## APPENDIX C

# Example Scaling Plan Sheets Submitted by DOTs

NOTE: This appendix is available electronically from the Transportation Research Board website. **[To the Editor—Please insert the link to the appendix]**. It contains example scaling plan sheets submitted by:

Central Federal Lands Highway Division Montana Department of Transportation Ohio Department of Transportation Western Federal Lands Highway Division Washington State Department of Transportation Wyoming Department of Transportation

#### REG STATE SHEET NO PROJECT SHEET SUMMARY OF QUANTITIES - Schedule A CA FLAP CR5401801 85 CA. 83 827 Partal Ra Sheet and Description Estimated A11-A12 B5-87 89 Quantities M 88 B10-B27 S1-511 Line Pay Item Remarks and/or Determination of E Item Pay Item Description Unit Number N Estimated Quantity No: APPROACH ROAD DRAINAGE GRADING SURFACING MISCELLANEOUS BRIDGE Bid ALLOWANCE D SUMMARY SUMMARY SUMMARY SUMMARY SUMMARIES SHEETS Schedule A0750 61701-1350 GUARDRAIL SYSTEM G4, TYPE 2, CLASS **B STEEL POSTS** LNFT 2,830.50 3,025.00 194.50 A0760 61702-0600 TERMINAL SECTION, TYPE FLARED EACH 13 13 (CALTRANS Type 17 E) A0770 61702-0800 TERMINAL SECTION TYPE TANGENT EACH 9 9 (CALTRANS Type 11 D) A0780 61704-1000 REPLACEMENT POST, STEEL EACH 5 5 A0790 61707-0000 STRUCTURE TRANSITION RAILING LNFT 42 42 Contract Quantity A0800 61710-0000 RAISING GUARDRAIL LNFT 235 15 250 61711-5000 IMPACT ATTENUATOR, QUADGUARD A0810 EACH 2 2 62201-0250 DUMP TRUCK, 10 CUBIC YARD MINIMUM A0820 CAPACITY HOUR 80 0680A 62201-0350 BACKHOE HOUR 80 A0840 62201-0850 WHEEL LOADER. 1 CUBIC YARD MINIMUM RATED CAPACITY HOUR 40 A0850 62201-2850 MOTOR GRADER, 12 FOOT MINIMUM BLADE HOUR 40 A0860 62201-3350 HYDRAULIC EXCAVATOR, 1 CUBIC YARD MINIMUM CAPACITY HOUR 40 62202-1000 MATERIALS TRANSFER VEHICLE LPSM A0870 ALL 52301-0000 CENERAL LABOR A0880 Y HOUR ΥT 100 $\sim$ $\gamma\gamma\gamma$ 62302-0 00 SPECIAL LABOR, SLOPE SCALING A0890 HOUR 36 - 8 40 62302-1000 SPECIAL LABOR, HIRED TECHNICA A0900 - 3 SERVICES HOUR 40 A0910 62302-1100 SPECIAL LABOR, HIRED SURVEY SERVICES HOUR 40 A0920 62510-2000 SEEDING, HYDRAULIC METHOD ACRE 10.8 1.2 12.0 A0930 62515-2000 MULCHING, HYDRAULIC METHOD ACRE 10.8 1.2 12.0 A0940 62516-3000 MULCHING, HYDRAULIC METHOD, BONDED FIBER MATRIX SQYD 3,013 87 3,100 A0950 63301-0000 SIGN SYSTEM EACH 90 2 92 A0960 63308-0000 OBJECT MARKER FACH 110 174 18 A0970 53309-0200 DELINEATOR, TYPE 2 EACH 319 31 350 A0980 63309-1000 DELINEATOR, TYPE SNOWPOLE EACH 46 46 63313-0000 RUMBLE STRIP (CENTERLINE) A0990 LNFT 47.333 48,000 667 63313-1000 RUMBLE STRIP, SHOULDER A1000 INFT 10,000 300 t0,300 A1010 63316-1000 REMOVE AND RESET SIGN EACH 2 5 3 A1020 63402-0300 PAVEMENT MARKINGS, TYPE B, SOLID MILE 83.T 6.9 90.0 Å1030 63402-0400 PAVEMENT MARKINGS, TYPE B. BROKEN MILE 3.1 0.9 4.0 A1040 63404-0800 PAVEMENT MARKINGS, TYPE H GAL 10.4 1.6 12.0 A1050 63502-0600 TEMPORARY TRAFFIC CONTROL BARRICADE TYPE 3 EACH 8 2 10 A1060 63502-0700 TEMPORARY TRAFFIC CONTROL, CONE EACH 50 60 10 A1070 63502-1300 TEMPORARY TRAFFIC CONTROL, DRUM EACH 131 19 150 MileStone: 100% Date Completed 04/02/15 Report Date: 04/02/15

				MINOR	EARTHWORKS	SUMMARY	
		-	Pay Item	Pay Item	Pay Item	-	
Station to Station		Side	20430-1000	21201-0000	20441-0000	The second se	
		Jue	SHOULDER, EXCAVATION	LINEAR GRADING	WASTE	Remarks	
·		The second second	Lt/Rt	LNFT	STA	CUYD	-
Segment	1				and the second second		
99+50	7	147+50	Lt	4,500			
99+50	÷	147+50	Rt	4,500			
147+50	1	177+00	12			180	See Geotech Report for more info
177+00	-	279+00	11	10,200			
177+00		279+00	Rt _	10,200			
		btotals		30,000	0,0	180	
Segment	2		10 mil				
279+00	1	373+00	12	9,400			
279+00	÷9.	365+00	Rt	8,600	1		
365+00	4	369+80	Rt		4.8	900	And the second sec
369+80	-	373+00	Rt	320			
10.000	_	ptotals		13,320	4.8	900	
Segment	3						
373+00	-	617+30	13	24,430			
373+00	14	561+10	Rt	18,810			
561+10	-	562+60	Rt		1.5	190	
562+60		685+95	Rt	12,335			
618+00	14.	619+90	2.1		1.9	500	
619+90	-	624=70	11	480			
624+70	-	626+35	12		1.7	2,700	
626+35	6	685+95	21	5.960			
685+95	-	686+35	Lt/Rt	-			Bridge
656+35	-	690+75	12	440			
686+35	-	690+75	Rt	440			
	SU	btotais		62,895	5,1	3,690	
Tetel		otal	_	111,215	9.9	4,770	

Notes:

1) Do not measure mainline Shoulder Excavation at Type 1 and Type 2 approach roads connections.

2) Do not measure Shoulder Excavation along approach roads

			SH	OULD	ER ST	ABILIZATION	N	
Station to Station			Width	Height	Pay Item 25201-0000			
		5ide	(avg.)	(avg.)	SPECIAL ROCK EMBANKMENT	Remarks		
		_	Lt/Rt	[ft]	(It)	CUYD		
Segment	1		-		-			
214+00	-	214+24	Lt	8	4	28.4	Type 1	
	-	Subt	otals			25.4	1	
Segment	2	2	_	-				
362+45	-	362+80	Lt	12	9	124.4	Type 1	
	_	Subt	otals			124.4		
Segment	3				Sec. Ander			
667+68	1	665+60	Lt	4	4	54.5	Type 2	
669+25	-	669+73	Lt	8	4	56.9	Type 1	
671-88	-	672=72	Rt	8	4	99.6	Type 1	
672+77	-	673+00	Rt	8	4	27.3	Type 1	
	-	Subt	otals	-		238.3		
	-	To				391.1	-	

	Roadway Escavation		Pay Item 20401-0000	Additional Excavation	Embankment For info only		For info only	Pay Item 20441-3000
Station to Station	Rcadway Prism	Approach Roads	ROADWAY EXCAVATION	(-) Unavailable Material (see note 1)	Roadway Prism	Approach Roads	(+) Various Backfill Material Generated Onsite (see note 3)	WASTE (see note 2)
	BCY	BCY	CUYD	BCY	CCY	CCY	CCY	CUYD
147+50 · 177+00	1,330	0	1,330	0	477	0	0	1
Approach Road Sta 373=58		tò	10	0	1	6	0	
Approach Road Sta 576+56		24	24	D		18	0	
TOTALS	1,330	34	1,364	0	477	24	0	727

NO. SHEETS

B8 827

REG STATE

R5 CA

PROJECT CA FLAP CRS4018(1)

Whitney Portal Road

NOTE

1. Unavailable material includes subexcavation.

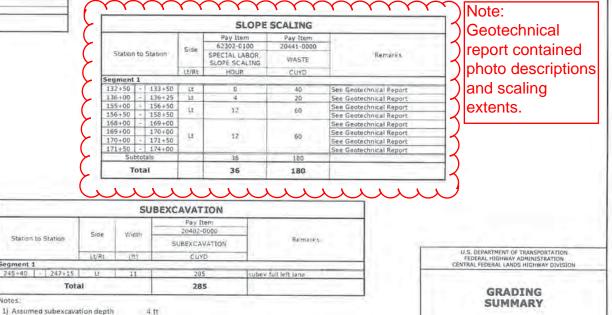
2. Waste quantity calculated using volumes adjusted for shrink/swell. A shrink/swell factor = 0.9 was used.

3. Various backfill material generated onsite includes Pulverized asphalt (See Surfacing Summary).

4. The quantities shown herein are approximations. Payment will be made for the actual quantities of work performed. 5. BCY = Bank cubic yard - one cubic yard of material as it lies in the natural state.

CCY = Compacted cubic yard - one cubic yard of material after it has been compacted to specification density.

6. Excavation quantities for Rockfall Ditches are included in item 20401-0000, Roadway Excavation.

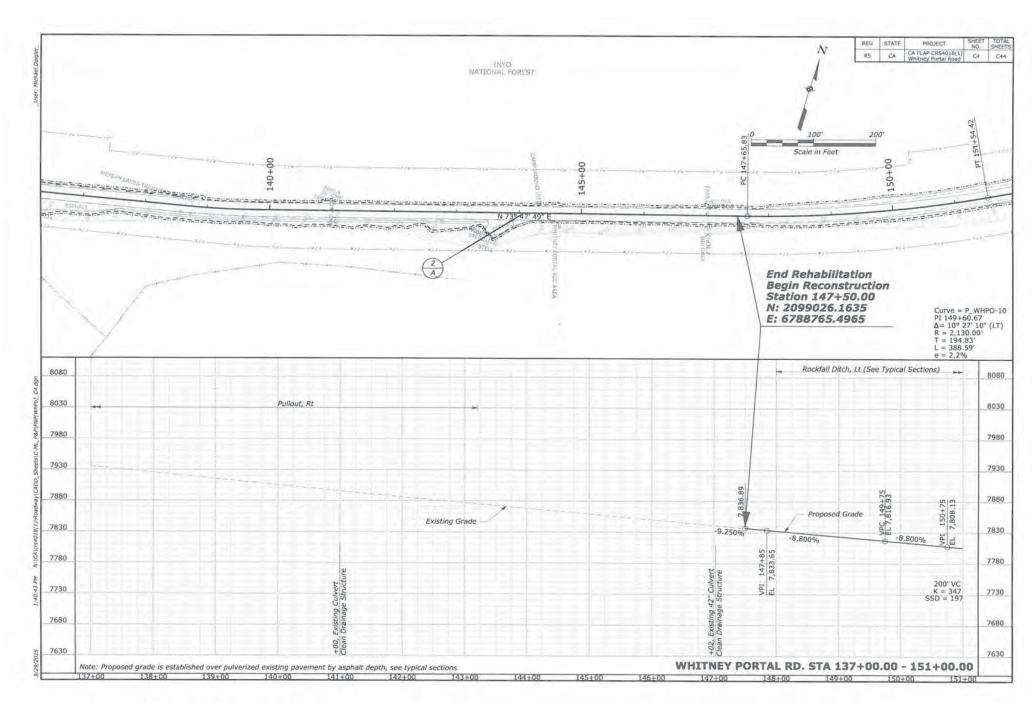


1) Assumed subexcavation depth

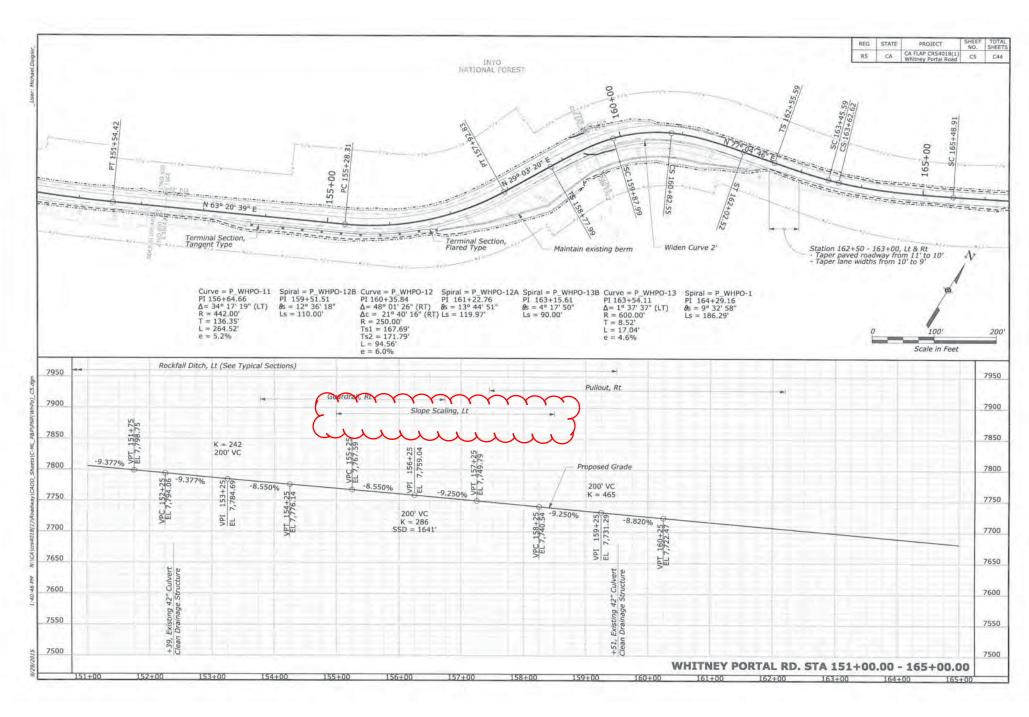
Segment 1

Notes.

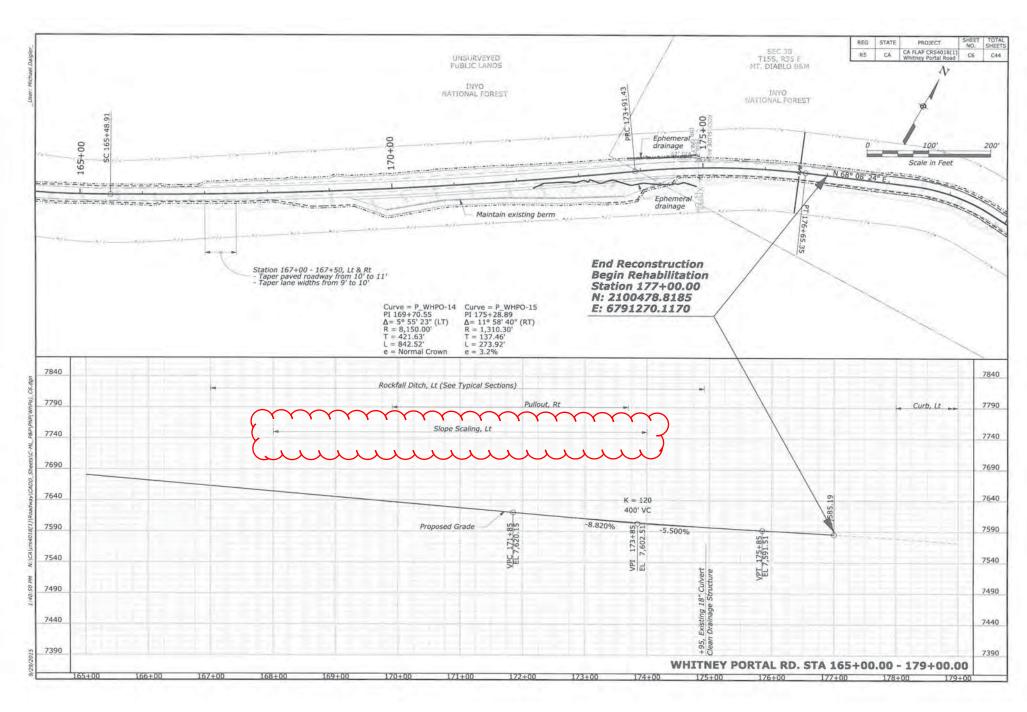
#### CENTRAL FEDERAL LANDS HIGHWAY DIVISION



#### CENTRAL FEDERAL LANDS HIGHWAY DIVISION



CENTRAL FEDERAL LANDS HIGHWAY DIVISION



# **SUMMARY**

		S	CALING	
STATION		SCALING	cubic yards	REMARKS
FROM	TO	HOURS		
1245+00.00	1257+00.00	560	1,250	UPPER FACE SITE # 1
1245+00.00	1257+00.00	1,040	2,300	LOWER FACE SITE #1
1268+00.00	1278+00.00	590	1,300	UPPER FACE SITE # 2
1268+00.00	1278+00.00	890	2,000	MIDDLE FACE SITE # 2
1268+00.00	1278+00.00	940	2,100	LOWER FACE SITE #2
тот	AL	4,020	# 8,950	

# FOR INFORMATION ONLY, INCLUDED IN THE COST OF UNCL. EXC.

		GI	RADING %	6
	1.1.14	cubic	c yards	
STATION		UNCL. EXC.	EXCESS EXC.	REMARKS
FROM	то	EXC.	EAG.	
1245+00.00	1257+00.00	1,300	1	CREST OF SLOPE SITE # 1
1245+00.00	1257+00.00	3,750		BOTTOM BENCH SITE # 1
1245+00.00	1257+00.00	1,000		TOE OF SLOPE/DITCH CLEANING SITE # 1
1268+00.00	1278+00.00	1,300	*	CREST OF SLOPE SITE # 2
1268+00.00	1278+00.00	3,000		TOP BENCH SITE # 2
1268+00.00	1278+00.00	550		BOTTOM BENCH SITE # 2
1268+00.00	1278+00.00	500		TOE OF SLOPE/DITCH CLEANING SITE # 2
		8,950		SCALING MATERIAL
T	OTAL	20,350	# 20,350	

% CONTRACTOR TO SUBMIT PLAN FOR BENCH CLEANING PRIOR TO BEGINNING WORK # FOR INFORMATION ONLY

		lump sum	-
STATION		TEMPORARY	REMARKS
FROM	то	PROTECTION	
1245+00.00	1257+00.00	0.5	SITE # 1
1268+00.00	1278+00.00	0.5	SITE#2
T	OTAL	1	-

ROCKFALL CONTAINMENT NETS (SEE SPECIAL PROVISIONS)

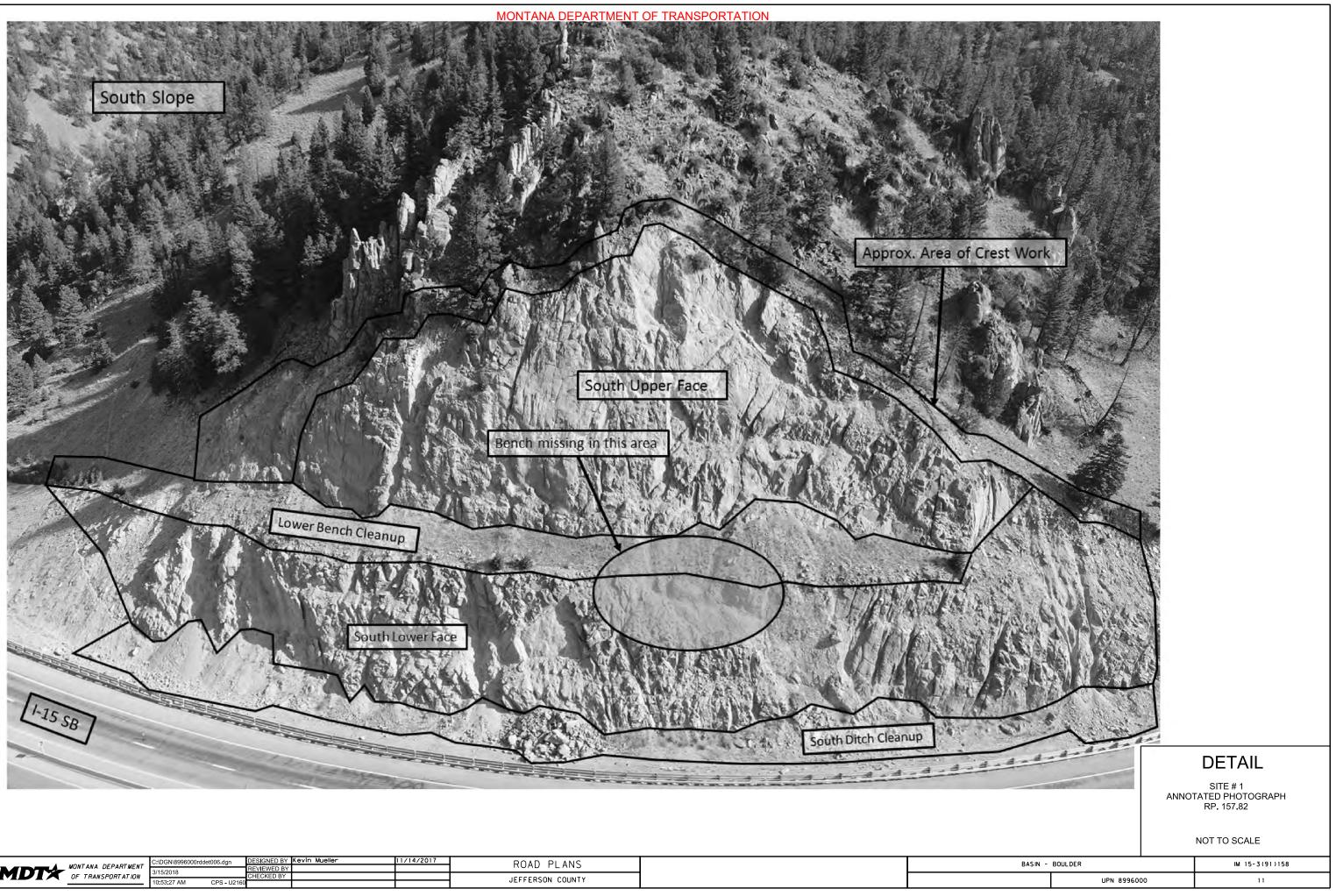
	CONC	CRETE BAR	
	eac	:h	P
REFERENCE POST	CONCRETE BARRIER RAIL	IMPACT ATTEN- UATOR	REMARKS
157.330	30		MEDIAN CROSSOVER
159.140	30	2	MEDIAN CROSSOVER
160.700	38		MEDIAN CROSSOVER
TOTAL	98	# 2	

# INSTALL WHEN WHEN CROSSOVERS ARE REMOVED

		MEDIA	N CROSSC	OVER #
REFERENCE POST	1	each		
	CROSSOVER CONST., MAINTAIN,& CLOSE	CROSSOVER MEDIAN BARRIER RAIL	CROSSOVER RECLAMATION	REMARKS
457.000	1			TWO-WAY CROSSOVER
157.330		1		TWO-WAY CROSSOVER
160,700		4		TWO-WAY CROSSOVER
163.572	1		1	TWO-WAY CROSSOVER
TOTAL	1	3	1	

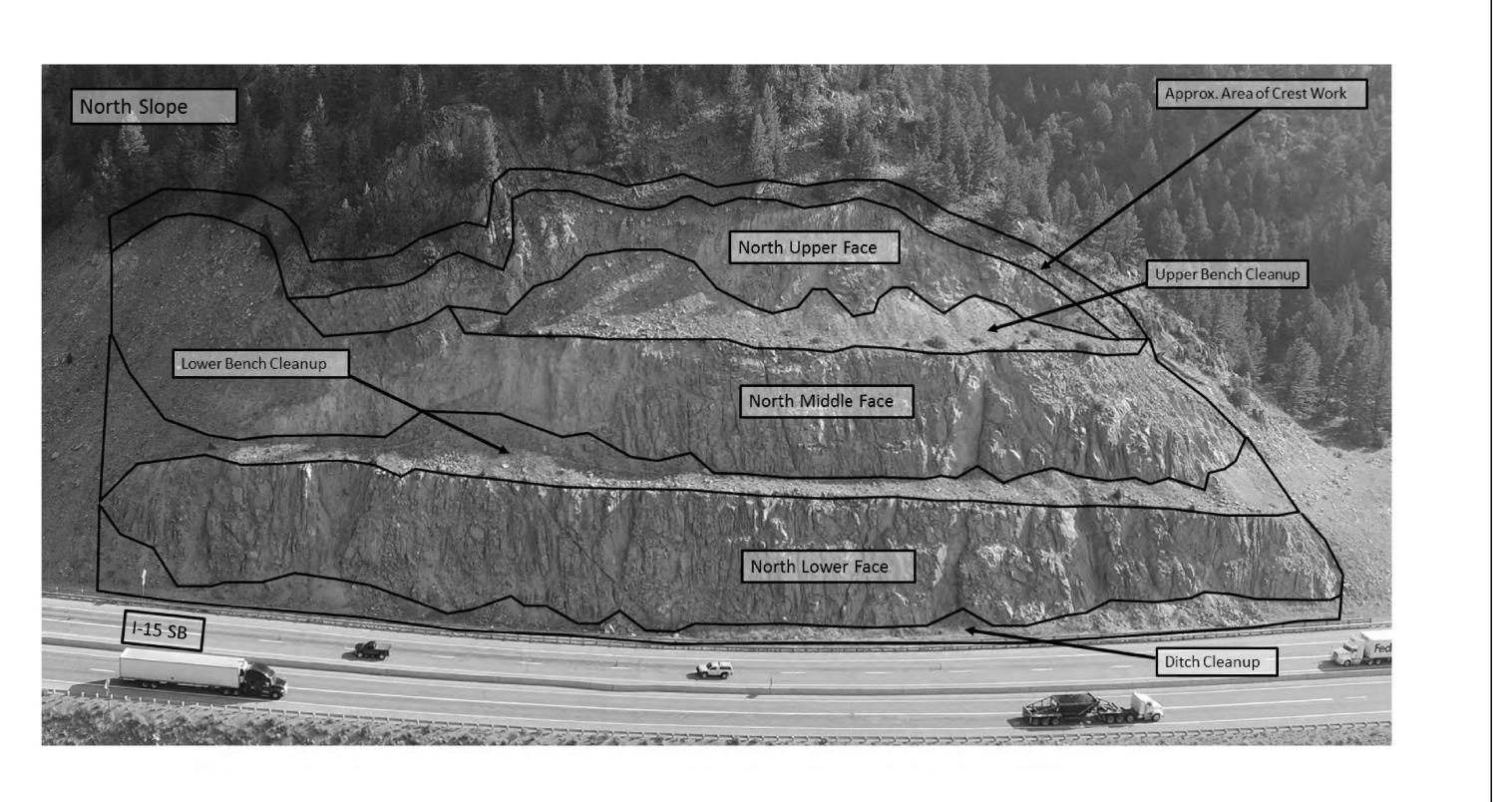
TRAFFIC CONTROL								
	each	miles						
POST	CROSSOVER	TWO-WAY	REMARKS					
157.330	2		TWO-WAY CROSSOVER					
159.140	2		TWO-WAY CROSSOVER					
160,700	2	-	TWO-WAY CROSSOVER					
163.572	2	_	TWO-WAY CROSSOVER					
		1.8	RP 157.330 TO RP 159.140 SOUTHBOUND					
		1.8	RP 157.330 TO RP 159.140 NORTHBOUND					
_	1 1	2.9	RP 160.700 TO RP 163.572 SOUTHBOUND					
		2,9	RP 160.700 TO RP 163.572 NORTHBOUND					
TOTAL	8	9.4						

3 MONTANA DEPARTMENT OF TRANSPORTATION 3/15/2018	60000rdsum002.dgn DESIGNED BY Kevi REVIEWED BY	in Mueller 12/23/2016	ROAD PLANS	BASIN - E	BOULDER	IM 15-3(91)158
1 OF TRANSPORTATION 3/15/2018 10:53:17 AM	CHECKED BY M CPS - U2160		JEFFERSON COUNTY		UPN 8996000	10



3		C:\DGN\8996000rddet006.dgn	DESIGNED BY	Kevin Mueller	11/14/2017	ROAD PLANS	
	MONTANA DEPARTMENT	3/15/2018	REVIEWED BY			NOAD I LANS	
MDIX OF TRANSPORTATION	10:53:27 AM CPS - U216	CHECKED BY			JEFFERSON COUNTY		
		10.53.27 AM CPS - 0216	1				

MONTANA DEPARTMENT OF TRANSPORTATION

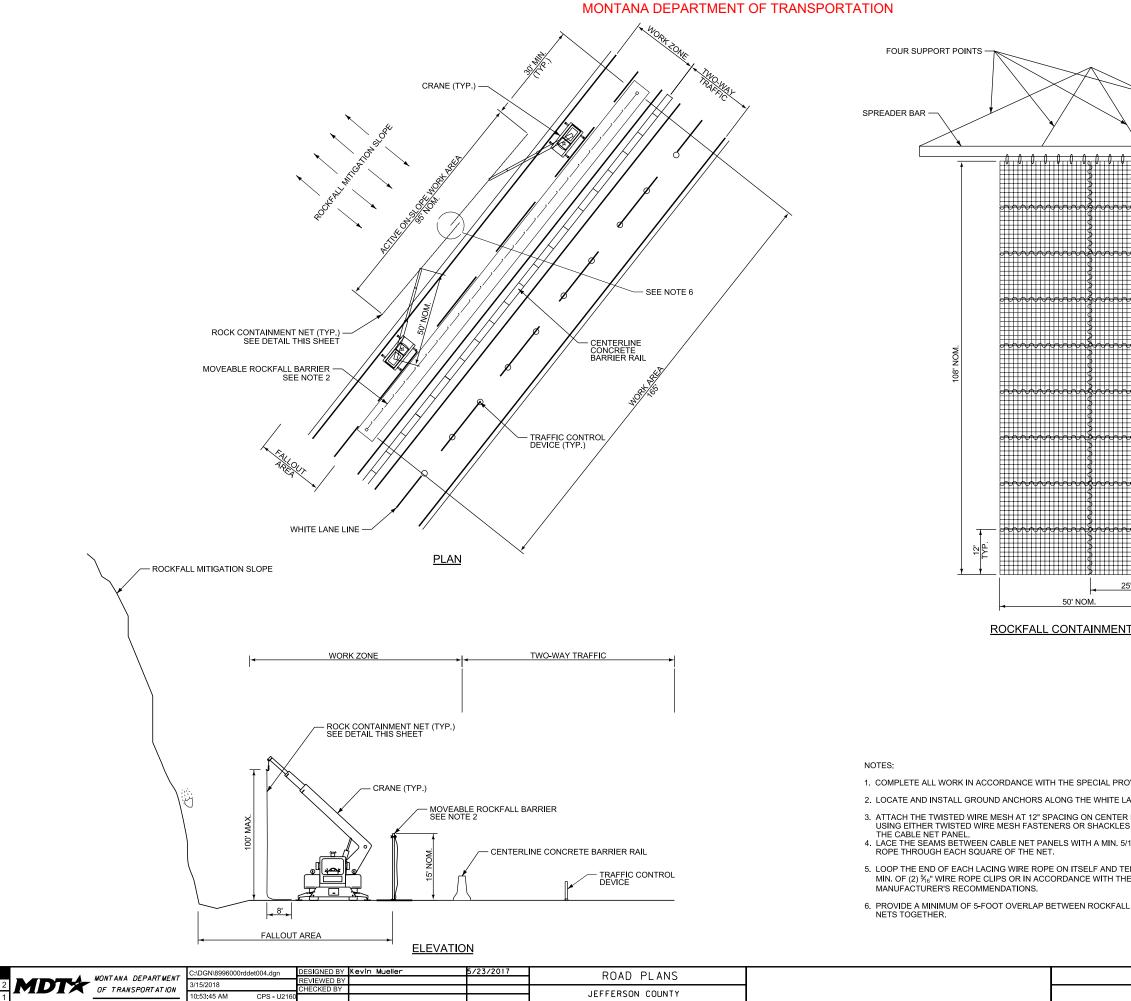


3		C:\DGN\8996000rddet006.dgn	DESIGNED BY	Kevin Mueller	11/14/2017	ROAD PLANS JEFFERSON COUNTY	
	ANA DEPARTMENT	3/15/2018	REVIEWED BY			NOAD TEANS	L
	TRANSPORTATION		CHECKED BY				
1		10:53:34 AM CPS - U2160				SELLERSON CODNIL	

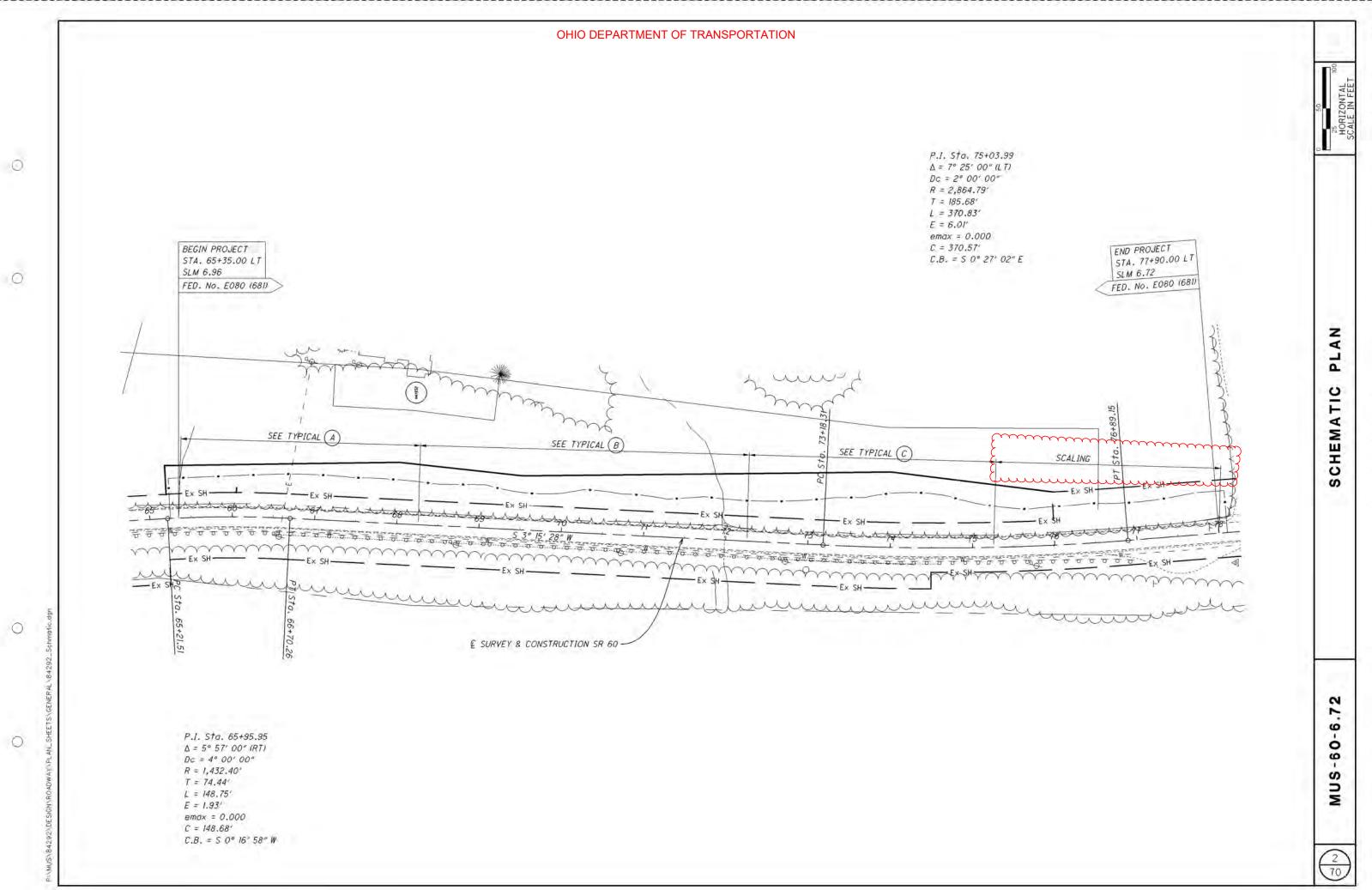
## DETAIL

SITE # 2 ANNOTATED PHOTOGRAPH RP. 158.20

			NOT TO SCALE
BASIN -	BOULDER		IM 15-3(91)158
	UPN 899600	00	12



	ATTACH TOP OF NE	T PANELS TO	
$\checkmark$	LACING WIRE ROPE	OR SHACKLES	
	TWISTED WIRE MES	H BACKING	
	CABLE NET PANELS CONSTRUCTED IN AC (SEE SPECIAL PROVIS	CORDANCE WI <sup>-</sup> SIONS)	TH THE CONTRACT
	— CABLE NET PANEL SEAN	4 (TYP.)	
	— CABLE NET PANEL SEAM	И (ТҮР.)	
ROVISIONS.			
ER HORIZONTALLY AND			
ES. ATTACH ON THE IMF 5/16" DIA. WIRE	ACT SIDE OF		
TERMINATE WITH A			
ALL CONTAINMENT NETS	OR SEAM LACE	CC	ONTAINMENT NET DETAILS
			NOT TO SCALE
BASIN -			IM 15-3(91)158
	UPN 899600	0	13



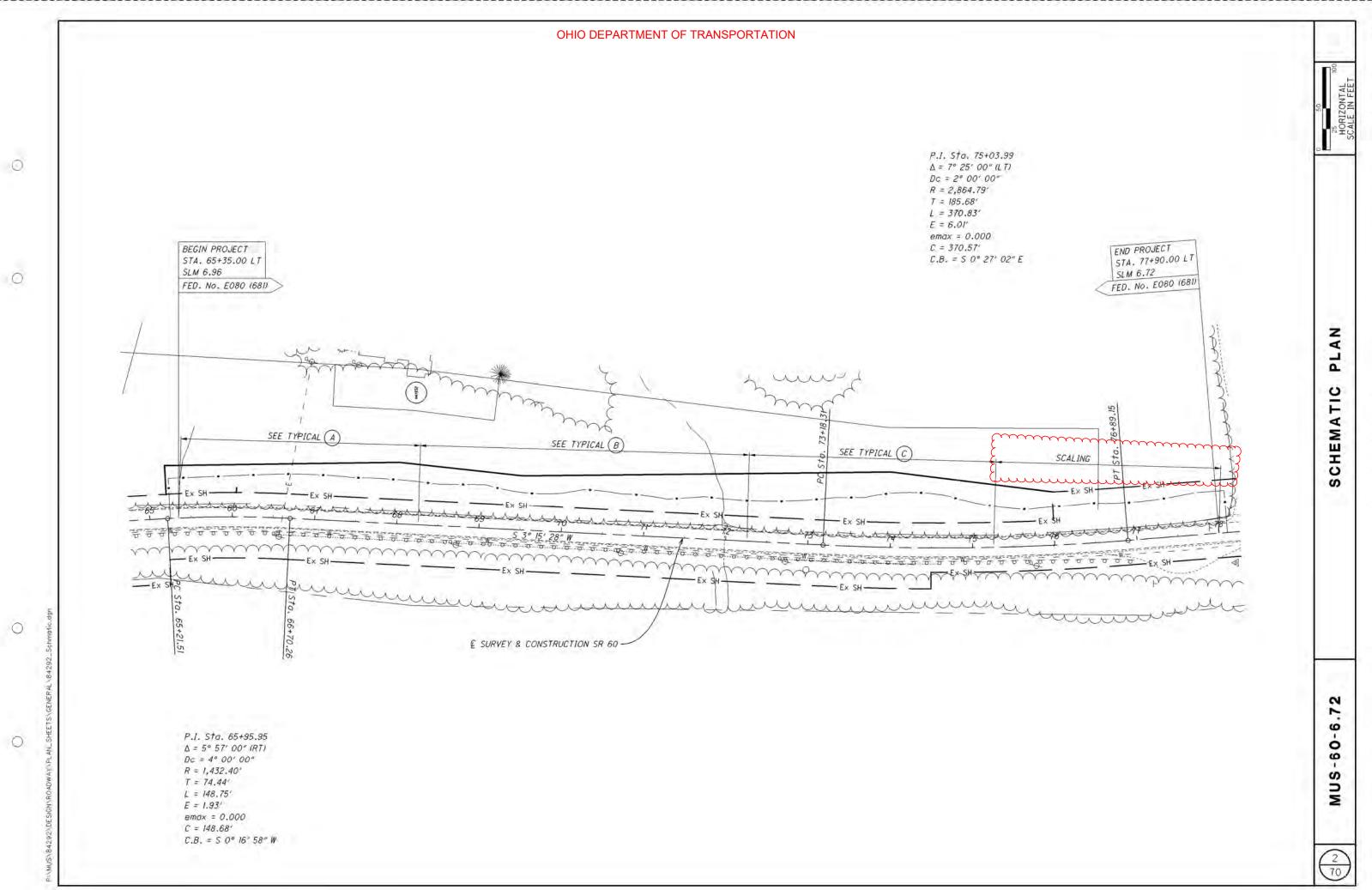


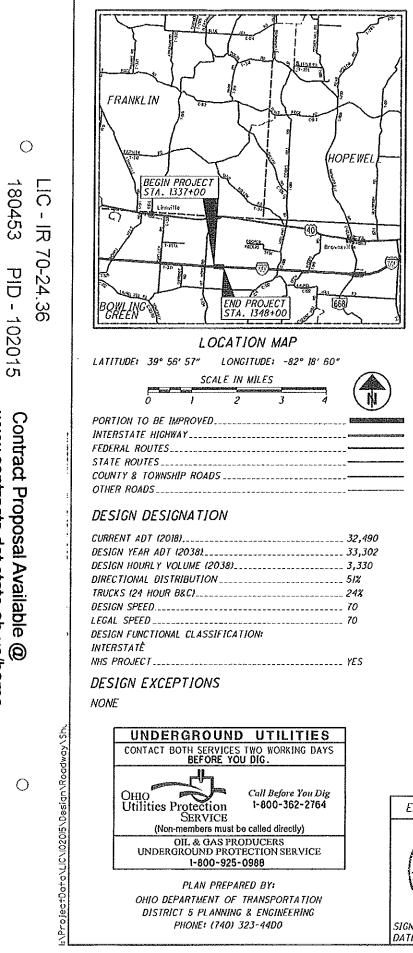
511		GRAND	TEMENT	1	PARTICIPATION						
		EM TIEMEAT.	ITEM	01/STR/PV	66	10A	10	8	6	5	
CLEARING AND GRUBBING		LUMP	11000	201	LUMP				LÜMP		
EXCAVATION	CU YD	6,004	10000	203	6,004		6,004		-		
GEOTEXTILE FABRIC	SQ YD	1,600	50000	204	1,600		1,600				
VIBRATION CONTROL AND MON		LUMP	14001	208	LUMP				LUMP		
PAVEMENT REPAIR	SQ YD	50	01000	253	50				50		
REFERENCE MONUMENT	EACH	5	40500	604	5	5	5	4			
SPECIAL - MISC .: STACKED CEL	SQ FT	9,000	98200	690	9,000		9,000				
mmm		$\dots$	mm			~~~~~~		- C			
SCALING	HOUR	40	00500	862	40	uuuu	40	£			
SPECIAL STEEL WIRE MESH	USQYDU	3,800	00650	862	3,800		3,800				
TRIM BLASTING ROCKFALL PROTECTION MISC.:	SQ FT FT	1,875 500	00700 99000	862 862	1,875		1,875				
NOON ALL INGILO NON MIDD.						-					
ER					11		-				
ROCK CHANNEL PROTECTION,	CU YD	80	34300	601	80		80		-		
	CO VD	4 000	00540	650	4 600	_		4 000			
SEEDING AND MULCHING, CLAS COMMERCIAL FERTILIZER	SQ YD TON	4,600	00540 20000	659 659	4,600		ć	4,600			
LIME	ACRE	0.95	31000	659	0.95		5	0.95			
WATER	MGAL	5.0	35000	659	5.0			5.0			
							1				
EROSION CONTROL MAT, TYPE	SQ YD	2,400	15060	671	2,400			2,400			
STORM WATER POLLUTION PRE		LUMP	15000	832	LUMP		1	LUMP			
EROSION CONTROL	EACH	12,000	30000	832	12,000			12,000			
	-						6				
TACK COAT	GALLON	120	10000	407	120					120	
ASPHALT CONCRETE, MISC.: SP	CU YD	60	90000	448	60					60	
MAINT			19191								1.11em
DETOUR SIGNING, AS PER PLAN		LUMP	12421	614	LUMP						LUMP
MAINTAINING TRAFFIC		LUMP	11000	614	LUMP		Í.		LUMP		
FIELD OFFICE, TYPE A	MONTH	4	16000	619	4		2	· · · · ·			1
MOBILIZATION		LUMP	10000	624	LUMP						
CONSTRUCTION LAYOUT STAKE	1	LUMP	10000	823	LUMP	S					

Q

DESCRIPTION	SEE SHEET	CALCULATED BT CHECKED NIL
ROADWAY		
IITORING, AS PER PLAN	8	
		*
LULAR CONFINED WALL SYSTEM		GENERAL SUMMARY
: ROCK BOLT		r su
ROSION CONTROL		AA
TYPE D WITHOUT FILTER		E I
SS 3C		GEI
G		
EVENTION PLAN		
PAVEMENT		
POT TREATMENT		
		5.72
		MUS-60-6.72
		MUS
ES		
		64 70

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# STATE OF OHIO DEPARTMENT OF TRANSPORTATION



# LIC - 70 - 24.36

## **BOWLING GREEN TOWNSHIP**

### LICKING COUNTY

INDEX OF SHEETS:

TITLE SHEET	1
GENERAL NOTES	2-3
GENERAL SUMMARY	4
PLAN - 1.R. 70	5
SITE PHOTOS	<i>6</i> -7

D NCINEEDS SEAL +	DM-4.3 1/15/1 DM-4.4 1/15/1			 	800	4/20/18	
D NCINEEDS SEAL +	DM-4.4 1/15/1						
NGINEERS SEAL: R			1		832 862	1/17/14 10/16/15	
	RM-4.2 4/18/1	14					
* NIKUNU C KADAKA E-SO788 KOJOTER KOJOTER KOJOTER	MT-95.30 7/21/1 MT-95.45 7/21/1 MT-99.60 7/15/1 MT-101.70 1/17/1 MT-101.75 7/15/1 MT-105.10 7/19/1	7 16 14 16 13					
VED: N. C. Kadokia [] E: MARCH 6, 2018 []	TC-41.20 10/18/1			 			

Contract Proposal Available @ www.contracts.dot.state.oh.us/home

Ο

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Dist 5

8/9/2018

PID -

102015

	1
PROJECT DESCRIPTION ROCK SCALING ON BOTH THE EASTBOUND AND WESTBOUND SIDES OF I.R. 70 NEAR STATE MILE MARKER I3B IN LICKING COUNTY. EARTH DISTURBED AREAS PROJECT EARTH DISTURBED AREA: N/A ESTIMATED CONTRACTOR EARTH DISTURBED AREA: N/A NOTICE OF INTENT EARTH DISTURBED AREA: N/A	FEDERAL PROJECT NO. E170469
LIMITED ACCESS THIS IMPROVEMENT IS ESPECIALLY DESIGNED FOR THROUGH TRAFFIC AND HAS BEEN DECLARED A LIMITED ACCESS HIGHWAY OR FREEWAY BY ACTION OF THE DIRECTOR IN ACCORDANCE WITH THE PROVISIONS OF SECTION 5511.02 OF THE OHIO REVISED CODE.	PID NO. 102015
2016 SPECIFICATIONS THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PLANS AND CHANGES LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.	CONSTRUCTION PROJECT NO.
I HEREBY APPROVE THESE PLANS AND DECLARE THAT THE MAKING OF THIS IMPROVEMENT WILL NOT REOUIRE THE CLOSING TO TRAFFIC OF THE HIGHWAY AND THAT PROVISIONS FOR THE MAINTENANCE OF TRAFFIC AND SAFETY OF TRAFFIC WILL BE AS SET FORTH ON THE PLANS AND ESTIMATES.	RAILROAD INVOLVEMENT NONE
APPROVED Jan 28, P.E. DATE 448 DISTRICT DEPUTY DIRECTOR	LIC-70-24.36
APPROVED Jerry Wran M DATE STUDIE DIRECTOR DEPARTMENT OF TRANSPORTATION	

#### UTILITIES

THERE ARE NO KNOWN UNDERGROUND OR OVERHEAD UTILITIES WITHIN THE PROJECT CONSTRUCTION LIMITS. THE FOLLOWING LIST OF UTILITIES IS PROVIDED FOR THE CONTRACTOR:

American Electric Power 850 Tech Center Drive Gahanna, Ohio 43230 Attn: Paul Paxton 614-883-6831

AT&T Ohio 111 North 4th Street Columbus, Ohio 43215 Attn: Mike Lepley 614-223-5872

Columbia Gas of Ohio 2429 North Linden Avenue Zanesville, Ohio 43701 Attn: Michael DiBenedetto 740-260-0370

Time Warner Cable 111 North 11th Street Newark, Ohio 43055 Attn: Craig Omen 740-541-2488

#### CONSTRUCTION NOTIFICATION

THE CONTRACTOR WILL ADVISE THE PROJECT ENGINEER A MINIMUM OF TWENTY-ONE CALENDAR DAYS PRIOR TO THE FOLLOWING: THE START OF CONSTRUCTION ACTIVITIES, LANE RESTRICTIONS, LANE CLOSURES, AND OR ROAD CLOSURES. THE PROJECT ENGINEER WILL FORWARD THIS INFORMATION TO THE FOLLOWING:

DISTRICT PUBLIC INFORMATION OFFICER (PIO) BY FAX: (614) 887-4510 OR BY EMAIL: D05.PIO@dot.ohio.gov

DISTRICT PERMIT SECTION BY FAX: (614) 887-4525 OR BY EMAIL: Brian.Bosch@dot.ohio.gov

CENTRAL OFFICE SPECIAH HAUL PERMITS SECTION BY FAX: (614) 728-4099 OR BY EMAIL: Hauling.Permits@dot.ohio.gov

THE PIO WILL, IN TURN, NOTIFY THE PUBLIC, THE LOCAL EMERGENCY SERVICES, AFFECTED SCHOOLS AND BUSINESSES, AND ANY OTHER IMPACTED LOCAL PUBLIC AGENCY OF ANY OF THE ABOVE MENTIONED ITEMS, VIA MEDIA SOURCES.

#### CLEARING AND GRUBBING

ALTHOUGH THERE ARE NO TREES OR STUMPS SPECIFICALLY MARKED FOR REMOVAL WITHIN THE LIMITS OF THE PROJECT, A LUMP SUM QUANTITY IS INCLUDED IN THE GENERAL SUMMARY FOR ITEM 201, CLEARING AND GRUBBING. ALL PROVISIONS AS SET FORTH IN THE SPECIFICATIONS UNDER THIS ITEM ARE INCLUDED IN THE LUMP SUM PRICE BID FOR ITEM 201, CLEARING AND GRUBBING.

TREE CLEARING MAY ONLY BE CONDUCTED BETWEEN OCTOBER 1 AND MARCH 31 TO MINMIZE POTENTIAL IMPACTS TO ENDANGERED BAT SPECIES.

## SURVEYING PARAMETERS OHIO DEPARTMENT OF RATE BOR SATINGN

PROJECT CONTROL: NORTH AMERICAN VERTICAL DATUM (NAVO88) OHIO STATE PLANE COORDINATE SYSTEM, SOUTH ZONE GRID COORDINATES, NAD 83 (CONUS) GEOID GIZA (OHIO)

SV 501 - CL CONCRETE MONUMENT: ELEVATION = 1055.260 NORTHING = 706,167.859 EASTING = 2,020,585.960

SV 502 - CL CONCRETE MONUMENT: ELEVATION = 1066.420 NORTHING = 706,132.952 EASTING = 2,021,084.828

#### SEEDING AND MULCHING

THE FOLLOWING QUANTITIES ARE PROVIDED TO GROWTH AND CARE OF PERMANENT SEEDED ARE.	
ITEM 659, SEEDING AND MULCHING, CLASS 2 (ESTIMATED QUANTITY)	5000 SY
ITEM 659, COMMERCIAL FERTILIZER, (5000 ÷ 7410)	0.67 TON
ITEM 659, LIME (5000 ÷ 4840)	1.03 ACRE
ITEM 65,9 WATER (5000 × 0.0054)	27 M GAL

SEEDING AND MULCHING SHALL BE APPLIED TO ALL AREAS BETWEEN THE OUTSIDE EDGE OF PAVED SHOULDER AND THE TOE OF THE FINISHED ROCK SLOPE.

#### MILE MARKER 138 SIGNS

THE FOLLOWING QUANTITIES HAVE BEEN INCLUDED IN THE GENERAL SUMMARY TO REMOVE AND REERECT THE EXISTING DIO-3 SIGNS (I ON WESTBOUND SIDE AND I ON EASTBOUND SIDE OF I.R. 70).

ITEM 630, GROUND	MOUNTED SUPPORT,	
	NO. 3 POST	30 F T

ITEM 630, REMOVAL OF GROUND MOUNTED SIGN AND REERECTION 2 EACH

#### MAINTAINING EXISTING PAVEMENT

IF THE EXISTING PAVEMENT OF I.R. 70 (INCLUDING PAVED SHOULDERS) IS DAMAGED BY THE CONTRACTOR'S EQUIPMENT OR FROM SCALING OPERATIONS, THE PAVEMENT SHALL BE REPAIRED AT THE DIRECTION OF THE PROJECT ENGINEER AND SHALL BE AT THE EXPENSE OF THE CONTRACTOR.

4		く
E	A SCALING WORK PLAN MUST BE SUBMITTED TO THE PROJECT ENGINEER FOR ACCEPTANCE AT LEAST TEN DAYS BEFORE	3
6	BEGINNING WORK AS PER SECTION 862.05 OF SUPPLEMENTAL SPECIFICATION 862.	2
7	THE CONTRACTOR MUST SPECIFICALLY	く
6	DETAIL HOW TRAFFIC WILL BE SHIELDED FROM ANY DEBRIS THAT MAY PROJECT OVER THE PORTABLE BARRIER AND INTO	2
7	THE LIVE TRAFFIC LANES.	く
7	THE SCALING WORK PLAN MUST ALSO SHOW THE PRIORITY	く
7	ORDER OF WORK TO BE DONE AT EACH LOCATION BASED ON	く
۲	FIELD EVALUATIONS, PRE-CONSTRUCTION MEETING, MEANS AND METHODS, AND APPROPRIATE BID ITEMS.	2
٢	REMOVAL OF TALUS MATERIAL UP TO 15 FT. ABOVE THE TOE	く
6	OF THE SLOPE SHALL BE PAID FOR UNDER THE EXCAVATION	く
7	ITEM UNLESS SPECIFICALLY IDENTIFIED FOR SCALING IN THE SCALING WORK PLAN.	J
7	SCALING WORK PLAN.	)
	ESTIMATED QUANTITIES:	)
	LIC-70-24.36 (WESTBOUND) ITEM 862. SCALING 96 HR	1
	ITEM 862, EXCAVATION 4,000 CY	イ
٢		く
$\succ$	LIC-70-24.44 (EASTBOUND) ITEM 862. SCALING 64 HR	く
7	ITEM 862, EXCAVATION 2,800 CY	J
4		)
	THE FOLLOWING QUANTITIES HAVE BEEN ESTIMATED AND	7
(	CARRIED TO THE GENERAL SUMMARY:	1
(	ITEM 862, SCALING 160 HR	1
(	ITEM 862, EXCAVATION 6,800 CY	イ
٢		_ <b>X</b>

### ITEM 623, CONSTRUCTION LAYOUT STAKES AND SURVEYING, AS PER PLAN

IN ADDITION TO THE SPECIFICATIONS IN THE C&MS, THE CONTRACTOR SHALL PERFORM A PRE-CONSTRUCTION AND POST-CONSTRUCTION TERRESTRIAL SCAN TO VERIFY THE EXCAVATION QUANTITIES.

ALL MATERIALS, LABOR, EQUIPMENT, AND TRAFFIC CONTROL TO PERFORM THESE SCANS SHALL BE INCLUDED IN THE UNIT PRICE BID FOR ITEM 623, CONSTRUCTION LAYOUT STAKES AND SURVEYING, AS PER PLAN.

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#### ITEM 614, MAINTAINING TRAFFIC

TRAFFIC SHALL BE MAINTAINED BY CLOSING THE SHOULDER OF I.R. 70 WITH PORTABLE BARRIER BY SCD MT-95.45 AND AS SHOWN ON SHEET 5 OF THESE PLANS. IF TRAFFIC NEEDS TO BE STOPPED ON I.R. 70, THE CONTRACTOR MAY UTILIZE SCD MT-99.60 TO PERFORM SHORT-TERM CLOSURES OF THE SIDE OF THE INTERSTATE THAT IS BEING WORKED ON.

THE WORK LIMITS SHOWN ON THESE PLANS ARE FOR PHYSICAL CONSTRUCTION ONLY. THE INSTALLATION AND OPERATION OF ALL TEMPORARY TRAFFIC CONTROL AND TEMPORARY TRAFFIC CONTROL DEVICES REOUIRED BY THESE PLANS SHALL BE PROVIDED BY THE CONTRACTOR WHETHER INSIDE OR OUTSIDE THESE WORK LIMITS.

DRUMS SHALL BE PROPERLY REFLECTORIZED (HIGH INTENSITY, FLORESCENT SHEETING) PLASTIC DRUMS AND WEIGHTED.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY TRAFFIC CONTROL IN PLACING AND REMOVING ITEM 622 PORTABLE BARRIER, 32".

ALL WORK AND TRAFFIC CONTROL DEVICES SHALL BE IN ACCORDANCE WITH ITEM 614 AND OTHER APPLICABLE PORTIONS OF THE SPECIFICATIONS, AS WELL AS THE OHIO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

PAYMENT FOR ALL LABOR, EQUIPMENT, AND MATERIALS AS DESCRIBED ABOVE SHALL BE INCLUDED IN THE LUMP SUM BID FOR ITEM 614, MAINTAINING TRAFFIC, UNLESS SEPARATELY ITEMIZED IN THE PLANS.

THE FOLLOWING QUANTITY HAS BEEN INCLUDED IN THE GENERAL SUMMARY:

ITEM 614, MAINTAINING TRAFFIC LS

#### SIGNS/SIGN SUPPORTS

ALL SIGNS AND SIGNS SUPPORTS NEEEDED AS PER ANY REFERENCED STANDARD DRAWING IN THESE PLANS SHALL CONFORM TO SCD MT-105.10. PAYMENT FOR TEMPORARY SIGNS AND SIGN SUPPORTS SHALL BE INCLUDED IN THE LUMP SUM BID FOR ITEM 614, MAINTAINING TRAFFIC AND SHALL INCLUDE ALL LABOR, EOUIPMENT, AND MATERIALS NEEDED TO INSTALL, MAINTAIN, AND REMOVE THE SIGNS.

#### DELINEATION OF PORTABLE BARRIER

BARRIER REFLECTORS AND OBJECT MARKERS SHALL BE INSTALLED ON ALL PORTABLE BARRIER (PB) USED FOR TRAFFIC CONTROL.

BARRIER REFLECTORS SHALL CONFORM TO C&MS 626, EXCEPT THAT THE SPACING SHALL BE AS PER TRAFFIC SCD MT-101.70. OBJECT MARKERS AND THEIR INSTALLATION SHALL CONFORM TO C&MS 614.03 AND SCD MT-101.70. WHEN THE PB CONTAINS GLARE SCREEN, ONE SET OF THREE VERTICAL STRIPES OF SHEETING SHALL BE CONSIDERED EQUIVALENT TO AN OBJECT MARKER, ONE-WAY.

PAYMENT SHALL BE FULL COMPENSATION FOR ALL MATERIAL, LABOR, INCIDENTALS AND EQUIPMENT NECESSARY FOR FURNISHING, INSTALLING, MAINTAINING AND REMOVING EACH OF THE ABOVE ITEMS IN THESE PLANS. LIC - 70-24.36

	UNIT	RRANON TOTAL		MENT OF	01/IMS/0			JM.	EET NU	SH	5	3	2
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IOVAL OF GROUND MOUNTED SIGN A	EACH	2	85100	630	2								2
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JECT MARKER, ONE WAY	EACH	38	13350	614	38				[]		38		
RTABLE CHANGEABLE MESSAGE SIGN		4	18601	614	4							4	
RTABLE BARRIER, 32"	FT	1,900	41000	622	1,900						1,900		
NTAINING TRAFFIC		LS	11000	614	LS								LS
NSTRUCTION LAYOUT STAKES AND S		LS	10001	623	LS								LS
BILIZATION		LS	10000	624	LS								
									[]				

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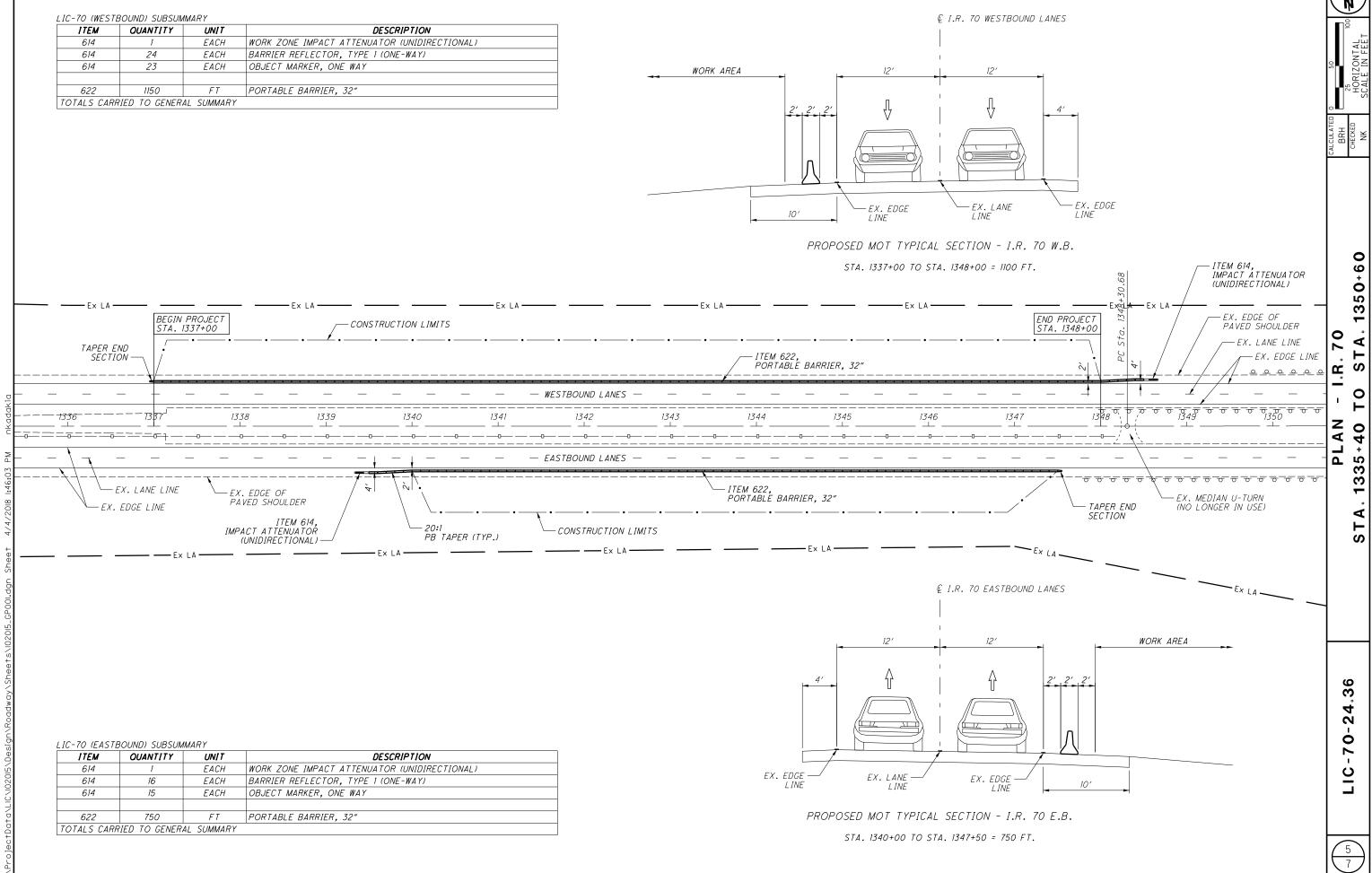
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DESCRIPTION	SEE Sheet No.	CALCULATED BRH CHECKED NK
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TRAFFIC CONTROL		Ŕ
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INCIDENTALS		
SURVEYING, AS PER PLAN	2	
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		LIC - 70-24°36
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#### OHIO DEPARTMENT OF TRANSPORTATION



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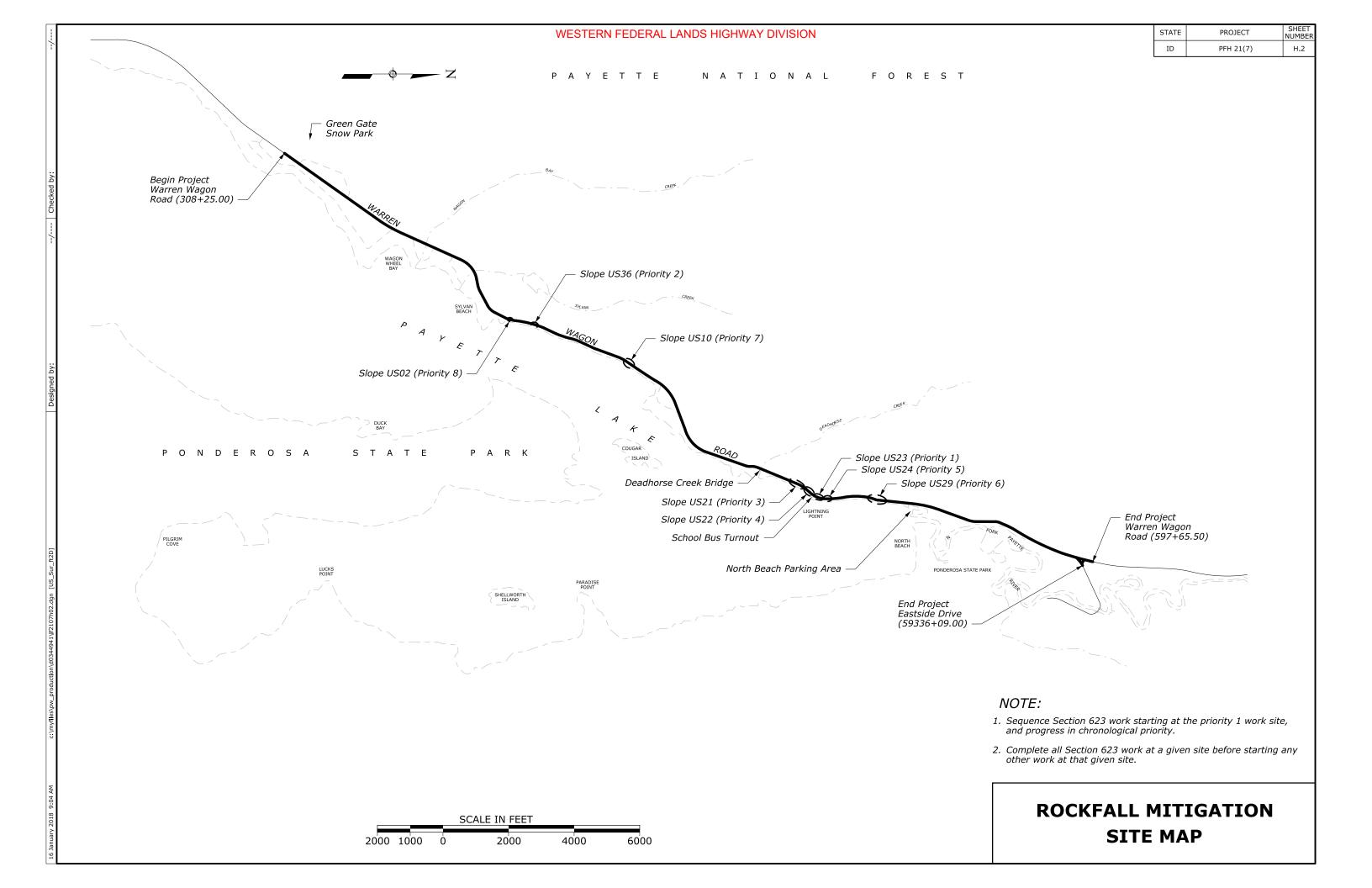
					WESTERN FEDE	RAL LANDS HIGH	HWAY DIVISION				STATE		ROJECT
											ID	Pł	FH 21(7)
	ROCKFALL MITIGATION QUANTITIES									]			
	ITEM NO.	DESCRIPTION	PRIORITY 8 SLOPE US02 (395+58 TO 396+80)	PRIORITY 2 SLOPE US36 (402+75 TO 404+85)	PRIORITY 7 SLOPE US10 (433+10 TO 436+60)	PRIORITY 3 SLOPE US21 (499+00 TO 504+00)	PRIORITY 4 SLOPE US22 (504+00 TO 507+60)	PRIORITY 1 SLOPE US23 (507+60 TO 510+80)	PRIORITY 5 SLOPE US24 (510+80 TO 513+50)	PRIORITY 6 SLOPE US29 (525+00 TO 530+00)	QUANTITIES	UNIT	
A	62302-0100	Special labor, slope scaling	120	120	200	260	200	200	150	300	1,550	HOUR	V
HEDULE	62901-1400	Rolled erosion control product, type 5.C	-	375	-	-	-	-	-	-	375	SQYD	DULE
SCHE	65101-1000	Draped rockfall protection, wire mesh (anchored)	20	375	-	-	-	-	-	-	375	SQYD	SCHEDUL
	26001-0000	Rock bolt (25 kip)			· ·		-	530		•	530	LNFT	
8	26001-0000	Rock bolt (50 kip)				+		1,090	-	-	1,090	LNFT	
H	26002-0000	Rock dowel		-		-	1	100	-	•	100	LNFT	TE
50	62302-0100	Special labor, slope scaling	120	120	200	260	200	200	150	300	1,550	HOUR	Ind
SCHEI	62901-1400	Rolled erosion control product, type 5.C	7	375	1				-		375	SQYD	SCHEDU
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	26001-0000	Rock bolt (25 kip)	÷.	665	-	-	-	530	-	-	1,195	LNFT	
0	26001-0000	Rock bolt (50 kip)	-	-		-	-	1,090	-	-	1,090	LNFT	U
1.20	26002-0000	Rock dowel	-	120	4	-		100		~ · · · ·	220	LNFT	
EDULE	62302-0100	Special labor, slope scaling	120	120	200	260	200	200	150	300	1,550	HOUR	DO
SCHE	62901-1400	Rolled erosion control product, type 5.C	-	375			~	-	-	*	375	SQYD	SCHEDULE
	65101-1000	Draped rockfall protection, wire mesh (anchored)	-	375	-		-	÷	-	-	375	SQYD	
	26001-0000	Rock bolt (25 kip)	-	665	-	215	÷	530	-	-	1,410	LNFT	
0	26001-0000	Rock bolt (50 kip)		-	-	1,015	*	1,090	-	-	2,105	LNFT	
4	26002-0000	Rock dowel		120		130		100			400	LNFT	D
Ing	62302-0100	Special labor, slope scaling	120	120	200	260	200	200	150	300	1,550	HOUR	EDUL
SCHEDUL	62901-1400	Rolled erosion control product, type 5.C		375	- 90 C		-	3			375	SQYD	SCHEI
	65101-1000	Draped rockfall protection, wire mesh (anchored)	•	375	-		-	141	-	4	375	SQYD	

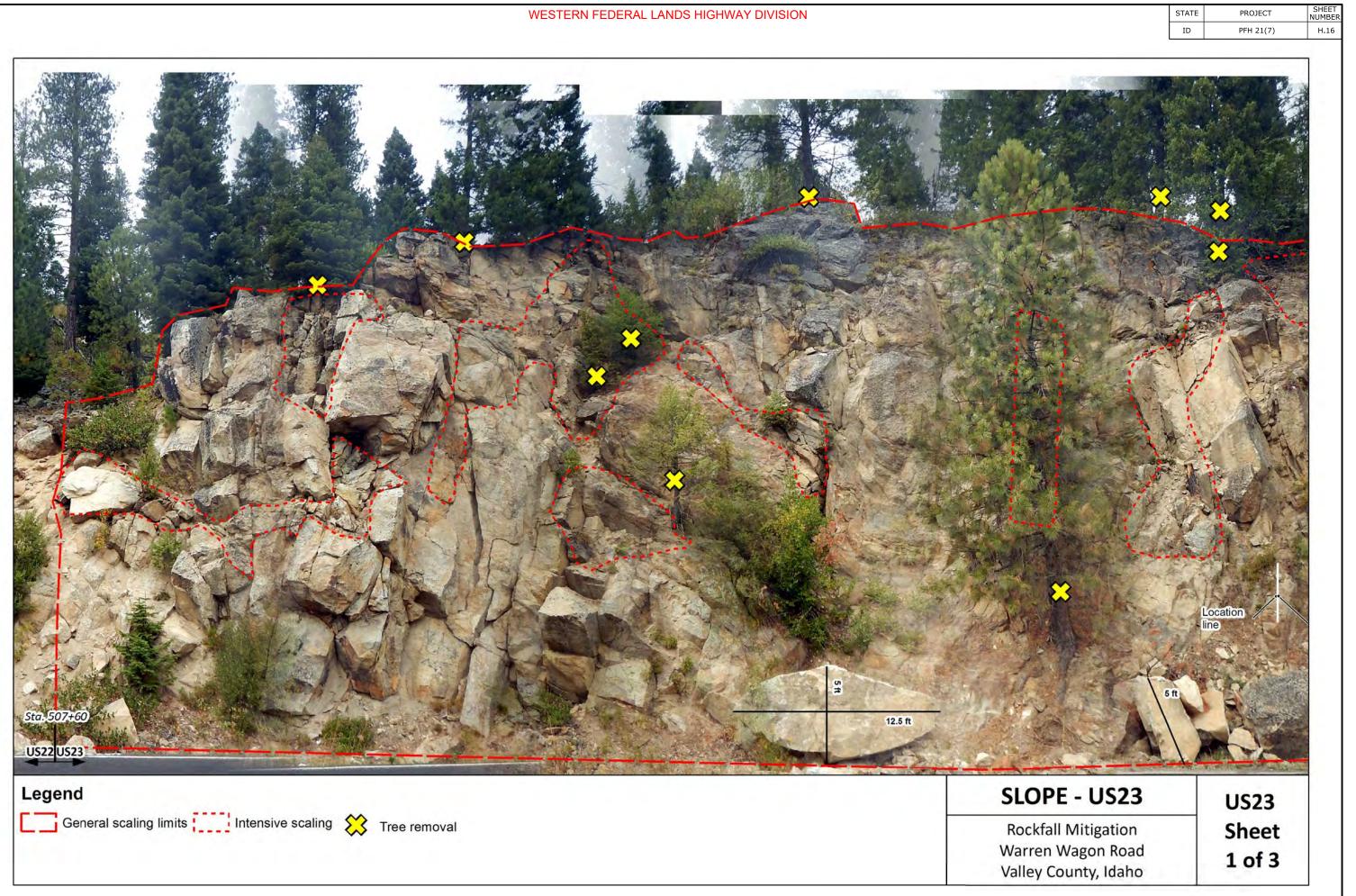
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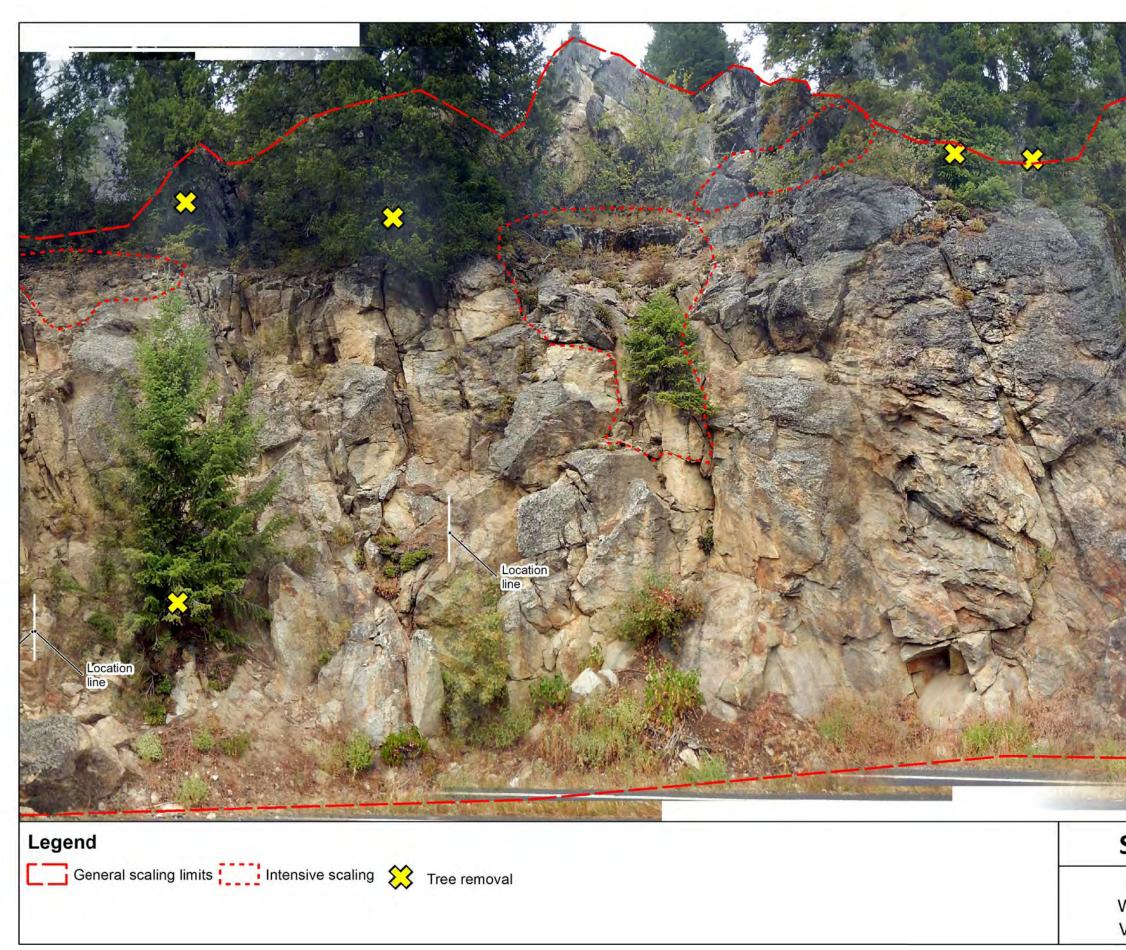
1. See Sheet H.2 for additional details and requirements.

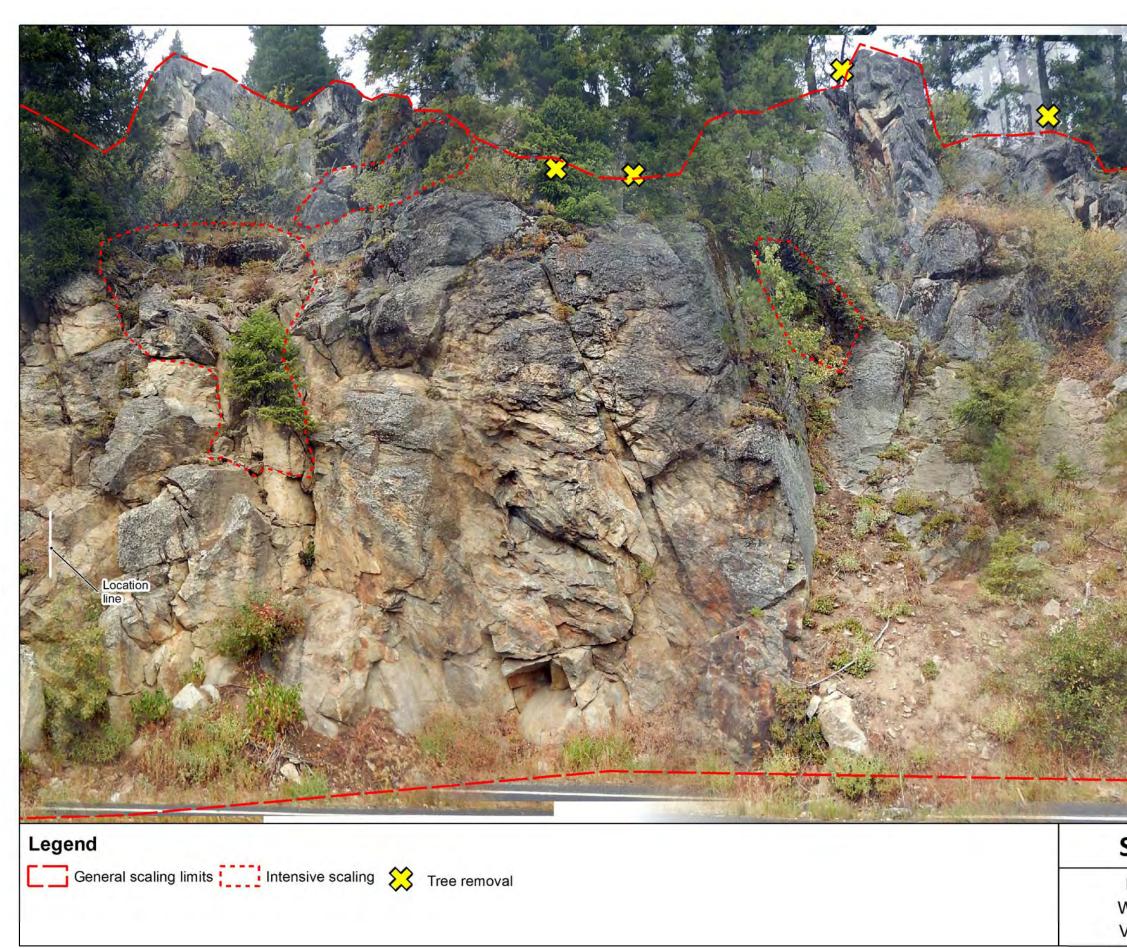
2. Do not start scaling work until authorized by the CO in writing. See Subsection 623.02C.

# TABULATION OF ROCKFALL MITIGATION QUANTITIES



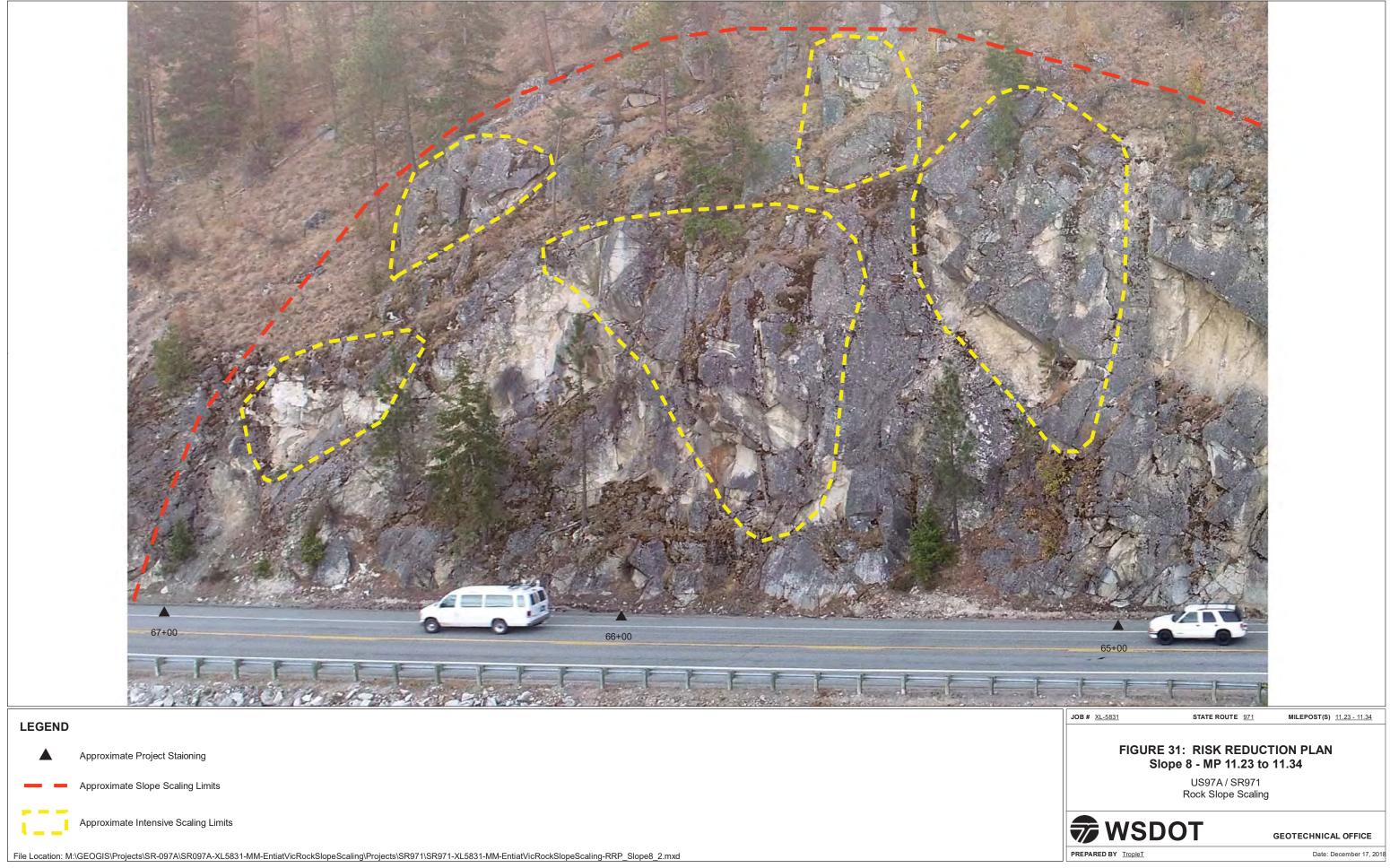




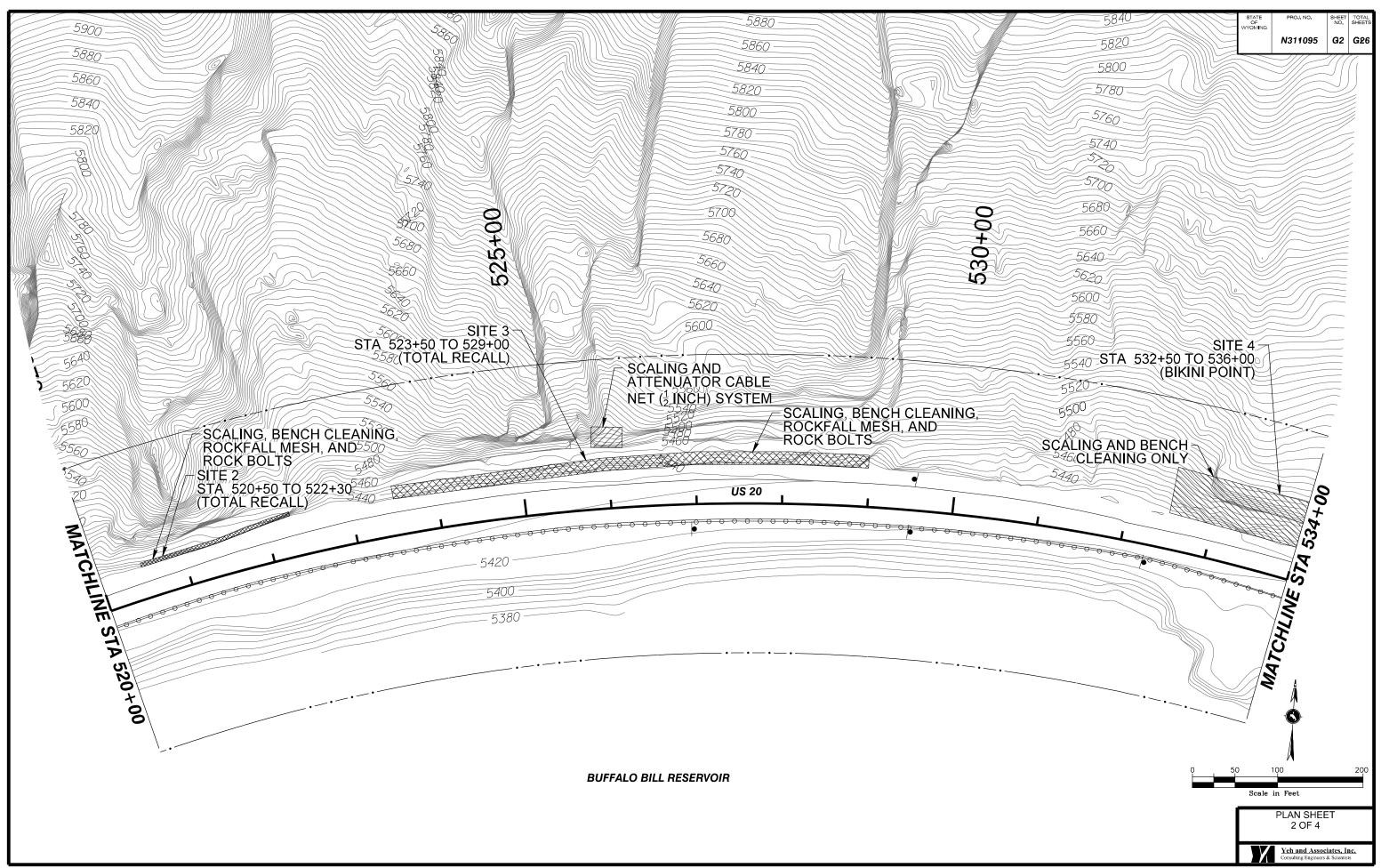


WESTERN FEDERAL LANDS HIGHWAY DIVISION

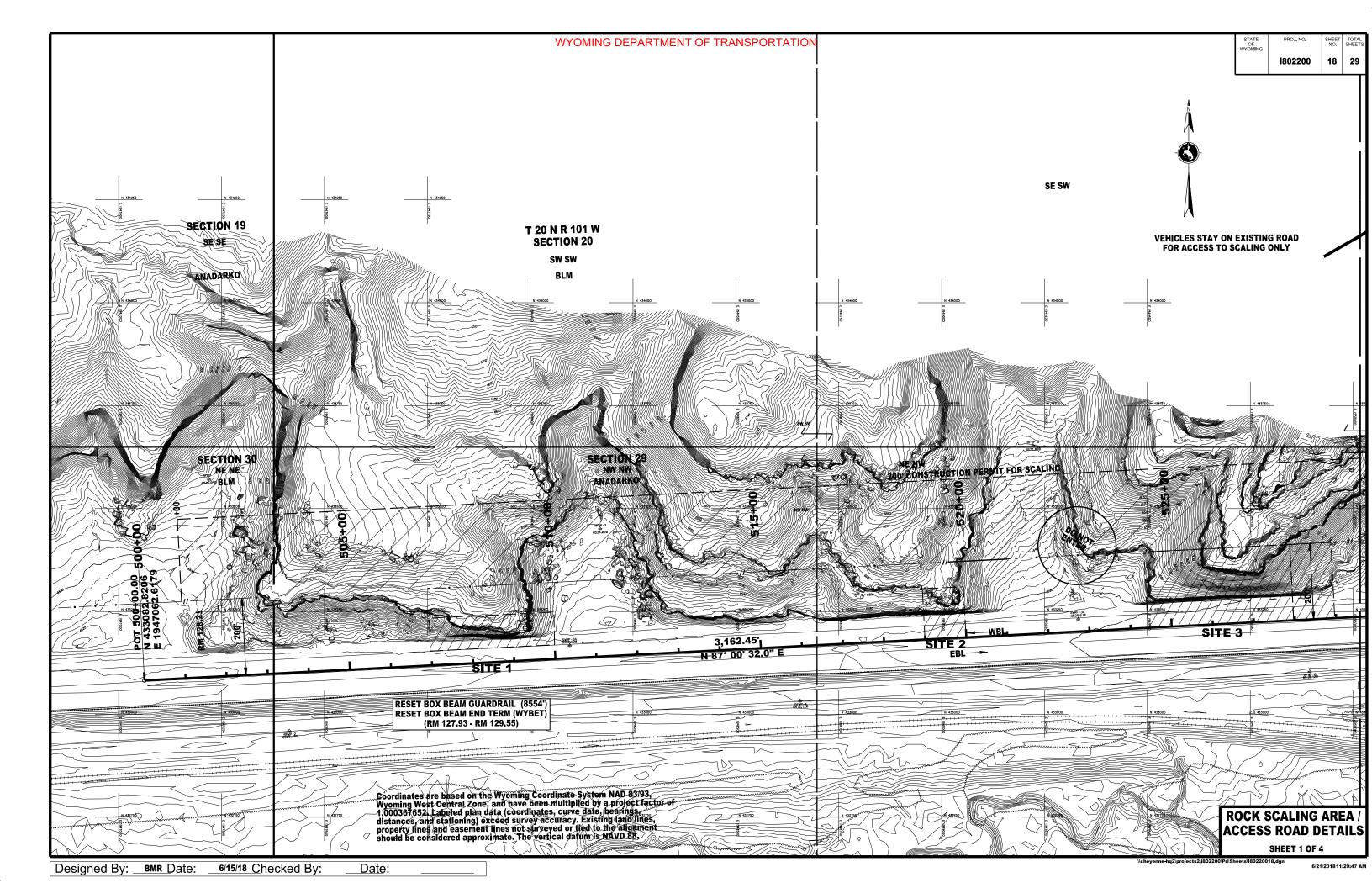
	STATE	PROJECT	SHEET NUMBEF
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		Sta. 510+80 US23 US24	The second second second second second
SLOPE - US23		US23	
<b>Rockfall Mitigation</b>		Sheet	3
Varren Wagon Road Valley County, Idaho		3 of 3	



#### WYOMING DEPARTMENT OF TRANSPORTATION



W:\2015 Projects\215-100 PE North Fork Rockfall Wyoming\Dwg\1095 Plan Sheet02.dgn



## APPENDIX D

## Example Scaling Specifications and Contractor Submittals Provided by DOTs

NOTE: This appendix is available electronically from the Transportation Research Board website. **[To the Editor— Please insert the link to the appendix]**. It contains example scaling specifications and selected contractor submittals provided by:

Central Federal Lands Highway Division (with sample contractor submittal) Montana Department of Transportation (with sample contractor submittal) North Carolina Department of Transportation Ohio Department of Transportation (with sample contractor submittal) Oregon Department of Transportation Pennsylvania Department of Transportation Western Federal Lands Highway Division (with sample contractor submittal) Washington State Department of Transportation Wyoming Department of Transportation (with sample contractor submittal)

#### CENTRAL FEDERAL LANDS HIGHWAY DIVISION E-111

#### CA FLAP CR S4018(1) WHITNEY PORTAL ROAD

#### Section 623. - GENERAL LABOR

#### Delete the text of this Section and substitute the following:

#### Description

**623.01** This work consists of furnishing workers and hand tools for construction work, survey crews, slope scaling, and/or furnishing qualified personnel to perform technical work ordered by the CO and not otherwise provided for under the contract.

**623.02** Workers and Equipment. Furnish competent workers and appropriate hand tools for the work.

Obtain approval of the length of a workday and workweek before beginning the work. Keep daily records of the number of hours worked. Submit the records along with certified copies of the payroll.

**623.03** Surveying Services. Furnish personnel, equipment, and material that conform to the requirements of Subsection 152.01. Survey according to Section 152.

Survey and establish controls within the tolerances shown in Table 152-1, or within other tolerances as established by the CO.

Prepare field notes in an approved format. Furnish calculations. All field notes, supporting documentation, and calculations become the property of the Government upon completion of the work.

**623.04 Office Technical Services.** Furnish qualified engineering personnel experienced in highway construction and design, capable of performing in a timely and accurate manner. Provide personnel with a minimum of NICET Level II certification in highway design and construction, or State (SHA) or industry certification-related design and construction equivalent to their intended responsibilities. Personnel with 2 years or more of recent job experience in the type of highway design and construction provided for under the contract may be used in lieu of certifications. Provide the names and relevant experience of all personnel. Furnish supporting tools and equipment (e.g., calculator, computer, and software, and appropriate and commonly-used drafting tools for the assigned task).

All calculations, notes, and supporting documentation become the property of the government upon completion of the work.

623.04A. Biologist. Furnish a qualified avian biologist with a minimum of a Bachelor's Degree in the biological sciences and with previous experience performing similar surveys. The biologist is responsible for performing bird surveys to protocol and determining if construction operations will disrupt the bird or have a negative impact on nesting birds.

#### CA FLAP CR S4018(1) WHITNEY PORTAL ROAD

**623.05 Slope Scaling.** Remove loose or potentially unstable rock and soil debris and vegetation on the slopes adjacent to the roadway where noted on the plans or as directed by the CO. Removal and disposal of all spoil resulting from scaling activities and all existing pre-scaling materials located between the cut slope and edge of the roadway are incidental to Ditch Excavation, Section 204.

- (a) Submittals. Six weeks prior to commencing scaling activities, submit to the CO for approval a detailed slope scaling plan that includes the following:
  - 1) Proposed construction sequence and schedule;
  - Types and quantities of equipment and tools to be used for slope scaling, including a high-reach excavator capable of removing rock from a cut slope crest 50 vertical feet above the roadway;
  - Personnel Qualifications. The foreman shall have a minimum of two years and scaling crew a minimum of one year demonstrated experience in rock scaling in similar capacities;
  - 4) Removal and disposal plan for spoil resulting from scaling operations and all existing pre-scaling materials located between the cut slope and edge of roadway;
  - 5) Devices, measures, and procedures to protect the public, construction personnel, and property and structures (including the pavement and utilities) from danger or damage; and
  - 6) Traffic control plan.
- (b) Pre-Scaling Meeting. One work-day prior to commencing scaling activities, schedule an on-site pre-scaling meeting. The scaling foreman is required to attend and a minimum of two weeks notice of the meeting will be provided to the FHWA. A FHWA Geotechnical Engineer will be present at the meeting and during the scaling activities to identify slope scaling locations and specific rocks and boulders to be removed.
- (c) Scaling Crew Requirements. Provide scaling crews with a foreman present at all times when scaling is performed. A crew is defined as one foreman and two qualified scalers (if a crewmember must leave for any reason that member shall be replaced by a qualified replacement).
- (d) Protection of Property. Provide devices, measures, and procedures to protect the public, construction personnel, and property and structures (including the pavement and utilities) from danger or damage caused by scaling activities. Any injuries or damages caused by scaling activities are the sole responsibility of the Contractor.

CA FLAP CR S4018(1) WHITNEY PORTAL ROAD

(e) Sequencing. Begin slope scaling at the top of the cut slope and proceed downward towards the roadway.

623.06 Acceptance. Additional surveying services will be evaluated under Section 152.

Hired technical services will be evaluated under Subsections 106.02 and 106.04

Slope scaling will be evaluated under Subsection 106.02.

#### Measurement

**623.07** Measure the Section 623 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

Round portions of an hour up to the nearest half hour. Measure time in excess of 40 hours per week at the same rate as the first 40 hours.

For surveying services, the minimum field survey crew is two persons. Measure surveying service by the crew hour. Do not measure time spent in making preparations, performing calculations, plotting cross-sections and other data, and processing computer data, and other efforts necessary to successfully accomplish the ordered survey services.

Do not measure time for worker's transportation time to and from the project site.

Measure office technical services by the hour as ordered by the CO for performing calculations, plotting cross-sections and other data, and processing computer data.

Measure slope scaling by the crew hour as ordered by the CO for slope scaling activities.

Work and materials associated with scaling activities, including protecting against danger and damage, are incidental to slope scaling and will not be measured for payment. Removing and disposing of spoil and materials associated with scaling activities are incidental to Ditch Excavation, Section 204.

#### Payment

**623.08** The accepted quantities will be paid at the contract price per unit of measurement for the Section 623 pay item listed in the bid schedule. Payment will be full compensation for the work prescribed in this section. See Subsection 109.05.

#### Section 625. - TURF ESTABLISHMENT

**Construction Requirements** 

## CENTRAL FEDERAL LANDS HIGHWAY DIVISION SAMPLE CONTRACTOR SUBMITTAL TRANSMITTAL FORM FOR SUBMITTALS & CERTIFICATIONS

Emailed

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(attach additional sheets as necessary)

	TRANS			): <u>7</u>	
PROJECT NAME: Whitney Portal Road					
DATE:					
PAY ITEM NUMBER & DESCRIPTION: 62302-0		ng			
DESCRIPTION OF INFORMATION SUBMITTE	D: Scaling Plan				
NUMBER OF COPIES FURNISHED: 1					
TYPE OF SUBMITTAL:	X_New Submittal	1.00	Res	submittal	
VARIANCE OR SUBSTITUTION REQUESTED?	Yes	Х	No		
APPLICABLE CONTRACT REFERENCES (LIST)	AND CONTRACT COMPLIANC	CE (INDI	CAT	<u>E):</u>	
PLAN SHEET(S)	PLAN COMPLIANCE?	Yes	No	Var/Sub	N/A X
FP SUBSECTION(S)	FP COMPLIANCE?			Var/Sub	
SCR SUBSECTION(S) 623.05	SCR COMPLIANCE?			Var/Sub	
ACCEPTED DRAWINGS				Var/Sub	
OTHER DESCRIBE ANY PROPOSED VARIATION OR SU	OTHER COMPLIANCE			Var/Sub	0000000
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**623.05 Slope Scaling:** will establish tie off point at the top of slope. These tie of point will consist of trees, 1 foot by 5/8 redheads, ½ inch cable anchors, 3/4 inch steel bars All tie off points will meet 5000lb pull out strength load barring requirements. Each site will be scaled from top down removing any loose debris or rocks with the tools mentioned below. All scalers will meet contract requirements (See item #3). All scalers will be equipped with five point rope access harnesses and non static 11.5 mm rappelling rope. The gear will that will be used will be rated for 450lbs working load and also double as rescue certified gear and also meets all osha and ansi requirements. Each site will be scaled and checked off by CO before moving forward to the next site.

(1) will begin scaling at site one on . The first scaling site is 132+5 then in sequence 136+00,155,156+50,168,169,170,171+5. The scaling will end on if there is no unforeseen site conditions.

(2) Equipment to be used: scaling bars, chainsaws, digging tools for brow rounding, Air bag 22 ton, Pre splitting methods such as Expansion grout, Boulder busting, (1) jack hammer, (1) rock drill, (1) 225 Air Compressor.

(3) Personnel Scaler Qualifications:	
: Foreman (over 5000 hours scaling)	
Contact:	
JOBS AND STATES WORKED IN	
Inspector DR.Pan	
Tecco drapery system, rock bolting, and tree cutting.	More job details
upon request.	
Owner -	-

#### CENTRAL FEDERAL LANDS HIGHWAY DIVISION SAMPLE CONTRACTOR SUBMITTAL



(4) Spoil and Disposal Plan: will provide necessary personnel and equipment to remove spoil and pre-existing materials. Theses item will be removed under the waste item as required during scaling and to allow controlled traffic access.

(5) Damage and Danger Protection: All scaling activities will be under the supervision of the scaling Foreman, who will ensure public and personnel safety from danger. Active scaling will

only be performed in all clear situations and will cease immediately if the safe area is compromised. Radio communication will be maintained with traffic and management elements. Property and structures will be preserved during operations as required. If necessary, physical protection devices and measures can be used. These may include concrete barrier, straw bails, berms, or spread material as cushion.

(6) Traffic Control: Scaling will only be performed in a pilot car closure. During scaling operations, the scaling Foreman will determine when controlled traffic may pass. The Foreman will stop active scaling, observe the status of falling material, and when ready use radio communication to let the pilot car operator that it is safe and clear to pass. The pilot car operator or supervisors will keep the scaling foreman informed of any emergency vehicles that have been given access. Additional flaggers will be utilized as required.

#### SPECIAL PROVISIONS

CONTRACT NO. Click here to enter text.

#### 1. SCALING (REVISED 12-11-15)

A. Description. Remove and dispose of all loose or detached blocks of rock, masses of soil, and other debris that constitute or could constitute a road hazard from the identified areas on the plans or as directed by the Project Manager. The use of a Pre-qualified Rock Slope Stabilization Contractor is required for this work. Perform all work in a manner that minimizes exposure of the public, construction personnel, and equipment to hazardous or potentially hazardous conditions. Provide all materials, equipment and labor necessary to perform this work.

B. Submittals. Submit four copies of a General Scaling Plan at the Pre-Construction Conference for approval by the Project Manager. The General Scaling Plan must include:

1) A detailed Work Plan for each slope scaled. The Work Plan must include, but is not limited to, the following:

a) The proposed construction/scaling sequence and schedule.

b) The types of equipment and tools to be utilized in the work.

c) The number of scaling crews to be employed on the project and their anticipated work schedule. Each scaling crew must consist of a minimum of one working foreman and two scalers. Maintain the same crew size(s) at all times. Any crew member who must leave the site, for any reason, must be replaced immediately by an equally qualified replacement crew member.

2) A Removal and Disposal Plan for scaling debris generated from the scaling operations.

3) A Scaling Traffic Control Plan including provisions to protect the roadway, traffic, adjacent facilities, and existing utilities. This plan must be compatible with the overall Traffic Control Plan and Sequence of Operations for the project.

4) A Rockfall Protection Plan that includes provisions for protecting the roadway during non-working hours against rockfalls, rollouts, etc.

The Project Manager will approve or reject the Contractor's General Scaling Plan submittal within 15 calendar days after receipt of a complete submission. Do not begin scaling work until the submittal requirements are satisfied and found acceptable to the Project Manager. Deviations from the approved submittals must be re-submitted for approval. No adjustment in contract time will be allowed due to incomplete submittals.

C. Materials. Vacant.

D. Construction Requirements.

1) Do not begin scaling until all provisions of the approved General Scaling Plan have been implemented.

2) Conduct scaling on all slopes as directed by the Project Manager in accordance with the approved General Scaling Plan.

3) Provide a working foreman to oversee the crew of scalers during all scaling work.

4) Do not perform scaling without the scaling foreman on-site.

5) Do not perform scaling activities under traffic unless MDT approved safety measures are in place.

6) If scaling activities have the potential for damaging the roadway and/or adjacent facilities, provide appropriate protective devices, in accordance with the approved General Scaling Plan prior to beginning scaling activities.

7) Perform scaling using standard hand scaling bars, portable hydraulic wedges, air pillows, light explosives, trim blasting, cracking agents, or other mechanical means. Other hand tools in addition to scaling bars may be used provided they have a demonstrated effectiveness to perform the required work. The use of power equipment, such as slushers, cranes with a drag scaling system, etc. must be approved by the Project Manager prior to use.

a) If cracking agents are used, provide a detailed plan, including type of cracking agent, MSDS sheets, manufacturer's technical data, hole spacing, loading sequence, and

SECTION I

Commented [MP1]: May also need the Temporary Rocklfall Barrier SP in conjunction with this for the specific project.

#### SPECIAL PROVISIONS

CONTRACT NO. Click here to enter text.

additional information for protecting traffic during the time period when the cracking agent is deployed, chemically active, and in use as a scaling method. b)

If explosives are used, the applicable requirements of Section 204 must be met.

Begin scaling activities a nominal 25 feet behind the slope crest, moving toward 8) the slope crest, and proceeding downward, removing all loose or detached blocks of rock, masses of soil, and other debris or hazards as the work progresses. When blasting is required, the explosive force must be sufficient to dislodge the hazard, but not damage the adjacent slope. If drilling blast holes is required as part of the removal process, drill the holes parallel to the slope face.

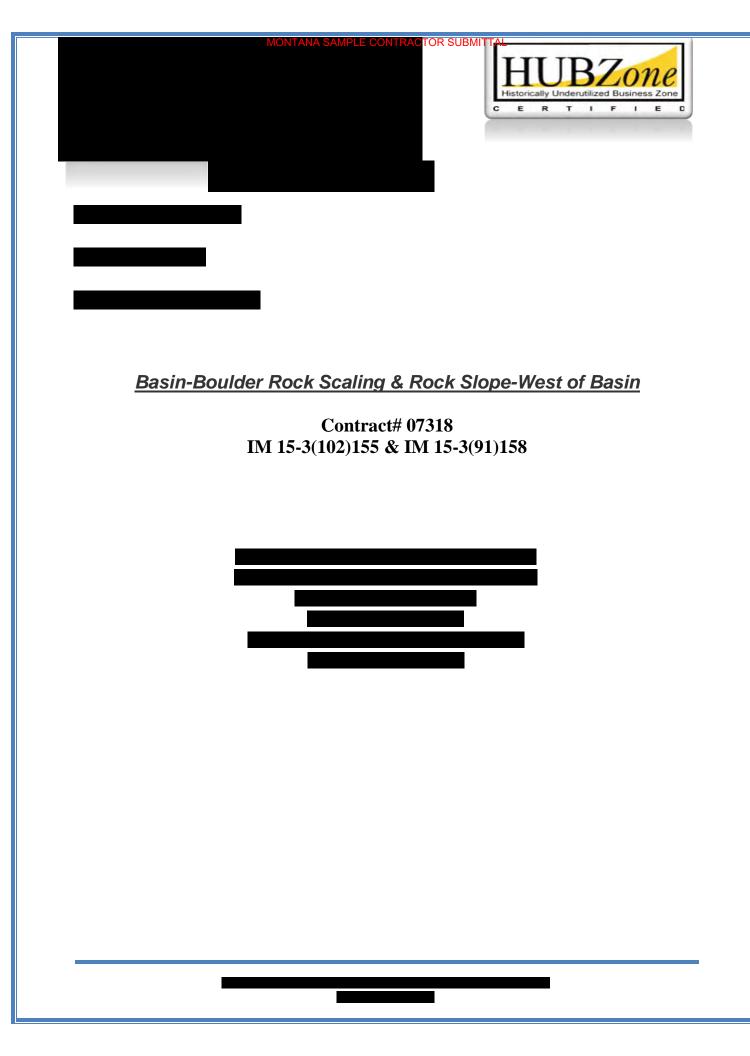
Upon completion of the first scaling pass, the resultant new face will be inspected 9) by the Project Manager to determine if scaling has been completed. If other hazards are identified that require removal, continue to scale the slope until the scaling has been completed to the satisfaction of the Project Manager.

10) Rockfall protection must be in place during non-working hours. Rockfall protection must be in accordance with the approved General Scaling Plan.

11) Remove all scaling debris produced during scaling operations from the site(s) and dispose of the material as directed by the Project Manager.

E. Method of Measurement. Scaling is measured by the man/crew hour. Measurement will occur from the time a scaler or scaling foreman is equipped and begins ascending the slope until the scaler or scaling foremen has descended the slope. Measurement is also made for the scaling foreman for time spent at the base of the slope when it is necessary for him to act as a spotter for a crew of at least two scalers working on the slope.

F. Basis of Payment. The unit price per man/crew hour for Scaling is full compensation for all labor, equipment, access, rigging, disposing of scaled debris, and materials necessary to perform the work. No separate measurement or payment will be made for repair to the roadway and associated structures damaged during the scaling operation, or scaling debris cleanup.



After scaling is complete of both sites 1 and 2. Will proceed to mesh repair site and scaling of West of Basin project location.

## Work Schedule:

August 1-5, 2018: Mob to West of Basin. Set up Road protection per Montana Dot specs.

**<u>August 8</u>**: establish tie off points on existing mesh. Open up mesh panel seam in area 1 & 2 and pry rocks out of damaged mesh area. Cut damaged mesh from slope in the minimum mesh replacement area.

<u>August 9-10:</u> Install wire mesh panels to manufacture and state specifications. Wire mesh panels will be hung with crane and connected with shackles per plan. All seeming of Mesh and over laps will meet special provision. Complete Mesh repair and scaling.

August 12-15: Demob MRB's and RCN's

## West of Basin Slope Scaling Work Plan:

- Number of crew members to be employed on Project (5).
- Scaler personnel and qualifications (See attachment).
- Scaling
- All scalers will have a minimum of 1000 scaling hour.
- All Foreman will have a minimum of 1500 scaling hour.

## Scaling and rope access equipment list:

- 13-ton air bag, 22-ton, 30-ton, 50-ton airbags, portable wedges.
- Air compressor for air bags, Chainsaws, digging tools, Radios.
- Antzi and OSHA approved rope access gear, rope rescue bag, forest service approved fire box with fire equipment; digging tools, fire extinguisher.
- Boulder buster, Hand drill.

## Rope Rescue Kit Includes:

- PMI 7/16in Extreme Pro Rope with Uni-core Technology Includes sewn eye on one end.
- GME Supply Orange Rescue Rope Bag
- Pac-Kit Titanium Bonded Shears
- PMI Easy Pick Off Strap The PMI Easy Pick Off Strap was designed to be weigh less and take up less room too.
- (4) West Fall Pro 7400 4-7/8"x3" Steel Carabiners
- Blue Water 3' Rhino Anchor Loop Sling The straps are available in a wide variety
  of lengths to accommodate different size structures. The straps are durable,
  lightweight, portable and easy to use.
- The anchor strap can be used in a number of configurations providing a safe and secure attachment point.
- Rock Exotic Aztek Compact System
- (1) West Fall Pro 7410 Carabiner
- West Fall Pro Chest Ascender
- West Fall Pro D4 Work Rescue Descender The D4 has a 240kg (500lbs) Working load limit which means it is suitable for two-man rescue, without the need for the creation of extra friction.
- The handle mechanism is designed to rotate through 360° making its use easier and simpler.
- DBI Sala No Worries Descender Double stop descender for 7/16" rope (8700387)
- Petzl I'D Small self-braking rope descender.
- 300' x 7/16" Kernmantle Rope with Sewn Eye.

## Scaling Plan & Sequence:

- 2 scaling crews will work 5-days a week for 10-hour days.
- Prepared and experienced for extreme conditions. These conditions include weather, access, slope size and difficult nature of scaling project.
- Safety of the scalers and all workers will be number one priority.
- The time frame in which the project has to be complete may cause exhaustion and risk of injury. will monitor this very closely.
- The size of the slope verses the number of working days that is allotted for project, can create hazardous condition for the scalers.
- The 11.5mm climbing ropes will tied to large fir trees on top of slope. Tree
  protectors will be used on trees to prevent damage to the bark of the tree, cable and
  grade 60-75 deformed bar anchors will be drilled and grouted scalers necessary.
- Where trees are not available grouted cable anchors and ¾ inch x 12-in red heads will be used for anchoring and load sharing. Scalers will use load sharing techniques to achieve tie off points to multiple anchors.
- Each tie off point will have a minimum of 5,000lbs pull strength.
- Scalers will have radio contact with ground crew and hill crew at all times.
- After access and Temporary protection is established for the slope and sufficient anchors are established scalers will begin scaling.
- The scalers will hike up each morning this should take approximately 30 minutes.
- Scalers will work their way down from top of slope spread out in approximately 15 feet away.
- Scalers will work from area 1 down to area 2.
- Airbags and boulder buster will be used to remove large rocks from slope if necessary.
- Each scaler should be able to cover a 15-foot swath of slope from top to bottom.
- will have one (1) MRB set up at site West of Basin.
- two (2) RCN's will be set up for west of basin scaling.

• Lower bench clearing will be done with all MRB's and RCN's in place per plan.

## **Temporary Rockfall Protection Plan:**

- Temporary Road protection (MRB, RCN) will me special provision Requirements).
- 1 Movable Rockfall Barriers and 2 RCN (see attached preliminary drawings for barriers).
- Contractor will supply all materials, equipment, and labor necessary to construct each MRB and RCN in accordance with the special provisions and as detailed in the Plans.
- Prior to beginning each work shift, contractor will inspect each MRB and RCN for damage.
- Contractor will maintain and repair each MRB and RCN as needed.
- Shellinger, will remove scaled debris from the fallout area behind the MRB and RCNs at the end of each work shift or whenever the depth of accumulated debris exceeds 4-feet.
- Movable Rockfall Barriers will be in place before any scaling starts. RCN will be lifted when scalers are working from 100 feet in elevation and lower.
- All Rockfall Protection Systems will be monitored daily and repaired as needed.
- Scalers will work within the limits of temporary rockfall containment areas.
- If any rocks or debris end up missing MRB's, RCN's during scaling activities the scaling will stop operations and adjust the system.
- Do not perform slope scaling or other work requiring on-slope work without temporary rockfall protection in place.
- Contractor will provide a minimum of two (1) MRBs and two (2) RCNs for all scaling work.
- For on-slope work other than scaling, contractor will install a minimum of one (1)
   MRB below all active on-slope work areas during activities that have the potential to dislodge rock or other material from the slope.

 When contractor is performing all on-slope work that could potentially produce hazardous rockfall during active traffic, restrict the active on-slope work area to the nominal 100-foot width provided by the RCNs, as shown in the plans.

## **CONSTRUCTION FALL PROTECTION PROGRAM:**

- Statement of Policy. The hazards of potential falls at heights of 4 feet and above will be addressed in this document. This instruction describes a systematic approach that must be used to protect and prevent people from falling. This instruction also lists some of the most common fall hazards and provides recommendations and guidelines for selecting fall arrest systems and identifies general practices of slope work.
- Training. A training program will be provided for all employees who will be exposed to fall hazards in the work area and will be conducted by competent personnel. The program will include but will not be limited to: a. A description of fall hazards in the work area b. Procedures for using fall prevention and protection systems c. Equipment limitations d. The elements encompassed in total fall distance e. Prevention, control and fall arrest systems f. Inspection and storage procedures.
- Initial training. Training will be conducted prior to job assignment. This employer will
  provide training to ensure that the purpose, function, and proper use of fall protection
  is understood by employees and that the knowledge and skills required for the safe
  application, and usage is acquired by employees. This standard practice instruction
  will be provided to and read by all employees receiving training. The training will
  include, as a minimum the following:
- Types of fall protection equipment appropriate for use.
- Recognition of applicable fall hazards associated with the work to be completed and the locations of such.
- Load determination and balancing requirements.
- Procedures for removal of protection devices from service for repair or replacement.
- All other employees whose work operations are or may be in an area where fall
  protection devices may be utilized, will be instructed to an awareness level concerning
  hazards associated with fall protection operations and big wall drilling and scaling
  hazard.
- Fall protection equipment identification. Fall protection equipment having identification numbers will be checked for legibility. Fall protection equipment having illegible identification markings will be turned in to the supervisor for inspection.
- Equipment maintenance and inspection requirements will be done daily.
- Equipment strengths and limitations.
- Retraining will be provided for all authorized and affected employees whenever (and prior to) a change in their job assignments, a change in the type of fall protection

equipment used, or when a known hazard is added to the work environment which affects the fall protection program.

- Additional retraining will also be conducted whenever a periodic inspection reveals, or whenever this employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of fall protection equipment or procedures.
- Whenever a fall protection procedure fails.
- The retraining will reestablish employee proficiency and introduce new or revised methods and procedures, as necessary.
- Fall Hazard Control Procedures (Fall Prevention).
- Control Procedures Development. Once a rockface or slope evaluation has taken place, procedures will be developed, documented, and utilized for the control of potential fall hazards.
- Physical observations of the work environment(s) that involve fall hazards or the potential of such.
- Observations of individuals and their job tasks and work habits that expose them to existing or potential fall hazards.
- The procedures contained in the company fall protection program. Specific procedural steps for the use and operation of body harness systems, and other fall protection systems. Specific procedural steps for the placement, erection, inspection, maintenance, disassembly and transfer of fall protection systems or devices and the person(s) responsible for them
- Specific requirements for testing fall protection systems or equipment to determine and verify the effectiveness of the fall protection control measures. The correct procedures to rescue employees who have fallen.
- The role of each employee in fall protection plans and applicable policies.
- Protective Materials and Hardware. Appropriate fall protection devices will be
  provided for potential fall hazards. Selection of the equipment will be based on the fall
  protection evaluation. Evaluations will be conducted by "Construction Safety
  manager". At some point it may be necessary for men to hang from the rock wall due
  to equipment reach restrictions.
- This procedure will be the following: Drill and set ¾" anchor bolts to desired depth according to manufacturer's specifications. Install ¾" washer and nut to set anchor bolt tight against rock wall. Install ¾" (equally rated) threaded eyelet on exposed threads followed by a locking ¾" nut.
- Cable anchors or grade 75 inch all thread bar grouted in with high strength grout.
- Fall Protection devices will be singularly identified; will be the only devices(s) used for controlling falls; will not be used for other purposes; and will meet the following requirements:
- Capable of withstanding the environment to which they are exposed for the maximum period that exposure is expected.

- All anchors will be capable of withstanding the ultimate load of 5,000 lbs. for the maximum period that exposure is expected.
- Standardization within company facilities. Fall protection devices will be standardized whenever possible.
- Full Body Harness Systems. A full body harness system consists of a full body harness and 5-point fall resist for rappelling, lanyard, energy shock absorber, and self-locking snap hook, ANTZI and OSHA approved gear for ascending and descending. All gear and full-body harness system to be inspected before use by the supervisor and/or the user.

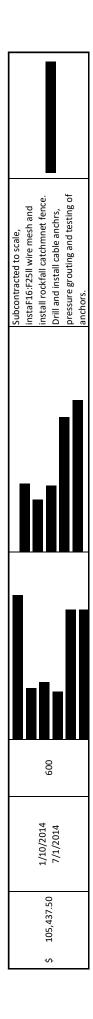
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Last	First		OSHA 10	OSHA 30	Sprat 1	Sprat 2	Sprat 3 C	CPR/First Aid	<b>Rescue Training</b>	boom ex forklift Man Lift Cert	Man Lift Cert	Rigging & Slinging
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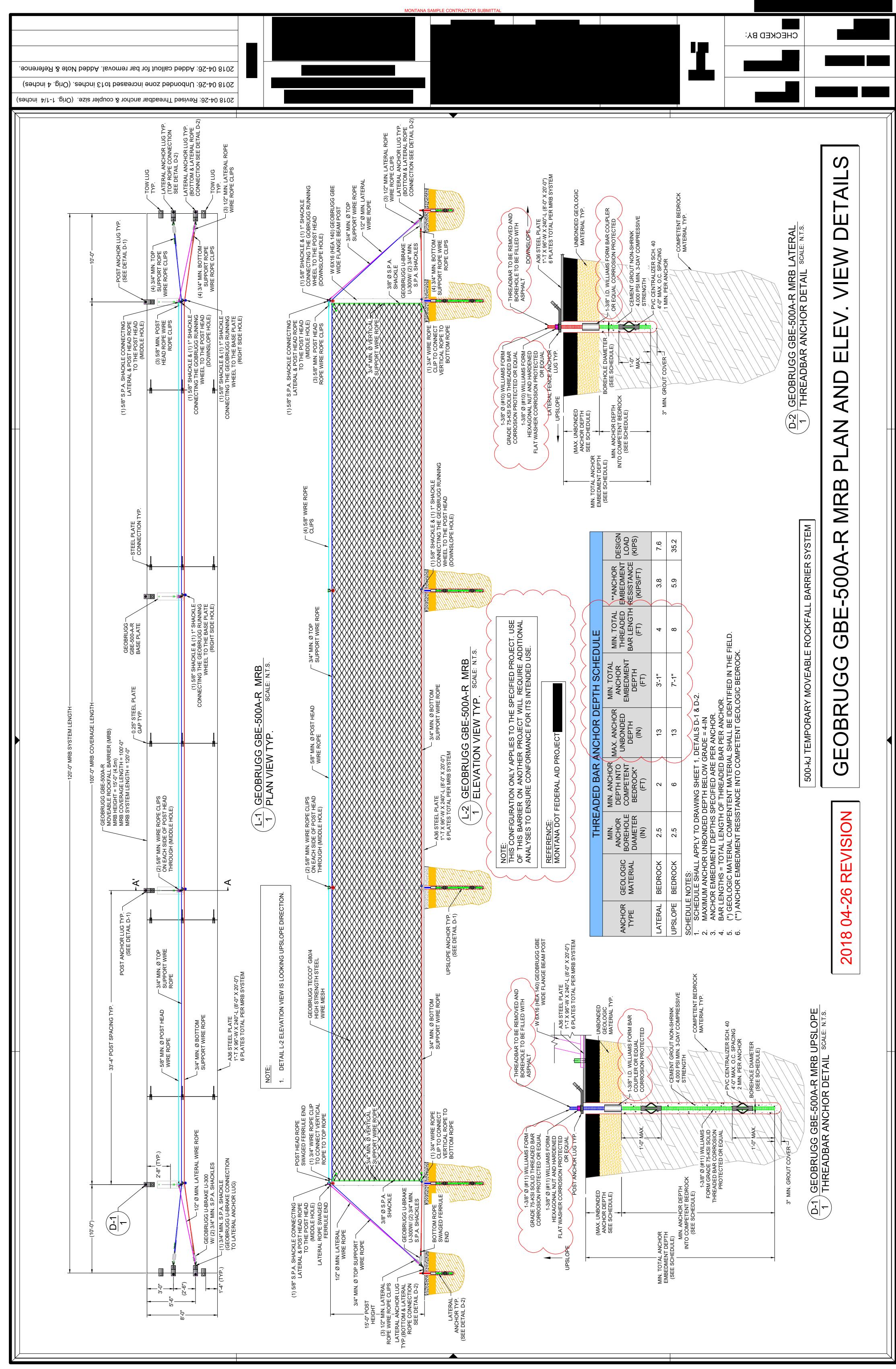
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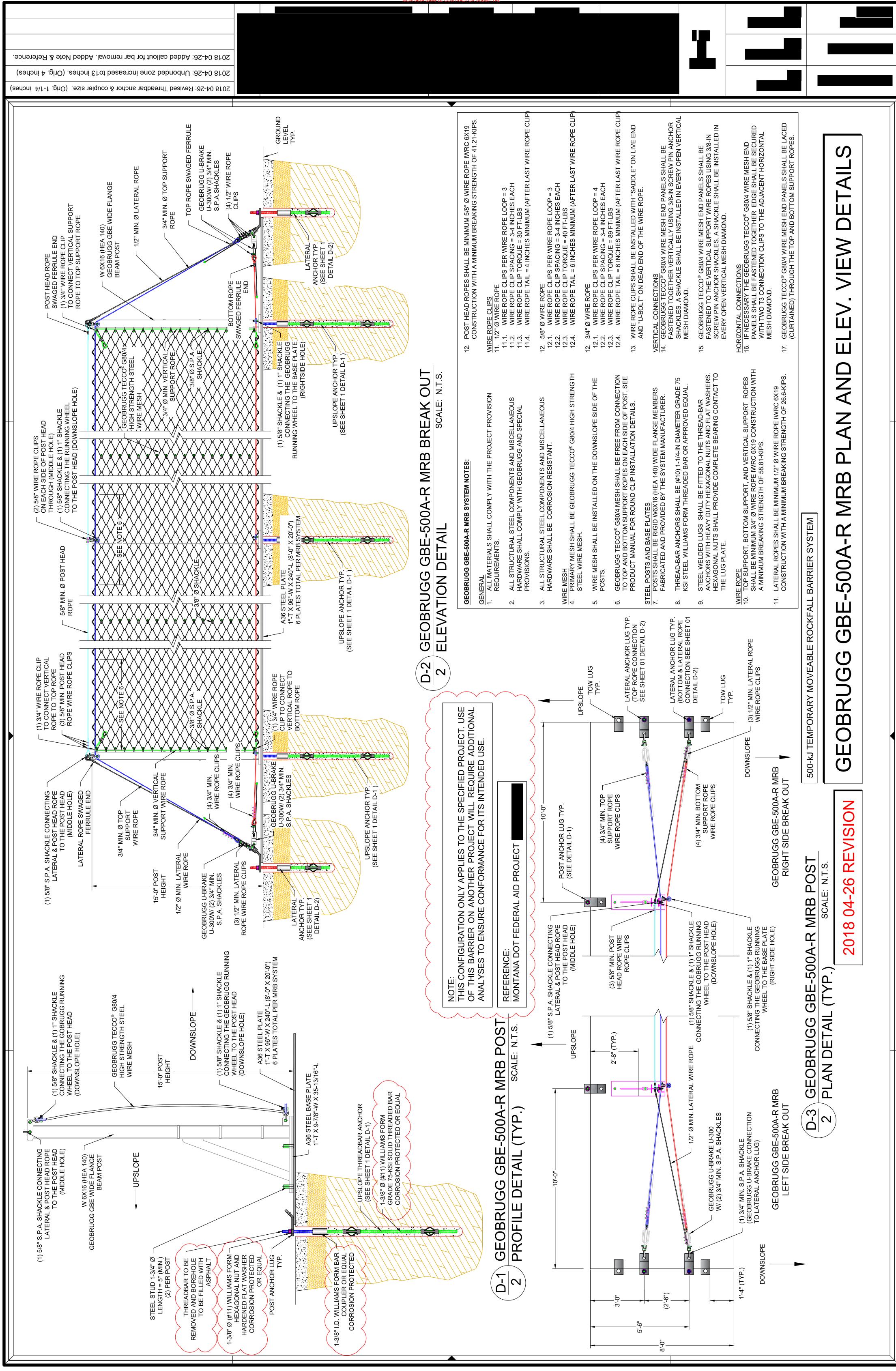
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	Supervisor/scalers on Job								
	Description of Job	Scaling, clearing, and rockfall barrior fence.	Subcontracted to scale and stabilize 1200ft slope.	pinned spider wire , high angle rock bolts and dust control. 1200 Inft 30 kip rock soil nails and spike plates.	High angle rock bolts,Scaling and clearing. 400 LNFT rock dowels.	high angle rock bolts wagon drill, repair and install wire mesh, attenuator fence installation. pointed rock bolts 30 #10 (35 foot bolts). 2000 Inft total bolts.	Scaling, clearing, and rockfall barrior fence. high angle rock bolts, pinned drapery. (1800 Inft of rock dowels).	Rockfall mitigation and slope stabilization	high angle rock bolts wagon drill. 280 Inft Rock dowels.
COMPLETED ROCKFALL PROJECTS	Contracting Agency and Point of Contact								
COMPL	Title / Contract No. Contract Lead								
	scaling hours.	80 each	450 each		32 each	360	80	80	
	Dates Start & Completed	12/09/17 01/18/18	9/15/2017 11/24/2017	07/14/17 8/18/17	06/16/17 06/30/17	6/5/2017- may 31- 2018	5/12/17 7/07/17	03/31/17 05/26/17	03/10/17 04/14/17
	Contract Amount \$	\$ 96,255.33	\$ 537,386.00	\$ 270,076.00	\$     48,025.00	\$ 1,051,056.00	\$ 358,823.00	\$ 217,138.00	\$ 43,583.00

Scaling, clearing, and rockfall barrior fence.	Scaling and clearing.	Tree cutting and scaling.	Scale and repair wire mesh as needed, replace cable anchors as needed.	Install wire screen, tecco, drapery cable systems, rock bolt systems and scaling.	Subcontracted to scale and install wire mesh, installed cable anchors.	Scaling and rockfall barrior fence.	Scaling, clearing, wire mesh.	Subcontracted to scale and install wire mesh, installed cable anchors. Rockfall bariers.	Contracted to scale.
210	450	131	500	240	265	200		150	80
10/23/2016	6/5/2016 8/21/2016	8/7/2016 8/20/2016	5/1/2016 5/1/2017	9/3/2016	4/1/2016			6/29/2015 11/15/2015	10/19/2015 10/31/2015
\$ 265,275.00	\$ 161,940.00	\$ 113,302.58	TBD	\$ 148,956.25	\$ 314,063.75	\$ 287,509.83	\$ 60,050.00	\$ 1,120,000.00	\$ 66,190.00

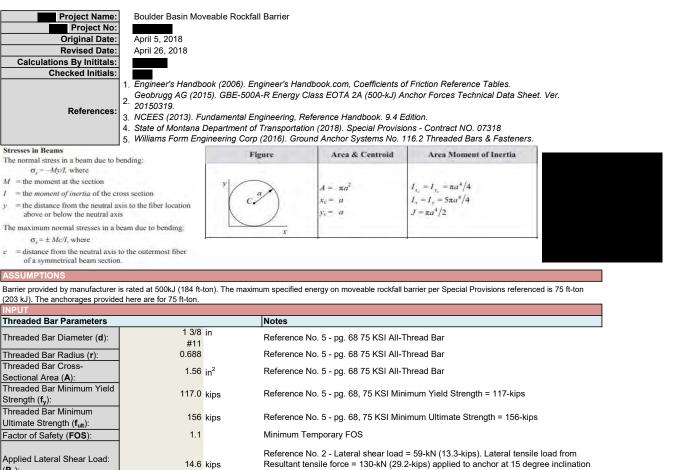
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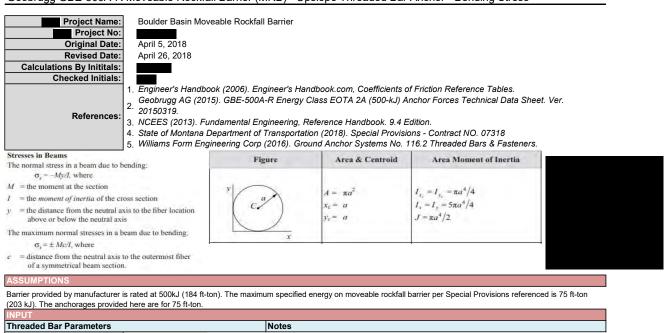
#### Geobrugg GBE-500A-R Moveable Rockfall Barrier (MRB) - Lateral Threaded Bar Anchor - Bending Stress



Applied Lateral Shear Load: ( <b>P</b> <sub>a</sub> ):	14.6	kips	Resultant tensile force = 130-kN (29.2-kips) applied to anchor at 15 degree inclination from horizontal. Tensile Force loading kept at 500-kJ Loads (Conservative).
Resisting Load: (P <sub>r</sub> ):	36.0	kips	Reference No. 2 - Axial compressive force perp. to base plate = 144-kN (32.4-kips)
Horizontal Base Frictional Coefficient (µs):	0.36		Reference No. 1 - Steel Material on Asphalt (Lubricated). Approximate conservative value
Distance Between Applied Load and Moment Origin (L):	13.0	in	Possible unbonded anchor threaded bar length above bedrock for couple connection

OUTPUT		
Threaded Bar Normal Stresses		Notes
Threaded Bar Minimum Yield	75 ksi	$(\sigma_v) = f_v / A$ Reference No. 5 - pg. 68 75 KSI All-Thread Bar
Stress ( <b>σ</b> <sub>y</sub> ):	75 KSI	$(0_y) = 1_y / X$ Reference No. 5 - pg. 06 75 KSI Ali- Tilead Bai
Threaded Bar Minimum	100 ksi	(σ <sub>uft</sub> ) = f <sub>uft</sub> / A Reference No. 5 - pg. 68 75 KSI All-Thread Bar
Ultimate Stress ( <b>σ<sub>ult</sub>):</b>	TOO KSI	(oult) = Tult / A Reference No. 5 - pg. 00 / 5 KSI All- Illieau Bai
Threaded Bar Allowable	90.9 ksi	$(\sigma_{\text{allow}}) = \sigma_{\text{ult}} / \text{FOS}$
Normal Stress ( <b>σ<sub>allow</sub>):</b>	00.0 831	
Design Loading		Notes
Frictional Resisting Force (F <sub>f</sub> ):	13.0 kips	$(F_f) = \mu_s * P_r$ Reference No. 3 - pg. 64
Design Applied Loading: ( <b>P</b> <sub>d</sub> ):	1.6 kips	$(P_{d}) = P_{a} - F_{f}$
Threaded Bar Applied Stress		Notes
Applied Moment at Section ( <b>M</b> ):	21 kip-in	M = P <sub>d</sub> x L Reference No. 3 - pg. 63
Distance From N.A. to O.D. Fiber of Threaded Bar Section ( <b>c</b> ):	0.688 in	c = r Reference No. 3 - pg. 78
Cross-Sectional Moment of Inertia (I):	0.18 in <sup>4</sup>	$I_x = (1/4)^*(\pi)^*(r^4)$ Reference No. 3 - pg. 66
Applied Normal Stress (σ <sub>applied</sub> ):	84 ksi	$(\sigma_{applied}) = (M^*c) / I_x$ Reference No. 3 - pg. 78
Threaded Bar Bending Stress Ve	rification	Notes
$\sigma_{\text{applied}} < \sigma_{\text{allow}}$	PASS	Applied normal stress < allowable normal stress





Throadoa Bar T aramotoro			Notes
Threaded Bar Diameter (d):	1 3/8 #11	in	Reference No. 5 - pg. 68 75 KSI All-Thread Bar
Threaded Bar Radius (r):	0.688		Reference No. 5 - pg. 68 75 KSI All-Thread Bar
Threaded Bar Cross- Sectional Area ( <b>A</b> ):	1.56	in <sup>2</sup>	Reference No. 5 - pg. 68 75 KSI All-Thread Bar
Threaded Bar Minimum Yield Strength ( <b>f</b> <sub>y</sub> ):	117.0	kips	Reference No. 5 - pg. 68, 75 KSI Minimum Yield Strength = 117-kips
Threaded Bar Minimum Ultimate Strength ( <b>f<sub>ult</sub>)</b> :	156	kips	Reference No. 5 - pg. 68, 75 KSI Minimum Ultimate Strength = 156-kips
Factor of Safety (FOS):	1.1		Minimum Temporary FOS
Applied Lateral Shear Load: ( <b>P</b> <sub>a</sub> ):	14.6	kips	Reference No. 1 - Lateral shear load = 59-kN (13.3-kips). Lateral tensile load from Resultant tensile force = 130-kN (29.2-kips) applied to anchor at 15 degree inclination from horizontal. Tensile Force loading kept at 500-kJ Loads (Conservative).
Resisting Load: ( <b>P</b> <sub>r</sub> ):	36.0	kips	Reference No. 2 - Axial compressive force perp. to base plate = 144-kN (32.4-kips)
Horizontal Base Frictional Coefficient (µs):	0.36		Reference No. 1 - Steel Material on Asphalt (Lubricated). Approximate conservative value
Distance Between Applied Load and Moment Origin (L):	13.0	in	Possible unbonded anchor threaded bar length above bedrock for couple connection

OUTPUT		
Threaded Bar Normal Stress	es	Notes
Threaded Bar Minimum Yield Strees ( $\sigma$ ):	75 ksi	(σ <sub>y</sub> ) = f <sub>y</sub> / A Reference No. 5 - pg. 68 75 KSI All-Thread Bar
Stress ( <b>σ</b> <sub>y</sub> ): Threaded Bar Minimum	100 ksi	(out) = fut / A Reference No. 5 - pg. 68 75 KSI All-Thread Bar
Ultimate Stress ( <b>σ</b> <sub>ult</sub> ): Threaded Bar Allowable	90.9 ksi	$(\sigma_{\text{allow}}) = \sigma_{\text{ull}} / FOS$
Normal Stress ( <b>σ</b> <sub>allow</sub> ):		
Design Loading		Notes
Frictional Resisting Force ( <b>F</b> <sub>f</sub> ):	13.0 kips	$(F_f) = \mu_s * P_r$ Reference No. 3 - pg. 64
Design Applied Loading: ( <b>P</b> <sub>d</sub> ):	1.6 kips	$(P_d) = P_a - F_f$
Threaded Bar Applied Stress		Notes
Applied Moment at Section (M):	21 kip-in	M = P <sub>d</sub> x L Reference No. 3 - pg. 63
Distance From N.A. to O.D. Fiber of Threaded Bar Section ( <b>c</b> ):	0.688 in	c = r Reference No. 3 - pg. 78
Cross-Sectional Moment of Inertia (I):	0.18 in <sup>4</sup>	$I_x = (1/4)^*(\pi)^*(r^4)$ Reference No. 3 - pg. 66
Applied Normal Stress ( <b>σ</b> <sub>applied</sub> ):	84 ksi	$(\sigma_{applied}) = (M^*c) / I_x$ Reference No. 3 - pg. 78
Threaded Bar Bending Stress	s Verification	Notes
$\sigma_{applied} < \sigma_{allow}$	PASS	Applied normal stress < allowable normal stress

#### Project No: Project Name: Original Date: Calculations by: Checked Initials: References:

Boulder Basin Moveable Rockfall Barrier May 18, 2018



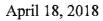
Information provided by

INPUT		Notes
Materials		
Steel Plate		
Thickness	1 in	
Length	20 ft	
Width	8 ft	
Unit Weight of Steel	490 lbs/ft^3	
Number of Plates	6	
Column		
Туре	HEA 140	
Weight per foot	16.0 lbs/ft	
Net		
Weight	1.0 lbs/ft^2	
Geometry		
Barrier Height	15 ft	
Distance of Post from Toe	5 ft	3-ft from slope edge of plate
Distance of Added Force from Toe	6 ft	Concrete block centroid
Subgrade		
Geomaterial Friction Angle	36 deg	Assumed
Static Friction Coefficient	0.727	
Dynamic Friction Coefficient	0.484	
Applied Loads		
Concrete Blocks	_	
Number of Blocks	4	
Block Weight	5,000.00 lbs/plate	
Total Weight	20,000.00 lbs/plate	
Number of Plates	6	
Additional Hold-down force	3,333 lbs/plate	Concrete weight
MEL Moment at Base for GBE-500	213,890 ft-lbs	
Applied Energy	84 ft-tons	250 KJ

OUTPUT		
Weight of Plates	39,200 lbs	
Weight of Mesh	300 lbs	
Total Weight of System	43,073 lbs	
Applied Force	7,130 lbs	
Static Sliding Force	31,295 lbs	
Dynamic Sliding Force	20,863 lbs	
Overturning Moment	106,945 lb-ft	
Resisting Moment	178,540 lb-ft	

SF Against Overturning 1.7
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RE:			

In accordance with the Scaling Special Provision, section B. 2; **Sector Scale Scale** is required to submit a "Removal and Disposal Plan" for rock and debris generated from scaling and bench cleaning operations. The Removal and Disposal Plan is as follows;

- **an adequate quantity of rock**/ debris can be safely loaded and hauled off.
- Materials shall be loaded into trucks and hauled to the Basin Interchange. Other outside entities (such as the county) have expressed interest in small quantities as well, but nothing for certain at this point.

If you have any questions or concerns, please do not hesitate to give me a call.

Sincerely,





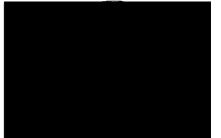
RE: Basin – Boulder & Rock Slope – W of Basin

In accordance with Special Provision No. 24, Section A.3; plans on using the following provisions to protect the roadway, traffic, and adjacent facilities, and existing utilities during the scaling operation.

A rock containment net, moveable rock fall barrier, and median concrete barriers will be used during the scaling operations in accordance with contract specifications and special provisions. In conjunction with these protective devices scalers will have radio contact with ground crew and hill crews at all times. Ground crew will have communication with traffic control, and the ability to hold traffic as needed during scaling operations. A loader will be onsite during the course of scaling operations that will be used as needed to assist with rock removal and barrier placement. Material will be left in place as needed to serve as additional protection in the form of either a berm or velocity dissipater for larger rocks removed during scaling operations. No above ground utilities have been observed, any subsurface utilities identified by locates prior to scaling operations will have additional cover left in place during scale to serve as additional protection. Should any damage occur to the median barrier during the scaling operations those facilities will be replaced with an MDT approved equivalent barrier. New guard rail adjacent to the scaling will be placed following scaling operations. The roadway will be milled and repaved following scaling operations.

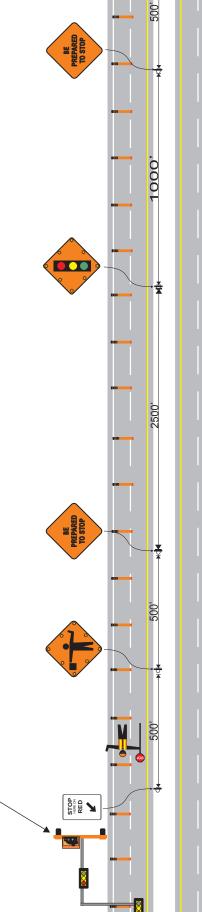
If you have any questions or concerns, please do not hesitate to give me a call.

### Sincerely,







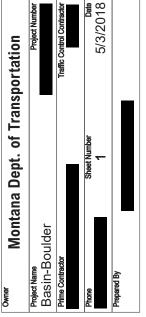


An informational walkback flagger will accompany the signal to inform motorists of the wait time.

Distances may be field adjusted based on ADT and average length of traffic backup during periods of stopage.

Signals will be placed in areas of single lane traffic only.

NOTES:



Date

AMPLE CONTRACTOR SUBMITTAL S

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#### NORTH CAROLINA

## **SLOPE SCALING**

## (SPECIAL)

### Description

Work under this item is for the complete removal of loose rock material by appropriate manual scaling at the direction of the Engineer. This work will take place once initial grading is complete and areas are determined to need specialized removal.

### **Construction Methods**

Use a work unit consisting of the following:

A two person man-lift, crane, ropes or other suitable equipment, capable of accessing existing rock faces up to those heights present on the project.

A work crew, consisting of at least a minimum of two scalers (2 man-hours per hour worked) completely conversant with scaling at heights, is required.

Tools and material needed for the efficient performance of the work.

Manual scaling is defined as all authorized work by the manual scaling crew including scaling, grubbing, sounding, trimming with hand-tools and hand-held machine tools, and air bags.

Undertake manual scaling from the top of the rock face down to ensure that at no time the scaling crew is working beneath loosened or undercut sections of the rock face.

At the start of each workday, the scaling crew is required to inspect the rock face to identify rock that requires immediate removal so as not to endanger the workers.

Prior to ending the day's operation, the scaling crew is required to inspect the rock face for approval by the Engineer.

### Measurement and Payment

*Slope Scaling* will be measured and paid for at the contract unit price per man hour. This work includes but is not limited to furnishing the labor, tools, equipment and materials, and performing the actual scaling work. Estimated contract quantity will be 40 man-hours.

Removal of scaled material to a suitable waste location will be considered incidental to the general excavation volume.

NC 28 Fontana

Graham County

Payment will be made under:

Pay Item

Slope Scaling

Pay Unit

Man-hour

## SCALING SLOPES

## 1.0 GENERAL

Scale the cut slopes for loose material at locations as directed by the Engineer. The site is a recent rockslide that requires hand scaling for immediate safety and long-term stability reasons. The site is 80-100' in height, 100' in width and is at approximate 0.75:1 average slope angle. Remove all loose spalls and rocks not firmly keyed into the rock slope and soil failures above the rock slope. Proceed from the top of slope downward to the roadway ditch or catchment area in the scaling operation. The scaling operation will require the slope to be traversed by laborers using hand tools to ensure that all potentially hazardous protrusions have been successfully removed to the satisfaction of the Engineer. Scaling efforts may include hand tools, airbags, pneumatic or hydraulic splitters, but not surface, trim or blasting of any type.

Since the scaling operation will entail considerable hazards due to falling rock and debris, the Contractor is advised adequately protect personnel and equipment. NCDOT will be responsible for protecting and repairing the roadway, median barrier and other structures damaged by falling rocks and debris.

## 2.0 MEASUREMENT

The quantity of rescaled slopes paid for will be the man-hours of slopes rescaled to the satisfaction of the Engineer.

## **3.0 BASIS OF PAYMENT**

The quantity of rescaling slopes, measured as provided for above, will be paid for at the contract unit price per hour for "Scaling Slopes". Such price and payment will be full compensation for all labor, tools, equipment, and all incidentals necessary to complete the work satisfactorily. This includes mobilization of equipment onto the site and slope for the scaling operation.

Payment will be made under:

Mobilization	. Lump Sum
Scaling Slopes	Ian Hours

OHIO

## STATE OF OHIO DEPARTMENT OF TRANSPORTATION

## SUPPLEMENTAL SPECIFICATION 862 ROCKFALL PROTECTION

### October 16, 2015

862.01 Description
862.02 Materials
862.03 Qualifications
862.04 Design Requirements
862.05 Submittals
862.06 Preconstruction Meeting
862.07 Construction
862.08 Method of Measurement
862.09 Basis of Payment

**862.01 Description**. This work consists of providing rockfall protection on an existing rock slope. The rockfall protection may consist of scaling, trim blasting, furnishing and installing a slope drape, or a combination of these.

Select the scaling methods, the trim blasting methods; and the slope drape and anchor installation methods to obtain the required results.

**862.02** Materials. Furnish materials conforming to:

Steel components, including anchors and clamps ......ASTM A36 Bolts, nuts, and washers......711.09

Furnish wire rope, cable net if required, and support ropes that are galvanized in conformance with Federal Specification RR-W-410F. For all other steel components that are not manufactured from zinc-coated wire, galvanize according to 711.02.

Furnish materials that are labeled by the manufacturer so that they can be identified on the manufacturer's working drawings.

A. Wire Mesh. Furnish a double-twist,  $8 \times 10$  hexagonal type wire mesh that is manufactured from either zinc-coated steel wire conforming to ASTM A641, Class 3 coating, soft temper, or from Zn-5Al-MM-coated steel wire conforming to ASTM A856, Class 3 coating, soft temper. Mesh openings for  $8 \times 10$  type are nominally 3.25 in  $\times 4.5$  in (83 mm  $\times 114$  mm). Use a wire with a minimum nominal diameter of 0.120 inch (US Steel Wire Gage No. 11, 3.05 mm) and a minimum tensile strength of 60,000 pounds per square inch (414 MPa), as tested according to ASTM A370, to manufacture the mesh. Include the zinc when calculating the tensile area. Furnish locking clips, lacing wire, and fasteners (hog rings) conforming to the above requirements except the minimum nominal diameter is 0.148 inch (US Steel Wire Gage No. 9, 3.80 mm).

#### OHIO

**B.** Cable Net. Furnish cable net consisting of individual square cable net panels joined along their edges. Furnish cable net panels composed of woven wire ropes with a maximum opening size of 12 in  $\times$  12 in (305 mm  $\times$  305 mm). Securely fasten wire ropes where they cross using a clip strong enough to resist slipping or breaking when subject to the loads generated by the design conditions.

Use a galvanized wire rope with a minimum diameter of 5/16 inch (7.9 mm) and a minimum breaking strength of 9,000 pounds (40 kN) to manufacture the cable net. Use the same wire rope to lace the cable net panels together.

**C.** Tecco Rockfall Drape. In place of wire mesh with cable net, the Contractor may furnish and install Tecco Rockfall Drape from Geobrugg as an alternative (Geobrugg North America, LLC, 551 W. Cordova Road, PMB 730, Santa Fe, NM, 87505). Furnish Tecco Rockfall Drape manufactured with 0.157 inch (4 mm) diameter wire.

**D.** Top Horizontal Support Wire Rope. The top of the slope drape is secured to a top horizontal support wire rope. For the wire rope used to support wire mesh, furnish a galvanized wire rope with a minimum diameter of 0.5 inch (12.7 mm), and a minimum breaking strength of 25,000 pounds (111 kN). For the wire rope used to support cable net, furnish a galvanized wire rope with a minimum diameter of 0.75 inch (19 mm), and a minimum breaking strength of 50,000 pounds(222 kN). Furnish additional wire rope meeting these requirements to use as tag lines to connect the perimeter rope to the anchors.

**E. Anchors**. Furnish either steel bolt or wire rope anchor types. For steel bolt anchors, furnish a 1 inch (25 mm) diameter, galvanized, continuously threaded or deformed steel bar conforming to ASTM A615, Grade 75, with a minimum ultimate strength of 79,000 lbs (351.4 kN). For wire rope anchors, furnish a galvanized 0.75 inch (19 mm) wire rope with a minimum breaking strength of 50,000 pounds (222 kN). Furnish centralizers fabricated from Schedule 40 PVC plastic pipe or tube, steel or other material not detrimental to the anchor. Do not use wood.

For soil anchors, furnish concrete conforming to Item 499 Class QC Misc or QC 1, or grout conforming to the requirements for rock anchors.

For rock anchors furnish grout consisting of a neat cement or sand/cement mixture. Furnish Type I, Type II, Type III, or Type IV cement conforming to ASTM C150 for the grout. Expansive admixtures may be used. Admixtures which control bleed or retard set may be used if approved by the Engineer. Furnish grout with a minimum 3-day compressive strength of 1500 psi (10.5 MPa) and a minimum 28-day compressive strength of 3000 psi (21 MPa) per AASHTO T106/ASTM C109.

If using a steel bolt anchor, furnish a 0.375 inch (9.5 mm) thick, galvanized, 6-inch square or round mild steel bearing plate. The plate must have a rounded edge on the side in contact with mesh wire and/or anchor cable. Furnish a galvanized flat washer and hex nut torqued to 100 ft-lbs.

Furnish wire rope clips compatible with the cable sizes shown in the plans, with drop forged carbon steel bases and heavy-duty hexagonal type nuts. Use thimbles and wire rope clips in accordance with the manufacturer's recommendations for size, number, spacing and torque.

**862.03 Qualifications**. Before beginning work, submit a list of proposed personnel and documentation verifying that they meet the qualification requirements listed below. Include a list of employer's names and telephone numbers, location and dates of previous slope drape projects, and the extent of work performed. This information must be verifiable. Slope drape work is defined as all activities related to the slope drape installation, including furnishing, fabricating, drilling, installing, and testing. Allow 14 days for the review of the documentation. Obtain approval of all personnel before beginning construction.

**A.** Slope Drape Site Supervisor. The Slope Drape Site Supervisor must be present at the job site at all times during the performance of slope drape work. Employ a Slope Drape Site Supervisor with at least two years of construction experience in the installation of slope drapes and who has supervised the successful installation of at least ten slope drapes.

B. Drill Operators. Employ Drill Operators who have successfully installed at least 50 anchors.

**C.** Scaling Foreman and Scaling Crew. Provide a scaling crew with one Scaling Foreman – present at all times when scaling is performed. A Scaling Crew consists of three qualified scalers, – one of which may also be the Scaling Foreman. Employ a Scaling Foreman and Scaling Crew – who have at least two years of demonstrated experience in rock scaling in similar capacities.

**D.** Mechanical Scaling Operator. Provide one or more persons to operate the mechanical scaling equipment selected. Employ operators who have successfully operated the selected equipment for at least one year.

**862.04 Design Requirements**. Design the slope drape system to control falling rocks of the sizes specified in the plans. Also design the slope drape system to prevent rocks with a minimum dimension specified in the plans from passing through. Design the slope drape to resist the applied loads without causing distress or damage to the connecting elements. Include calculations that demonstrate these requirements in the Slope Drape Installation Plan.

Use a slope drape design that has demonstrated satisfactory performance under similar conditions. Provide evidence of the satisfactory performance to the Engineer upon request.

Use standard components to the greatest extent practical and minimize custom components in the slope drape design. Design the slope drape to require minimal maintenance when subjected to the design conditions. Design a slope drape that is resistant to corrosion, UV degradation, and thermal deterioration. Design a slope drape that can be pulled outward at the bottom for rock removal.

## 862.05 Submittals.

**A.** Scaling Work Plan. Submit a written work plan for the rock slope scaling to the Engineer for acceptance at least ten days before beginning work. Submit five copies. Include the following information:

- 1. Proposed construction sequence and schedule.
- 2. Type and quantity of equipment.
- 3. Number of scaling crews required for the project.
- 4. Methods of mechanical scaling (if any).

- 5. Removal and disposal plan for materials generated from the scaling, trim blasting, and slope crest preparation.
- 6. Contractor's protection plan to protect personnel, facilities, and other structures from injury or damage caused by scaling activities.

**B.** Slope Drape Installation Plan. Submit a written installation plan for the slope drape to the Engineer for acceptance at least ten days before beginning work. Submit five copies and a CD-ROM with the design in electronic format. Include the following information:

- 1. Complete working drawings and engineering calculations, prepared, signed, sealed and dated by a Registered Engineer.
- 2. Proposed construction sequence and schedule.
- 3. One sample of the proposed type of slope drape fabric (mesh types), ground anchor, and hardware (bearing nuts and plates) from the normal stock of the supplier. With the samples, include certified mill reports indicating tensile yield point and elongation results of the ground anchors, and the tensile and punching tests of the cable net and wire mesh.
- 4. Proposed anchor type and spacing.
- 5. Proposed anchor drilling methods and equipment, including drill hole diameter and length proposed to achieve the required pullout resistance.
- 6. Proposed grout design, including the following:
  - a. Manufacturer's certified test results of set time, shelf life, and compressive strength.
  - b. Type of Portland cement.
  - c. Aggregate source and gradation.
  - d. Proportions of mix by weight and water-cement ratio.
  - e. Manufacturer, brand name and technical literature for proposed admixtures.
  - f. Results of compressive strength tests performed according to AASHTO T106/ASTM C109 and completed no more than one year before the start of grouting. Use an AASHTO accredited independent testing lab to verify the specified minimum 3 and 28-day grout compressive strengths.
- 7. Proposed anchor grout placement procedures and equipment.
- 8. Proposed anchor testing methods and equipment setup.
- 9. Identification number and certified calibration records for each test jack, pressure gauge and load cell to be used.
- 10. The manufacturer's recommended maintenance program for the slope drape.

Allow at least ten days for review. Do not begin work until the submittals have been accepted by the Engineer. Any changes or deviations from the accepted submittals must be resubmitted. The Engineer will not grant an extension of time because of incomplete submittals.

**862.06 Preconstruction Meeting**. Meet with the Engineer before beginning rockfall protection work to clarify construction requirements, coordinate schedules and activities, and identify the division of responsibilities between the Contractor and the subcontractors. Have the slope drape subcontractor and scaling subcontractor attend the meeting.

**862.07 Construction**. Safety of the work is the responsibility of the Contractor. Perform the work in a manner that minimizes the exposure of the public, construction personnel, and equipment to hazardous and potentially hazardous conditions.

Preserve vegetation on the slopes wherever possible. Remove or prune vegetation only where anchors are required, where the vegetation reduces the effectiveness of the slope drape, or when directed by the Engineer. Where necessary, cut stumps flush with the ground surface, but leave root systems in place. Do not disturb vegetation more than 50 feet (15 m) upslope of the proposed limits of the slope drape. Dispose of removed vegetation according to 201.02 and 105.17.

A. Scaling. Perform scaling of the slope face by removing potentially unstable boulders, rocks, and trees to reduce the rockfall hazard and minimize required maintenance after construction. Perform scaling at the direction of the Engineer. Scaling may consist of hand or mechanical methods; including, but not limited to, pry bars, air bladders, air wands, pneumatic or hydraulic jacks, air bags, pneumatic drills or jack hammers, slusher, excavator, or hoe ram. Begin scaling at the top of the slope and proceed downward. Either stabilize or scale all loose rock and other unstable materials larger than one cubic foot  $(0.03 \text{ m}^3)$  in volume to the satisfaction of the Engineer. Obtain approval from the Engineer before using power equipment to perform scaling.

Protect personnel, the public, adjacent properties, structures, utilities, and roadway from injury or damage caused by scaling activities. The Contractor's scaling work plan must be in place before beginning the scaling work. Any injuries or damages caused by scaling are the responsibility of the Contractor.

**B.** Trim Blasting. The Contractor may use trim blasting to remove large blocks or overhangs which are difficult to dislodge by hand or mechanical methods. Perform trim blasting according to all applicable Federal, State, and local laws and regulations; the provisions of 107.09; and the following requirements.

1. Drill blast holes 3.0 inches (75 mm) in diameter or less, and spaced 36 inches (900 mm) apart or less.

2. Use detonating cord as the primary explosive charge in all blast holes. The Contractor may also use small-diameter explosive cartridges only if they occupy 10 percent of the blast hole length or less.

3. Do not use a delay between blast holes.

4. Do not use more than 3 pounds (1.3 kg) of explosives per blast hole and not more than 200 pounds (90 kg) of explosives per blast.

5. Before firing any blast in areas where flying rock may result in personal injury or unacceptable damage to property, place blasting mats or wire mesh to prevent flyrock.

6. Follow all safety procedures described in 208.08.

The Contractor may use non-explosive materials, such as expanding foams, instead of explosives for trim blasting.

#### OHIO

**C. Anchors**. Design the anchor type, dimensions, and spacing to support the loads determined from the slope drape design. Do not exceed an anchor spacing of 25 feet (7.6 m) for a cable net slope drape or 50 feet (15.2 m) for a wire mesh slope drape. Determine the anchor length to meet the requirements of the pullout test. Do not use an anchor length less than 10 feet (3.05 m). Ground conditions may require anchors that are longer than the minimum length. Where the lengths of the anchors vary, the Engineer will permit the use of threaded couplers to extend the anchor tendon, or other methods recommended by the manufacturer.

Do not use water during drilling. Provide a uniform hole diameter for the entire length of the hole unless otherwise approved by the Engineer. The minimum hole diameter is shown on the plans. Drill holes within five degrees of the orientations and inclinations shown on the plans. Clean the hole before installing the anchor.

Place at least two centralizers on each anchor to position the tendon within 1 inch (25 mm) of the center of the hole. Place the centralizers within 2 feet (0.6 m) of the top and bottom of the hole. Securely attach the centralizers to the anchor tendon.

Test at least 25 percent of the anchors and at least one anchor of each type of anchor, soil, and rock. The Engineer will select the location of each test anchor. Perform each test in the presence of the Engineer. Each pullout test consists of incrementally loading the anchor assembly to the maximum test load or to failure, whichever occurs first. Failure is defined as when the movement of the anchor continues without an increase in the load or when the anchor has displaced 2 inches (50 mm). If more than 20 percent of the tested anchors fail, increase the number of tested anchors to 50 percent of the total. Replace all failed anchors and retest them at no additional cost to the Department.

Apply the test load by jacking against a temporary yoke or load frame. No part of the yoke or load frame may bear within 3 feet (0.9 m) of the anchor. Measure the applied test load using either a calibrated pressure gage with graduations no greater than 100 psi (0.7 MPa) or a calibrated load cell. Calibrate the pressure gage and the hydraulic jack as a unit and provide the certified calibration chart. Calibrate against a test machine whose calibration is traceable to the National Institute of Standards and Technology (NIST). Ensure the calibration is done to an accuracy of 2 percent and at least one year before shipment to the project. Measure movement of the anchor using dial gages that have an accuracy of 0.001 inch (0.03 mm). Measure movement relative to a fixed reference point that is at least 3 feet (0.9 m) from the anchor and yoke or load frame. Record all measurements, including the failure load if failure occurs.

Load	Hold Time
AL (0.05 ADL max.)	Until Stable
0.25 ADL	Until Stable
0.50 ADL	Until Stable
1.00 ADL	Until Stable
1.50 ADL	Until Stable

Load each anchor in the following sequence (ADL = allowable design load):

The alignment load (AL) is the minimum load required to align the testing equipment and should not exceed 5 percent of the ADL. Dial gages should be set to "zero" after the alignment load has been applied.

Unload the anchor after completion of the test.

**D.** Slope Drape. Install the slope drape according to the manufacturer's recommendations when they do not conflict with the plans or specifications.

Have a representative from the slope drape manufacturer on site for at least one day at the beginning of the slope drape installation work to train and provide guidance on the installation of the slope drape. Have the slope drape manufacturer inspect the installed drape and submit to the Department a statement declaring that the slope drape was installed according to the manufacturer's requirements and recommendations.

Connect the wire mesh and cable net together before placing the slope drape on the slope. Securely fasten the wire mesh to each cable net panel and to the lacing. Fasten the wire mesh and cable net so they are flush without any gaps that exceed 4 inches (100 mm). No discontinuities in the wire mesh are allowed. Attach the mesh every 12 inches (305 mm), horizontally and vertically, using galvanized steel fasteners, approximately 0.148 inch in diameter (US steel wire gauge 9, 0.377 mm), after coating. Use fasteners that have a connection strength equal to or greater than the strength of the mesh.

Connect the cable net panels using 5/16 inch (7.9 mm) lacing cable (seam rope) through each square of the net. Loop the end of the seam rope back on itself and secure it with two 5/16 inch (7.9 mm) rope clips.

Place the wire mesh between the slope and the cable net. Place the slope drape so it follows the contours of the slope and minimizes gaps and large spaces between the drape and the ground surface. Secure the top of the slope drape to a top horizontal support wire rope. Position the top support rope at least 5 feet (1.5 m) above the top of the cut slope. Use top horizontal support ropes that are no longer than 100 feet (30.5 m) each. Interior horizontal support ropes are not required.

Connect wire ropes (tag lines) to the end of the anchors and secure the ends of the wire rope with wire rope clips. Install the wire rope clips according to the manufacturer's recommendations.

**E.** Excavation. Remove and dispose of all waste material from between the bottom of the cut slope and the edge of the roadway. Waste material includes both scaled materials and naturally occurring talus. Restore roadway backslopes and ditches to their original condition. Remove overburden material above the rock face to round the top of the slope before scaling work is complete. Dispose of waste material according to 105.16 and 105.17.

**862.08** Method of Measurement. The Department will measure Scaling by the number of crew hours accepted. The Department will not measure idle time or stand-by time. The Department will measure the slope drape by the number of square yards of surface area of slope drape installed. The Department will not measure the area of drape used in any overlaps. Anchors and anchor tests are incidental to the slope drape and will not be measured separately.

OHIO

The Department will measure trim blasting by the number of square feet (square meters) along the face of the rock where material was dislodged and removed by the blast. The Department will calculate the area for trim blasting by multiplying the maximum height, measured along the slope of the drill hole, by the maximum horizontal width.

The Department will measure Excavation by the number of cubic yards (cubic meters) of material removed and disposed using either a surveyed three-dimensional volume method, or the "measured in the vehicle" method according to 109.01.

**862.09 Basis of Payment**. The Department will pay for accepted quantities at the contract price as follows:

Item	Unit	Description
862	Hour	Scaling
862	Square Foot	Trim Blasting
	(Square Meter)	
862	Square Yard	Slope Drape
	(Square Meter)	
862	Cubic Yard	Excavation
	(Cubic Meter)	

## **Designer Note:**

Consult with the Office of Geotechnical Engineering when considering the use of Rockfall Protection.

This work will produce rockfall, and will require a substantial laydown area during construction. Therefore, it is recommended that the road below this work be closed. At least two lanes of roadway should be available when performing this work. If a road closure is not possible, then a barrier or earthen berm should be placed to separate traffic from the accumulation of debris.

Construction limits are defined primarily on a visual and geometric basis. Wherever the slope visually appears to be susceptible to producing rockfall, or where the geometry of the slope is adverse, rockfall protection should be considered. The top of the slope drape should extend at least five feet beyond the crest of the slope (over more durable bedrock) and at least ten feet over weatherable bedrock or soil. The bottom of the slope drape should be about five feet above the bottom of the slope/ditch. Determine this minimum distance, and the minimum distance to the anchors, based on anticipated weathering advance of the underlying material. Anchors should be installed beyond anticipated areas of instability.

Scaling is recommended as part of all rockfall protection. Estimate the amount of time for scaling based on one hour of scaling for every 200 square feet of slope.

On slopes where rock overhangs and large boulders are present, trim blasting may be necessary in addition to hand and mechanical scaling. Estimate the area of trim blasting based on 100 square feet for every 2000 square feet of slope.

Estimate the excavation quantity from surveyed cross sections or assumed typical section areas of debris removal. Identify the method of measuring the excavation quantity by including the applicable plan note:

<u>ITEM 862 - Excavation</u> - The excavation quantity will be determined by a three-dimensional volume method.

<u>ITEM 862 - Excavation</u> - The excavation quantity will be determined by the "measured in vehicle" method.

Determine the rockfall protection material, either wire mesh, high strength wire mesh, or cable net and wire mesh, based on the expected block sizes. Identify the design block size in the plans from which the Contractor will design the slope drape and anchor spacings and capacity. Determine the maximum anchor spacings and a minimum anchor capacity of 20 kips. For these and all parameters, consult the document, *Design Guidelines for Wire Mesh/Cable Net Slope Protection* (Muhunthan, B., S. Shu, N. Sasiharan, O. Hattamleh, 2005, Olympia, Wash: Washington State Dept. of Transportation).

Consider adding 10% to the estimated slope drape area to account for surface irregularities along the rock slope. Consider including erosion control mats and seeding at the brow of all slopes and on slopes 1:1 and flatter for erosion control.

Consider drainage above the drape for long overburden slopes. Consider drainage elsewhere on the slope where free water is evident.

Plan insert sheets are required and can be obtained from the Office of Geotechnical Engineering. Show a representative slope. ODOT Project 180453 LIC-70-24.36 862 Specification Scaling Plan Sep. 25, 2018

### 1.1 Introduction

- 1.2 This plan is being prepared in accordance with ODOT supplemental specification (862.05 A.) Scaling Work Plan. This plan describes the method and safety procedures during scaling procedures.
- 1.3 This plan is combined along with Scaling Subcontractor work plan.
- 2.1 Construction sequence & Schedule
  - 2.1 Set PCB and Shoulder Closure at the West Bound location Sep. 25
  - 2.2 Perform Pre-Construction Terrestrial Scan between Sep.26-Sep.28 on the West Bound Location only.
  - 2.3 Scaling Subcontractor will mobilize in, do a pre-construction review of site, and start scaling operations on Oct. 1
  - 2.4 Prime Contractor is planning to have Scaling Subcontractor to start scaling at station 1337+00 and work their way up stations. If field conditions allow for that.
  - 2.5 Once Scaling Subcontractor is moved up station far enough. Prime Contractor will then start the excavation and clean up.
  - 2.6 Prime Contractor will set PCB and Shoulder closure at the East Bound location Oct. 15
  - 2.7 Perform Pre-Construction Terrestrial Scan Oct. 16 on the East Bound location.
  - 2.8 Scaling Subcontractor will then move operations to the East-Bound location and begin scaling. Oct. 17

\*Schedule could change due to weather and other unforeseen conditions.

## 3.1 Type and Quantity of Equipment

Description	Туре	Quantity
Excavator	Kabalaa 210 ar 160	1
	Kobelco 210, or 160	
Skid Steer	Kubota 952S	1
		1
Front Loader	Case 750D	

- 4 Number of Scaling Crews
  - 4.1 Scaling Subcontractor will provide one scaling crew
- 5 Methods of mechanical scaling (if any)
  - 5.1 No mechanical scaling is anticipated. If required it will be done by an excavator as per plan
- 6 Removal and Disposal Plan
  - 6.1 Prime Contractor will use a Hydraulic Excavator to remove all materials generated from scaling operations.
  - 6.2 The material will be loaded into dump trucks and hauled away to an approved dump site.
- 7 Safety
  - 7.1 Prime Contractor will utilize the PCB to protect the public and roadway from any hazards caused by the scaling procedure.
  - 7.2 Prime Contractor also will perform a rolling stop per Standard Construction Drawing MT-99.60 at the request of Scaling Subcontractor if the situation is required.
  - 7.3 Prime Contractor will provide equipment on site to remove any material that restricts traffic flow.

Scaling Subcontractor Rockfall Scaling Plan

ODOT Project No. 18-0453 Rock Slope Maintenance

### INTRODUCTION

Scaling Subcontractor will work with Prime Contractor and Ohio Department of Transportation (ODOT) to match the area located on the Plans and the actual slope which is to be scaled. The scaling will take place after approving the location by Prime Contractor and ODOT.

### **General Scaling Information**

Start date is anticipated to be September 24th, 2018.

All work is anticipated to be performed Monday– Friday, unless otherwise needed and agreed upon by Prime Contractor and ODOT.

The Project duration is anticipated to consist of twenty (20) working days, this includes time for set-up and site preparations for scaling.

The crew will consist of 2 scalers and 1 spotter/scaling Superintendent. Superintendent and scalers will be determined at the beginning of the project and will meet all qualifications. Only scalers which meet the qualifications will be utilized. See attached listed of qualified personnel.

The equipment on site is anticipated to include the following: air compressor, ropes scaling equipment (bars, pillows, ect. as required), hand drills, and other miscellaneous tools. Rope access safety equipment such as rope and harness are OSHA approved state of the art equipment, and used by highly trained mountain rescue teams.

The project will be overseen by our on-site Project Superintendent and monitored off-site by the Operations Manager and project support staff. Safety enforcement will be within the guidelines OSHA and the included "SCALING SUBCONTRACTOR Health & Safety Program & Safe Work Practices". The on-site safety officer for SCALING SUBCONTRACTOR will be the Project Superintendent. Daily quality control of the work will be performed by the Project Superintendent.

### SCHEDULE OF CONSTRUCTION OPERATIONS

- 1. Mobilization and Site Preparation
- 2. Location of Scaling Area
- 3. Rock Scaling
- 4. Demobilize

#### MOBILIZATION AND SITE PREPARATION

Prior to any work on site SCALING SUBCONTRACTOR will perform a site safety meeting which will outline how SCALING SUBCONTRACTOR will be in compliance with the Occupational Safety and Health Administration (OSHA) and the SCALING SUBCONTRACTOR safety plan during all operations. All ropes

used for repelling the slopes will be attached to anchoring points at all times. SCALING SUBCONTRACTOR employees will need to be in radio contact with all personnel in and around the work area in the event a dangerous situation needs to be resolved as to ensure the safety of all involved. Daily tail-gate safety meetings will be held, and review of potential safety hazards will be discussed, a daily JSA will be produced. All personnel will abide by the procedure in the included "SCALING SUBCONTRACTOR Health & Safety Program & Safe Work Practices" as part of their safety measures. The on-site safety officer for SCALING SUBCONTRACTOR will be the Project Superintendent.

See "SCALING SUBCONTRACTOR Health & Safety Program & Safe Work Practices" for more information on SCALING SUBCONTRACTOR safe work practices.

Upon arriving on site SCALING SUBCONTRACTOR would first set up the staging area. SCALING SUBCONTRACTOR will lay out a parking area and locations for storing equipment and materials while limiting our impact of the surrounding environment and watershed, and to limit impacts on operations during work activities.

### LOCATION OF SCALING AREA

SCALING SUBCONTRACTOR will work with Prime Contractor and ODOT to determine the extents of the Project, including the locations of Scaling Operations. SCALING SUBCONTRACTOR will mark the limits of the areas for Rock Scaling.

### SCALING PROTECTION

Protection measures for roadway surface, structures, utilities, and other facilities adjacent to the rock slope during scaling activities is to be performed by others at the direction of the Prime Contractor.

#### ROCK SAFETY SCALING

Prior to any rock scaling taking place, SCALING SUBCONTRACTOR will locate and install tie-off points for scalers. The tie-off points will consist of large trees or drilled and grouted solid bar anchors. Solid bar anchors will be installed above the location were scaling is to take place, and scalers will tie-off ropes to these anchors. SCALING SUBCONTRACTOR will be in compliance with the OSHA during all scaling operations. Our employees will need to be in radio contact with all personnel in and around the work area in the event a large or dangerous rock needs to be removed as to ensure the safety of all involved.

SCALING SUBCONTRACTOR will perform Rock Scaling of the slope at the specified areas. Workers will begin at the top of the slope moving down slope and remove loose boulders and rocks from the slope with use of scaling bars, and other equipment if required. The descent of the scalers will be such as that at all times all scalers will be aware of the other persons scaling and will be descending at the same rate so no scalers will ever be working above another. If additional rock blocks are identified that need scaling, blocks will be address prior to continuing to scale the slope. Scaling will continue until the scaling is completed to the satisfaction of the Project Engineer. The same sequence will be used at each scaling location.

SCALING SUBCONTRACTOR does not intend to use any power equipment to perform the scaling, ie mechanical scaling. In the event a rock block needs to be removed and is too large to be scaled by scaling bar SCALING SUBCONTRACTOR will be prepared to remove the rock block using an air bag/pillow.

The air bag/pillow will require the use of air compressor to inflate the bag/pillow. SCALING SUBCONTRACTOR anticipates no other equipment to be used during scaling activities.

### COLLECTION OF DEBRIS

Collection of rock slope debris generated by rock slope scaling is to be performed by others at the direction of the Prime Contractor.

### DEMOBILIZATION

Once final acceptance of the work performed is given and final site cleanup is performed, SCALING SUBCONTRACTOR will demobilize from the site. SCALING SUBCONTRACTOR will ensure that all construction equipment, tools, materials, and miscellaneous items are cleared and removed from the work area. Coordination with Prime Contractor and ODOT will be performed prior to any removal or disposal of equipment and materials from the project site.

### SUMMARY OF KEY EMPLOYEE INSTALLATION EXPERIENCE

### AS OF DECEMBER 31, 2017

Employee 1 – 14,440 lf rock bolts, dowels and rock/soil anchors; 90,000 sf wire mesh; 90,436 sf cable and ring nets; 731 lf rockfall and debris flow barriers; 200 lf drains; 120,211 sf rockfall attenuator; 4,025 sf spider nets; and 1,299 chrs. scaling on jobs totaling 5,108 hours. DOH: 4/15/2015

Employee 2 – 76,125 lf rock bolts, dowels and rock/soil anchors; 2,008,573 sf wire mesh; 243,177 sf anchored mesh; 727,245 sf cable and ring nets; 13,480 lf rockfall and debris flow barriers; 400 lf drains; 140,000 sf rock mesh; 114,000 sf Tecco; 6,277 lf snow nets; 127,411 sf rockfall attenuator; 365 cy shotcrete; and 3,932 chrs. scaling on jobs totaling 16,846 hours. DOH: 1/24/2007

*Employee 3* – 46,028 lf rock bolts, dowels and rock/soil anchors; 907,415 sf wire mesh; 168,547 sf anchored mesh; 430,889 sf cable and ring nets; 76,250 sf Tecco; 200 lf extensometers; 812lf chain link fence; 6,277 lf snow nets; 11,341 lf rockfall and debris flow barriers; 2,080 cy shotcrete; 22,500 sf erosion matting and 3,821 chrs. scaling on jobs totaling 19,687 hours. DOH: 4/02/2007

Employee 4 – 24,225 lf rock bolts, dowels and rock/soil anchors; 6,000 sf wire mesh; 305,588 sf cable and ring nets; 160 lf rockfall catchment and debris flow barriers; 75,000 sf Tecco; 4,852 lf snow nets; 50,000 sf rockfall attenuator; 310 chrs. Scaling on jobs totaling 2,410 hours. DOH: 5/23/2016

Employee 5 – 59,455 lf rock bolts, dowels and rock/soil anchors; 1,609,251 sf wire mesh; 39,060 sf anchored mesh; 874,801 sf cable and ring nets; 122,614 sf rockfall attenuator; 400 cy mechanical excavating; 24,784 lf rockfall and debris flow barriers; 209,959 sf Tecco mesh; 22,500 sf erosion control matting; 100 cy shotcrete; 5,849 chrs. scaling on jobs totaling 14,490 hours. DOH 06/20/2005

Employee 6 – 38,174 lf rock/soil anchors; 140,000 sf rock mesh; 129,000 sf Tecco; 400 lf drains; 25 cy shotcrete; 50,000 sf Attenuator; 1,050 lf catchment and debris flow barrier; 65,300 sf cable and ring nets; 159,978 sf wire mesh; 4,000 sf anchored wire mesh; 625 chrs. scaling on jobs totaling 4,908 hours. DOH: 06/18/2014

Employee 7 – 26,368 lf rock/soil anchors; 400 lf drains; 217,248 Tecco; 25 cy shotcrete; 4,000 sf Anchored wire mesh; 785 lf snow nets; 113,192 sf cable and ring nets; 222,110 sf rockfall attenuator; 811 lf rockfall catchment barrier; 151,450 sf wire mesh; 1,601 chrs. scaling on jobs totaling 4,477 hours. DOH: 6/01/2015

Employee 8 – 5,569 If rock bolts, dowels and rock/soil anchors; 1,806 cy shotcrete; 51,552sf cable and ring net drapery; 812If chain link fence; 76,250 sf Tecco; 135,300 sf wire mesh; 7,500sf anchored wire mesh; 2,810 If rockfall catchment barrier; and 1,831 chrs scaling on jobs totaling 4,393 hours. DOH: 06/15/2015

Employee 9 – 27,349 lf rock bolts, dowel and rock/soil anchors; 859,414 sf wire mesh; 812lf chain link fence; 6,277 lf snow nets; 334,004 sf cable & ring nets; 58,327 sf anchored mesh; 200 lf extensometers; 1,781 cy shotcrete; 76,250 sf Tecco; 4,484 lf rockfall and debris flow barriers and 2,644 chrs. scaling on jobs totaling 8,618 hours. DOH: 4/11/2011

*Employee 10* – 51,369 lf rock bolts, dowels and rock/soil anchors; 884,637 sf wire mesh; 249,407 sf anchored mesh; 971,637 sf cable and ring nets; 140,000 sf rock mesh, 5,254 lf rockfall and debris flow barriers; 4,025 sf spider nets; 400 cy mechanical excavating; 6,277 lf snow nets; 129,814 sf rockfall attenuator; 590 cy shotcrete and 3,852 chrs scaling on jobs totaling 13,605 hours. DOH: 9/17/2007

Employee 11 – 45,999 lf rock bolts, dowels and rock/soil anchors; 228,000 sf wire mesh; 45,000 sf cable and ring nets; 135,623 sf Tecco mesh; 50,000 sf Attenuator; 4,000 sf Anchored wire mesh; 400 lf drains; 1,652 lf rockfall catchment and debris flow barrier; 679 chrs. scaling on jobs totaling 6,113 hours. DOH: 6/18/2014

Employee 12 – 58,270 lf rock bolts, dowels and rock/soil anchors; 400 cy mechanical excavating; 200 lf drains; 769,645 sf wire mesh; 11,454 lf rockfall and debris flow barriers; 120,211 sf rockfall attenuator; 6,277 lf snow nets; 14,300 sf erosion control mat; 40 cy shotcrete; 3,921 chrs. Scaling; 6,525 sf spider wire; 1,365,288 sf cable and ring nets; 95,550 sf Tecco mesh on jobs totaling 12,930 hours. DOH: 1/09/2007

*Employee 13* – 126,480 lf rock bolts, dowels and rock/soil anchors; 1,936,719 sf wire mesh; 304,338 sf anchored mesh; 1,188,276 sf cable and ring nets; 200 lf extensometers; 229,871 sf Tecco; 140,000 sf rock mesh; 25,200 lf rockfall and debris flow barriers; 290 cy shotcrete; 106,449 sf rockfall attenuators; 4,025 sf spider nets; 51,100 sf erosion matting and 5,334 chrs. scaling on jobs totaling 28,331 hours. DOH: 2/15/2000

*Employee* 14 – 92,692 lf rock bolts, dowels and rock/soil anchors; 1,465,103 sf wire mesh; 213,418 sf anchored mesh; 840,727 sf cable and ring nets; 200 lf extensometers; 223,871 sf Tecco; 400 lf drains; 140,000 sf rock mesh; 13,658 lf rockfall and debris flow barriers; 106,449 sf rockfall attenuators; 275 cy shotcrete and 3,377 chrs. scaling on jobs totaling 17,923 hours. DOH: 5/12/2003

*Employee 15* – 47,112 lf rock bolts, dowels and rock/soil anchors; 1,132,340 sf wire mesh; 275,330 sf anchored mesh; 632,061 sf cable and ring nets; 140,000 sf rock mesh; 200 lf extensometers; 193,248 sf Tecco; 8,176 lf rockfall and debris flow barriers; 274 cy shotcrete; 51,100 sf erosion matting; 101,899 sf rockfall attenuators and 3,684 chrs. scaling on jobs totaling 14,939 hours. DOH: 9/27/2005

*Employee 16* – 89,324 lf rock bolts, dowels and rock/soil anchors; 812,294 sf wire mesh; 292,572 sf anchored mesh; 1,373,915 sf cable and ring nets; 61,277 lf snow nets; 200 lf extensometers; 400 lf drains; 400 cy mechanical excavating; 122,614 sf rockfall attenuator; 47,702 sf Tecco; 8,366 lf rockfall

and debris flow barriers; 315 cy shotcrete; 28,600 sf erosion control matting and 6,348 chrs. scaling on jobs totaling 21,422 hours. DOH: 7/01/2002

*Employee* 17 – 57,764 lf rock bolts, dowels and rock/soil anchors; 522,303 sf wire mesh; 479,358 sf cable and ring nets; 122,614 sf rockfall attenuator; 10,762 lf rockfall and debris flow barriers; 4,025 sf spider nets; 25 cy shotcrete; 4,000 af Anchored wire mesh; 140,000 sf rock mesh; 3,800 chrs. scaling; 51,458 sf Tecco mesh on jobs totaling 14,241 hours. DOH: 10/19/2003

*Employee 18 -* 13,848 If rock bolts, dowel and rock/soil anchors; 375,814 sf wire mesh; 51,552sf cable & ring nets; 812If chain link fence; 1,756 cy shotcrete; 76,250 sf Tecco; 50,827 sf anchored mesh; 2,409 If rockfall and debris flow barriers and 1,015 chrs. scaling on jobs totaling 7,603 hours. DOH: 3/15/2011

*Employee 19* – 66,329 lf rock bolts, dowels and rock/soil anchors; 5,086,959 sf wire mesh; 216,485 sf anchored mesh; 1,193,593 sf cable and ring nets; 6,277 lf snow nets; 200 lf extensometers; 76,250 sf Tecco; 27,369 lf rockfall and debris flow barriers; 812lf chain link fence; 2,105 cy shotcrete; 22,500 sf erosion matting and 5,935 chrs. scaling on jobs totaling 26,592 hours. DOH: 5/18/1999

Employee 20 – 97,212 lf rock bolts, dowels and rock/soil anchors; 1,829,332 sf wire mesh; 183,150 sf anchored mesh; 1,578,684 sf cable and ring nets; 6,277 lf snow nets; 226,950 sf Tecco; 400 cy mechanical excavating; 4,025 sf spider nets; 224,513 sf Attenuator; 140,000 sf rock mesh; 200 lf extensometers; 17,603 lf rockfall and debris flow barriers; 40 cy shotcrete; 51,100 sf erosion matting and 7,865 chrs. scaling on jobs totaling 23,696 hours. DOH: 8/20/2002

Employee 21 – 42,921 lf rock bolts, dowel and rock/soil anchors; 76,250 sf Tecco; 762,914 sf wire mesh; 71,347 sf anchored mesh; 3,450 lf rockfall and debris flow barriers; 6,277 lf snow nets; 812lf chain link fence; 200 lf extensometers; 334,004 sf cable nets; 2,081 cy shotcrete and 2,628 chrs. scaling on jobs totaling 9,860 hours. DOH: 1/1/2011

Note: Project Superintendents are designated in **BOLD** type.

\*SPRAT/IRATA Certified Level II Rope Access Technician

## SECTION 003xx - ROCK SLOPE SCALING

Section 003xx, which is not a Standard Specification, is included in this Project by Special Provision.

### Description

**003xx.00 Scope** - This work consists of furnishing materials, equipment, labor, incidentals, and supervision necessary to perform rock slope scaling, at locations shown or as directed.

## 003xx.01 Definitions:

**Scaling** – Removal of vegetation, loose rock and soil from the slope at locations shown or as directed. Scaling is performed using hand tools, hydraulic jacks, pneumatic pillows, and any other tools or equipment approved by the Engineer.

**Machine Scaling** – Removal of vegetation, loose rock and soil from the slope at locations shown or as directed. Machine scaling is performed using a standard or specialized "high-reach" excavator equipped with a hydraulic hammer as well as a bucket or other attachments approved by the Engineer. Requires a Qualified Machine Scaler to operate machine scaling equipment.

**Scaling Foreman** – A Scaling Foreman has at least three (3) years of demonstrated experience in this role and a minimum of 1,500 hours of rope access scaling experience.

**Qualified Scaler** – A Qualified Scaler has at least one (1) year of demonstrated experience in this role and a minimum of 1,000 hours of rope access scaling experience.

**Qualified Machine Scaler** – A Qualified Machine Scaler has at least one (1) year of demonstrated experience as an equipment operator performing slope scaling and a minimum of 1,000 hours of machine scaling experience.

**Scaler** – A Scaling Foreman, Qualified Scaler, or Qualified Machine Scaler actively performing scaling on-slope. A Scaling Foreman acting as a spotter is also considered a Scaler.

**Temporary Rockfall Containment System** – A suspended or ground-mounted containment system capable of preventing all scaled rock and materials from entering the travel lanes of the roadway.

### 003xx.02 Required Submittals:

(a) **Personnel Qualifications** – Submit the following information at the preconstruction conference:

• Name, address and present employer for each person employed as a scaler or machine scaler.

- Documentation showing the foreman has at least three (3) years of demonstrated experience in this role and a minimum of 1,500 hours of rope access scaling experience.
- Documentation showing that each scaler has at least one (1) year of demonstrated experience in this role and a minimum of 1,000 hours of rope access scaling experience.
- Documentation showing that each machine scaler has at least one (1) year of demonstrated experience in this role and a minimum of 1,000 hours of machine scaling experience.
- Project names and locations and year projects were completed.
- Contact names and phone numbers of project owners who can verify each experience listed.

If the Engineer determines the proposed foreman, machine scalers, or scalers are not qualified, they will not be allowed to work on the project as scalers.

**(b)** Work Plan Submittal - Submit a detailed slope scaling work plan for each rock slope not less than 21 days prior to commencing work. Work shall not begin until the plan is approved and written notice is provided. Include the following in the work plan:

- Proposed scaling sequence and schedule
- Types of tools and equipment to be used
- The number of machine scalers, scalers, and scaling foremen, to be employed on the project
- Temporary rockfall containment system details
- Debris removal and disposal plans;
- Provisions to protect adjacent facilities.
- Proposed herbicide for stump treatment, including manufacturer's data sheets

## **Materials**

**003xx.10 Herbicide for Stump Treatment –** A solution of Triclopyr herbicide (with at least 40% Triclopyr as the active ingredient).

## Equipment

**003xx.20 Temporary Rockfall Containment System** - Provide a temporary rockfall containment system capable of preventing all scaled rock and materials from entering the travel lanes of the roadway. The containment system may be ground-mounted or suspended.

**003xx.21 Scaling tools and equipment** – Provide hand tools, portable hydraulic wedges, air pillows or other power tools and associated equipment necessary to perform rock slope scaling. Other tools or equipment may include air compressors, hydraulic pumps, and equipment necessary to access the slope.

Do not use equipment and tools which the Engineer determines to be unsatisfactory.

Scaling tools and equipment are incidental to slope scaling.

**003**xx.**22 Machine Scaling Equipment** – Furnish a tracked excavator with sufficient reach to perform the required scaling. Provide all necessary attachments such as excavator buckets, hydraulic hammers (breakers), rippers, grapples, etc.

### Labor

003xx.30 General - Furnish qualified foreman, machine scalers, or scalers.

Fill in the blanks for number of scalers and foreman. Renumber Machine Scaling Personnel if scaling personnel are not included in this project.

**003xx.31 Scaling Personnel** - Provide, at a minimum, \_\_\_ qualified scalers and \_\_\_\_ qualified scaling foreman.

Fill in the blanks for number of machine scalers and foreman.

**003xx.32** *(003xx.31)* **Machine Scaling Personnel** – Provide, at a minimum, \_\_\_\_ qualified machine scaler and \_\_\_\_ qualified scaling foreman.

Support personnel necessary for the machine scaling equipment are considered incidental to machine scaling.

### Construction

**003xx.40 Scaling Operations** - Proceed according to the approved work plan and the following:

**003xx.41 Vegetation Removal** – Except as noted in 003xx.43, flush-cut brush and trees on the slope and within 10 feet of the crest of the slope and leave the root wad intact. Within 2 minutes of cutting each tree or shrub, wick and saturate stumps with the herbicide listed in the approved work plan. All trees and shrubs to be cut shall receive this herbicide application. Complete initial tree felling prior to performing other scaling work.

Once the scaling work is complete, flush-cut any additional brush and trees within 10 feet of the final slope crest and leave the root wads intact. Treat the stumps with herbicide as above.

**003xx.42 Scaling** - Begin slope scaling at the top of the rock slope and proceed downwards toward the bottom of the slope, removing loose rock and soil as the work progresses.

The Engineer will inspect the work as slope scaling progresses to determine if additional scaling is needed. If additional slope scaling is required, continue to scale the slope as directed.

Only scale sections of the slope protected by the approved containment system. If scaling debris escapes the containment system, cease scaling operations until the containment system is repaired or modified to contain the scaling debris.

**003xx.43 Machine Scaling** - Begin machine scaling at the top of the rock slope and proceed downwards toward the highway, removing loose rock and soil as the work progresses. Remove vegetation, including root wads, from the area being scaled.

The Engineer will inspect the work as slope scaling progresses to determine if additional scaling is needed. If additional slope scaling is required, continue to scale the slope as directed.

Once the scaling work is complete, flush-cut any additional brush and trees within 10 feet of the final slope crest and leave the root wad intact. Treat the stumps with herbicide as in 003xx.41.

Only scale sections of the slope protected by the approved containment system. If scaling debris escapes the containment system, cease scaling operations until the containment system is repaired or modified to contain the scaling debris.

**003xx.44 Waste Removal** - Prior to slope scaling, remove and dispose of all existing rock, soil and vegetation from the ditch and reestablish ditch grade to promote drainage per 00330.41(a-8). Rock, soil, and vegetation generated during scaling activities are considered waste materials. Periodically remove accumulated waste produced during the scaling operation. Do not allow waste to accumulate to the point that subsequent material falling into the ditch is deflected into the travel lanes of the roadway.

**003xx.45 Waste Disposal** - Unless otherwise specified and subject to the requirements of 00280.05, dispose of waste materials described in 003xx.44, as follows:

Use the following if there is no Agency-provided stockpile/disposal site.

Dispose of materials, classed as waste materials in 003xx.44, outside and beyond the limits of the Project and Agency-controlled property and according to 00290.20. Do not dispose of materials on Wetlands, either public or private, or within 300 feet of rivers or streams.

Use the following if designating an Agency-provided stockpile/disposal site. Fill in the blank with the description of what materials are to be hauled to the agency provided disposal site.

Dispose of \_\_\_\_\_ as specified in 00235.xx and as shown.

Dispose of all other materials, classed as waste materials in 003xx.44, outside and beyond the limits of the Project and Agency-controlled property and according to 00290.20. Do not dispose of materials on Wetlands, either public or private, or within 300 feet of rivers or streams.

#### Measurement

### 003xx.80 Measurement

(a) Scaler - Hours for each scaler will be measured to the nearest 0.25 hour. The measured number of hours will start from the time the scaler is equipped and begins to ascend the slope to the time the scaler descends the slope in any work shift.

The Scaling Foreman will be measured as a Scaler while working on the slope, as defined above. When not working on the slope, the Scaling Foreman is incidental to the pay item "Scalers".

Other persons involved in the scaling operation who are not working on the slope are incidental to the pay item "Scalers".

(b) Machine Scaling - Hours for machine scaling will be measured to the nearest 0.25 hour. The measured number of hours will start from the time the machine scaler positions the equipment and begins scaling to the time the scaler moves the equipment away from the area being scaled. For measurement, the scaling equipment and the machine scaler are considered a single unit.

The Scaling Foreman will be measured as a Scaler while working on the slope, as defined in (b) above. When not working on the slope, the Scaling Foreman is incidental to the pay item "Machine Scaling".

There will be no mesurement of other persons involved in the scaling operation who are not working on the slope.

(c) Temporary Rockfall Containment System – No measurement of quantities will be made for the temporary rockfall containment system.

Use the following when the project is a stand-alone rockfall mitigation project:

(d) Waste Removal – Waste removal will be measured based on volume of material hauled, determined by truck capacity.

Use the following when scaling is part of a larger project with other earthwork:

(d) Waste Removal - There will be no measurement of equipment and operators for loading, hauling, and disposal of waste.

## Payment

**003xx.90 Payment** - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item ......Unit of Measurement

(a)	Scaler	Hour
	Machine Scaling	
(c)	Temporary Rockfall Containment System	Lump Sum
(d)	Waste Removal	Cubic Yard

Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the Work as specified.

Use the following when scaling is a stand-alone rockfall mitigation project:

Equipment and operators for loading, hauling, and disposal of scaling debris are incidental to waste removal.

Use the following when scaling is part of a larger earthwork project:

Waste removal and all equipment and operators for loading, hauling, and disposal of scaling debris are incidental to scaling.

Other persons involved in the scaling operation who are not working on the slope are incidental to the pay item "Scalers".

**ECMS Code:** I – c00055

**Owner:** Central Office

Provision Name: c00055 - ROCK SLOPE SCALING

**Instructions for Usage:** This special provision is for scaling of existing slopes. When blasting is required for the scaling, follow Section 207 for the blasting work. When a roadway cannot be shutdown and detoured temporarily also use the supplemental special provision I-c00056 "ITEM 9000-6171 - Temporary Shielding for Rock Slope Scaling".

Project-specific limitations and requirements for traffic delays and stoppages must be clearly provided in the project Traffic Control Plan and approved by the District Traffic Engineer.

For moderate and large-sized scaling projects the planned quantity for Scaled Rock Disposal should be developed by Lidar survey 3-D representations and cross-sections. Plans should show removal limits and include marked-up photographs.

Header: ITEM 9000-6172 – ROCK SLOPE SCALING

ITEM 9000-61xx - CONTROLLED BLASTING

ITEM 9000-6173 - SCALED ROCK DISPOSAL

ITEM 9000-6174 - SCALED VEGETATION DISPOSAI

ITEM 9000-6175 - AERIAL LIFT

## **Provision Body:**

**I. DESCRIPTION**—This work is removal of vegetation, loose rocks, and potentially unstable rocks on slopes by manual, mechanical, chemical, and explosive methods. Includes removal and disposal of all material resulting from the scaling and blasting operation and all pre-scaling rockfall material located in the area between the rock slope and the pavement.

## II. MATERIAL-

(a) Scaling Equipment. Provide scaling bars, winching, drag scaling, air bags, hydraulic jacks, chemical expansive agents, excavators, hydraulic and pneumatic hammers, drills, aerial lifts, and cranes. Provide communication equipment to allow for two-way audio and photo communication.

(b) Explosives. When blasting is used, provide blasting agents as specified in Section 207.2.

(c) Submittals. Prepare and submit a detailed project Scaling Plan to the Representative at least 21 calendar days before starting the scaling work.

Do not start scaling work until the Scaling Plan is approved in writing. Acceptable submittals will be approved by the Representative within 21 calendar days. Deviations from the approved submittals must be re-submitted for approval. No adjustment for contract time will be allowed due to incomplete submittals. Include the following information in the Scaling Plan:

**1.** Schedule. Provide a schedule of operations that outlines the planned construction sequence and duration of the scaling work.

**2. Equipment.** List the types of equipment and tools to be used for the work and for accessing the work area.

**3.** Qualifications of Personnel. Provide documentation that the personnel conducting work or activities related to scaling operations have performed satisfactory work on three similar projects within the last 3 years. All scaling personnel must have a minimum of 2 years of full-time experience in rock slope stabilization that includes rock scaling. Scaling supervisor must have at least 1,000 hours of documented experience as a rock slope scaler. Scalers must have at least 500 hours as a rock slope scaler.

**4.** Crews. Indicate the anticipated number of planned scaling crews to be employed on the project. A crew is defined as one scaling supervisor and a minimum of two scalers. Maintain the minimum crew size(s) at all times.

**5.** Material Control and Removal. In the scaling sequence for the project, describe the intended direction and fall area for rock debris generated from the slope, frequency and method of rock debris removal, and disposal plan for rock debris generated from the slope scaling work and any rock debris currently along and adjacent to the toe of the slope.

**6.** Traffic Control. Follow the approved Traffic Control Plans (TCP) requirements provided in the contract. Any proposed changes or additions to the TCP must meet Publication 213 and be approved by the Representative.

**7. Protection.** Describe methods and procedures to be used to protect personnel and the traveling public from harm and adjacent facilities and structures from damage. Include provisions to protect adjacent roadway facilities and components and any local private facilities. Include references to methods described in the Shielding Plan as required in the special provision for "Temporary Shielding for Rock Slope Scaling." Restore, repair, or recompense for damage or injury caused by this work.

**8.** Environment. Describe the procedure of application of herbicide and the manufacturer's specification sheet for the specific herbicide to be used. Plan to protect the environment by minimizing erosion, preventing sedimentation and pollutants from entering streams or waterways, and any other environmental impacts.

**9. Emergency Management.** Describe the plan of action for possible worker injury. Describe the plan of action for potentially large rocks or rock masses scaled onto the roadway that are not removable within the time limit restriction for traffic as indicated in the TCP.

**III. CONSTRUCTION**—Proceed as indicated on the TCP and according to the approved Scaling Plan and Shielding Plan.

Prevent damage to adjacent roadway facilities and components, existing rockfall protection structures and appurtenances, and adjacent or local private facilities. Repair or replace any pavement, guide rail, signage, structures, property or other components, public or private utilities, and any local private properties or facilities damaged due to the scaling work, at no expense to the Department. Provide adequate means to protect motorists and surrounding property from injury and/or damage during rock scaling and all other activities according to the approved Shielding Plan.

Conform to required regulations, permits and licenses as specified in Section 107.08.

During rock removal, provide sufficient qualified personnel to allow fully-staffed scaling crews at all times. A crew supervisor must be on-site during any scaling work.

Perform scaling only in the presence of the Representative. Use communication equipment between the Representative and each rock scaling crew to effectively communicate the slope conditions or issue alerts regarding unstable conditions.

(a) Conduct slope scaling within the slope stabilization area indicated on the plans and prepare finished rock slope surface using manual, mechanical, chemical, and explosive methods. Begin rock scaling at the top of the slope and proceed downward toward the roadway, removing all loose rocks and unstable blocks as the work progresses. Remove any overhanging rock as directed by the Representative.

(b) Do not remove pieces of rock that will result in undercutting of overlying material. Do not excavate material that will disturb intact rock, compromise the stability of the rock face or slope, or disturb or damage the toe of slope unless such work is deemed necessary by the Department to meet project objectives or to correct a more serious condition, as directed by the Representative.

For cases where scaling has disturbed intact rock, compromised stability of the rock face, or damaged the toe of slope, cease scaling within and near the affected area and submit a Corrective Action Plan and supporting analysis to the Representative for review and approval. Scaling work can continue in unaffected areas of the slope that do not further disturb the affected area, or that are not in locations where operations may be affected by compromised stability of the rock face. The submission for design and corrective action must satisfactorily demonstrate adequacy to resolve and correct the problem as determined by the Representative. The Representative will respond to the submission within 21 calendar days of receipt. Prepare the Corrective Action Plan at no cost to the Department. No adjustments in contract time will be allowed as the result of preparation, Department review, and implementation of the plan. Conduct all work for corrective action resulting from damages from activities not directed or approved by the Representative at no additional cost to the Department.

(c) Remove all vegetation from the rock slope within the limits, or as directed by the Representative, by spraying with approved herbicide and/or by cutting and mechanical removal. Vegetation includes trees, woody shrubs, brush, vines, grass, and similar organic matter. Perform herbicide treatment as specified in Section 804.2(d). Perform tree removal and stump treatment as specified in Sections 810.2 and 810.3(b). Cut all trees to a height of not more than 4 inches above the ground line. Record all completed herbicide treatment type and quantities used, however, the Department Form M-609, Roadside Activity Report is not required. Only treat stumps that will remain on the slope and will not be removed by subsequent scaling.

(d) If chemical expansion agents are used, store securely until use. Handle and use all chemicals according to the manufacturer's instructions. If cracking agents are used, provide a detailed plan, including type of cracking agent, Material Safety Data Sheets, manufacturer's technical data, hole spacing, loading sequence, and additional information for protecting traffic during the time period when the cracking agent is deployed, chemically active, and in use as a scaling method.

(e) Blasting is permitted with an approved Blasting Plan. Conform to Section 207 when scaling operations require blasting to remove rock to the profile indicated in the plans and as required by field conditions.

(f) Provide 48 hours advanced notice to the Representative before completion of any work to allow the Representative to evaluate the condition of the exposed face according to the specifications. All rocks and debris displaced during scaling must be removed completely from the slope to allow inspections by the Representative.

To aid visual slope inspections, provide and operate an aerial lift having a telescopic or articulating boom equipped with an occupied platform. The lift extension must permit inspection of the entire slope face, capable of achieving a minimum platform height of 115 feet at a 70-foot horizontal reach, but not to exceed a maximum platform height of 150 feet or horizontal reach of 80 feet. For inspections of lower height

slopes that do not require the maximum platform height and reach, an adequate lift of lesser vertical and horizontal capacity can be used. Lifts must have a minimum platform load capacity of 750 pounds in partially-extended configuration, and 500 pounds in their fully-extended configuration. The platform must be capable of accommodating both the lift operator and a passenger conducting the inspection. The operator must be trained to safely operate the lift, and the lift must be operated at all times according to the manufacturer's requirements and recommendations. Make any site preparations or modifications as necessary to permit proper positioning and safe operation of the lift, while permitting inspection of the entire slope face. All rock scaling activities will cease during any inspections necessary for the Representative to evaluate scaling activities, check the progress of work, or assess stability of the slope or an individual rock block or mass. Scale additional rock identified during inspections at the direction of the Representative.

(g) Remove all rock and debris produced from the blasting (if performed) and scaling operations as well as existing debris at the base of the slope and dispose as specified in Section 105.14. Do not exceed one 15-minute traffic stoppage per 2 hours for frequency of removal, unless the Representative deems it necessary to provide more frequent intervals to maintain a safe and efficient worksite or to allow the Representative to safely inspect the work. Remove or stabilize any rock on the cut face that is loose, hanging, deemed to be unsafe or unstable, or that creates a potentially dangerous condition to the satisfaction of the Representative during or upon completion of each portion of rock scaling.

Scaling and/or removal of rock carried out below or beyond the grades indicated on the plans, below or beyond that established by the Representative, or for contractor convenience is at no additional cost to the Department.

### IV. MEASUREMENT AND PAYMENT—

#### (a) Rock Slope Scaling. Crew Hour.

Measured by each crew-hour. Payable includes' time when a fully-staffed crew is physically on the slope preparing to scale, ascending the slope, descending the slope, actively scaling, and on-slope standby during clean-up or when necessary for the safe conduct of traffic. Intermittent on-slope standby time up to 15 minutes is allowed for clean-up of scaled rocks at the base of the slope. Standby time exceeding 15 consecutive minutes is not payable, unless approved by the Representative.

### (b) Controlled Blasting. Linear Foot.

Measured on linear foot of acceptable presplit or trim blasthole depth for required blastholes drilled within the tolerance as specified in Section 207.3(f).

### (c) Scaled and Blasted Rock Disposal. Cubic Yard.

Pay quantity is determined by measuring the volume of rock material in a fully-loaded (by weight) haul truck, and the cumulative haul count, as approved by the Representative. Truck load volumes that are less than a full load will be measured individually and paid separately from the cumulative haul count.

#### (d) Scaled Vegetation Disposal. Cubic Yard.

Pay quantity is determined by measuring the chipped volume of all scaled vegetation with a diameter of 12 inches or less, as approved by the Representative. Dispose of scaled tree segments and branches having a diameter greater than 12 inches, at no additional cost to the Department.

#### (e) Aerial Lift. Lump Sum.

#### WESTERN FEDERAL LANDS HIGHWAY DIVISION

## Section 623. — GENERAL LABOR

#### 05/11/14-FP14

## Description

### 623.01 Delete this Subsection and substitute the following:

This work consists of the following:

(a) Furnishing workers and hand tools for the work listed in Subsection 622.01 in addition to work ordered by the CO and not otherwise provided for within the original contract scope.

(b) Survey and stake the original ground within the slope scaling limits.

(c) Slope scaling, which includes removing loose or detached blocks of rock from existing rock slopes and natural rock outcrops. Slope scaling also includes the flattening (slope regrading) of over-steepened portions of existing shallow slump features.

(d) Vegetation removal from slope brows and rock slope faces, including the removal of trees, shrubs, and other vegetation.

(e) Remove and dispose debris generated from the work performed under Subsections 623.01(b) and 623.01(c).

## **Construction Requirements**

### 623.02A Slope Scaling General. (Added Subsection).

Survey existing boulders, rockfall debris, and rockfill buttress according to Subsection 152.05(j) to obtain the original ground conditions within the slope scaling limits.

Before starting scaling operations, provide temporary protection to safeguard traffic, utilities, and rockfall and debris from entering any near bodies of water during rock scaling operations in accordance with Sections 656, 107.02, and 107.10(a), respectively.

Perform general scaling within the limits shown on the plans, and as directed by the CO. Specific unstable blocks to be removed and/or areas requiring greater scaling efforts are identified in the plans as intensive scaling areas. The over-steepened portions of two shallow slump features that require flattening (slope regrading) are identified in the plans as intensive scaling areas.

Remove trees and vegetation on an unstable slope before slope scaling that unstable slope; and complete slope scaling on an unstable slope before starting other rockfall mitigation work on that unstable slope.

## 623.02B Slope Scaling Equipment. (Added Subsection).

Perform slope scaling using rope/cable-supported laborers with scaling bars, portable hydraulic wedges, and air pillows. Use of hand drills, splitters, or other mechanical/hand tools may be used by the Contractor if approved in writing by the CO. Do not use excavators, cranes, or other heavy equipment for slope scaling unless otherwise directed by the CO in writing.

## 623.02C Slope Scaling Submittals. (Added Subsection).

At least 14 days before starting slope scaling work, submit the following detailed information to the CO, in writing.

(a) **Personnel.** Provide an experienced Scaling Foreman, Scalers, and Apprentices that are qualified to perform the work. Provide written evidence for each of the following personnel showing each have satisfactorily performed similar work for the following minimum durations, or have the required certification(s). Do not use workers that have not been approved by the CO.

(1) Scaling Foreman. Provide a scaling foreman with at least 1,500 hours, and at least 3 years of documented experience as a slope scaling foreman on similar projects.

(2) Scaler(s). Provide scalers with at least 1,000 hours, and at least 1 year of documented experience on similar projects.

(3) **Apprentice(s).** Apprentices certified by the Society of Professional Rope Access Technicians (SPRAT) or a demonstrated equivalent training or certification as follows, may perform work on slopes less than 50 vertical feet in total height, at a ratio of two assigned designated scalers to one apprentice.

(a) SPRAT or PCIA Certified Level I Technician, or demonstrated equivalent training, with at least 500 hours of dual rope access within the last year (see <u>www.sprat.org and https://pcia.us/</u>); or

(*b*) SPRAT or PCIA Certified Level II Technician with Veterans Preference. Submit DD Form 214 or equivalent DD Form documenting an *Honorable Discharge*. Veterans with preference will be given priority.

(b) Slope Scaling Work Plan. Submit a plan detailing the following information. Do not start slope scaling work until the CO approves the work plan in writing.

(1) The proposed construction sequence and schedule.

(2) The types of equipment and tools to be utilized in the work.

(3) The number of Scaling Foremen, Scalers, and Apprentices working on the project.

(4) Removal and disposal plan for existing ditch debris and debris generated from slope scaling and vegetation removal.

(5) Provide a traffic control plan during open road periods.

(6) Provide a plan consistent with Section 656 to protect existing road, utilities, existing barriers, and the environment during slope scaling operations.

## 623.02D Slope Scaling Operations. (Added Subsection).

(a) Provide work site safety and perform work to protect workers, equipment, and the travelling public from hazardous, and potentially hazardous conditions. Do not perform work when the Scaling Foreman is not present to direct the work. Maintain constant two-way radio contact between the Scaling Foremen, on-slope scalers and apprentices, equipment operators, and flaggers.

Provide safety scaling beyond scaling and tree removal limits boundaries as needed to safely perform the prescribed work. This work is subsidiary to the prescribed work and the hours needed to perform this work will not be tracked or paid for separately.

(b) Perform work such that a Scaling Foreman has constant visual contact with all scalers and apprentices working on unstable slopes. Provide additional Scaling Foremen to ensure this requirement is continuously met. The Scaling Foreman is not allowed to slope scale with the on-slope scalers/apprentices.

(c) Only use apprentices on slopes less than 50 vertical feet in total height. Do not allow apprentices on these slopes when the two designated scalers cannot accompany the apprentice; and when the Scaling Foreman cannot directly supervise the apprentice. If an apprentice scaler is performing in a dangerous or unsafe manner at any time, they will be removed from the project by the CO.

(d) Remove trees and other vegetation as shown in the plans, as specified herein, and as directed by the CO. Cut trees and large woody shrubs according to Subsection 201.04, leaving root wads intact. Remove vegetation before the rock scaling operations begin.

(e) Unless otherwise directed by the CO, establish anchors for ropes/cables within the work limits.

(f) Scale unstable slopes from the top, working down toward the road, removing loose, detached, and identified blocks/areas of rock as the work progresses.

(g) Perform general scaling and intensive scaling according to the plans, the CO-approved Slope Scaling Work Plan, these Section 623 requirements, and as directed by the CO.

(h) Remove scaled rock blocks that hang up on slopes during scaling operations. Remove additional rock blocks as directed by the CO, and continue scaling an unstable slope until directed by the CO to stop work on the unstable slope.

(i) Break non-transportable rocks into manageable pieces for hauling and in accordance with Subsection 107.10.

(j) Adjust operations and allow emergency traffic through the work site according to Subsection 156.04.

(**k**) Re-establish the original ground surveyed according to Subsection 623.02A by removing debris generated from slope scaling and vegetation removal. Dispose of the removed debris according to Subsection 203.05(a).

### Measurement

## 623.04 Add the following:

Do not measure temporary traffic, utility, and environmental protection related to Section 623 work.

Do not measure construction survey and staking; clearing and grubbing; and removal of structures and obstructions to the designated disposal area(s) related to Section 623 work.

Do not measure hours for the Scaling Foremen.

Do not measure hours for safety scaling work.

Do not measure special labor hours when the Scaling Foreman is not overseeing the scalers or apprentices.

Measure special labor hours by actual hours of production time of each scaler/apprentice for all unstable slopes.

Hour measurements for each special labor – scaler starts when each scaler/apprentice is equipped and begins to climb the rockfall mitigation slope; and ends when each scaler/apprentice has descended the rockfall mitigation slope.

## Payment

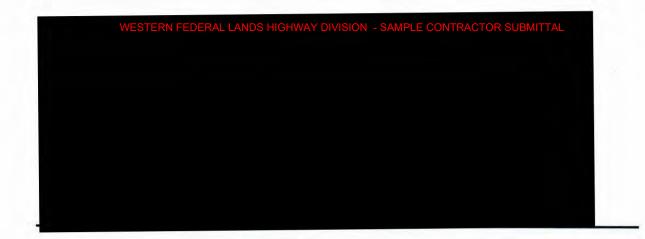
### 623.05 Add the following:

Payment for special labor hours are based on the total hours shown in the bid schedule, and is not subject to adjustments under Subsection 109.06 when special labor hours deviate from the estimated hours shown at each individual unstable slope.

Hours for each special labor – scaler will be rounded up to the nearest quarter hour at the end of each shift.

#### WESTERN FEDERAL LANDS HIGHWAY DIVISION - SAMPLE CONTRACTOR SUBMITTAL

	Project Name: Project Number: Date of Submittal: New Submittal # Submittal Revision of Submit		d
I cert	Bid Item Number Bid Item work is subsidiary to) tify that the attached submittal FAR TAR	conforms to the requirements of: s asfollows: Signature Print	
UBSECT TU CON PUMPT	SCAMS - CODY MUR	Date of Rev accepted as submitted accepted as noted: <u>Scaling Fundant</u> - ONE WILLIAS <u>SSA FURBEL</u> (M rejected and requires resubmission for the fo	- JULAS KROWE. SEL JONE, AMUN WILLING Howing reasons: Further - OAUS WILLS, ROWW AND MASSING



Project: ID PFH 21(7) Warren Wagon Road

Prime Contractor: Owner: Submittal: Slope Scaling Plan.

Date: 05/13/2019

(1). The proposed scaling sequence:

- Schedule- Will be Referenced in or Narrative. Scaling will be by the day basis or as directed by CO.
- The scalers will hike up each morning this should take approximately 10 minutes. They will install Anchors with a minimum of 5000lb pullout strength per Scaler. Scalers shall not share in adequate anchoring points or Anchors rated for only one scaler. Scalers will have radio contact between flaggers, ground crew and hill crew at all times.
- Types of anchors that may be used but not limited too; Where trees are not available Grouted Cable anchors and <sup>3</sup>/<sub>4</sub> inch x 12in red heads will be used for anchoring and load sharing. Scalers will use load sharing techniques to achieve tie off points to multiple anchors. secured and anchored (self-drilling anchors, cable grouted anchors, hollow bar anchors, trees with 8in diameter bases that are alive and well, cable anchors temporarily grouted in at a minimum depth of 3-feet. Arial platform basket scaling may be done from equipment, threaded bar with and eye top or double plated with nut, read heads, load sharing anchor apparatuses.

- Once satisfactory tie off points have been inspected and excepted from scaling foremen. The scalers will begin scaling from the top of slope. Just above the Brow no more than 15 feet or as directed by CO.
- will safety scale all drilling areas and pinned drapery installation areas before any drilling activities take place in those zones.
- Scaling outside the agreed upon scaling limits will not be paid by
- Scalers will work adjacent to each other and at the same elevation.
- Scaling above one another or below unstable rocks from the tow will not be permitted.
- Each scaler should be able to cover a 15-foot swath from top to bottom of slope, descending towards the road way.
- Loose debris, soils vegetation and rock coulombs will be removed as the scalers progress down the slope.
- The scalers will round the slopes brow and will not dig holes or create unstable vertical walls during scaling operations.
- Scaling hpurs will be agreed upon daily with Scaling Foreman and Prime Contractor.
- RS will keep daily logs that will have the following information; completed scaling hours for the day, area scaled daily, number of scalers that worked for that day.
- Scaling Will not commence with out approval from CO.
- Traffice control and Road protection where required will be set up before scaling activity will start.
- Spot and safety Scaling will be the typical activity for this project.
- Safety meetings between scaling crew and ground crew will happen daily and they will address the following items; overhead hazards, hydration, communication, public safety, scope of work and scaling areas, workzone safety, identification and location of first aid and fire equipment, medical support and rescue plan and personnel anchoring and inspection.
- Scaling limits will be define by CO.

 The CO will inspect the work as slope scaling progresses to determine if additional scaling is needed. If slope scaling beyond that shown is identified, continue to scale the slope as directed. The CO will inspect the work as slope scaling progresses to determine if additional scaling is needed. If slope scaling beyond that shown is identified, continue to scale the slope as directed.

(2) The types of equipment and tools to be utilized in the work.

- 33-ton air bag, 50-ton 70-ton airbags, portable wedges
- Air compressor for air bags, Chainsaws, digging tools, Radios.
- ANTSI and OSHA approved rope access gear, rope rescue bag, forest service approved fire box with fire equipment; digging tools, fire extinguisher.
- Boulder buster, 60lb Pneumatic Hand drill, portable wedges, steel scaling bars
- o PPE
- Hard Toed Boots
- First aid kits.
- 13 gallon spill kits
- Forest service required fire tools.

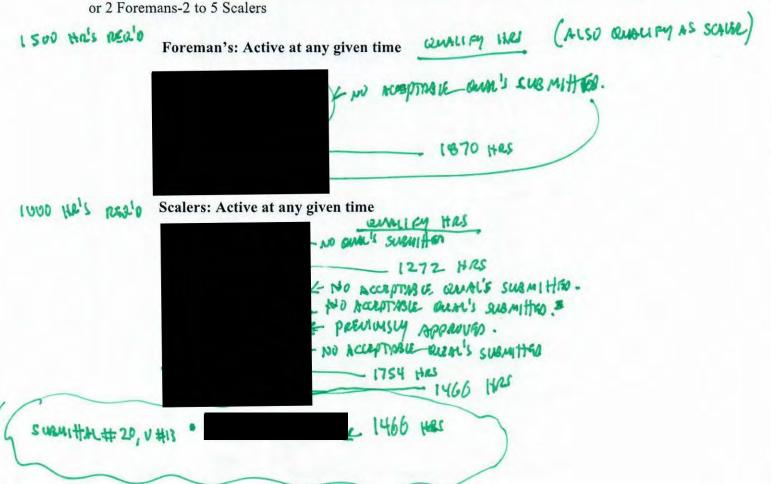
### Typical Rope Access Gear May Include but not limited to:

- <u>PMI 7/16in Extreme Pro Rope with Unicore Technology</u> Includes sewn eye on one end.
- GME Supply Orange Rescue Rope Bag
- Pac-Kit Titanium Bonded Shears
- <u>PMI Easy Pick Off Strap</u> The PMI Easy Pick Off Strap was designed to weigh less and take up less room too.
- (4) WestFall Pro 7400 4-7/8"x3" Steel Carabiners
- <u>Blue Water 3' Rhino Anchor Loop Sling</u> The straps are available in a wide variety of lengths to accommodate different size structures. The straps are

durable, lightweight, portable and easy to use. The anchor strap can be used in a number of configurations providing a safe and secure attachment point.

- <u>Rock Exotic Aztek Compact System</u>
- West Fall Pro 7410 Carabiner
- o West Fall Pro Chest Ascender
- Choose your descender from the three options below:
- West Fall Pro D4 Work Rescue Descender The D4 has a 240kg (500lbs)
   Working load limit which means it is suitable for two-man rescue, without the need for the creation of extra friction. The handle mechanism is designed to rotate through 360° making its use easier and simpler.
- <u>DBI Sala No Worries Descender</u> Double stop descender for 7/16" rope (8700387)
- Petzl I'D Small self-braking rope descender
- 300' x 7/16" Kernmantle Rope with Sewn Eye

(3) Personnel Qualifications: (see attachemnts for resumes). Scaling Foremen & Scalers-1 or 2 Foremans-2 to 5 Scalers





(4) Removal and disposal plan for debris generated from slope scaling and vegetation removal. **DONE BY PRIME CONTRACTOR**:

# OWNER/PRESIDENT

started and the started in 2011 after working several years for other rock stabilization companies when he realized there was a business opportunity for this niche industry. He has since grown the business to more than 20 Laborers and Scaling Specialists, Project Manager and Office personnel. The provide of the prides of the service and the best quality work and working relationship he can provide. He prides himself on striving for perfection and will do whatever it takes to make sure the job is done right and to the satisfaction of our customer.

## **Qualifications & Certifications:**

- S.P.R.A.T. Certified
- Federal License to possess explosive materials; US DOJ Bureau of ATF
- School of Vermont Rope Training Classes I & II
- Scaling Team Leader for Janod, Inc 2010-2012
- Traffic Control Supervisor Certification
- ACI Certified Shotcrete Nozzleman
- Heavy Equipment Operating since 2005
- Performing Soil Nail Walls and Slope Stabilization projects since 2005
- OSHA 30 Hour Safety Class
- Over 4,000 hours of Slope Scaling and Ground Scaling since 2005
- Over 10,000 LF of Drilling and Bolt Installation since 2005
- Over 500,000 SQFT of Wire Mesh Systems Installed (Tecco®, Cable Netting Type 1, DTWM and more)
- Over 2,000 LF of Timber Set Removal
- Over 3,000 LF of Steel Set Erection
- Certified Erosion and Sediment Control Manager; Oregon Dept of Transportation
- NCCCO Certified (National Commission for the Certification of Crane Operators)
- OSHA Certified Rigger-Signaler
- Level I Antiterrorism Awareness Trained
- US Department of Labor Mine Safety and Health Training
- Hazardous Waste Operations and Emergency Response Training
- Nissan Forklift Safe Operator Certified
- BNSF & UP Erail Contractor Safety Qualified
- 15,000lf of Rockfall Barrier Fence

(cont'd pg. 2/2)

## **Key Skills:**

**Rock Scaling** Shotcrete Soil Nail Walls Drilling Grouting Wire mesh installation Traffic Control Supervisor Certified Heavy Equipment Operating Bidding/Estimating/Proposals/Submittals Employee Management **Budgeting and Cost Controls** Rock bolt and anchor installation Clearing and Grubbing **Chuck Tending** Plugger Time Management Blasting

## **Employer Summary:**

- Owner/Operator
- Scaling Team
- Laborer

Experts 2011-present Rock Stabilization Specialists 2010-2012 2005-2010

## **Education:**

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## **Contact Information:**

**Owner/Operator** 



has been in the logging and hazard removal business since 2002 when he started with clearing and grubbing and installing fire lines. have known each other since childhood, shortly after starting on as a co-owner/laborer. The is instrumental in helping the operations run smoothly for as he is on the job site full time. The liaison between the job site and the office for employee relations and materials ordering and handling as well as relations with the on-site job owner, inspectors and/or subcontractors.

## **Qualifications & Certifications:**

- BNSF & UP Erail Contractor Safety Qualified
- Operator Safety Training Certified
- OSHA Certified Rigger-Signaler
- Nissan Forklift Safe Operator Certified
- ACI Certified Shotcrete Nozzleman #01371245
- Over 3,000 hours of rock scaling since 2002
- Trail reconditioning and grooming more than 10 years
- Heavy Equipment Operating since 2002
- Over 15,000 LF of rock drilling
- Certified CAL OSHA Gas Tester
- Steel set erector and retaining wall installation

WESTERN FEDERAL LANDS HIGHWAY DIVISION - SAMPLE CONTRACTOR SUBMITTAL

(cont'd pg. 2/2)

## **Key Skills:**

**Rock Scaling** Shotcrete Soil Nail Walls Drilling Blasting Grouting Wire mesh installation **Traffic Control** Heavy Equipment Operating Employee Management Rock bolt and anchor installation Clearing and Grubbing **Chuck Tending** Plugger Time Management Fire fighting Fire line digging Tree falling Trail grooming Logging

# Employer Summary:

 • Owner/Laborer
 2011-present

 • Project Manager /, Inc- 2004-2011

 • Laborer - 2002-2004

 • Laborer 2002

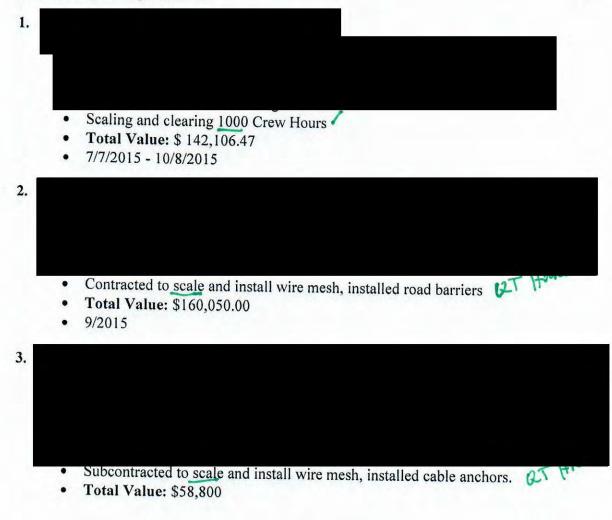
## **Contact Information:**

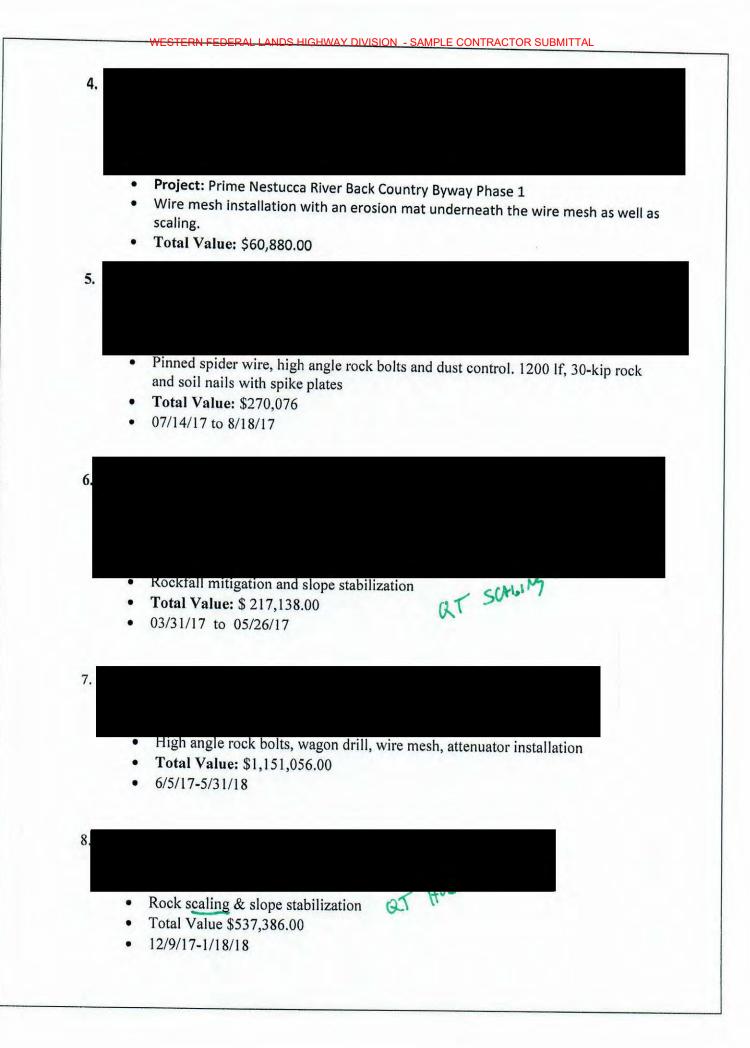


Project Manager

joined the second team in 2018, bringing with him over 16 years of experience in the rockfall industry with certifications and training in construction and geotechnical engineering. The has experience with the operation of light equipment, hydraulic/air systems and rope access work and is a reliable and dedicated employee that works well both individually and in a team environment. The assisted in the Rockfall program at and helped the company grow their yearly revenue to over \$5 million.

# **Previous Project Experience:**





## **Key Skills:**

**Clearing & Grubbing** Rock Scaling Shotcrete Soil Nail Walls Drilling Grouting Wire mesh installation Traffic Control Supervisor Certified Heavy Equipment Operating Bidding/Estimating/Proposals/Submittals **Employee Management Budgeting and Cost Controls** Rock bolt and anchor installation **Chuck Tending** Plugger **Time Management** Blasting

## **Employer Summary:**

**Contact Information:** 

started with and has shown amazing growth in a short time. experience in both the United States Army and the Florida National Guard prepared him for both the harsh environment, physically grueling labor, and mental fortitude required to be in the Rock Fall Stabilization Industry. started as a General Laborer with and through hard work, determination and the willingness to go the extra mile, he has proven he is a valuable employee and earned the position of Job Site Supervisor.

## **Qualifications & Certifications:**

- Nissan Forklift Safe Operator Certified .
- Oregon Commercial Driver's License
- OSHA Certified Rigger-Signaler Training
- Army Commendation Medal for his service during Operation Enduring Freedom WHERE? WHEN? PROJECT?
- NCCCO Crane Operator Certification
- BNSF & UP Erail Contractor Safety Qualified
- Over 15,000lf of Rock Drilling & Bolting
- Over 1,500 Hours of Rock Scaling
- Over 4,000lf of Rockfall Barrier Fence Installed
- Over 20,000sf of Soil Nail Wall Installation
- Over 2,000cy of Shotcrete Nozzleman experience

# **Key Skills:**

Rock Scaling Shotcrete Soil Nail Walls Drilling Grouting Wire mesh installation Heavy Equipment Operating Employee Management Rock bolt and anchor installation Clearing and Grubbing Chuck Tending Plugger Time Management On-site Security detail Mechanical repair

# Employer Summary:

## **Contact Information:**



# **On-Site Supervisor**

started with **and the second of an experience** of our original employees. He came to us with more than 10 years of Construction and Mill experience. Dustin is an instrumental employee on our scaling and ground crews. His background in the Construction industry has translated well in the Rockfall Mitigation industry and he shows strength, determination and a desire to do the best job possible.

## **Qualifications & Certifications:**

- Nissan Forklift Safe Operator Certified
- OSHA Certified Rigger-Signaler Training
- NCCCO Crane Operator Certification
- BNSF & UP Erail Contractor Safety Qualified
- WSDOT Traffic Control Supervisor Certification
- ODOT Traffic Control Supervisor Certification
- Over 100,000sf of Wire Mesh Drapery Installation
- Over 1,500 hours of Rock Scaler Foreman
- Over 10,000lf of Rock Drilling/Bolting

## **Key Skills:**

Rock Scaling Shotcrete Soil Nail Walls Drilling Grouting Wire mesh installation Heavy Equipment Operating Employee Management Rock bolt and anchor installation Clearing and Grubbing Chuck Tending Plugger Time Management On-site Security detail Mechanical repair

# **Employer Summary:**

**Contact Information:** 

Foreman

has been in the Rockfall Mitigation industry since 2006 when he started with on a rockfall job in Oregon City, Oregon. Nate has extensive experience with tunnels, snotcrete, and rock drilling.

# **Qualifications & Certifications:**

- ACI Certified Shotcrete Nozzleman
- BNSF & UP Erail Contractor Safety Qualified
- Over 20,000lf Rock Drilling and Bolting
- 5,000cy of Shotcrete Nozzleman Experience (hand & robot)
- Over 2 miles of Timber Set Removal & Steel Erection
- Over 2,000 hours of Rock Scaling
- Over 20,000sf of Soil Nail Wall Installation

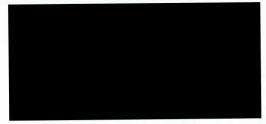
# **Key Skills:**

Rock Scaling Shotcrete Soil Nail Walls Drilling Grouting Wire mesh installation Heavy Equipment Operating Rock bolt and anchor installation Clearing & Grubbing

# **Employer Summary:**



## **Contact Information:**



WESTERN FEDERAL LANDS HIGHWAY DIVISION - SAMPLE CONTRACTOR SUBMITTAL

Project Name: Project Number:	Warren Wagon Road
Date of Submittal: 05/20/19           New Submittal #           Submittal Revision of Submittal #	1 Copies Attached
Bid Item Number (or Bid Item work is subsidiary to)	Abor, Slope Scaling Version 14
Name/Signature of	FHWA Use Only
Receiver Name/Signature of Reviewer This submittal Z Is accepted as Z Is accepted as SEE C2	A REAL OF ALLER
Returned to Contractor	Date Returned/ 19

PROJECT: Warren Wagon Road, Western Federal Lands

Safety Plan



## Hazard Communication and Rescue Procedures:

#### Following is a list of quick checks you can make throughout the day:

- 1. -What have the weather conditions been over the past few days? Recent heavy snows? Heavy rains? Extreme heat?
- 2. -Can you observe any wind loading, deuteriation from rain, extreme heat on the slopes?
- 3. -Are you keeping an eye on the orientation and steepness of the slopes as you cross them?
- 4. -Are you lingering in gullies, bowls, or valleys?
- 5. -Noticed any recent avalanche, flash floods or high wind advisory activity on other slopes similar to the one you are on?
- 6. -If a slope looks suspect, are there alternative routes?

### **Special procedures:**

- Hazard analysis of upper brow and all areas scaled by previous contractor before work starts.
- Qualified and competent labors to perform work
- Safety meetings weekly
- Tailgate meetings daily
- Have the proper safety equipment and tools for the job.

## Extra precautions to take:

- 1. -If there is no alternative to crossing a suspect slope, so one person at a time to minimize risk.
- 2. -When descending or ascending a slope, try to stay as far away from sides as possible to decrease your chances of being caught in high winds, slippery slopes.
- 3. -Be aware of the condition of those in your party. If someone is tired, hungry, or cold they may not be using their best judgement.
- 4. -Remain constantly aware of changing weather or temperature conditions, particularly if your outing will last more than a few hours.

### Statement of Policy.

- The hazards of potential falls at heights of 4 feet and above will be addressed in this document. This instruction describes a systematic approach that must be used to protect and prevent people from falling. This instruction also lists some of the most common fall hazards and provides recommendations and guidelines for selecting fall arrest systems and identifies general practices of slope work.
- Types of fall protection equipment appropriate for use.

- Recognition of applicable fall hazards associated with the work to be completed and the locations of such.
- Load determination and balancing requirements.
- Procedures for removal of protection devices from service for repair or replacement.
- All other employees whose work operations are or may be in an area where fall protection devices may be utilized, will be instructed to an awareness level concerning hazards associated with fall protection operations and big wall drilling and scaling hazard.
- All other employees whose work operations are or may be in an area where fall protection devices may be utilized, will be instructed to an awareness level concerning hazards associated with fall protection operations and big wall drilling and scaling hazard.
- Fall protection equipment identification. Fall protection equipment having identification numbers will be checked for legibility. Fall protection equipment having illegible identification markings will be turned in to the supervisor for inspection.
- Equipment maintenance and inspection requirements will be done daily.
- Equipment strengths and limitations.
- Retraining will be provided for all authorized and affected employees whenever (and prior to) a change in their job assignments, a change in the type of fall protection equipment used, or when a known hazard is added to the work environment which affects the fall protection program.
- Additional retraining will also be conducted whenever a periodic inspection reveals, or whenever this employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of fall protection equipment or procedures.
- Whenever a fall protection procedure fails.
- The retraining will reestablish employee proficiency and introduce new or revised methods and procedures, as necessary.
- Fall Hazard Control Procedures (Fall Prevention).
- Control Procedures Development. Once a rockface or slope evaluation has taken place, procedures will be developed, documented, and utilized for the control of potential fall hazards.
- Physical observations of the work environment(s) that involve fall hazards or the potential of such.
- Observations of individuals and their job tasks and work habits that expose them to existing or potential fall hazards.
- The procedures contained in the company fall protection program. Specific procedural steps for the use and operation of body harness systems, and other fall protection systems. Specific procedural steps for the placement, erection,

inspection, maintenance, disassembly and transfer of fall protection systems or devices and the person(s) responsible for them

- Specific requirements for testing fall protection systems or equipment to determine and verify the effectiveness of the fall protection control measures. The correct procedures to rescue employees who have fallen.
- The role of each employee in fall protection plans and applicable policies.
- Protective Materials and Hardware. Appropriate fall protection devices will be provided for potential fall hazards. Selection of the equipment will be based on the fall protection evaluation. Evaluations will be conducted by **Conduct**

Foreman". At some point it may be necessary for men to hang from the rock wall due to equipment reach restrictions.

- This procedure will be the following: Drill and set <sup>3</sup>/<sub>4</sub>" anchor bolts to desired depth according to manufacturer's specifications. Install <sup>3</sup>/<sub>4</sub>" washer and nut to set anchor bolt tight against rock wall. Install <sup>3</sup>/<sub>4</sub>" (equally rated) threaded eyelet on exposed threads followed by a locking <sup>3</sup>/<sub>4</sub>" nut. All Anchors for Personnel will have a 5000 lb pull out strength per Persons.
- Cable anchors or grade 75 inch all thread bar grouted in with high strength grout.
- Fall Protection devices will be singularly identified; will be the only devices(s) used for controlling falls; will not be used for other purposes; and will meet the following requirements:
- Capable of withstanding the environment to which they are exposed for the maximum period that exposure is expected.
- All anchors will be capable of withstanding the ultimate load of 5,000 lbs. for the maximum period that exposure is expected.
- Standardization within company facilities. Fall protection devices will be standardized whenever possible.

Full Body Harness Systems. A full body harness system consists of a full body harness and 5-point fall resist for rappelling, lanyard, energy shock absorber, and self-locking snap hook, ANTSI and OSHA approved gear for ascending and descending. All gear and full-body harness system to be inspected before use by the supervisor and/or the user.

## SAFETY AND MEDICAL EVACUATION PLAN:

- Hazard analysis will be done before work starts. Identify hazards.
- Prime will have equipment to open road at any time.
- Pre-work safety meeting and hazard analysis will happen before any scaling is done. The best measure for scaling injuries is awareness and identification of potential hazards. Preventive measures are a key to accident awareness.
- Only qualified and trained personnel will attempt rescue. The first thing will be done is make sure all hazards are clear and no rescuers will be in danger.

- In the event emergency or evacuation or rope rescue of injured personnel
   will first call local authorities; search and rescue, ambulance, fire department. If First responders are not able to rescue
   will use double rope rescue system.
- Manlift on site will be first activity to be used for rescue. The injured worker will be placed in platform by two laborers securing the neck and lower body when lifting. If it is neck or back injury the injured persons will be not be moved until first responders show up. All onsite personnel have up to date first aid and cpr cards.
- Injured worker will be picked off from trained persons with double rope system. The use of pulleys and a quantum back up device will be used to load transfer injured worker from there rope to rescuer rope. The rescuer will straddle the injured persons between legs and take the dead weight on to the second rope if applicable. These quantum devices will release injured worker from his rope and transfer to rescue rope. Depending on location on injured worker will be taken down the slope or up slope.
- If injury happens first responders will be called immediately.

# **Rope Protection:**

- Rope protectors will be placed on ropes where rope rub happens on the brow or sharp rocks. Rope protectors will consist of fabric covers or rubber hosed wrapped around rope.
- All rope will be in good working condition and free of frayed threads or knots that are not blood knots, buttery fly knot, or figure eight knots.
- Tree protectors will be used around bark when wrapping trees for decent. Splicing of rope will fall under these knots.
- Ropes will be cared for by cleaning them from grit by washing by hand and hang drying. Ropes will be wrapped up daily and not left out in the elements.

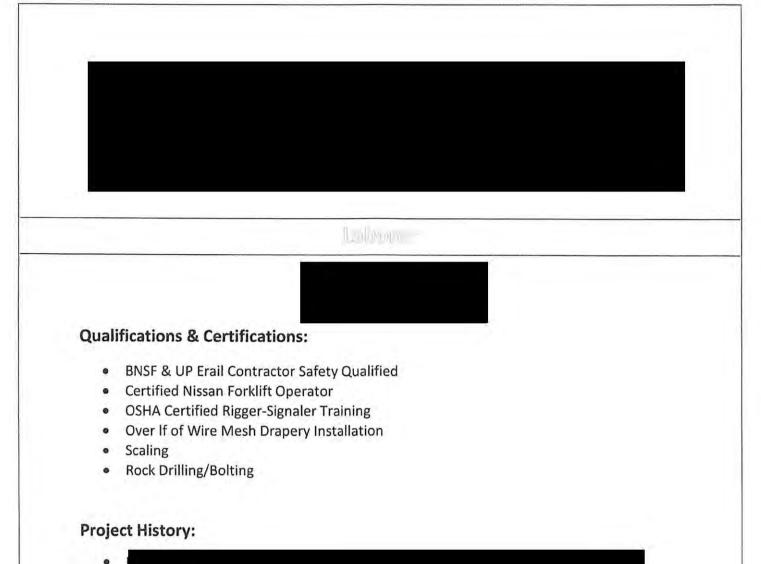
# Warren Wagon Road ID PFH 21(7)

#### **Emergency Evacuation Plan**

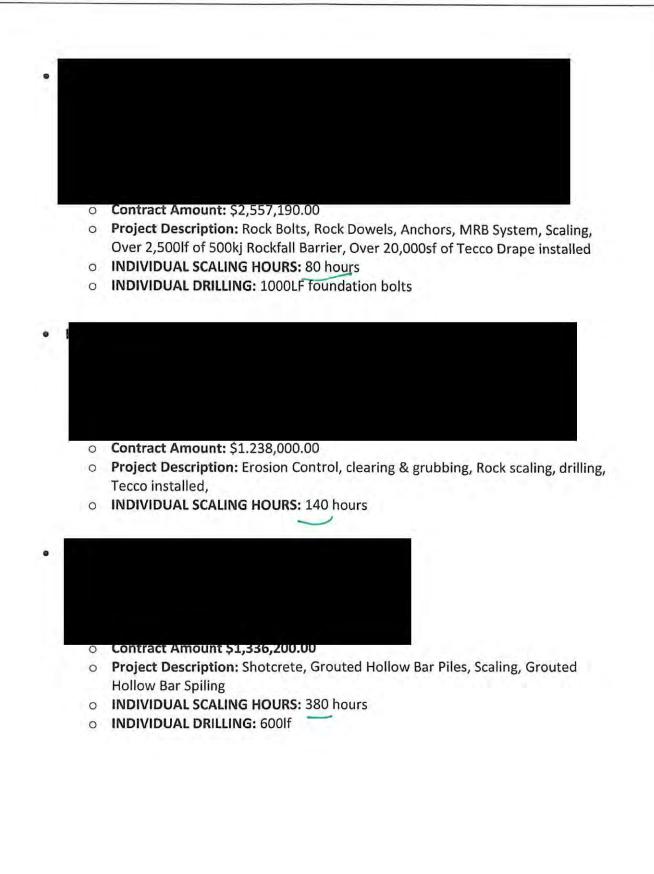
Emergency services are informed about rockfall operations and will have a Sheriffs boat on standby in case of any emergency that occur at the north end of the project and **standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of any emergency that occur at the north end of the project and standby in case of any emergency that occur at the north end of the project and <b>standby in case of an** 

Life Flight is also informed to land at North beach if every other resource is not available to make it to the north end of the lake in a timely manner.

accessible in case of an emergency ever arises.



- Contract Amount: \$2,003,000.00
  - Project Description: Over 400 hours of Rock Scaling, 6,000lf Rock bolts, Blasting, 8,000cy debris removal
  - o INDIVIDUAL SCALING HOURS: 100 hours
  - INDIVIDUAL DRILLING HOURS: 1200lf rock bolts





- o Project Description: Scaling, Tecco Mesh , Jersey Barrier, Cable Install
- INDIVIDUAL SCALING HOURS: 40 hours

## Key Skills:

Rock Scaling Shotcrete Soil Nail Walls Drilling Grouting Wire mesh installation Heavy Equipment Operating Rock bolt and anchor installation Clearing and Grubbing Mechanical repair

## **Employer Summary:**

- •
- •

## **Contact Information:**

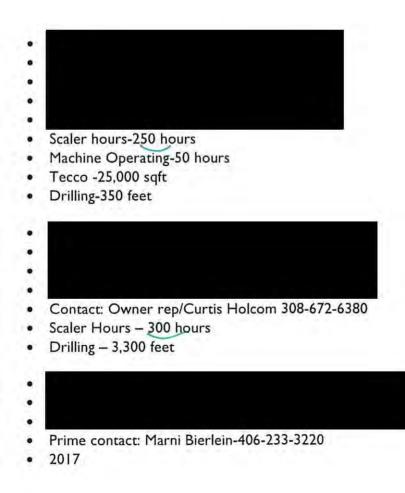




Experience; Forklift Operator:5 years (1,100 hours) SkidSteer Operator: 5 years (1,100 hours) Rock Scaler: 3.5 years Driller/Installer: 2.5 years (4,000 feet) Shotcrete: 1,500 yards

Rockfall Experience

# Construction Projects:



- Scaler Hours 150 hours
- Drilling 1,400 feet

-		
0		
Sca	ler Hours – 250 hours	
Dri	lling - 800 LF	
Sho	tcrete – over 750 CY	
Ś.		
0		
1		
Dri	lling – 750 LF	
	outing – 40 hours	
	ling- 100 hrs	





Completion Date: November 1, 2019

Date: 7/31/18 Submittal: #20 Road Protection Plan

#### Narrative of work for roadway protection

will supply concrete jersey barrier and place in the middle lane or slope side of road way to protect from debris falling in the road way or past roadway into Payette lake. Location of barrier will be determined and changed by each different location that slope scaling work is being done.

Sincerely,



Field Engineer

CC via Email:

July 30, 2018

To whom it may concern,

is giving pe	mission to	to dispose of exc	ess road material in the
area that is owned by area is a pre-existing disposal area.		Commercial Street on	. The
for any mis-use of this site.	n shall not hold	or the landowner,	, responsible

This site will also be used as a concrete/grout washout area.

There shall be no hazardous waste disposed of at this site, i.e oils, tires or other materials of this nature.



#### WESTERN FEDERAL LANDS HIGHWAY DIVISION - SAMPLE CONTRACTOR SUBMITTAL

1	WASHINGTON
2 3 4 5	The Contractor agrees to pay and authorizes the Project Engineer to deduct from any money due or coming due to the Contractor the above liquidated damages for failure to complete the work as specified.
6 7	Temporary Traffic Control
8 9	General
10 11	Section 1-10.1 is supplemented with the following:
12 13 14 15	(April 1, 2013) The Contracting Agency will provide the following labor, equipment and/or materials resources to the Contractor for use on the project.
15 16 17 18 19	*** Traffic Control Supervisor Traffic Control Labor Traffic Control devices ***
20 21 22 23	The Contractor shall notify the Engineer when each resource is to be utilized and shall provide a minimum of *** 3 *** working days advance notice to allow any necessary arrangements to be made.
24 25	Division 2 Earthwork
26 27 28	Roadway Excavation and Embankment
29 30	Construction Requirements
31 32	Rock Cuts
33 34	Section 2-03.3(2) is supplemented with the following:
35	(******)
36 37	Rock Slope Scaling and Removal and Disposal of Rock Slope Scaling Debris The Contractor shall remove loose rock and soil from the existing rock slope locations
38	shown in the Plans or as specified by the Engineer, and shall remove and dispose of
39 40	all rock slope scaling debris generated by the work.
41	Equipment
42 43 44 45	Between August 6, 2018 and September 23, 2018 all Contractor work shall be performed with scaling bars, air pillows, and other hand tools demonstrated to be effective in performing the work to the satisfaction of the Engineer.
45 46 47 48 49 50	After September 23, 2018 all Contractor work shall be performed with scaling bars, portable hydraulic wedges, air pillows, hand drills, splitters, and other mechanical or hand tools demonstrated to be effective in performing the work to the satisfaction of the Engineer.

.

1	Submittals
2 3 4 5 6 7	The Contractor shall submit a rock slope scaling plan to the Engineer for approval in accordance with Section 1-05.3. The rock slope scaling plan shall include, but not be limited to, the following:
5 6 7 8 9 10 11	<ol> <li>Documented work experience of all rock slope scaling foremen and scalers scheduled to be working on the project. Rock slope scaling foremen shall have at least 1,500 hours of documented experience as a rock slope scaler. Rock slope scalers shall have at least 1,000 hours of documented experience as a rock slope scaler.</li> </ol>
12 13	2. The proposed construction sequence and schedule.
13 14 15 16	<ol><li>The type of tools and equipment to be used for rock scaling purposes.</li></ol>
17 18 19 20	<ol> <li>The number of rock slope scaling crews to be employed on the project, with a rock slope scaling crew defined as one qualified foreman and two qualified scalers.</li> </ol>
21 22 23	<ol><li>Operation plan for collection, removal and disposal of all rock slope scaling debris generated by the rock slope scaling work.</li></ol>
24 25 26 27	<ol> <li>Operation plan for protection of roadway surface, guardrail, guideposts, pavement markings, railroad facilities, structures, utilities, and other facilities adjacent to the rock slope scaling locations.</li> </ol>
28 29 30 31	<ol> <li>If the roadway is exposed to the collection of rock slope scaling debris, the submittal shall include the equipment and procedure to be used to clear the roadway for public use between rock slope scaling operations.</li> </ol>
32 33 34 35	The Contractor shall not begin rock slope scaling operations until receiving the Engineer's approval of the rock slope scaling plan.
36 37 38 39 40 41	Rock Slope Scaling Construction Requirements As a first item of work, the Contractor shall clear the rock slope of trees and woody vegetation within the work zone as shown in the Plans or otherwise specified by the Engineer. The vegetation shall be close cut, leaving the root wad intact. No trees shall be removed from the top of the slope crest.
42 43 44 45 46 47	The Contractor shall conduct rock slope scaling operations in accordance with the details shown in the Plans, the traffic control restrictions and requirements shown in the Plans and specified in the Special Provisions, and the rock slope scaling plan as approved by the Engineer. The size and work experience of the rock slope scaling crew as defined above shall be maintained at all times.
48 49 50 51 52	Rock slope scaling shall begin at the top of the rock slope and work shall proceed down slope, removing loose rock and soil as the work progresses. The extent of rock slope scaling shall be as shown in the Plans and as adjusted in the field by the Engineer.

\_

1	WASHINGTON Rock Slope Scaling Debris Collection and Removal
1	
2 3 4	The Contractor shall collect, remove and dispose of all rock slope scaling debris
3	generated by the work, including all rock debris within the limits of the project
4	present at the base of the slope at the beginning of the project. Ditches and
5	benches shall be cleared of all rock slope scaling debris and returned to original
6 7	functional condition as specified by the Engineer.
8	The Contractor shall break up any rocks that are too large to transport into
9	manageable sized pieces for haul.
10	
11	Rock slope scaling debris collection and removal shall be conducted in
12	accordance with the traffic control restrictions and requirements shown in the
13	Plans and specified in the Special Provisions, and the rock slope scaling plan
14	as approved by the Engineer.
15	
16	Except when the Plans or Special Provisions specify a Contracting Agency
17	provided site for disposal of all or specific portions of the rock slope scaling
18	debris, all rock slope scaling debris shall be disposed of at a site conforming to
19	Section 2-03.3(7)C.
20	
21	Measurement
22	
23	Section 2-03.4 is supplemented with the following:
24	Decion 2-03.4 is supplemented with the following.
25	(April 5, 2010)
26	Rock slope scaling will be measured by the crew hour.
27	Nock slope scaling will be measured by the crew hour.
28	Book close cooling debris removal including haul will be measured by the oubic yard in
28 29	Rock slope scaling debris removal including haul will be measured by the cubic yard in
29 30	the hauling conveyance at the point of removal from the work site.
	December 2014
31	Payment
32	
33	Section 2-03.5 is supplemented with the following:
34	/######
35	(******)
36	"Rock Slope Scaling", per crew hour.
37	The unit contract price per crew hour for "Rock Slope Scaling" shall be full pay for
38	performing the Work as specified, including protection of existing facilities, and street
39	cleaning. Payment for "Rock Slope Scaling" shall begin once the Contractor has
40	commenced work activities and shall end when the Contractor concludes work activities
41	each working day.
42	
43	"Rock Slope Scaling Debris Removal Incl. Haul", per cubic yard.
44	The unit contract price per cubic yard for "Rock Slope Scaling Debris Removal Incl. Haul"
45	shall be full pay for performing the Work as specified, including collection, removal and
46	disposal of all rock debris within the limits of the project present at the base of the slope
47	at the beginning of the project and as generated by the Work.
48	• •
49	All costs in connection with felling of trees and woody vegetation from the site as
50	specified, and collection, removal and disposal of all trees and woody vegetation cut and
51	removed from the slope, shall be included in the unit contract price for "Rock Slope
52	Scaling".
	$\sim$
	SR 165

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## SPECIAL PROVISION FOR HAND SCALING ROCK CUTS

## Project No. N311095 and 1507038 Combined Yellowstone National Park - Cody Chief Joseph Scenic Highway

REFERENCE: The 2010 Edition of the Wyoming Department of Transportation's *Standard Specifications for Road and Bridge Construction*.

DESCRIPTION: This special provision describes the requirements for hand scaling rock cuts.

CONSTRUCTION: Ensure the contractor performing scaling has a minimum of five years rock scaling experience. Not less than 15 working days prior to commencing the rock slope scaling, provide the engineer:

- 1. Written evidence that the rock slope scaling foreman has at least five years of demonstrated experience as a rock slope scaling foreman. The rock slope scalers must have at least two years of demonstrated experience on similar projects.
- 2. A work plan for each rock slope to be scaled. The plan will include;
  - a. The proposed construction sequence and schedule,
  - b. A list of the equipment and tools the contractor will use for each slope,
  - c. The number of scaling crews. A crew is defined as a qualified foreman and two qualified scalers,
  - d. A rock removal and disposal plan for rock and debris generated from the rock slope scaling work.

Do not begin work until the appropriate submittals have been reviewed by the engineer.

Do not allow traffic to pass through the work zone during scaling operations.

Protect the pavement with a system to minimize roadway damage. Repair damaged pavement at no additional cost to the department. Clear the roadway and ditches of rock, load, haul, and dispose of rock debris at the designated waste areas:

- project N311095 at approximately RM 37.38 on US 14/16/20, Lot 1 in the SE1/4, SW1/4, Section 11, T52N, R104W
- project 1507038 at approximately RM 34.89 on WYO. 296 in the NW 1/4, NW 1/4, of Section 26, T55N, R104W.

Provide a crew that consists at all times of a working foreman and two scalers on the slope. Immediately replace with a foreman or scaler any crew member who leaves. Utilize light mechanical means such as airbags, hydraulic jacks or splitters, to remove unstable rock that cannot be removed by conventional manual methods.

Following completion of scaling operations on a slope, the site will be inspected by the engineer to determine whether the scaling is complete. If additional rocks are identified as being hazardous, continue to scale the slope until the scaling has been completed to the satisfaction of the engineer.

MEASUREMENT and PAYMENT: The engineer will measure:

- 1. Scaling (manual) by the crew-hour, with a crew defined as a working foreman and two scalers clipped into ropes and on the slope. Standby time while the road is cleared of debris and traffic passing through the work zone will be at the manual scaling rate.
- 2. Setup or breakdown time of personnel and equipment for scaling (manual) will not be measured directly for payment. Hand (manual) scaling from a man lift or another piece of equipment will be paid for as Scaling (Manual).

The department will pay as follows:

Pay Item	Pay Unit	Measure to the Nearest	Pay to the Nearest
Scaling (Manual)	CRWH	0.5 h	0.5 CRWH

When specified, the engineer will measure and pay for loading, hauling, and disposing of rock debris material as Unclassified Excavation in accordance with Section 203, Excavation and Embankment.

09-08-16

## SPECIAL PROVISION FOR HAND SCALING ROCK CUTS

## Project No. I802200 Rock Springs-Rawlins Point of Rocks West Section

REFERENCE: The 2010 Edition of the Wyoming Department of Transportation's *Standard Specifications for Road and Bridge Construction*.

DESCRIPTION: This special provision describes the requirements for hand scaling rock cuts.

CONSTRUCTION: Prior to the pre-construction conference, submit to the engineer for review a rock retention system plan that will prevent any rocks and debris from reaching the eastbound travel lane. Provide documentation of previous successful use of the rock retention system on other rock scaling projects. A rock scaling report is available from the department's Geology Program upon request.

Submit to the engineer for review a construction plan 10 working days prior to the safety element conference described below.

Include the following in the construction plan:

- 1. The name of the contractor or subcontractor responsible for the plan preparation and the proposed work
- 2. Schedule, procedures, equipment, and sequence of operations
- 3. Any additional actions or hazard recognition that will be taken to ensure that the work will be performed safely
- 4. The names and qualifications of workers who will be in charge/responsible for the work including:
  - a. Years of experience mitigating rockfall; and
  - b. The number of scaling crews. A crew is defined as a qualified foreman and two qualified scalers,
- 5. A rock removal and disposal plan for rock and debris generated from the rock slope scaling work.

The area in which the contractor will be performing the rock scaling work is within the

### WYOMING

limits of active rockfall. The contractor needs to recognize the hazards related to rockfall mitigation construction as well as the following safety elements:

- 1. Work requiring the use of an excavator and heavy equipment to move scaled material ; and
- 2. Rock scaling and rope access.

Schedule a safety element conference with the engineer 10 working days prior to beginning construction on each safety element. Attendance is mandatory for the contractor, the appropriate subcontractors, and the contractor's foreman/safety officer.

After the safety element conference, and prior to beginning work on the safety elements, submit a final construction plan to the engineer for record purposes only.

Provide the following to the engineer 14 calendar days prior to commencing the rock slope scaling:

- 1. Written evidence that the rock slope scaling foreman has at least five years of demonstrated experience as a rock slope scaling foreman. The rock slope scalers must have at least two years of demonstrated experience on similar projects.
- 2. A rock scaling plan for each rock slope to be scaled. The plan will include:
  - a. The proposed construction sequence and schedule; and
  - b. A list of the equipment and tools the contractor will use for each slope.

Do not begin work until the rock scaling plans have been approved by the engineer.

Prior to scaling, any potential rocks which may require short term closures of the highway should be identified and brought to the attention of the engineer.

Do not allow any traffic on the west bound lane travel lane during scaling operations. Provide protection and/or rockfall barrier for the existing roadway and highway features to prevent damage from scaling and excavation operations. Repair any damage to the roadway and highway features.

Provide a crew on the slope that consists at all times of a working foreman and two scalers. Immediately replace with a foreman or scaler any crew member who leaves. Access to the top of the slope is limited and any equipment must stay on the existing two-track roadway.

Following completion of scaling operations, the site will be inspected by the engineer to determine whether the scaling is complete. If additional rocks are identified as being

hazardous, continue to scale the slope until the scaling has been completed to the satisfaction of the engineer.

Clear the roadway and ditches of scaled rock, load, haul, and dispose of rock debris at the Point of Rocks waste area (RM 130.0). Use equipment to shape the stockpiles so an accurate volumetric measurement can be obtained.

Remove the rock retention system and return the roadway to its original condition including making repairs to any damaged highway features including the pavement.

MEASUREMENT and PAYMENT: The engineer will measure:

- 1. Scaling (manual) by the crew-hour, with a crew defined as a working foreman and two scalers clipped into ropes and on the slope, and will not include setup or breakdown time of personnel and equipment.
- 2. Scaling (Manual) by the crew-hour for work performed using a man lift or another piece of equipment, and will not include setup or breakdown time of personnel and equipment.

Scaling (Manual) will include all items, materials and labor used for the installation, repair and removal of the rock retention system and restoring the roadway to its original condition.

The department will pay as follows:

Pay Item	Pay Unit	Measure to the Nearest	Pay to the Nearest
Scaling (Manual)	CRWH	0.5 h	0.5 CRWH

05-16-18

#### CONSTRUCTION WORK PLAN: CHIEF JOSEPH HIGHWAY SCHEDULE

#### Scaling and Installation of Mesh and Anchors

July 24<sup>th</sup> and the second will begin the installation process for the anchors. Each hole will be drilled with a Pneumatic air drill rig. The drill rig will use vegetable oil for drilling oils and also biodegradable drill oils. The drill rig has a hoist and wheels to be able to mobilize it on top of slope. The anchors will be installed to a minimum of 5 feet deep and 3.5in diameter holes. All materials requirements will meet all specifications out lined in the special provisions for rock fall mesh. Grouting of anchors will be done from bottom of hole up.

Drill holes will be uniform and in straight line. Drilling equipment (see attachment). Holes will be drilled and flushed to meet special provisions diameter, length and alignment.

**July 28<sup>th</sup>-**Drilling will be done and grout will be in the cure stage. Grout will cure for a minimum of 3 days. Testing requirements will meet special provisions for wire mesh testing and grouting. Testing Equipment will meet all special provision requirements (anchor testing).

July 31st-Aug 3rd-Testing will be completed to meet all special provision requirements.

Aug 4th-Top cable installation to be done per specifications.

Aug 7<sup>th</sup>-8<sup>th</sup>-Once the top cable, bearing ropes and rope anchors are completed **transform** will begin hanging the slope. **The slope and the slope** will use a 60-ton Boom Truck (truck and crane operator provided by NCSG Crane and Heavy Haul) to lift each mesh panel to the top of the slope. The boom truck will have a 150-foot tag line that is hooked up to a pick bar. The rolls of mesh will be precut and placed in the ditch with the curl facing the hill. The boom truck will lift each pick one at a time up above top of slope and lower bottom of mesh panel to top cable.

Employees will then grab the bottom of the mesh and secure it with 9-gauge tie wire to the top cable. Once the wire mesh is secured the boom truck will lower the mesh down the slope. **Secure and the mesh and secure and the mesh and the mesh and the mesh reaches bottom of slope the quick release on the pick bar will be activated and the mesh will be released from the boom truck. The next pick will be done the same with a 2-foot overlap on each mesh panel.** 

There will be safety meeting done daily to ensure safety and communication. The estimated time for this would take two days.

"An Equal Opportunity Employer"

### List of Proposed Equipment to be used:

- IT-28 Front End Loader (
- 228 or 308 Komatsu Excavator (
- 18 CY Side Dump (
- Air compressor for drilling, grouting and seeming panels. (<sup>\*</sup>
- A 60-ton Boom Truck capable of lifting 600 pounds with a licensed and insured crane
- operator with lifting experience (
- Gradall fork lift for moving material. (
- T.31 Hydraulic drilling machine (
- Canyon Pneumatic Rock Drill Model MA90 (

#### WYOMING CONTRACTOR SUBMITTAL



Supervisor

### Work Experience:

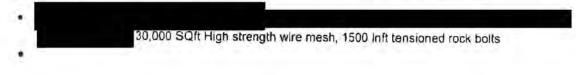
	2013-2017( 1800 scaling hours )
Supervis	sar & Onerstor
	167 rock bolts foot, 167 rock bolts foot,
	475 feet of rockfall barrier fence with high strength tecco. Wire mesh
re	pairs and scaling.
	Wire mesh installation and scaling
2 G	50,000 Sqft Raised fences Double twist wire mesh.

#### Supervisor and Operator ( 240 scaling Hours)

- August 2011-Dec 2012

Scaling, wire mesh drapery, grubbing and clearing, jute mat, operating all-terrain 2-10 ton forklift,

35'-85' man-lifts, Krupp drill rig with both soil nail and micro pile applications. Krupp drill rig chuck tender, general labor setting mesh and rebar mat and hose tender for shotcrete.



## Supervisor and Operator ( 2500 scaling hours)

- August 1995-July 2012

Super visor of a multitude of jobs between 1997 and 2012.

Installing rock fall protection, scaling, grubbing and clearing, rock drilling, rock chuck tender, liner drill operator, operating all-terrain 2-10 ton forklift, wheeled and track bobcat, outdoor boom man-lifts 35'-120', front-end loader. Worked on

#### WYOMING CONTRACTOR SUBMITTAL



Small Business (ESB)

installing triple twist wire mesh for three months and the three Laupahoehoe gulches in Hawaii for 15 months installing tecco drapery and pin tecco as well as RXI fences.



#### Experience: 2014-Present

## Rockfall Specialist

- Rockfall mitigation
- Scaling
- SOH Officer

#### 2012-2014

Raker and General Laborer with the Paving Division

- Raking asphalt on roadways, highways, byways, airstrips, parking lots and driveways.
- Operation of small equipment relating to paving with asphalt.

#### 1998-2010

#### Crew Foreman

- Responsible for overseeing operations, ensuring projects are completed on time and within budget. Worked closely with State, Federal and Railroad personnel and inspectors throughout the various phases of projects.
- Completed more than 3500 hours of high scaling.
- 3 years experience with liner drill operation on slopes.
- 12 years of helicopter rigging experience, including but not limited to rigging and hand signaling.
- Performed quality control tests on rock bolts.
- 12 years of extensive Geobrugg Fence, TECCO Drape and SPIDER netting experience. Completed system installations from start to finish.
- Installed grouted anchor systems.
- Proficient operation of equipment including backhoe, skid steer, excavators with multiple attachment types (augers, drill rigs etc.)

#### Certifications: 2012 LIUNA

- Rigging Qualified meets the ANSI A10.42 Rigging Qualifications and Responsibilities
- Signal Person Qualified meets the OSHA 1926.1428 Hand and Voice Signals Requirements

#### 2012-2015 Oregon Department of Transportation

- Traffic Control Flagger
- ID# 66680

#### 2010 OSHA

- Construction Safety and Health Completed 10hr course
- Construction Safety and Health Completed 30hr course

#### 2005-2009 Equipment Operation

- Equipment Safe Operation Training in accordance with OSHA 29CFR1910.178(1) and 1926.602(d) for Rough Terrain Forklifts
- Equipment Safe Operation Training in accordance with OSHA 1910-178(1) for Rough Terrain Straight Boom and Telescopic Rough Terrain Forklift

#### 2012-2015 Sierra Rescue (Rescue 3 International)

RRC Swiftwater Rescue & Medical Aid Certification

#### WYOMING CONTRACTOR SUBMITTAL

### Education:



References:

: Letters of recommendations available upon request.



Please see list of recent jobs for the set of ( see attachment )

Labor and Job Site Supervisor: +5500 scaling hours Employed Since: 09/03/2013 Other Certifications/Certificates: OSHA 30, Rope Rescue, Forklift Operator

2017 • 22,000 sqft Rock mesh 30/30 ODOT scaling contract Scaling/ wire mesh 55,000 sqft Scaling Contract scaling contract. 2016/17 scaling and Barrier , Idaho 2015 ( fencing.



#### WYOMING CONTRACTOR SUBMITTAL

	Date of Last Physical: 01/29/2014	
This verifies the below named is currently licensed as		
a Crane Hoisting - First Class Operator		
License #: Acuve		
To use the license as a Pocket Card, cut to the size of a	business card or drivers license	
To use the license as a Pocket Card, cut to the size of a (either single or double-wide to fold), laminate if desi	business card or drivers license ired. wing online include:	
Remember to renew online if possible. Benefits of rene The ability to change an address (for most professions). The ability to print license(s) the same day as the renew. The ability to print multiple licenses including one for a	business card or drivers license ired. wing online include: al. pocket card if desired.	
To use the license as a Pocket Card, cut to the size of a (either single or double-wide to fold), laminate if desi Remember to renew online if possible. Benefits of rene The ability to change an address (for most professions). The ability to print license(s) the same day as the renew.	business card or drivers license ired. wing online include: al. a pocket card if desired.	

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Supervisor dol nO mechanical scaling, 20 ton air bag, 13 ton Install wire screen, tecco, drapery cable Subcontracted to install 230,000 sq. ft. supported mesh and install wire mesh. Subcontracted to scale and install wire systems, rock bolt anchor systems and Scale and repair wire mesh as needed fence. Drill and Install cable anchors, mesh and install rockfall catchment of wire mesh istalled cable anchors Subcontracted to scale, install wire Rockscaling with change order for Replace cable anchors as needed pressure grouting and testing of Description of Job Subcontracted to scale, fix post mesh, installed cable anchors install cable anchors anchors alr bag. scaling Name, Fax, and Phone of Owner / Agency Rep. Contracting Agency and Malling Address, COMPLETED ROCKFALL PROJECTS COMPLETED ROCKFALL PROJECTS This / Contract No. Contract Lead Prime or Sub 8/6/2014 Prime Prime 5/19/2014 Prime 1/10/2014 Sub 2/8/2013 Sub 7/14/2013 Sub 7/31/2013 Sub 7/1/2014 9/1/2014 2/5/2014 E102/1/8 Start & Completed Dates \$205,875.00 2013-2016 \$37,960.00 \$224,492.50 \$21,150.00 \$105,437.50 \$268,914,54 \$145,800.00 Amount 5 Contract

WYOMING CONTRACTOR SUBMITTAL

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WYOMING CONTRACTOR SUBMITTAL

Supervisor On Job										
Description of Job	Subcontracted to scale and install wire mesh, installed cable anchors	Install wire screen, tecco, drapery cable systems, rock bolt anchor systems and scaling	Contracted to scale and install wire mesh. Install road barriers	Contracted to scale	Subcontracted to scale and install wire mesh, installed cable anchors	Subcontracted to scale and clear debris mesh, installed cable anchors			Subcontracted to scale and install wire mesh, installed cable anchors	
Contracting Agency and Mailing Address, Name, Fax, and Phone of Owner / Agency Rep.										
Title / Contract No. Contract Lead										
Dates Prime Start & Completed or Sub	4/24/2015 Sub	5/5/2015 Prime 5/5/2016	7/7/2015 Prime 10/8/2015	10/19/2015 Prime 10/31/2015	6/29/2015 Sub 11/15/2015	12/1/2015 Sub 1/9/2016	Sub	Sub	4/1/2016 Sub	
Contract Arnount \$ Star	\$60,050.00	\$145,800.00	\$142,106.47	S66, 190.00	\$452,480.00	\$107,750.00	\$60,050,00	\$ 287,509.83	\$314,063.75	

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# WYOMING CONTRACTOR SUBMITTAL

Supervisor On Job					
Description of Job	Install wire screen, tecco, drapery cable systems, rock bolt anchor systems and scaling	Scale and repair wire mesh as needed Replace cable anchors as needed			
Contracting Agency and Mailing Address, Name, Fax, and Phone of Owner / Agency Rep.					
The / Contract No. Contract Lead					
Dates Prime Start & Completed or Sub	9/3/2016 Prime	5/1/2016-5/1/2017 Prime	8/7/2016 Prime 8/20/2016	6/5/2016 Sub 8/21/2016	10/23/2016 Sub
	\$148,956.25	180 5/	\$113,302.58	\$ 161,940.00	\$ 265,275.00

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