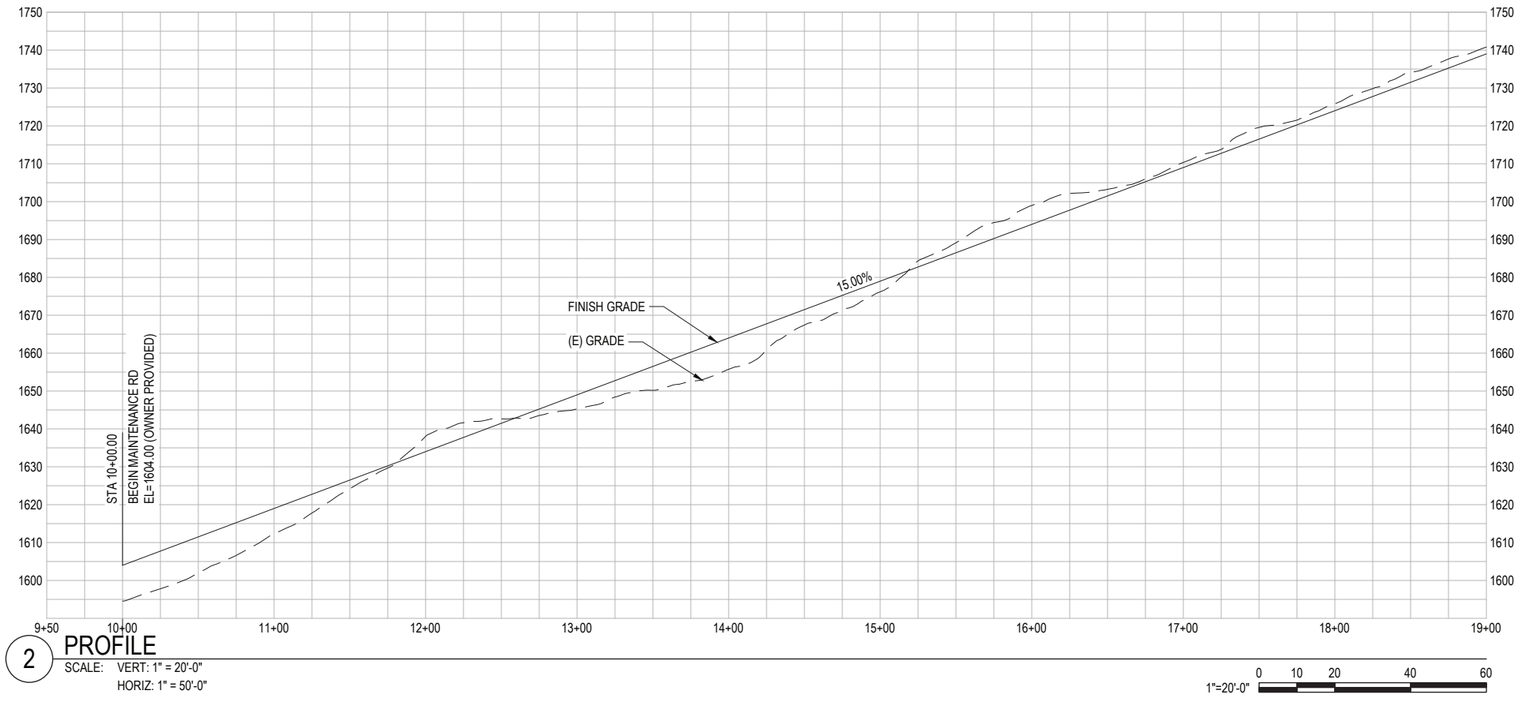

2 PROFILE
SCALE: VERT: 1" = 20'-0"
HORIZ: 1" = 50'-0"

1"=20'-0" 0 10 20 40 60

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PHASE 1B IMPROVEMENT PLANS
HATCHER PASS ROAD

STA 10+00.00 TO STA 19+00.00 PLAN & PROFILE

Date 04/22/19
Design DICH
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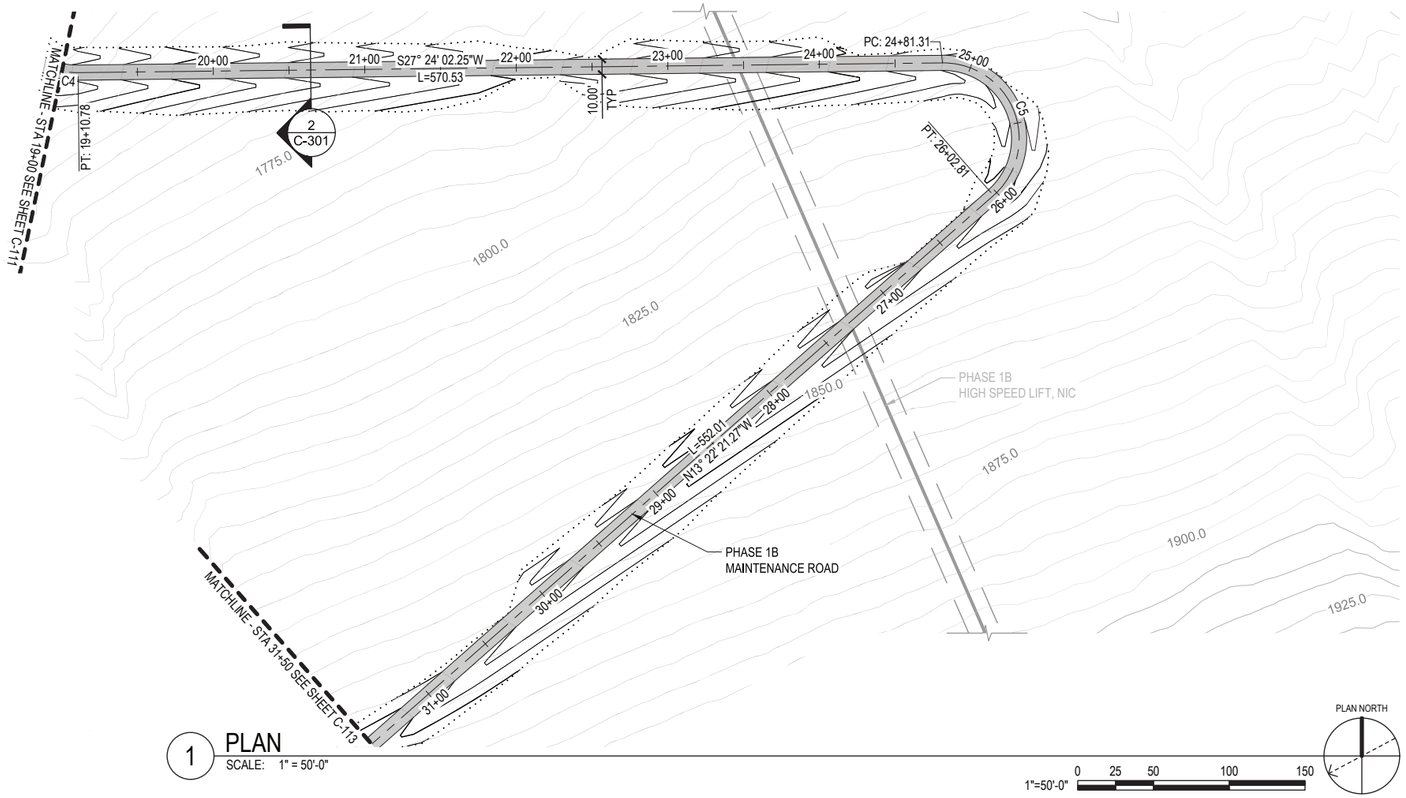
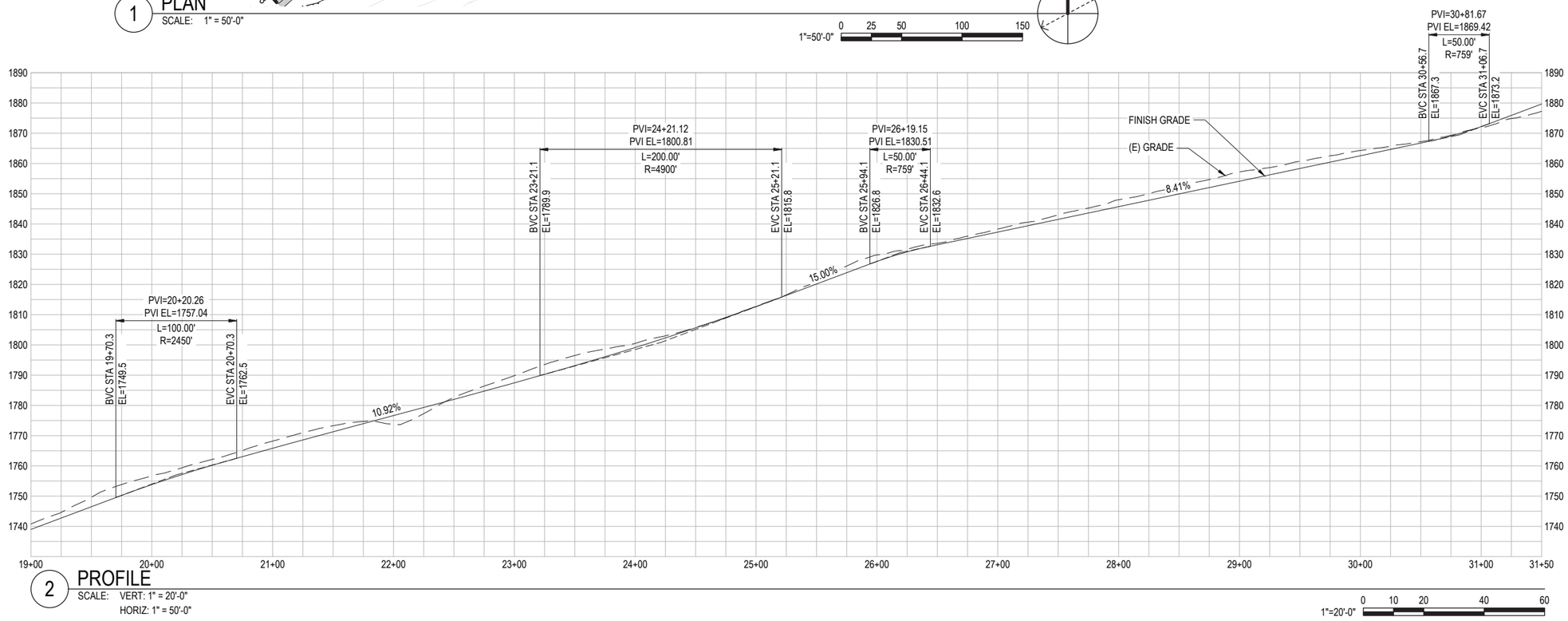
Solicitation No. CED 201902
Sheet No. C-111

CURVE TABLE

CURVE NO.	PC STA.	PI STA.	PT STA.	Δ°	DC	R	T	LC	E
C4	18+22.47	18+83.33	19+10.78	101.19	180.00	50.00	60.86	88.31	28.77
C5	24+81.31	26+15.85	26+02.81	139.23	000.00	50.00	134.54	121.50	93.53



1 PLAN
SCALE: 1" = 50'-0"



2 PROFILE
SCALE: VERT: 1" = 20'-0"
HORIZ: 1" = 50'-0"

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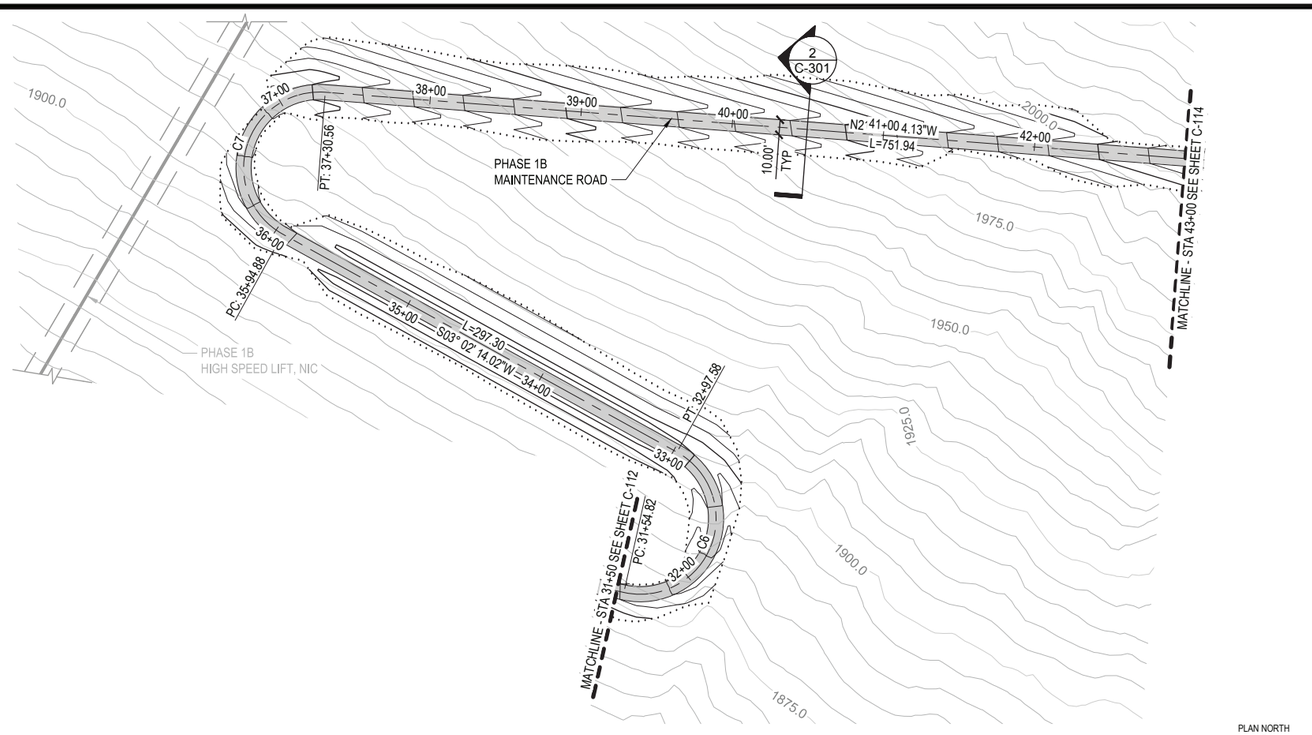
PHASE 1B IMPROVEMENT PLANS
HATCHER PASS ROAD

STA 19+00.00 TO STA 31+50.00 PLAN & PROFILE

Date 04/22/19
Design DICH
Drawn DICH
Solicitation No. CED 201902
Sheet No. C-112



1 PLAN

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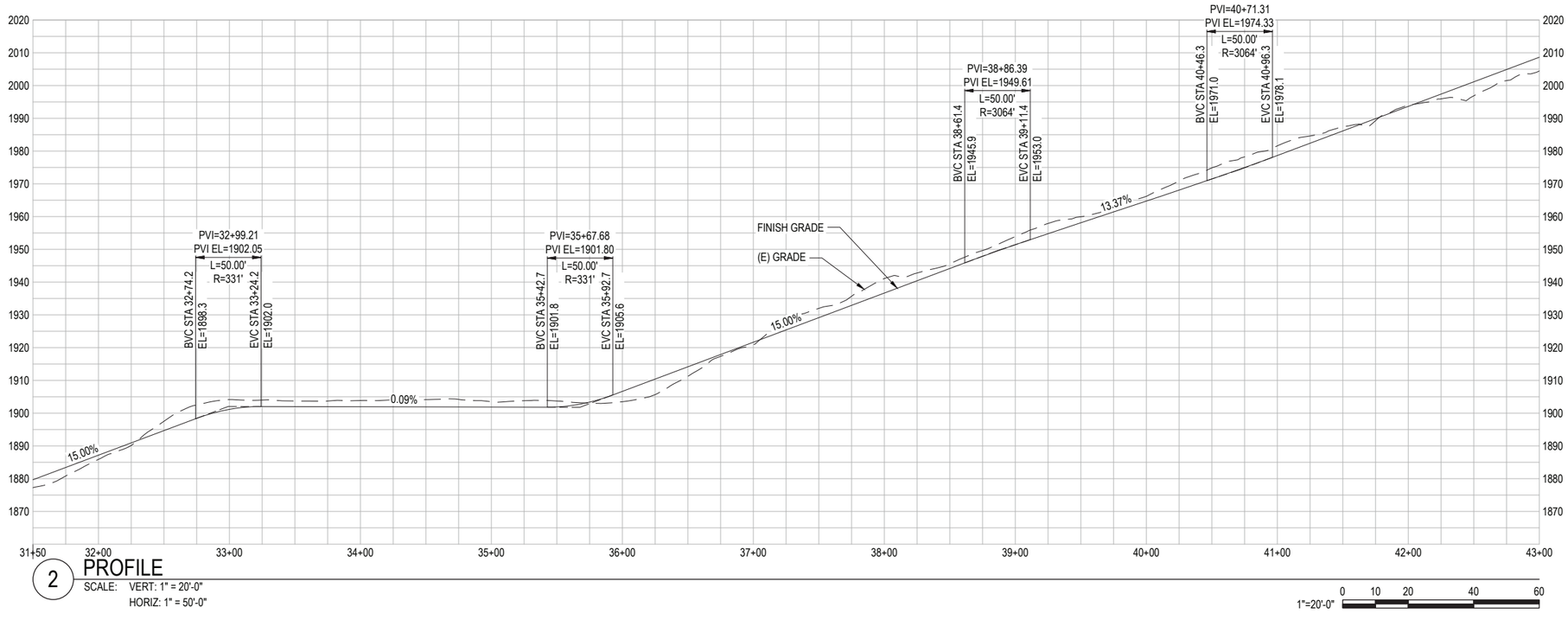

2 PROFILE

SCALE: VERT: 1" = 20'-0"
HORIZ: 1" = 50'-0"

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CURVE TABLE

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C6	31+54.82	35+01.59	32+97.58	163.59	180.00	50.00	346.77	142.76	300.35
C7	35+94.88	38+24.88	37+30.56	155.47	180.00	50.00	230.00	135.67	185.37

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Date 04/22/19
Design DICH
Drawn DICH
Solicitation No. CED 201902
Sheet No. C-113

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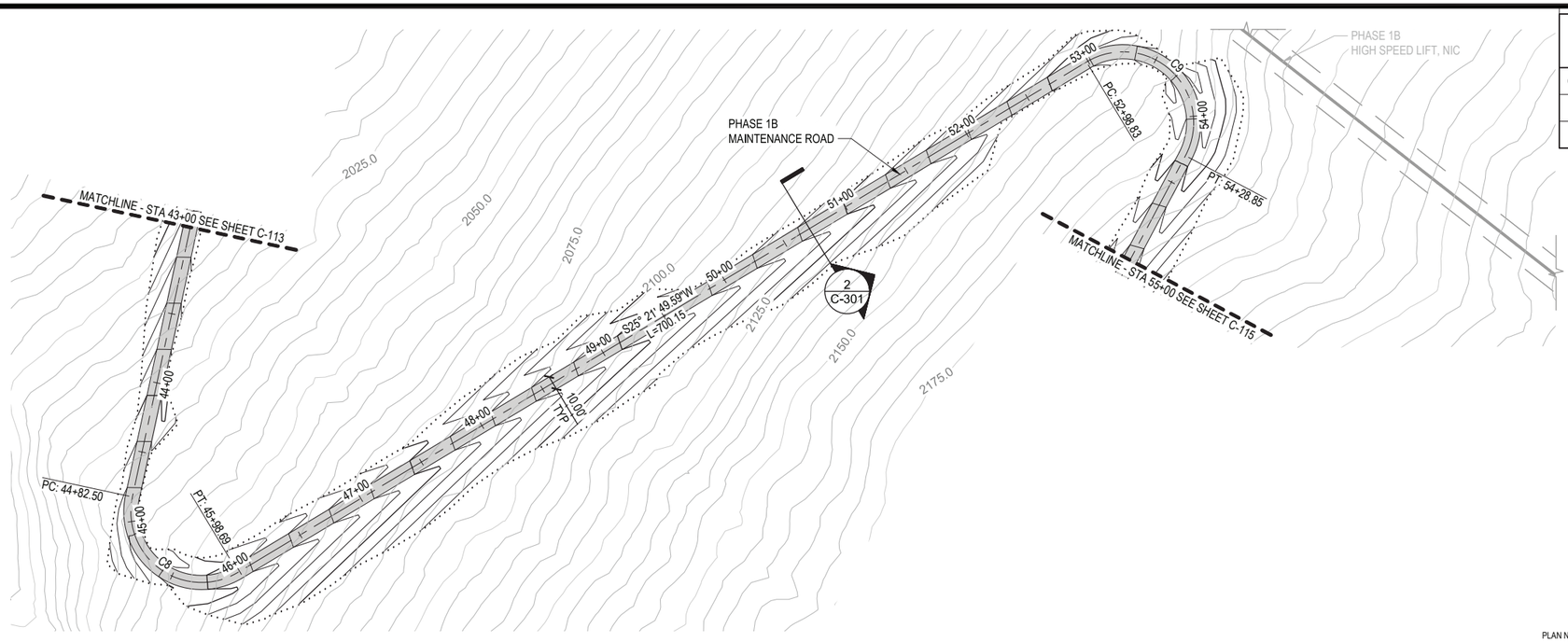

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C9	52+98.83	54+79.05	54+28.85	148.99	180.00	50.00	180.21	130.02	137.02

1 PLAN
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PLAN NORTH

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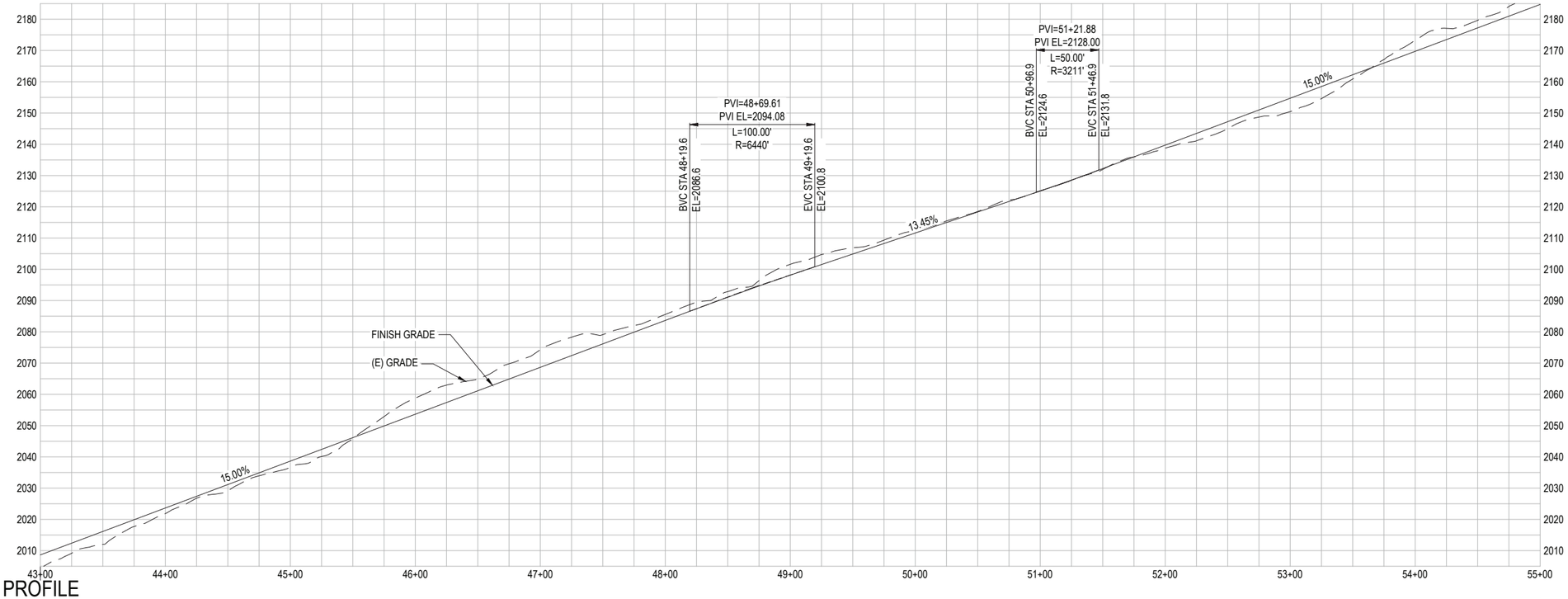

2 PROFILE
SCALE: VERT: 1" = 20'-0"
HORIZ: 1" = 50'-0"

1"=20'-0" 0 10 20 40 60

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HATCHER PASS ROAD

STA 43+00.00 TO STA 55+00.00 PLAN & PROFILE

Date	04/22/19
Design	DICH
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Solicitation No.	CED 201902
Sheet No.	C-114

CURVE TABLE

CURVE NO.	PC STA.	PI STA.	PT STA.	Δ°	DC	R	T	LC	E
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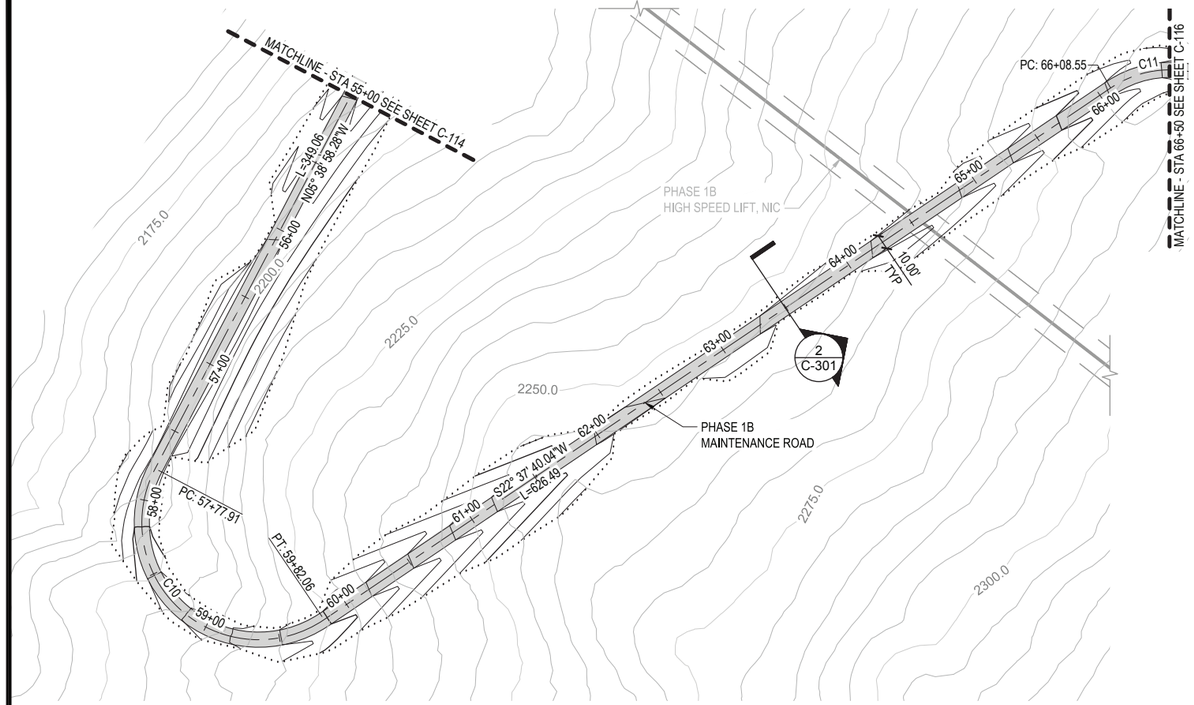

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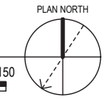
SCALE: 1" = 50'-0"



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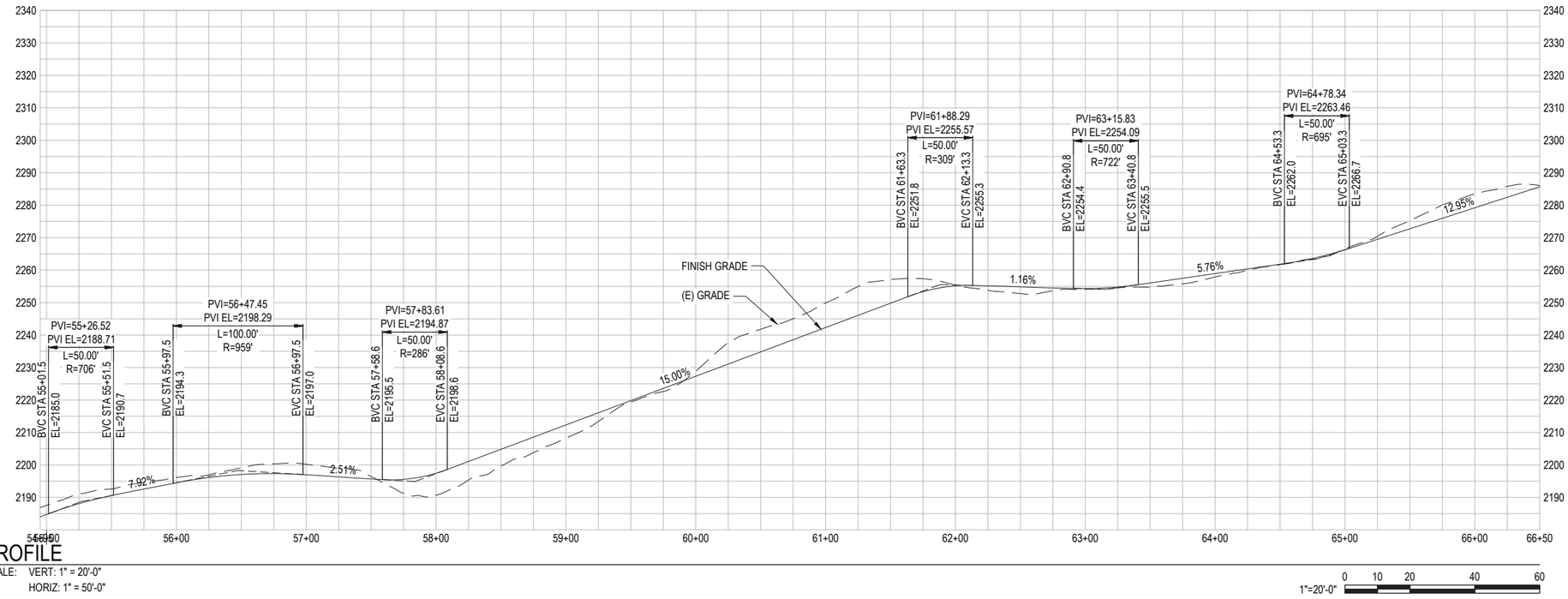

2 PROFILE
SCALE: VERT: 1" = 20'-0"
HORIZ: 1" = 50'-0"

1"=20'-0" 0 10 20 40 60

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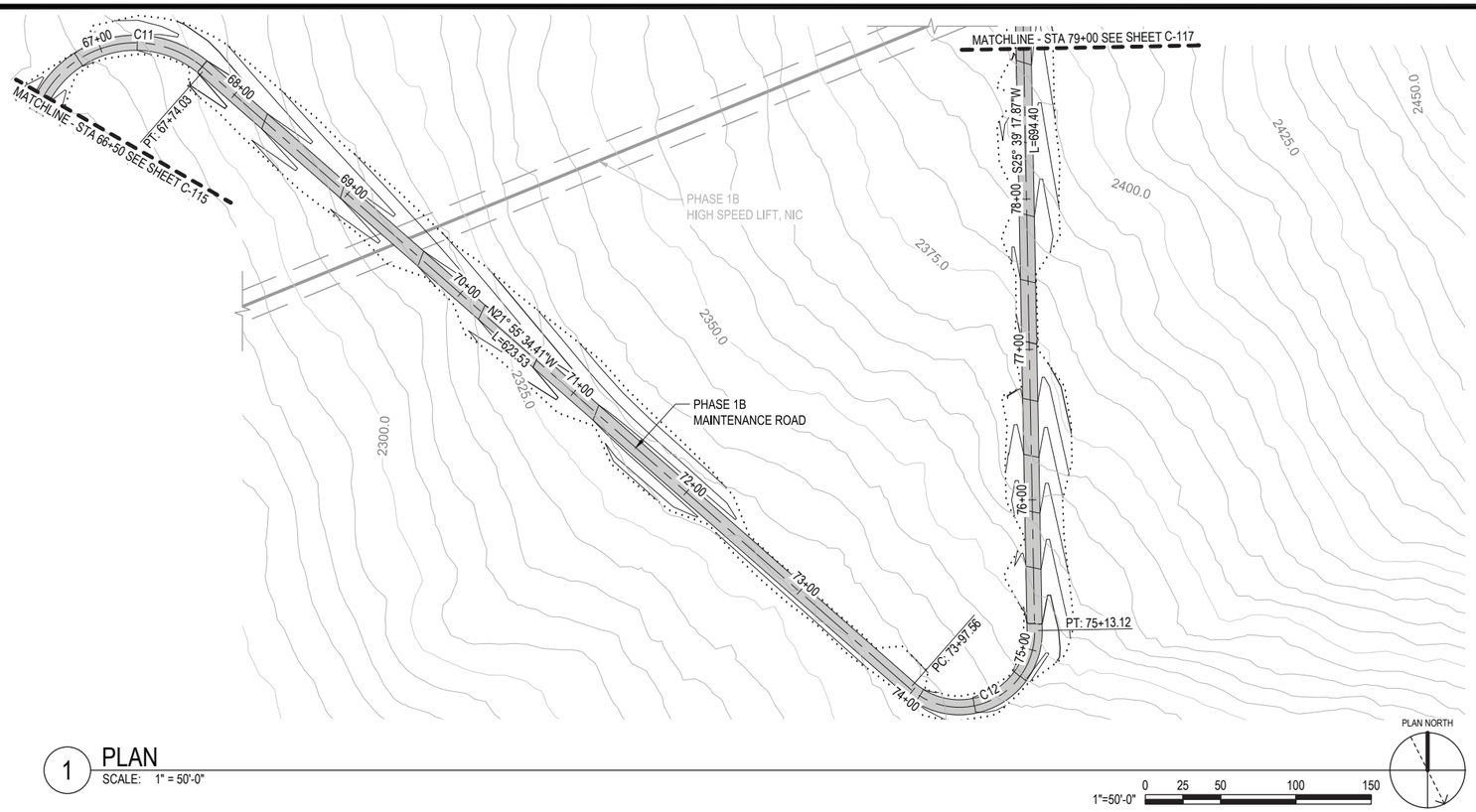
HATCHER PASS ROAD

STA 55+00.00 TO STA 66+50.00 PLAN & PROFILE

Date 04/22/19
Design DICH
Drawn DICH
Solicitation No. CED 201902
Sheet No. C-115



1 PLAN
SCALE: 1" = 50'-0"

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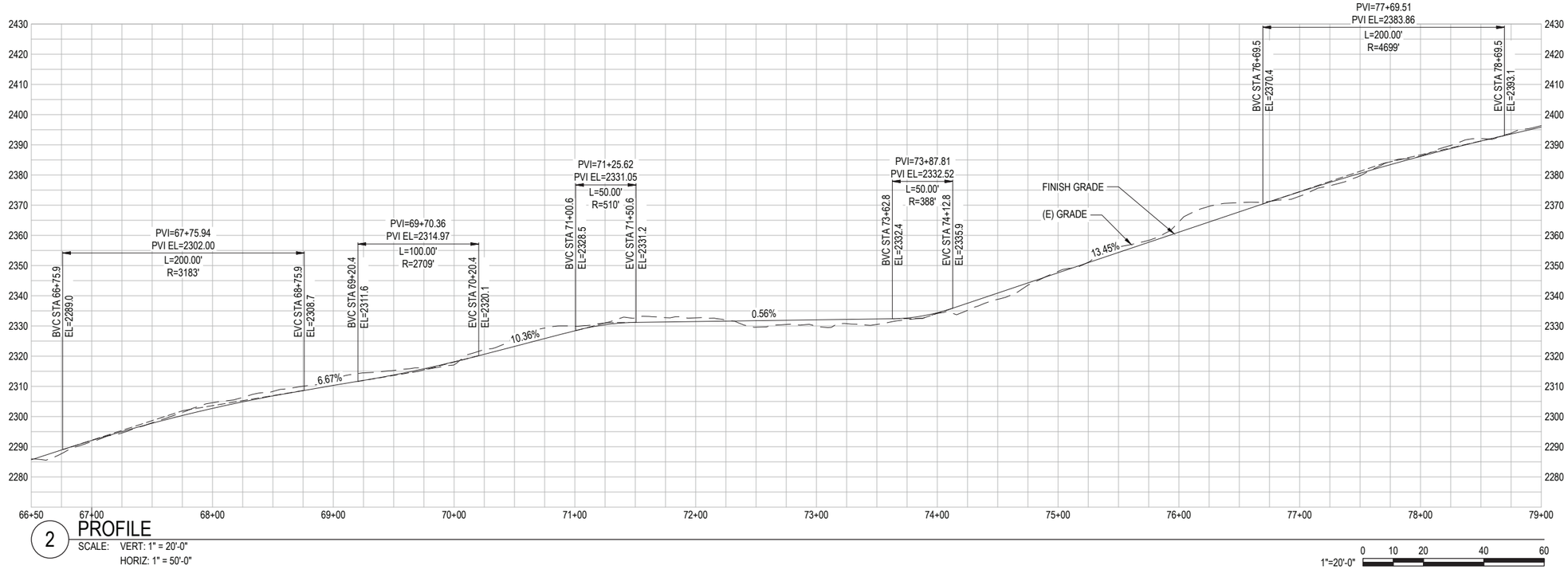
C12	73+97.56	75+10.98	75+13.12	132.42	000.00	50.00	113.42	115.56	73.95



2 PROFILE
SCALE: VERT: 1" = 20'-0"
HORIZ: 1" = 50'-0"

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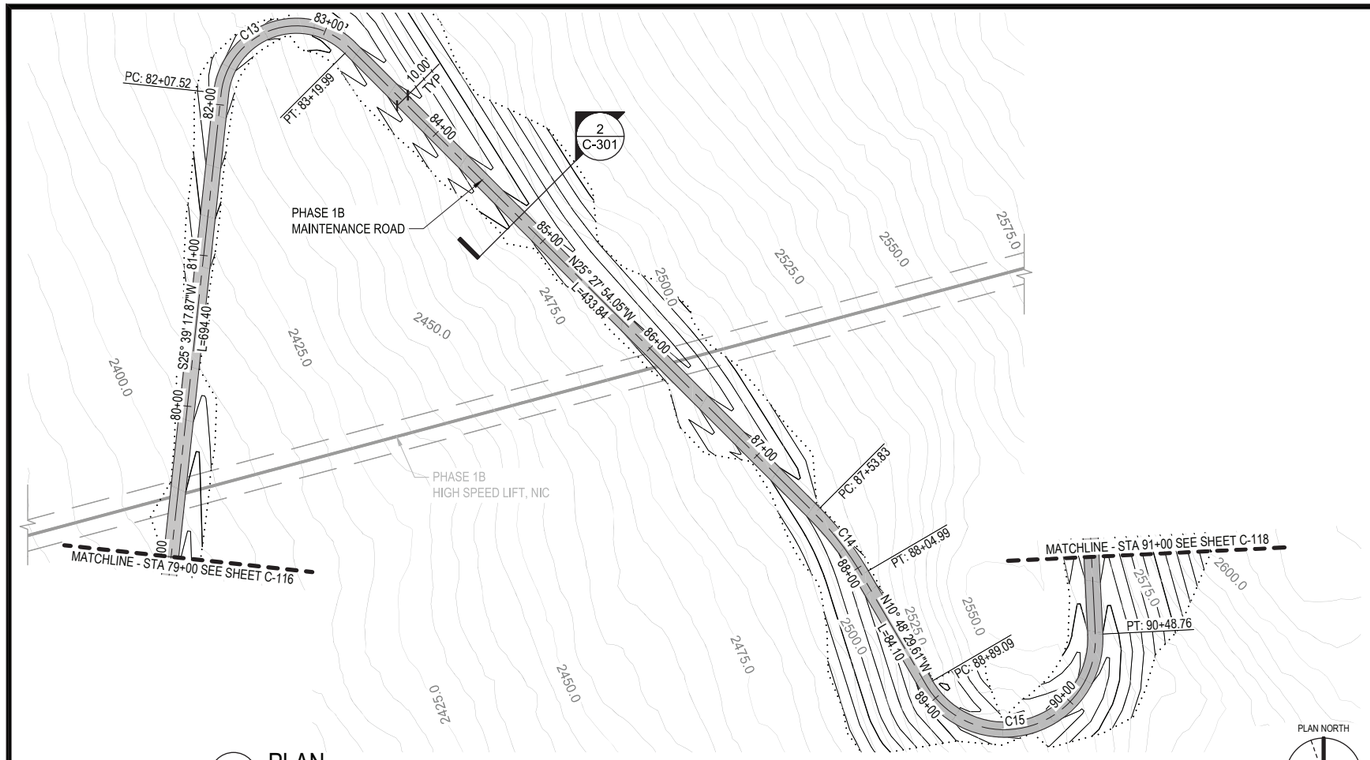
HATCHER PASS ROAD

STA 66+50.00 TO STA 79+00.00 PLAN & PROFILE

Date 04/22/19
Design DICH
Drawn DICH
Solicitation No. CED 201902
Sheet No. C-116

CURVE TABLE

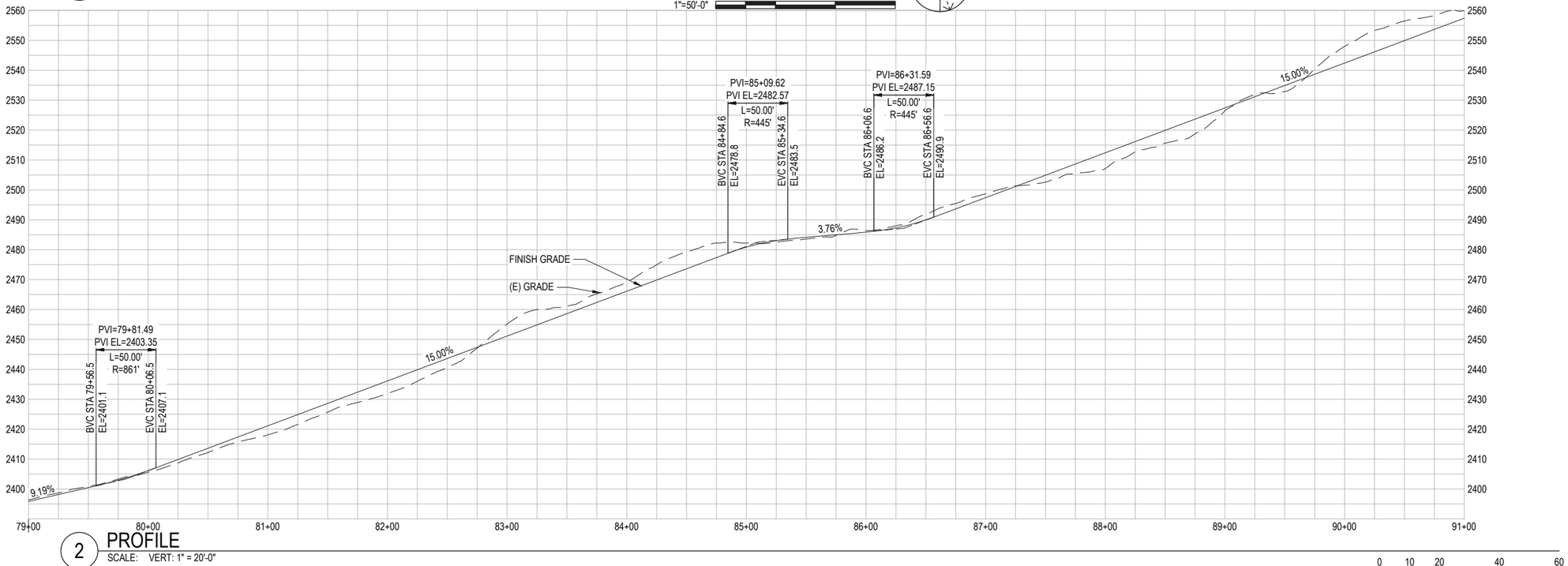
CURVE NO.	PC STA.	PI STA.	PT STA.	Δ°	DC	R	T	LC	E
C13	82+07.52	83+12.06	83+19.99	128.88	000.00	50.00	104.55	112.47	65.89
C14	87+53.83	87+79.55	88+04.99	14.66	028.96	200.00	25.72	51.16	1.65
C15	88+89.09	91+34.04	90+48.76	152.47	112.89	60.00	244.96	159.67	192.20



1 PLAN
SCALE: 1" = 50'-0"

PLAN NORTH

1"=50'-0" 0 25 50 100 150



2 PROFILE
SCALE: VERT: 1" = 20'-0"
HORIZ: 1" = 50'-0"

1"=20'-0" 0 10 20 40 60

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PHASE 1B IMPROVEMENT PLANS
HATCHER PASS ROAD

STA 79+00.00 TO STA 91+00.00 PLAN & PROFILE

Date 04/22/19
Design DICH
Drawn DICH
Solicitation No. CED 201902
Sheet No. C-117

CURVE TABLE

CURVE NO.	PC STA.	PI STA.	PT STA.	Δ°	DC	R	T	LC	E
C16	95+67.48	96+65.17	96+77.25	125.79	000.00	50.00	97.69	109.77	59.74
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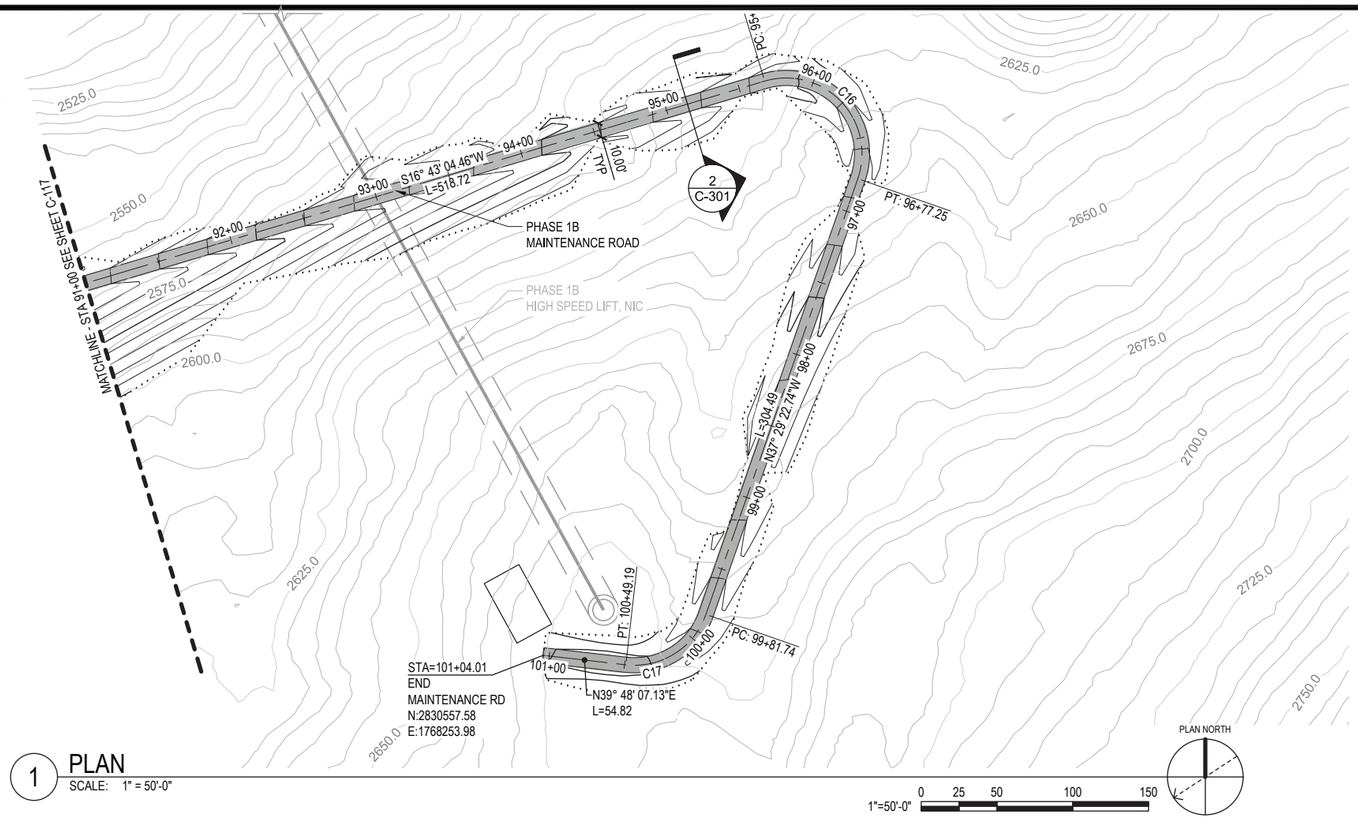

1 PLAN
SCALE: 1" = 50'-0"

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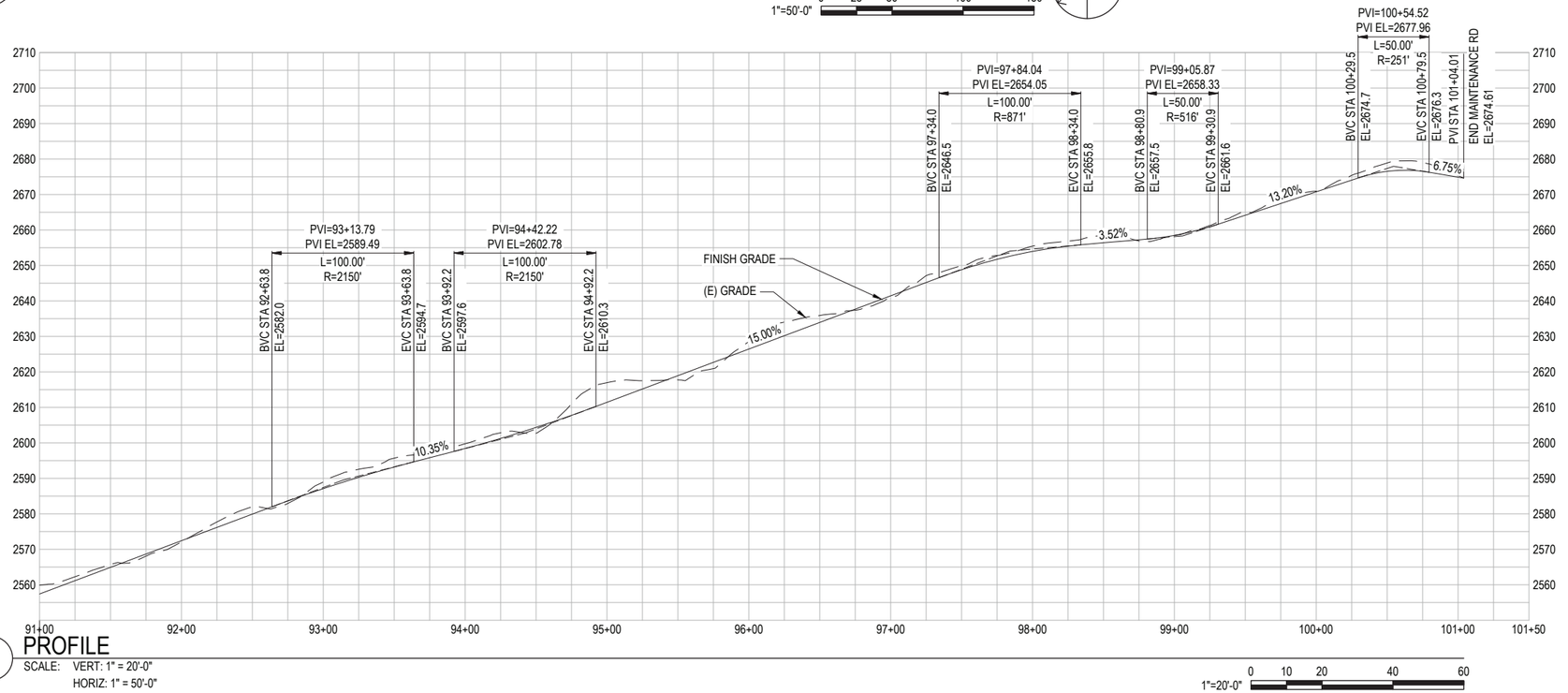

2 PROFILE
SCALE: VERT: 1" = 20'-0"
HORIZ: 1" = 50'-0"

1"=20'-0" 0 10 20 40 60

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HATCHER PASS ROAD

STA 91+00.00 TO STA 101+04.01 PLAN & PROFILE

Date	04/22/19
Design	DICH
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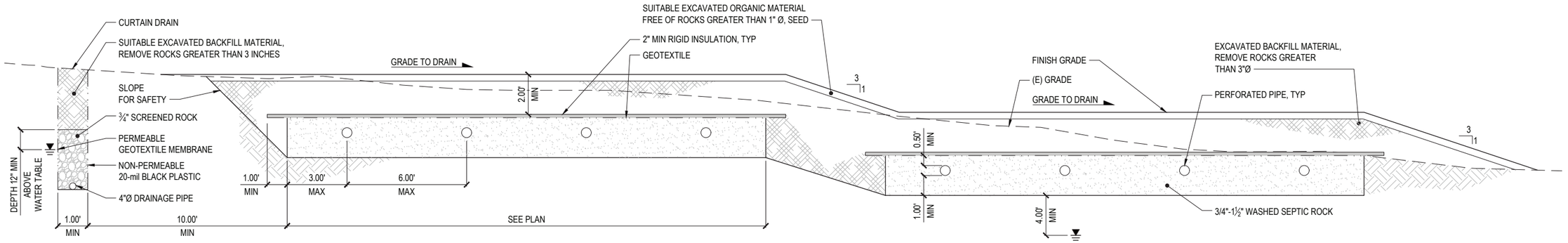
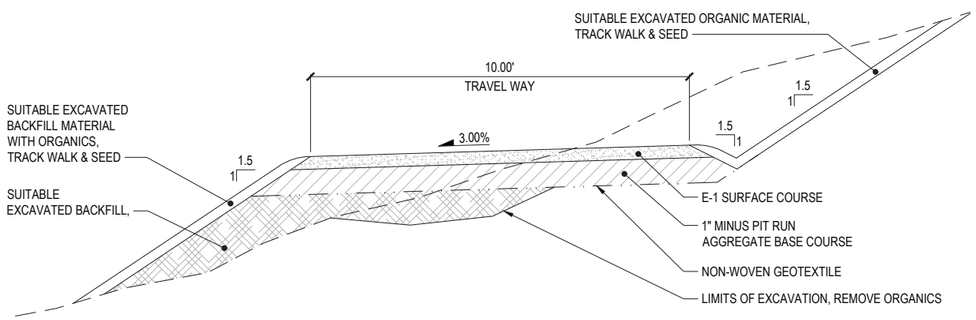
Solicitation No.	CED 201902
Sheet No.	C-118



1 MOUNDED ABSORPTION FIELD - SECTION

SCALE: 3/8" = 1'-0"

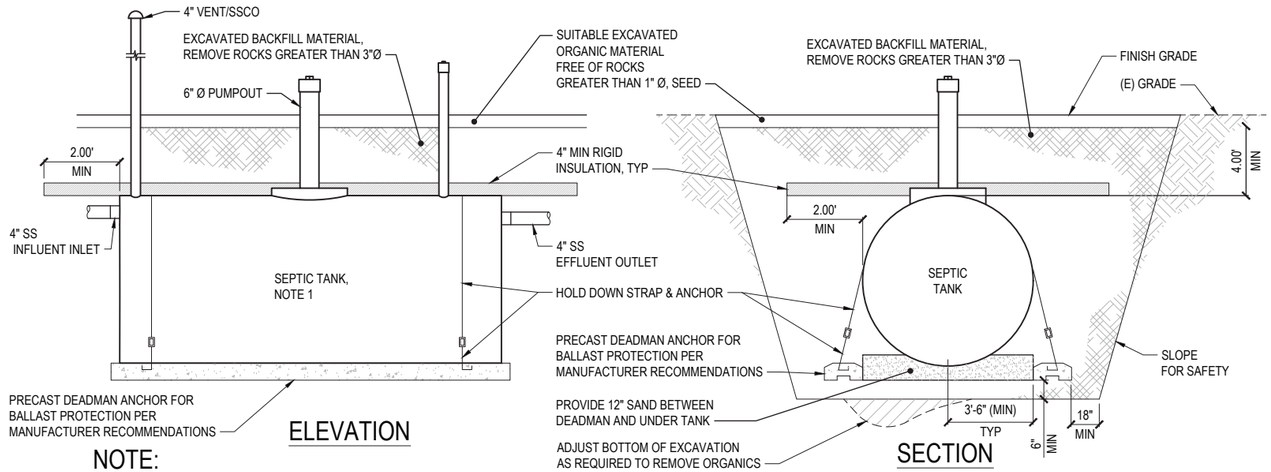
3/8"=1'-0" 0 1 2 3 4 6 8



2 TYPICAL MAINTENANCE ROAD - SECTION

SCALE: 1/2" = 1'-0"

1/2"=1'-0" 0 1 2 4 6

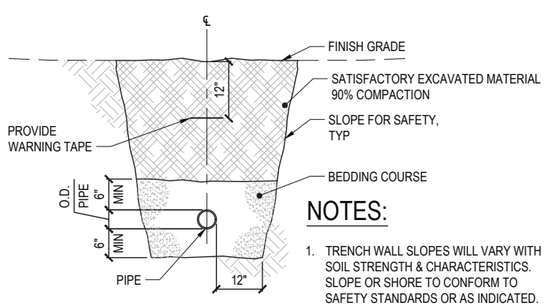


NOTE:

1. SEPTIC TANK SHALL MEET THE REQUIREMENTS AND BE INSTALLED PER STATE OF ALASKA 18 AAC 72 AND THE UNIFORM PLUMBING CODE.
2. TANK BALLAST IS DESIGNED FOR BUOYANT FORCE IN THE FINAL INSTALLED CONDITION WITH ALL BACKFILL IN-PLACE TO FINISHED GRADE. BALLAST IS NOT DESIGNED FOR A FLOODED OPEN PIT CONDITION. MAINTAIN A DRY EXCAVATION UNTIL BACKFILL IS COMPLETE TO FINISHED GRADE.

3 SEPTIC TANK - SECTION

SCALE: NTS



NOTES:

1. TRENCH WALL SLOPES WILL VARY WITH SOIL STRENGTH & CHARACTERISTICS. SLOPE OR SHORE TO CONFORM TO SAFETY STANDARDS OR AS INDICATED.

4 TYPICAL TRENCH SECTION

SCALE: NTS

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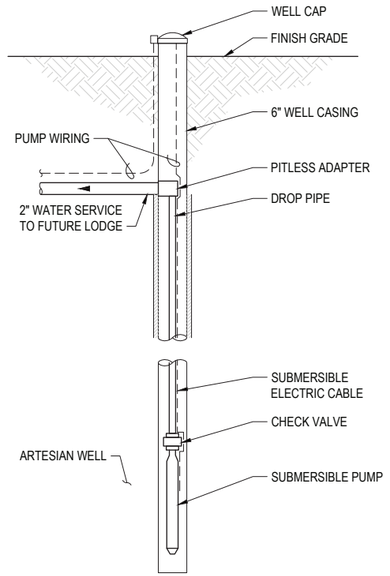
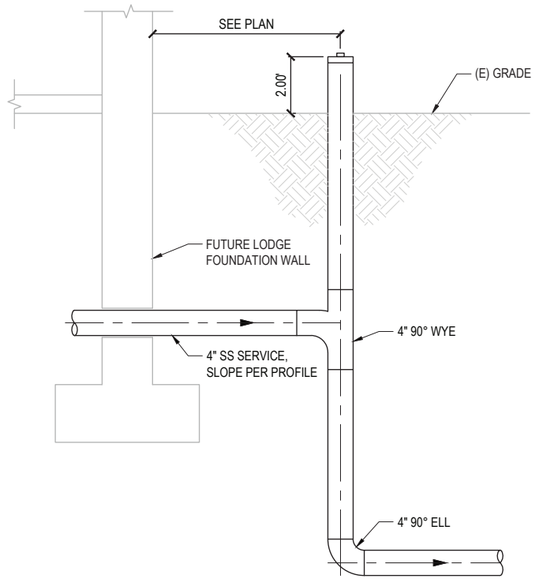
HATCHER PASS ROAD
SECTIONS & DETAILS

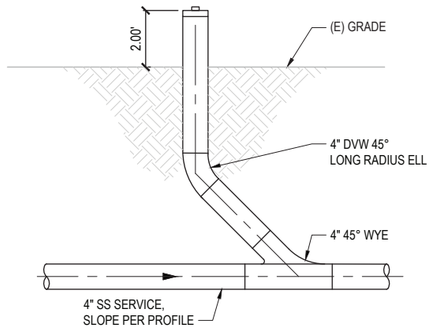
Date	04/22/19
Design	APEX
Drawn	DICH
Solicitation No.	CED 201902
Sheet No.	C-301



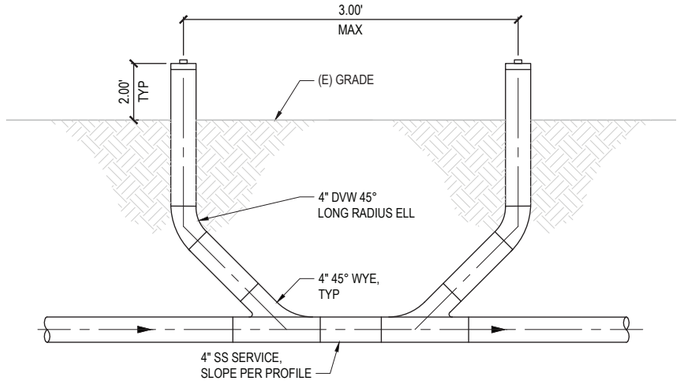
1 WELL DETAIL
SCALE: NTS



2 DROP CLEANOUT DETAIL
SCALE: NTS



3 CLEANOUT DETAIL
SCALE: NTS



4 DOUBLE CLEANOUT DETAIL
SCALE: NTS

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HATCHER PASS ROAD

CIVIL DETAILS

Date 04/22/19
Design APEX
Drawn DICH
Solicitation No. CED 201902
Sheet No. C-501

Appendix B: Construction Specifications

SECTION 221353 - FACILITY SEPTIC TANKS

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Septic tanks.
2. Pipe and fittings.
3. Absorption systems.

1.3 This specification is in accordance with the State of Alaska and DEC. All work and materials should comply with these requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1. Include construction details, material descriptions, dimensions of individual components, and profiles.
2. Include manhole openings, covers, and pipe connections.

B. Shop Drawings: For mound absorption systems.

1. Include covers, pipe connections, and accessories.
2. Include piping with sizes and invert elevations.
3. Include underground structures.
4. Include other utilities.

PART 2 - PRODUCTS

2.1 STEEL SEPTIC TANK

A. Description: steel construction; fabricated for septic tank application; single chamber.

B. Filter Access: Include access hole, large enough to remove filter, over filter position.

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C. Resilient Connectors: ASTM C923 (ASTM C923M) or other watertight seal, of size required for piping, fitted into inlet and outlet openings.

D. Capacity and Characteristics:

1. Capacity: 3,000 gallon.
2. Inlet and Outlet Size: 4 inch.

2.2 PE DISTRIBUTION PIPE AND FITTINGS

A. Tube and Fittings: ASTM F405, perforated corrugated tube with solid-wall fittings.

B. Couplings: PE band, matching tube and fitting dimensions.

2.3 PVC DISTRIBUTION PIPE AND FITTINGS

A. Pipe and Fittings: ASTM D2729, perforated, for solvent-cemented joints.

B. Solvent Cement: ASTM D2564. Include primer according to ASTM F656.

2.4 NONPRESSURE PIPE COUPLINGS

A. Description: Comply with ASTM C1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, with corrosion-resistant-metal tension band and tightening mechanism on each end.

1. Sleeve Materials for Plastic Pipes: ASTM F477, elastomeric seal or ASTM D5926, PVC.
2. Sleeve Materials for Dissimilar Pipes: ASTM D5926, PVC or other material compatible with pipe materials being joined.

2.5 MOUND ABSORPTION-SYSTEM MATERIALS

A. Washed Septic Rock-Filter Material: ¾ inch to 1-1/2 inches.

B. Cap: Clay, silt-lone, or combination of clay and silt.

C. Topsoil: Good quality, free of stones, metal, and glass.

D. Vegetation Cover: Grass compatible with adjacent ground cover. No shrubs or trees.

E. Cover for Filter Mat: Typar 3401 or equivalent. Geotechnical fabric products shall conform to AASHTO M288 Class 3 and have the following characteristics:
1. Minimum Permittivity (ASTM D4491) - 0.5 sec-1

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2. Maximum Apparent Opening Size (ASTM D4751) – 0.20 to 0.21 mm (US Sieve #70)

F. Cover for Distribution: All geotechnical insulation products shall meet the current ASTM standard specifications for “Rigid Cellular Polystyrene Thermal Insulation,” and have a minimum compressive strength of 40 psi. Examples of products that meet this standard are Dow Styrofoam Highload 40 and InsulFoam 40, or approved equal.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling for piping are specified in Section 312000 "Earth Moving."

1. Stockpile topsoil for reuse in finish grading without intermixing with other excavated material. Stockpile materials away from edge of excavation and do not store within drip line of remaining trees.
2. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

3.2 PIPING INSTALLATION

A. Comply with requirements for sewer pipe installation specified OWSIM.

B. Install distribution piping according to the following:

1. Use perforated pipe and fittings for mound absorption systems with perforations at bottom.
2. PE Tube and Fittings: ASTM F481.
3. PVC Sewer Pipe and Fittings: ASTM F481.

3.3 PIPE JOINT CONSTRUCTION

A. Join distribution piping with or according to the following:

1. Install pipe and fittings for mound absorption systems with closed joints unless otherwise indicated.
2. PE Tube and Fittings: With PE band couplings.
3. PVC Sewer Pipe and Fittings: With solvent-cemented joints according to ASTM F402 and ASTM D2321.

B. Join dissimilar pipe materials according to ASTM D5926, with couplings and gaskets compatible with pipe materials being joined.

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3.4 CLEANOUT INSTALLATION

A. Install cleanouts according to the following:

1. Inlet and Outlet of Septic Tanks: PVC cleanouts.

B. PVC Cleanouts: Install with PVC riser from sewer and distribution piping to PVC cleanout at grade. Use 4 inch PVC sewer pipe and fittings with solvent-cemented joints for risers and cleanout fitting.

C. Cleanout Support: Set cleanouts in concrete blocks 18-by-18-by-12-inches deep unless location is in concrete pavement.

D. Set top of cleanout 2 inches above surrounding rough grade, or set flush with grade if installed in pavement.

3.5 MOUND ABSORPTION-SYSTEM INSTALLATION

A. Plow top 6 inches of surface.

B. Place layers of sand, aggregate, cap, and topsoil above plowed area. Provide grass topping to match adjacent vegetation. Provide side slope not steeper than 3:1. Tie slope toe smoothly into existing grade.

C. Provide solid vent pipe with vent cap extending 12 inches above top of mounds.

D. Install sewer piping at minimum slope of 1 percent and maximum slope of 2 percent.

E. Install distribution piping solidly bedded in filter material, with full bearing for each pipe section throughout its length. Maintain pipe alignment with no slope.

1. Install perforated pipe with perforations down and joints tightly closed. Install collars and couplings as required.
2. Install elbow fittings with tight joints.

F. Install and grade materials around mound absorption systems to prevent storm runoff from washing away a portion of mound absorption systems and to prevent exposing pipes.

1. Install absorption-system materials as follows from surface of excavation to grade:

a. Each Bed Size: 24 feet wide with distribution piping apart by 94 feet long.
b. Septic Rock Fill: Not less than 12-inch thickness above plowed earth or broken-up sod.
c. Aggregate Filter Material Layer: OD of distribution piping minimum.
d. Topsoil: 1-2 feet and extended to edges of mound.
e. Vegetation Cover: Grass or match adjacent ground cover at surface.

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3.6 IDENTIFICATION

A. Identification materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green, detectable warning tape directly over piping, at outside edges of underground structures, and at outside edges of absorption systems.

3.7 FIELD QUALITY CONTROL

A. System Tests: Perform testing of completed septic tank system piping and structures according to authorities having jurisdiction.

B. Additional Tests: Fill underground structures with water and let stand overnight. If water level recedes, locate and repair leaks and retest. Repeat tests and repairs until no leaks exist.

3.8 CLEANING

A. Clear interior of piping and structures of dirt and other superfluous material as work progresses.

B. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of workday or when work stops.

END OF SECTION 221353

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SECTION 312000 – SEPTIC FIELD EARTH MOVING

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Septic System Site.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Septic Field Bedding: Aggregate layer placed over the excavated subgrade in the field before laying pipe.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
1. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

E. Fill: Soil materials used to raise existing grades.

F. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.

H. Septic Field Bedding: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials

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1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct preexcavation conference at Skeetawk Ski Area.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.
b. Coordination of Work with utility locator service.
c. Extent of trenching by hand or with air spade.
d. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Rigid Insulation.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D698 or ASTM D1557.

C. Seismic survey report from seismic survey agency.

D. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.7 QUALITY ASSURANCE

A. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:

1. Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

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B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:

1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

C. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.8 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Refer to the State of Alaska, Onsite Wastewater System Installation Manual and DEC codes.

2.2 GEOTEXTILES

A. Separation Geotextile: W Typar 3401 or equivalent. Geotechnical fabric products shall conform to AASHTO M288 Class 3 and have the following characteristics:
1. Minimum Permittivity (ASTM D4491) - 0.5 sec-1
2. Maximum Apparent Opening Size (ASTM D4751) – 0.20 to 0.21 mm (US Sieve #70)

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

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1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

B. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.

1. Perform blasting without damaging adjacent structures, property, or site improvements.
2. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

3.4 EXCAVATION FOR SEPTIC FIELD BED

A. Excavate field to indicated gradients, lines, depths, and elevations.

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B. Excavate field to uniform widths to provide the following clearance on each side of pipe or conduit.

C. Septic field Bottoms: Excavate and shape field bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipe and conduit 6 inches in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.

D. Septic field Bottoms: Excavate septic field 12 inches deeper than bottom of pipe and conduit elevations to allow for bedding course.

3.5 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required septic field bedding depth.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.6 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.7 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

   1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring, bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

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3.8 SEPTIC FIELD BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding on septic field bottom and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Initial Backfill:

1. Soil Backfill: Place and compact initial backfill of washed ¾" to 1-1/2" washed septic rock, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

D. Final Backfill:

1. Rigid Insulation: Place insulation above washed septic rock.
2. Controlled Low-Strength Material: Place final backfill of controlled low-strength material to final subgrade elevation.

E. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade.

3.9 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 3 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.10 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.

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3.11 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

3.12 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.

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1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

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SECTION 312000 – CURTAIN DRAIN EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Excavating and backfilling trenches for septic field.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

   1. Initial Backfill: Filter Material placed beside and over pipe in a trench.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Filter Material: 1-1/2 inch to 3 inch round rock.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
   2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
   3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

E. Fill: Soil materials used to raise existing grades.

F. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.

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H. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

I. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct preexcavation conference at Hatcher Pass Xperience, Skeetawk Ski Area.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.
b. Coordination of Work with utility locator service.
c. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
d. Extent of trenching by hand or with air spade.
e. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.
2. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches.
2. Warning Tape: 12 inches long; of each color.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D698 or ASTM D1557.

C. Seismic survey report from seismic survey agency.

D. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

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1.7 QUALITY ASSURANCE

A. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:

1. Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:

1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

C. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

1.8 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Refer to the State of Alaska, Onsite Wastewater System Installation Manual and DEC codes.

2.2 GEOTEXTILES

A. Separation Geotextile: W Typar 3401 or equivalent. Geotechnical fabric products shall conform to AASHTO M288 Class 3 and have the following characteristics:

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1. Minimum Permittivity (ASTM D4491) - 0.5 sec-1
2. Maximum Apparent Opening Size (ASTM D4751) – 0.20 to 0.21 mm (US Sieve #70)

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

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3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

B. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.

1. Perform blasting without damaging adjacent structures, property, or site improvements.
2. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

3.4 EXCAVATION FOR CURTAIN DRAIN

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit 4 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course.

3.5 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.6 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

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1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.7 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Removing trash and debris.
4. Removing temporary shoring, bracing, and sheeting.
5. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.8 CURTAIN DRAIN BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Initial Backfill:

1. Filter Material: Place and compact initial backfill of 1-1/2 inch to 3 inch round rock, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

D. Final Backfill:

1. Soil Backfill: Place final backfill of controlled low-strength material to final subgrade elevation.

E. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.9 SOIL FILL

A. Place and compact fill material in layers to required elevations as follows:

B. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.10 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

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1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.

3.11 SUBSURFACE DRAINAGE

A. Subsurface Drain: Place subsurface drainage geotextile around perimeter of curtain drain trench. Place a 12-inch course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.

3.12 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

3.13 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

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C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.14 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.

1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

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SECTION – POTABLE WATER SUPPLY WELL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Well casings.
2. Grout.

1.3 DEFINITIONS

A. HDPE: High density polyethylene plastic.

1.4 ACTION SUBMITTALS

A. Product Data: Submit certified performance curves and rated capacities of selected well pumps and furnished specialties and accessories for each type and size of well pump indicated.

B. Shop Drawings: For well pumps. Show layout and connections.

1.5 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports:

1. For each well pump, include the following:

a. Substrata formations.
b. Water-bearing formations.
c. Water levels.
d. Laboratory water analysis.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each well pump to include in emergency, operation, and maintenance manuals.

1. Project Record Documents: Record the following data for each water supply well:

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a. Casings: Material, diameter, thickness, weight per foot of length, and depth below grade.
b. Screen: Material, construction, diameter, and opening size.
c. Pumping Test: Static water level, maximum safe yield, and drawdown at maximum yield.
d. Log: Formation log indicating strata encountered.

B. Well Driller Qualifications: An experienced water supply well driller licensed in the jurisdiction where Project is located.

C. Testing Agency Qualifications: Certified by the EPA or State to analyze drinking water for compliance monitoring.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Comply with AWWA A100 for water supply wells.

2.2 WELL CASINGS

A. Steel casing, 6” diameter.

B. Pitless Adapter: Fitting, of shape required to fit onto casing, with waterproof seals.

C. Pitless Unit: Factory-assembled equipment that includes pitless adapter.

D. Well Seals: Casing cap, with holes for piping and cables, that fits into top of casing and is removable, waterproof, and vermin proof.

2.3 GROUT

A. At least 10 feet of continuous bentonite grouting within the first 20 feet below the ground surface, and must conform to Alaska Department of Environmental Conservation 18 AAC 80.015 (b).

B. Water Analysis Testing:

1. The source will be tested by a qualified testing agency to make bacteriological, physical, and chemical analyses of water from each finished well and report the results. Make analyses according to requirements of authorities having jurisdiction, specifically the Alaska Department of Environmental Conservation Drinking Water Program and 18-AAC-80.
2. Engineer will analyze water sample from each finished well for bacteriological, physical, and chemical quality and report the results. Make analyses according to requirements of authorities having jurisdiction, specifically the Alaska Department of Environmental Conservation Drinking Water Program and 18-AAC-80.

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2.4 CLEANING AND DISINFECTION

A. Water supply well and line disinfection must be carried out as required by the Alaska Department of Environmental Conservation (DEC) 18-AAC-80.

2.5 PROTECTION

A. Exercise care to prevent breakdown or collapse of strata overlaying that from which water is to be drawn.

B. Protect water supply wells to prevent tampering and introducing foreign matter. Retain temporary well cap until installation is complete.

END OF SECTION

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SECTION 312000 – UTILITY ROAD EARTH MOVING

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades gravel roadway.
3. Excavating and backfilling for gravel roadway.
4. Drainage course for grade.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for pit excavation that

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cannot be removed by rock-excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:

I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D1586.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct preexcavation conference at Hatcher Pass Xperience, Skeetawk Ski Area.

1. Review methods and procedures related to earthmoving, including, but not limited to, the following:

a. Personnel and equipment needed to make progress and avoid delays.
b. Coordination of Work and equipment movement with the locations of tree- and plant-protection zones.
c. Extent of trenching by hand or with air spade.
d. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following manufactured products required:

1. Geotextiles.

B. Samples for Verification: For the following products, in sizes indicated below:

1. Geotextile: 12 by 12 inches.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:

1. Classification according to ASTM D2487.
2. Laboratory compaction curve according to ASTM D698 or ASTM D1557.

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C. Seismic survey report from seismic survey agency.

D. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earth-moving operations. Submit before earth moving begins.

1.7 QUALITY ASSURANCE

A. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:

1. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
2. Seismographic monitoring during blasting operations.

B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E329 and ASTM D3740 for testing indicated.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Refer to Alaska Department of Transportation and Public Facilities Standard Specification for Highway Construction (2017 Edition).

2.2 GEOTEXTILES

A. Refer to Alaska Department of Transportation and Public Facilities Standard Specification for Highway Construction (2017 Edition).

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.

B. Protect and maintain erosion and sedimentation controls during earth-moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

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3.2 DEWATERING

A. Provide dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

B. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

D. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

B. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.

1. Perform blasting without damaging adjacent structures, property, or site improvements.
2. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

B. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.

1. Earth excavation includes excavating obstructions visible on surface; and soil, boulders, and other materials not classified as rock or unauthorized excavation.

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a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.

2. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction.

3.5 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade below the roadway to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.6 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.7 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring, bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

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3.8 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 1.5 horizontal so fill material will bond with existing material.

B. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.9 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.10 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D698 or ASTM D1557:
1. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.11 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch .

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3.12 SUBBASE AND BASE COURSES UNDER ROADWAY

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course as follows:

1. Install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Shape subbase course to required crown elevations and cross-slope grades.
3. Place subbase course 6 inches or less in compacted thickness in a single layer.
4. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D698 or ASTM D1557.

3.13 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Determine prior to placement of fill that site has been prepared in compliance with requirements.
2. Determine that fill material classification and maximum lift thickness comply with requirements.
3. Determine, during placement and compaction, that in-place density of compacted fill complies with requirements.

B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

D. Testing agency will test compaction of soils in place according to ASTM D1556, ASTM D2167, ASTM D2937, and ASTM D6938, as applicable. Tests will be performed at the following locations and frequencies:

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.14 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

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1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

B. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Architect.

1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

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Appendix C: Construction Estimate

Apex Engineering

Skeetawk Ski Area Maintenance Road & Water/Wastewater Construction Estimate

Materials:

Description	Supplier	Qty	Unit	Material Unit Price ($)	Equipment Price ($)	Cost
Maintenance Road						
Maintenance Road Excavation (10'W x 8976'L x 2'D)		34515	CY			
E-1 Surface Course (10'W x 8976'L x 4"D)	Flintstone Pit	1108	CY	$ 9.00		$ 9,973.33
1" Minus Pit Run (10'W x 8976'L x 8"D)	Flintstone Pit	2216	CY	$ 5.00		$ 11,081.48
Geotextile (HP270) 15'x300' Roll	Polar Supply	30	ROLL	$ 275.00		$ 8,250.00
Equipment - Dozer	United Rentals	20	DAY		$ 500.00	$ 10,000.00
Equipment - Compactor	United Rentals	20	DAY	$ -	$ 350.00	$ 7,000.00
Hydroseed	Able Hydroseed	311443	SF	$ 0.10		$ 31,144.29
					Subtotal:	$ 77,449.10
Well						
Well Drill Contract ($47/ft)	PENN Jersey Drilling	100	FT	$ 47.00		$ 4,700.00
Submersible Well Pump & Appurtenances ($1500 per 50 ft)	PENN Jersey Drilling	100	FT	$ 30.00		$ 3,000.00
**Assumption: Well will be 100 ft deep					Subtotal:	$ 7,700.00
Septic						
Equipment - Dozer	United Rentals	4	DAY		$ 500.00	$ 2,000.00
Septic Sand	AAA Valley Gravel	250.5	TON	$ 10.25		$ 2,567.63
1/2" Washed Septic Rock	AS&G	375	TON	$ 7.25		$ 2,718.75
2" Rigid Insulation 32sqft board	Home Depot	5000	SF	$ 29.37		$ 4,589.06
4" Rigid Insulation 32sqft board	Home Depot	205	SF	$ 58.74		$ 376.30
4" PVC Non-perf Sewer Pipe+20% (10ft sections)	Home Depot	294	LF	$ 16.47		$ 581.06
Stand Pipes, Clean Out Pipes, Tank Pipes (10ft	Home Depot	14	EA	$ 16.47		$ 230.58
Sanitary Tee	Home Depot	4	EA	$ 7.16		$ 28.64
Caps	Home Depot	14		$ 7.98		$ 111.72

Perforated Piping +20% (10ft sections)	Home Depot	890	LF	$	9.42		$ 1,006.06
3000 Gallon Septic Tank (76 inch diameter, 180 inch	Greer	1	EA	$	6,800.00		$ 6,800.00
Hydroseed	Able Hydroseed	7600	SF	$	0.10		$ 760.00
						Subtotal:	$ 19,769.80

Curtain Drain

Equipment - Dozer	United Rentals	6	DAY			$ 500.00	$ 3,000.00
Geotextile (6 ounce) 15'x300' Roll (1800 sqrt)	Polar Supply	1	ROLL	$	386.00		$ 386.00
Black Plastic 20'x100' Roll (1800 sqrt)	Home Depot	1	ROLL	$	108.00		$ 108.00
3/4" Round Gravel	AS&G	50	CY	$	50.38		$ 2,519.00
4" Drain Pipe (perforated on the top only) 100ft	Grainger	300	LF	$	60.00		$ 180.00
						Subtotal:	$ 3,193.00

Total Materials Cost	**$ 108,111.90**

Labor:

Description	Supplier	Qty	Unit	Cost
Maintenance Road	TBD	1.7	Mile	$ 500,000.00
Well Water System	PENN Jersey Drilling	100	FT	$ 7,700.00
Septic System	TBD	4500	SQFT	$ 20,000.00
Curtain Drain	TBD	300	LF	$ 15,000.00

Total Labor:	**$ 542,700.00**

Appendix D: Water and Wastewater Calculations

Apex Engineering

Calculations for Peak Instaneous Demand (PID) of Water System*

2015 Uniform Plumbing Code (UPC)

UPC Fixture	# of Fixtures	UPC Fixture Unit Value	Resultant
Dishwasher, domestic	2	1.5	3.0
Lavatory	10	1.0	10.0
Sink, bar	1	2.0	2.0
Sink, kitchen, domestic	2	1.5	3.0
Water Closet, gravity	10	2.5	25.0

Total UPC Fixture Unit Values=	43.0

2015 UPC PID from Chart A 103.1(2)=	**38**	**gpm**

AWWA M22 Sizing Water Service Lines and Meters

M22 Fixture	# of Fixtures	M22 Fixture Unit Value	Resultant
Dishwasher	2	2.0	4.0
Faucet (lavatory)	10	1.5	15.0
Faucet (bar)	1	2.2	2.2
Faucet (kitchen)	2	2.2	4.4
Toilet (tank)	10	4.0	40.0

Total M22 Fixture Unit Values=	65.6

AWWA M22 PID (from Figure 4-2)=	**47**	**gpm**

Estimated PID=	**47**	**gpm**

Required Storage for Commercial should at least (PID-Well yield)*20min

assume well yield	10	gpm

Required water storage	**740**	**gal**

***Design does not account for fire protection**

Assumptions:
One full kitchen consists of two sinks, two dishwashers
Ground floor will have two toilets, two bathroom sinks, wash station
Second floor will have six toilets, six sinks
Third floor has bar sink, two toilets, two sinks

Apex Engineering

Dynamic Head Loss from Well to Building

design based on peak demand 47 gpm

Hazen-Williams Equation: $h_L = 10.4L(Q/C)^{1.85}D^{-4.87}$

h_L = headloss, ft
L = length, ft
Q = flow rate, gpm
C = Hazen-Williams C-factor
D = pipe inside diameter, in.

assume a pipe length of 200 ft from the well to the building and a 2" HDPE line

pipe length =	200	ft
inner diameter =	1.656	in
C =	140	
h_L =	**23.67**	**ft**

Apex Engineering

Daily Estimated Wastewater Design Flow

From EPA manual Table 3-4*, assume a Bar/cocktail lounge - Flow range in gallons/unit/day 2-4

assume median value of 3 gal/customer/day	3	gal/customer/day
	675	customers/day
Daily Estimated Design Flow	**2025**	**gpd**

Peak Estimated Wastewater Design Flow

Average Flow per minute (12 hours of operation)=	2.8	gpm
apply a peaking factor	5	
Estimated Peak Design Flow	**14**	**gpm**

Septic Tank Sizing

From ADEC 18 AAC 72.035 (3)(C), net minimum volume of septic tank size = 1,125 gal. + 0.75 * (daily design flow)

round volume up to nearest standard tank size	2643.8	gal
Septic tank size	**3000**	**gal**

Leachfield Sizing

According to ADEC 18-AAC-72.260 Table B, assume an application rate of 0.45 gal/day/ft^2 based on soil type

Application Rate	0.45	gal/day/ft^2

*area of leachfield is equal to flow per day divided by the application rate***

Area of Leachfield	**4500**	**ft^2**

*Onsite Wastewater Treatment Systems Manual (EPA, 2002) Chapter 3: Establishing Treatment System Performance Requirements

**Onsite Wastewater Treatment Systems Manual (EPA, 2002) Chapter 4: Treatment Processes and Systems

Apex Engineering

Buoyancy calculations for Septic Tank

Greer 3000 gal tank

Tank Diameter	6.33	ft
Tank Length	15	ft
Tank Depth	4	ft
Tank Volume	3000	gal
Tank Weight	3120	lb

Material Properties

Specific Weight of Water	62.4	lb/ft^3
Specific Weight of Soil	82	lb/ft^3

Buoyancy force exerted on the tank

Factor of Safety	1.3	
Buoyancy Force	32610.24	lb
	32.61	kip

Equivalent fluid weight of overbearing soil (lb)

Soil Volume above tank	444.56	ft^3
Soil Weight	36453.87	lb
	36.45	kip

Net Buoyancy	-6963.63	lb
	-6.96	**kip**

Overbearing weight of the soil and the tank weight are greater than the buoyancy force, therefore minimum anchorage is necessary

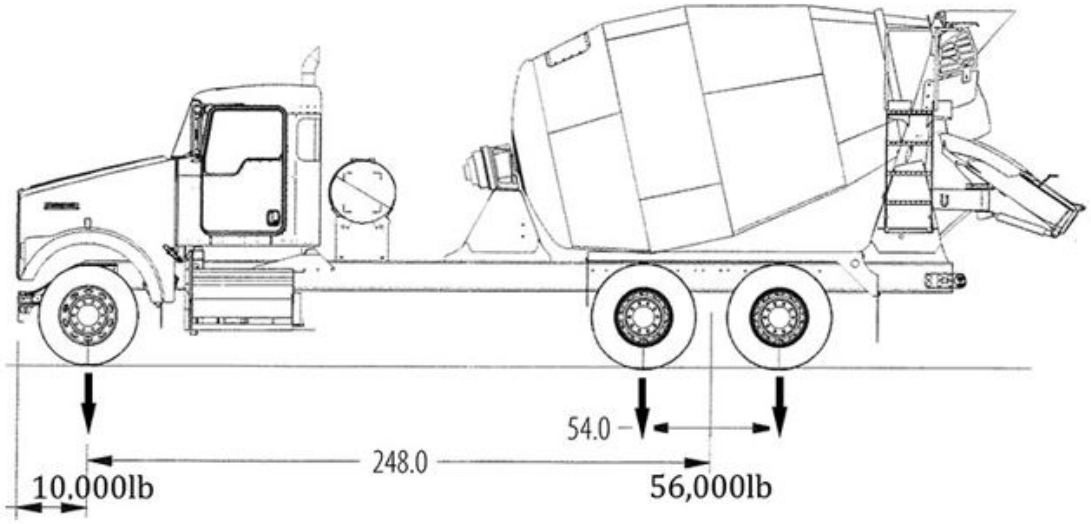
Notes:

*Inorganic silts and clayey silts (ML) with some poorly graded sands and gravels (SP)

Assumptions:

Specific weight of Saturated ML & SP* soil classification

Appendix E: Maintenance Road Design Vehicle

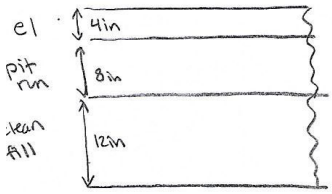


Reference : https://www.structuremag.org/?p=10927

Typical Concrete Truck Specifications

- Fully loaded truck exerts approximately 66,000 lbs. (10,00 lbs. on front-axle and 28,000 lbs. on each rear-axle)
- Distance between front and rear axles is approximately 248 inches
- Rear axles spacing is 54 inches (4.5 ft)
- Wheel base width is approximately 102 inches (8.5 ft)
- Typical tire pressure is approximately 120 psi

Appendix F: Maintenance Road Calculations



Base

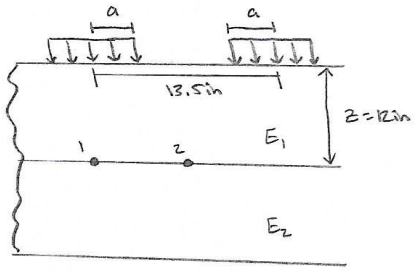
$E_1 = 28{,}000$psi based on 80% CBR $h_1 = 12$in

Subbase

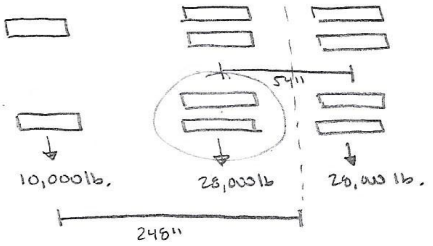
$E_2 = 17{,}000$psi based on 40% CBR

Base on Figure 7.15, Untreated base 80 CBR → $E_1 = 28{,}000$psi

Subbase Figure 7.16, untreated 40 CBR → $E_2 = 17{,}000$psi



assume $\frac{E_1}{E_2} = 2.5$ $q = 120$psi $S_d = 13.5$in (assume)



Calculate vertical deflection on interface at pt. 1 & 2.

$\frac{28{,}000\text{lb}}{4\text{ tires}} = 7{,}000$ lb/tire $= P$

$q = \frac{P}{A} \rightarrow A = \frac{P}{q} = \frac{7000\text{lb}}{120\text{psi}} = 58.3\text{in}^2$

$A = \frac{\pi}{4}(d^2) = 58.3$

$d = 8.62$

$a = 4.3$

left tire: pt. 1

$\frac{h_1}{a} = \frac{12}{4.3} = 2.8$

$\frac{r}{a} = \frac{0}{4.3} = 0$

Figure 2.19:

$F = 0.43$

right

$\frac{h_1}{a} = 2.8$

$\frac{r}{a} = \frac{13.5}{4.3} = 3.14$

$F = 0.26$

$F = 0.43 + 0.26 = 0.69$

$v_1 = \frac{qa}{E_2} F = \frac{(120)(4.3)}{17{,}000}(0.69) = 0.021\text{in}$

pt. 2: left tire = right tire @ pt. 2

$\frac{h_1}{a} = \frac{12}{4.3} = 2.8$

$\frac{r}{a} = \frac{13.5/2}{4.3} = 1.57$

$F = 0.36$ $F_{total} = 0.36 + 0.36 = 0.72$

$v_2 = \frac{qa}{E_2} = \frac{120(4.3)}{17{,}000}(0.72) = 0.022\text{in}$

$v_1 < v_2$ use v_2

$v_{truck} = 0.022\text{in}$ $v^*_{allowable} = 0.067$ (1.7mm)

* Based on Asphalt Institute allowable max. deflection on local roads with ESALs (≈100,000)

$v_{truck} < v_{allow}$

Design is good ✓