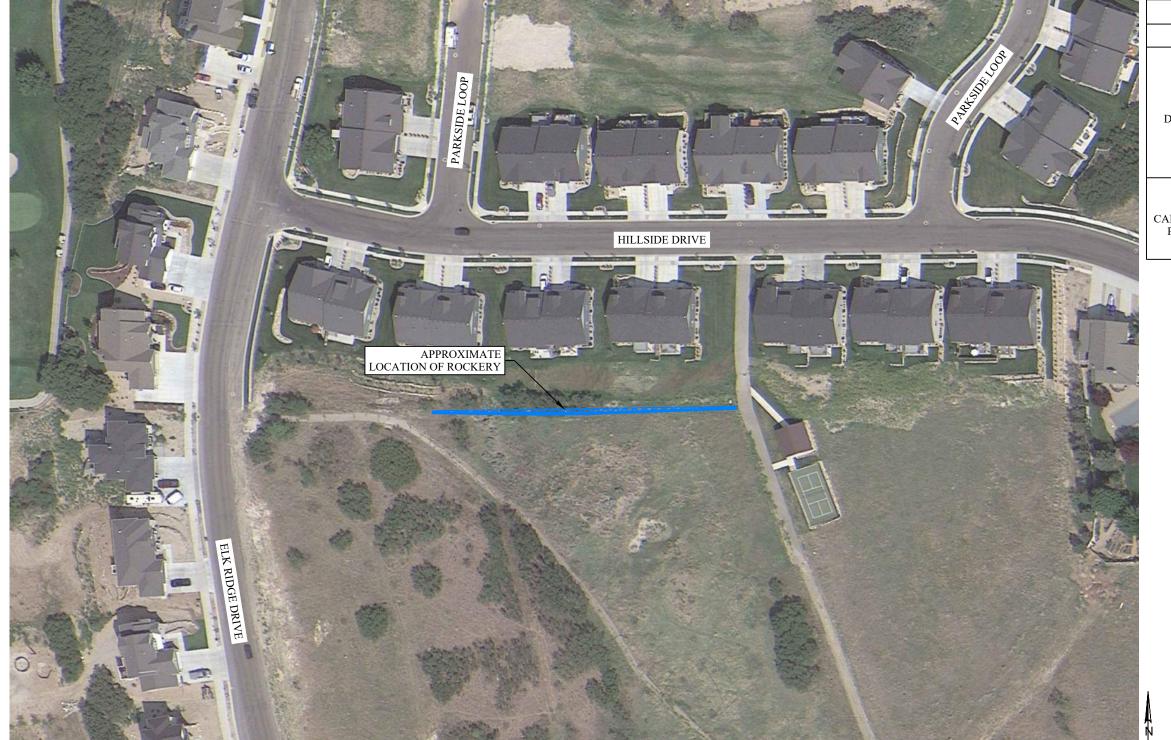
ROCKERY DESIGN PACKAGE LIGHTHOUSE HEIGHTS SUBDIVISION ELK RIDGE, UTAH



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.

PROJECT AERIAL VIEW REFERENCE IMAGE FROM GOOGLE EARTH PRO, IMAGE DATE AUGUST 28, 2021

> 12429 SOUTH 300 EAST DRAPER, UTAH 84020 (801) 748-4044

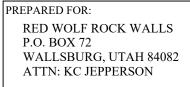
0	20	40	60	100	2
_			S	CALE: 1" = 100'	

DESIGNED BY: DHB	6-27-2022	PLOT S	SCALE
DRAWN BY: DHB	6-27-2022	1=	=1
CHECKED BY: BMJ	6-27-2022	DWG S	
APPROVED BY: BMJ	6-27-2022	1"=	100'
IGES PROJECT NO:	SHEET NO:	1	REV
02158-117		1	N/A

COVER SHEET

ROCKERY LIGHTHOUSE HEIGHTS SUBDIVISION ELK RIDGE, UTAH

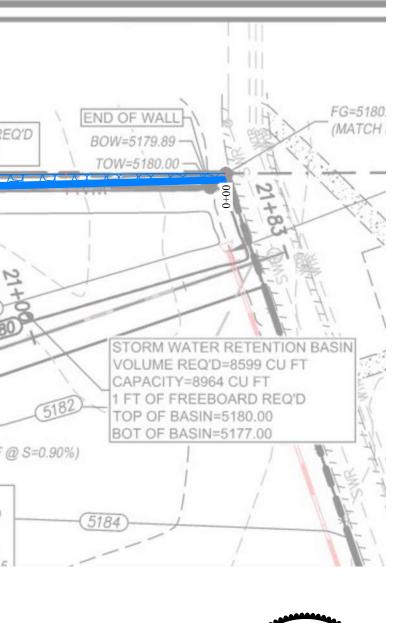
DESIGN PACKAGE CONTENTS							
	SHEET NO.	DESCRIPTION					
	1	COVER SHEET					
	2	PLAN VIEW					
SHOP	3	TYPICAL SECTION VIEW					
DRAWINGS	4	CONSTRUCTION SPECIFICATIONS & NOTES					
	5	DESIGN CRITERIA					
	6	SITE PHOTOS					
DESIGN ALCULATION	SECTION 2	STABILITY CALCULATIONS					
PACKAGE	SECTION 3	GLOBAL STABILITY RESULTS					



APPROVED BY: BRADLEY M. JOHNSON, P.E.



SUMP REQ'D RIM=5182.93 FL IN(NW)=5174.80 SUMP=5164.80 FL IN(E)=5174.80 SUMP=5164.80	EXPOSED HEIGHT: 9 FEET	FL OUT(W)=5 BOW=5171.74 TOW=5180.03	BOW=5171.62 TOW=5180.00	FLARED OUTLET #1 R FL OUT(SW)=5179.00
18" RCP REQ'D (302.9 LF @ S=0.39	5" RCP REQ'D (38.0 LP @ S=1	0000		5178 5178 5178 5178 5178
5202 FG=5186.96 5204 5204	1441111	B #1 Q'D 1.93	Control 1	15" RCP REQ'D (17.1 LF CB#2 CURB INLET REQ'D RIM=5181.61 FL IN(SW)=5179.11 EL OUT(NE)=5179.11
APPROXIMATE EXTENT APPROXIMATE EXTENT OF ROCKERY BATTER CALE: 1" = 30'	APPROXIMATE EXTENT OF TOP BOULDER IN ROCKERY	CONS SUBDIVIS	<u>PLAN VIEW</u> ENCE IMAGE PROVIDED BY PEPG ULTING, LIGHTHOUSE HEIGHTS SION, GRADING & DRAINAGE PLAN, C4.0, DATED SEPTEMBER 1, 2021.	
REV REVISION DESCRIPTION REVISIONS	DATE BY CHK	12429 SOUTH 300 EAST DRAPER, UTAH 84020 (801) 748-4044	ROCKERY LIGHTHOUSE HEIGHTS SUBDIVISION ELK RIDGE, UTAH PLAN VIEW	DESIGNED BY: DHB6-2DRAWN BY:DHB6-2CHECKED BY:BMJ6-2APPROVED BY:BMJ6-2IGES PROJECT NO:SH02158-117



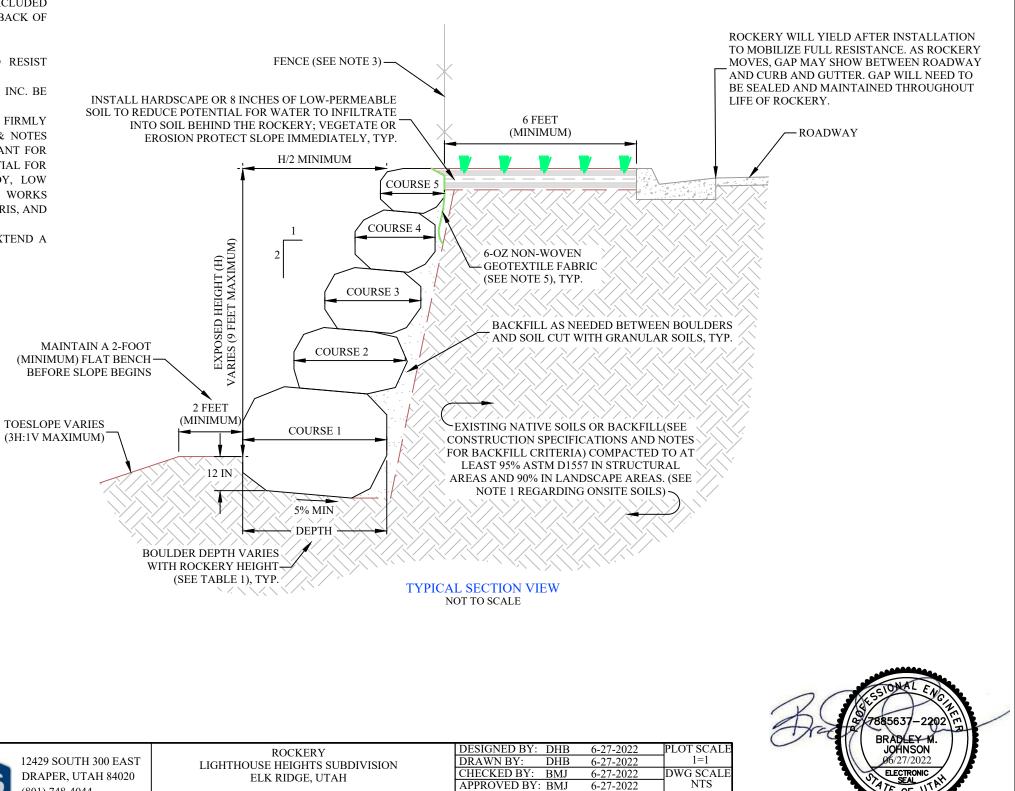
7-2022	PLOT S	CALE
7-2022	1=	1
7-2022	DWG SO	
7-2022	1"=	50
EET NO:	2	REV
	L	N/A



SECTION VIEW NOTES:

- SOIL CUT SHOULD BE BENCHED AS NEEDED TO PROTECT WORKERS AND TO COMPLY WITH OSHA REQUIREMENTS.
- 2. ROCKERIES ARE VULNERABLE TO EROSION AND HYDROSTATIC PRESSURES IMMEDIATELY AFTER INSTALLATION BUT PRIOR TO THE PLACEMENT OF LANDSCAPING/FINISHING ELEMENTS (E.G., LANDSCAPING, HARDSCAPE, CURB & GUTTER, PAVEMENT, ETC.). TO PREVENT DAMAGE TO THE ROCKERY DURING ADDITIONAL SITE WORK, ALL SURFACE DRAINAGE SHOULD BE DIRECTED AWAY FROM THE ROCKERY. EXCESS WATER DURING HEAVY PRECIPITATION EVENTS, IF NOT DRAINED PROPERLY, CAN CAUSE WASHOUTS AT ROCKERY ENDS AND 'BLOWOUTS' OF INTERIOR SECTIONS. THESE PRECAUTIONS SHOULD BE TAKEN DURING AND AFTER ROCKERY CONSTRUCTION, UNTIL THE FINAL SITE DRAINAGE AND LANDSCAPING ARE COMPLETE.
- WE RECOMMEND THAT AN APPROPRIATE SAFETY FENCE/BARRICADE BE CONSIDERED BY THE 3. OWNER ABOVE THE ROCKERY. DESIGN OF THE FENCE/BARRICADE IS SPECIFICALLY EXCLUDED FROM THIS ENGINEERING. IF THE FENCE POST WILL BE PLACED WITHIN 3 FEET OF THE BACK OF THE BOULDERS, COMPLY WITH THE FOLLOWING RECOMMENDATIONS:
- 3.1. IF CHAIN LINK FENCE OR RAILING, EXTEND POST A MINIMUM DEPTH OF 36 INCHES.
- 3.2. IF VINYL, WOOD, PRECAST (OR SIMILAR), USE SLEEVE-IT TYPE SYSTEM TO RESIST OVERTURNING MOMENT OF FENCE SYSTEM.
- 3.3. WE RECOMMEND THAT ONCE THE FENCING SYSTEM IS DETERMINED THAT IGES, INC. BE CONTACTED TO ACCESS THE IMPACT OF THE FENCE ON THE ROCKERY.
- 4. ROCKERIES HAVE SOIL PLACED BETWEEN BOULDERS TO ENSURE THAT THE BOULDERS FIRMLY REST ON AT LEAST TWO BOULDERS BENEATH (SEE CONSTRUCTION SPECIFICATIONS & NOTES SHEET FOR DETAILS). KEEPING THE SOIL FROM ERODING AWAY OVER TIME IS IMPORTANT FOR LONG-TERM STABILITY AS WELL AS AESTHETIC REASONS. TO HELP REDUCE THE POTENTIAL FOR THIS SOIL TO ERODE, WE RECOMMEND THAT THE SOIL BE PLANTED WITH HARDY, LOW MAINTENANCE, DROUGHT-TOLERANT VEGETATION. EXAMPLES OF VEGETATION THAT WORKS WELL WITH ROCKERIES INCLUDE SEDUM, AUBRIETA, SEMPERVIVUM, PULSATILLA VULGARIS, AND DIANTHUS.
- INSTALL 6-OZ NON-WOVEN GEOTEXTILE FABRIC BEHIND THE UPPER BOULDER AND EXTEND A 5. MINIMUM OF 4 INCHES BELOW THE TOP OF SECOND BOULDER DOWN.

	TABLE 1 MINIMUM BOULDER DEPTH SCHEDULE								
COURSE	BOULDER SIZE (DEPTH) FOR EACH COURSE (COURSE 1 IS BOTTOM COURSE) FO VARIOUS EXPOSED WALL HEIGHTS (H) [ADD 1-FOOT MINIMUM EMBEDMENT FOR ALL ROCKERY SECTIONS]								
	9-FOOT ROCKERY	8-FOOT Rockery	7-FOOT ROCKERY	6-FOOT ROCKERY	5-FOOT ROCKERY	4 FOOT ROCKERY OR LESS			
5	2.0 FEET	-	-	-	-	-			
4	2.5 FEET	2.0 FEET	2.0 FEET	2.0 FEET	-	-			
3	3.0 FEET	2.5 FEET	2.5 FEET	2.0 FEET	2.0 FEET	2.0 FEET			
2	3.0 FEET	3.0 FEET	2.5 FEET	2.5 FEET	2.5 FEET	2.0 FEET			
1	3.5 FEET	3.5 FEET	3.0 FEET	3.0 FEET	3.0 FEET	3.0 FEET			



REVISION DESCRIPTION	DATE	BY	CHK	
REVISIONS				

(801) 748-4044

SHEET NO: IGES PROJECT NO: 02158-117

3

REV

N/A

TYPICAL SECTION VIEW

ROCKERY CONSTRUCTION SPECIFICATIONS:

- 1. GENERAL 1.1. DESIGN AND CONSTRUCTION INFORMATION IS BASED ON SITE GEOMETRY, THE REFERENCED CONSTRUCTION PLAN AND THE ENGINEERING ANALYSIS PERFORMED AS PART OF THE SCOPE OF WORK FOR THIS PROJECT.
- LOCATE AND FULLY RESOLVE ALL CONFLICTS WITH EXISTING AND/OR PROPOSED UTILITIES PRIOR TO ROCKERY 1.2 CONSTRUCTION.
- COMPLY WITH ALL ASPECTS OF OSHA 1926 SUBPART P APP B, SLOPING AND BENCHING FOR ALL EXCAVATED SLOPES. 1.3.
- IMPLEMENT THE FOLLOWING MEASURES TO REDUCE THE POTENTIAL FOR HYDROSTATIC PRESSURES TO BUILDUP BEHIND 1.4. THE ROCKERY:
- ESTABLISH HARDSCAPE OR LOW-PERMEABLE SOIL ABOVE ROCKERY AS SHOWN ON TYPICAL SECTION VIEW. BEFORE 1.4.1 FINAL LANDSCAPING ELEMENTS ARE COMPLETED AT THE SITE. VEGETATION OR EROSION CONTROL MEASURES MUST BE INSTALLED ABOVE AND BELOW THE ROCKERY IMMEDIATELY FOLLOWING CONSTRUCTION.
- INSTALL 6-OZ (MINIMUM) NON-WOVEN GEOTEXTILE FABRIC AS SHOWN IN THE TYPICAL SECTION VIEW TO REDUCE 1.4.2 POTENTIAL FOR EROSION AND DRAINAGE CHANNELS TO FORM.
- 1.5. CONDITIONS SUCH AS LEAKY OR BROKEN IRRIGATION LINES AND/OR UNCONTROLLED RUNOFF FROM IMPROPER SITE GRADING CAN LEAD TO UNDERMINING OR HYDROSTATIC PRESSURES BUILDING UP BEHIND THE ROCKERY, WHICH CAN LEAD TO SLOPE OR BOULDER MOVEMENT.

HYDROSTATIC PRESSURES WERE NOT CONSIDERED IN THE ANALYSIS OF THE ROCKERY AND MUST BE AVOIDED. 1.5.1

- ROCKERIES ARE VULNERABLE TO EROSION AND HYDROSTATIC PRESSURES IMMEDIATELY AFTER INSTALLATION BUT 1.5.2. PRIOR TO THE PLACEMENT OF THE FINISHING LANDSCAPING ELEMENTS (E.G., LOW-PERMEABLE SOIL OR HARDSCAPE). AS THESE ELEMENTS ARE CRITICAL TO THE OVERALL STABILITY OF THE ROCKERY, THE ROCKERY ARE NOT CONSIDERED COMPLETE UNTIL THEY ARE IN PLACE.
- THE OWNER SHALL BE AWARE OF THE RISKS IF THESE OR OTHER CONDITIONS OCCUR THAT COULD SATURATE OR 1.5.3. ERODE THE SOIL BEHIND THE ROCKERY OR IF THE FINISHING/LANDSCAPING ELEMENTS ARE NOT INSTALLED IMMEDIATELY FOLLOWING THE INSTALLATION OF THE ROCKERY.
- 2. MATERIALS
- RETAINED BACKFILL SOILS 2.1.
- 2.1.1. APPROVED IMPORTED GRANULAR BACKFILL BORROW OR APPROVED NATIVE SOILS THAT HAVE BEEN SCREENED AND PROCESSED COMPLYING WITH THE FOLLOWING CRITERIA:
- GRANULAR MATERIALS CONTAINING LESS THEN 35% FINES 2.1.1.1
- MAXIMUM NOMINAL PARTICLE SIZE OF 4 INCHES 2.1.1.2.
- PI OF 6 OR LESS, pH GREATER THAN 3 BUT LESS THAN 9 2.1.1.3.
- REASONABLY FREE FROM ORGANIC OR OTHER DELETERIOUS MATERIALS 2.1.1.4.
- MINIMUM EFFECTIVE FRICTION ANGLE OF 32 DEGREES 2.1.1.5.
- USE DURABLE ANGULAR BOULDERS WITH A MINIMUM NOMINAL DIAMETER OF 24 INCHES. MEET ALL MINIMUM DIAMETERS 2.2 IN ACCORDANCE WITH DESIGN DRAWINGS. ROCKS SHOULD FOLLOW FHWA GUIDELINES:
- 2.2.1. USE ROCKS THAT ARE HARD, ANGULAR, DURABLE, AND ABLE TO RESIST PHYSICAL, CLIMATIC, AND CHEMICAL DECOMPOSITION.
- USE ROCKS THAT ARE ROUGHLY RECTANGULAR, TABULAR, OR CUBIC IN SHAPE; ROUNDED ROCKS AND COBBLES 2.2.2. SHOULD NOT BE USED.
- ROCKS SHOULD CONSIST OF INTACT BLOCKS WITHOUT OPEN FRACTURES, FOLIATION, OR OTHER PLANES OF WEAKNESS 2.2.3 2.3. GEOTEXTILE FABRIC
- 6-OZ. MINIMUM NON-WOVEN 2.3.1.

3. INSTALLATION

- ROCKS SHOULD BE STACKED IN GENERAL ACCORDANCE WITH THE ASSOCIATED ROCKERY CONTRACTORS (ARC) AND FHWA 3.1. ROCKERY CONSTRUCTION GUIDELINES. ARC GUIDELINES ARE GIVEN ON THIS SHEET (SEE GUIDELINES TO THE RIGHT). FHWA GUIDELINES ARE SUMMARIZED AS FOLLOWS:
- EACH ROCK SHOULD BEAR ON AT LEAST TWO OTHER ROCKS 3.1.1.
- EACH ROCK SHOULD HAVE AT LEAST THREE BEARING POINTS TWO IN FRONT AND ONE IN BACK 3.1.2.
- 3.1.3. THE FRONT-MOST BEARING POINTS FOR EACH ROCK SHOULD BE WITHIN 6 INCHES OF THE AVERAGE FACE OF THE ROCKERY
- THE REAR OF THE ROCKS SHOULD BE ALIGNED ALONG AN IMAGINARY VERTICAL PLANE. IF ROCKS LARGER THAN THE 3.1.4. MINIMUM SPECIFIED DIAMETERS ARE USED, THEY CAN EXTEND BEYOND THIS IMAGINARY PLANE PROVIDED THEY DO NOT INTERFERE WITH ROCKERY DRAINAGE
- THE TOPS OF EACH ROCK SHOULD BE SLOPED BACK AT LEAST 5% TOWARDS THE BACK OF THE ROCKERY 3.1.5.
- ROCK FACING SHOULD BE STACKED AT A MAXIMUM STEEPNESS OF 1 HORIZONTAL TO 2 VERTICAL 3.1.6.
- THE BOTTOM ROW OF ROCKS SHOULD BE BURIED (EMBEDDED) A MINIMUM DEPTH OF 12 INCHES FOR ALL ROCKERIES. 3.1.7.
- PLACE ROCKERY BACKFILL MATERIAL IN 12-INCH MAXIMUM LOOSE LIFTS AND COMPACT TO A MINIMUM OF 95 PERCENT OF 3.2 ASTM D1557 (MODIFIED PROCTOR) IN STRUCTURAL AREAS AND 90 PERCENT IN LANDSCAPE AREAS. THINNER LIFTS MAY BE NECESSARY TO ACHIEVE REQUIRED COMPACTION.
- PERFORM DENSITY TESTING OF THE BACKFILL SOILS AT 50-FOOT INTERVALS ON EVERY LIFT. 3.2.1.
- 3.2.2. USE ONLY SMALL, WALK-BEHIND TYPE COMPACTION EQUIPMENT WITHIN 3 FEET OF THE BACK OF THE ROCKERY BOULDERS.
- IF ANY LOCATIONS EXIST WHERE THE ROCKERY WILL NOT BE PLACED UPON NATIVE SOILS, COMPACT THE FILL TO A 3.2.3. MINIMUM OF 95 PERCENT OF ASTM D1557.

INSTALL 6-OZ NON-WOVEN GEOTEXTILE FABRIC BEHIND THE UPPER BOULDER AS SHOWN ON THE TYPICAL SECTION VIEW 3.3. SHEET.

- 4. CONSTRUCTION OBSERVATION
- TO FULFILL ANY APPLICABLE CITY, COUNTY AND/OR STATE AGENCY REQUIREMENTS, AND TO PROTECT THE CONTRACTOR 4.1. AND DESIGN ENGINEER, IGES, INC., MUST PERFORM PERIODIC CONSTRUCTION OBSERVATIONS

	REV	REVISION DESCRIPTION REVISIONS	DATE	BY CHR	EST. 1998	12429 SOUTH 300 EAST DRAPER, UTAH 84020 (801) 748-4044	ROCKERY LIGHTHOUSE HEIGHTS SUBDIVISIO ELK RIDGE, UTAH CONSTRUCTION SPECIFICATIONS
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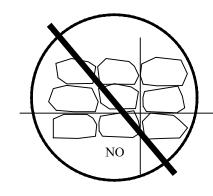
i.1.1	IF IGES, INC. DOES NOT OBSERVE THE ROCKERY D
	THE ROCKERY CONSTRUCTION WITH THE DESIGN
	INC., DOES NOT PERFORM THE PERIODIC CONSTRU
	CONTRACTOR/OWNER ASSUMES ALL RESPONSIBIL
	BOGUERNU ODGERNU TION GGUERNU F

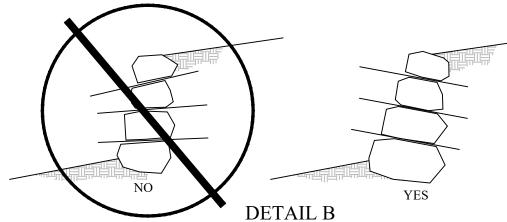
- 4.2. ROCKERY OBSERVATION SCHEDULE:
- 4.2.1.
- ASSESS THE MINIMUM EMBEDMENT REQUIREMENTS ARE MET. 4.2.2.
- 4.2.3.
- 4.2.4 WHETHER MINIMUM COMPACTION REQUIREMENTS ARE MET.
- 4.2.5. BELOW THE ROCKERY.
- 4.2.6. ALL BACKFILL SOILS CONSISTING OF FREE DRAINING GRANULAR SOILS.
- 4.2.7.

ROCK STACKING CONSTRUCTION GUIDELINES:

ROCKS SHOULD BE STACKED IN GENERAL ACCORDANCE WITH FHWA AND THE ASSOCIATED ROCKERY CONTRACTORS (ARC) ROCKERY CONSTRUCTION GUIDELINES, SUMMARIZED AS FOLLOWS:

- ROCKS SHOULD BE PLACED SO THAT THERE ARE NO CONTINUOUS JOINT PLANES IN EITHER THE VERTICAL OR LATERAL DIRECTION (SEE DETAIL A)
- WHEREVER POSSIBLE, EACH ROCK SHOULD BEAR ON AT LEAST TWO ROCKS BELOW IT
- THE UPPER PLANE OF EACH ROCK BETWEEN COURSES (THE TOP SURFACE OF ROCK), ROCKERY (SEE DETAIL B)





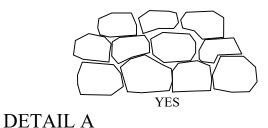
KERY	DESIGNED BI: DHB	0-2/
HTS SUBDIVISION	DRAWN BY: DHB	6-27
GE. UTAH	CHECKED BY: BMJ	6-27
JL, OTAH	APPROVED BY: BMJ	6-27
	IGES PROJECT NO:	SHE
CIFICATIONS & NOTES	02158-117	

URING CONSTRUCTION, A FINAL LETTER REGARDING COMPLIANCE OF CRITERIA AND RECOMMENDATIONS CANNOT BE PROVIDED. IF IGES, JCTION OBSERVATIONS OUTLINED ON THIS SHEET, THE ROCKERY LITY FOR THE ROCKERY.

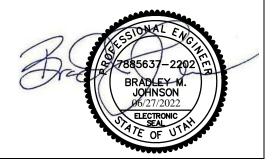
OBSERVE AND ASSESS THE SUITABILITY OF THE OF THE FOUNDATION BEARING SOILS. OBSERVE THE SIZE, POSITION, BATTER, AND PLACEMENT FOR EACH COURSE OF BOULDERS. OBSERVE THE PLACEMENT OF RETAINED FILL SOILS. OBSERVE THE COMPACTION OF THE RETAINED FILL AND ASSESS OBSERVE THE COMPLETED ROCKERY TO ASSESS FINISHED ROCKERY WALL HEIGHTS, BATTER, BACKSLOPE AND TOESLOPE GRADING CONDITIONS, AND THE SUITABILITY OF EROSION CONTROL MEASURES INSTALLED ABOVE AND

THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING THE CONSTRUCTION OBSERVATIONS AND QUALITY CONTROL.

SHOULD SLOPE BACK TOWARDS THE SLOPE FACE AND AWAY FROM THE FACE OF THE



7-2022	PLOT S	CALE
7-2022	1=	1
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EET NO:	1	REV
	4	N/A



ROCKERY GEOMETRY AND LOADING CONDITIONS												
LENGTH (FEET)	MAXIMUM EXPOSED HEIGHT (FEET)	BACKSLOPE CONDITIONS	SURCHARGE LOADING									
327	9	RELATIVELY FLAT	250 PSF (ROADWAY)									

SOIL CONDITIONS USED IN DESIGN (ASSUMED)											
EARTH MATERIALS	FRICTION ANGLE	COHESION	UNIT WEIGHT								
RETAINED SOIL	32°	100 PSF	125 PCF								
FOUNDATION SOIL	32°	100 PSF	125 PCF								

NOTES:

1. IGES, 2022, SITE OBSERVATIONS MADE ON JUNE 20, 2022.

COHESION USED DURING GLOBAL STABILITY ANALYSES ONLY. 2.

GENERAL NOTES:

- THE ENGINEERING PRESENTED IN THIS DESIGN PACKAGE IS BASED ON SPECIFIC PRODUCTS (E.G., COMPETENT/DURABLE BOULDERS, SOIL STRENGTHS GIVEN ABOVE, GEOMETRY AND LOADING CONDITIONS GIVEN IN THE TABLE ABOVE, ETC.). ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS WILL INVALIDATE THIS ENGINEERING. ANY CHANGES IN ROCKERY LOCATION, GRADES AT THE TOE OR TOP OF THE ROCKERY, ROCKERY HEIGHTS, AND SOIL PARAMETERS AT THE SITE WILL ALSO INVALIDATE THE ENGINEERING. FIELD ADJUSTMENTS/CHANGES MAY BE NEEDED TO MEET ACTUAL CONDITIONS ONCE CONSTRUCTION COMMENCES. IGES SHOULD BE CONSULTED WHERE FIELD CHANGES ARE REQUIRED.
- 2. THESE DOCUMENTS ARE INSTRUMENTS OF SERVICE AND SHALL REMAIN THE INTELLECTUAL PROPERTY OF IGES, INC. THE DESIGN PACKAGE HAS BEEN FURNISHED FOR THIS SPECIFIC PROJECT ONLY. ANY PARTY ACCEPTING THIS DOCUMENT DOES SO IN CONFIDENCE AND AGREES THAT NO USE OR RE-USE OF THESE DOCUMENTS (EITHER IN WHOLE OR IN PART) SHALL BE PERMITTED UNLESS EXPRESSLY AUTHORIZED IN WRITING BY IGES, INC.
- ROCKERIES ARE VULNERABLE TO EROSION AND HYDROSTATIC PRESSURES IMMEDIATELY AFTER INSTALLATION BUT 3. PRIOR TO THE PLACEMENT OF LANDSCAPING/FINISHING ELEMENTS AT THE SITE (E.G., LANDSCAPING, HARDSCAPE, CURB & GUTTER, PAVEMENT, ETC.). TO PREVENT DAMAGE TO THE ROCKERY DURING ADDITIONAL SITE WORK, ALL SURFACE DRAINAGE SHOULD BE DIRECTED AWAY FROM THE ROCKERY. EXCESS WATER DURING HEAVY RAIN EVENTS, IF NOT DRAINED PROPERLY, CAN CAUSE WASHOUTS AT ROCKERY ENDS AND 'BLOWOUTS' OF INTERIOR SECTIONS. THESE PRECAUTIONS SHOULD BE TAKEN DURING ROCKERY CONSTRUCTION, AND AFTER, UNTIL THE FINAL SITE DRAINAGE, LANDSCAPING AND PAVING ARE COMPLETE.

ENC	GINEERING ANAL
ANALYSIS	I
EXTERNAL STABILITY	MACK, D.A., SAND D.G., 2006, ROCKER ASSOCIATES C FHEW-CF
GLOBAL STABILITY	SLIDE 2 MODE

	_
SEISMIC PARAM	EJ
SEISMIC CRITERIA	
7% IN 75 YEARS	

SOURCES & NOTES:

- SITE: http://earthquake.usgs.gov/ws/designmaps, ACCESSED 6-22-2022.
- RECOMMENDED IN THE FHWA ROCKERY DESIGN MANUAL.
- 3. DESIGN MANUAL METHODOLOGY.
- ANALYSES ($k_{\rm h} = 0.163$ g).

DATE BY CHK

12429 SOUTH 300 EAST DRAPER, UTAH 84020 (801) 748-4044

ROCKERY LIGHTHOUSE HEIGHTS SUBDIVISION ELK RIDGE, UTAH

DESIGNED BY: DHB	6-2
DRAWN BY: DHB	6-2
CHECKED BY: BMJ	6-2
APPROVED BY: BMJ	6-2
IGES PROJECT NO:	SH
02158-117	

DESIGN CRITERIA

REVISION DESCRIPTION REVISIONS

REV

LYSIS USED IN DESIGN

DESIGN REFERENCES/SOFTWARE

DERS, S.H. MILLHONE, W.L., FIPPIN, R.L., AND KENNEDY, Y DESIGN AND CONSTRUCTION GUIDLINES, SANDERS & GEOSTRUCTURAL ENGINEERING, INC., REPORT NO. FL/TD-06-006, REPORT DATED NOVEMBER, 2006

ELER: ROCSCIENCE, INC., 1998-2022, VERSION 9.023: BUILD DATE MAY 25, 2022

TERS USED IN DESIGN

EXTERNAL & GLOBAL STABILITY

DESIGN PGA (As)	k,
0.391g	0.163g (EXTERNAL) 0.196g (GLOBAL)

U.S. GEOLOGICAL SURVEY, U.S. SEISMIC DESIGNMAPS WEB APPLICATION,

SITE CLASS D WAS ASSUMED FOR THE ONSITE SOILS USING 2009 AASHTO GUIDE SPECIFICATIONS. AASHTO SPECIFICATIONS WERE USED AS

A MAXIMUM ALLOWABLE SEISMIC DISPLACEMENT THRESHOLD OF 3.91 INCHES (10^*A_s) WAS USED TO REDUCE THE HORIZONTAL SEISMIC ACCELERATION COEFFICIENT IN ACCORDANCE WITH AASHTO LRFD

ONE-HALF OF THE DESIGN PGA (As) WAS USED TO MODEL THE HORIZONTAL SEISMIC ACCELERATION FOR GLOBAL STABILITY

7-2022	PLOT S	CALE
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	3	N/A















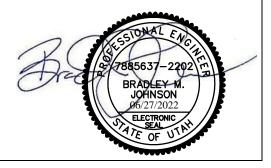
PHOTOS TAKEN DURING SITE OBSERVATION MADE ON JUNE 20, 2022

REVISION DESCRIPTION DATE BY C REVISIONS	К К С С 5 7. 1998 К К С 5 7. 1998 К К С 5 7. 1998 К С 5 7. 1998	LIGHTHOUSE HEIGHTS SUBDIVISION ELK RIDGE, UTAH	DRAWN BY: DHB CHECKED BY: BMJ APPROVED BY: BMJ	6-27 6-27 6-27 6-27 SHI
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7-2022	DWG S	
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$\boldsymbol{\varphi}_s =$	32	deg	Soil Friction	n Angle - Effec	ctive	Soil Cut Ang	gle:	α=	82.9	deg	Soil Cut An	gle				FS	FS	
$c_s =$	0	psf	Cohesion In	tercept of soil		Rockery Fac	e Slope:	1	Н	2	V		Fail	ure Mecha	inism	Required	Obtained	OK
$\gamma_s =$	125	pcf	Unit weight	of the soil									Ex	ternal Slic	ling	1.5	2.4	OK
$\gamma_R =$	150	pcf	Unit weight	of the rock	Seismic Earth Pressure Coefficient: (Mack et al., 2000)								Exter	nal Overtu	urning	2.0	3.8	OK
δ =	32.0	deg	Interface Fri	iction Angle		A =	0.391	Peak Grou	ind Accelerat	tion (7% in 7	5 years)		Individua	ll Rock Ov	verturning	2.0	5.1	OK
ψ=	7.1	deg	Back Cut In	t Inclination $d = 3.9$ in (Allowable E							t)		Individ	lual Rock	Sliding	1.5	2.3	OK
μ=	0.70		Frictional C	omponent		$k_h =$	0.163	τ	Use 1/2 of A?	? N			Bea	aring Capa	ncity	2.0	2.6	OK
μ_{rock} =	0.55		Rock-to-Ro	ck Friction		$k_v =$	0		(If "N" then	use displace	ment-factore	d k _h)		nic Overtı		1.5	1.6	OK
K _A =	0.226		Active Earth	n Pressure Coe	fficient	$\theta =$	9.24						Se	ismic Slid	ing	1.1	1.3	OK
v =	63.4	deg	Rockery Fac	ce Angle		$K_{AE} =$	0.343						Seismic	Bearing	Capacity	1.5	2.6	OK
Surcharge:	<u>.</u>																	
Uniform:	Uniform A	pplied Sur	charge				Strip:	Strip Load	l Surcharge									
$q_s =$	0	psf					$q_s =$	250	psf									
$F_s =$	0	lbf/ft	(Horizontal	Surcharge Loa	ad)		$\mathbf{x}_{\mathbf{s}} =$	6	ft	(Distance f	rom soil cut)		$F_s =$	90	lbf/ft	(Horizontal S	urcharge Load))
$y_s =$	5	ft	(Surcharge l	load centroid)			$W_s =$	12	ft	(Width of S	Strip Load)		$y_s =$	2.0	ft			
E (69	.	• (D	• •	•,														
Factor of S		ainst Be			0									-			OV	
e _{max} =	0.583		$q_{max} =$	2,54		psf		$e_{s,s} =$	0.507		FS _{BC}	2.7			•	eck (static):		
$e_s =$	-0.553		$q_{ult} =$	6,69	1	psf		$q_{max,s} =$	2,602		FS _{BC,s}	2.6		Eccent	ricity Chec	k (seismic):	OK	
# Rocks =	5		(R* - Bould	er Height to W	idth Ratio)												
Boulder	B' (ft)	R*	H _R (ft)	H-H' (ft)	ΣWi	$\Sigma W_i * x_i$	F _H	F _{H.s}	Fu	F _{u.s}	Mo	M _{0.8}	Mr	M _{r.s}	FS _{SL}	FSOT	FS _{SL.S}	FS _{OT.S}
1	3.5	0.7	2.5	10.0	3,970	14,146	1,369	2,799	3,194	3,448	4,351	11,955	16,469	18,010	2.4	3.8	1.3	1.6
2	3.0	0.7	2.2	7.5	2,776	8,147	769	1,667	1,713	1,826	1,849	5,435	9,267	10,004	2.3	5.1	1.1	1.9
3	3.0	0.7	2.2	5.3	1,860	4,200	363	888	1,116	1,172	644	2,084	4,743	5,093	3.1	7.4	1.4	2.5
4	2.5	0.7	1.7	3.1	944	1,527	123	353	551	570	128	492	1,678	1,774	4.5	>10	1.7	3.7
5	2.0	0.7	1.4	1.4	362	362	24	98	205	209	11	64	386	400	8.5	>10	2.2	6.3
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PROJECT D	Г NO.: (DATE: (02158- 6/22/20)22	2		<u>CTION:</u> HARGE:		-	Rockery	7						ÍG	E	S
Rockery Geo		& Soil I	Data:														EST. 1998	
$H_{total} =$	9	ft	Total Height	t of Rockery		Slope Ge	ometry:]	Backslope:	1.0	Н	0.0	V		Broken I	Back Slope:	Ν	
$H_R =$	8	ft	Exposed He	ight of Rocker	у	Backslope:		β_{eq} =	0.0	deg	Eq. Backslo	pe Angle			Back	slope Rise:	0	ft
$\varphi_s =$	32	deg	Soil Friction	n Angle - Effec	ctive	Soil Cut Ang	gle:	α=	82.9	deg	Soil Cut An	gle				FS	FS	
$c_s =$	0	psf	Cohesion In	tercept of soil		Rockery Fac	e Slope:	1	Н	2	V			ure Mecha		Required	Obtained	OK
$\gamma_{s} =$	125	pcf	Unit weight	of the soil										ternal Slid	0	1.5	2.6	OK
$\gamma_R =$	150	pcf	Unit weight	of the rock		Seismic E	arth Pro	essure C	oefficient:	-	(Mack et al.	, 2006)	Exter	nal Overtu	urning	2.0	4.2	OK
δ =	32.0	deg	Interface Fri	iction Angle		A =	0.391	Peak Grou	and Accelerat	ion (7% in 7	5 years)				verturning	2.0	6.0	OK
ψ=	7.1	deg	Back Cut In	clination		d =	3.9	in	(Allowable	Displacemen	nt)		Individ	lual Rock	Sliding	1.5	2.7	OK
μ=	0.70		Frictional Co	omponent		$k_h =$	0.163	1	Use 1/2 of A?	N				aring Capa		2.0	3.3	OK
TOCK	0.55		Rock-to-Roo	ck Friction		$k_v =$	0		(If "N" then	use displace	ment-factore	d k _h)		nic Overtu	0	1.5	1.7	OK
8	0.226		Active Earth	n Pressure Coe	fficient	$\theta =$	9.24							ismic Slid		1.1	1.3	OK
ν =	63.4	deg	Rockery Fac	ce Angle		$K_{AE} =$	0.343						Seismic	Bearing (Capacity	1.5	3.3	OK
Surcharge:																		
Uniform: Un	Jniform Ap	oplied Sur	charge				<u>Strip:</u>	-	l Surcharge									
$q_s =$	0	psf					$q_s =$	250	psf									
$F_s =$	0	lbf/ft	(Horizontal	Surcharge Loa	nd)		$\mathbf{x}_{\mathbf{s}} =$	6 ft (Distance from soil cut)					$F_s = 63$ lbf/ft (Horizontal Surcharge Load)					
$y_s =$	4.5	ft	(Surcharge l	oad centroid)			$W_s =$	10	ft	(Width of S	Strip Load)		$y_s = 1.5$ ft					
Factor of Saf	fety aga	inst Be	aring Cap															
$e_{max} =$	0.583		$q_{max} =$	2,01	7	psf		$e_{s,s} =$	0.450		FS _{BC}	3.5		Ecce	ntricity Ch	eck (static):	OK	
e _s = _	-0.451		$q_{ult} =$	6,95	9	psf		$q_{max,s} =$	2,143		FS _{BC,s}	3.3		Eccent	ricity Chec	k (seismic):	OK	
# Rocks =	4		r` ı	er Height to W	· · · · · · · · · · · · · · · · · · ·			1		1	Т	I	1	1		T		
	B' (ft)	R*	$H_{R}(ft)$	H-H' (ft)	ΣW_i	$\Sigma W_i^* x_i$	F_{H}	F _{H,s}	F_{μ}	$F_{\mu,s}$	Mo	M _{o,s}	M _r	M _{r,s}	FS _{SL}	FSOT	FS _{SL,S}	FS _{OT,S}
1	3.5	0.8	2.8	9.0	3,502	11,175	1,089	2,303	2,784	2,988	3,107	8,729	13,017	14,230	2.6	4.2	1.3	1.7
2	3.0	0.8	2.5	6.2	2,137	5,170	488	1,132	1,299	1,374	993	3,055	5,901	6,377	2.7	6.0	1.3	2.1
3	2.5	0.8	2.1	3.7	1,122	1,913	174	464	662	689	214	767	2,128	2,265	3.8	10.0	1.5	3.0
4	2.0	0.8	1.6	1.6	431	431	34	126	246	251	19	97	464	484	7.2	>10	2.0	5.0
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PROJEC	CT NO.: DATE:	02158- 6/22/20)22			<u>CTION:</u> HARGE:		-	Rockery	7						ÍC	F	ŝ
Rockery G		& Soil	<u>Data:</u>														EST. 1998	
$H_{total} =$	8	ft	Total Heigh	t of Rockery		<u>Slope Ge</u>	ometry:		Backslope	1.0	Н	0.0	V		Broken I	Back Slope:	Ν	
$H_R =$	7	ft	Exposed He	eight of Rocker	ry	Backslope:		β_{eq} =	0.0	deg	Eq. Backslo	pe Angle			Back	slope Rise:	0	ft
$\varphi_s =$	32	deg	Soil Friction	n Angle - Effec	ctive	Soil Cut An	gle:	α=	82.9	deg	Soil Cut An	gle				FS	FS	
$c_s =$	0	psf	Cohesion In	ntercept of soil		Rockery Fac	e Slope:	1	Н	2	V		Fail	ure Mecha	nism	Required	Obtained	OK
$\gamma_{s} =$	125	pcf	Unit weight	of the soil										ternal Slic	0	1.5	2.6	OK
$\gamma_R =$	150	pcf	Unit weight	of the rock		Seismic H	Earth Pr	essure C	oefficient	<u>.</u>	(Mack et al.	., 2006)	Exter	mal Overtu	urning	2.0	4.3	OK
δ =	32.0	deg	Interface Fr	iction Angle		A =	0.391	Peak Grou	and Accelera	tion (7% in 7	5 years)		Individua	al Rock Ov	verturning	2.0	6.5	OK
ψ=	7.1	deg	Back Cut In	clination		d =	3.9	in	(Allowable	Displacemen	nt)		Individ	dual Rock	Sliding	1.5	2.8	OK
μ=	0.70		Frictional C	component		$k_{h} =$	0.163	1	Use 1/2 of A	? N			Bea	aring Capa	ncity	2.0	3.0	OK
μ_{rock} =	0.55		Rock-to-Ro	ck Friction		$k_v =$	0		(If "N" then	use displace	ment-factore	d k _h)	Seisr	nic Overtı	urning	1.5	1.7	OK
K _A =	0.226		Active Earth	h Pressure Coe	efficient	$\theta =$	9.24						Se	ismic Slid	ing	1.1	1.4	OK
ν =	63.4	deg	Rockery Fa	ce Angle		$K_{AE} =$	0.343						Seismic	Bearing (Capacity	1.5	3.4	OK
Surcharge:	<u>:</u>																	
Uniform:	Uniform A	pplied Su	rcharge				Strip:	Strip Load	l Surcharge									
$q_s =$	0	psf					$q_s =$	250	psf									
$F_s =$	0	lbf/ft	(Horizontal	Surcharge Loa	ad)		$\mathbf{x}_{\mathbf{s}} =$	6	ft	(Distance from soil cut)			$F_s = 34$ lbf/ft (Horizontal Surcharge Load)					
$y_s =$	4	ft	(Surcharge	load centroid)			$W_s =$	8	ft	(Width of S	Strip Load)		$y_s =$	1.0	ft			
<u>Factor of S</u>	Safety aga	ainst Be	aring Cap	oacity:														
e _{max} =	0.500		$q_{max} =$	2,07	'8	psf		$e_{s,s} =$	0.340		FS _{BC}	3.0		Ecce	ntricity Ch	eck (static):	OK	
$e_s =$	-0.497		$q_{ult} =$	6,19	91	psf		q _{max,s} =	1,860		FS _{BC,s}	3.4		Eccent	ricity Chec	k (seismic):	OK	
# Rocks =	4		(R* - Bould	ler Height to W	/idth Ratio)	-	_			-						-	-
Boulder	B' (ft)	R*	$H_{R}(ft)$	H-H' (ft)	ΣW_i	$\Sigma W_i^* x_i$	$F_{\rm H}$	F _{H,s}	Fμ	F _{µ,s}	Mo	M _{o,s}	M _r	M _{r,s}	FS _{SL}	FSOT	FS _{SL,S}	FS _{OT,S}
1	3.0	0.8	2.5	8.0	2,746	7,931	843	1,801	2,185	2,346	2,161	6,151	9,181	10,006	2.6	4.3	1.4	1.7
2	2.5	0.8	1.9	5.4	1,707	3,925	377	886	1,035	1,094	683	2,151	4,402	4,713	2.8	6.5	1.3	2.2
3	2.5	0.8	1.9	3.6	1,074	1,831	162	435	632	657	192	694	2,029	2,156	4.0	>10	1.6	3.2
4	2.0	0.8	1.7	1.7	441	441	36	130	252	257	20	103	476	497	7.0	>10	2.0	4.9
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
· · · · · ·																		

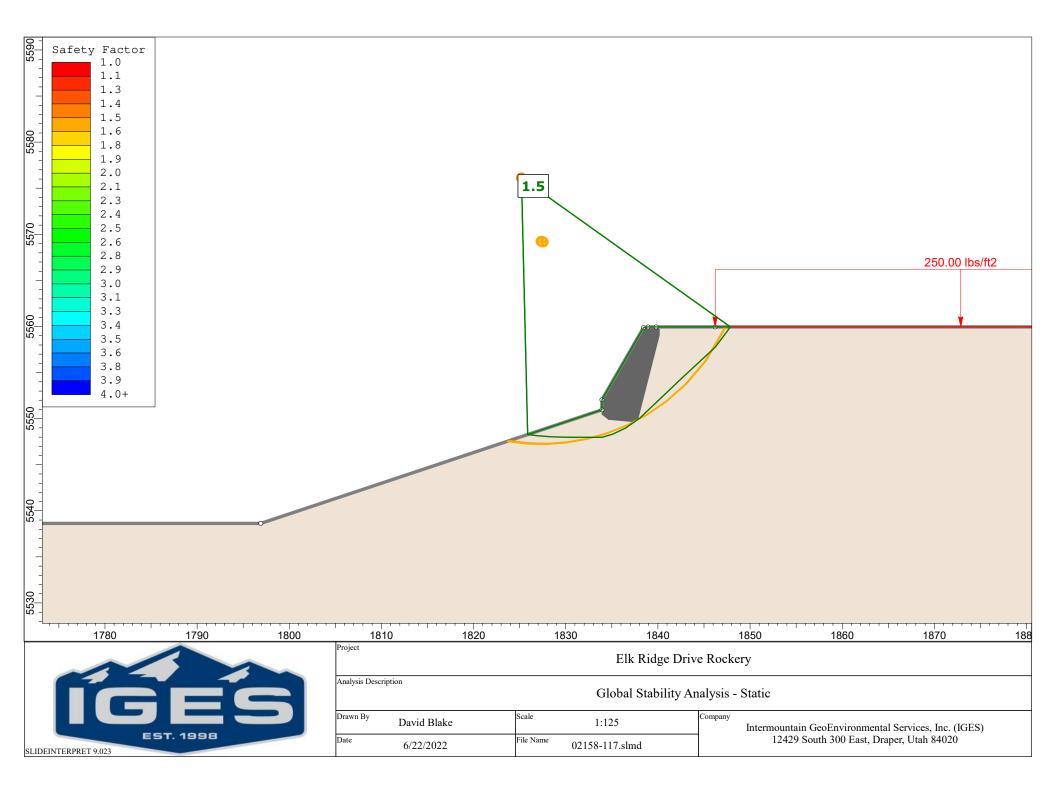
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	PROJEC	CT NO.: DATE:	02158- 6/22/20	022	•		<u>CTION:</u> HARGE:		-	Rockery	y						ÍG		S
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			& Soil	Data:														651.1998	
$ \begin{array}{c} \varphi_{i} = & 32 & deg \\ \varphi_{i} = & 32 & deg \\ \varphi_{i} = & 0il Fristion Angle - Effective \\ \varphi_{i} = & 125 \\ \varphi_{i} = & 11i \\ \varphi_{i} = & 150 \\ \varphi_{i} = & 101ii \ weight of the role and \\ \varphi_{i} = & 0.321 \\ \varphi_{i} = & 0.322 \\ \varphi_{i} = & 0.321 \\ \varphi_{i} = & 0.322 \\ \varphi_{i} = & 0.324 \\ \varphi_{i} = & 0.226 \\ \varphi_{i} = & 0.324 \\ \varphi_{i} = & 0.226 \\ \varphi_{i} = & 0.343 \\ \hline \\ \begin{array}{c} Simic Surdarge \\ \varphi_{i} = & 0.343 \\ \hline \\ Simic Surdarge \\ \varphi_{i} = & 0.343 \\ \hline \\ Simic Surdarge \\ \varphi_{i} = & 0.500 \\ \varphi_$	$H_{total} =$	7	ft	Total Heigh	t of Rockery		Slope Ge	ometry:]	Backslope	: 1.0	Н	0.0	V		Broken I	Back Slope:	Ν	
$ \begin{array}{c} r_{s} = 0 & prf \\ r_{s} = 0 & prf \\ r_{s} = 125 & prf \\ r_{s} = 0.555 & Rock-s-Rock Friction \\ r_{s} = 0.555 & Rock-s-Rock Friction \\ r_{s} = 0.226 & Active Earnh Pressure Coefficient \\ r_{s} = 0.226 & Active Earnh Pressure Coefficient \\ r_{s} = 0.226 & Active Earnh Pressure Coefficient \\ r_{s} = 0.226 & Active Earnh Pressure Coefficient \\ r_{s} = 0.343 & r_{s} = 6 & n \\ r_{s} = 0 & prf \\ $	$H_R =$	6	ft	Exposed He	ight of Rocker	ry	Backslope:		β_{eq} =	0.0	deg	Eq. Backslo	pe Angle			Back	slope Rise:	0	ft
$ \begin{array}{c} y_{a} = 125 & pcf \\ y_{b} = 125 & pcf \\ y_{b} = 150 & pcf \\ y_{b} = 120 & pcf \\ y_{b} = 120 & pcf \\ y_{b} = 0.70 & pcf \\ pcd = 100 & pcf \\ y_{b} = 0.70 & pcf \\ pcd = 100 & pcf \\ y_{c} = 0.55 & Rock-to-Rock Fristion \\ k_{c} = 0 & 0.163 & Ue 12 or A2 & N \\ W_{c} = 0.55 & Rock-to-Rock Fristion \\ k_{c} = 0 & 0.163 & Ue 12 or A2 & N \\ W_{c} = 0.226 & Active Earth Pressure Coefficient \\ y_{c} = 0.226 & Active Earth Pressure Coefficient \\ y_{c} = 0 & psf \\ F_{c} = 0.500 & q_{max} = 1.615 & psf \\ q_{max} = 0.269 & FS_{bc} \\ 1.397 & FS_{bc,s} \\ 1 & 3.0 & 0.7 & 2.1 & 7.0 & 2.284 & 5.969 & 6.33 & 1.396 & 1.800 & 1.923 & 1.438 & 4.174 & 6.913 & 7.531 & 2.9 & 4.9 & 1.4 & 1.9 \\ 2 & 2.5 & 0.7 & 1.5 & 1.5 & 3.89 & 3.89 & 2.8 & 10.8 & 2.21 & 2.25 & 1.4 & 7.6 & 4.15 & 4.32 & 7.9 & >1.0 & 2.1 & 5.7 \\ \hline \hline \hline \hline \begin{array}{c} Rock s = 4 \\ Rock s = 4 \\ Rock s = 4 \\ (R^{*} - Boulder Height to Width Ratio) \\ \hline \hline \hline \hline \hline \hline \begin{array}{c} Roc \\ Roc \\ Roc \\ Roc \\ Roc \\ S = 0.7 & 1.5 & 1.5 & 3.89 & 3.89 & 2.8 & 10.8 & 2.21 & 2.25 & 1.4 & 7.6 & 4.15 & 4.32 & 7.9 & >1.0 & 2.1 & 5.7 \\ \hline \hline \begin{array}{c} Roc \\ S = 0.00 & 0.0 & 0.0 & N/A & 0 & 0 & N/A \\ \hline \begin{array}{c}$	$\varphi_{s} =$	32	deg	Soil Friction	n Angle - Effec	ctive	Soil Cut An	gle:	α=	82.9	deg	Soil Cut An	gle				FS	FS	
$ \begin{array}{c} r_{R} = & 150 & pcf & Unit weight of the rock \\ \delta = & 32.0 & deg & Interface Friction Angle \\ V = & 7.1 & deg & Bek Cut Inclination \\ W = & 7.1 & deg & Bek Cut Inclination \\ W = & 7.1 & deg & Bek Cut Inclination \\ W = & 7.1 & deg & Bek Cut Inclination \\ W = & 7.1 & deg & Bek Cut Inclination \\ W = & 7.1 & deg & Bek Cut Inclination \\ W = & 6.55 & Rock-to-Rock Friction \\ W = & 6.26 & Active Earth Pressure Coefficient \\ W = & 6.3.4 & deg & Neckry Tace Angle \\ V = & 63.4 & deg & Neckry Tace Angle \\ W = & 63.4 & deg & Neckry Tace Angle \\ \hline \\ \frac{V = & 63.4 & deg \\ S = & 100 & Print \\ P_{r,e} = & 0 & pef \\ F_{r,e} = & 0 & pef \\ \hline \\ \frac{V = & 63.55 & Rock-to-Rock Friction \\ S = & Stripp: \\ S trip Load Surcharge \\ Q_{r,e} = & 2.50 & pef \\ F_{r,e} = & 0 & pef \\ F_{r,e} = & 0 & pef \\ F_{r,e} = & 0 & pef \\ \hline \\ \frac{V = & 63.55 & pef \\ Q_{r,e} = & 2.50 & pef \\ F_{r,e} = & 0.500 & q_{max} = \\ \frac{1.615}{2} & pef \\ q_{max} = & 0.269 & FS_{BC} \\ \frac{4.0}{2} & Eccentricity Check (static): \\ \frac{V = & 0.5 & n}{2} \\ \frac{V = N + 0.5 & n}$	$c_s =$	0	psf	Cohesion In	tercept of soil		Rockery Fac	e Slope:	1	Н	2	V		Fail	ure Mecha	inism	Required	Obtained	OK
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\gamma_s =$	125	pcf	Unit weight	of the soil									Ex	ternal Slic	ling	1.5	2.9	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\gamma_R =$	150	pcf	Unit weight	of the rock		Seismic F	Carth Pr	essure C	oefficient	<u>:</u>	(Mack et al.	, 2006)	Exter	nal Overtu	urning	2.0	4.9	OK
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	δ =	32.0	deg	Interface Fr	iction Angle		A =	0.391	Peak Grou	and Accelera	tion (7% in 7	5 years)		Individua	al Rock Ov	verturning	2.0	6.8	OK
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	ψ=	7.1	deg	Back Cut In	clination		d =	3.9	in	(Allowable	Displacemen	nt)		Individ	lual Rock	Sliding	1.5	2.9	OK
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	μ=	0.70		Frictional C	omponent		$k_h =$	0.163	τ	Use 1/2 of A	? N			Bea	aring Capa	ncity	2.0	4.0	OK
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	μ_{rock} =	0.55		Rock-to-Ro	ck Friction		$k_v =$	0		(If "N" then	n use displace	ement-factore	d k _h)	Seisr	nic Overtı	urning	1.5	1.9	OK
Surcharge: Uniform: Uniform Applied Surcharge Strip: Strip: <t< td=""><td>K_A =</td><td>0.226</td><td></td><td>Active Earth</td><td>h Pressure Coe</td><td>efficient</td><td>$\theta =$</td><td>9.24</td><td></td><td></td><td></td><td></td><td></td><td>Se</td><td>ismic Slid</td><td>ing</td><td>1.1</td><td>1.4</td><td>OK</td></t<>	K _A =	0.226		Active Earth	h Pressure Coe	efficient	$\theta =$	9.24						Se	ismic Slid	ing	1.1	1.4	OK
	ν=	63.4	deg	Rockery Fa	ce Angle		$K_{AE} =$	0.343						Seismic	Bearing	Capacity	1.5	4.6	OK
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Surcharge:	<u>:</u>																	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Uniform:	Uniform A	pplied Su	rcharge				Strip:	Strip Load	l Surcharge									
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$q_s =$	0	psf					$q_s =$	250	psf									
Factor of Safety against Bearing Capacity: $e_{max} = 0.500$ $q_{max} = 1.615$ psf $e_{s,s} = 0.269$ FS_{Bc} 4.0 Eccentricity Check (static): OK $e_s = -0.441$ $q_{ult} = 6,335$ psf $q_{max,s} = 1,397$ $FS_{Bc,s}$ 4.6 Eccentricity Check (seismic): OK # Rocks = 4 (R*-Boulder Height to Width Ratio) (R*-Boulder Height to Width Ratio) Eccentricity Check (seismic): OK $\boxed{Boulder}$ B'(ft) R* H _R (ft) H-H' (ft) ΣW_i ΣW_i $F_{H,s}$ F_{u} $F_{u,s}$ M_o $M_{o,s}$ M_r $M_{r,s}$ FS_{st} $FS_{ort,s}$ 1 3.0 0.7 2.1 7.0 2,284 5,969 633 1,396 1,800 1,923 1,438 4,174 6,913 7,531 2.9 4.9 1.4 1.9 2 2.5 0.7 1.9 4.8 1,406 2,861 298 709 849 895 479 1,523 3,224 3,476 2.9 6.8 1.3 2.3 3 2.0 0.7 1.5 3.6	$F_s =$	0	lbf/ft	(Horizontal	Surcharge Loa	ad)		$\mathbf{x}_{\mathbf{s}} =$	6	ft	(Distance f	rom soil cut)		$F_s =$	14	lbf/ft	(Horizontal S	urcharge Load)	1
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$y_s =$	3.5	ft	(Surcharge	load centroid)			$W_s =$	6	ft	(Width of S	Strip Load)		$y_s =$	0.5	ft			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Factor of S	Safety ag	ainst Be	earing Cap	acity:														
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	e _{max} =	0.500		q _{max} =	1,61	5	psf		$e_{s,s} =$	0.269		FS _{BC}	4.0		Ecce	ntricity Ch	eck (static):	OK	
Boulder B' (ft) R* H _R (ft) H-H' (ft) ΣW_i $\Sigma W_i^* x_i$ F _H F _{L,s} M _o M _o M _r M _{r,s} FS _{SL} FS _{OT} FS _{SL,s} FS _{OT,s} 1 3.0 0.7 2.1 7.0 2,284 5,969 633 1,396 1,800 1,923 1,438 4,174 6,913 7,531 2.9 4.9 1.4 1.9 2 2.5 0.7 1.9 4.8 1,406 2,861 298 709 849 895 479 1,523 3,234 3,476 2.9 6.8 1.3 2.3 3 2.0 0.7 1.5 3.0 777 1,208 112 307 456 473 111 420 1,319 1,389 4.1 >10 1.6 3.4 4 2.0 0.7 1.5 3.89 389 28 108 221 225 14 76 415 432 7.9		-0.441			6,33	35	psf			1,397			4.6		Eccent	ricity Chec	k (seismic):	ОК	
Boulder B' (ft) R* H _R (ft) H-H' (ft) ΣW_i $\Sigma W_i^* x_i$ F _H F _{L,s} M _o M _o M _r M _{r,s} FS _{SL} FS _{OT} FS _{SL,s} FS _{OT,s} 1 3.0 0.7 2.1 7.0 2,284 5,969 633 1,396 1,800 1,923 1,438 4,174 6,913 7,531 2.9 4.9 1.4 1.9 2 2.5 0.7 1.9 4.8 1,406 2,861 298 709 849 895 479 1,523 3,234 3,476 2.9 6.8 1.3 2.3 3 2.0 0.7 1.5 3.0 777 1,208 112 307 456 473 111 420 1,319 1,389 4.1 >10 1.6 3.4 4 2.0 0.7 1.5 3.89 389 28 108 221 225 14 76 415 432 7.9	# Rocks =	4		(P* Bould	er Height to W	lidth Patio													
1 3.0 0.7 2.1 7.0 2,284 5,969 633 1,396 1,800 1,923 1,438 4,174 6,913 7,531 2.9 4.9 1.4 1.9 2 2.5 0.7 1.9 4.8 1,406 2,861 298 709 849 895 479 1,523 3,234 3,476 2.9 6.8 1.3 2.3 3 2.0 0.7 1.5 3.0 777 1,208 112 307 456 473 111 420 1,319 1,389 4.1 >10 1.6 3.4 4 2.0 0.7 1.5 3.89 389 28 108 221 225 14 76 415 432 7.9 >10 2.1 5.7 5 0.0 0.0 N/A 0 0 N/A N/A N/A N/A N/A N/A N/A N/A 6 0.0 0			R*	Ì	ē		, ,	F.,	Fu	F	F	M	M	М	M	FSer	FSor	FSere	FSore
2 2.5 0.7 1.9 4.8 1,406 2,861 298 709 849 895 479 1,523 3,234 3,476 2.9 6.8 1.3 2.3 3 2.0 0.7 1.5 3.0 777 1,208 112 307 456 473 111 420 1,319 1,389 4.1 >10 1.6 3.4 4 2.0 0.7 1.5 1.5 389 389 28 108 221 225 14 76 415 432 7.9 >10 2.1 5.7 5 0.0 0.0 N/A 0 0 N/A									1	F*		-					1		
3 2.0 0.7 1.5 3.0 777 1,208 112 307 456 473 111 420 1,319 1,389 4.1 >10 1.6 3.4 4 2.0 0.7 1.5 1.5 389 389 28 108 221 225 14 76 415 432 7.9 >10 2.1 5.7 5 0.0 0.0 0.0 N/A 0 0 N/A	2									-	-								
4 2.0 0.7 1.5 1.5 389 389 28 108 221 225 14 76 415 432 7.9 >10 2.1 5.7 5 0.0 0.0 0.0 N/A 0 0 N/A						-													
5 0.0 0.0 0.0 N/A 0 0 N/A										-							-		
6 0.0 0.0 N/A 0 0 N/A														-	-				
7 0.0 0.0 N/A 0 0 N/A	_						-												
							-												

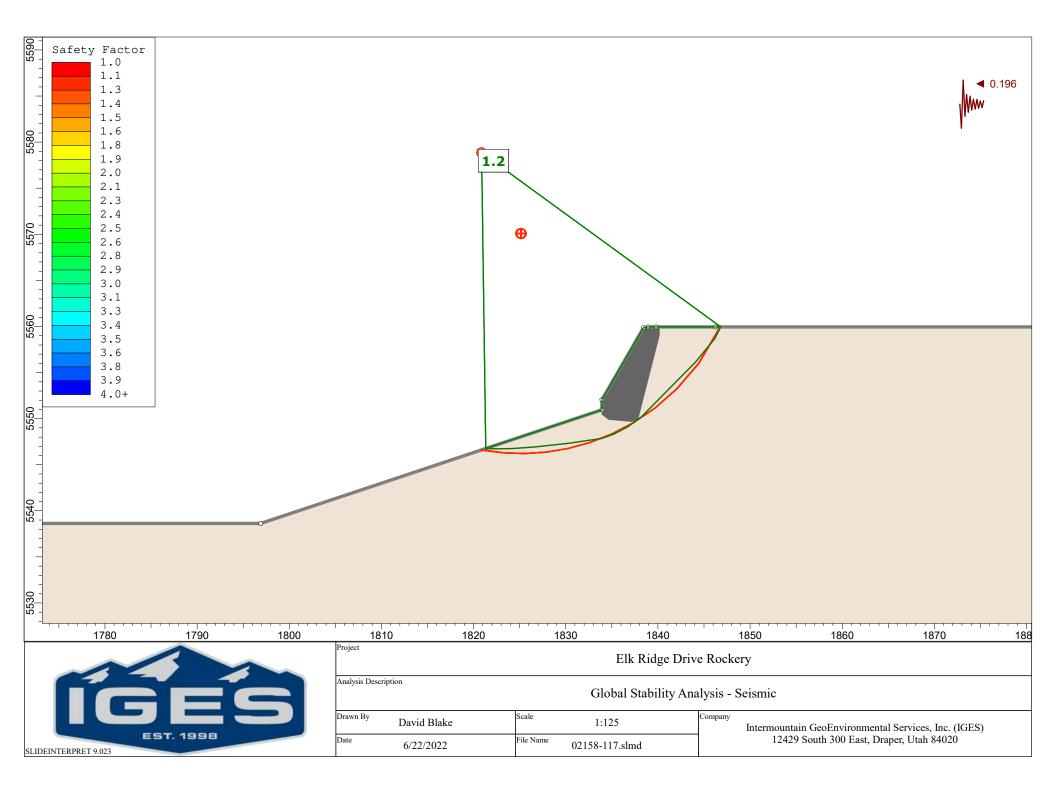
PROJEC	CT NO.: DATE:	02158- 6/22/2()22			<u>CTION:</u> HARGE:		-	l Rockery	7						ÍC		Ś
Rockery G									D 1 1	1.0		0.0				1.01	N	
$H_{total} =$	6	ft	0	t of Rockery		<u>Slope Ge</u>	ometry:		Backslope:	1.0	Η	0.0	V			Back Slope:		
$H_R =$	5	ft		eight of Rocker		Backslope:		β_{eq} =	0.0	deg	Eq. Backslo				Back	slope Rise:	1	ft
$\varphi_s =$	32	deg		n Angle - Effec		Soil Cut An	-	α =	82.9	deg	Soil Cut An	gle				FS	FS	0.11
$c_s =$	0	psf		tercept of soil		Rockery Fac	e Slope:	1	Н	2	V			ure Mecha		Required	Obtained	OK
$\gamma_s =$	125	pcf	Unit weight			.		G					-	ternal Slid		1.5	3.5	OK
$\gamma_{\rm R} =$	150	pcf	Unit weight			-			oefficient:		(Mack et al.	, 2006)		nal Overtu	0	2.0	6.2	OK
δ =	32.0	deg		iction Angle		A =			and Accelerat						verturning	2.0	>10	OK
ψ=	7.1	deg	Back Cut In			d =	3.9	in	(Allowable	-	nt)			lual Rock		1.5	3.9	OK
μ=	0.70		Frictional C	•		$k_h =$	0.163	1	Use 1/2 of A?					aring Capa		2.0	4.3	OK
$\mu_{rock} =$	0.55		Rock-to-Ro			$k_v =$	0		(If "N" then	use displace	ement-factore	d k _h)		nic Overtu	-	1.5	2.2	OK
K _A =	0.226			h Pressure Coe	efficient	$\theta =$	9.24							ismic Slid	0	1.1	1.6	OK
v =	63.4	deg	Rockery Fa	ce Angle		$K_{AE} =$	0.343						Seismic	Bearing	Japacity	1.5	6.2	OK
Surcharge:	-	1. 1.0					Chains	G	10 1									
	Uniform A	••	rcharge				Strip:		l Surcharge									
$q_s =$	0	psf		a 1 1	I)		$q_s =$	250	psf	()			Е –	2	11.6/0	<i>a</i>		
$F_s =$	0	lbf/ft		Surcharge Loa	ad)		$\mathbf{x}_{s} =$	6 4	ft		rom soil cut)		$F_s =$	2	lbf/ft	(Horizontal S	urcharge Load)	
$y_s =$	3	ft	(Surcharge	load centroid)			$W_s =$	4	ft	(Width of	Strip Load)		$y_s =$	0.0	ft			
Factor of S	Sofoty og	ninst Bo	oring Con															
	0.500	anist De		<u>1,47</u>	2	c		a –	0.141		FS _{BC}	4.3		E	the states of the	eck (static):	OK	
$e_{max} =$			$q_{max} =$	· · · · · ·		psf		$c_{s,s} -$				-			•	· /		
$e_s =$	-0.460		$q_{ult} =$	6,28	34	psf		q _{max,s} =	1,029		FS _{BC,s}	6.2		Eccent	ricity Chec	k (seismic):	UK	
# Rocks =	3		(R* - Bould	ler Height to W	/idth Ratio)												
Boulder	B' (ft)	R*	H_{R} (ft)	H-H' (ft)	ΣWi	$\Sigma W_i * x_i$	F _H	F _{H.s}	Fu	F _{u.s}	Mo	M _{o.s}	Mr	M _{r.s}	FS _{SL}	FSOT	FS _{SL.S}	FS _{OT,S}
1	3.0	0.8	2.4	6.0	2,085	4,988	463	1,084	1,609	1,701	922	2,859	5,683	6,134	3.5	6.2	1.6	2.2
2	2.5	0.8	2.0	3.6	1,095	1,852	166	446	645	670	199	720	2,056	2,186	3.9	>10	1.6	3.1
3	2.0	0.8	1.6	1.6	420	420	33	121	239	244	17	91	451	471	7.4	>10	2.1	5.2
4	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8	0.0	0.0	0.0	N/A	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	DJECT: CT NO.: DATE:	02158-		-		<u>CTION:</u> łarge:		-	Rockery	7						ÍG		ŝ
Rockery G	eometry	& Soil	Data:														EST. 1998	
$H_{total} =$	5	ft	Total Heigh	t of Rockery		<u>Slope Ge</u>	ometry:	I	Backslope:	1.0	Н	0.0	V		Broken H	Back Slope:	Ν	
$H_R =$	4	ft	Exposed He	ight of Rocker	У	Backslope:		β_{eq} =	0.0	deg	Eq. Backslo	pe Angle			Back	slope Rise:	0	ft
$\phi_{s} =$	32	deg	Soil Friction	n Angle - Effec	tive	Soil Cut An	gle:	α=	82.9	deg	Soil Cut An	gle				FS	FS	
$c_s =$	0	psf	Cohesion In	tercept of soil		Rockery Fac	e Slope:	1	Н	2	V		Failu	ire Mecha	nism	Required	Obtained	OK
$\gamma_{s} =$	125	pcf	Unit weight	of the soil									Ext	ternal Slid	ling	1.5	3.9	OK
$\gamma_R =$	150	pcf	Unit weight	of the rock		Seismic H	Earth Pr	essure C	oefficient:	-	(Mack et al.	, 2006)	Exter	nal Overtu	urning	2.0	7.3	OK
δ =	32.0	deg	Interface Fri	iction Angle		A =	0.391	Peak Grou	nd Accelerat	ion (7% in 7	5 years)		Individua	l Rock Ov	verturning	2.0	>10	OK
ψ=	7.1	deg	Back Cut In	clination		d =	3.9	in	(Allowable	Displacemer	nt)		Individ	ual Rock	Sliding	1.5	4.2	OK
μ=	0.70		Frictional C	omponent		$k_{h} =$	0.163	τ	Jse 1/2 of A?	Ν			Bea	ring Capa	icity	2.0	6.7	OK
μ_{rock} =	0.55		Rock-to-Ro	ck Friction		$k_v =$	0		(If "N" then	use displace	ment-factored	d k _h)	Seisn	nic Overtu	Irning	1.5	2.5	OK
K _A =	0.226		Active Earth	n Pressure Coe	fficient	$\theta =$	9.24						Se	ismic Slid	ing	1.1	1.7	OK
ν=	63.4	deg	Rockery Fac	ce Angle		$K_{AE} =$	0.343						Seismic	Bearing (Capacity	1.5	8.0	OK
Surcharge	<u>:</u>																	
Uniform:	Uniform A	pplied Su	rcharge				Strip:	Strip Load	Surcharge									
$q_s =$	0	psf					$q_s =$	250	psf									
$F_s =$	0	lbf/ft	(Horizontal	Surcharge Loa	ıd)		$\mathbf{x}_{\mathbf{s}} =$	6	ft	(Distance f	rom soil cut)		$F_s =$	0	lbf/ft	(Horizontal S	urcharge Load)
$y_s =$	2.5	ft	(Surcharge l	load centroid)			** *											
				ioud controla)			$W_s =$	2	ft	(Width of S	Strip Load)		$y_s =$	0.0	ft			
ractor of S	Safety ag	ainst Be	earing Cap				$W_s =$	2	ft	(Width of S	Strip Load)		$y_s =$	0.0	ft			
$e_{max} =$	Safety aga 0.500	ainst Be	e <mark>aring Cap</mark> q _{max} =		0	psf	W _s =	2 e _{s,s} =	ft 0.164	(Width of S	Strip Load) FS_{BC}	6.7	$y_s =$			eck (static):	OK	
		<u>ainst Be</u>		acity:		psf psf	W _s =	2 $e_{s,s} =$ $q_{max,s} =$		(Width of S	•	6.7 8.0	y _s =	Ecce	ntricity Cho	eck (static): k (seismic):		
$e_{max} = e_s =$	0.500 - 0.335	ainst Be	$q_{max} =$ $q_{ult} =$	<u>acity:</u> 1,00	17	psf	W _s =	e _{s,s} =	0.164	(Width of S	FS _{BC}		y _s =	Ecce	ntricity Cho			
$e_{max} = e_s =$	0.500 - 0.335	ainst Be	$q_{max} =$ $q_{ult} =$	bacity: 1,00 6,60	7 /idth Ratio ΣW _i	psf	$W_s =$	e _{s,s} =	0.164 829 F _µ	(Width of S $F_{\mu,s}$	FS _{BC}	8.0 M _{o,s}	y _s =	Ecce	ntricity Cho			
$e_{max} = e_s =$ # Rocks =	0.500 -0.335 3		$q_{max} =$ $q_{ult} =$ (R* - Bould) $H_{R} (ft)$ 2.2	er Height to W H-H' (ft) 5.0	7 /idth Ratio	psf	F _н 325	$e_{s,s} =$ $q_{max,s} =$	0.164 829 F _µ 1,258	F _{μ,s} 1,323	FS _{BC} FS _{BC,s}	8.0		Ecce Eccent	ntricity Check ricity Check FS _{SL} 3.9	k (seismic):	ОК	FS _{OT,S} 2.5
$e_{max} = e_s =$ $e_s =$ # Rocks = Boulder	0.500 -0.335 3 B' (ft)	R*	$q_{max} = q_{ult} =$ $(R^* - Bould)$ $H_R (ft)$	nacity: 1,00 6,60 er Height to W H-H' (ft)	7 /idth Ratio ΣW _i	$\Sigma W_i^* x_i$	F _H	$e_{s,s} =$ $q_{max,s} =$ $F_{H,s}$	0.164 829 F _µ	F _{μ,s}	FS _{BC} FS _{BC,s}	8.0 M _{o,s}	Mr	Ecce Eccentr M _{r,s}	ntricity Che ricity Checl FS_{SL}	k (seismic): FS _{OT}	OK FS _{SL,S}	FS _{OT,S}
$e_{max} = e_{s} =$ $\# Rocks =$ Boulder 1	0.500 -0.335 3 B' (ft) 3.0	R* 0.7	$q_{max} =$ $q_{ult} =$ (R* - Bould) $H_{R} (ft)$ 2.2	er Height to W H-H' (ft) 5.0	7 ⁷ idth Ratio ΣW _i 1,647	$\frac{\Sigma W_i^* x_i}{3,453}$	F _н 325	$e_{s,s} = q_{max,s} = F_{H,s}$ $F_{H,s}$ 784	0.164 829 F _µ 1,258	F _{μ,s} 1,323	FS _{BC} FS _{BC,s} M _o 546	8.0 M _{o,s} 1,747	<u>M</u> _r 3,937	Ecce Eccentr M _{r.s} 4,249	ntricity Check ricity Check FS _{SL} 3.9	k (seismic): FS _{OT} 7.3	OK FS _{SL,S} 1.7	FS _{0T,S} 2.5
$e_{max} = e_{s} =$ $\frac{\# Rocks =}{Boulder}$ $\frac{1}{2}$	0.500 -0.335 3 B' (ft) 3.0 2.0	R* 0.7 0.7	$q_{max} =$ $q_{ult} =$ $(R^* - Bould$ $H_R (ft)$ 2.2 1.4	er Height to W H-H' (ft) 5.0 2.9	7 ⁷ idth Ratio ΣW _i 1,647 756	ΣW _i *x _i 3,453 1,164	F _H 325 106	$e_{s,s} = q_{max,s} = F_{H,s}$ 784 294	0.164 829 F _µ 1,258 443	F _{μ,s} 1,323 459	FS _{BC} FS _{BC,s} M _o 546 102	8.0 M _{o,s} 1,747 391	M _r 3,937 1,269	Ecce Eccentr <u>M_{r,s}</u> <u>4,249</u> 1,335	ntricity Check ricity Check FS _{SL} 3.9 4.2	k (seismic): FS _{OT} 7.3 >10	OK FS _{SL,S} 1.7 1.6	FS _{0T,S} 2.5 3.5
$e_{max} = e_{s} = e_{s} = \frac{\# Rocks}{Boulder} = \frac{1}{2}$	0.500 -0.335 3 B' (ft) 3.0 2.0 2.0	R* 0.7 0.7 0.7	$q_{max} =$ $q_{ult} =$ (R* - Bould $H_R (ft)$ 2.2 1.4 1.4	er Height to W H-H' (ft) 5.0 2.9 1.4	7 /idth Ratio ΣW _i 1,647 756 378	ΣW _i *x _i 3,453 1,164 378	F _H 325 106 27	$e_{s,s} = q_{max,s} = F_{H,s}$ 784 294 104	$\begin{array}{c} 0.164 \\ 829 \\ \hline F_{\mu} \\ 1,258 \\ 443 \\ 215 \\ \end{array}$	F _{µ,s} 1,323 459 219	FS _{BC} FS _{BC,s} M _o 546 102 13	8.0 M _{o,s} 1,747 391 71	M _r 3,937 1,269 403	Eccentri Eccentri 4,249 1,335 419	ntricity Check ricity Check FS _{SL} 3.9 4.2 8.1	k (seismic): FS _{0T} 7.3 >10 >10	OK FS _{SL,S} 1.7 1.6 2.1	FS _{OT,S} 2.5 3.5 5.9
$e_{max} = e_{s} = e_{s} = \frac{e_{s}}{Boulder}$ $\frac{1}{2}$ $\frac{3}{4}$	0.500 -0.335 B' (ft) 3.0 2.0 2.0 0.0	R* 0.7 0.7 0.7 0.0	$q_{max} =$ $q_{ult} =$ (R* - Bould H _R (ft) 2.2 1.4 1.4 0.0	er Height to W H-H' (ft) 5.0 2.9 1.4 N/A	7 7 7 7 7 7 7 56 378 0	ΣW _i *x _i 3,453 1,164 378 0	F _H 325 106 27 N/A	$e_{s,s} =$ $q_{max,s} =$ $F_{H,s}$ 784 294 104 N/A	0.164 829 1,258 443 215 N/A	F _{μ,s} 1,323 459 219 N/A	FS _{BC} FS _{BC,s} M _o 546 102 13 N/A	8.0 M _{o,s} 1,747 391 71 N/A	M _r 3,937 1,269 403 N/A	Eccentric Eccentric 4,249 1,335 419 N/A	ntricity Check ricity Check FS _{SL} 3.9 4.2 8.1 N/A	k (seismic): FS _{0T} 7.3 >10 >10 N/A	OK FS _{SL,S} 1.7 1.6 2.1 N/A	FS _{0T.5} 2.5 3.5 5.9 N/A
$e_{max} = e_{s} = e_{s} = \frac{1}{1}$ $\frac{1}{2}$ $\frac{1}{3}$ $\frac{4}{5}$	0.500 -0.335 3 B' (ft) 3.0 2.0 2.0 0.0 0.0	R* 0.7 0.7 0.7 0.0 0.0	$\begin{array}{l} q_{max} = \\ q_{ult} = \\ \hline (R^* - Bould \\ H_R (ft) \\ 2.2 \\ 1.4 \\ 1.4 \\ 0.0 \\ 0.0 \\ 0.0 \\ \end{array}$	er Height to W H-H' (ft) 5.0 2.9 1.4 N/A N/A	7 ⁷ idth Ratio ΣW _i 1,647 756 378 0 0	ΣW _i *x _i 3,453 1,164 378 0 0	F _H 325 106 27 N/A N/A	$e_{s,s} =$ $q_{max,s} =$ $F_{H,s}$ 784 294 104 N/A N/A	0.164 829 1,258 443 215 N/A N/A	F _{μ,s} 1,323 459 219 N/A N/A	FS _{BC} FS _{BC,s} M _o 546 102 13 N/A N/A	8.0 M _{0,8} 1,747 391 71 N/A N/A	M _r 3,937 1,269 403 N/A N/A	Eccentri Eccentri 4,249 1,335 419 N/A N/A	ntricity Check ricity Check FS _{SL} 3.9 4.2 8.1 N/A N/A	k (seismic): FS _{OT} 7.3 >10 >10 N/A N/A	OK FS _{SL,S} 1.7 1.6 2.1 N/A N/A	FS _{0T,S} 2.5 3.5 5.9 N/A N/A









Slide2 Analysis Information

02158-117

Project Summary

File Name:	02158-117.slmd
Slide2 Modeler Version:	9.023
Project Title:	Elk Ridge Drive Rockery
Analysis:	Global Stability Analysis
Author:	David Blake
Company:	IGES, Inc.
Date Created:	6/22/2022

Currently Open Scenarios

Group	Name	Scenario Name	Global Minimum	Compute Time
Group 1	\diamond	Static	Spencer: 1.484040	00h:00m:03.493s
		Seismic	Spencer: 1.171230	00h:00m:05.772s

Analysis Options

All Open Scenarios

Slices Type:	Vertical
	Analysis Methods Used
	Spencer
Number of slices:	25
Tolerance:	0.005
Maximum number of iterations:	50
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Seismic Loading

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🔷 <u>Group 1 - Static</u>	
Advanced seismic analysis:	No
Staged pseudostatic analysis:	No
Group 1 - Seismic Advanced seismic analysis: Staged pseudostatic analysis:	No No
Staged pseudostatic analysis: Seismic Load Coefficient (Horizontal):	0.196
Seisine Load Coefficient (110112011al).	0.170

Loading

🔶 <u>Group 1 - Static</u>

 Distribution: Magnitude [psf]: Orientation:

Constant 250 Vertical

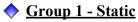
Materials

Native	
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	125
Cohesion [psf]	100
Friction Angle [deg]	32
Water Surface	Assigned per scenario
Ru Value	0
Rockery	
Color	
Strength Type	Anisotropic strength
Unit Weight [lbs/ft3]	150
Cohesion 1 [psf]	0
Cohesion 2 [psf]	3000
Friction Angle 1 [deg]	45
Friction Angle 2 [deg]	0
Angle from 1 [deg]	-10
Water Surface	Assigned per scenario
Ru Value	0

Materials In Use

	Material		Static		Seismic	
Native		\checkmark		\checkmark		
Rockery		\checkmark		\checkmark		

Global Minimums



Method: spencer

FS	1.484040
Axis Location:	1825.180, 5576.108
Left Slip Surface Endpoint:	1825.864, 5548.270
Right Slip Surface Endpoint:	1847.860, 5559.953
Resisting Moment:	280683 lb-ft
Driving Moment:	189135 lb-ft
Resisting Horizontal Force:	8214.92 lb
Driving Horizontal Force:	5535.51 lb
Total Slice Area:	91.7176 ft2
Surface Horizontal Width:	21.9966 ft
Surface Average Height:	4.16963 ft

🔷 <u>Group 1 - Seismic</u>

Method: spencer

FS	1.171230
Axis Location:	1820.858, 5578.858
Left Slip Surface Endpoint:	1821.307, 5546.751
Right Slip Surface Endpoint:	1846.812, 5559.953
Resisting Moment:	324908 lb-ft
Driving Moment:	277408 lb-ft
Resisting Horizontal Force:	8432.81 lb
Driving Horizontal Force:	7199.96 lb
Total Slice Area:	97.2174 ft2
Surface Horizontal Width:	25.5056 ft
Surface Average Height:	3.81161 ft