GABION WALL DESIGN PACKAGE
LOT 39 SUMMIT POWDER MOUNTAIN RESORT
8365 EAST SUMMIT PASS
WEBER COUNTY, UTAH

PROJECT AERIAL VIEW

REFERENCE IMAGE FROM GOOGLE EARTH PRO VERSION 7.1.5.1557, BUILD DATE 5-20-2015, PHOTO TAKEN JUNE 18, 2017.

0 50 100 150 250 500

SCALE: 1" = 250' (11x17 ONLY)

NOTE: THIS PLAN SET HAS BEEN PREPARED WITH COLOR LINE-TYPES TO MAKE SOME DETAILS AND SPECIFICATIONS MORE CLEAR. ANY COPIES OF THESE PLANS SHOULD BE MADE IN COLOR.

DESIGN PACKAGE CONTENTS		
	SHEET NO.	DESCRIPTION
SHOP DRAWINGS	1	COVER SHEET
	2	PLAN VIEW
	3	ELEVATION VIEWS
	4	TYPICAL SECTION VIEW
	5	CONSTRUCTION SPECIFICATIONS & NOTES
	6	DESIGN CRITERIA
DESIGN CALCULATION PACKAGE	SECTION 2	GABION STABILITY CALCULATIONS
	SECTION 3	GLOBAL STABILITY CALCULATIONS

PREPARED FOR:	39 SUMMIT LLC 314 LYTTON AVENUE, SUITE 200 PALO ALTO, CA 94301 ATTN: MEGAN MILLER & CASSANDRA BERESINI
PREPARED BY:	TYLER B. LOERTSCER, P.E.I.
REVIEWED BY:	PROFESSIONAL ENGINEER No. 6370734 DAVID A. GLASS 09-27-17 ELECTRONIC SEAL STATE OF UTAH DAVID A. GLASS, P.E.

REV		DATE	BY	CHK

REVISIONS

IGES®
12429 SOUTH 300 EAST, STE. 100
DRAPER, UTAH 84020
(801) 748-4044 FAX: (801) 748-4045

GABION WALL DESIGN PACKAGE
LOT 39 SUMMIT POWDER MOUNTAIN RESORT
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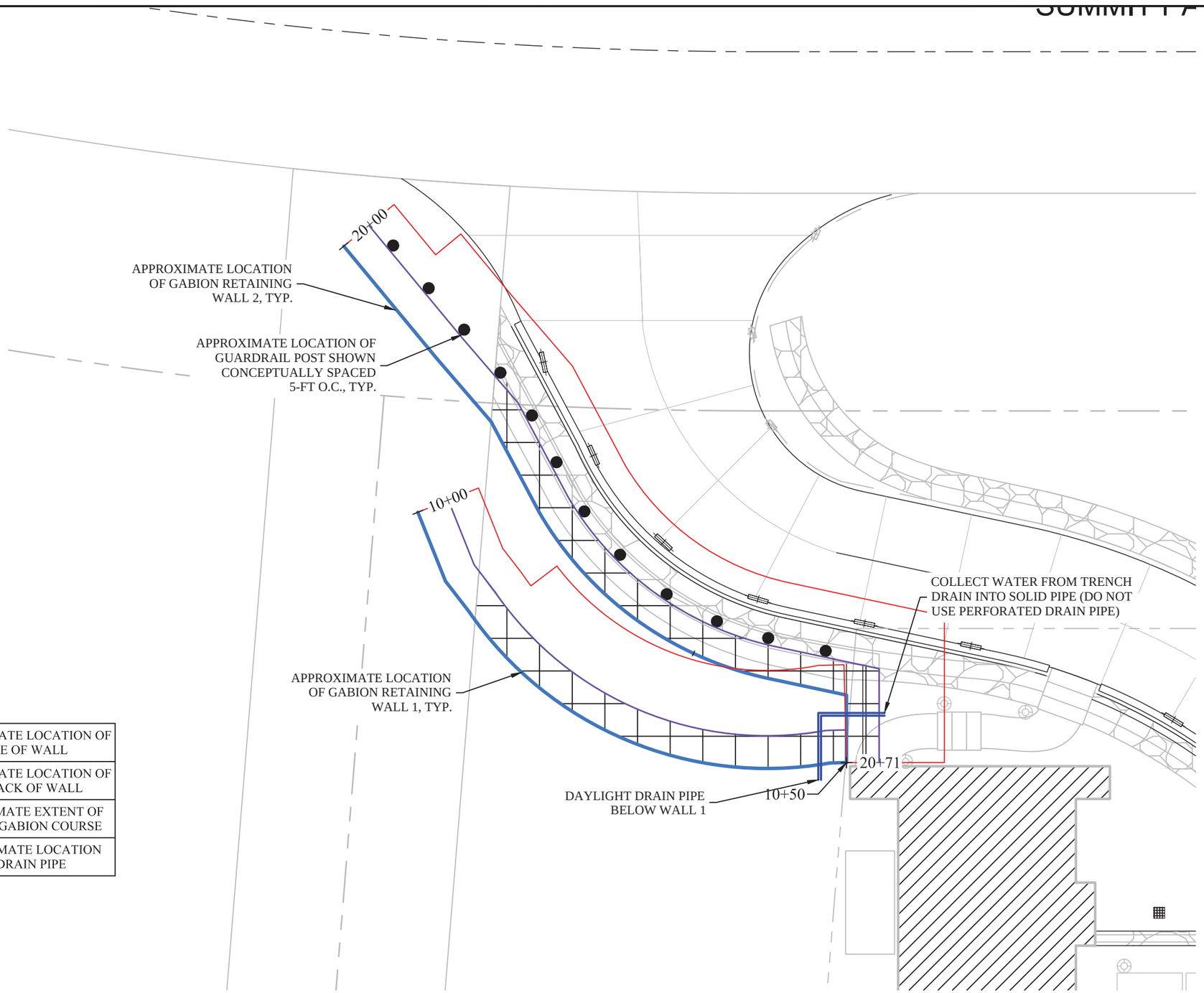
COVER SHEET

DESIGNED BY:	TBL	9-25-2017	PLOT SCALE 1=1
DRAWN BY:	TBL	9-25-2017	
CHECKED BY:	DAG	9-27-2017	DWG SCALE 1"=250'
APPROVED BY:	DAG	9-27-2017	
IGES PROJECT NO. 02132-003	SHEET NO. 1		REV. N/A



	APPROXIMATE LOCATION OF FACE OF WALL
	APPROXIMATE LOCATION OF TOP BACK OF WALL
	APPROXIMATE EXTENT OF BOTTOM GABION COURSE
	APPROXIMATE LOCATION OF DRAIN PIPE

PLAN VIEW

REFERENCE IMAGE FROM MARMOL RADZINER AIA, 39 SUMMIT, LLC, 8365 E. SUMMIT PASS, EDEN, UT 8430, SITE PLAN, SHEET A1.01, SHEET DATED JUNE 27, 2017.

0 2 4 6 10 20

SCALE: 1" = 10' (11x17 ONLY)

REV		DATE	BY	CHK

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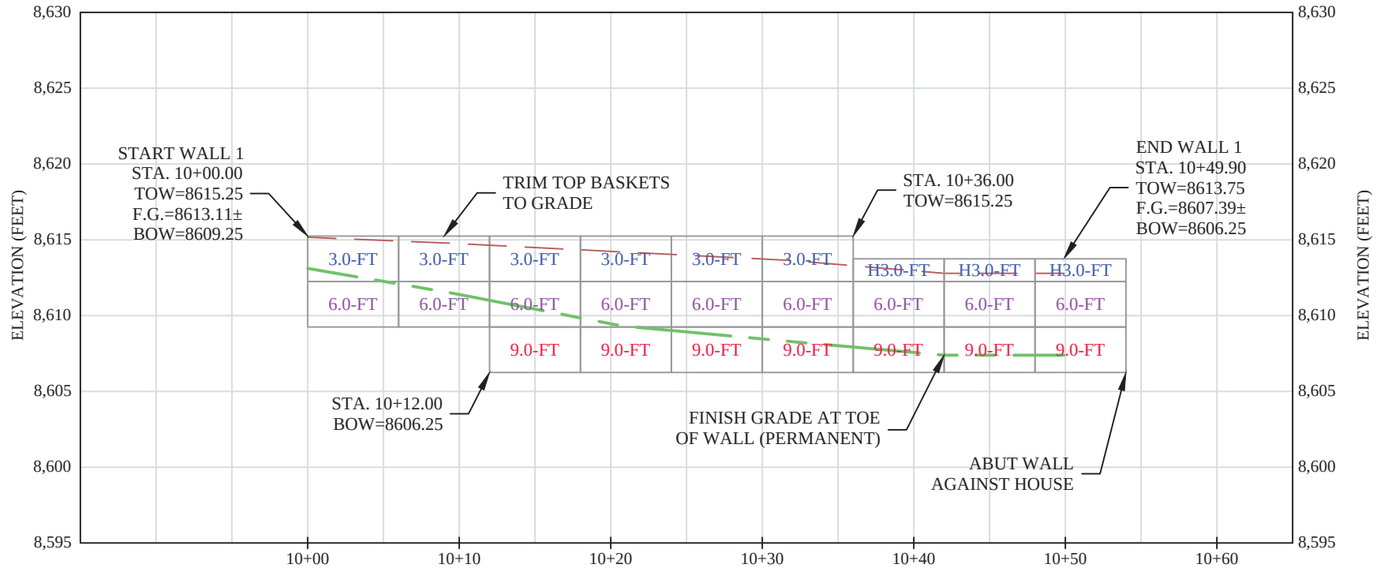
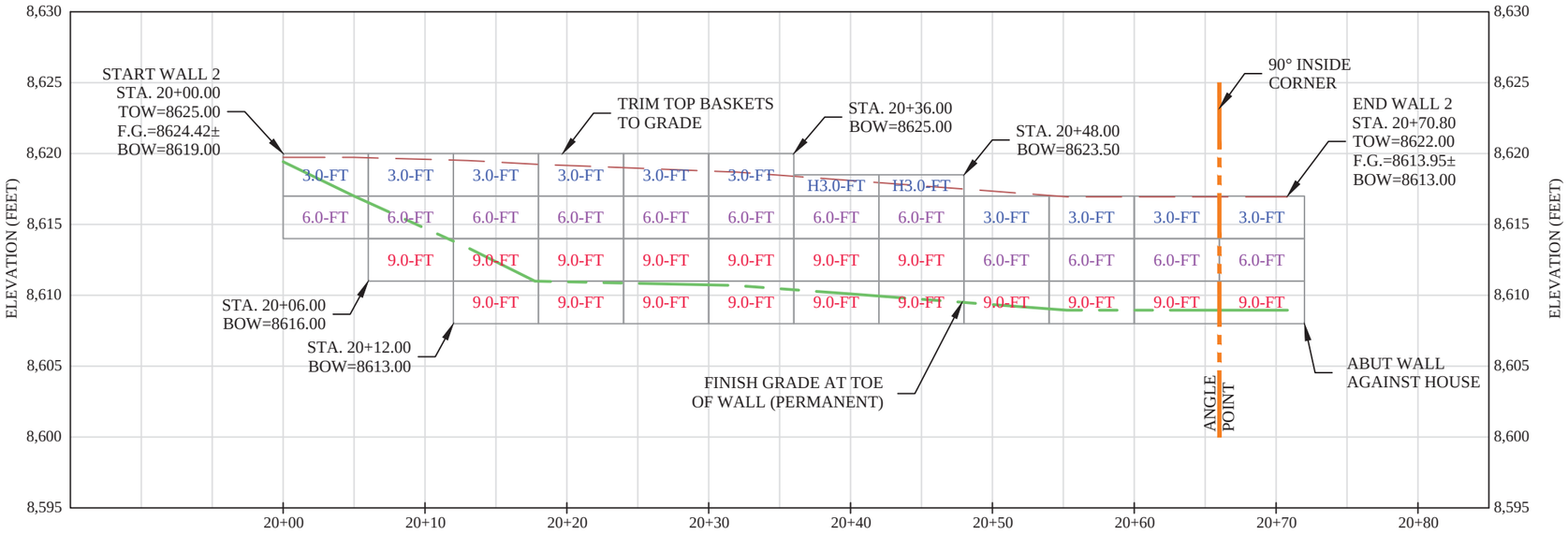
WEBER COUNTY, UTAH

PLAN VIEW

DESIGNED BY:	TBL	9-25-2017	PLOT SCALE 1=1
DRAWN BY:	TBL	9-25-2017	
CHECKED BY:	DAG	9-27-2017	DWG SCALE 1"=10'
APPROVED BY:	DAG	9-27-2017	
IGES PROJECT NO. 02132-003	SHEET NO. 2		REV. N/A





H3.0-FT	GABION BASKET: 3-FT DEEP, 6-FT WIDE, 1.5-FT HIGH
3.0-FT	GABION BASKET: 3-FT DEEP, 6-FT WIDE, 3-FT HIGH
6.0-FT	GABION BASKET: 6-FT DEEP, 6-FT WIDE, 3-FT HIGH
9.0-FT	GABION BASKET: 9-FT DEEP, 6-FT WIDE, 3-FT HIGH

ELEVATION VIEWS

REFERENCE ELEVATIONS BASED ON PLANS FROM TALISMAN CIVIL CONSULTANTS, 39 SUMMIT, LLC, 8365 E. SUMMIT PASS, EDEN, UT 84310, SITE GRADING AND DRAINAGE PLAN, SHEET C1.1, DATED SEPTEMBER 22, 2017. ELEVATION VIEWS CONCEPTUALLY SHOWN ONLY - FIELD ADJUSTMENTS/CHANGES SHOULD BE EXPECTED ONCE CONSTRUCTION COMMENCES. IGES SHOULD BE CONSULTED WERE FIELD CHANGES ARE REQUIRED.

LEGEND

TOW = TOP OF RETAINING WALL
BOW = BOTTOM OF RETAINING WALL
FG = FINISHED GRADE AT BOTTOM OF WALL

0 2 4 6 10 20
SCALE: 1" = 10' (11x17 ONLY)

REV		DATE	BY	CHK

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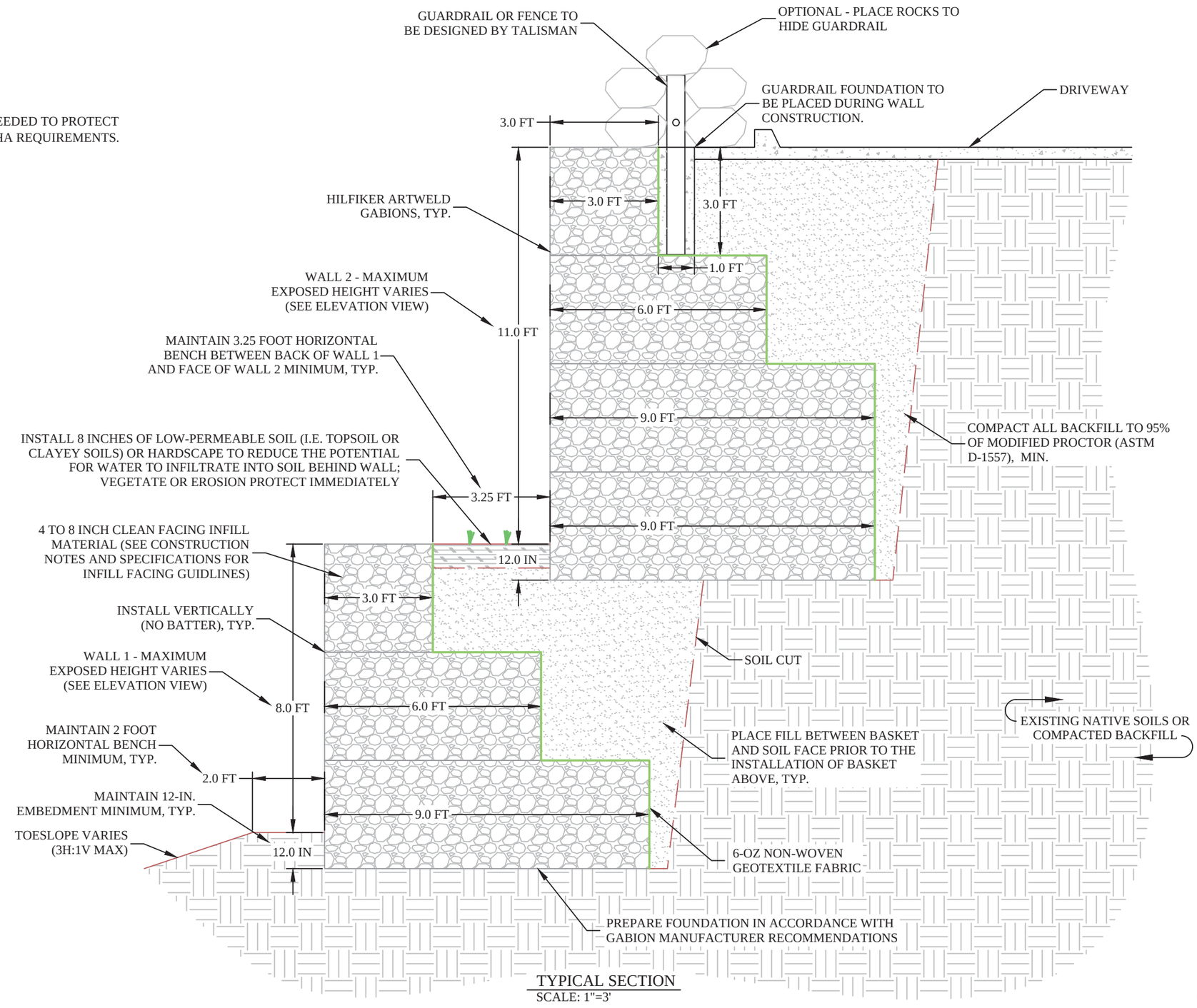
8365 EAST SUMMIT PASS
WEBER COUNTY, UTAH
ELEVATION VIEWS

DESIGNED BY:	TBL	9-25-2017	PLOT SCALE 1=1
DRAWN BY:	TBL	9-25-2017	
CHECKED BY:	DAG	9-27-2017	DWG SCALE 1"=10'
APPROVED BY:	DAG	9-27-2017	
IGES PROJECT NO. 02132-003	SHEET NO. 3		REV. N/A

NOTES:

1. SOIL CUT SHOULD BE BENCHED AS NEEDED TO PROTECT WORKERS AND TO COMPLY WITH OSHA REQUIREMENTS.



TYPICAL SECTION
SCALE: 1"=3'

0 1.5 3 6
SCALE: 1" = 3' (11x17 ONLY)

REV		DATE	BY	CHK

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8365 EAST SUMMIT PASS
WEBER COUNTY, UTAH

TYPICAL SECTION VIEW

DESIGNED BY:	TBL	9-25-2017	PLOT SCALE 1=1
DRAWN BY:	TBL	9-25-2017	
CHECKED BY:	DAG	9-27-2017	DWG SCALE 1"=3'
APPROVED BY:	DAG	9-27-2017	
IGES PROJECT NO. 02132-003	SHEET NO. 4		REV. N/A

CONSTRUCTION SPECIFICATIONS

1. INTRODUCTION
   - 1.1. FOLLOW THE GUIDANCE CONTAINED IN THE HILFIKER GABION CONSTRUCTION MANUAL FOR THE RETAINING WALL UNLESS SPECIFICALLY SUPERSEDED BY MORE STRINGENT SPECIFICATION OR MATERIAL PROPERTIES PROVIDED HEREIN OR ON THE DRAWINGS.
     - 1.1.1. IN THE EVENT THERE IS ANY CONFLICT OR AMBIGUITY BETWEEN THE FOLLOWING SPECIFICATIONS AND THE REFERENCED GUIDANCE, BRING ANY SUCH ISSUES IMMEDIATELY TO THE ATTENTION OF IGES, INC. FOR WRITTEN CLARIFICATION.
   - 1.2. DESIGN AND CONSTRUCTION INFORMATION IS BASED ON GEOTECHNICAL INFORMATION OBTAINED FROM SITE TOPOGRAPHY, PROJECT PLANS, SITE GEOMETRY, SITE OBSERVATIONS, DISCUSSIONS WITH THE CLIENT AND THE ENGINEERING ANALYSIS PERFORMED AS PART OF THE SCOPE OF WORK FOR THIS PROJECT BY IGES, INC.
   - 1.3. LOCATE ALL EXISTING UTILITIES PRIOR TO RETAINING WALL CONSTRUCTION.
   - 1.4. THE DESIGN HAS IMPLEMENTED THE FOLLOWING MEASURES TO REDUCE THE POTENTIAL FOR SATURATION OF THE SOIL BEHIND THE RETAINING WALLS:
     - 1.4.1. ESTABLISH HARSCAPE, VEGETATION, OR EROSION CONTROL MEASURES ABOVE AND BELOW WALL IMMEDIATELY FOLLOWING CONSTRUCTION.
   - 1.5. CONDITIONS SUCH AS LEAKY OR BROKEN IRRIGATION LINES AND/OR UNCONTROLLED RUNOFF FROM IMPROPER SITE GRADING (I.E. ALLOWING WATER TO POND ABOVE RETAINING WALL) CAN LEAD TO UNDERMINING OR HYDROSTATIC PRESSURES BUILDING UP BEHIND THE WALLS, WHICH CAN LEAD TO SLOPE OR WALL MOVEMENT.
     - 1.5.1. HYDROSTATIC CONDITIONS WERE NOT CONSIDERED AND MUST BE PREVENTED.
     - 1.5.2. THE OWNER SHALL BE AWARE OF THE RISKS IF THESE OR OTHER CONDITIONS OCCUR THAT COULD SATURATE OR ERODE THE SOIL BEHIND THE WALLS.
     - 1.5.3. RETAINING WALLS ARE VULNERABLE TO EROSION AND HYDROSTATIC PRESSURES IMMEDIATELY AFTER INSTALLATION OF THE RETAINING WALL BASKETS, BUT PRIOR TO THE PLACEMENT OF THE LANDSCAPING OR FINISHING ELEMENTS AT THE SITE (I.E. 8-INCHES OF LOW PERMEABLE SOIL/HARDSCAPE, INSTALLATION OF CURB & GUTTER, VEGETATION OF SLOPES, ETC.). AS THESE ARE CRITICAL COMPONENTS TO THE OVERALL STABILITY OF THE RETAINING WALLS, THE RETAINING WALLS ARE NOT CONSIDERED COMPLETELY INSTALLED UNTIL THE LANDSCAPING/FINISHING ELEMENTS ARE COMPLETED. WE RECOMMEND THAT THESE ELEMENTS BE INSTALLED IMMEDIATELY FOLLOWING THE INSTALLATION OF THE BASKETS
       - 1.5.3.1. THE OWNER SHALL BE AWARE OF THE RISK TO THE RETAINING WALLS IF THE FINISHING/LANDSCAPING ELEMENTS ARE NOT INSTALLED IMMEDIATELY FOLLOWING THE INSTALLATION OF THE RETAINING WALL BASKETS.
   - 1.6. COMPLY WITH ALL ASPECTS OF OSHA 1926 SUBPART P APP B, SLOPING AND BENCHING FOR ALL EXCAVATED SLOPES.
2. GABION RETAINING WALL MATERIALS
   - 2.1. HILFIKER GABION BASKETS CONSISTING OF ARTWELD GABION PRODUCTS USING 3"x3" 9 GAUGE WELDED WIRE MESH THAT HAS BEEN ELECTROPLATE GALVANIZED - SEE PRODUCT STANDARD SPECIFICATIONS. ALTERNATIVE FINISHES MAY BE ACCEPTABLE, BUT MUST BE APPROVED IN WRITING BY IGES PRIOR TO USE.
   - 2.2. BACKFILL SOILS
     - 2.2.1. IMPORTED, GRANULAR BORROW OR APPROVED NATIVE GRANULAR SOILS SCREENED FOR REMOVAL OF DEBRIS OR IMPORTED MATERIALS COMPLYING WITH THE FOLLOWING CRITERIA:
       - 2.2.1.1. GRANULAR MATERIALS CONTAINING LESS THAN 25% FINES
       - 2.2.1.2. MAXIMUM NOMINAL PARTICLE SIZE OF 4 INCHES
       - 2.2.1.3. PI OF 6 OR LESS
       - 2.2.1.4. PH GREATER THAN 3 BUT LESS THAN 9
       - 2.2.1.5. REASONABLY FREE FROM ORGANIC, OR OTHER DELETERIOUS MATERIALS
       - 2.2.1.6. MINIMUM EFFECTIVE FRICTION ANGLE OF 34 DEGREES
   - 2.3. BASKET FILL
     - 2.3.1. 4- TO 8-INCH CLEAN AGGREGATE.
     - 2.3.2. MINIMUM IN-PLACE UNIT WEIGHT OF 120 POUNDS PER CUBIC FOOT.
     - 2.3.3. MATERIAL CONTAINING LESS THEN 5% FINES.
3. GABION RETAINING WALL INSTALLATION
   - 3.1. FIELD-VERIFY PROPOSED FINISHED GRADE AT BOTTOM OF WALL TO PROVIDE A MINIMUM WALL EMBEDMENT OF 12 INCHES AS SHOWN ON THE ELEVATION AND SECTION DRAWINGS.
   - 3.2. GRADE AND COMPACT FOUNDATION SUBGRADE SOILS FOR THE FULL LENGTH OF THE GABION RETAINING WALL PRIOR TO PLACEMENT OF THE GABION BASKETS AND ANY BACKFILL.
   - 3.3. REMOVE AND REPLACE ANY FOUNDATION SOILS FOUND TO BE UNSUITABLE OR UNSTABLE WITH APPROVED FILL MEETING THE CRITERIA OUTLINED IN NOTE 2.2 ABOVE.
   - 3.4. INSTALL ALL GABION BASKETS IN ACCORDANCE WITH HILFIKER GABION GUIDELINES.
   - 3.5. SET GABION INFILL WITHIN 12 INCHES OF THE WALL FACE BY HAND TO PREVENT GABION DEFORMATION.
   - 3.6. OFFSET SUCCESSIVE ROWS OF GABIONS AS SHOWN ON THE TYPICAL SECTION VIEW - SHEET NO 3.
   - 3.7. ROW WIDTHS SHOWN ARE MINIMUM REQUIRED. ROWS MAY BE LENGTHENED TO FACILITATE CONSTRUCTION AS NEEDED.
   - 3.8. SET AND CHECK THE FIRST ROW OF GABION UNITS FOR LEVEL AND ALIGNMENT.
   - 3.9. PLACE WALL BACKFILL MATERIAL IN 12-INCH MAXIMUM LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 95 PERCENT OF THE MAXIMUM DRY DENSITY (ASTM D-1557).
     - 3.9.1. PERFORM DENSITY TESTING OF THE BACKFILL SOILS AT 50-FOOT INTERVALS MEASURED ALONG WALL FACE.
       - 3.9.1.1. PERFORM 2 TESTS PER LIFT, MINIMUM.
     - 3.9.2. IF APPLICABLE USE ONLY SMALL, WALK-BEHIND TYPE COMPACTION EQUIPMENT WITHIN 1 FOOT OF THE BACK OF THE GABIONS.
     - 3.9.3. IF ANY LOCATIONS EXIST WHERE THE RETAINING WALLS WILL NOT BE PLACED UPON NATIVE SOILS, COMPACT THE FILL TO A MINIMUM OF 95 PERCENT OF ASTM D-1557.
4. CONSTRUCTION OBSERVATION
   - 4.1. TO FULFILL ANY APPLICABLE CITY, COUNTY AND/OR STATE AGENCY REQUIREMENTS, AND TO PROTECT THE CONTRACTOR AND DESIGN ENGINEER, IGES, INC. MUST PERFORM PERIODIC CONSTRUCTION OBSERVATIONS.
     - 4.1.1. IF IGES, INC. DOES NOT OBSERVE THE RETAINING WALL DURING CONSTRUCTION, A FINAL LETTER REGARDING COMPLIANCE OF THE WALL CONSTRUCTION WITH THE DESIGN CRITERIA AND RECOMMENDATIONS CANNOT BE PROVIDED. IF IGES, INC. DOES NOT PERFORM THE PERIODIC CONSTRUCTION OBSERVATIONS OUTLINED BELOW, THE WALL CONTRACTOR/OWNER ASSUMES ALL RESPONSIBILITY FOR THE RETAINING WALL.
   - 4.2. PROCEED WITH GABION WALL OBSERVATIONS AS FOLLOWS:
     - 4.2.1. OBSERVE THE EXCAVATION OF THE FOUNDATION SOILS.
       - 4.2.1.1. ASSESS THE SUITABILITY OF THE FOUNDATIONS SOILS.
         - 4.2.1.1.1. PROVIDE WRITTEN NOTICE OF ACCEPTANCE PRIOR TO PROCEEDING WITH RETAINING WALL CONSTRUCTION.
     - 4.2.2. OBSERVE THE INSTALLATION OF EACH COURSE OF RETAINING WALL GABION.
       - 4.2.2.1. ASSESS MINIMUM EMBEDMENT REQUIREMENTS.
       - 4.2.2.2. ASSESS DEPTH OF INFILL FACING ZONE.
       - 4.2.2.3. ASSESS GABION PLACEMENT AND POSITIONING FOR COMPLIANCE WITH THE REQUIREMENTS SET FORTH IN THE SECTIONS ABOVE.
     - 4.2.3. OBSERVE THE INSTALLATION OF ANY RETAINED BACKFILL.
       - 4.2.3.1. EVALUATE THAT THE BACKFILL MATERIALS MEET THE REQUIREMENTS SET FORTH IN SECTION 2.2. ABOVE.
       - 4.2.3.2. OBSERVE FILL PLACEMENT AND COMPACTION.
         - 4.2.3.2.1. ASSESS LOOSE LIFT THICKNESS.
         - 4.2.3.2.2. OBSERVE OPERATION OF COMPACTION EQUIPMENT.
           - 4.2.3.2.2.1. NOTE OUT-OF-TOLERANCE BEHAVIOR REGARDING MINIMUM ALLOWABLE OPERATING DISTANCE BEHIND BACK OF RETAINING WALL BASKETS.
       - 4.2.3.3. ASSESS COMPACTED BACKFILL MATERIAL FOR COMPLIANCE WITH REQUIREMENTS SET FORTH IN SECTION 3.9. ABOVE.
     - 4.2.4. OBSERVE THE COMPLETED RETAINING WALL SYSTEM.
       - 4.2.4.1. ASSESS THE FINISHED RETAINING WALL HEIGHT AND BATTER.
       - 4.2.4.2. EVALUATE THAT BACKSLOPE AND TOESLOPE GRADING CONDITIONS DO NOT EXCEED DESIGN GEOMETRY TOLERANCES.
       - 4.2.4.3. ASSESS SUITABILITY OF EROSION CONTROL MEASURES INSTALLED ABOVE THE RETAINING WALL.

REV		DATE	BY	CHK

REVISIONS

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GABION WALL DESIGN PACKAGE
LOT 39 SUMMIT POWDER MOUNTAIN RESORT
8365 EAST SUMMIT PASS
WEBER COUNTY, UTAH
CONSTRUCTION SPECIFICATIONS & NOTES

DESIGNED BY:	TBL	9-25-2017	PLOT SCALE 1=1
DRAWN BY:	TBL	9-25-2017	
CHECKED BY:	DAG	9-27-2017	DWG SCALE NTS
APPROVED BY:	DAG	9-27-2017	
IGES PROJECT NO. 02132-003	SHEET NO. 5		REV. N/A

GABION DESIGN PACKAGE
LOT 39 SUMMIT POWDER MOUNTAIN RESORT
8365 EAST SUMMIT PASS
WEBER COUNTY, UTAH

RETAINING WALL GEOMETRY AND LOADING CONDITIONS			
WALL	MAXIMUM HEIGHT (FT)	BACKSLOPE CONDITIONS	SURCHARGE LOADING
1	9	RELATIVELY FLAT	UPPER TIER
2	12	RELATIVELY FLAT	DRIVEWAY

RETAINING WALL ANALYSIS USED IN DESIGN	
ANALYSIS	DESIGN REFERENCES/SOFTWARE
EXTERNAL STABILITY	NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA) METHODOLOGY
GLOBAL STABILITY	SLIDE: ROCSCIENCE, INC., 1998-2017, VERSION 7.027, BUILD DATE AUGUST 15, 2017

MATERIAL ESTIMATED QUANTITIES			
GABION BASKETS		GABION QUANTITIES	FILL VOLUME
H3.0-FT	GABION BASKET: 3-FT DEEP, 6-FT WIDE, 1.5-FT HIGH	5 UNITS (45 FT^2)	2 YD^3
3.0-FT	GABION BASKET: 3-FT DEEP, 6-FT WIDE, 3-FT HIGH	16 UNITS (288 FT^2)	11 YD^3
6.0-FT	GABION BASKET: 6-FT DEEP, 6-FT WIDE, 3-FT HIGH	21 UNITS (378 FT^2)	28 YD^3
9.0-FT	GABION BASKET: 9-FT DEEP, 6-FT WIDE, 3-FT HIGH	24 UNITS (432 FT^2)	48 YD^3
TOTAL		66 UNITS (1,188 FT^2)	88 YD^3

NOTES:
1. MAY USE 3-FT WIDE BASKETS INSTEAD OF 6-FT WIDE BASKETS.

ASSUMED SOIL CONDITIONS USED IN DESIGN			
EARTH MATERIALS	FRICTION ANGLE	COHESION	UNIT WEIGHT
RETAINED SOIL	34°	150 PSF	120 PCF
FOUNDATION SOIL	34°	150 PSF	120 PCF

SOURCES & NOTES:
1. GEOTECHNICAL INVESTIGATION REPORT, LOT 39R OF POWDER MOUNTAIN RESORT, 8634 EAST SUMMIT PASS, WEBER COUNTY, UTAH, IGES PROJECT NO. 02052-001, DATED JUNE 3, 2015.
2. COHESION USED DURING GLOBAL STABILITY ANALYSES ONLY.

SEISMIC PARAMETERS USED IN RETAINING WALL DESIGN				
SEISMIC CRITERIA	GLOBAL STABILITY		EXTERNAL STABILITY	
	MCE PGA	k_h	DESIGN PGA	k_h
2% IN 50 YEARS	0.33g	0.16g (GLOBAL)	0.22g	0.09g (EXTERNAL)

SOURCES & NOTES:
1. GEOTECHNICAL INVESTIGATION REPORT, LOT 39R OF POWDER MOUNTAIN RESORT, 8634 EAST SUMMIT PASS, WEBER COUNTY, UTAH, IGES PROJECT NO. 02052-001, DATED JUNE 3, 2015.
2. A MAXIMUM ALLOWABLE SEISMIC DISPLACEMENT THRESHOLD OF 2.2 INCHES (10*PGA) WAS USED TO REDUCE THE HORIZTONTAL SEISMIC ACCELERATION COEFFICIENT IN ACCORDANCE WITH NCMA 3RD EDITION METHODOLOGY.
3. ONE-HALF OF THE MCE PGA WAS USED TO MODEL THE HORIZONTAL SEISMIC ACCELERATION FOR GLOBAL STABILITY ANALYSES (k_h = 0.16g).

REV		DATE	BY	CHK

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GABION WALL DESIGN PACKAGE
LOT 39 SUMMIT POWDER MOUNTAIN RESORT
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DESIGN CRITERIA

DESIGNED BY:	TBL	9-25-2017	PLOT SCALE	1=1
DRAWN BY:	TBL	9-25-2017		
CHECKED BY:	DAG	9-27-2017	DWG SCALE	NTS
APPROVED BY:	DAG	9-27-2017		
IGES PROJECT NO. 02132-003		SHEET NO. 6	REV.	N/A

Section 2

PROJECT: Gabion Design - Lot 39 Summit Powder Mountain

PROJECT NO.: 02132-003 **SECTION: Wall 1 - 9 FT**

DATE: 9/25/2017 **SURCHARGE: Upper Tier**

Gabion Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Gabion Wall
H_R =	8	ft	Exposed Height of Gabion Wall
ϕ_s =	34	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	120	pcf	Unit weight of the soil
γ_u =	140	pcf	Unit weight of the infill rock
ϕ_r =	35	deg	Infill Rock Friction Angle
δ =	22.7	deg	Interface Friction Angle
ψ =	0.0	deg	Back Cut Inclination
μ =	0.70		Frictional Component
K_A =	0.272		Active Earth Pressure Coefficient

Slope Geometry:

Backslope:	β_{con} =	6.0	deg Eqv. Backslope Angle
Soil Cut Angle:	α =	0.0	deg Soil Cut Angle

Seismic Earth Pressure Coefficient:

A =	0.220	Peak Ground acceleration (2% in 50 years)
d =	2.2	in (Allowable Displacement)
k_h =	0.092	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.23	
K_{AE} =	0.338	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.5	OK
External Overturning	2.0	5.9	OK
Individual Overturning	2.0	6.0	OK
Individual Sliding	1.5	3.4	OK
Bearing Capacity	2.0	19.8	OK
Seismic Overturning	1.5	3.6	OK
Seismic Sliding	1.1	1.7	OK
Seismic Bearing Capacity	1.5	19.5	OK

Surcharge:

Dead Load Uniform Surcharge:

q_{sd} =	185	psf	(Dead Load Surcharge)
F_{sd} =	453.4	lbf/ft	(Horizontal Surcharge Load)
y_{sd} =	4.5	ft	(Surcharge load centroid)

Live Load Uniform Surcharge:

q_{sl} =	0	psf	(Dead Load Surcharge)
F_{sl} =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_{sl} =	0	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_w =	0.000	q_{ac} =	1,026	psf	$e_{c,s}$ =	1.234	FS_{BC} = 19.8
e_c =	0.734	q_{ult} =	20,351	psf	$q_{ac,s}$ =	1,042	$FS_{BC,s}$ = 19.5

Gabions = 3

Gabion No.	W_u (ft)	Δ_u (in)	H_u (ft)	H_{wall} (ft)	ΣW_i	$\Sigma W_i * x_i$	P_H	$P_{H,s}$	R_{sc}	$R_{sc,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	9.0	0.0	3.0	9.0	7,560	26,460	1,640	2,480	3,893	3,922	5,547	9,327	32,623	33,179	2.5	5.9	1.7	3.6
2	6.0	0.0	3.0	6.0	3,780	9,450	822	1,234	2,802	2,821	1,922	3,158	11,509	11,674	3.4	6.0	2.3	3.7
3	3.0	0.0	3.0	3.0	1,260	1,890	275	407	923	928	345	543	2,235	2,255	3.4	6.5	2.3	4.2
4	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
5	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A

9.0 Total Estimated Height of Gabion Retaining Wall

(See Design Manual for Segmental Retaining Walls, National Concrete Masonry Association [NCMA] 3rd Edition for terms and equations of wall design)

PROJECT: Gabion Design - Lot 39 Summit Powder Mountain

PROJECT NO.: 02132-003 **SECTION: Wall 1 - 6 FT**

DATE: 9/25/2017 **SURCHARGE: Upper Tier**

Gabion Geometry & Soil Data:

H_{total} =	6	ft	Total Height of Gabion Wall
H_R =	5	ft	Exposed Height of Gabion Wall
ϕ_s =	34	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	120	pcf	Unit weight of the soil
γ_u =	140	pcf	Unit weight of the infill rock
ϕ_r =	35	deg	Infill Rock Friction Angle
δ =	22.7	deg	Interface Friction Angle
ψ =	0.0	deg	Back Cut Inclination
μ =	0.70		Frictional Component
K_A =	0.272		Active Earth Pressure Coefficient

Slope Geometry:

Backslope:	β_{con} =	6.0	deg Eqv. Backslope Angle
Soil Cut Angle:	α =	0.0	deg Soil Cut Angle

Seismic Earth Pressure Coefficient:

A =	0.220	Peak Ground acceleration (2% in 50 years)
d =	2.2	in (Allowable Displacement)
k_h =	0.092	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.23	
K_{AE} =	0.338	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.3	OK
External Overturning	2.0	5.1	OK
Individual Overturning	2.0	5.2	OK
Individual Sliding	1.5	2.7	OK
Bearing Capacity	2.0	18.6	OK
Seismic Overturning	1.5	3.4	OK
Seismic Sliding	1.1	1.6	OK
Seismic Bearing Capacity	1.5	18.3	OK

Surcharge:

Dead Load Uniform Surcharge:

q_{sd} =	277	psf	(Dead Load Surcharge)
F_{sd} =	452.6	lbf/ft	(Horizontal Surcharge Load)
y_{sd} =	3	ft	(Surcharge load centroid)

Live Load Uniform Surcharge:

q_{sl} =	0	psf	(Dead Load Surcharge)
F_{sl} =	0.0	lbf/ft	(Horizontal Surcharge Load)
y_{sl} =	0	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_w =	0.000	q_{ac} =	794	psf	$e_{c,s}$ =	0.945	FS_{BC}	18.6
e_c =	0.619	q_{ult} =	14,745	psf	$q_{ac,s}$ =	805	$FS_{BC,s}$	18.3

Gabions = 2

Gabion No.	W_u (ft)	Δ_u (in)	H_u (ft)	H_{wall} (ft)	ΣW_i	$\Sigma W_i * x_i$	P_H	$P_{H,s}$	R_{sc}	$R_{sc,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	6.0	0.0	3.0	6.0	3,780	9,450	960	1,372	1,974	1,987	2,339	3,574	11,857	12,021	2.3	5.1	1.6	3.4
2	3.0	0.0	3.0	3.0	1,260	1,890	345	476	919	924	449	647	2,322	2,342	2.7	5.2	1.9	3.6
3	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
4	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
5	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A

6.0 Total Estimated Height of Gabion Retaining Wall

(See Design Manual for Segmental Retaining Walls, National Concrete Masonry Association [NCMA] 3rd Edition for terms and equations of wall design)

PROJECT: Gabion Design - Lot 39 Summit Powder Mountain

PROJECT NO.: 02132-003 **SECTION: Wall 2 - 12 FT**

DATE: 9/25/2017 **SURCHARGE: Driveway**

Gabion Geometry & Soil Data:

H_{total} =	12	ft	Total Height of Gabion Wall
H_R =	11	ft	Exposed Height of Gabion Wall
ϕ_s =	34	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	120	pcf	Unit weight of the soil
γ_u =	140	pcf	Unit weight of the infill rock
ϕ_r =	35	deg	Infill Rock Friction Angle
δ =	22.7	deg	Interface Friction Angle
ψ =	0.0	deg	Back Cut Inclination
μ =	0.70		Frictional Component
K_A =	0.254		Active Earth Pressure Coefficient

Slope Geometry:

Backslope:	β_{con} =	0.0	deg — Eqv. Backslope Angle
Soil Cut Angle:	α =	0.0	deg — Soil Cut Angle

Seismic Earth Pressure Coefficient:

A =	0.220	Peak Ground acceleration (2% in 50 years)
d =	2.2	in (Allowable Displacement)
k_h =	0.092	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.23	
K_{AE} =	0.311	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.1	OK
External Overturning	2.0	4.0	OK
Individual Overturning	2.0	4.2	OK
Individual Sliding	1.5	2.7	OK
Bearing Capacity	2.0	11.7	OK
Seismic Overturning	1.5	2.8	OK
Seismic Sliding	1.1	1.6	OK
Seismic Bearing Capacity	1.5	11.5	OK

Surcharge:

Dead Load Uniform Surcharge:

q_{sd} =	200	psf	(Dead Load Surcharge)
F_{sd} =	610.2	lbf/ft	(Horizontal Surcharge Load)
y_{sd} =	6	ft	(Surcharge load centroid)

Live Load Uniform Surcharge:

q_{sl} =	100	psf	(Dead Load Surcharge)
F_{sl} =	305.1	lbf/ft	(Horizontal Surcharge Load)
y_{sl} =	6	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_w =	0.000	q_{ac} =	1,747	psf	$e_{c,s}$ =	1.683	FS_{BC}	11.7
e_c =	1.162	q_{ult} =	20,351	psf	$q_{ac,s}$ =	1,774	$FS_{BC,s}$	11.5

Gabions = 4

Gabion No.	W_u (ft)	Δ_u (in)	H_u (ft)	H_{wall} (ft)	ΣW_i	$\Sigma W_i * x_i$	P_H	$P_{H,s}$	R_{sc}	$R_{sc,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	9.0	0.0	3.0	12.0	11,340	43,470	2,872	3,856	5,865	5,910	13,176	19,082	53,206	54,061	2.1	4.0	1.6	2.8
2	9.0	0.0	3.0	9.0	7,560	26,460	1,774	2,383	5,621	5,659	6,271	9,012	32,333	32,814	3.2	5.2	2.4	3.6
3	6.0	0.0	3.0	6.0	3,780	7,560	929	1,191	2,797	2,813	2,281	3,067	9,535	9,678	3.0	4.2	2.4	3.2
4	3.0	0.0	3.0	3.0	1,260	1,890	338	397	921	925	443	532	2,225	2,243	2.7	5.0	2.3	4.2
5	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A

12.0 Total Estimated Height of Gabion Retaining Wall

(See Design Manual for Segmental Retaining Walls, National Concrete Masonry Association [NCMA] 3rd Edition for terms and equations of wall design)

PROJECT: Gabion Design - Lot 39 Summit Powder Mountain

PROJECT NO.: 02132-003 **SECTION: Wall 2 - 9 FT**

DATE: 9/25/2017 **SURCHARGE: Driveway**

Gabion Geometry & Soil Data:

H_{total} =	9	ft	Total Height of Gabion Wall
H_R =	8	ft	Exposed Height of Gabion Wall
ϕ_s =	34	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	120	pcf	Unit weight of the soil
γ_u =	140	pcf	Unit weight of the infill rock
ϕ_r =	35	deg	Infill Rock Friction Angle
δ =	22.7	deg	Interface Friction Angle
ψ =	0.0	deg	Back Cut Inclination
μ =	0.70		Frictional Component
K_A =	0.254		Active Earth Pressure Coefficient

Slope Geometry:

Backslope:	β_{con} =	0.0	deg Eqv. Backslope Angle
Soil Cut Angle:	α =	0.0	deg Soil Cut Angle

Seismic Earth Pressure Coefficient:

A =	0.220	Peak Ground acceleration (2% in 50 years)
d =	2.2	in (Allowable Displacement)
k_h =	0.092	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.23	
K_{AE} =	0.311	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.3	OK
External Overturning	2.0	5.2	OK
Individual Overturning	2.0	5.0	OK
Individual Sliding	1.5	2.7	OK
Bearing Capacity	2.0	19.2	OK
Seismic Overturning	1.5	3.6	OK
Seismic Sliding	1.1	1.7	OK
Seismic Bearing Capacity	1.5	19.0	OK

Surcharge:

Dead Load Uniform Surcharge:

q_{sd} =	200	psf	(Dead Load Surcharge)
F_{sd} =	457.7	lbf/ft	(Horizontal Surcharge Load)
y_{sd} =	4.5	ft	(Surcharge load centroid)

Live Load Uniform Surcharge:

q_{sl} =	100	psf	(Dead Load Surcharge)
F_{sl} =	228.8	lbf/ft	(Horizontal Surcharge Load)
y_{sl} =	4.5	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_w =	0.000	q_{ac} =	1,059	psf	$e_{c,s}$ =	1.192	FS_{BC} = 19.2
e_c =	0.830	q_{ult} =	20,351	psf	$q_{ac,s}$ =	1,072	$FS_{BC,s}$ = 19.0

Gabions = 3

Gabion No.	W_u (ft)	Δ_u (in)	H_u (ft)	H_{wall} (ft)	ΣW_i	$\Sigma W_i * x_i$	P_H	$P_{H,s}$	R_{sc}	$R_{sc,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	9.0	0.0	3.0	9.0	7,560	26,460	1,774	2,383	3,878	3,903	6,271	9,012	32,333	32,814	2.3	5.2	1.7	3.6
2	6.0	0.0	3.0	6.0	3,780	9,450	929	1,191	2,791	2,808	2,281	3,067	11,425	11,568	3.0	5.0	2.4	3.8
3	3.0	0.0	3.0	3.0	1,260	1,890	338	397	920	924	443	532	2,225	2,243	2.7	5.0	2.3	4.2
4	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
5	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A

9.0 Total Estimated Height of Gabion Retaining Wall

(See Design Manual for Segmental Retaining Walls, National Concrete Masonry Association [NCMA] 3rd Edition for terms and equations of wall design)

PROJECT: Gabion Design - Lot 39 Summit Powder Mountain

PROJECT NO.: 02132-003 **SECTION: Wall 2 - 6 FT**

DATE: 9/25/2017 **SURCHARGE: Driveway**

Gabion Geometry & Soil Data:

H_{total} =	6	ft	Total Height of Gabion Wall
H_R =	5	ft	Exposed Height of Gabion Wall
ϕ_s =	34	deg	Soil Friction Angle - Effective
c_s =	0	psf	Cohesion Intercept of soil
γ_s =	120	pcf	Unit weight of the soil
γ_u =	140	pcf	Unit weight of the infill rock
ϕ_r =	35	deg	Infill Rock Friction Angle
δ =	22.7	deg	Interface Friction Angle
ψ =	0.0	deg	Back Cut Inclination
μ =	0.70		Frictional Component
K_A =	0.254		Active Earth Pressure Coefficient

Slope Geometry:

Backslope:	β_{con} =	0.0	deg Eqv. Backslope Angle
Soil Cut Angle:	α =	0.0	deg Soil Cut Angle

Seismic Earth Pressure Coefficient:

A =	0.220	Peak Ground acceleration (2% in 50 years)
d =	2.2	in (Allowable Displacement)
k_h =	0.092	Use 1/2 of A? N
k_v =	0	(If "N" then use displacement-factored k_h)
θ =	5.23	
K_{AE} =	0.311	

Failure Mechanism	FS Required	FS Obtained	OK
External Sliding	1.5	2.3	OK
External Overturning	2.0	5.0	OK
Individual Overturning	2.0	5.0	OK
Individual Sliding	1.5	2.7	OK
Bearing Capacity	2.0	18.7	OK
Seismic Overturning	1.5	3.8	OK
Seismic Sliding	1.1	1.8	OK
Seismic Bearing Capacity	1.5	18.5	OK

Surcharge:

Dead Load Uniform Surcharge:

q_{sd} =	200	psf	(Dead Load Surcharge)
F_{sd} =	305.1	lbf/ft	(Horizontal Surcharge Load)
y_{sd} =	3	ft	(Surcharge load centroid)

Live Load Uniform Surcharge:

q_{sl} =	100	psf	(Dead Load Surcharge)
F_{sl} =	152.6	lbf/ft	(Horizontal Surcharge Load)
y_{sl} =	3	ft	(Surcharge load centroid)

Factor of Safety against Bearing Capacity:

e_w =	0.000	q_{ac} =	787	psf	$e_{c,s}$ =	0.811	FS_{BC} = 18.7
e_c =	0.603	q_{ult} =	14,745	psf	$q_{ac,s}$ =	796	$FS_{BC,s}$ = 18.5

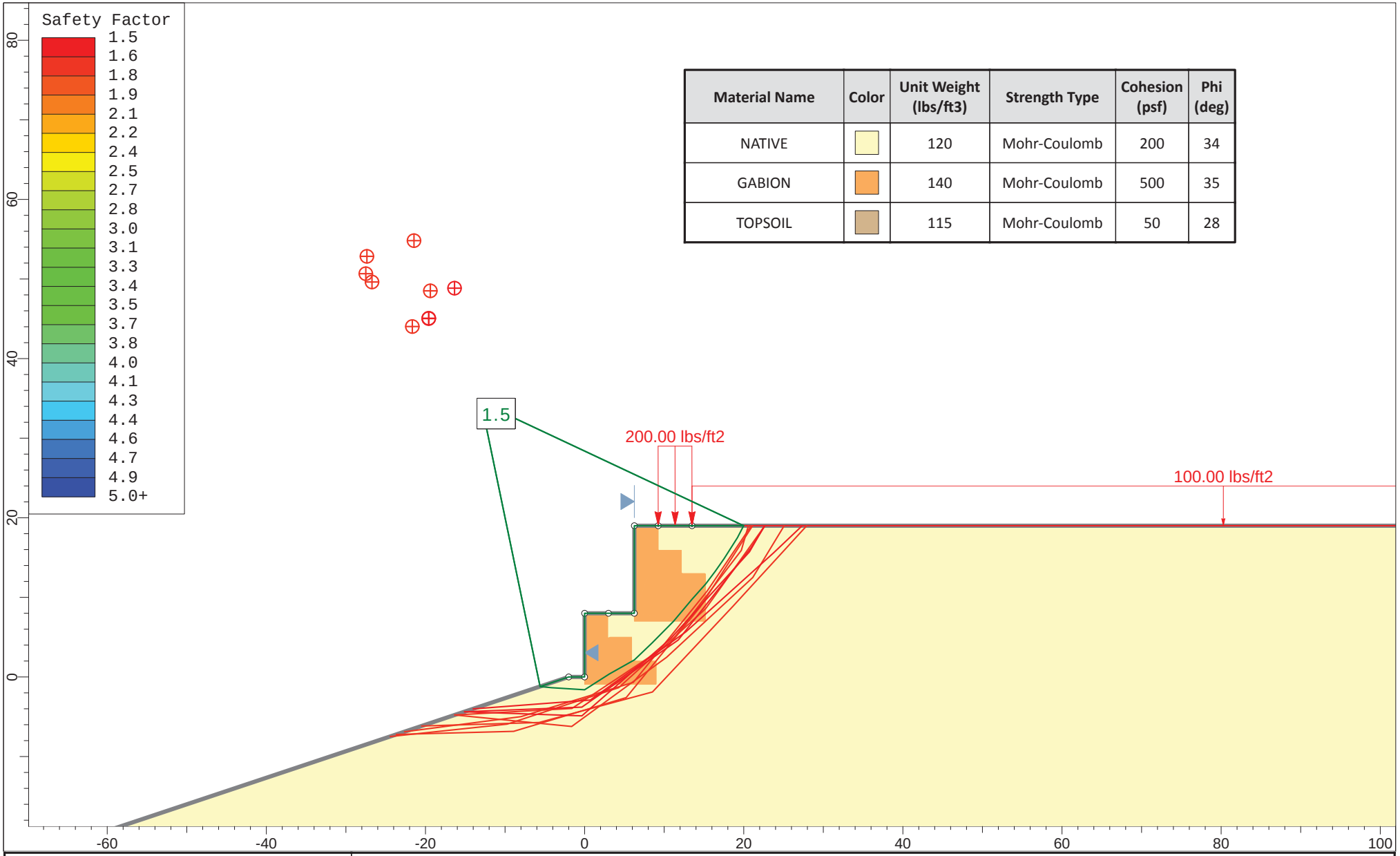
Gabions = 2

Gabion No.	W_u (ft)	Δ_u (in)	H_u (ft)	H_{wall} (ft)	ΣW_i	$\Sigma W_i * x_i$	P_H	$P_{H,s}$	R_{sc}	$R_{sc,s}$	M_o	$M_{o,s}$	M_r	$M_{r,s}$	FS_{SL}	FS_{OT}	$FS_{SL,S}$	$FS_{OT,S}$
1	6.0	0.0	3.0	6.0	3,780	9,450	929	1,191	1,940	1,951	2,281	3,067	11,425	11,568	2.3	5.0	1.8	3.8
2	3.0	0.0	3.0	3.0	1,260	1,890	338	397	917	922	443	532	2,225	2,243	2.7	5.0	2.3	4.2
3	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
4	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
5	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	0	0	0	0	0	0	0	0	N/A	N/A	N/A	N/A

6.0 Total Estimated Height of Gabion Retaining Wall

(See Design Manual for Segmental Retaining Walls, National Concrete Masonry Association [NCMA] 3rd Edition for terms and equations of wall design)

Section 3



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
NATIVE		120	Mohr-Coulomb	200	34
GABION		140	Mohr-Coulomb	500	35
TOPSOIL		115	Mohr-Coulomb	50	28

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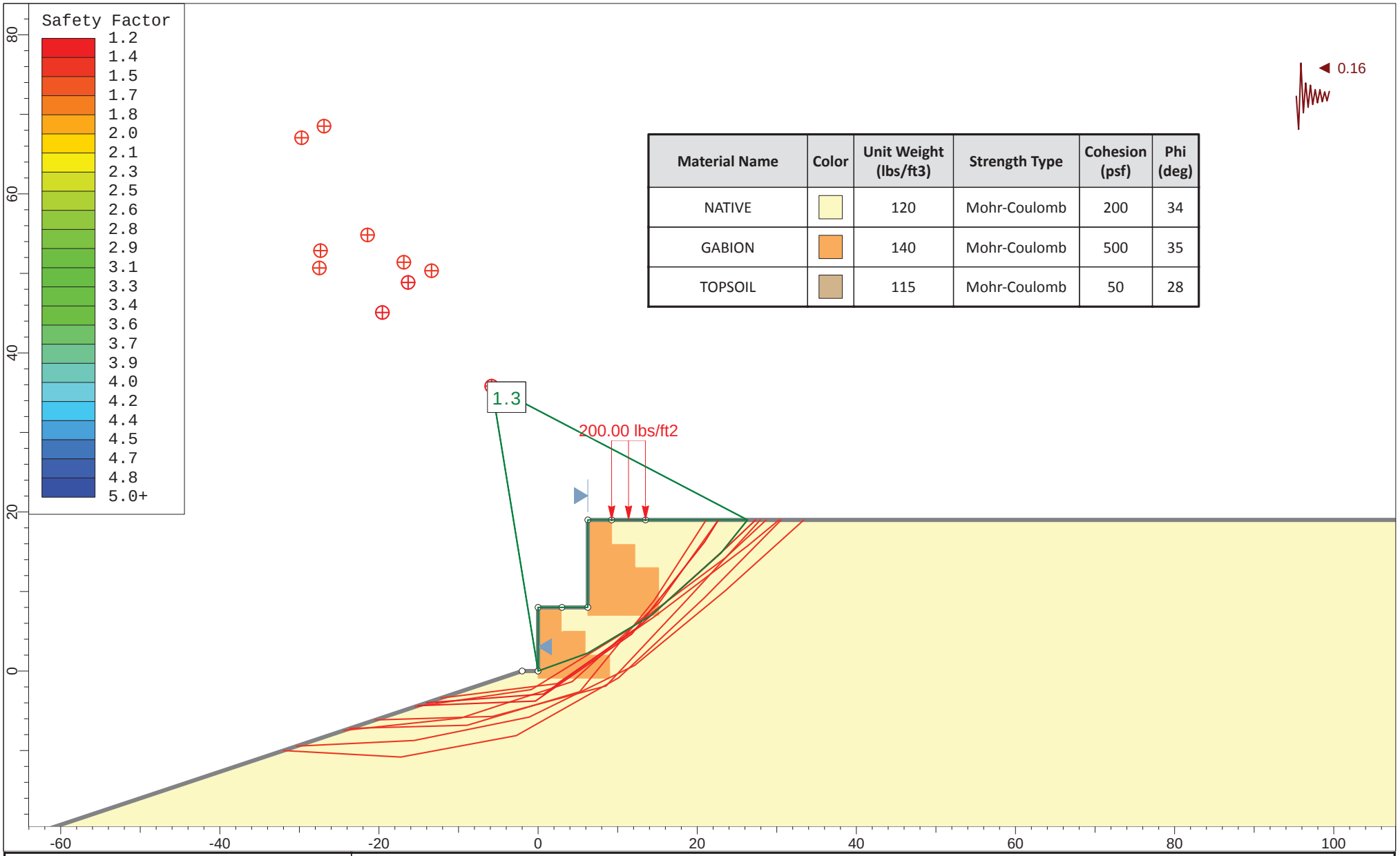
SLIDEINTERPRET 7.027

Project	LOT 39 SUMMIT POWDER MOUNTAN RESORT - GABION WALLS		
Analysis Description	GLOBAL STABILITY ANALYSIS - STATIC CONDITIONS		
Drawn By	TYLER L	*Scale* 1:200	*Company* IGES, INC.
Date	9/25/2017	*File Name*	02132-003.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
NATIVE		120	Mohr-Coulomb	200	34
GABION		140	Mohr-Coulomb	500	35
TOPSOIL		115	Mohr-Coulomb	50	28

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SLIDEINTERPRET 7.027

Project	LOT 39 SUMMIT POWDER MOUNTAIN RESORT - GABION WALL		
Analysis Description	GLOBAL STABILITY ANALYSIS - SEISMIC CONDITIONS		
Drawn By	TYLER L	*Scale* 1:200	*Company* IGES, INC.
Date	9/25/2017	*File Name*	02132-003.slmd