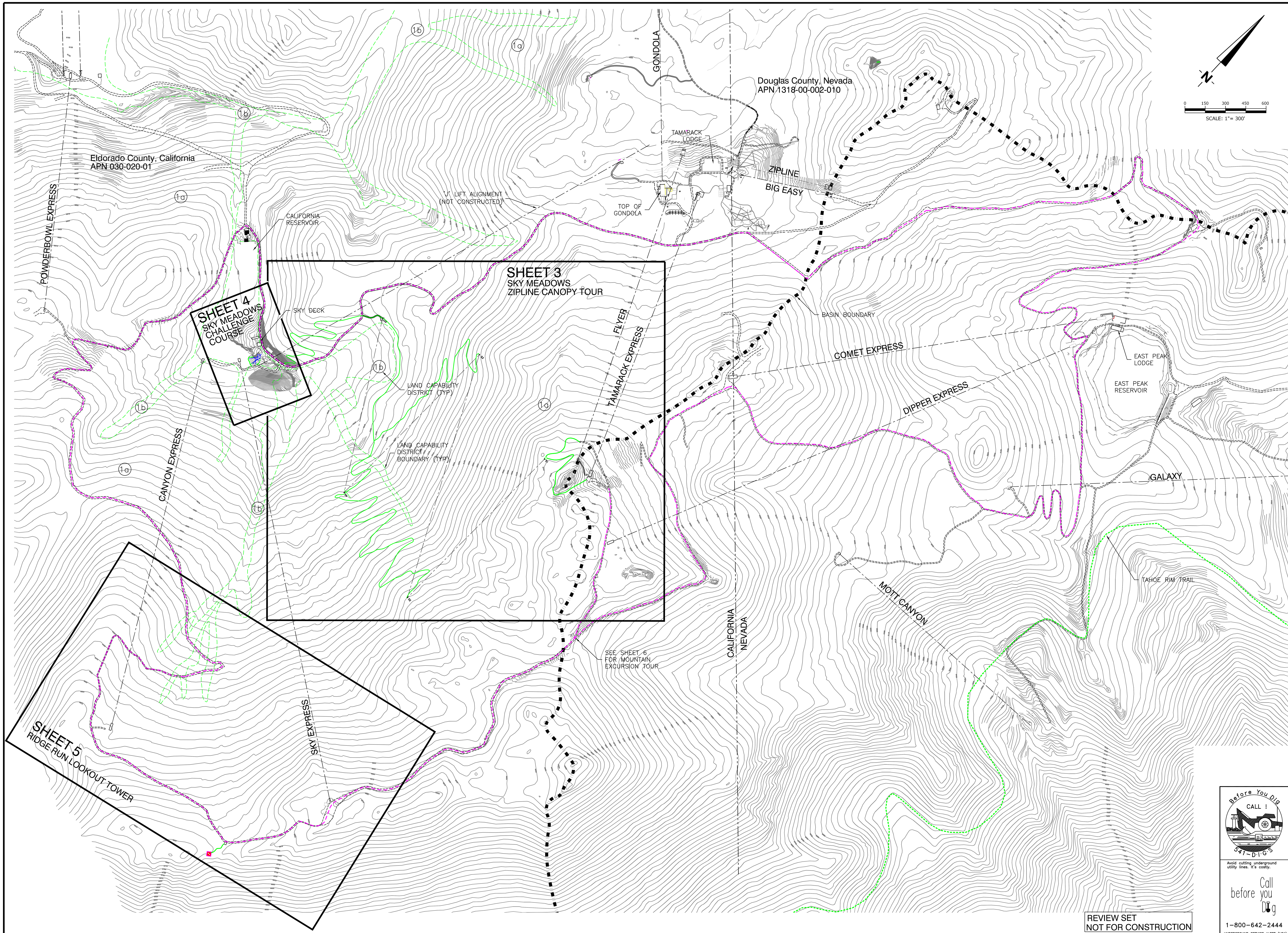

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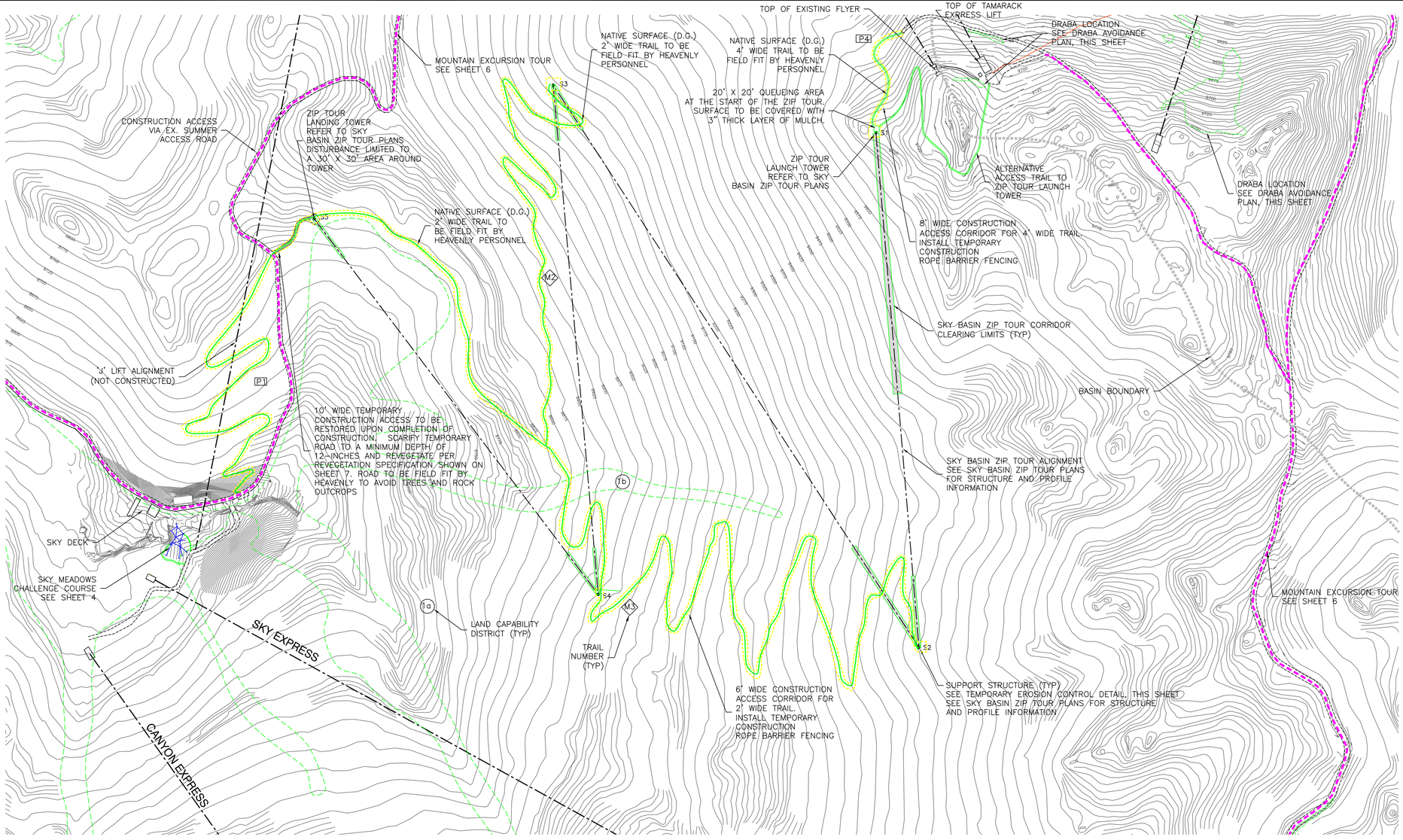
REVISION	DATE

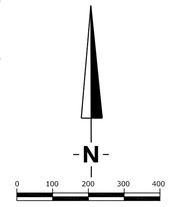
HEAVENLY MOUNTAIN RESORT
Sky Meadows Basin Epic Discovery Activities

SITE PLAN AND SHEET INDEX

JOB NO.:	12-602.7
DATE:	1/29/14
DESIGNED:	MMG
DRAWN :	MLM/FRB
CHECKED:	MMG

SHEET 2





LEGEND:

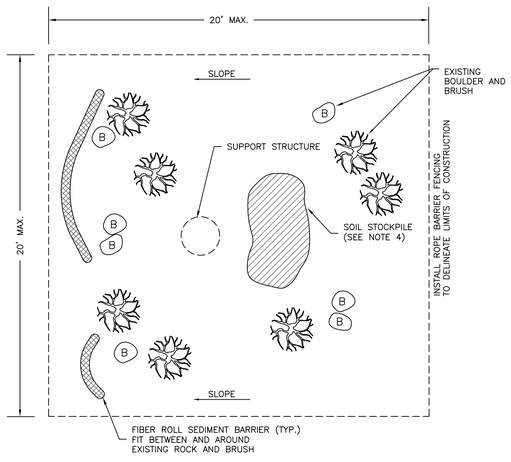
P-S2 PUBLIC HIKING TRAILS

S2 ADMINISTRATIVE MAINTENANCE TRAILS

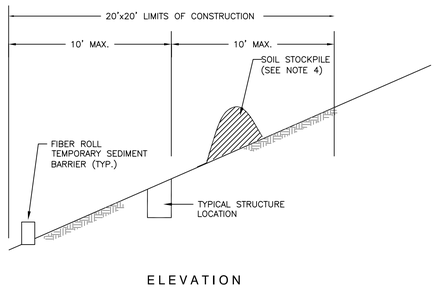
SKY BASIN ZIP TOUR CORRIDOR CLEARING LIMITS (TYP)
TOTAL ESTIMATED CLEARING: 1.1 ACRES

NOTES:

1. ALL TRAILS SHALL BE AT GRADE, NATIVE MATERIAL TRAILS THAT ARE FIELD FIT TO MINIMIZE REMOVAL OF VEGETATION AND UTILIZE THE NATURAL TOPOGRAPHY TO MINIMIZE GRADES.
2. STACKED SWITCHBACKS SHALL BE MINIMIZED TO THE EXTENT POSSIBLE.
3. FORMER ROADWAY PRISMS SHALL BE UTILIZED WHERE PRACTICABLE FOR NEW TRAIL ALIGNMENTS.
4. ALL TRAIL CONSTRUCTION CORRIDORS OUTSIDE OF THE TRAIL ITSELF SHALL BE REVEGETATED PER THE REVEGETATION SPECIFICATIONS INCLUDED IN THESE PLANS.



PLAN



ELEVATION

TEMPORARY EROSION CONTROL FOR STRUCTURE CONSTRUCTION

NOT TO SCALE

SKY BASIN ZIP TOUR GENERAL NOTES:

1. There shall be a 20-foot by 20-foot maximum temporary clearing around each support structure.
2. All disturbed areas shall be revegetated per the revegetation specifications included in these plans. Any vegetative debris from the site shall be chipped and/or re-scattered over the disturbed area.
3. SEZ areas in the vicinity of construction will be flagged in the field so that they are clearly visible during construction.
4. Structure foundation excavation and structure placement will be completed using techniques to minimize the amount of disturbance at the site. After the structure has been placed, any remaining soil from any foundation excavation shall be spread within the 20-ft x 20-ft construction limits. These areas shall be revegetated per the revegetation specifications included in these plans.

TAHOE DRABA AVOIDANCE AND RESOURCE PROTECTION PLAN

EXISTING CONDITIONS AND PLANT LOCATIONS

Surveys for Tahoe Draba (Draba asterophora var. asterophora) were performed by Lake Tahoe Basin Management Unit botanists and Hauge Brueck botanists and biologists on the project. Plants were located in close proximity of and within the alignment of the existing road. Please see the plan sheets showing the plant locations.

Tahoe Draba shall be avoided, protected, and monitored during construction. There will be no vehicle traffic off road outside of construction limits.

PROTECTIVE MEASURES

In order to avoid and protect the existing Draba Asterophora plants the following measures shall be taken: The large populations shall be avoided and protected by surrounding the existing plants with continuous orange protective fencing.

All other plants shall be surrounded with orange protective fencing. A distance of 3 feet shall be maintained between the existing plants and the surrounding protective fence. All fences shall be maintained and supported by sufficient stakes or poles in such a manner to prevent access or disturbance to the enclosure.

Grading will be minimized in the area near the plants in order to maintain the existing vertical elevations. In the event blasting is required nearby, the plants shall be covered with canisters during blasting and canisters shall be removed immediately after blasting.

Continuous protective fencing shall be installed immediately adjacent to the existing plants. The protective fencing shall be installed in such a manner to protect the existing plants from both vehicle and pedestrian disturbance. All fencing shall be approved by the LTBMU Forest Botanist.

During and upon completion of construction activities, the area shall be monitored and surveyed for damaged plants. The Forest Botanist shall give final approval for removal of protective fencing.

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SKY BASIN ZIP TOUR

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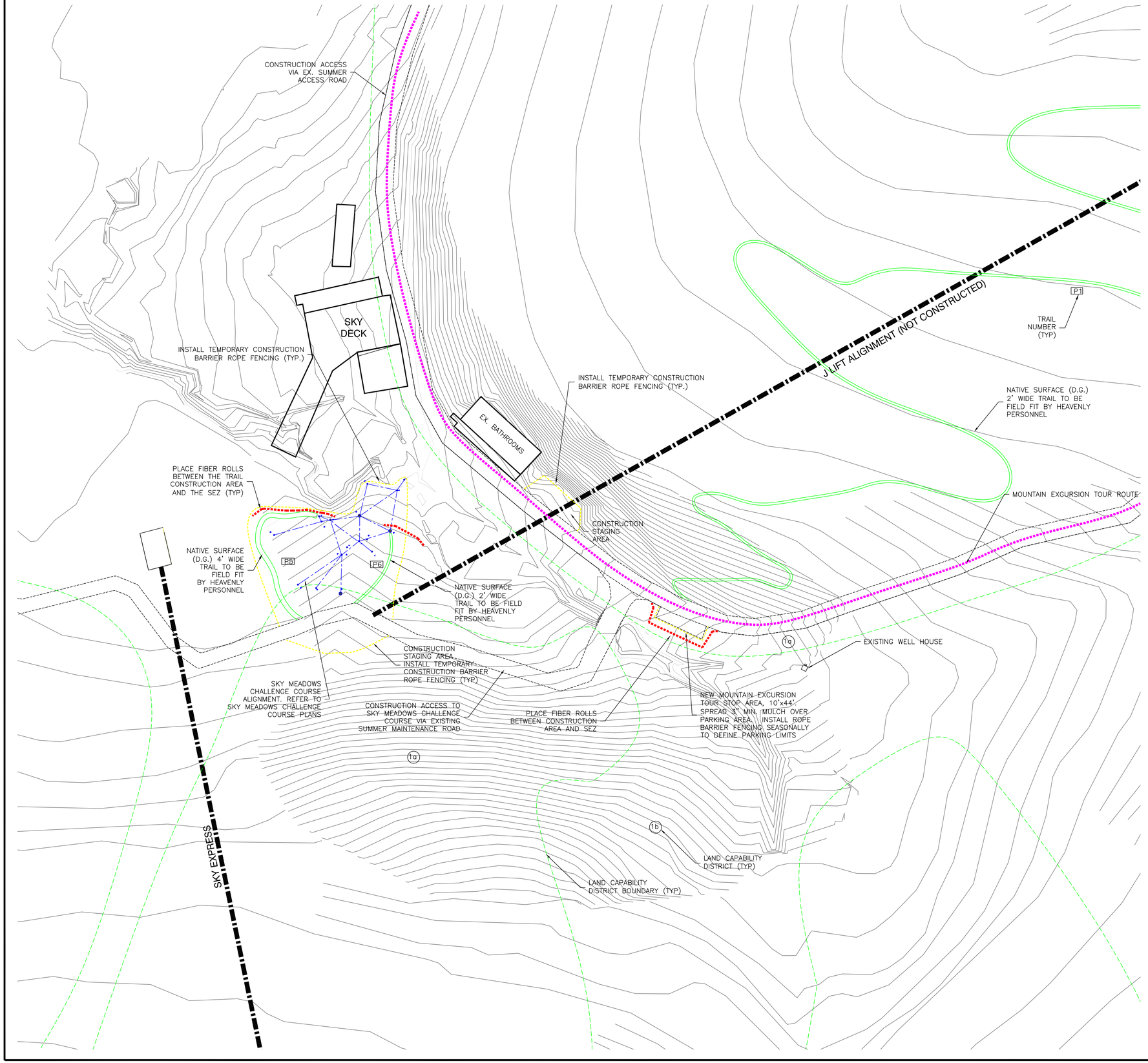
CHECKED:	MMG

SHEET 3



0 20 40 60 80

SCALE: 1"= 40'

LEGEND:

P2 PUBLIC HIKING TRAILS

M2 ADMINISTRATIVE MAINTENANCE TRAILS

NOTES:

1. ALL TRAILS SHALL BE AT GRADE, NATIVE MATERIAL TRAILS THAT ARE FIELD FIT TO MINIMIZE REMOVAL OF VEGETATION AND UTILIZE THE NATURAL TOPOGRAPHY TO MINIMIZE GRADES.
2. STACKED SWITCHBACKS SHALL BE MINIMIZED TO THE EXTENT POSSIBLE.
3. FORMER ROADWAY PRISMS SHALL BE UTILIZED WHERE PRACTICABLE FOR NEW TRAIL ALIGNMENTS.
4. ALL TRAIL CONSTRUCTION CORRIDORS OUTSIDE OF THE TRAIL ITSELF SHALL BE REVEGETATED PER THE REVEGETATION SPECIFICATIONS INCLUDED IN THESE PLANS.

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SKY MEADOWS CHALLENGE COURSE

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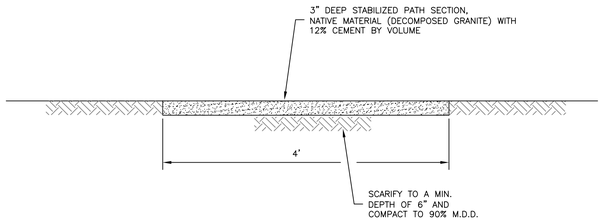
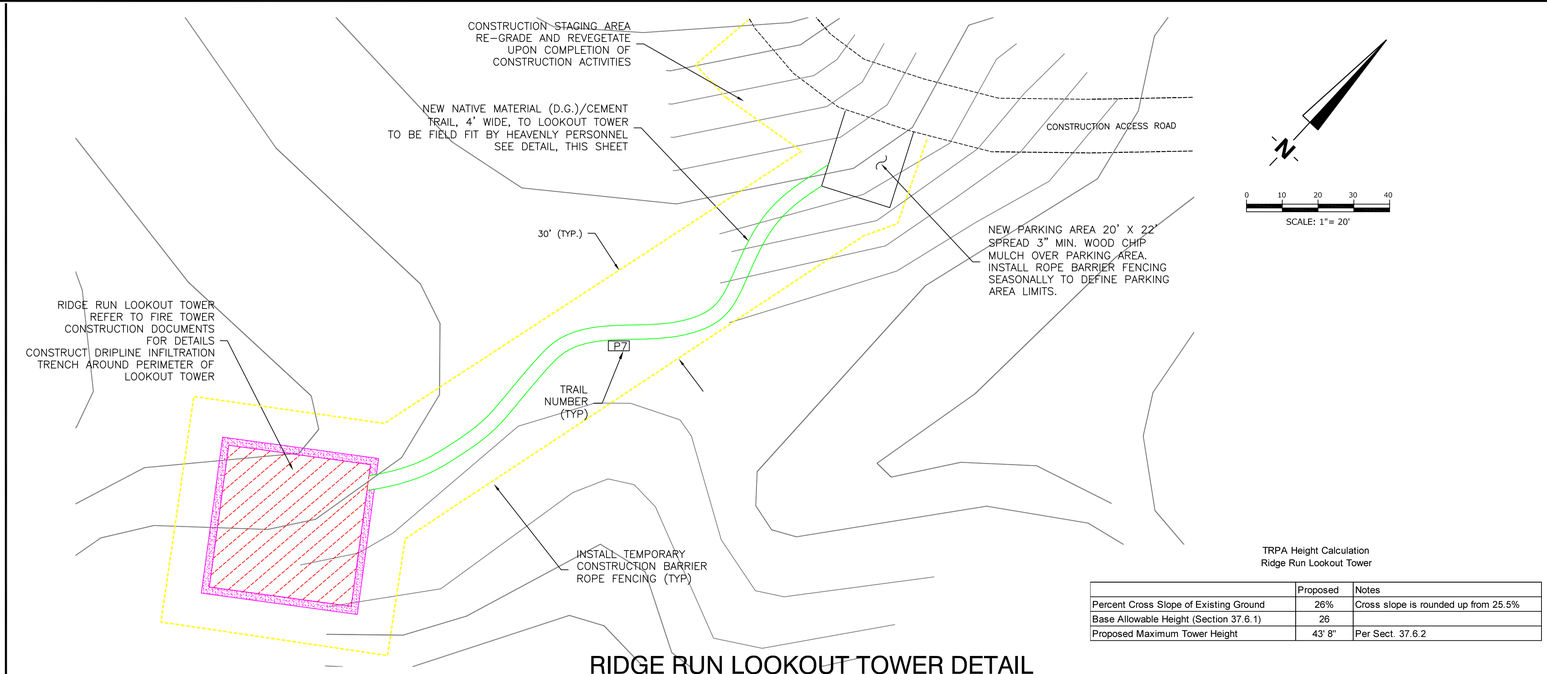
SHEET 4



DG/CEMENT TRAIL DETAIL

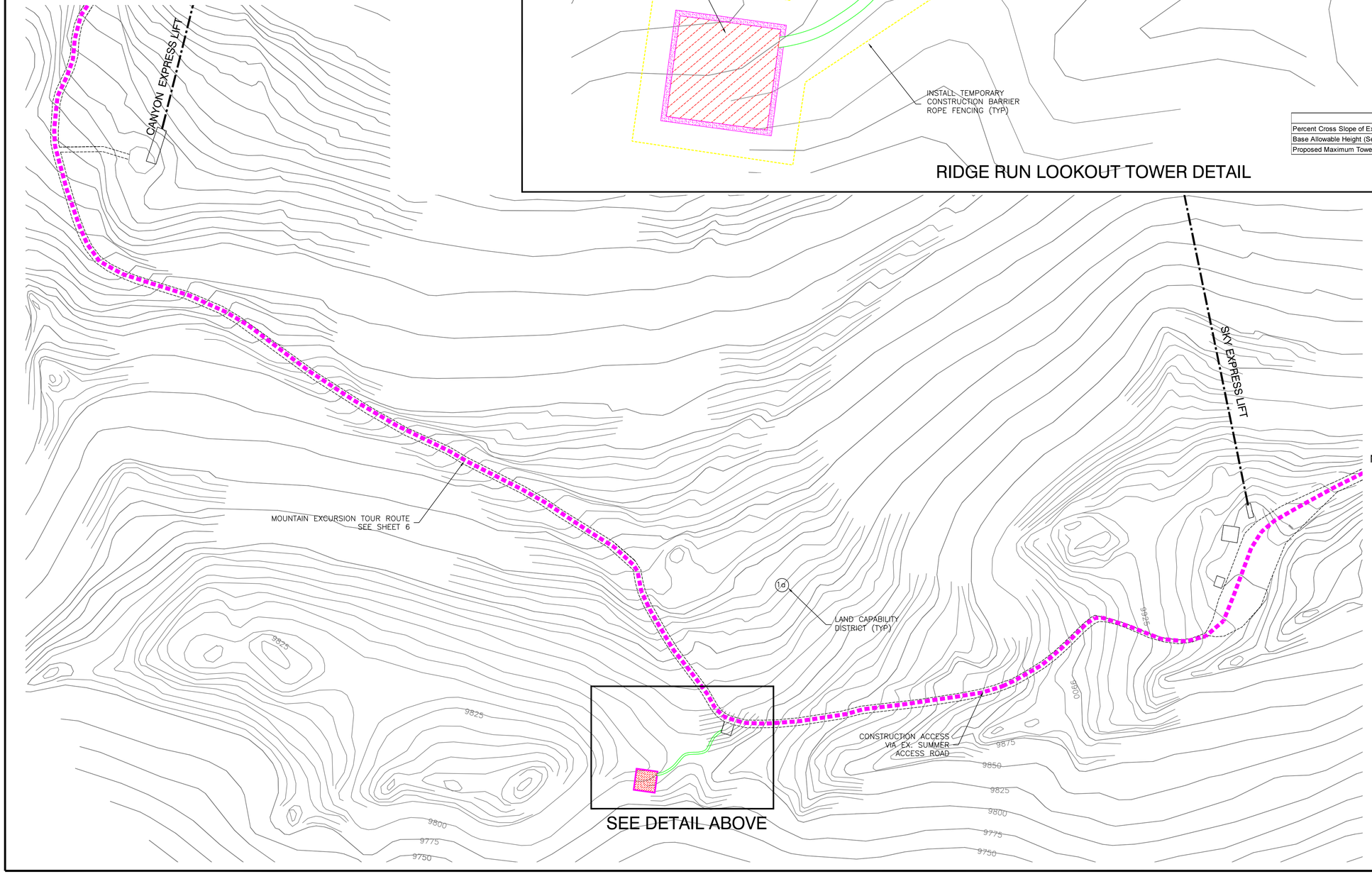
NO SCALE



RIDGE RUN LOOKOUT TOWER DETAIL

TRPA Height Calculation
Ridge Run Lookout Tower

	Proposed	Notes
Percent Cross Slope of Existing Ground	26%	Cross slope is rounded up from 25.5%
Base Allowable Height (Section 37.6.1)	26	
Proposed Maximum Tower Height	43' 8"	Per Sect. 37.6.2



LEGEND:

P2 PUBLIC HIKING TRAILS

MZ ADMINISTRATIVE MAINTENANCE TRAILS

NOTES:

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RIDGE RUN LOOKOUT TOWER

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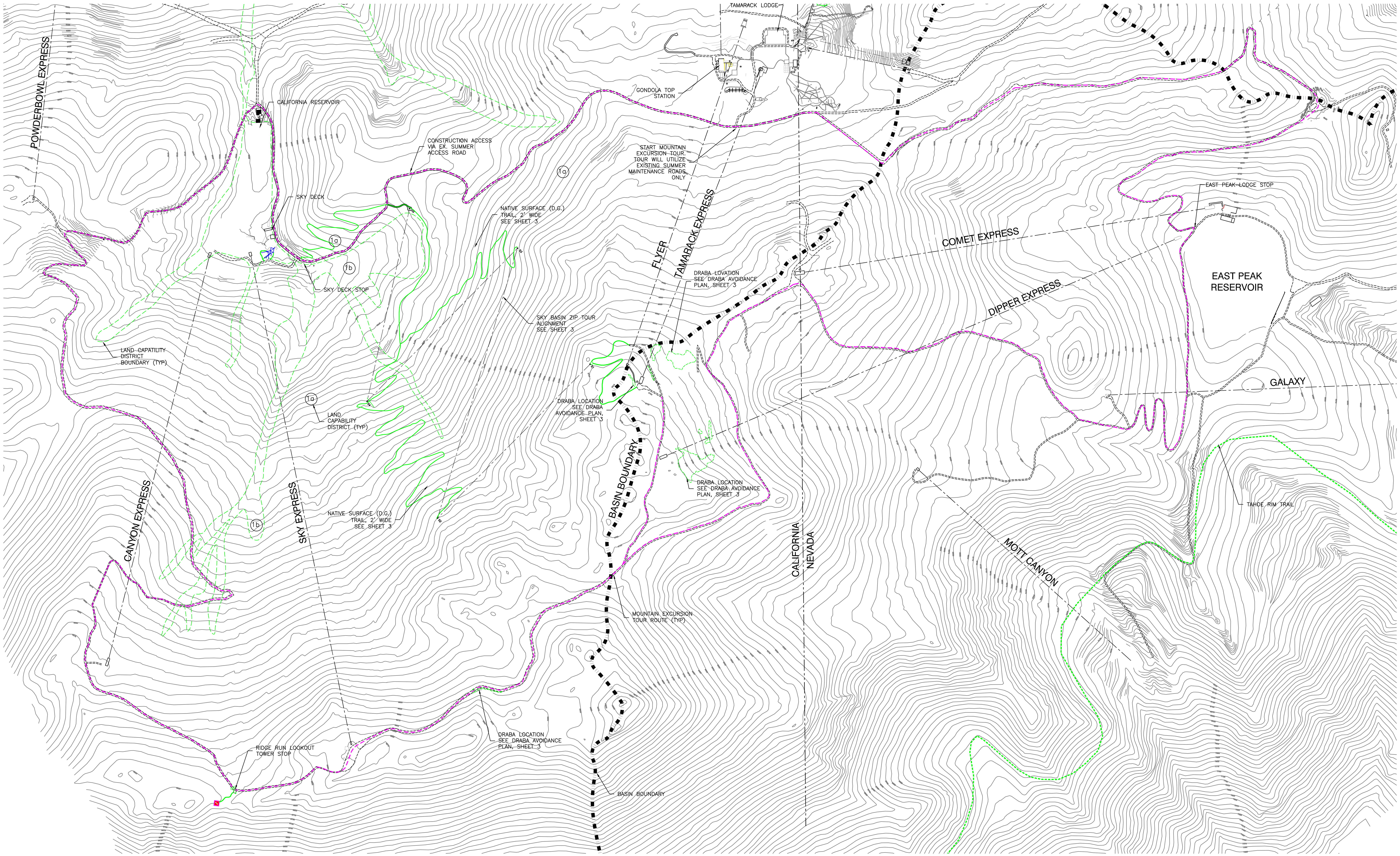
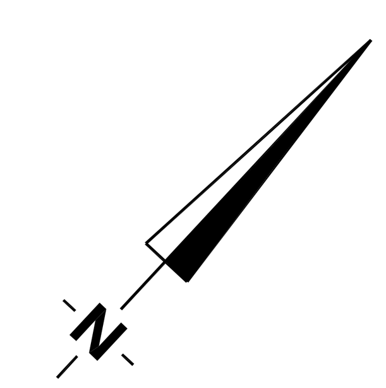
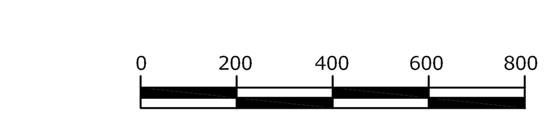
CHECKED:	MMG

SHEET 5







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HEAVENLY MOUNTAIN RESORT
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MOUNTAIN EXCURSION TOUR

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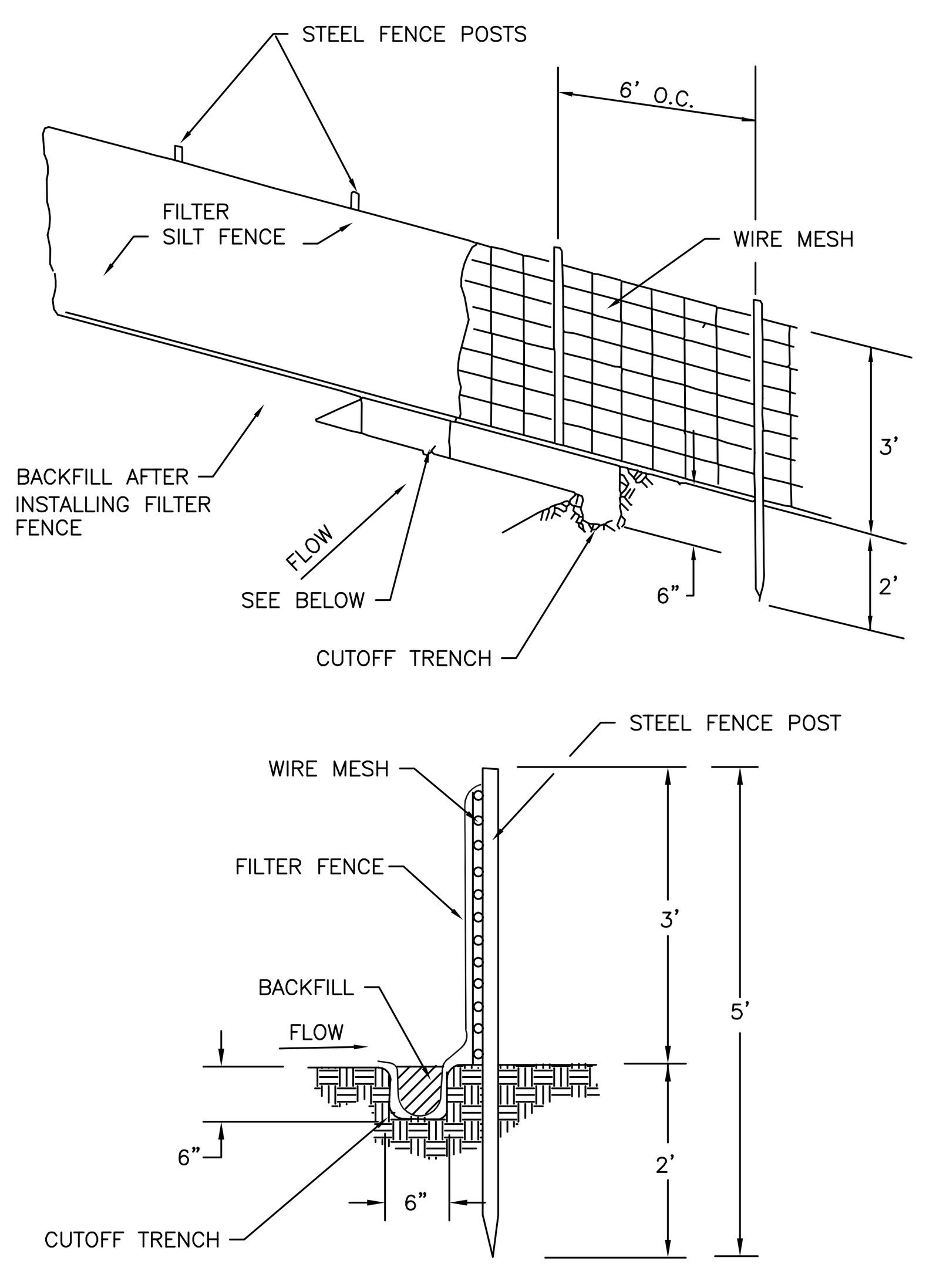
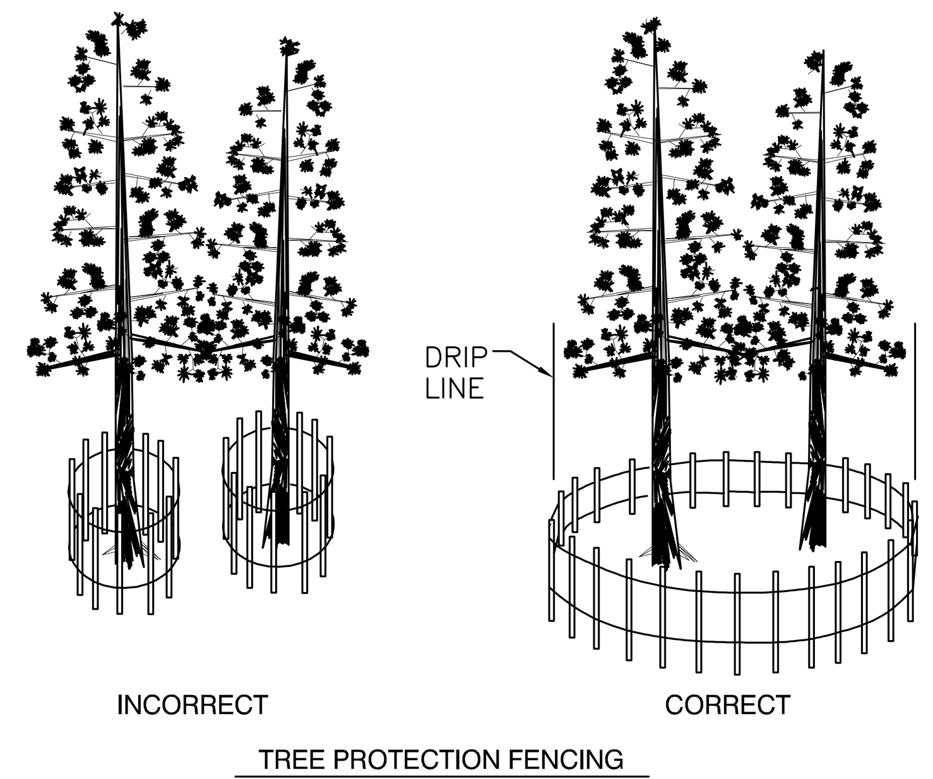
SHEET 6



NOTES:
1. THE CONTRACTOR MAY USE MANUFACTURED FILTER FENCING IN LIEU OF THE ABOVE, SUBJECT TO SUBMITTAL OF MANUFACTURER'S DATA SHEETS TO THE ENGINEER FOR APPROVAL.
2. WIRE MESH CAN BE DELETED IF POST SPACING IS REDUCED TO 4–FOOT OC.
3. ENDS OF RUN OF FILTER FENCE SHALL BE TURNED UPHILL TO FORM A 'J'.

TEMPORARY EROSION CONTROL TYPICAL FILTER FENCE

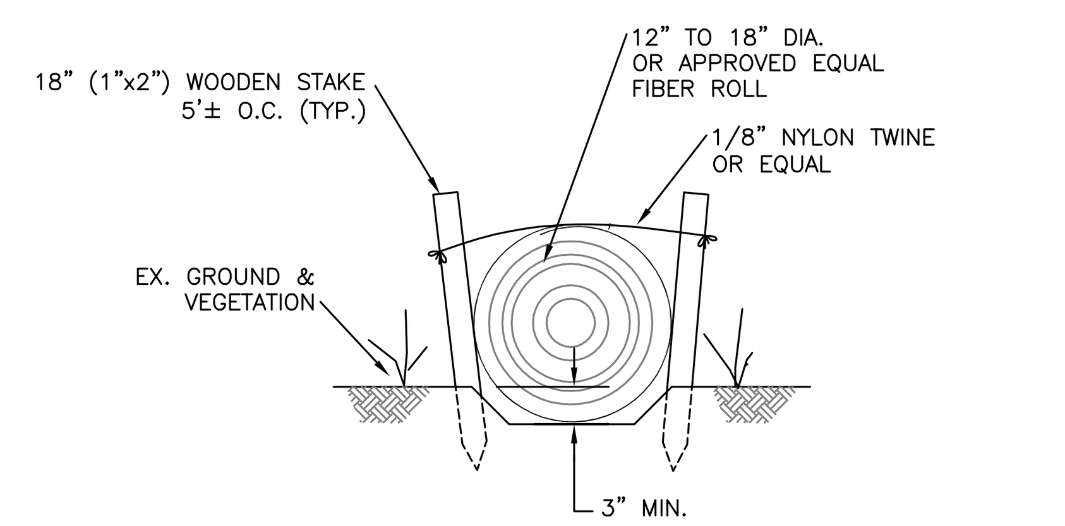
NO SCALE



NOTE:
1. TEMPORARY FENCING TO BE A MINIMUM OF 4' HIGH.
2. POSTS TO BE SET AT A MINIMUM OF 6' ON CENTERLINE FROM EACH OTHER.
3. FENCING MATERIALS TO BE APPROVED BY THE ENGINEER.

TEMPORARY EROSION CONTROL TREE PROTECTION DETAIL

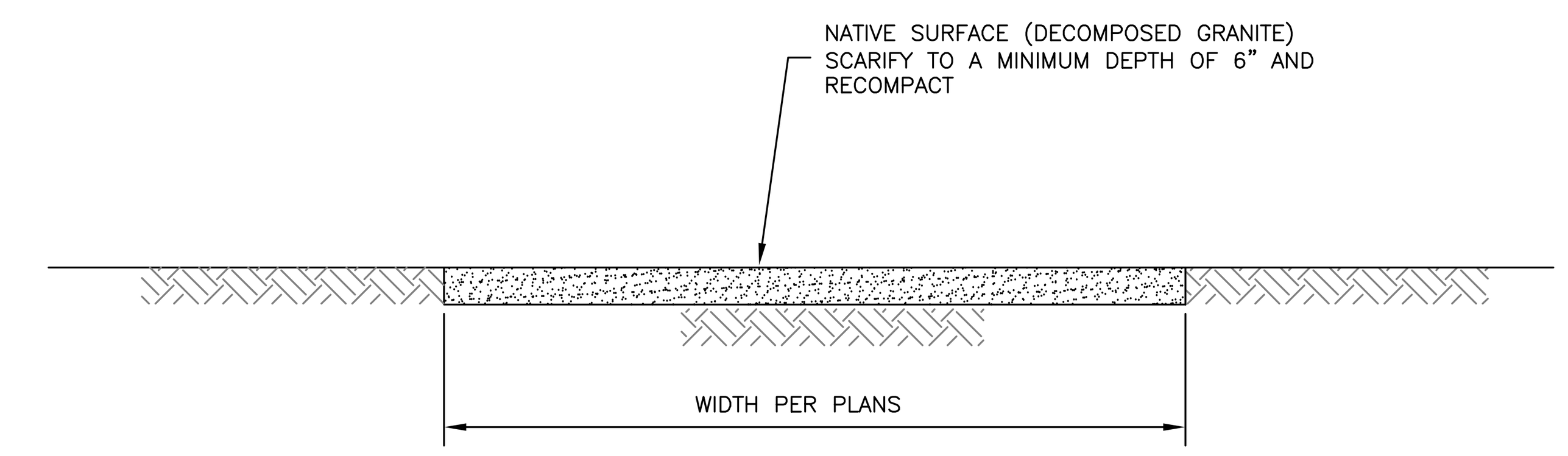
NO SCALE



NOTES:
1. FIBER ROLL INSTALLATION REQUIRES THE PLACEMENT AND SECURE STAKING OF THE ROLL IN A TRENCH, 3" TO 6" DEEP, DUG ON CONTOUR. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL.
2. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
3. FIBER MATERIAL SHALL BE BIODEGRADABLE WEED–FREE STRAW, JUTE, COIR, OR EXCELSIOR. MATERIALS REQUIRE TRPA AND U.S. FOREST SERVICE APPROVAL PRIOR TO INSTALLATION.

TEMPORARY SEDIMENT BARRIER FIBER ROLLS

NO SCALE



NATIVE SURFACE (DG) TRAIL DETAIL

NO SCALE

EROSION CONTROL NOTES

1. FOR ALL USE OF THE STAGING AREAS WHEN SNOW COVER IS NOT PRESENT, HEAVENLY SHALL HAVE ALL TEMPORARY EROSION CONTROL MEASURES IN PLACE AND APPROVED BY TRPA. HEAVENLY SHALL INCORPORATE ADEQUATE DRAINAGE PROCEDURES DURING THE CONSTRUCTION PROCESS TO ELIMINATE EXCESSIVE PONDING AND/OR EROSION. AFTER A RAINSTORM, ALL SILT AND DEBRIS MUST BE REMOVED FROM CHECK BERMS AND DESILTING FACILITIES, AND ANY DAMAGED EROSION CONTROL MEASURES MUST BE REPAIRED.
2. AN ONSITE INSPECTION BY TRPA STAFF IS REQUIRED PRIOR TO ANY CONSTRUCTION OR GRADING ACTIVITY. TRPA STAFF SHALL DETERMINE IF THE ONSITE CONSTRUCTION TEMPORARY EROSION CONTROL MEASURES HAVE BEEN PROPERLY INSTALLED. NO GRADING OR CONSTRUCTION SHALL COMMENCE UNTIL TRPA PRE-GRADE CONDITIONS OF APPROVAL ARE MET.
3. HEAVENLY SHALL BE RESPONSIBLE TO INSTALL AND MAINTAIN ALL CONSTRUCTION BMPS TO ENSURE PROPER WORKING CONDITIONS. ROADS USED DURING CONSTRUCTION WILL BE INSPECTED DAILY BY HEAVENLY FOR DRAINAGE AND GRADING. RUTS WILL BE REPAIRED IMMEDIATELY. WATERBARS, CULVERTS, AND DITCHES (DRAINAGE STRUCTURES) WILL BE MAINTAINED ON A DAILY BASIS DURING CONSTRUCTION.
4. SEDIMENT BARRIERS AND CONSTRUCTION LIMIT FENCING WILL BE INSPECTED DAILY DURING CONSTRUCTION BY THE HEAVENLY FOR DAMAGE AND APPROPRIATE PLACEMENT. SEDIMENT BARRIERS SHALL BE REPAIRED AND/OR RELOCATED AS NEEDED ON A DAILY BASIS.
5. TEMPORARY BMP MEASURES SHALL BE IMPLEMENTED FOR ALL PROJECT LOCATIONS.
6. EXCAVATION SHALL NOT EXCEED 5-FEET BELOW GROUND SURFACE.
7. DISTURBED AREAS, ROADWAYS, AND STAGING AREAS USED DURING CONSTRUCTION SHALL BE SWEPT AND /OR PROVIDED WITH DUST ABATEMENT SUCH AS A WATER TRUCK AS NEEDED.
8. FOR ALL NATIVE TREES TO REMAIN, TEMPORARY CONSTRUCTION FENCE SHALL BE INSTALLED AROUND THE DRIPLINE OF ALL TREES ADJACENT TO THE ROAD AND WORK AREAS, WHERE FEASIBLE, OR OTHER MEASURES DEEMED APPROPRIATE BY THE TRPA INSPECTOR.
9. HEAVENLY SHALL BE RESPONSIBLE FOR MAINTAINING THE SITE IN A NEAT AND ORDERLY MANNER THROUGHOUT THE CONSTRUCTION PROCESS.
10. TURNING OR MANEUVERING OF BACKHOE, EXCAVATOR OR OTHER EQUIPMENT WILL BE MINIMIZED TO REDUCE SOIL DISTURBANCE.
11. ALL BARREN AREAS AND AREAS DISTURBED BY CONSTRUCTION SHALL BE REVEGETATED IN ACCORDANCE WITH THE TRPA HANDBOOK OF BEST MANAGEMENT PRACTICES. APPLICATION OF A MULCH MAY ENHANCE VEGETATIVE ESTABLISHMENT.

REVEGETATION SPECIFICATIONS

PART 1. GENERAL

ALL AREAS DISTURBED DURING CONSTRUCTION OTHER THAN EXISTING ACCESS ROADS, INCLUDING ACCESS CORRIDORS, STORAGE AREAS, STAGING AREAS, AND CONSTRUCTION AREAS SHALL BE STABILIZED ACCORDING TO THESE SPECIFICATIONS. UPON COMPLETION OF GRADING AND CONSTRUCTION, AND PRIOR TO REVEGETATION, ALL AREAS TO BE REVEGETATED WILL BE INSPECTED BY THE ENGINEER'S REVEGETATION SPECIALIST (RS). THE CONTRACTOR SHALL NOTIFY THE ENGINEER AT LEAST FIVE WORKING DAYS PRIOR TO PLANTING TO SCHEDULE THE REQUIRED INSPECTION. FINAL SEEDING AND MULCH TREATMENT AREAS WILL BE STAKED IN THE FIELD AT THAT TIME. REVEGETATION TREATMENTS PERFORMED BY AN OUTSIDE CONTRACTOR SHALL NOT BE INITIATED WITHOUT THE APPROVAL OF THE ENGINEER. REVEGETATION PERFORMED BY HEAVENLY PERSONNEL NEED NOT BE APPROVED BY THE ENGINEER OR THE REVEGETATION SPECIALIST PRIOR TO INITIATING REVEGETATION WORK.

STABILIZATION TREATMENTS SHALL BE INSTALLED AS PER THESE SPECIFICATIONS AND THE PLAN SHEETS AND SHALL CONSIST OF WOOD CHIP INCORPORATION INTO THE TOP 12 INCHES OF SOIL, SEEDING, AND PINE NEEDLE/WOOD CHIP MULCH APPLICATION.

PART 2. PRODUCTS AND EXECUTION OF TREATMENTS

SEED

SEED MIXTURES ARE SHOWN IN TABLE 1 ON THIS SHEET.

SEED SHALL BE CLEAN NEW CROP SEED, PURCHASED PREMIXED ON A PURE LIVE SEED (PLS) BASIS. SEED SHALL BE DELIVERED TO THE SITE IN ORIGINAL UNOPENED CONTAINERS BEARING THE DEALER'S GUARANTEED ANALYSIS AND GERMINATION PERCENTAGE, AND SHALL MEET THE STATE OF CALIFORNIA FREEDOM FROM NOXIOUS WEED REQUIREMENTS. NO SUBSTITUTIONS IN THE SEED MIXTURE WILL BE ACCEPTED WITHOUT WRITTEN APPROVAL FROM THE RS.

SEED LABELS SHALL BE REMOVED FROM THE SEED SACKS BY THE RS AT THE TIME OF SEEDING. SEED LABELS WILL INCLUDE DOCUMENTATION FOR EACH TYPE OF SEED CERTIFYING THAT A RECOGNIZED LABORATORY TESTED THE SEED WITHIN 6 MONTHS OF THE DATE OF DELIVERY.

Table 1. Seed Mix

Common Name Variety	Scientific Name	Seeding Rate Pure Live Seed Pounds Per Acre
Squirreltail (High elevation collection	Elymus elymoides ssp. Elymoides (Sierra)	10
Mokelumne or El Dorado Brome (or other high elevation Tahoe collection)	Bromus carinatus (Mokelumne)	5
Western Needlegrass (or other high elevation Tahoe collection)	Achnatherum occidentale	3
Antelope Bitterbrush (+5500 ft. Sierra Collection)	Purshia tridentata	5
Sulfur-flower Buckwheat	Erigonum umbellatum	2
	Total PLS Pounds Per Acre Rate	25

PART 2 (CONT.) PRODUCTS AND EXECUTION OF TREATMENTS

WOOD CHIPS

WOOD CHIPS SHALL BE PREPARED FROM TREES REMOVED DURING CONSTRUCTION AND MAINTENANCE ACTIVITIES ON HEAVENLY MOUNTAIN RESORT. TOPS AND BRANCHES OF TREES REMOVED ON THIS AND OTHER HEAVENLY MOUNTAIN RESORT PROJECT SITES WILL BE CHIPPED TO A MINIMUM DIAMETER OF 2 INCHES, AND A MAXIMUM LENGTH OF 6 INCHES.

PINE NEEDLES

PINE NEEDLES SALVAGED FROM THE CONSTRUCTION SITE CAN BE USED AS A MULCH MATERIAL. PINE NEEDLE MULCH SHALL BE WEED FREE AND CLEAN WITHOUT DEBRIS, OR EXCESSIVE WOODY MATERIAL.

SOIL TREATMENT

ALL AREAS TO BE STABILIZED (WITH AND WITHOUT SEEDING) SHALL BE LOOSENED TO A DEPTH OF AT LEAST 12 INCHES TO ALLEVIATE COMPACTION AND TO INCORPORATE WOOD CHIPS TO IMPROVE WATER INFILTRATION AND WATER HOLDING CAPACITY. A UNIFORM 3-INCH LAYER OF WOOD CHIPS SHALL BE SPREAD ACROSS THE SURFACE OF THE TREATMENT AREAS. WOOD CHIPS SHALL BE INCORPORATED INTO THE TOP 12 INCHES OF SOIL BY AN APPROVED LOOSENING METHOD. AREAS SHALL BE RAKED SMOOTH FOLLOWING WOOD CHIP INCORPORATION.

SEEDBED PREPARATION

AREAS DESIGNATED FOR SEEDING BY THE RS SHALL BE UNIFORMLY BROADCAST SEEDED WITH HAND OPERATED BROADCAST SEEDERS. THE CONTRACTOR SHALL PROVIDE THE RS A WRITTEN STATEMENT OR SITE DEMONSTRATION TO VERIFY THAT THE SEEDING BROADCAST EQUIPMENT HAS BEEN CALIBRATED TO THE SPECIFIED APPLICATION RATES. LARGE AND SMALL SIZE SEED AS INDICATED IN TABLE 1 SHALL BE BROADCAST IN SEPARATE APPLICATIONS. SEEDING SHALL NOT OCCUR UNDER CONDITIONS THAT WOULD ALLOW SEED TO BECOME WIND BORN. SEED SHALL NOT BE INCORPORATED AND APPLIED WITH HYDROMULCH. IMMEDIATELY FOLLOWING BROADCASTING, THE SEEDED AREAS SHALL BE LIGHTLY HAND-RAKED TO PLACE THE SEED AT DEPTH OF ¼ TO ½ INCH INTO THE SOIL. NO FURTHER VEHICULAR ACCESS WILL BE ALLOWED ON TREATMENT AREAS UPON COMPLETION OF SEEDING. SEEDINGS SHALL NOT BE LEFT OVERNIGHT WITHOUT RECEIVING MULCH TREATMENT.

PINE NEEDLE/ WOOD CHIP MULCH

ALL SEEDED AREAS SHALL BE MULCHED WITH PINE NEEDLES OR WOOD CHIPS. PINE NEEDLE MULCH SHALL BE SPREAD ACROSS SEEDED AREAS IN A LOOSE 2" LAYER TO ACHIEVE A MINIMUM OF 90 PERCENT COVER.

UNSEEDED TREATMENT AREAS SHALL BE MULCHED WITH WOOD CHIPS SPREAD IN A UNIFORM 6 TO 8 INCH LAYER.

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HEAVENLY MOUNTAIN RESORT
Sky Meadoes Basin Epic Discovery Activities

DETAIL SHEET

JOB NO.:	12-602.7
DATE:	1/29/14
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DRAWN :	MLM/FRB
CHECKED:	MMG

APPENDIX 3.1-A
WATER QUALITY COMPLIANCE DATA

	Discharge (cfs)	Turburdity (NTU)	Suspended Sediment (mg/L)	Specific Conductivity (mmhos)	Nitrite/ Nitrate (mg/L)	Total Phosphorus (mg/L)	SRP (mg/L)	TKN (mg/L)	Total Nitrogen (mg/L)	Chloride (mg/L)	Total Iron (mg/L)
California State Standard			**60***			**0.015**			**0.19**	**0.15**	**0.03**
HV-C3- Property Line Annual Averages*											
2006	4.3	3.24	8.31	34.71	0.012	***0.032***	0.007	0.114	0.121	***2.467***	***0.341***
2007	0.76	1.95	2.1	50.2	0.005	***0.023***	0.006	0.08	0.084	***1.288***	***0.119***
2008	0.55	0.94	1.36	41.6	0.005	***0.018***	0.004	0.086	0.091	***1.95***	***0.09***
2009	0.46	0.79	1.86	41.83	0.003	***0.021***	0.004	0.061	0.06	***1.27***	***0.087***
2010	1.31	7.71	38.38	43.2	0.013	***0.089***	0.005	0.351	***0.387***	***0.965***	***0.064***
2011	5.47	9.14	20.37	46.53	0.026	***0.042***	0.006	0.129	***0.154***	***0.66***	***0.732***
2012	1.09	1.16	2.81	-	0.005	***0.02***	-	0.085	***0.09***	***0.94***	***-***
2013	0.72	1.37	2.97	-	0.003	***0.02***	-	0.103	***0.106***	***1.08***	***-***
# Samples	146	101	146	146	146	146	101	146	146	72	27
#Noncompliance	-	-	0	-	-	8	-	-	1	8	6
%Noncompliance	-	-	0.0%	-	-	100.0%	-	-	12.5%	100.0%	100.0%
Maximum Daily	21.38	102.00	506.00	63.70	0.06	1.05	0.02	4.25	4.31	5.90	2.50
Minimum Daily	0.005	0.07	0.27	25.00	0.001	0.009	0.001	0.02	0.00	0.10	0.03
Mean Daily	2.13	3.34	9.37	40.69	0.009	0.032	0.005	0.12	0.13	1.17	0.26
Std Error Daily	3.94	11.96	45.76	7.41	0.013	0.087	0.003	0.35	0.36	0.81	0.49
HV-H5- Hidden Annual Averages*											
2006	4.41	1.94	5.38	39.89	0.004	***0.032***	0.008	0.13	0.134	***0.843***	***0.107***
2007	1.18	1.24	2.76	47.42	0.007	***0.026***	0.01	0.095	0.102	***0.485***	***0.107***
2008	1.11	1.19	1.94	46.02	0.013	***0.025***	0.019	0.112	0.126	***0.993***	***0.082***
2009	0.81	1.42	3.00	44.57	0.008	***0.029***	0.008	0.112	0.12	***0.822***	***0.184***
2010	2.34	2.58	9.19	45.33	0.008	***0.043***	0.01	0.217	***0.225***	***0.4***	***0.134***
2011	7.05	3.27	9.16	45.90	0.004	***0.032***	0.007	0.162	0.167	***0.244***	***0.105***
2012	1.67	1.31	3.03	-	0.009	***0.025***	-	0.133	0.141	***0.309***	-
2013	1.42	1.35	3.06	-	0.009	***0.026***	-	0.108	0.117	***0.276***	-
# Samples	145	145	145	100	145	145	100	145	145	72	27
#Noncompliance	-	-	0	-	-	8	-	-	1	8	6
%Noncompliance	-	-	0.0%	-	-	100.0%	-	-	12.5%	100.0%	100.0%
Maximum Daily	31.93	16.00	70.00	66.80	0.04	0.20	0.08	0.97	0.97	2.40	0.44
Minimum Daily	0.09	0.09	0.40	15.23	0.001	0.011	0.001	0.04	0.04	0.10	0.01
Mean Daily	2.72	1.82	4.80	44.14	0.007	0.029	0.010	0.13	0.14	0.41	0.12
Std Error Daily	4.55	2.09	9.87	14.40	0.006	0.020	0.011	0.13	0.13	0.39	0.10

* Suspended Sediment Annual Averages shown are straight averages. The recalculated value using a weighted average based on the days between sample collection are shown in Table 2.3.

	Discharge (cfs)	Turburdity (NTU)	Suspended Sediment (mg/L)	Specific Conductivity (mmhos)	Total Phosphorus (mg/L)	SRP (mg/L)	Nitrate/ Nitrite (mg/L)	TKN (mg/L)	Total Nitrogen (mg/L)
Nevada State Standard		**10.0**	**25**			**0.100**			**0.60**
HV-E1-Edgewood Above (2006-2013)									
2006	0.66	3.9	4.4	71	0.040	0.009	0.001	0.164	0.165
2007	0.32	3.9	6.4	66	0.062	0.007	0.001	0.195	0.196
2008	0.57	6.0	11.5	64	0.087	0.004	0.003	0.302	0.304
2009	0.35	3.1	8.0	66	0.056	0.003	0.002	0.134	0.136
2010	0.19	2.3	5.5	69	0.030	0.004	0.002	0.150	0.152
2011	0.38	9.8	23.5	80	0.053	0.005	0.002	0.233	0.235
2012	0.31	5.1	11.3	98	0.064	0.002	0.002	0.185	0.188
2013	0.22	4.5	11.1	90	0.066	0.004	0.001	0.235	0.237
# Samples	79	79	79	79	79	79	79	79	79
#Noncompliance	-	3	7	-	-	0	-	-	3
%Noncompliance	-	4%	9%	-	-	0%	-	-	4%
Maximum Daily	3.24	82.00	205.0	131.0	0.366	0.015	0.008	1.098	1.10
Minimum Daily	0.003	0.80	0.40	42.70	0.016	0.001	0.001	0.078	0.079
Mean Daily	0.39	4.99	10.42	78.50	0.056	0.005	0.002	0.200	0.202
Std Error Daily	0.49	9.46	24.59	18.88	0.058	0.003	0.001	0.162	0.162
HV-E2-Edgewood Below (2006-2013)									
2006	0.69	**12.7**	18.6	153	0.093	0.009	0.031	0.232	0.263
2007	0.36	7.0	10.8	93	0.060	0.008	0.025	0.196	0.221
2008	0.42	**13.4**	23.5	97	0.131	0.005	0.018	0.319	0.337
2009	0.22	6.2	16.5	114	0.048	0.003	0.041	0.187	0.228
2010	0.27	6.4	14.1	113	0.035	0.005	0.028	0.182	0.210
2011	0.52	6.0	7.4	151	0.039	0.004	0.031	0.210	0.240
2012	0.32	5.4	9.1	134	0.044	0.003	0.037	0.252	0.289
2013	0.19	6.7	8.7	153	0.053	0.004	0.035	0.228	0.263
# Samples	108	109	109	109	109	109	109	109	109
#Noncompliance	-	18	13	-	-	0	-	-	2
%Noncompliance	-	17%	12%	-	-	0%	-	-	2%
Max	4.17	99.00	188.0	478.0	0.58	0.014	0.085	0.963	0.997
Min	0.010	0.65	1.20	43.80	0.01	0.001	0.001	0.064	0.083
Mean	0.402	8.10	12.88	136.34	0.06	0.005	0.032	0.227	0.259
Std Err	0.52	11.11	22.57	63.26	0.08	0.003	0.018	0.133	0.132

APPENDIX 3.1-B
HEAVENLY VALLEY CREEK BIOASSESSMENT MONITORING DATA

Lahontan Regional Water Quality Control Board

INTERNAL MEMO

To: Bud Amorfini, Engineering Geologist

From: Thomas Suk, Senior Environmental Scientist

Date: June 29, 2014

Subject: **HEAVENLY VALLEY CREEK—ANALYSIS OF RESULTS FROM A DECADE OF BIOASSESSMENT MONITORING (2001-2011), AND RECOMMENDATIONS FOR FUTURE MONITORING**

This memo replies to your request for bioassessment site scores for Heavenly Valley Creek for 2010 and 2011, and includes an analysis of the available bioassessment data for the past decade, with recommendations for the future.

Background

Total Maximum Daily Loads (TMDLs) were adopted by the Regional Water Board in January 2001, and approved by the USEPA in September 2002. The adopted "desired condition" for Heavenly Valley Creek is:

> **"Improving trends in benthic invertebrate community metrics over time, approaching conditions in Hidden Valley Creek"**

The adopted TMDLs (in part) required Water Board staff to work with the U.S. Forest Service (USFS) to design a bioassessment monitoring plan that is capable of tracking progress toward the desired condition. That plan was completed by the USFS and submitted to the Water Board in March 2003 (*see* USFS 2003). The plan called for bioassessment sampling at five sites at a frequency of "two years on, two years off" (i.e., sampling to be conducted 2002-03, 2006-07, 2010-11, 2014-15, etc., at least until attainment of the desired condition is documented).

It was subsequently proposed by the USFS, and agreed by Water Board staff, that one of the five sites (i.e., Upper Hidden Valley Creek, elevation 9,030 feet) would be dropped from the study design, due to its ephemeral flow conditions (which limited the value of the results) and difficult access (which imposed significant costs).

The remaining four sites include three "test" sites along Heavenly Valley Creek—i.e., Sky Meadows (at 8,540 feet elevation), Below Patsy's (at 7,921 ft.), and USFS Property Line (at 6,614 ft.)—and one "control" site at Hidden Valley Creek (6,642 ft.). The control site at Hidden Valley Creek is also known as "Lower" Hidden Valley Creek.

From 2001-2011, benthic macroinvertebrate (BMI) samples were collected by four different entities (using a variety of different methods), as summarized in Table 1, below:

Table 1. Bioassessment sampling events at four locations near Heavenly ski resort, including sampling entity and site codes.

Sample Year	Sample Date	**HVC-1 Heavenly Valley Cr "Sky Meadows"** R5BIO-016 (USFS)	**HVC-2 Heavenly Valley Cr "Below Patsy's"** R5BIO-018 (USFS)	**HVC-3 Heavenly Valley Cr "Property Line"** R5BIO-017 (USFS) 634HEV001 (SNARL)	**LHC-1 (Lower) Hidden Valley Cr** (control site) R5BIO-019 (USFS) 634HID001 (SNARL)
2001	Jul-01	USFS	USFS	USFS	USFS
2001	Jul-01			UCSB-SNARL	UCSB-SNARL
2002	Jul-02			UCSB-SNARL	UCSB-SNARL
2002	Jul-02	USFS	USFS	USFS	USFS
2003	Jul-03	USFS	USFS	USFS	USFS
2006	Sep-06	Heavenly	Heavenly	Heavenly	Heavenly
2007	Aug-07	Heavenly	Heavenly	Heavenly	Heavenly
2010	Aug-10	Heavenly	Heavenly	Heavenly	Heavenly
2011	Aug-11	Heavenly	Heavenly	Heavenly	Heavenly
2011	Oct-11				DFW-ABL

Methods

The bioassessment data (from multiple sources and dates, as summarized in Table 1) were compiled, formatted, scored, and analyzed for trends. Drs. Andrew Rehn and Peter Ode of the Dept. of Fish & Wildlife's Aquatic Bioassessment Laboratory (DFW-ABL) graciously agreed to assist us in compiling, formatting, scoring, and assessing the data.

It took several months (during 2013) and a lot of effort (by Andy, Pete, and me) just to obtain all of the data from the various sources. This initial step took longer than expected. In particular, some of the decade-old data were difficult and time-consuming to locate. I want to specifically acknowledge Dr. Joseph Furnish of the USFS, who provided substantial assistance in locating the "missing" data.

Once we had obtained and compiled all of the data, Dr. Rehn then formatted the data and calculated site scores for all sites/dates, using both the Eastern Sierra Index of Biological Integrity ("ESIBI," Herbst and Silldorff 2009), and the California Stream Condition Index (CSCI) which is currently being prepared for publication by DFW-ABL in collaboration with co-authors at the Southern California Coastal Water Research Project (*see* Mazor and others, in preparation).

The results were evaluated to assess the biotic condition of sites, and to assess trends at individual sites over time.