



SUBMITTAL PACKAGE

Project: Grand Junction Recreation Center Rock Wall

Project #: 003-0353

Location: Grand Junction, CO

Client: Eldorado Climbing

Submittal Date: 5/16/2025

Prepared by:



Daniel J. Peak, P.E.



Table of Contents

Cover Page.....1

Table of Contents.....2

Project Information3

General Notes 4

Facility Loads6

Reference Drawings.....Appendix A

Reference Rock Wall CalculationsAppendix B

Project Information

Project Summary

The project covered by this submittal consists of a permanent indoor climbing wall to be installed at the Grand Junction Recreation Center in Grand Junction, CO. The wall framing is comprised of standardized shot rock concrete system developed by Eldorado Climbing. The wall structure is anchored down to a slab below and to the CMU wall behind the climbing wall.

Eldorado Climbing has produced a drawing set specific to this project that details the arrangement of the climbing wall components. That drawing set is attached to this submittal.

Scope of Review

Peak Thrills Engineering has performed a structural review of the climbing wall framing in accordance with the codes and reference documents listed in the general notes.

Conclusions

Our review has concluded that the climbing wall structure referenced above has sufficient structural stability and integrity to support the loads indicated in the general structural notes in accordance with the codes and reference documents listed in the general notes.

Limitations and Exceptions

The scope of review for this submittal is limited to the items listed above. All other temporary or permanent structures on site not specifically referenced under "Scope of Review" are the responsibility of others.

Where the items covered by this submittal are attached to existing structures, it is the responsibility of the engineer of record for those existing structures to review the impact of the elements referenced in this submittal.

General Structural Notes

CODES

1. 2018 INTERNATIONAL BUILDING CODE
2. ASCE 7-16: MINIMUM DESIGN LOADS AND ASSOCIATED CRITERIA FOR BUILDINGS AND OTHER STRUCTURES
3. AISC 360-16: SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS
4. 2018 NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION
5. ACI 318-19: BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE
6. GENERAL SPECIFICATION FOR THE DESIGN AND ENGINEERING OF ARTIFICIAL CLIMBING STRUCTURES, FIRST EDITION

CONSTRUCTION AND SAFETY

1. CONTRACTOR SHALL BRACE ENTIRE STRUCTURE AS REQUIRED DURING CONSTRUCTION TO MAINTAIN STABILITY UNTIL THE STRUCTURE IS COMPLETE AND FUNCTIONING AS THE DESIGNED UNIT.
2. ENGINEER SHALL NOT BE RESPONSIBLE FOR THE MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OF CONSTRUCTION SELECTED BY CONTRACTOR.
3. THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. WHEN ON SITE, THE ENGINEER IS RESPONSIBLE FOR HIS OWN SAFETY BUT HAS NO RESPONSIBILITY FOR THE SAFETY OF OTHER PERSONNEL OR SAFETY CONDITIONS AT THE SITE.
4. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. SHOULD ANY DISCREPANCY BE FOUND, CONTRACTOR SHALL NOTIFY ARCHITECT/ENGINEER IMMEDIATELY OF THE CONDITION.

DESIGN LOADS

1. DEAD LOAD:
 - A. SELF-WEIGHT OF STRUCTURE
 - B. CLIMBING SURFACE: 5 PSF
2. LIVE LOADS:
 - A. CLIMBER WEIGHT: 270 LB EACH
 - B. BELAY LOAD: 1350 LB
 - C. LEAD LOAD: 1350 LB
3. WIND LOADS: NONE
4. SEISMIC LOADS:
 - A. SEISMIC RISK CATEGORY: II
 - B. SEISMIC IMPORTANCE FACTOR, I_e : 1.0
 - C. SITE CLASS: D (ASSUMED)
 - D. $S_{DS} = 0.25$
 - E. $S_{D1} = 0.10$
 - F. RESPONSE MODIFICATION FACTOR, $R = 2.0$
 - G. SEISMIC COEFFICIENT, $C_s = 0.13$

STRUCTURAL STEEL

1. ALL STEEL DETAILING, FABRICATION, AND ERECTION SHALL CONFORM TO THE LATEST VERSION OF THE FOLLOWING SPECIFICATIONS UNLESS NOTED OTHERWISE ON THE DRAWINGS:
 - A. AISC 360: SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS
 - B. AISC 303: CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES
 - C. RCSC SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS
 - D. AWS D1.1: STRUCTURAL WELDING CODE-STEEL
2. STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING CRITERIA UNLESS NOTED OTHERWISE ON THE DRAWINGS:
 - A. MISC PLATE, BAR, ANGLES AND CHANNELS: ASTM A36, $F_y = 36$ KSI
 - B. HSS TUBES: ASTM A500 GR B, $F_y = 46$ KSI
 - C. PIPE SHAPES: ASTM A53, TYPE E OR S, GRADE B, $F_y = 35$ KSI
 - D. BOLTS: ASTM A325-N
 - E. HARDENED WASHERS: ASTM F436
 - F. NUTS: ASTM A563
 - G. FIELD WELDS: AWS E70XX, LOW HYDROGEN ELECTRODES

POST-INSTALLED ANCHORS

1. EXCEPT WHERE INDICATED ON THE DRAWINGS, POST-INSTALLED ANCHORS SHALL CONSIST OF THE FOLLOWING ANCHOR TYPES.
2. ANCHORAGE TO CONCRETE AND SOLID GROUTED MASONRY:
 - A. SIMPSON STRONG BOLT 2 PER ICC ESR-3037.
3. ANCHOR CAPACITY USED IN DESIGN SHALL BE BASED ON THE TECHNICAL DATA PUBLISHED BY THE MANUFACTURER OR OTHER SUCH METHOD AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD. SUBSTITUTION REQUESTS FOR ALTERNATE PRODUCTS MUST BE APPROVED IN WRITING BY THE STRUCTURAL ENGINEER OF RECORD PRIOR TO USE. CONTRACTOR SHALL PROVIDE CALCULATIONS THAT HAVE BEEN SEALED BY ANOTHER LICENSED ENGINEER DEMONSTRATING THAT THE SUBSTITUTED PRODUCT IS CAPABLE OF MEETING THE PERFORMANCE OF THE SPECIFIED PRODUCT. SUBSTITUTIONS WILL BE EVALUATED BY THEIR HAVING AN ICC ESR SHOWING COMPLIANCE WITH THE RELEVANT BUILDING CODE FOR SEISMIC USES, LOAD RESISTANCE, INSTALLATION CATEGORY, AND AVAILABILITY OF COMPREHENSIVE INSTALLATION INSTRUCTIONS.
4. USE OF DIAMOND CORE BIT WITH ROUGHENING TOOL FOR ANCHOR HOLES REQUIRES APPROVAL FROM ENGINEER OF RECORD PRIOR TO DRILLING. UNLESS OTHERWISE SHOWN IN THE DRAWINGS, ALL HOLES SHALL BE DRILLED PERPENDICULAR TO THE CONCRETE SURFACE.
5. INSTALL ANCHORS PER THE MANUFACTURER'S PRINTED INSTALLATION INSTRUCTIONS, AS INCLUDED IN THE ANCHOR PACKAGING.
6. ANCHOR CAPACITY IS DEPENDENT UPON SPACING BETWEEN ADJACENT ANCHORS AND PROXIMITY OF ANCHORS TO EDGE OF CONCRETE. INSTALL ANCHORS IN ACCORDANCE WITH SPACING AND EDGE CLEARANCES INDICATED ON THE DRAWINGS.

CONCRETE

1. CONCRETE WORK AND TESTING, AS PERFORMED BY "QUALIFIED FIELD-TESTING TECHNICIANS" AND "QUALIFIED LABORATORY TECHNICIANS", SHALL CONFORM TO ALL REQUIREMENTS OF ACI 301-16, "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS", EXCEPT AS MODIFIED BY THE SUPPLEMENTAL REQUIREMENTS BELOW. REPORTS FROM TESTS REQUIRED BY SECTION 1.6 OF ACI 301-16 SHALL BE SUBMITTED TO STRUCTURAL ENGINEER, ARCHITECT, OWNER, CONTRACTOR, CONCRETE SUPPLIER, AND BUILDING OFFICIAL.
2. MATERIALS: (f'_c BASED ON 28 DAY UNLESS NOTED)
 - A. CONCRETE FOR WALL: $f'_c = 4500$ PSI, WATER/CEMENTITIOUS RATIO = 0.45.
 - B. REINFORCING STEEL: ASTM A615 60 KSI YIELD DEFORMED BARS AND ASTM A185 WELDED WIRE FABRIC, FLAT SHEETS ONLY.
 - C. FLY ASH: ASTM C618, TYPE F OR C. WHEN USED, FLY ASH-TO- TOTAL CEMENTITIOUS RATIO SHALL BE 15% MINIMUM.
 - D. GROUND GRANULATED BLAST FURNACE SLAG: ASTM C989. TOTAL GROUND GRANULATED BLAST FURNACE SLAG -TO- TOTAL CEMENTITIOUS RATIO SHALL NOT EXCEED 50% MAXIMUM.
 - E. FLY ASH, NATURAL POZZOLANS, SILICA FUME, OR GROUND GRANULATED BLAST FURNACE SLAG: WHEN EXPOSED TO DEICING CHEMICALS, LIMIT THE MAXIMUM WEIGHT TO THE PERCENTAGES OF THE TOTAL WEIGHT OF CEMENTITIOUS MATERIALS GIVEN IN TABLE 4.2.2.8 OF ACI 301-16.
 - F. PLASTICIZING ADMIXTURE: ASTM C1017.
 - G. WATER REDUCING ADMIXTURE: ASTM C494.
 - H. CHLORIDE CONTENT OF CONCRETE: LIMIT TOTAL CHLORIDE ION CONTENT TO AMOUNT INDICATED IN TABLE 4.2.2.6 OF ACI 301-16. ADMIXTURES CONTAINING CHLORIDE ARE NOT PERMITTED IN REINFORCED CONCRETE OR CONCRETE CONTAINING METALS.
3. IF CONCRETE ARRIVES AT THE POINT OF DELIVERY WITH A SLUMP BELOW THAT WHICH WILL RESULT IN THE SPECIFIED SLUMP AT THE POINT OF PLACEMENT AND IS UNSUITABLE FOR PLACING AT THAT SLUMP, THE SLUMP MAY BE ADJUSTED ONCE ONLY TO THE REQUIRED VALUE BY ADDING WATER UP TO THE AMOUNT ALLOWED IN THE ACCEPTED MIXTURE PROPORTIONS. THE ADDITION OF WATER SHALL BE IN ACCORDANCE WITH ASTM C94. DO NOT EXCEED THE SPECIFIED WATER-CEMENTITIOUS MATERIAL RATIO OR SLUMP IN THE APPROVED MIX DESIGN. DO NOT ADD WATER TO CONCRETE DELIVERED IN EQUIPMENT NOT ACCEPTABLE FOR MIXING. AFTER PLASTICIZING OR WATER REDUCING ADMIXTURES ARE ADDED TO THE CONCRETE AT THE SITE TO ACHIEVE FLOWABLE CONCRETE, DO NOT ADD WATER TO THE CONCRETE. MEASURE SLUMP (AND AIR CONTENT OF AIR ENTRAINED CONCRETE), AFTER SLUMP ADJUSTMENT, TO VERIFY COMPLIANCE WITH SPECIFIED REQUIREMENTS.
4. SLUMP SHALL BE MEASURED PRIOR TO THE ADDITION OF ADMIXTURES AND AFTER THE ADDITION OF ADMIXTURES.

Facility Loads

The climbing wall and its framing system place the following maximum service-level loads on the surrounding structure. It is the responsibility of the facility engineer of record to ensure that these loads are adequately supported by the facility structure. Reference the calculation package for more detailed reactions at each facility attachment point.

Base of Climbing Wall

- 2000 PLF vertical load acting on floor
- 150 LB lateral force at each anchor

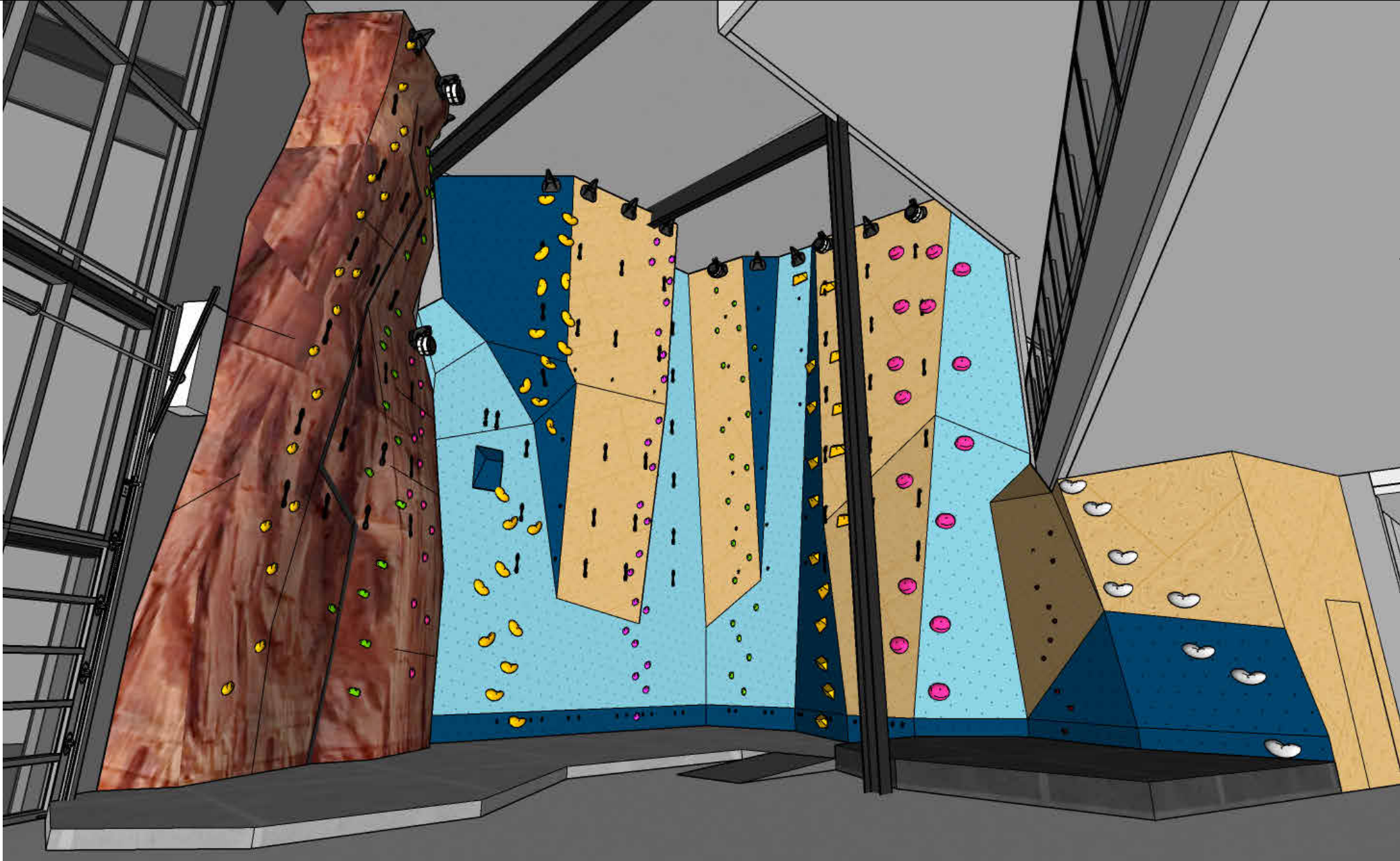
Ledger to Wall @ Each Anchor

- Parallel to wall: 100 LB
- Away from wall: 350 LB
- Toward wall: 400 LB
- Vertical: 50 LB



APPENDIX A

REFERENCE DRAWINGS



1699 Cherry St. Unit B
Louisville, CO 90027
720-664-9354

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

EB1416

GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506




SHEET INDEX

0.0	COVER PAGE
0.1	STEEL BOM - PROFILES
0.2	STEEL BOM -GUSSETS
1.0	PROJECT OVERVIEW
2.0	BASE LAYOUT
2.1	BASE LAYOUT W/ PIPES
3.0	STEEL OVERVIEW - LEDGERS & TIEBACKS
3.1	STEEL OVERVIEW - PIPES
4.0	OSB OVERVIEW
5.0	OSB SHAPES FOR CNC
6.0	STEEL PLATES
SR2.0	SHOT ROCK 2.0 TYPICALS

COVER PAGE



0.0

												<div><div></div><div>1699 Cherry St. Unit B Louisville, CO 90027 720-664-9354</div></div>			
								DATE: 5/16/2025							
								AUTHOR: AMR							
								REVISIONS							
								NUMBER DATE							
								EB1416							
								GRAND JUNCTION REC CENTER - SHOT ROCK							
								2836 RECREATION WAY, GRAND JUNCTION, CO 81506							
								STEEL BOM - PROFILES							
								<div><div></div></div>							
								<div><div></div></div>							
								0.1							

Sticks (20ft)	Profile	Member	Length
One (1)	L4x3x0.25in-A36	L100	23 1/2"
		L101	62 1/2"
		L102	28 1/8"
		L103	23 9/16"
		L104	77 1/2"
Seven (7)	L2x2x3/13	L300	36 1/2"
		L301	46 13/16"
		L302	17 13/16"
		L303	26 5/16"
		L304	10"
		L305	21 3/4"
		L306	46 9/16"
		L307	12 11/16"
		L308	8"
		L309	62 1/8"
		L310	9"
		L311	51 11/16"
		L312	51 15/16"
		L313	56"
		L314	28 7/8"
		L315	8 1/16"
		L316	34 7/16"
		L317	37 9/16"
		L318	27 1/4"
		L319	23 7/16"
L300s ARE TIEBACK MEMBERS		L320	28 7/8"
		L321	11 15/16"
		L322	11 1/2"
		L323	33 3/16"
		L324	28 13/16"
		L325	22 13/16"
		L326	9"
		L327	28 1/8"
		L328	41 9/16"
		PIPE-2in-SCH40	
P135	20 5/16"		
P136	76 7/16"		
P137	48 1/4"		
P138	47 7/8"		
P139	30 5/8"		
P140	21 15/16"		
P141	52 13/16"		
P142	36 1/4"		
P143	52 1/4"		
P144	42 15/16"		
P145	71 7/16"		
P146	37 5/16"		
P147	9 5/16"		
P148	42 5/16"		
P149	6"		
P150	59 3/16"		
P151	12 13/16"		
P152	40 7/8"		
P153	18 3/8"		
P154	17 1/2"		
P155	30 3/8"		
P156	13 1/16"		
P157	10 9/16"		
P158	8 11/16"		
P159	42"		
P160	23 1/16"		
P161	47 1/2"		
P162	47 13/16"		
P163	41 13/16"		
P164	56 3/8"		
P165	19 1/4"		
P166	52 1/4"		
P167	18 1/2"		
P168	56 1/16"		
P169	17 5/16"		
P170	12 1/8"		
P171	94"		
P172	44 9/16"		
P173	5 7/8"		
P174	48 1/4"		
P175	21 3/4"		
P176	67 1/16"		
P177	69"		
P178	13 7/8"		
P179	6"		
P180	83 1/2"		
P181	92 5/16"		
P182	78 5/8"		
P183	11 15/16"		
P184	59 9/16"		
P185	26 11/16"		
P186	33 13/16"		
P187	67 13/16"		
P188	51 3/16"		
P189	37 7/16"		
P190	23 3/4"		
P191	67 5/16"		
P192	67 1/8"		
PIPE-2in-SCH40		P193	84 15/16"
		P194	6"
		P195	82 3/16"
		P196	103 3/16"
		P197	73 9/16"
		P198	47 1/4"
		P199	99 1/4"
		P200	14 3/16"
		P201	76 1/4"
		P202	106 3/16"
		P203	57 9/16"
		P204	31 9/16"
		P205	16"
		P206	40 5/8"
		P207	11 1/16"
		P208	41 15/16"
P209	60"		
P210	38 1/16"		
P211	31 3/4"		
P212	87 3/8"		
P213	56 1/16"		
P214	36 7/16"		
P215	12 13/16"		
P216	91 7/8"		
P217	52 15/16"		

SINGLE GUSSETS

GussetNo	Pipe1	Pipe2	Angle
001	P134	P135	111.07°
002	P134	P169	82.77°
003	P134	P192	102.75°
005	P134	P212	96.93°
007	P135	P172	67.84°
008	P135	P208	99.83°
009	P135	P209	73.08°
011	P136	P139	118.80°
013	P136	P146	53.49°
014	P136	P150	33.82°
016	P136	P196	18.91°
020	P137	P149	96.66°
021	P137	P157	85.88°
023	P137	P179	83.34°
024	P137	P183	67.67°
027	P138	P184	108.61°
028	P138	P202	77.21°
029	P138	P208	82.29°
030	P138	P216	91.86°
033	P139	P160	120.28°
034	P139	P189	48.02°
035	P139	P196	42.28°
037	P140	P171	48.55°
038	P140	P180	40.53°
040	P140	P201	136.18°
041	P140	P214	141.42°
042	P141	P156	129.32°
043	P141	P200	90.00°
045	P142	P144	87.01°
046	P142	P150	50.40°
047	P142	P152	92.86°
048	P142	P189	88.33°
051	P144	P150	42.59°
055	P146	P150	92.69°
056	P146	P171	43.35°
060	P146	P214	126.69°
062	P148	P172	100.55°
063	P148	P208	96.06°
065	P149	P174	83.34°
070	P152	P210	83.20°
071	P156	P177	55.51°
072	P156	P180	137.27°
073	P156	P201	46.01°
075	P158	P162	141.42°
076	P158	P185	71.38°
078	P160	P175	75.95°
080	P160	P203	108.95°
081	P160	P205	73.08°
082	P161	P175	137.79°
084	P161	P188	44.91°

084	P161	P188	44.91°
085	P161	P203	37.30°
087	P161	P211	111.79°
088	P162	P167	107.08°
091	P164	P182	37.78°
093	P164	P197	40.46°
095	P165	P188	127.79°
098	P165	P211	75.52°
100	P167	P186	106.16°
102	P167	P204	90.66°
103	P167	P206	78.03°
104	P168	P179	88.01°
105	P168	P183	58.68°
107	P168	P194	91.99°
108	P168	P207	97.86°
109	P169	P172	98.32°
112	P170	P187	82.87°
114	P170	P191	92.75°
117	P172	P217	76.23°
118	P173	P181	87.72°
119	P173	P193	98.64°
120	P173	P202	89.60°
121	P173	P216	96.12°
122	P174	P179	96.66°
125	P175	P205	215.62°
126	P175	P207	63.71°
128	P177	P192	92.62°
129	P177	P200	85.18°
130	P177	P212	67.69°
131	P178	P184	52.00°
133	P178	P198	107.86°
134	P178	P208	117.59°
135	P178	P209	69.50°
137	P179	P213	91.99°
138	P180	P195	66.83°
139	P180	P212	97.27°
142	P181	P215	90.03°
143	P182	P184	146.89°
147	P182	P199	48.85°
148	P182	P206	54.52°
150	P183	P205	104.12°
151	P183	P210	112.72°
153	P184	P198	20.15°
155	P185	P193	116.61°
156	P185	P202	55.16°
157	P185	P206	142.10°
158	P186	P199	104.05°
159	P186	P203	117.96°
161	P186	P211	73.32°

162	P187	P190	80.43°
163	P187	P194	97.13°
164	P187	P207	56.39°
165	P188	P190	84.84°
166	P188	P207	138.34°
167	P189	P205	118.62°
168	P189	P210	95.61°
169	P191	P194	87.25°
173	P194	P213	88.01°
174	P195	P198	56.41°
175	P195	P209	122.79°
176	P195	P214	119.51°
178	P196	P199	52.16°
179	P196	P203	85.83°
181	P197	P198	118.75°
182	P197	P199	52.91°
183	P197	P214	65.32°
187	P202	P206	152.77°
190	P204	P211	89.85°
192	P209	P212	73.11°
193	P215	P216	86.13°
195	P216	P217	93.02°

DOUBLE GUSSETS

GussetNo	Pipe1	Pipe2	Include?	Angle1	Angle2
001	P143	P192	Yes	86.87°	93.13°
002	P143	P212	Yes	106.55°	73.45°
003	P145	P195	Yes	62.70°	117.30°
004	P145	P212	Yes	101.41°	78.59°
005	P147	P181	Yes	90.97°	89.03°
006	P147	P216	Yes	85.19°	94.81°
007	P148	P216	Yes	90.21°	89.79°
008	P151	P193	Yes	96.35°	83.65°
009	P151	P202	Yes	91.88°	88.12°
010	P153	P171	Yes	77.29°	102.71°
011	P153	P214	Yes	87.26°	92.74°
012	P154	P180	Yes	138.54°	41.46°
013	P154	P201	Yes	135.25°	44.75°
014	P155	P176	Yes	74.81°	105.19°
015	P155	P196	Yes	111.89°	68.11°
016	P157	P210	Yes	93.73°	* 86.27°
017	P159	P182	Yes	73.09°	106.91°
018	P159	P202	Yes	100.38°	79.62°
019	P163	P195	Yes	58.25°	121.75°
020	P163	P197	Yes	116.92°	63.08°
021	P164	P199	Yes	86.63°	93.37°
022	P166	P184	Yes	106.20°	73.80°
023	P166	P202	Yes	100.38°	79.62°
024	P176	P199	Yes	58.87°	121.13°
025	P176	P203	Yes	79.12°	100.88°



1699 Cherry St. Unit B
Louisville, CO 90027
720-664-9354

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

EB1416

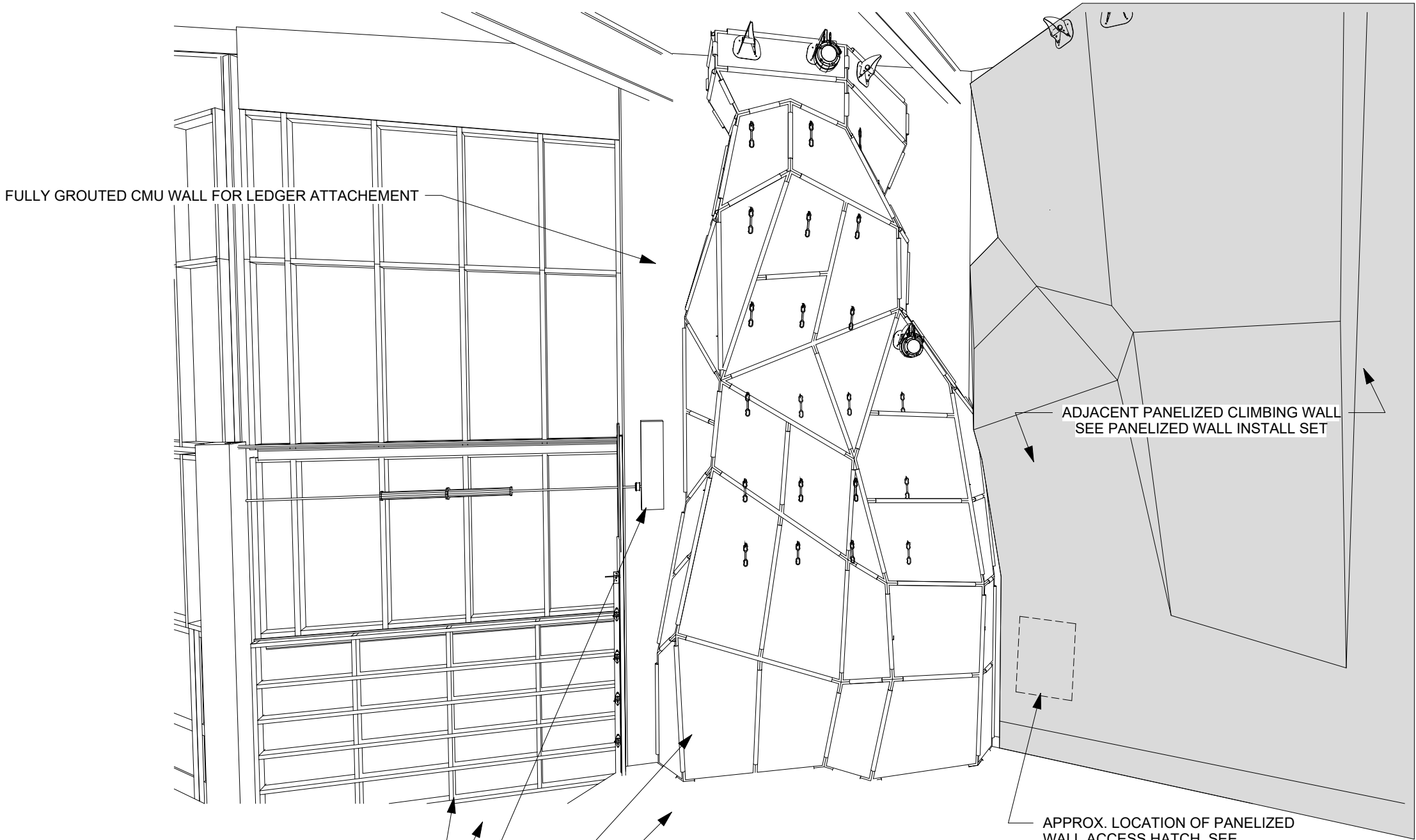
GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

STEEL BOM -GUSSETS



0.2



- ADJACENT STOREFRONT GLAZING SYSTEM & OVERHEAD DOOR
- CONC. SLAB ON GRADE FOR BASE ANCHOR ATTACHMENT
- CLIMBING WALL TO BE CLEAR OF MOTOR FOR OVERHEAD DOOR
- OMIT OSB ON SHAPES FOR BACK OF WALL ACCESS AS NEEDED
- 5.5" PROTEC FLOORING, SEE FLOORING SHEET 7.0

ITEM	QTY
BELAY BAR	4
LEAD BOLT	21

1
1.0

PROJECT OVERVIEW

- SHOT ROCK 2.0 ROPE WALL**
- 17' WIDE X 33' TALL X 6' MAX PROJECTION OFF BULDING WALL
 - 4 BELAY BARS
 - 4 LEAD LANES
 - 1 KNURLLED NUT HAND HOLD PLACEMENT PER 1 SF OF WALL
 - NO ACCESS HATCH, ACCESS VIA ADJACENT PANELIEZD WALL AND CAVITY BEYOND
 - VARIETY OF TERRAIN FOR ALL SKILL LEVELS
 - WINGATE SANDSTONE AESTHETIC TO MATCH INDEPENDENCE MONUMENT / COLORADO NATIONAL MONUMENT
 - VARIETY OF SCULPTED CRACKS & FEATURES FOR NATURAL CLIMBING ABILITY
 - 5.5" PROTEC FLOORING, CONTINUOUS W/ PANELIZED WALL



1699 Cherry St. Unit B
Louisville, CO 90027
720-664-9354

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

EB1416

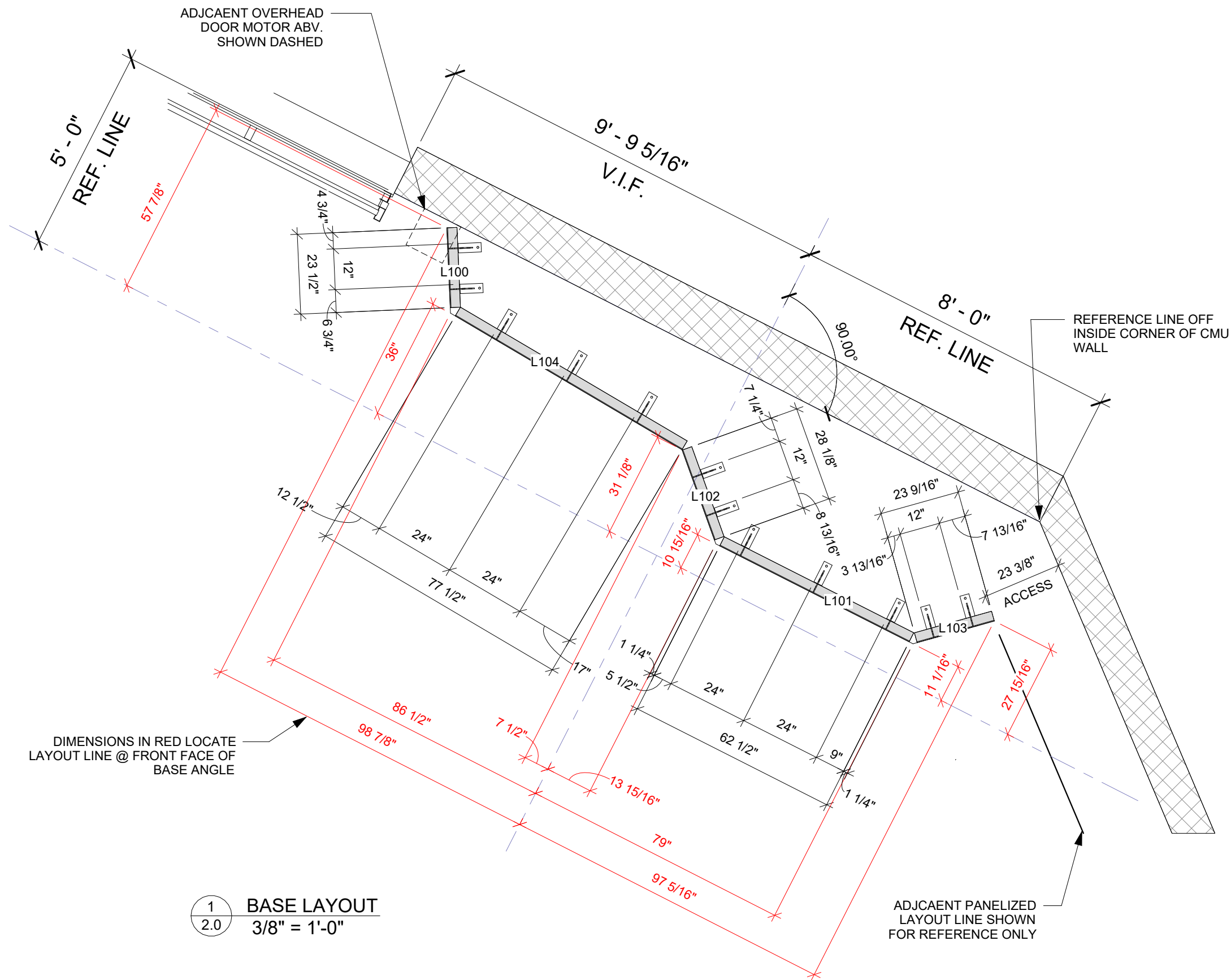
GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

PROJECT OVERVIEW



1.0



DIMENSIONS IN RED LOCATE
LAYOUT LINE @ FRONT FACE OF
BASE ANGLE

1 BASE LAYOUT
2.0 3/8" = 1'-0"



1699 Cherry St. Unit B
Louisville, CO 90027
720-664-9354

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

EB1416

GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

BASE LAYOUT



2.0

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

EB1416

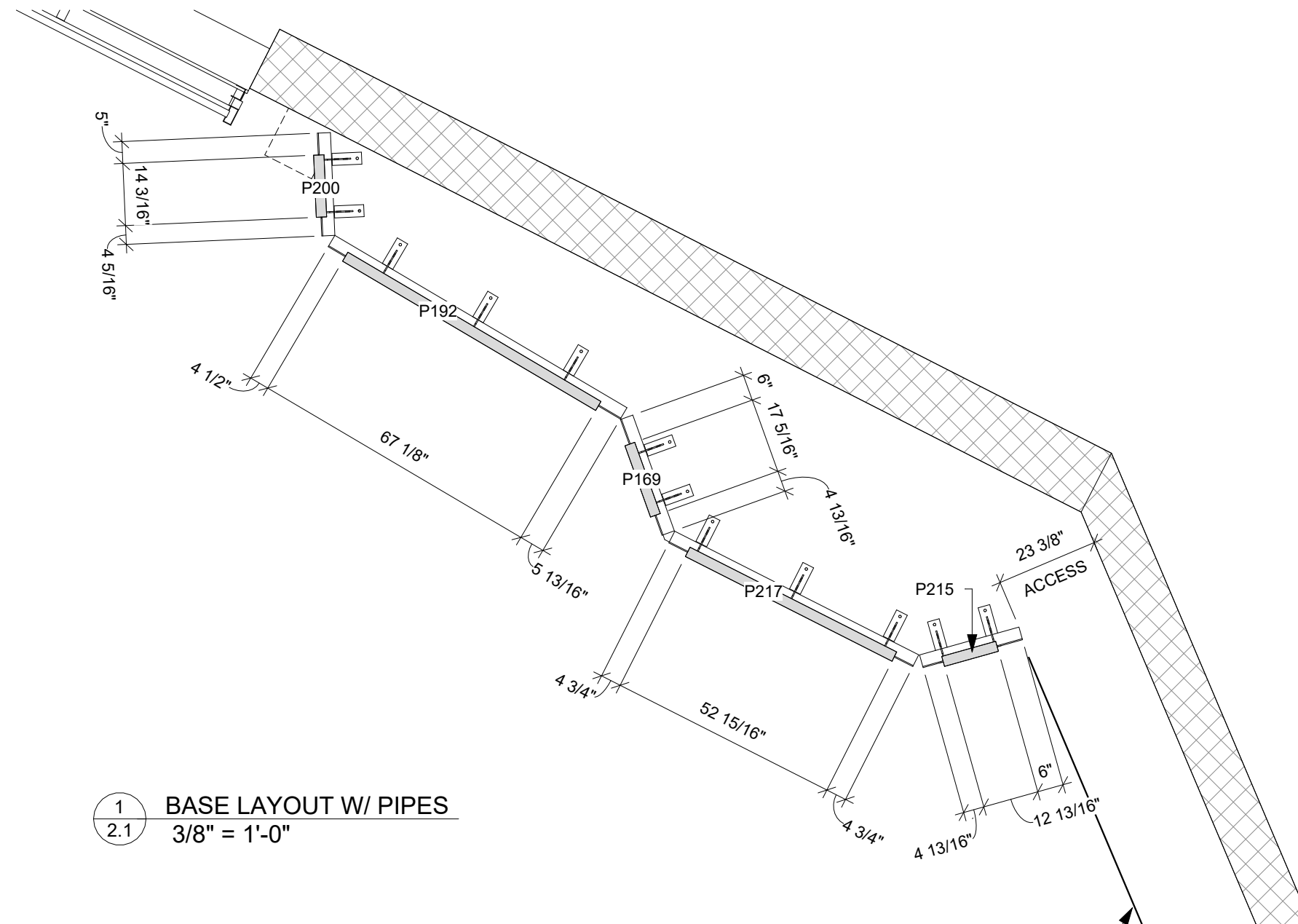
GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

BASE LAYOUT W/
PIPES

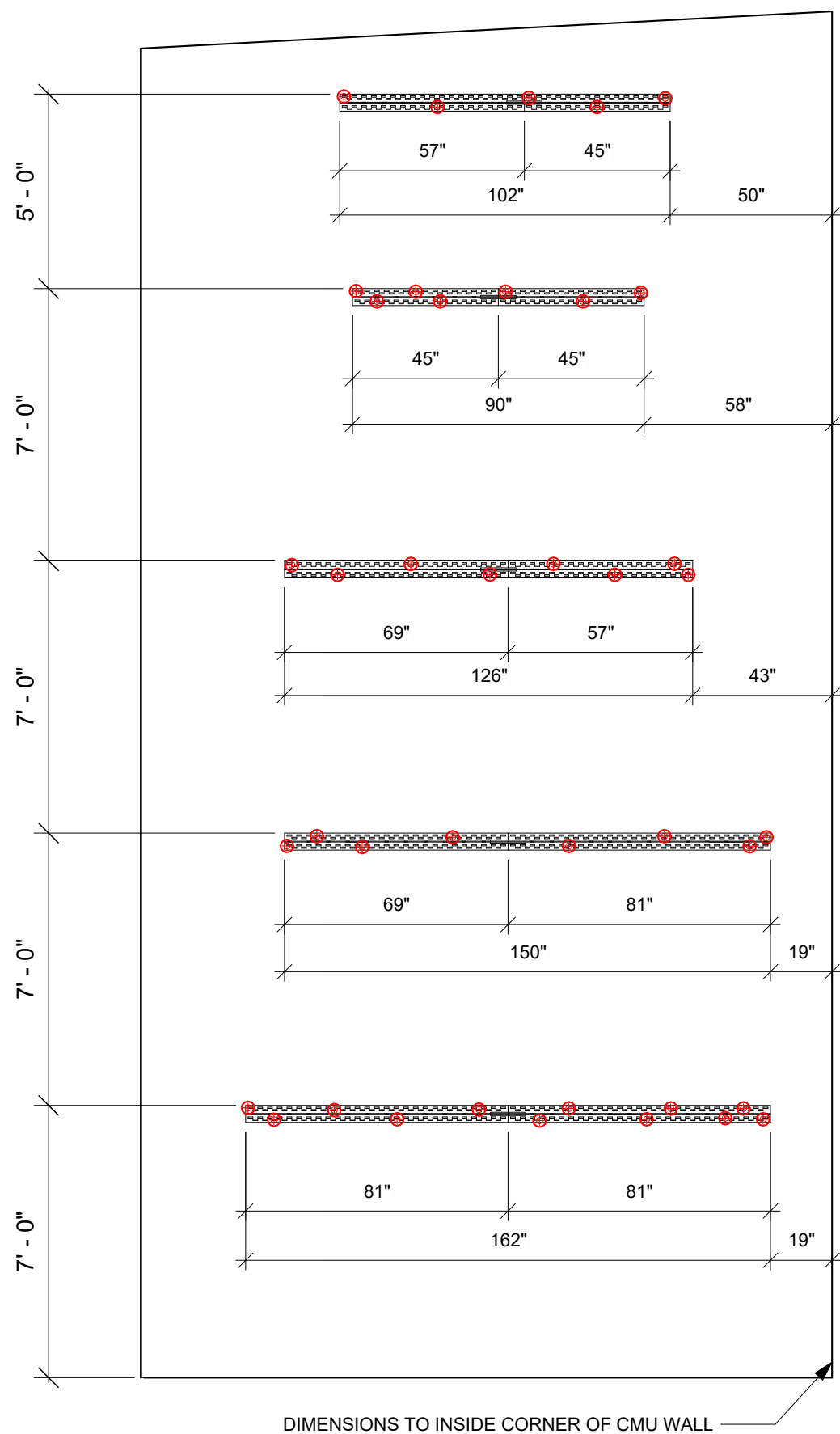


2.1



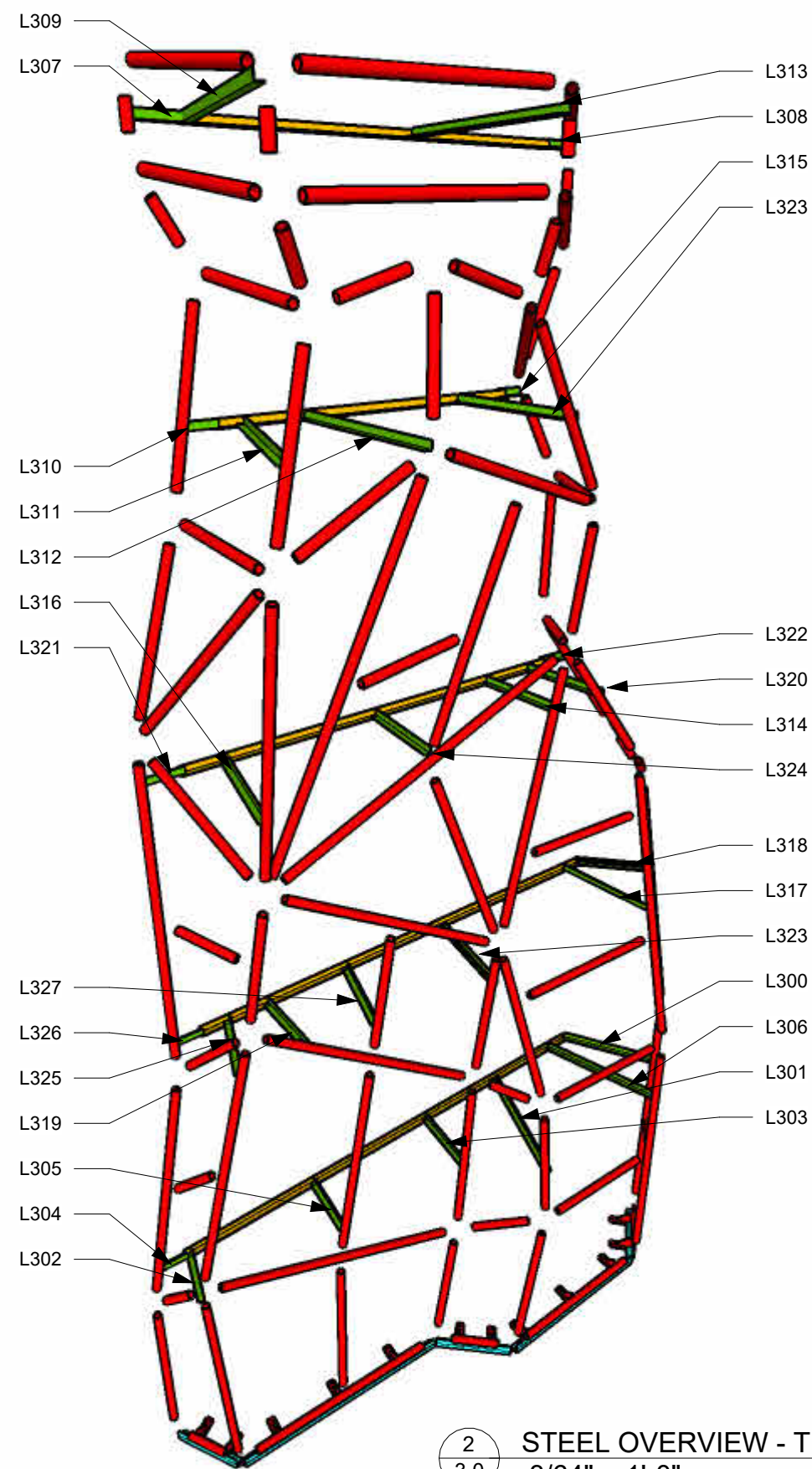
1 BASE LAYOUT W/ PIPES
2.1 3/8" = 1'-0"

Item No	PartNo	Description	QTY	Packable
1	PWS-2.0-L01	Straight Splice Plate	10	Yes
2	PWS-2.0-W04-45	Ledger - 45in	3	Yes
3	PWS-2.0-W04-57	Ledger - 57in	2	Yes
4	PWS-2.0-W04-69	Ledger - 69in	2	Yes
5	PWS-2.0-W04-81	Ledger - 81in	3	Yes
6	SR-2.0-W03	Anchor Foot	12	Yes



1
3.0 LEDGER LAYOUT
1/4" = 1'-0"

- NOTES:
- REQUIRED WALL ANCHOR LOCATIONS SHOWN IN RED
 - ANCHORS TO BE MIN. 8" APART
 - ALTERNATE ANCHORS PLACEMENTS ON TOP AND BOTTOM OF LEDGER
 - ADDITIONAL ANCHORS MAY BE PLACED FOR HANGING LEDGERS BUT NOT REQUIRED
 - TIEBACKS TO BE WELDED WITHIN 8" OF ANCHOR LOCATIONS



2
3.0 STEEL OVERVIEW - TIEBACKS
3/64" = 1'-0"

- NOTES:
- WALL LEDGERS SHOWN YELLOW
 - L2X2X3/16 TIEBACKS SHOWN GREEN
 - 2" SCH.40 PIPE SHOWN RED



1699 Cherry St. Unit B
Louisville, CO 90027
720-664-9354

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

EB1416

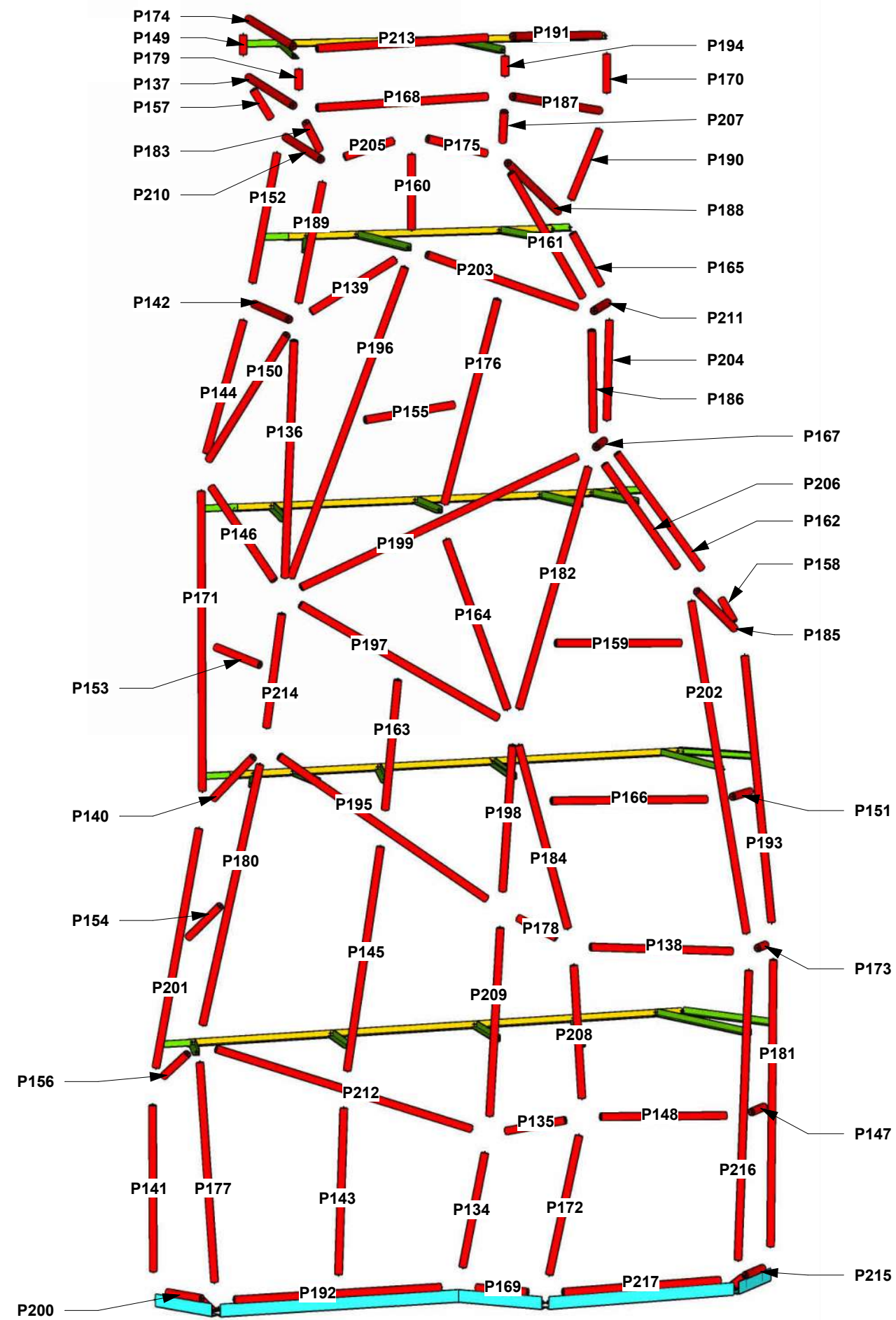
GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

STEEL OVERVIEW -
LEDGERS & TIEBACKS



3.0



1
3.1 STEEL OVERVIEW - PIPES



1699 Cherry St. Unit B
Louisville, CO 90027
720-664-9354

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

EB1416

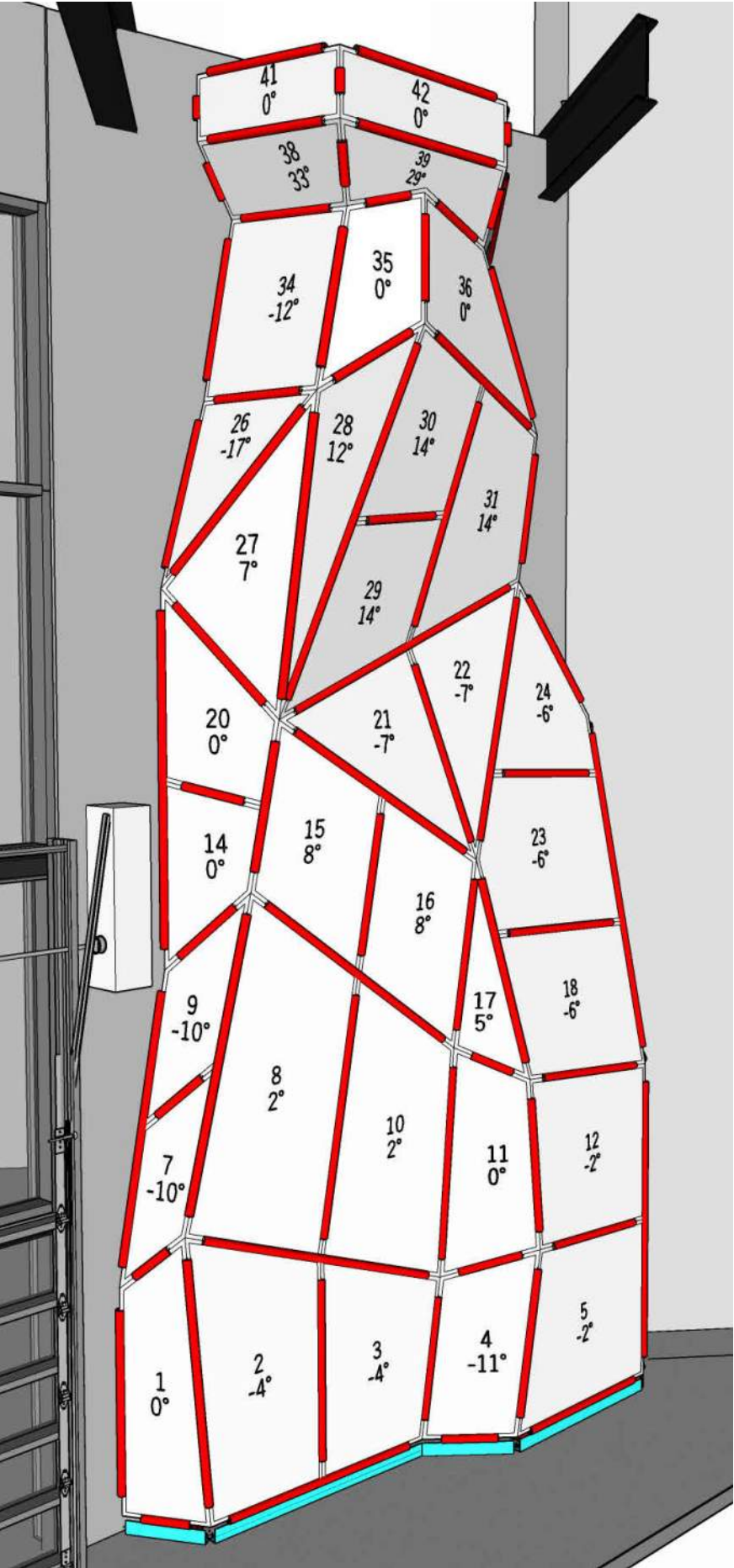
GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

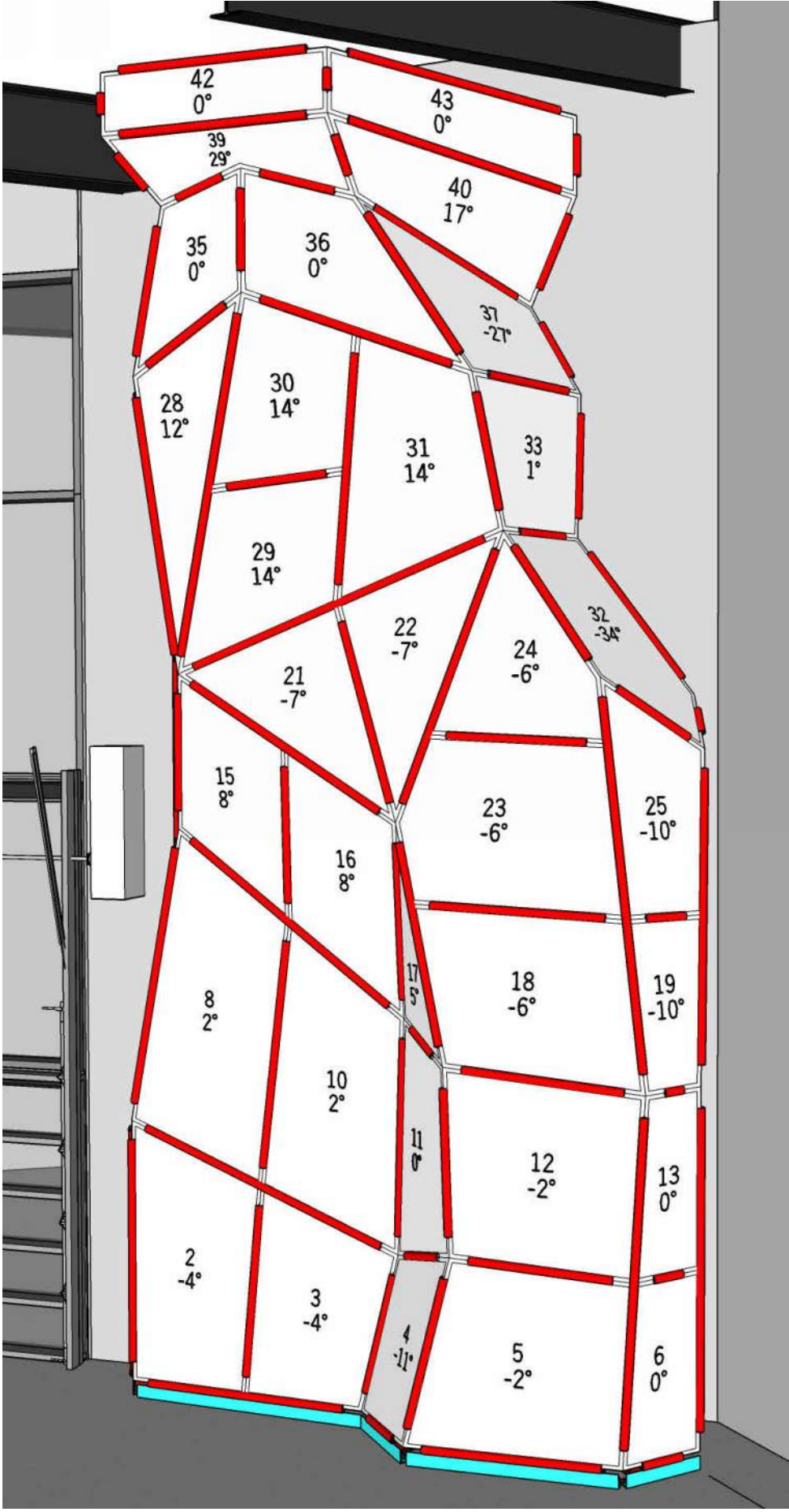
STEEL OVERVIEW -
PIPES



3.1



1 OSB OVERVIEW 1 OF 2
4.0



2 OSB OVERVIEW 2 OF 2
4.0

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

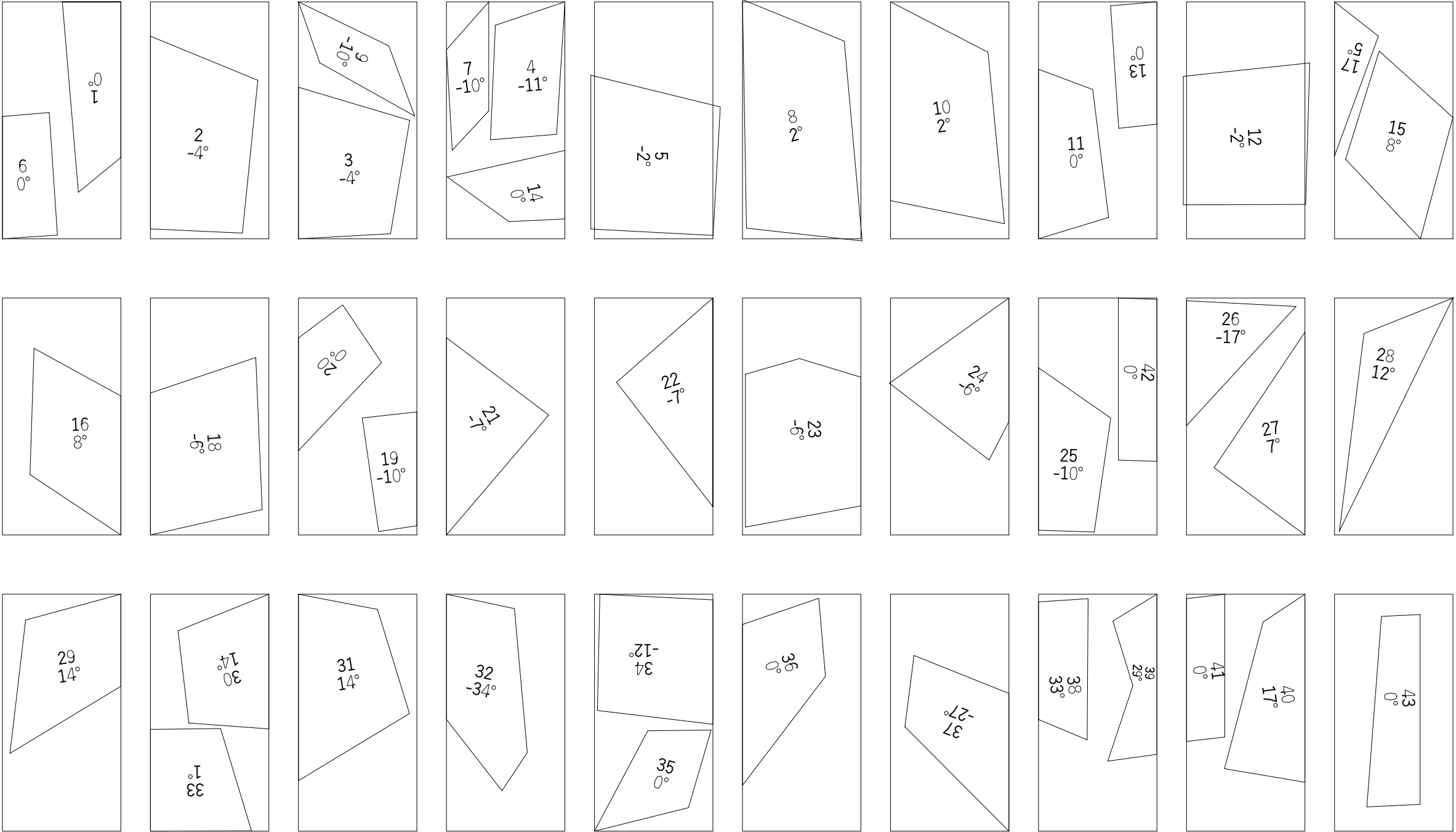
EB1416

GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

OSB OVERVIEW





1
5.0

OSB CNC OVERVIEW

- NOTES:
- QTY: 30 SHEETS OF OSB
 - SHAPES 5 & 12 OVERSIZED, OK TO CUT
 - NO BASE SHAPES ON CUSTOM WALLS



ELBORADO
CLIMBING

1699 Cherry St. Unit B
Louisville, CO 90027
720-664-9354

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS

NUMBER DATE

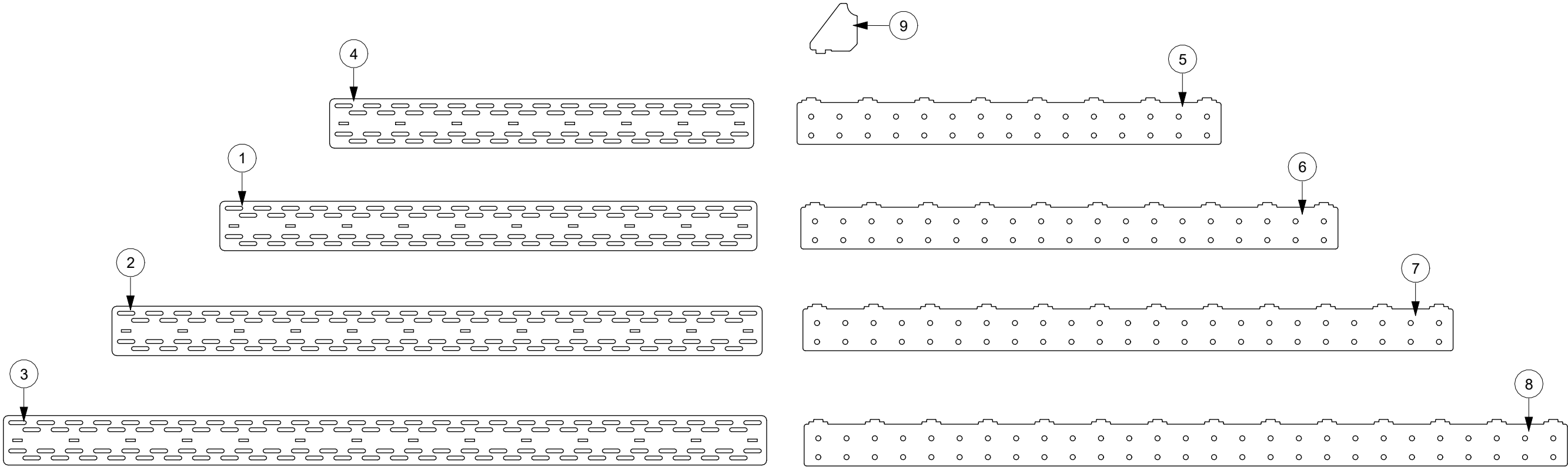
EB1416

GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

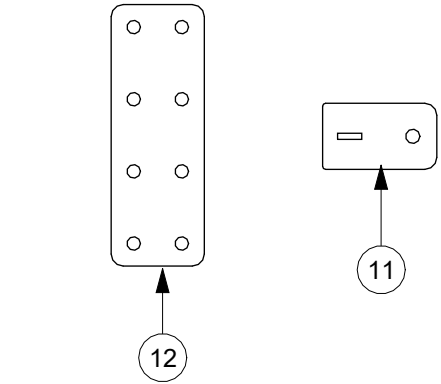
OSB SHAPES FOR CNC





1
6.0 Plates 1/4"

ItemNo	PartNo	Description	Qty	Material	Thickness
1/4" PLATES					
1	PWS-2.0-L12-57	Ledger Plate One - 57in	2	ASTM A36 Steel	0.25
2	PWS-2.0-L12-69	Ledger Plate One - 69in	2	ASTM A36 Steel	0.25
3	PWS-2.0-L12-81	Ledger Plate One - 81in	3	ASTM A36 Steel	0.25
4	PWS-2.0-L12-45	Ledger Plate One - 45in	3	ASTM A36 Steel	0.25
5	PWS-2.0-L13-45	Ledger Plate Two - 45in	3	ASTM A36 Steel	0.25
6	PWS-2.0-L13-57	Ledger Plate Two - 57in	2	ASTM A36 Steel	0.25
7	PWS-2.0-L13-69	Ledger Plate Two - 69in	2	ASTM A36 Steel	0.25
8	PWS-2.0-L13-81	Ledger Plate Two - 81in	3	ASTM A36 Steel	0.25
9	SR-2.0-L02	Anchor Gusset	12	ASTM A36 Steel	0.25
3/8" PLATES					
11	SR-2.0-L04	Baseplate	12	ASTM A572 Grade 50 Steel	0.375
12	PWS-2.0-L01	Straight Splice Plate	10	ASTM A572 Grade 50 Steel	0.375



2
6.0 Plates 3/8"



1699 Cherry St. Unit B
Louisville, CO 90027
720-664-9354

DATE: 5/16/2025

AUTHOR: AMR

REVISIONS
NUMBER DATE

EB1416

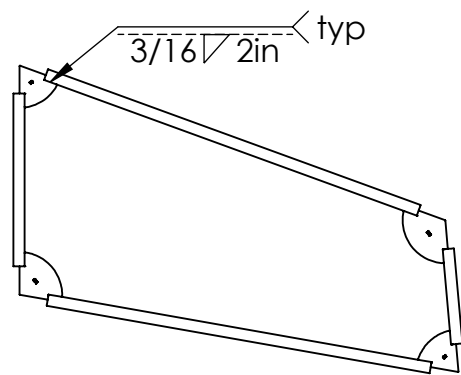
GRAND JUNCTION REC
CENTER - SHOT ROCK

2836 RECREATION
WAY, GRAND
JUNCTION, CO 81506

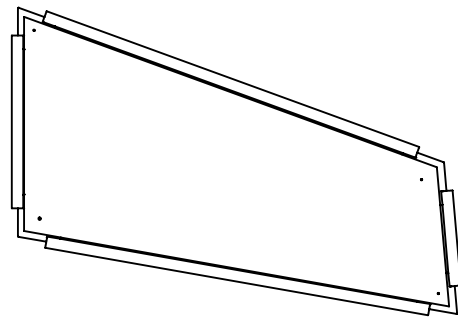
STEEL PLATES



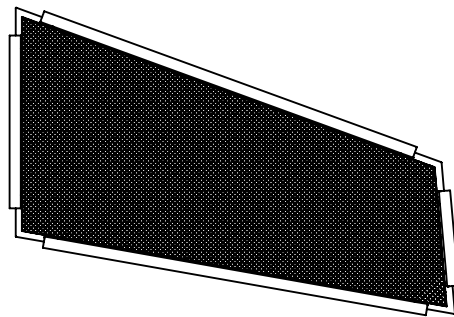
6.0



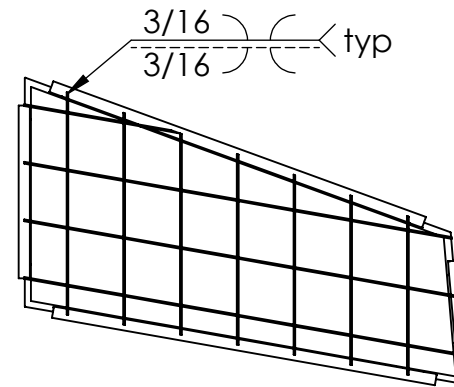
Step 1
Welding
Pipes and Gussets



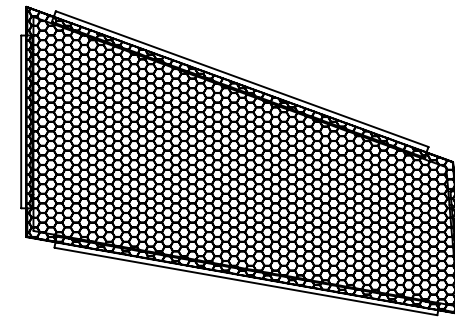
Step 2
Nailing (or Screwing)
Shape to Gussets



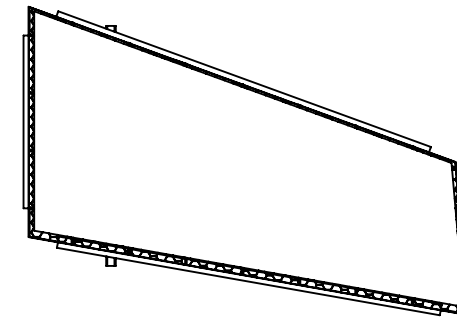
Step 3
Stapling
Lath to Shape
(if not already done)



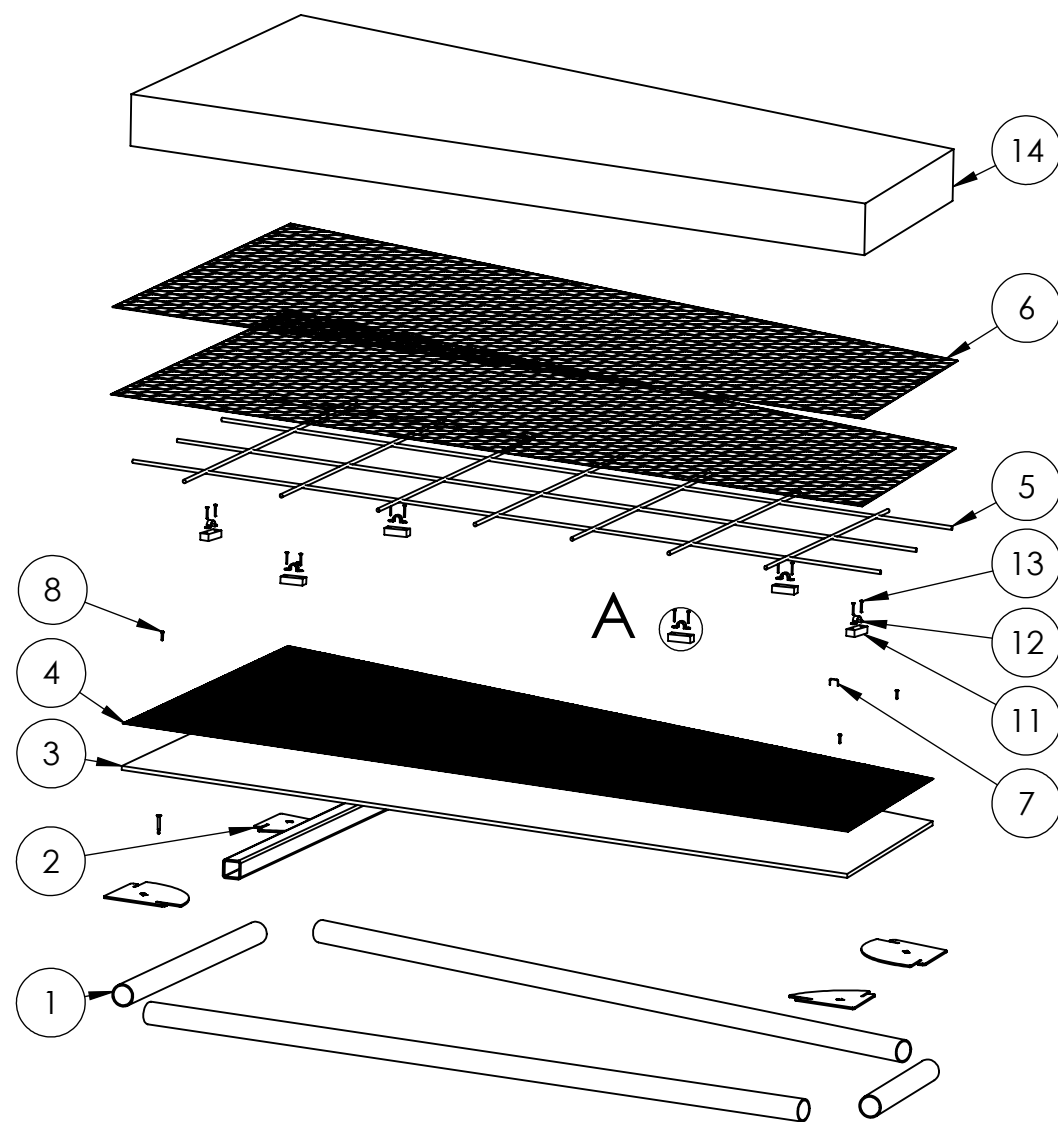
Step 4
Welding
Rebar to Pipes and Rebar



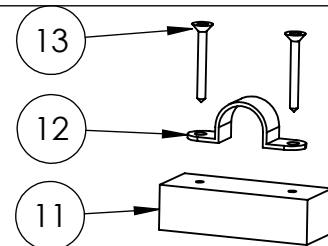
Step 5
Stapling
Poultry Netting (x2) to Shapes



Step 6
Concreting
Scratch Coat + Texture Coat



ItemNo	PartNo	DESCRIPTION	QTY
1	MAT-STL-005-2.375-0.154-A53GrB	Steel Pipe - 2in - Schedule 40 - A53 Grade B	4
2	SR-2.0-L01	Single Gusset	4
3	SR-2.0-C01	Typical Shape	1
4	4113145	Metal Lath - Galvanized	1
5	MAT-STL-RB-3-A706Gr60	Rebar - #3 - Carbon Steel - A706 Grade 60 (or better)	11
6	NB20-4X150M1	Poultry Netting - 20 Gauge - 1in Mesh	2
7		Spot Nail - 16 Gauge - Galvanized - Wide Crown - 1in Wide - 0.625in Leg	AR
8	237346	Hilti Nail - X-U MX Steel and Concrete Nails - Collated	4
9	50353	Hilti Powder Cartridge - 6.8/11 M10 - 27 Caliber - Red	4
10	14N200UFTZ	Self Drilling Screw - #14 x 2in Long - Flat Head - Tamper Resistant T25 Torx Drive - Zinc Plated	4
11	SR-2.0-C02	Rebar Block	6
12	751300010038	Pipe Hanger Strap - 0.5in - Galvanized	6
13	GRK00091	GRK Screw - R4 - #9 x 1.25in Long - Zinc Yellow	8
14	n/a	Concrete (Scratch Coat + Texture Coat)	1
22	MAT-STL-007-2-2-0.1875-A500GrB-50	Steel Square Tube - 2in x 2in x 0.1875in - A500 Grade B Steel - 50in Long	1



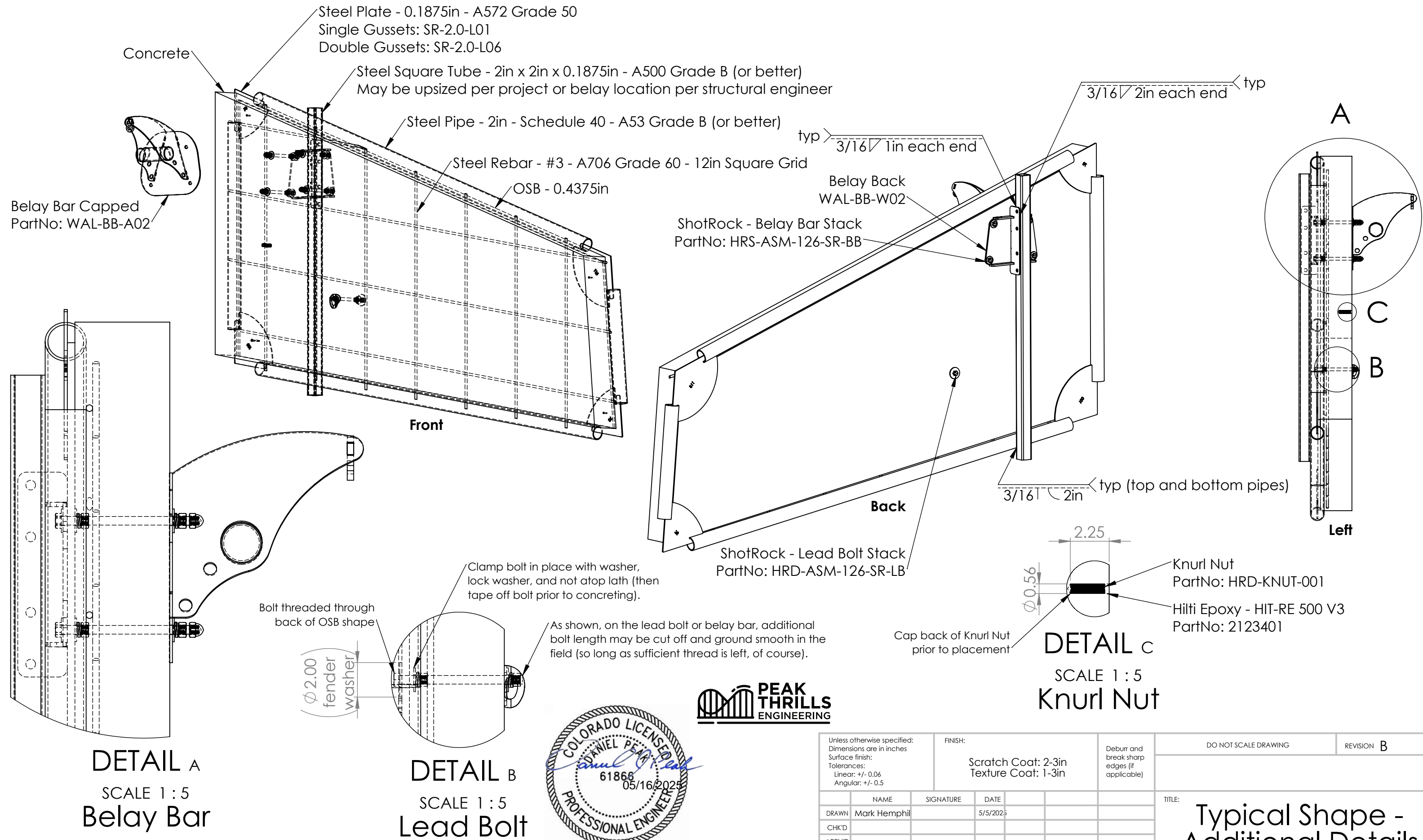
DETAIL A
SCALE 1 : 3

Use to affix shapes to
rebar mid-shape or
along any long
unspported edges



Unless otherwise specified: Dimensions are in inches Surface finish: Intermittent		FINISH: Scratch Coat: 2-3in Texture Coat: 1-3in	Debur and break sharp edges (if applicable)	DO NOT SCALE DRAWING	REVISION B
DATE 4/22/2024				TITLE: Typical Shape	
		MATERIAL: As Noted		DWG NO. SR-2.0-A02	B
		WEIGHT: 286.293184		SCALE: 1:40	SHEET 1 OF 2

Notes:
1. Any and all hardware specified above is nonstructural and may be substituted as desired with another item (e.g. to address availability, lead time, efficiency, etc.)
2. Item 3 (OSB shape) is intended to be affixed to item 2 (Gusset) with either items 8 and 9, or item 10, or any other substitute fastener(s) if/as needed.

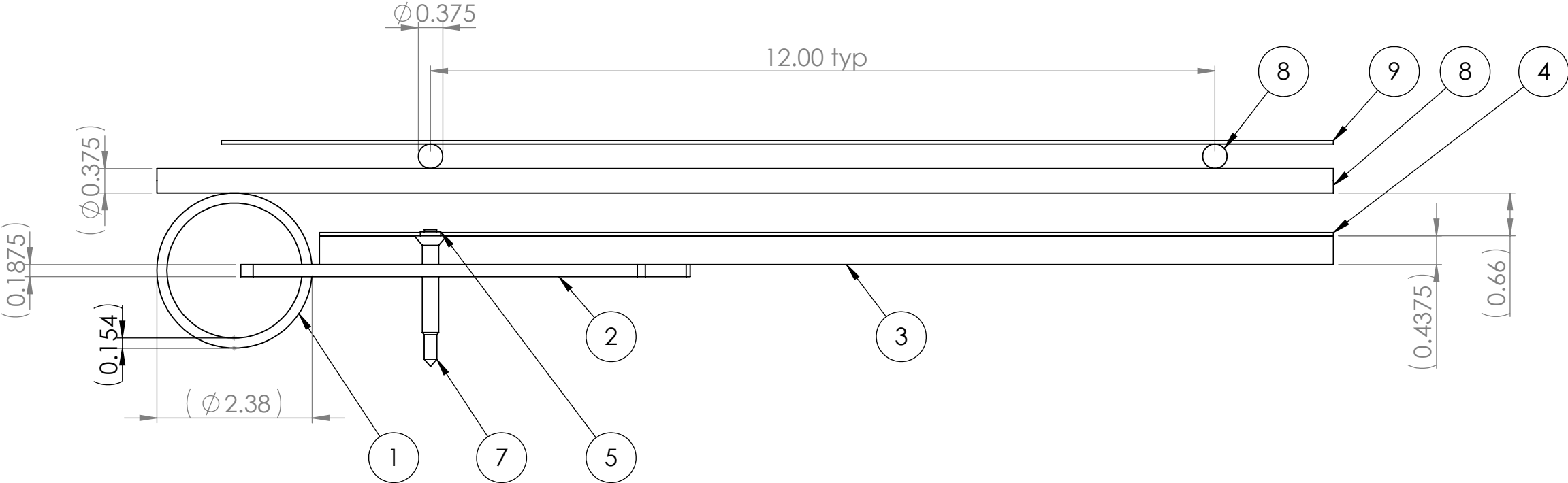


Notes:

1. Not pictured here are the lath (stapled atop the OSB) or the double layer of poultry netting (placed atop the rebar, also stapled to the OSB). See sheet 1 for the full details associated with the shapes themselves. This drawing speaks specifically to the two belay conditions (Belay Bars and Lead Bolts) and the Knurl Nuts (which receive holds).

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: Scratch Coat: 2-3in Texture Coat: 1-3in		Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING	REVISION B
DRAWN	Mark Hemphil		DATE	5/5/2025		TITLE: Typical Shape - Additional Details	
CHK'D							
APPV'D							
MFG							
Q.A							
			MATERIAL:		As Noted	DWG NO.	SR-2.0-A02
			WEIGHT: 286.293184			SCALE: 1:15	SHEET 2 OF 2

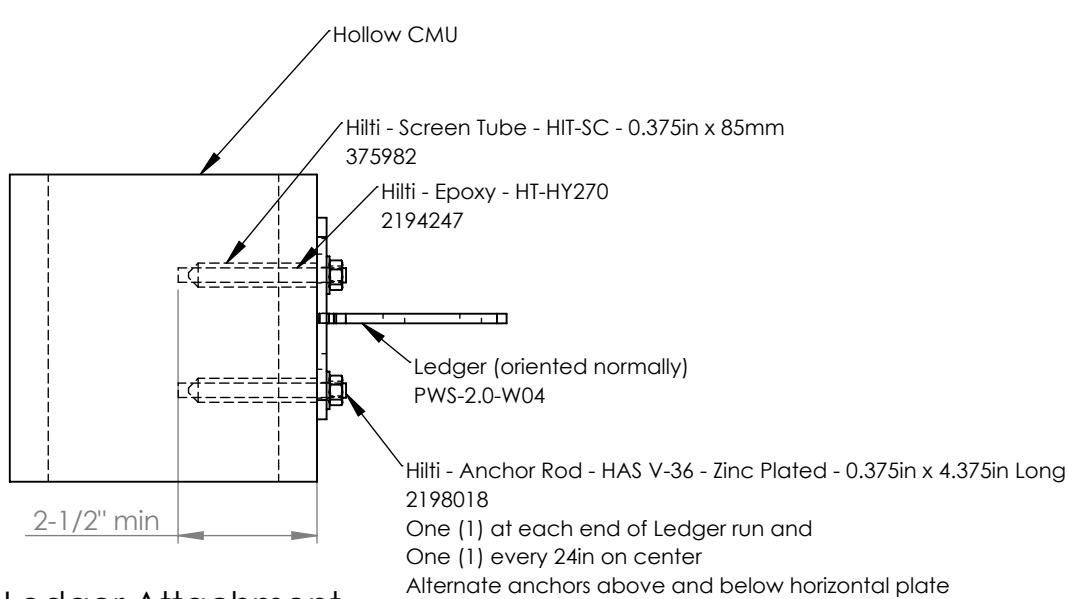
ITEM NO.	PartNo	DESCRIPTION	QTY Shown
1	MAT-STL-005-2.375-0.154-A53GrB	Steel Pipe - 2in - Schedule 40 - A53 Grade B	1
2	SR-2.0-L01	Single Gusset	1
3	SR-2.0-C01	Typical Shape	1
4	4113145	Metal Lath - Galvanized	1
5	237346	Hilti Nail - X-U MX Steel and Concrete Nails - Collated	1
6	50353	Hilti Powder Cartridge - 6.8/11 M10 - 27 Caliber - Red	1
7	14N200UFTZ	Self Drilling Screw - #14 x 2in Long - Flat Head - Tamper Resistant T25 Torx Drive - Zinc Plated	1
8	MAT-STL-RB-3-A706Gr60	Rebar - #3 - Carbon Steel - A706 Grade 60 (or better)	3
9	NB20-4X150M1	Poultry Netting - 20 Gauge - 1in Mesh	2



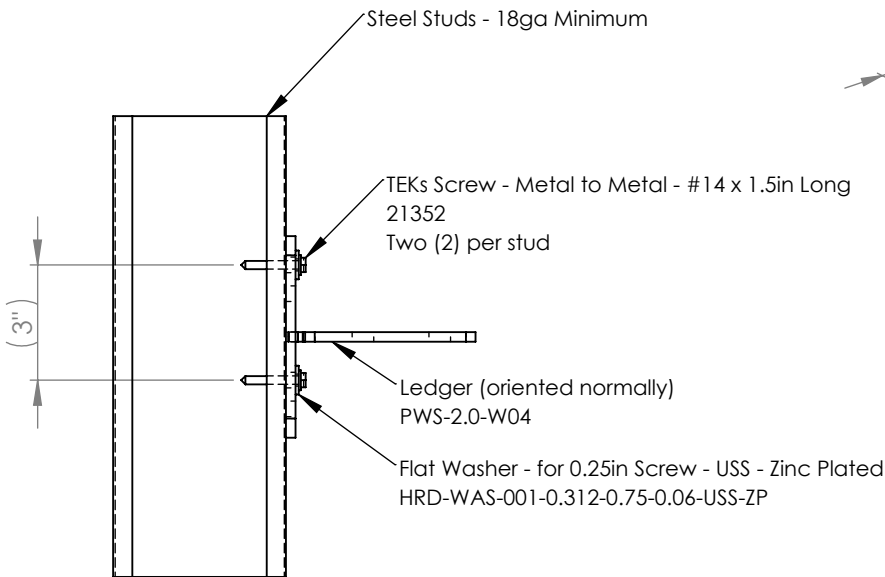
Notes:
1. Items 5 and 6, or 7 alone, or any other fastener may suffice to initially affix item 3 (any given OSB shape) to item 2 (any given gusset).

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION A											
DRAWN			Mark Hemphil			SIGNATURE			DATE			2/18/2025			TITLE: Typical Section								
CHK'D																							
APPV'D																							
MFG																							
Q.A																							
									MATERIAL:			As Noted			DWG NO.			SR-2.0-A03			B		
															WEIGHT:			SCALE: 1:2			SHEET 1 OF 1		

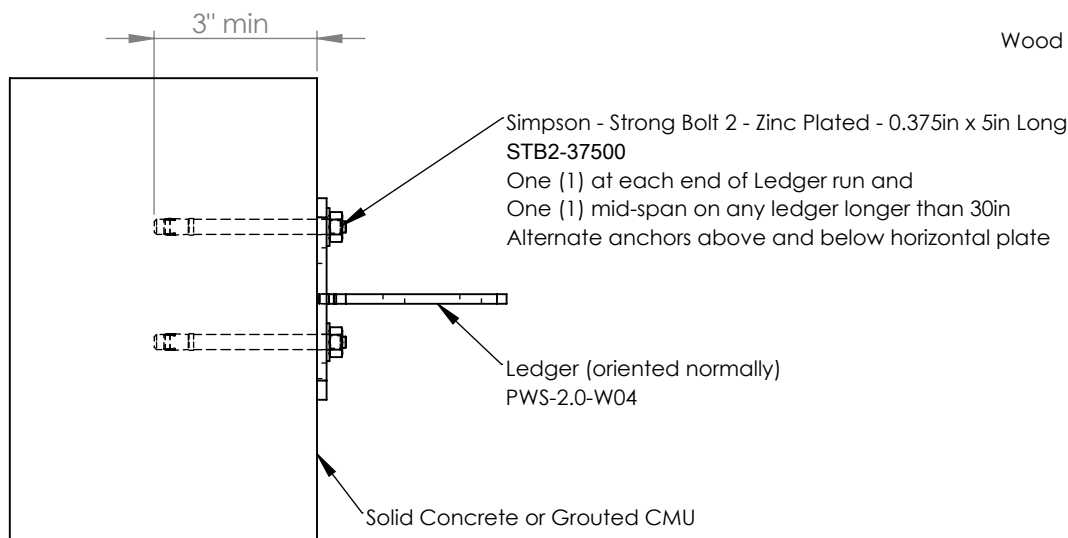
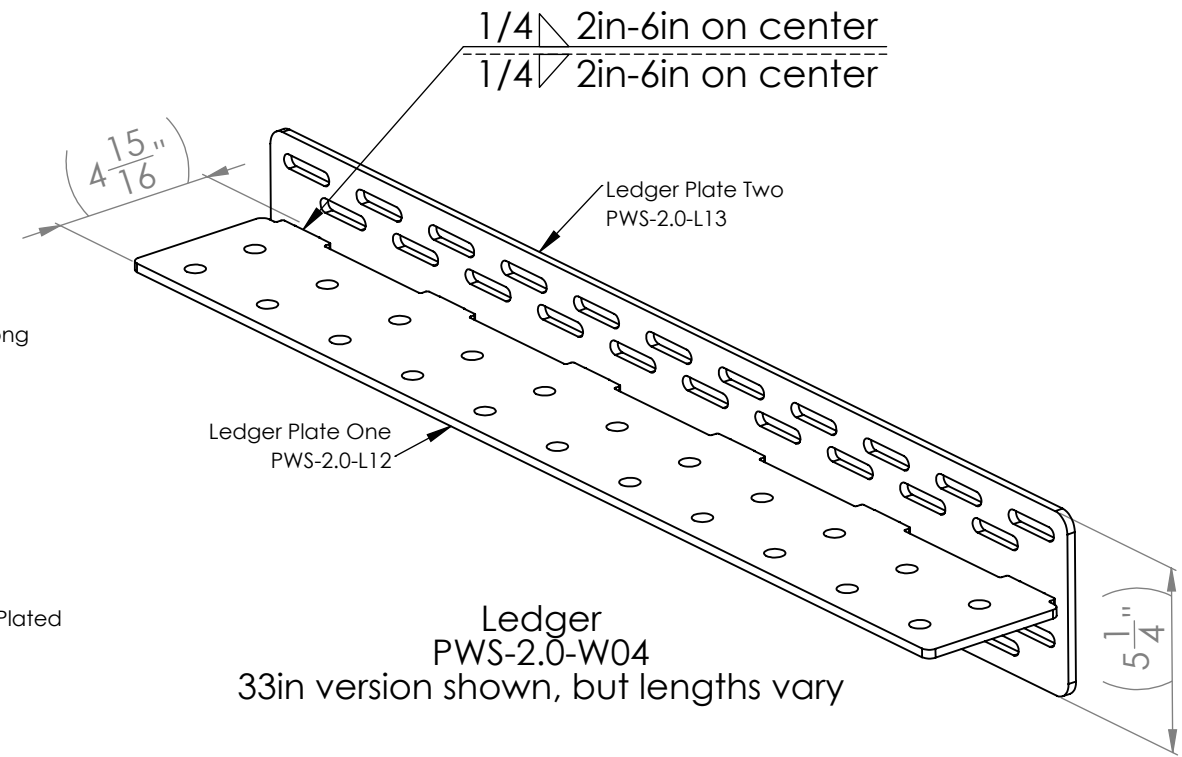
Ledger Spacing: 96in max



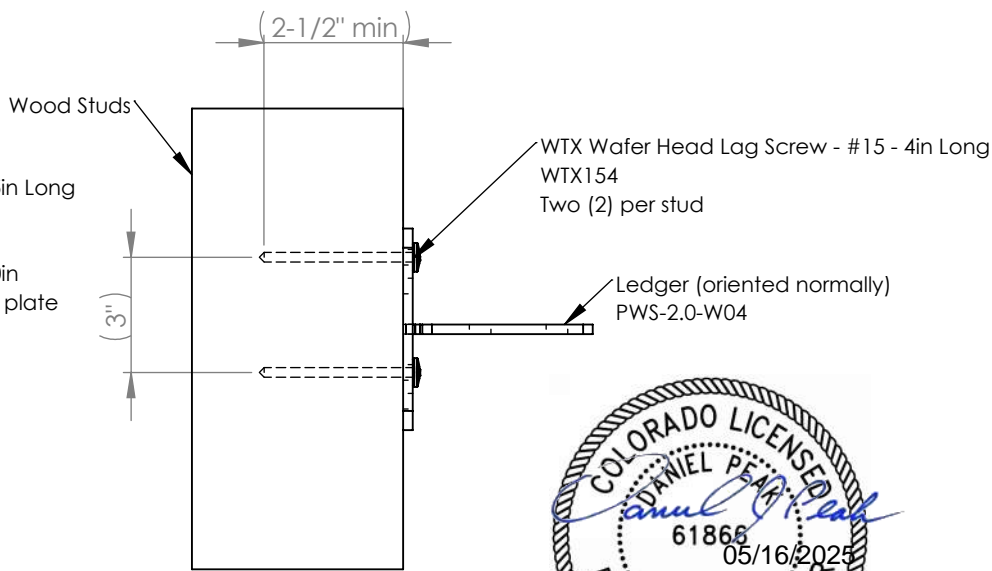
Ledger Attachment to Hollow CMU



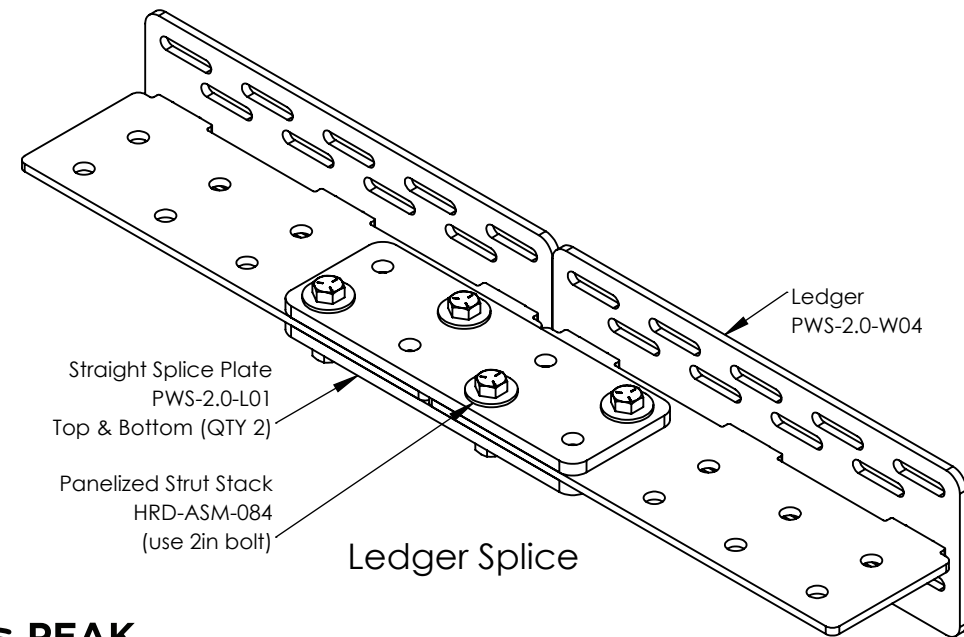
Ledger Attachment to Front of Steel Studs



Ledger Attachment to Solid Concrete or Grouted CMU



Ledger Attachment to Front of Wood Studs



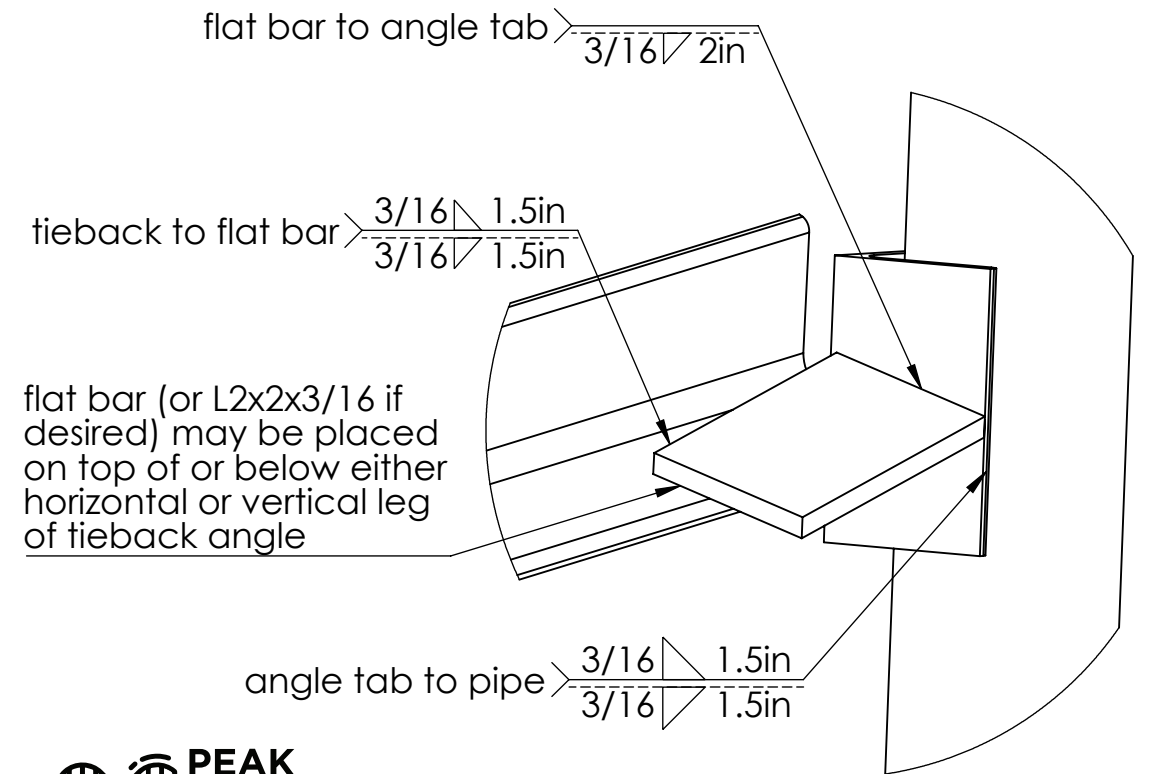
Notes:

1. It is permissible to install ledgers or brackets atop wall cladding (e.g. drywall, plywood, etc.), so long as the appropriate embedment (into whichever wall type) is maintained (as defined by the manufacturer of each fastener and the structural engineer stamping these plans).

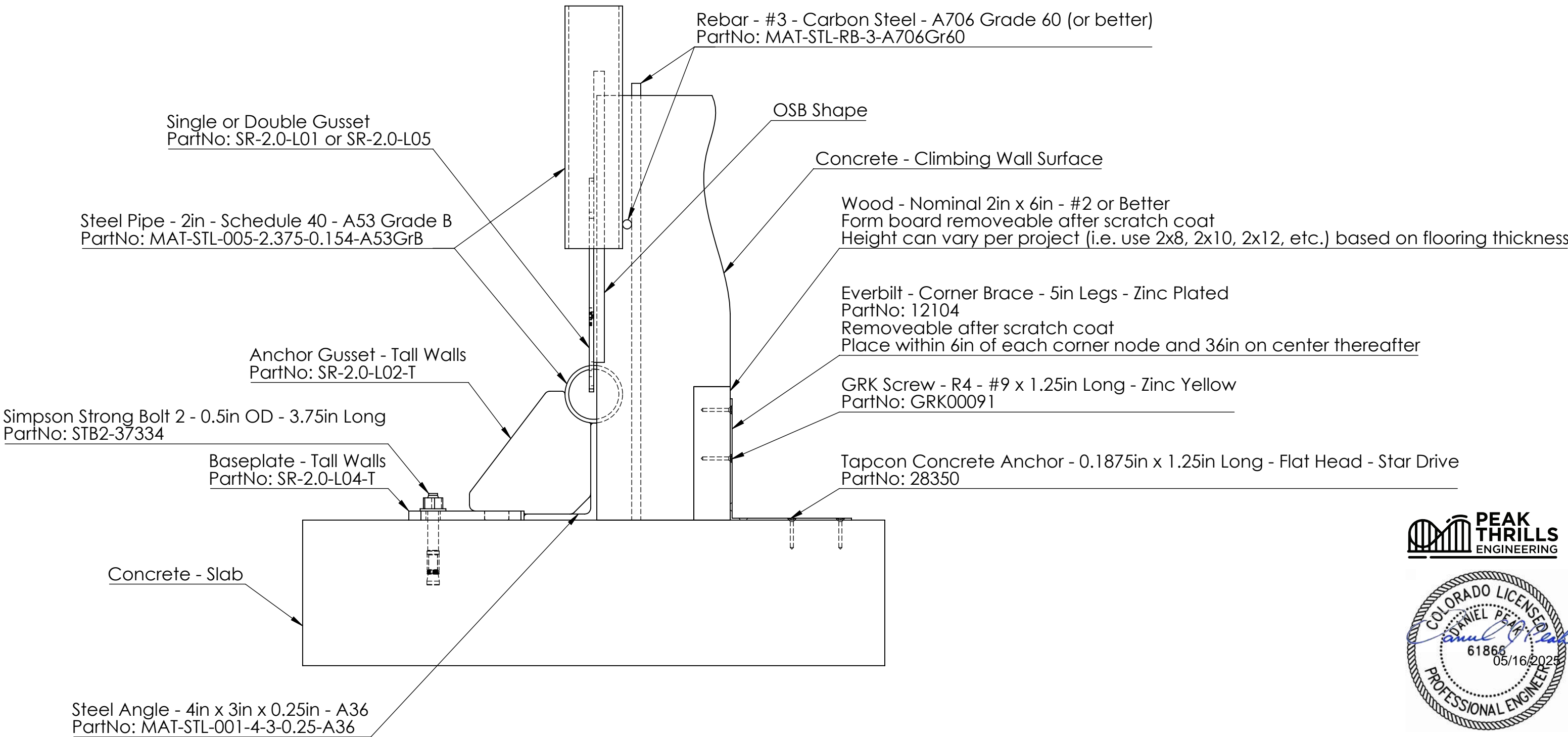
2. Wedge anchors (or any other fastener) may change per project if/when required by engineering. For example each Strong Bolt 2 may be replaced with a KB TZ2 of equivalent diameter and length for high seismic areas. Additionally, any Zinc Plated Simpson Strong Bolt 2 may be replaced with a Zinc Plated Hilti KB1 of equivalent diameter and length.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION A		
									TITLE:					
DRAWN Mark Hemphill			SIGNATURE			DATE 4/12/2023			ShotRock 2.0 - Typical Ledgers - Indoor					
CHK'D														
APPV'D														
MFG														
Q.A						MATERIAL:			DWG NO.			B		
									SR-2.0-A04-I					
						WEIGHT: 221.632622			SCALE: 1:5			SHEET 1 OF 1		

1. Connection from tieback to pipe can be direct (if a clean weld is possible), or facilitated via one or more clips or tabs (either 0.25in A36 flat bar / plate as shown, or with 2in x 2in x 0.1875in angle iron).
2. Tiebacks spacing and placement determined per project by structural engineer.

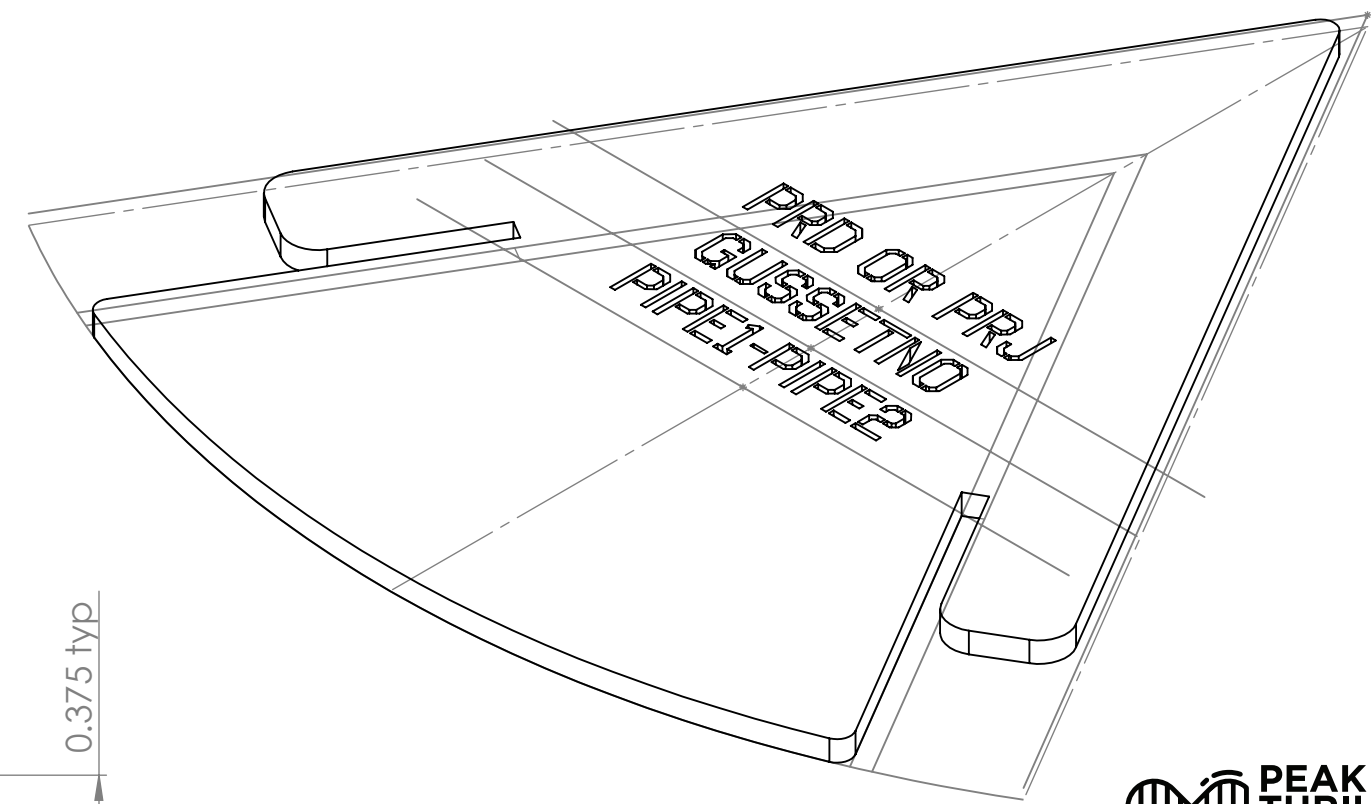
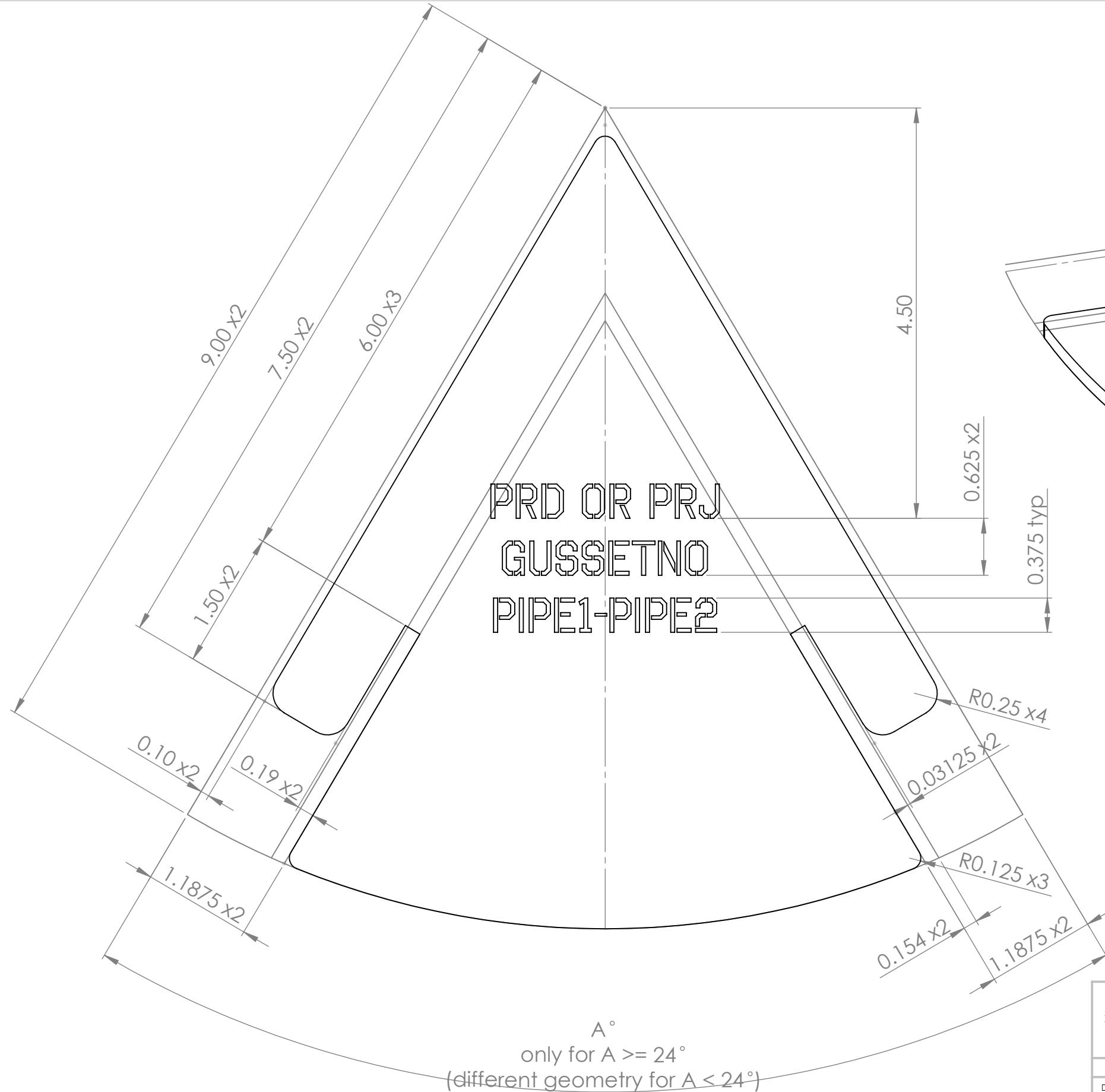


Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5		FINISH: None				Deburr and break sharp edges (if applicable)		DO NOT SCALE DRAWING		REVISION A	
		NAME		SIGNATURE		DATE		TITLE:			
DRAWN		Mark Hemphil				5/5/2025		Typical Tieback			
CHK'D											
APP'VD											
MFG											
Q.A											
						MATERIAL:		DWG NO.		B	
						As Noted		SR-2.0-A06			
								SCALE: 1:15		SHEET 1 OF 1	
						WEIGHT:					

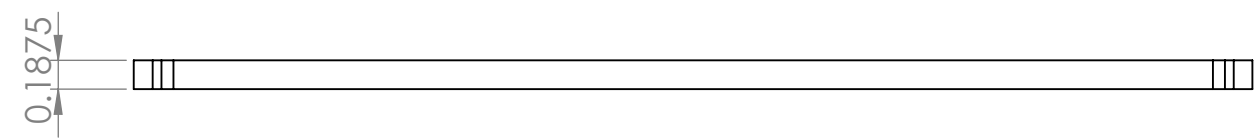


Note:
1. Anchor Feet for Tall Walls (SR-2.0-W03-T) may be fabricated ahead of time. The plates which comprise this weldment (SR-2.0-L02-T and SR-2.0-L04-T) are called out above in case this pre-fabrication doesn't occur for any reason.

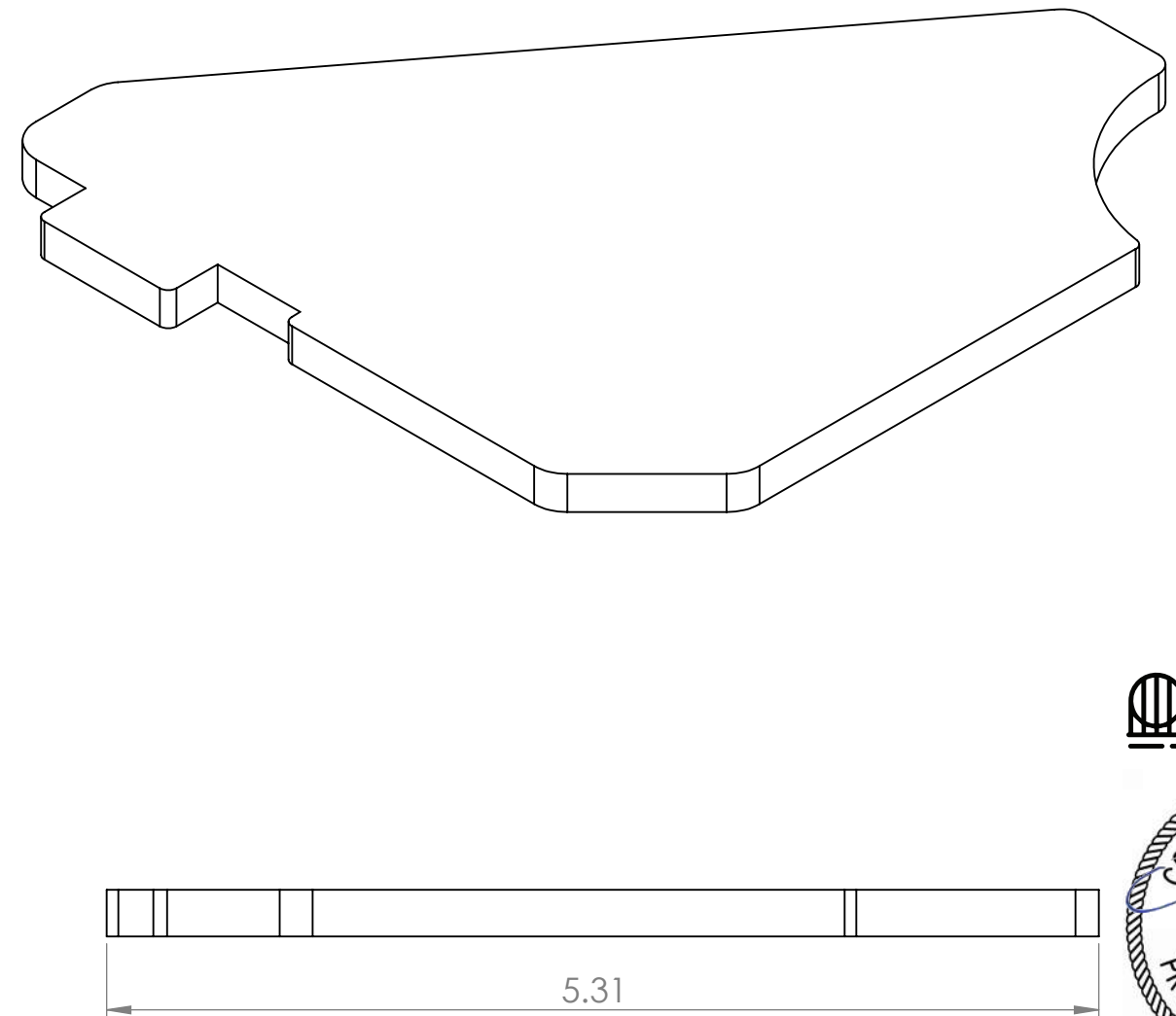
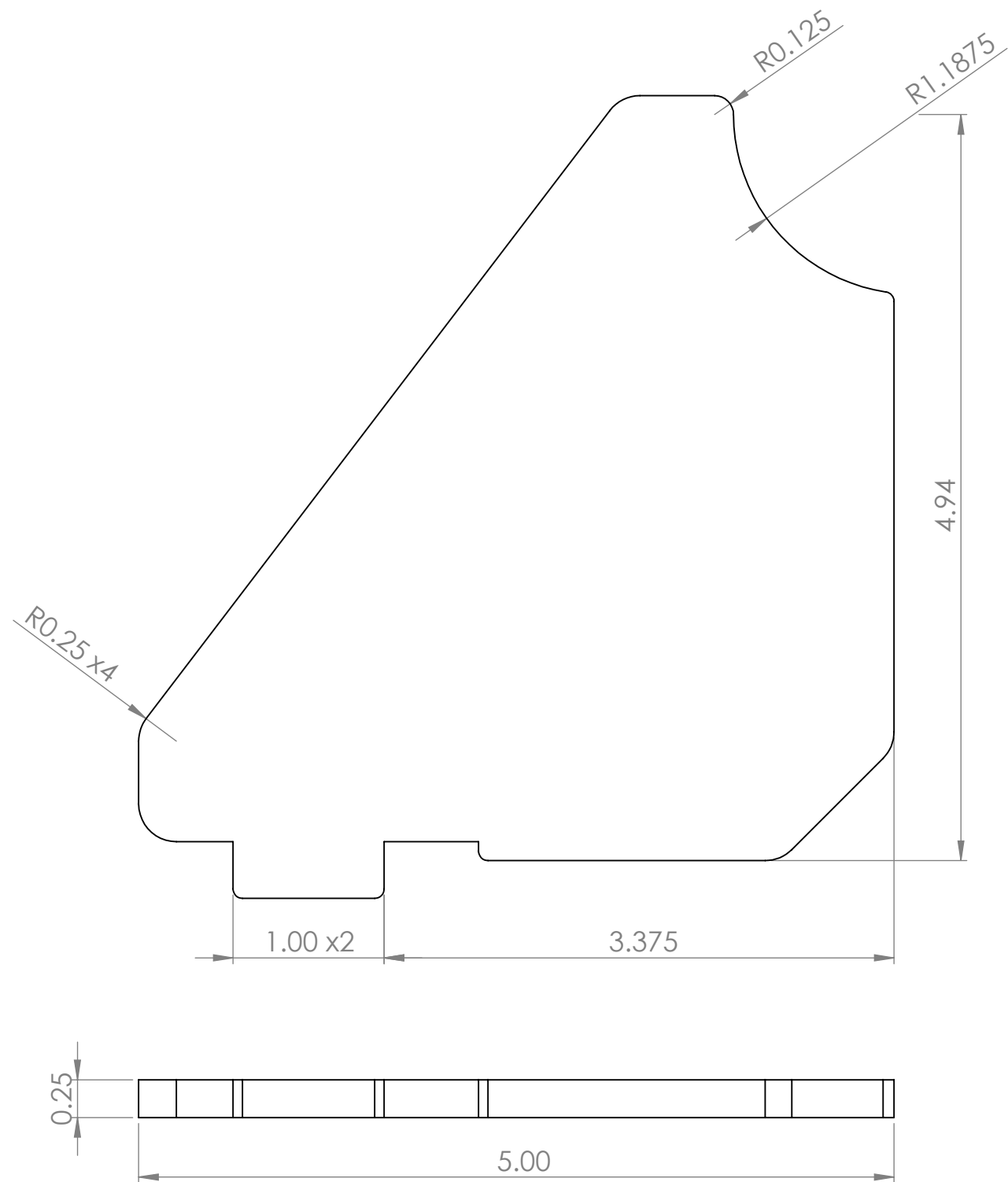
Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING	REVISION	A
	NAME	SIGNATURE	DATE				TITLE: ShotRock Curb Detail		
DRAWN	Mark Hemphil		5/6/2025						
CHK'D									
APPV'D									
MFG									
Q.A						MATERIAL: As Noted	DWG NO.	SR-2.0-A08	B
						WEIGHT:	SCALE: 1:4	SHEET 1 OF 1	



- Notes:
1. Manufacture from customer-supplied data (e.g. laser-cut from DXF file).
 2. Deburr and break all sharp edges.

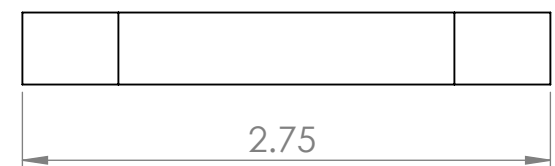
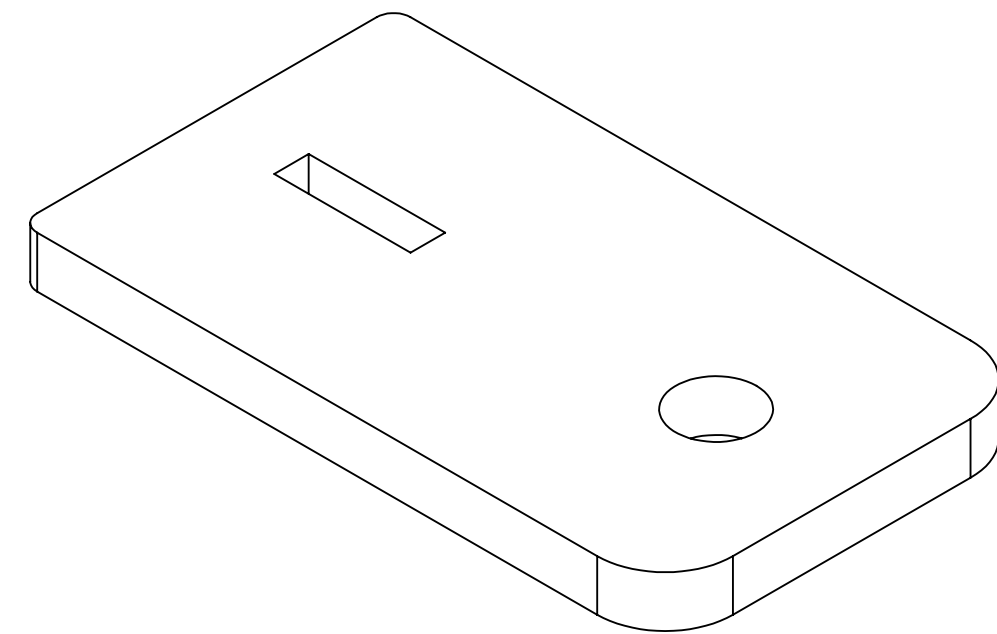
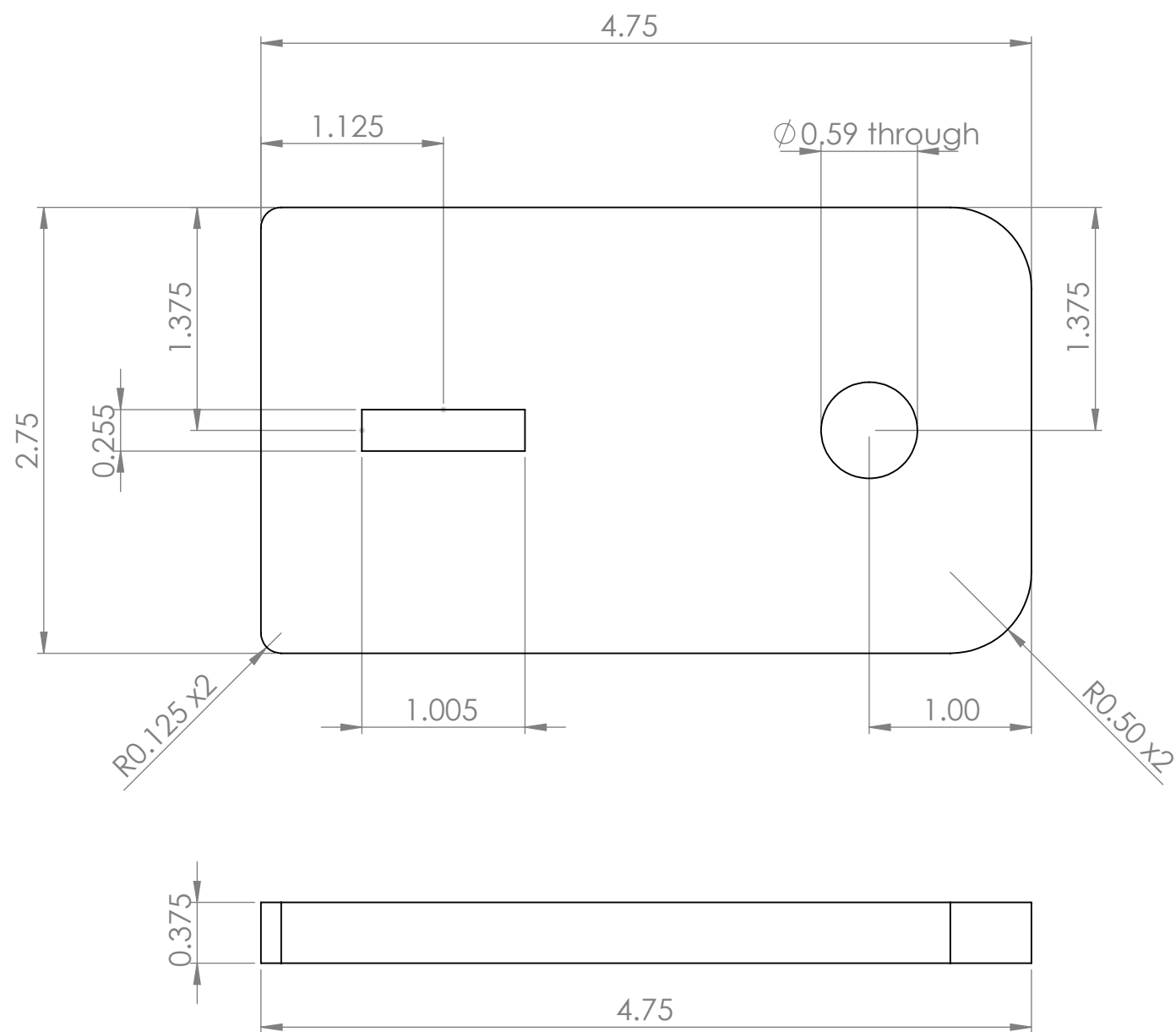


Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING	REVISION	A
	NAME	SIGNATURE	DATE				TITLE: Single Gusset		
DRAWN	Mark Hemphil		7/14/2023						
CHK'D									
APPV'D									
MFG									
Q.A							DWG NO.		
						MATERIAL: ASTM A572 Grade 50 Steel	SR-2.0-L01		
						WEIGHT: 0.592121	SCALE: 1:1.25	SHEET 2 OF 2	



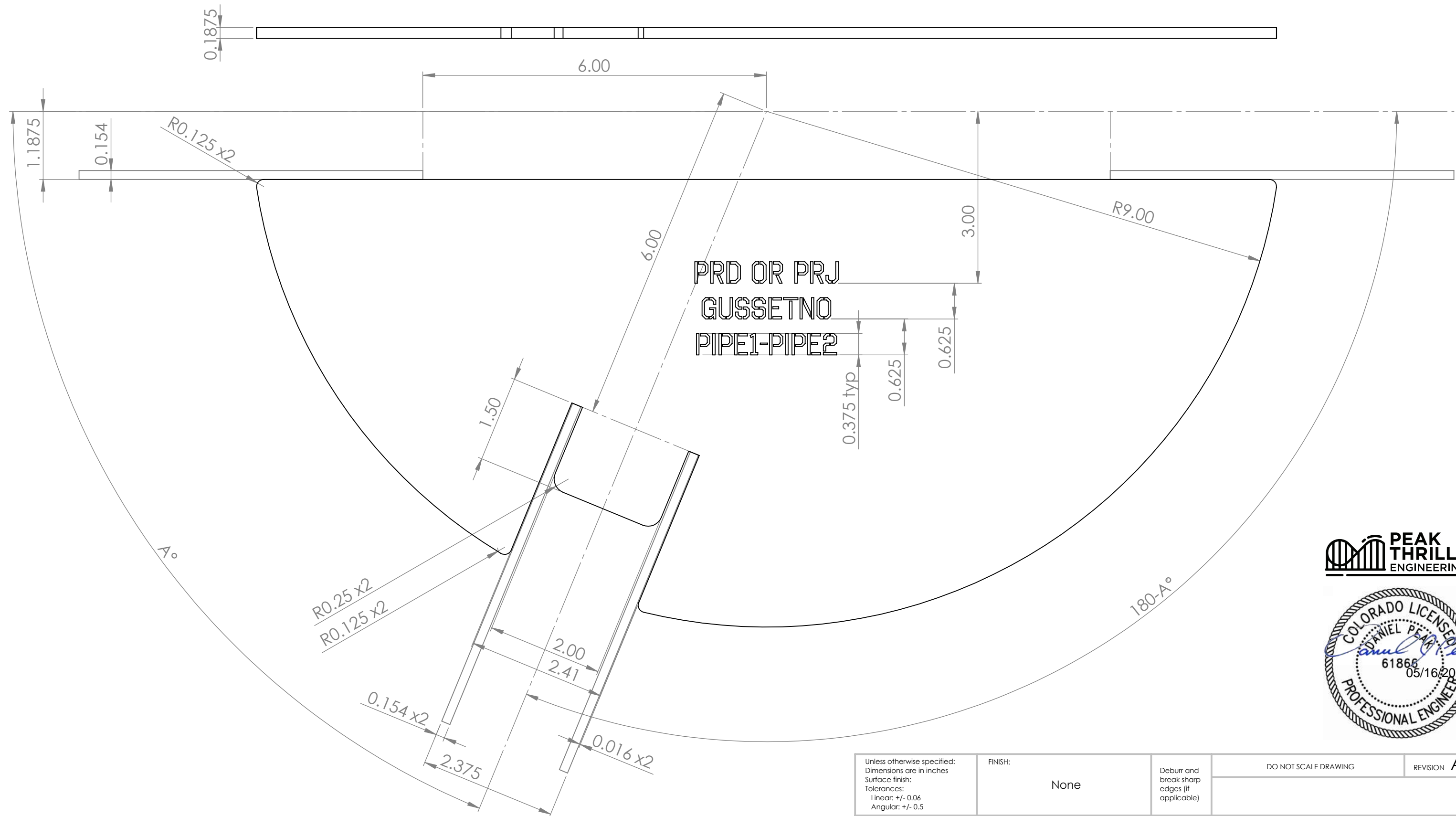
- Notes:
1. Manufacture from customer-supplied data (e.g. laser-cut from DXF file).
 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING		REVISION C		
							TITLE: Anchor Gusset - Tall Walls				
	NAME	SIGNATURE	DATE								
DRAWN	Mark Hemphil		7/16/2023								
CHK'D											
APPV'D											
MFG											
Q.A				MATERIAL: ASTM A36 Steel			DWG NO.		SR-2.0-L02-T		B
				WEIGHT: 1.23			SCALE: 1:1		SHEET 2 OF 2		



- Notes:
- 1. Manufacture from customer-supplied data (e.g. laser-cut from DXF file).
 - 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION C			
	NAME		SIGNATURE		DATE						TITLE: Baseplate - Tall Walls				
DRAWN	Mark Hemphil				7/16/2023										
CHK'D															
APPV'D															
MFG															
Q.A															
							MATERIAL:				DWG NO.			B	
							ASTM A572 Grade 50 Steel				SR-2.0-L04-T				
							WEIGHT: 1.32				SCALE: 1:1			SHEET 2 OF 2	

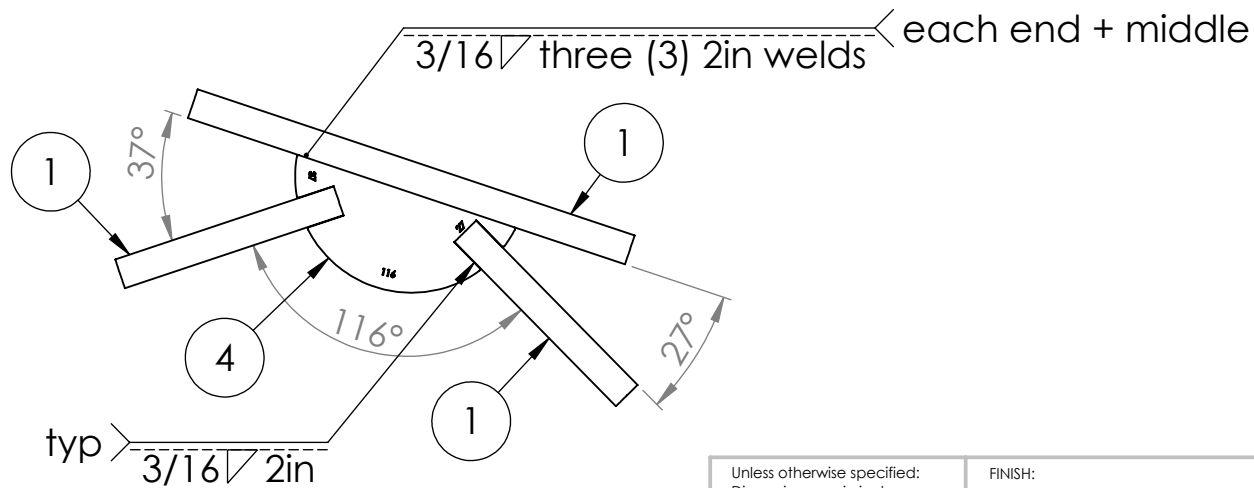
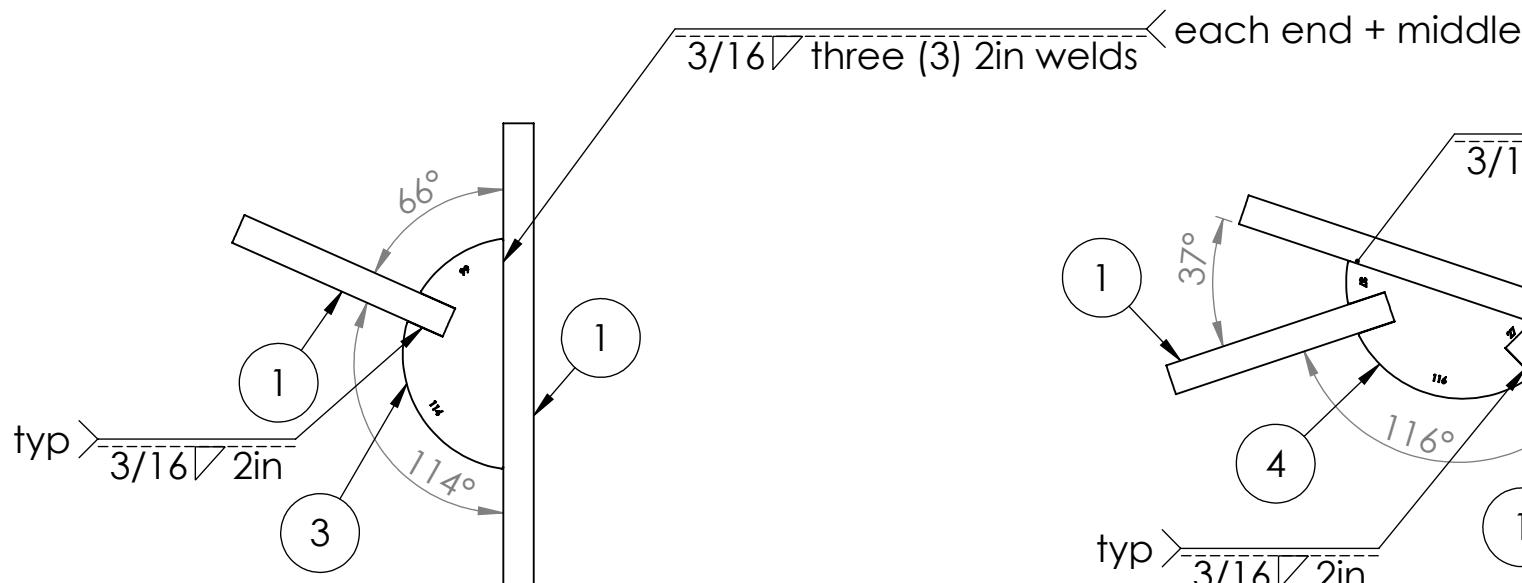
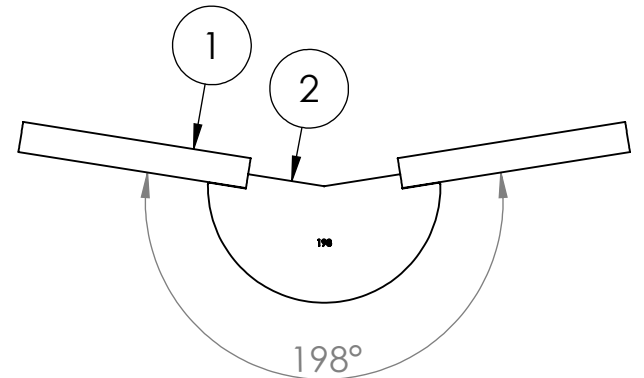
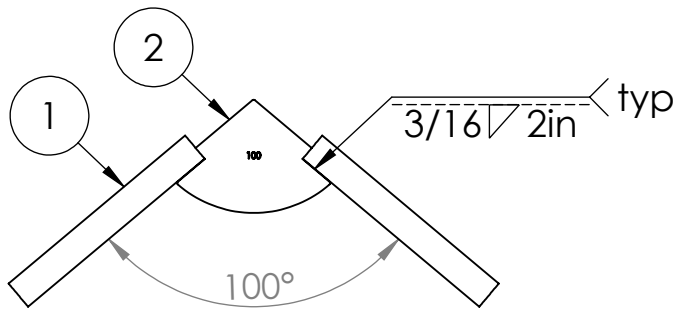
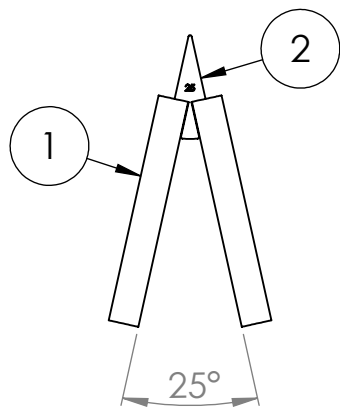


Notes:

1. Manufacture from customer-supplied data (e.g. laser-cut from DXF file).
2. Deburr and break all sharp edges.
3. One example is shown here, but others are of a similar construction.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION A					
									TITLE: Double Gusset (180°)								
NAME			SIGNATURE			DATE											
DRAWN Mark Hemphil						7/14/2023											
CHK'D																	
APPV'D																	
MFG																	
Q.A									MATERIAL:			DWG NO.			B		
									ASTM A572 Grade 50 Steel			SR-2.0-L05					
									WEIGHT: 5.361994			SCALE: 1:1.6			SHEET 2 OF 2		

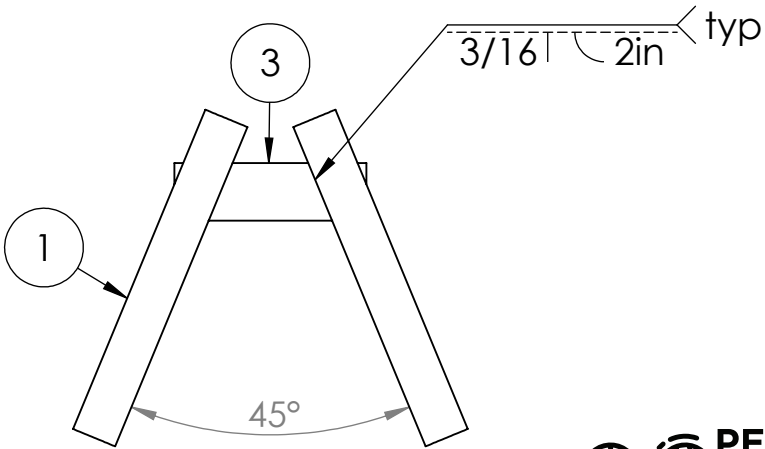
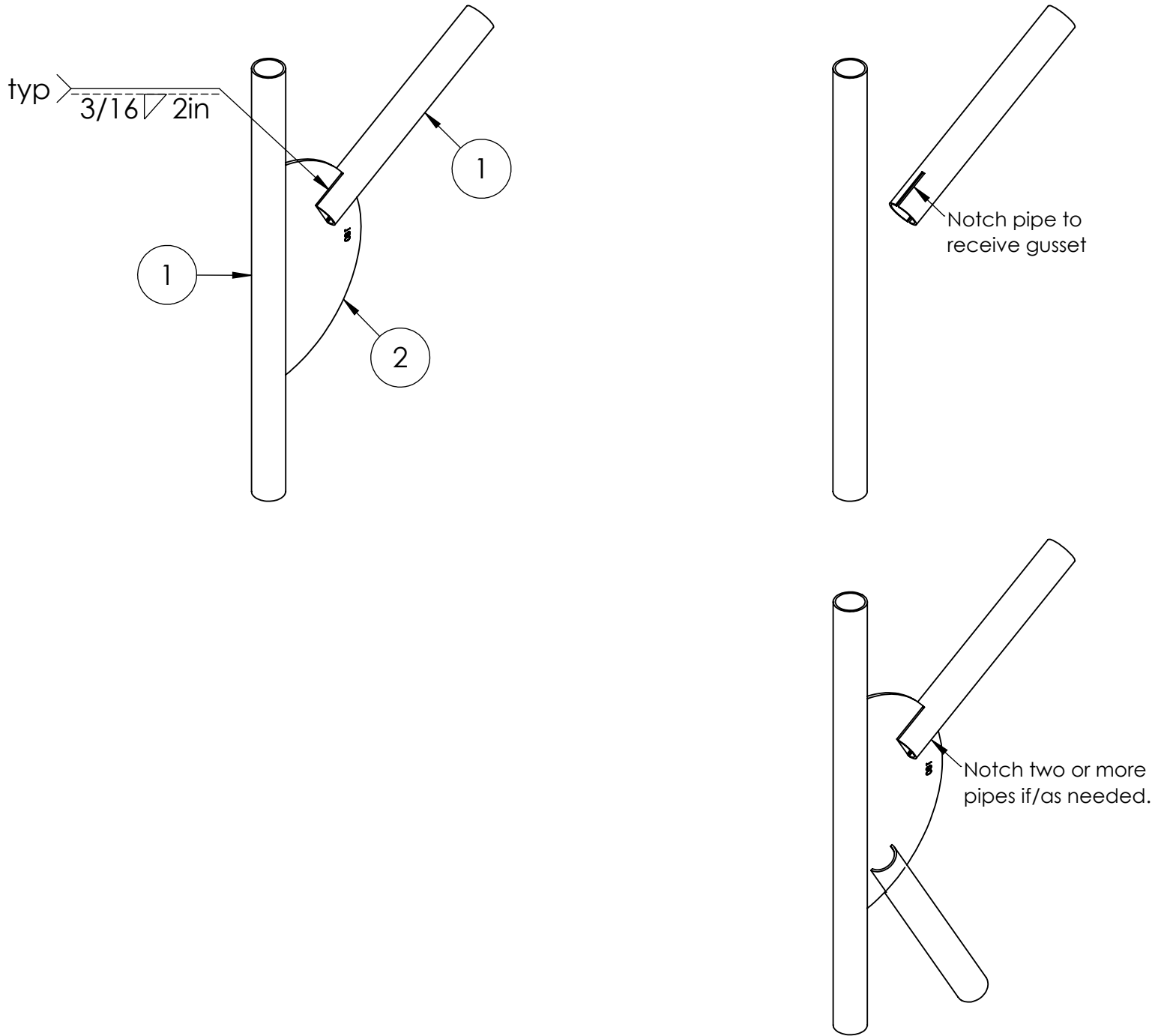
ItemNo	PartNo	DESCRIPTION	2D - under 180°	2D - over 180°	2D - Double	2D - Triple
1	MAT-STL-005-2.375-0.154-A53GrB	Steel Pipe - 2in - Schedule 40 - A53 Grade B	2	2	2	3
2	SR-2.0-L01	Single Gusset	1	-	-	-
3	SR-2.0-L05	Double Gusset	-	-	1	-
4	SR-2.0-L06	Triple Gusset	-	-	-	1



- Notes:
1. Singular angles for each condition are shown, but all other vertices are constructed similarly.
 2. Gussets may be trimmed in field if/as necessary to reduce the relative angle between pipes.
 3. Pipes could be any length (within the bounds dictated by engineering for a given boulder or custom wall).
 4. These details addresses the typical 2D connections. Gusset to gusset welds are covered on subsequent pages.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION B					
									TITLE: ShotRock 2.0 - Vertex - 2D - Planned Angle								
NAME			SIGNATURE			DATE											
DRAWN			Mark Hemphil			9/26/2023											
CHK'D																	
APPV'D																	
MFG									DWG NO. SR-2.0-W01-2D-P								
Q.A																	
						MATERIAL: As Noted			B								
						WEIGHT:			SCALE: 1:15								
									SHEET 1 OF 3								

ItemNo	PartNo	DESCRIPTION	2D - via 180°	2D - via Angle Iron
1	MAT-STL-005-2.375-0.154-A53GrB	Steel Pipe - 2in - Schedule 40 - A53 Grade B	1	-
2	SR-2.0-L05-180	Double Gusset - 180 Degrees	1	-
3	MAT-STL-001-3-3-0.1875-A36	Steel Angle - 3in x 3in x 0.1875in - A36	-	1

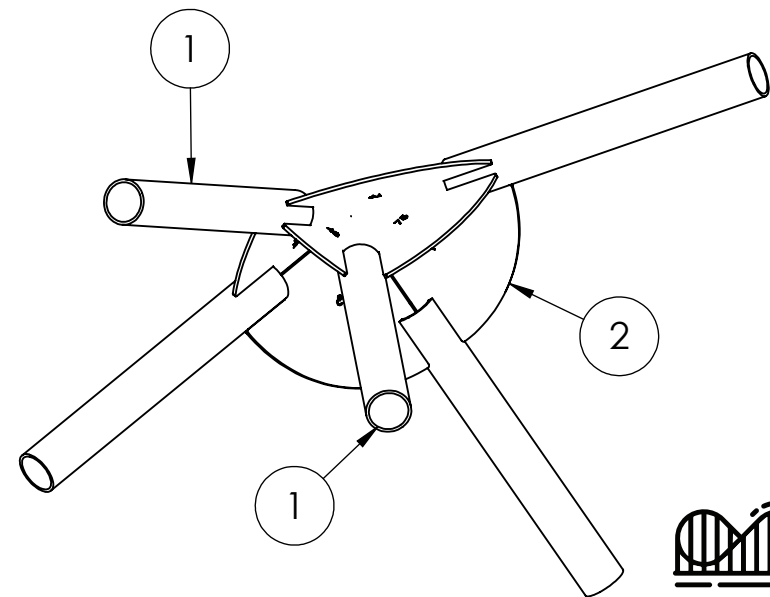
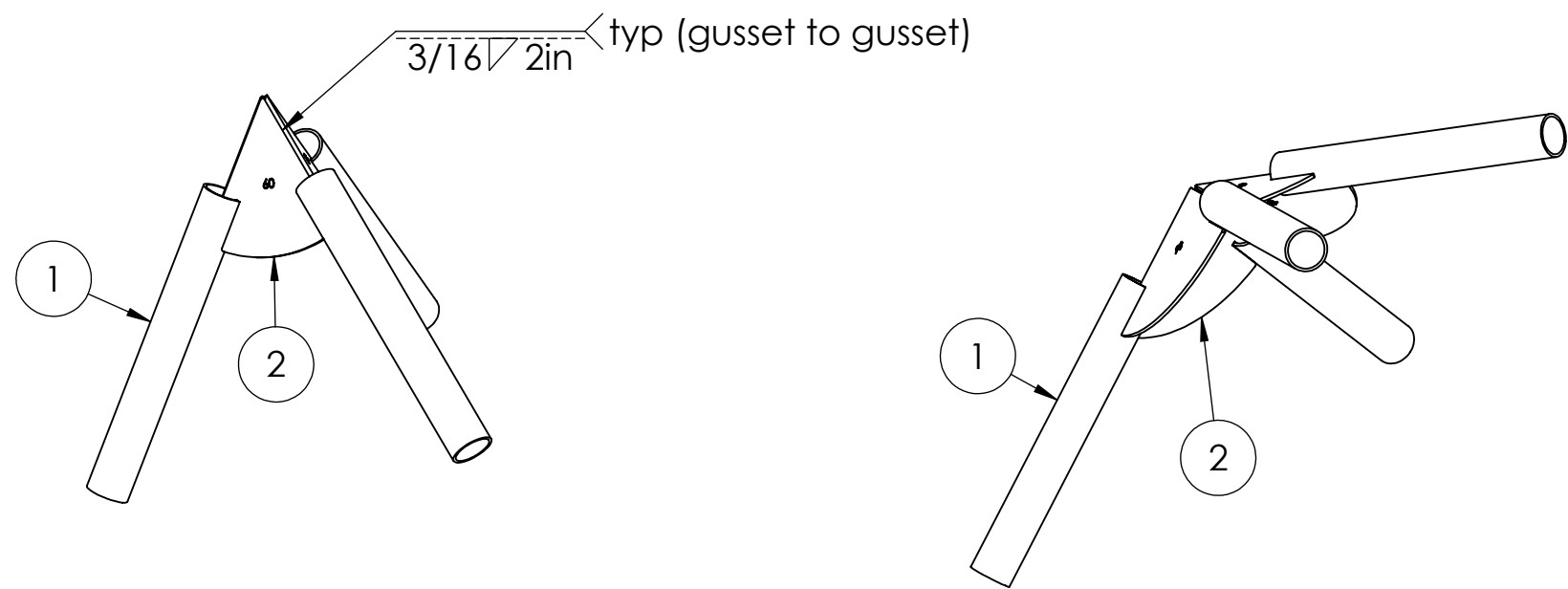


Notes:

- 1. Singular angles for each condition are shown, but all other vertices are constructed similarly.
- 2. Gussets may be trimmed in field if/as necessary to reduce the relative angle between pipes.
- 3. Pipes could be any length (within the bounds dictated by engineering for a given boulder or custom wall).
- 4. These details addresses the typical 2D connections. Gusset to gusset welds are covered on subsequent pages.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5		FINISH: None		Deburr and break sharp edges (if applicable)		DO NOT SCALE DRAWING		REVISION B	
						TITLE: ShotRock 2.0 - Vertex - 2D - Unplanned Angle			
DRAWN	Mark Hemphil		9/26/2023						
CHK'D									
APPV'D									
MFG									
Q.A				MATERIAL: As Noted		DWG NO. SR-2.0-W01-2D-U		B	
				WEIGHT:		SCALE: 1:10		SHEET 2 OF 3	

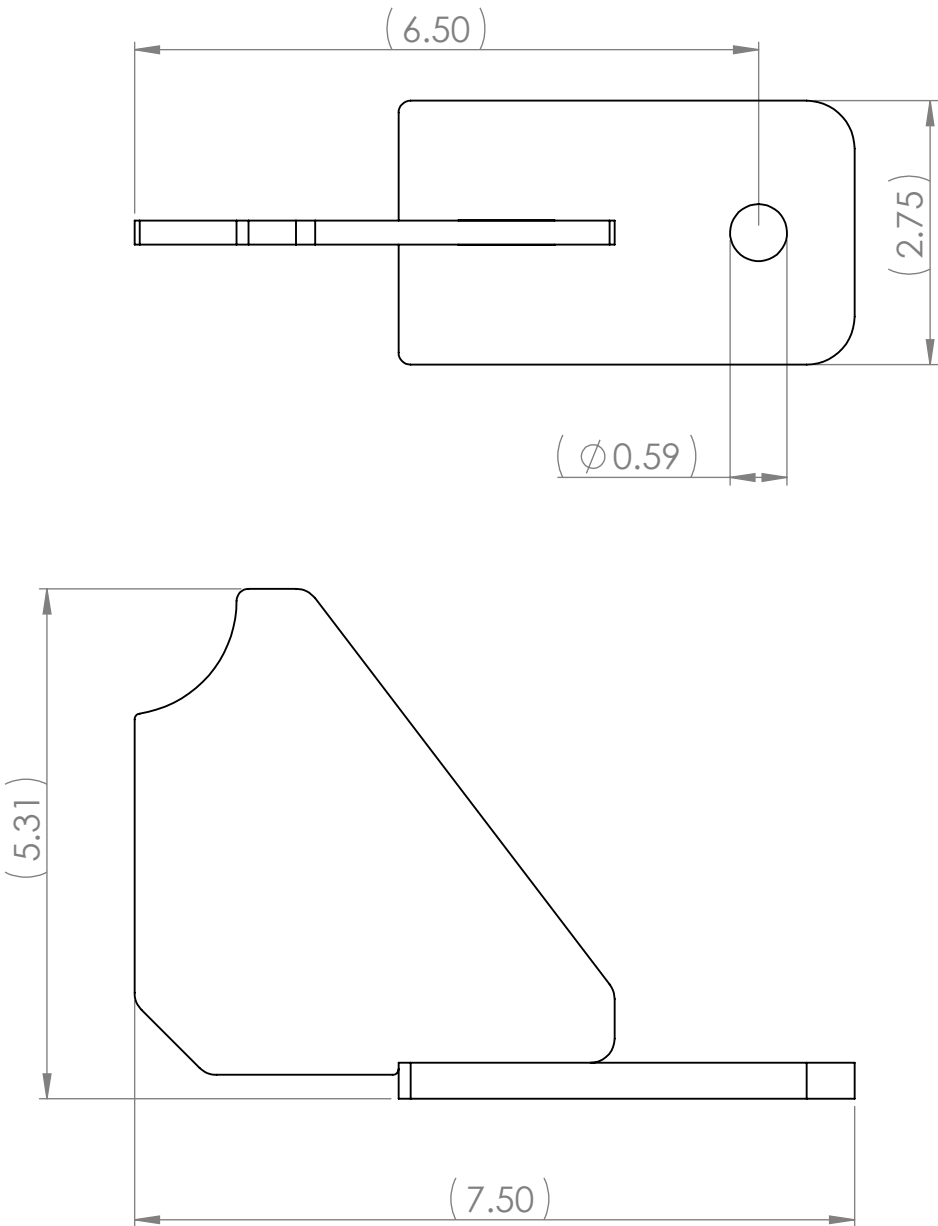
ITEM NO.	PartNo	DESCRIPTION	3D - 3 Pipes	3D - 4 Pipes	3D - 4 Pipes - with Internal Diagonal
1	MAT-STL-005-2.375-0.154-A53GrB	Steel Pipe - 2in - Schedule 40 - A53 Grade B	3	4	5
2	SR-2.0-L01	Single Gusset	3	4	2



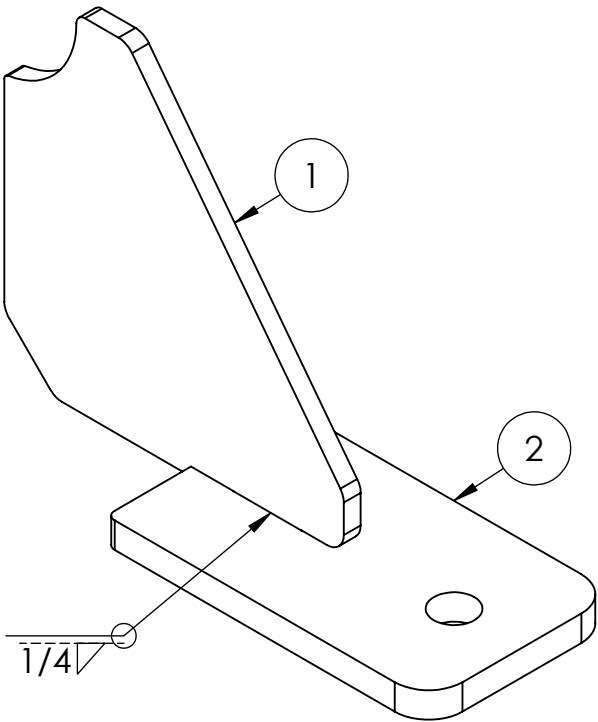
- Notes:
1. Rebar (#3 unless otherwise specified) may be used as a weld backer material for any gusset to gusset weld with an undesirably large gap between adjacent plates.
 2. Conversely, if the gusset plates overlap, one or both may be ground down to fit in 3D space.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING	REVISION B
NAME	SIGNATURE	DATE					TITLE: ShotRock 2.0 - Vertex - 3D	
DRAWN Mark Hemphil		9/26/2023						
CHK'D								
APPV'D								
MFG								
Q.A						MATERIAL: As Noted	DWG NO. SR-2.0-W01-3D	B
						WEIGHT:	SCALE: 1:10	SHEET 3 OF 3

ITEM NO.	PartNo	DESCRIPTION	Tall Walls
1	SR-2.0-L02-T	Anchor Gusset - Tall Walls	1
2	SR-2.0-L04-T	Baseplate - Tall Walls	1



Fabrication Time	Minutes
Time - Assembling	
Time - CNCing	
Time - Cutting	
Time - Drilling	
Time - Grinding	5
Time - Ironworking	
Time - Painting	
Time - Routing	
Time - Transporting	
Time - Welding	15
Time - Total	20

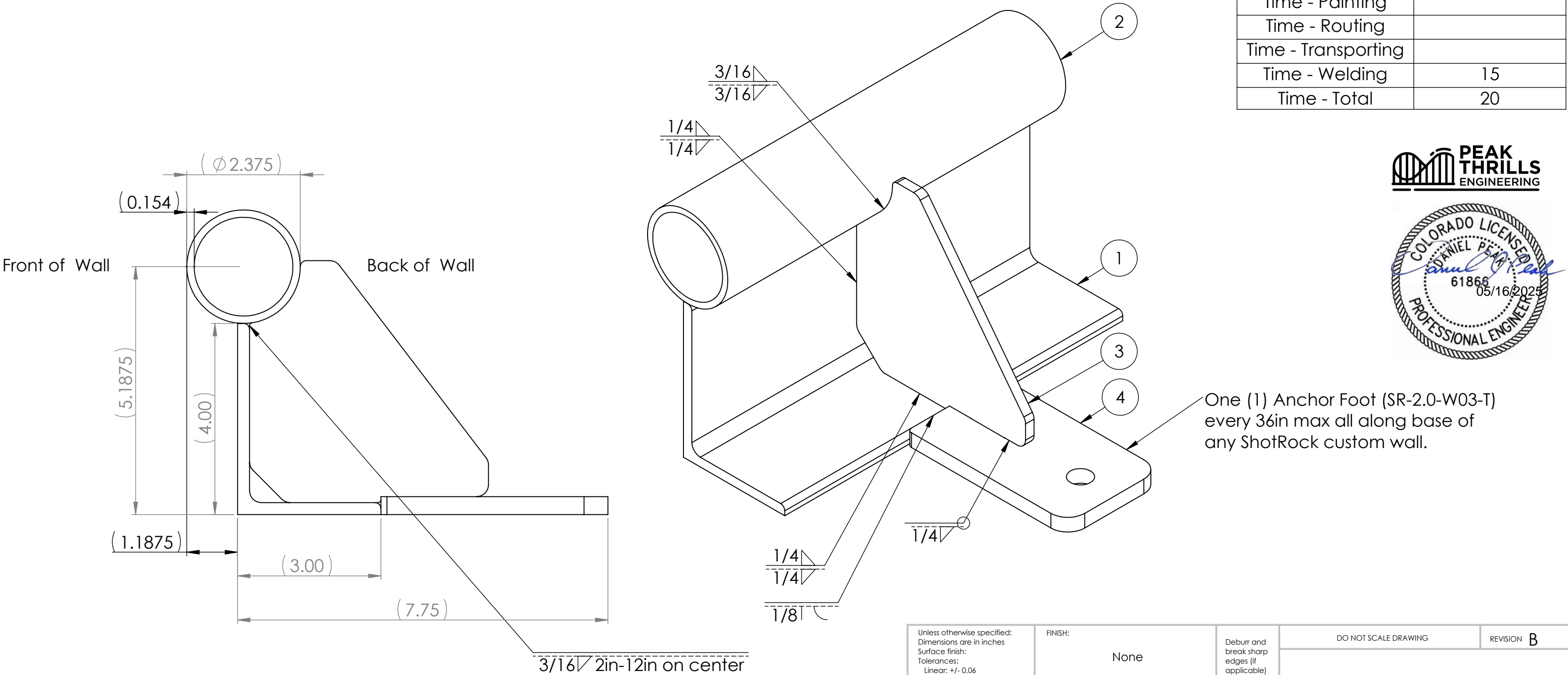


Notes:
1. These sub-assemblies may be fabricated prior to incorporating them into either a boulder or custom wall. They are not project-specific.
2. All plates should be self-fixturing.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING		REVISION B		
							TITLE: Anchor Foot - Tall Walls				
	NAME	SIGNATURE	DATE								
DRAWN	Mark Hemphil		7/16/2023								
CHK'D											
APPV'D											
MFG											
Q.A				MATERIAL: As Noted			DWG NO. SR-2.0-W03-T		B		
				WEIGHT: 3.54			SCALE: 1:2		SHEET 2 OF 4		

ITEM NO.	PartNo	DESCRIPTION	Tall Walls - in Context
1	MAT-STL-001-4-3-0.25-A36	Steel Angle - 4in x 3in x 0.25in - A36	1
2	MAT-STL-005-2.375-0.154-A53GrB	Steel Pipe - 2in - Schedule 40 - A53 Grade B (or Better)	1
3	SR-2.0-L02-T	Anchor Gusset - Tall Walls	1
4	SR-2.0-L04-T	Baseplate - Tall Walls	1

Fabrication Time	Minutes
Time - Assembling	
Time - CNCing	
Time - Cutting	
Time - Drilling	
Time - Grinding	5
Time - Ironworking	
Time - Painting	
Time - Routing	
Time - Transporting	
Time - Welding	15
Time - Total	20



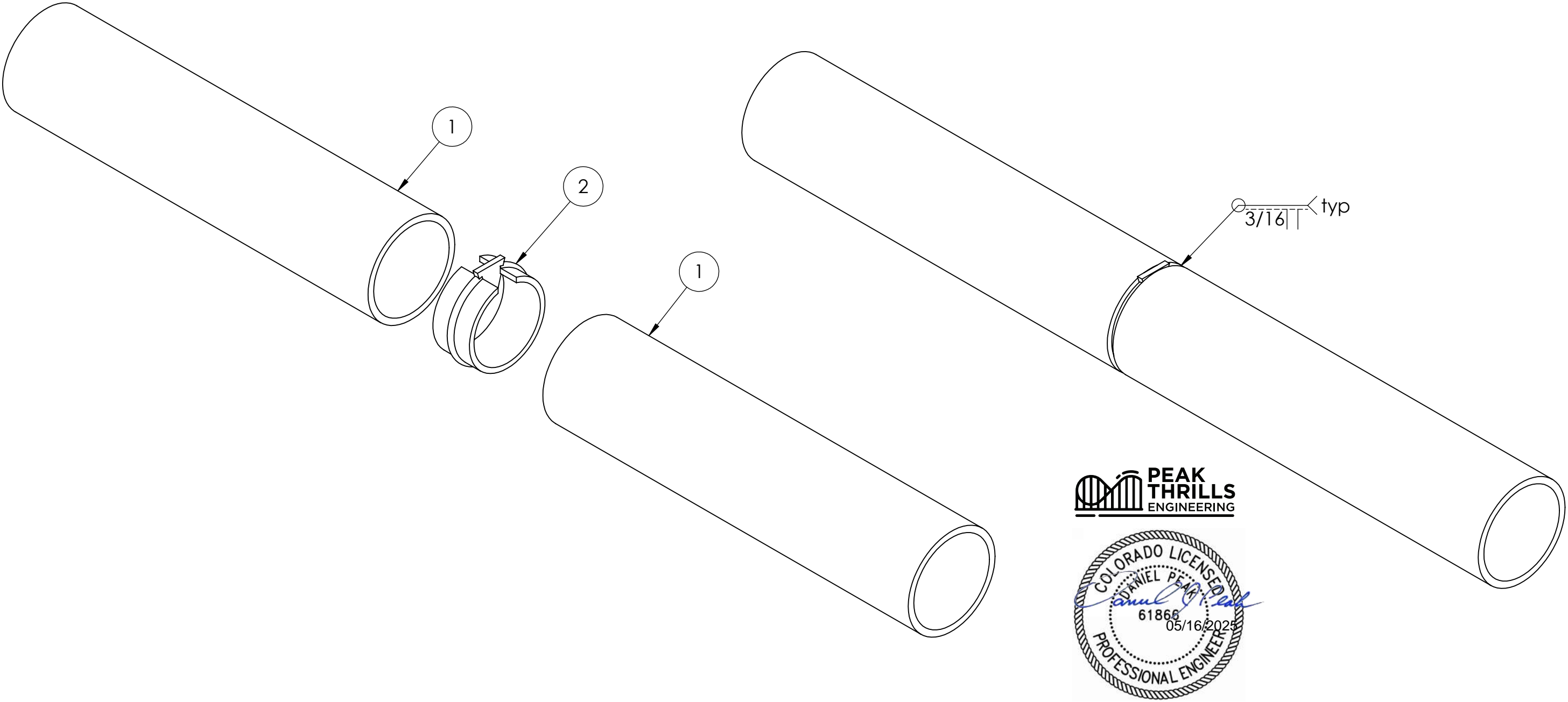
Notes:

1. This "in context" drawing corresponds with how the actual Anchor Foot will attach to other primary steel members of custom ShotRock projects.

2. All plates should be self-fixturing.

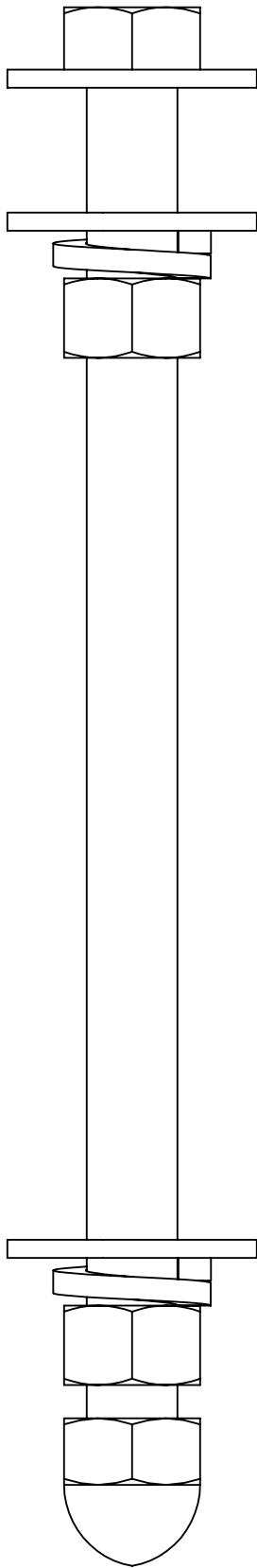
Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION B		
									TITLE: Anchor Foot - Tall Walls - in Context					
NAME			SIGNATURE			DATE								
DRAWN			Mark Hemphil			7/16/2023								
CHK'D														
APPV'D														
MFG														
Q.A						MATERIAL: As Noted			DWG NO. SR-2.0-W03-T			B		
						WEIGHT: 3.54			SCALE: 1:2			SHEET 4 OF 4		

ITEM NO.	PartNo	DESCRIPTION	QTY.
1	MAT-STL-005-2.375-0.154-A53GrB	Steel Pipe - 2in - Schedule 40 - A53 Grade B	2
2	1043	Steel Wedge Lock Welding Connector for 2in Schedule 40 Steel Pipe	1

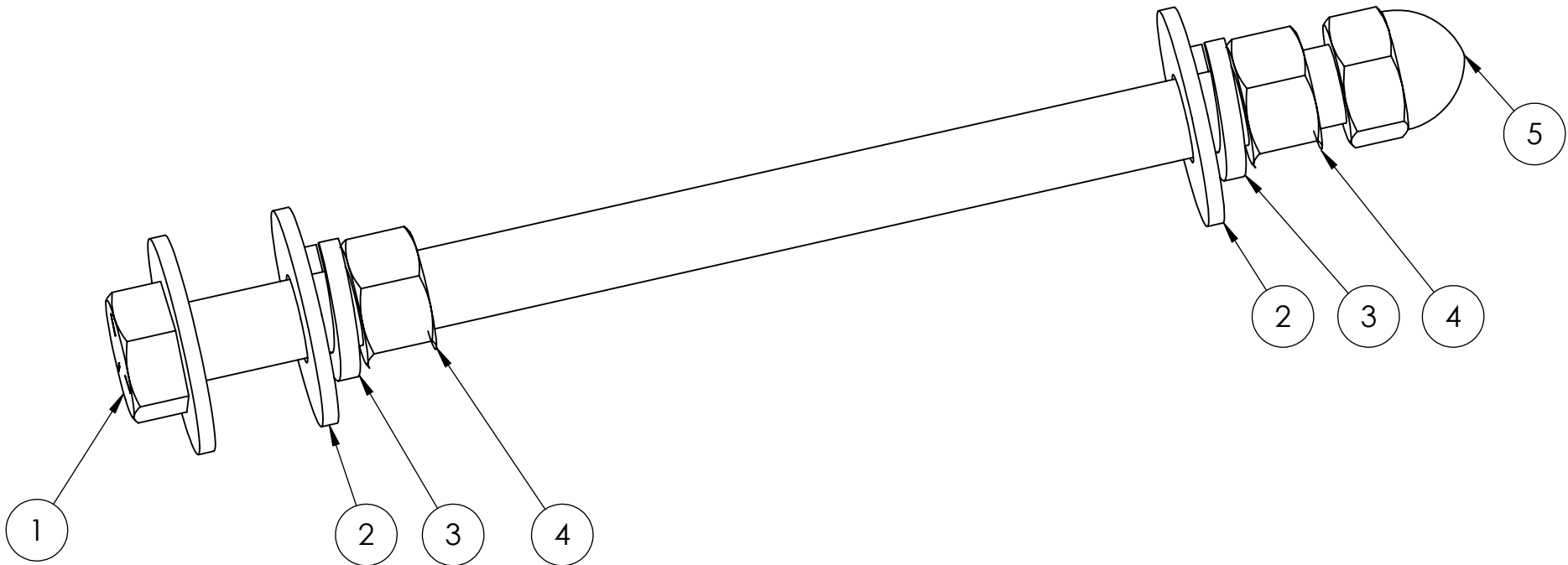


Notes:
1. Use this detail to splice any continuous run of pipe (e.g. in order to ship smaller, palletizable pipe lengths without sacrificing strength in the final installed "continuous" run of pipe).

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5		FINISH: None		Deburr and break sharp edges (if applicable)		DO NOT SCALE DRAWING		REVISION A	
NAME		SIGNATURE		DATE		TITLE:		Pipe Splice	
DRAWN	Mark Hemphil			2/25/2025					
CHK'D									
APPV'D									
MFG									
Q.A						MATERIAL:		DWG NO.	
						As Noted		SR-2.0-W06	
						WEIGHT:		SCALE: 1:2	
								SHEET 1 OF 1	



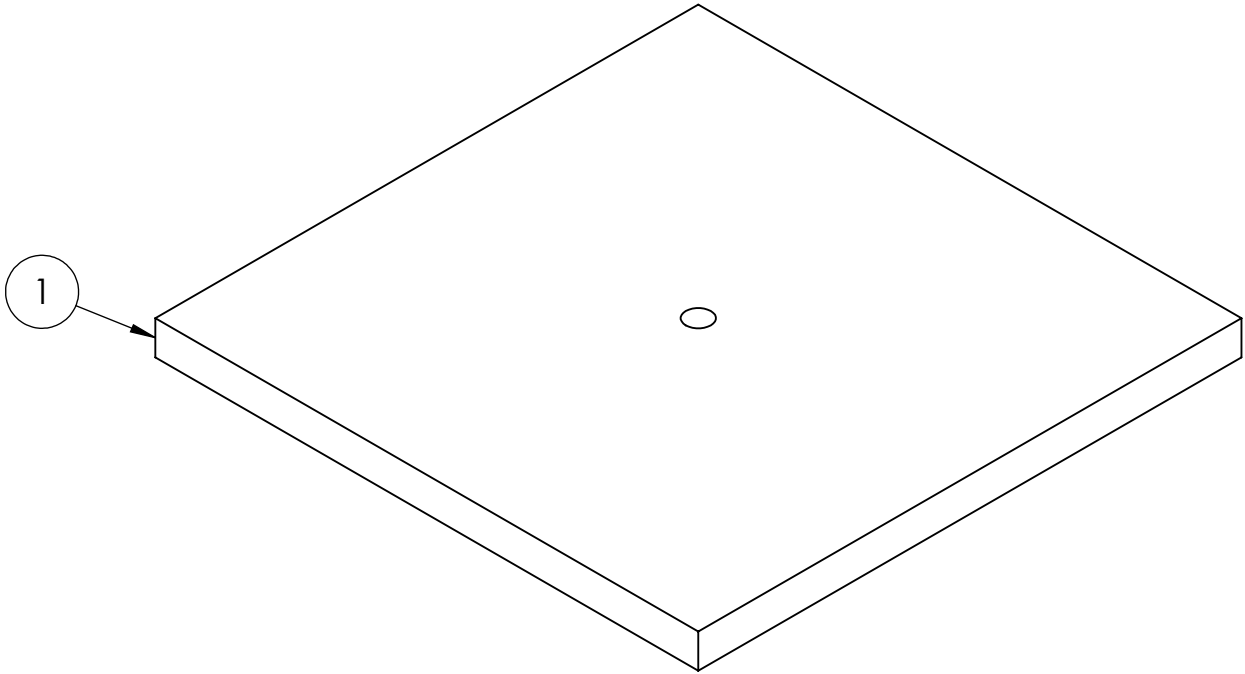
ITEM NO.	PartNo	DESCRIPTION	QTY
1	HRD-SCR-001-0.5-13-8-HH-EH-5-ZP-FT	Screw - 0.5in - 13 Thread - 8in Long - Hex Head - External Hex - Grade 5 - Zinc Plated - Full Thread	1
2	HRD-WAS-001-0.562-1.375-0.132-2-ZP	Flat Washer - 0.5in - USS - Zinc Plated	3
3	HRD-WAS-002-0.512-0.869-5-ZP	Split Lock Washer - 0.5in - Grade 5 - Zinc Plated	2
4	HRD-NUT-001-0.5-13-EH-5-ZP	Nut - 0.5in - 13 Thread - External Hex - Grade 5 - Zinc Plated	2
5	HRD-NUT-006-0.5-13-NI	Acorn Nut - 0.5in - 13 Thread - Nickel Plated	1



Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5				FINISH: None		Deburr and break sharp edges (if applicable)		DO NOT SCALE DRAWING		REVISION A	
		NAME		SIGNATURE		DATE				TITLE: ShotRock - Belay Bar Stack - Indoor	
DRAWN											
CHK'D											
APPV'D											
MFG											
Q.A											
								MATERIAL: As Noted		DWG NO. HRD-ASM-126-SR-BB-I	
										B	
								WEIGHT: 0.747685		SCALE: 1:1	
										SHEET 1 OF 2	

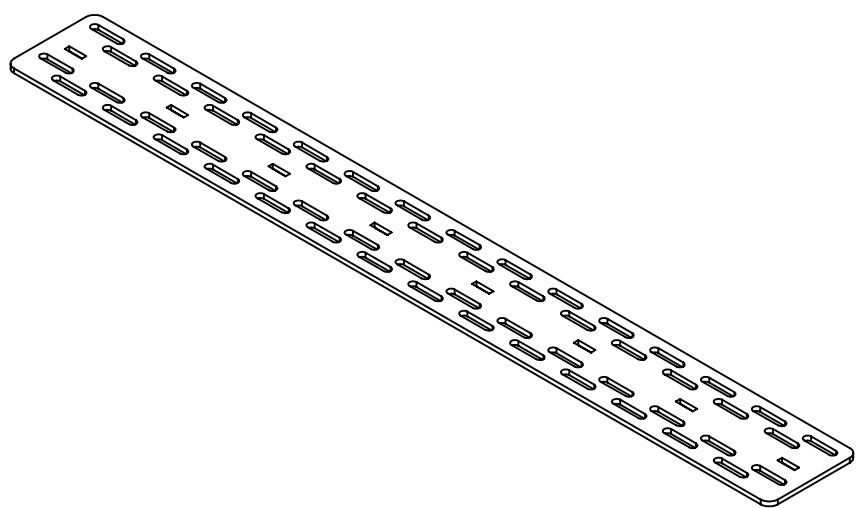
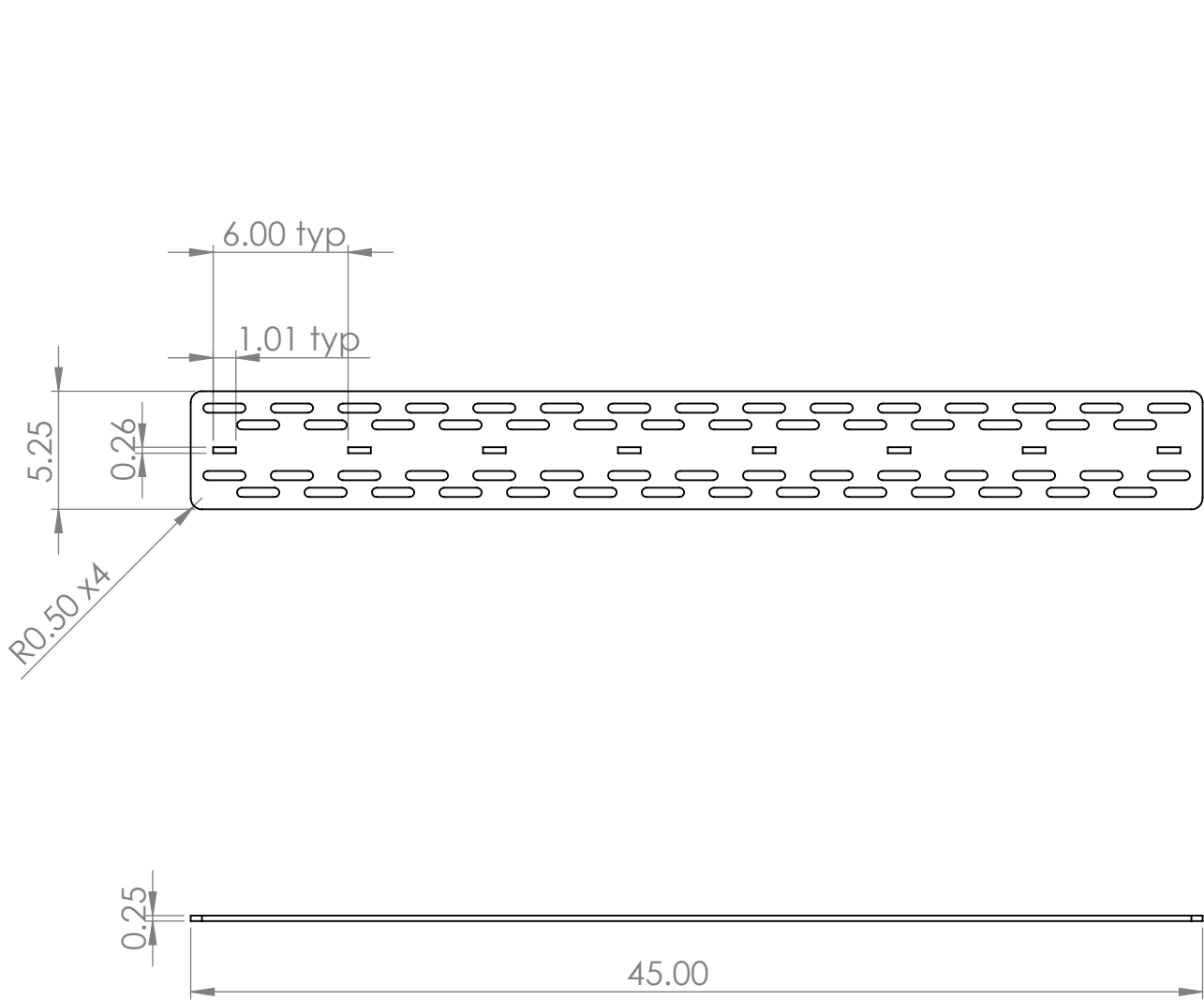
ITEM NO.	PartNo	DESCRIPTION	QTY	Vendor	VendorNo
1	varies	Concrete Substrate	1	varies	varies
2	CTG-S-DP36-C	Coating - Sealant - Proseal DP-36 - Clear - 5 Gal (Covers 3500sf with One Coat)	1	Proseal	PS DP-36
3	CTG-P-BFCC-CR	Coating - Paint - Brickform Cem Coat - Colored - 5 Gal (Covers 300sf With One Coat)	2	Rio Grande	CC4-####
4	CTG-P-BCS-CR	Coating - Paint - Behr - Concrete Stain - Solid Colored - 5 Gal (Covers 2000sf With One Coat)	1	Home Depot	TBD
5	CTG-P-BCS-STC	Coating - Paint - Behr Concrete Stain - Semi Transparent - 1 Gal (Covers 300sf With One Coat)	1	Home Depot	TBD
6	CTG-S-SGWB-C	Coating - Sealant - Salt Guard WB - Clear - 5 Gal (Covers 1250sf with One Coat)	1	Amazon	SH-4606705
7	varies	Metal Lath (paper backed or not, per foreman)	1	Rio Grande	varies
8	varies	Fiberglass Tape	1	varies	varies

Contexts of Use
ShotRock



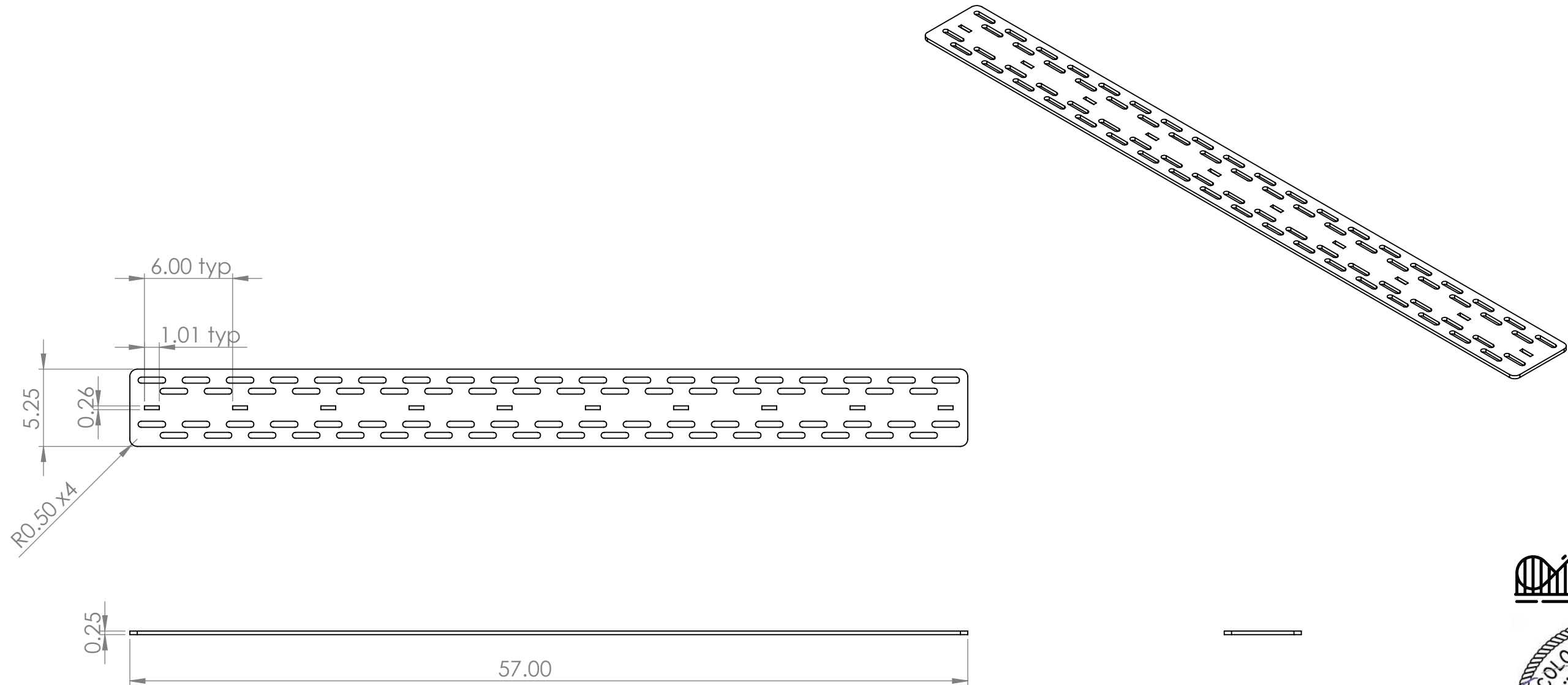
- Notes:
- 1. Coatings may be applied by roller, sprayer, bottle brush, etc. as appropriate.
 - 2. Tint/coloration is to be requested at time of paint ordering (i.e. mixed in by vendor).

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: (this is a finish)			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING	REVISION	B
	NAME	SIGNATURE	DATE				TITLE: Coating - ShotRock		
DRAWN	Mark Hemphil		3/11/2021						
CHK'D									
APPV'D									
MFG									
Q.A						MATERIAL: As Noted	DWG NO.	CTG-SR	B
						WEIGHT:	SCALE: 1:3	SHEET 9 OF 9	



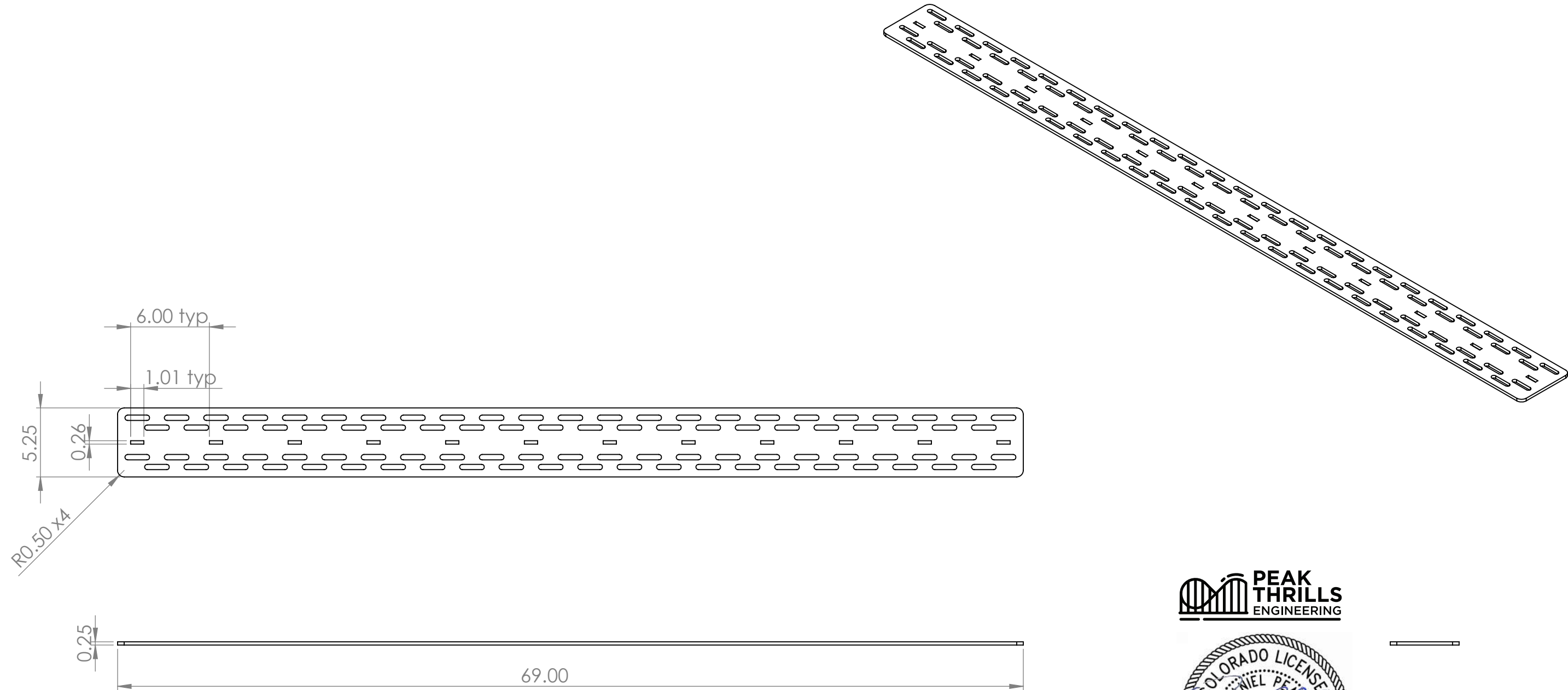
- Notes:
1. Manufacture from customer-supplied data (e.g. laser-cut from dxf file).
 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING	REVISION	A
	NAME	SIGNATURE	DATE				TITLE: Ledger Plate One - 45in Long		
DRAWN	Mark Hemphil		4/10/2023						
CHK'D									
APPV'D									
MFG									
Q.A						MATERIAL: ASTM A36 Steel	DWG NO.	PWS-2.0-L12-45	B
						WEIGHT: 13.599228	SCALE: 1:8	SHEET 7 OF 12	



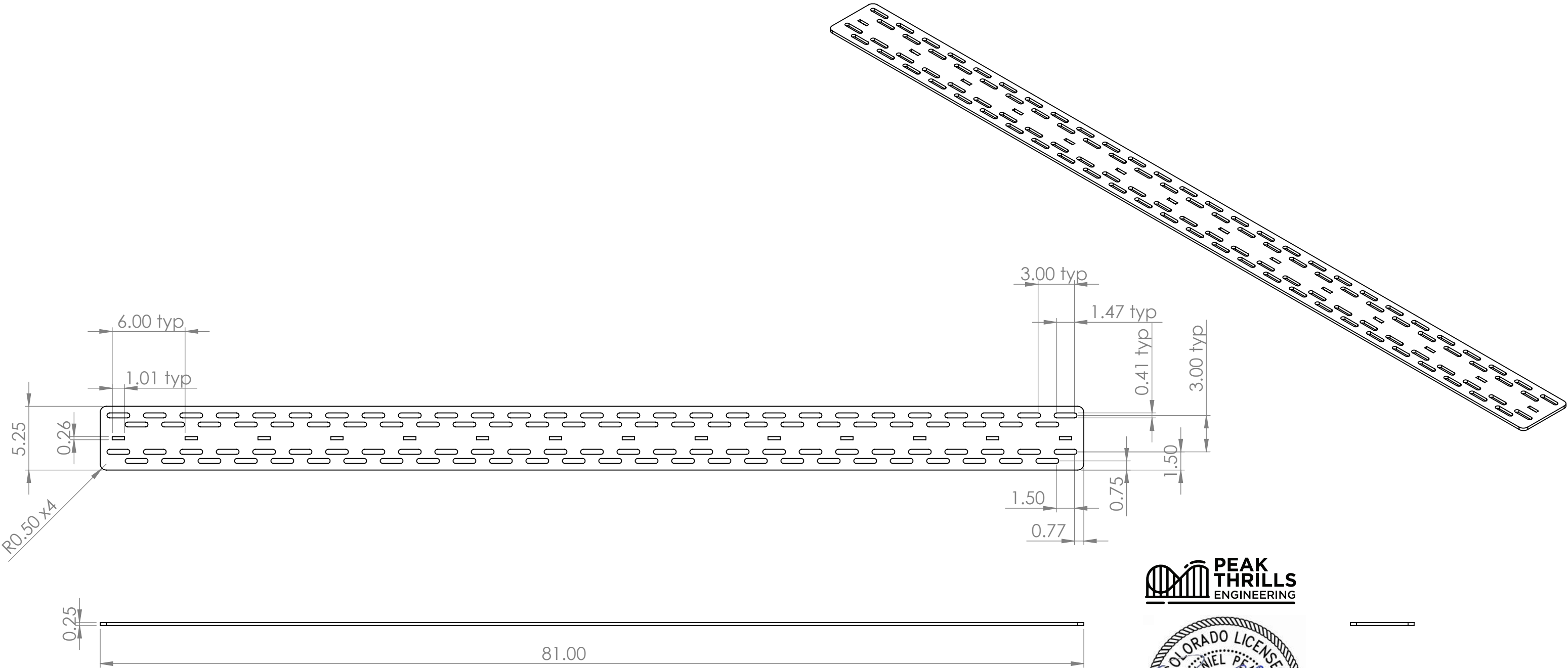
- Notes:
- 1. Manufacture from customer-supplied data (e.g. laser-cut from dxf file).
 - 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION A					
			NAME			SIGNATURE			DATE			TITLE: Ledger Plate One - 57in Long					
DRAWN			Mark Hemphil						4/10/2023								
CHK'D																	
APPV'D																	
MFG																	
Q.A																	
									MATERIAL: ASTM A36 Steel			DWG NO. PWS-2.0-L12-57			B		
									WEIGHT: 17.204764			SCALE: 1:8			SHEET 8 OF 12		



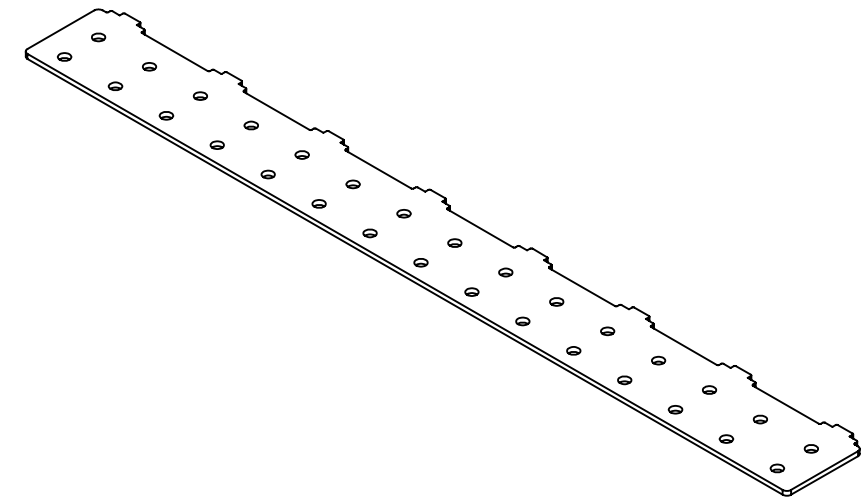
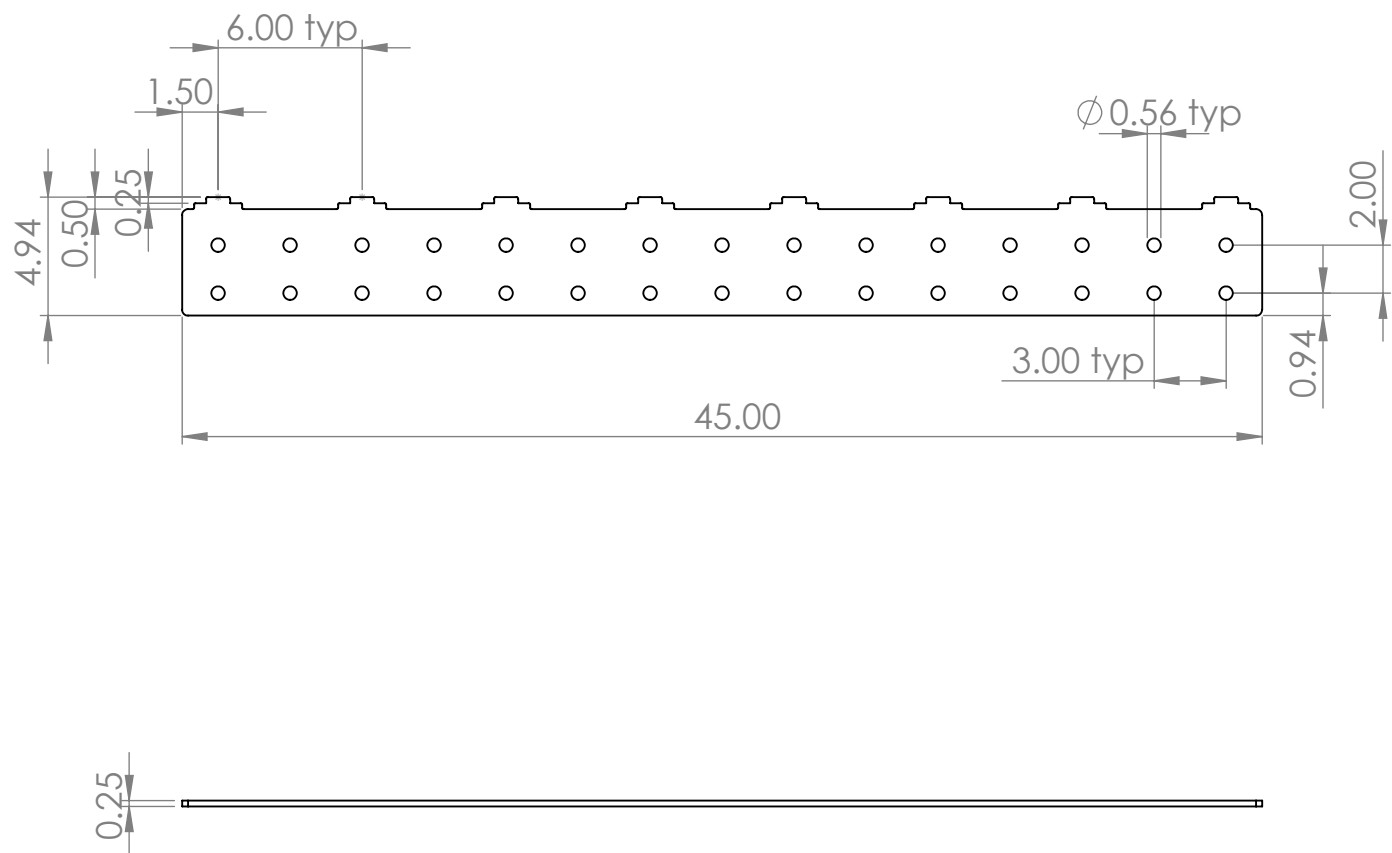
- Notes:
- 1. Manufacture from customer-supplied data (e.g. laser-cut from dxf file).
 - 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING		REVISION A		
	NAME	SIGNATURE	DATE				TITLE: Ledger Plate One - 69in Long				
DRAWN	Mark Hemphil		4/10/2023								
CHK'D											
APPV'D											
MFG											
Q.A											
						MATERIAL: ASTM A36 Steel	DWG NO. PWS-2.0-L12-69			B	
							SCALE: 1:8			SHEET 10 OF 12	



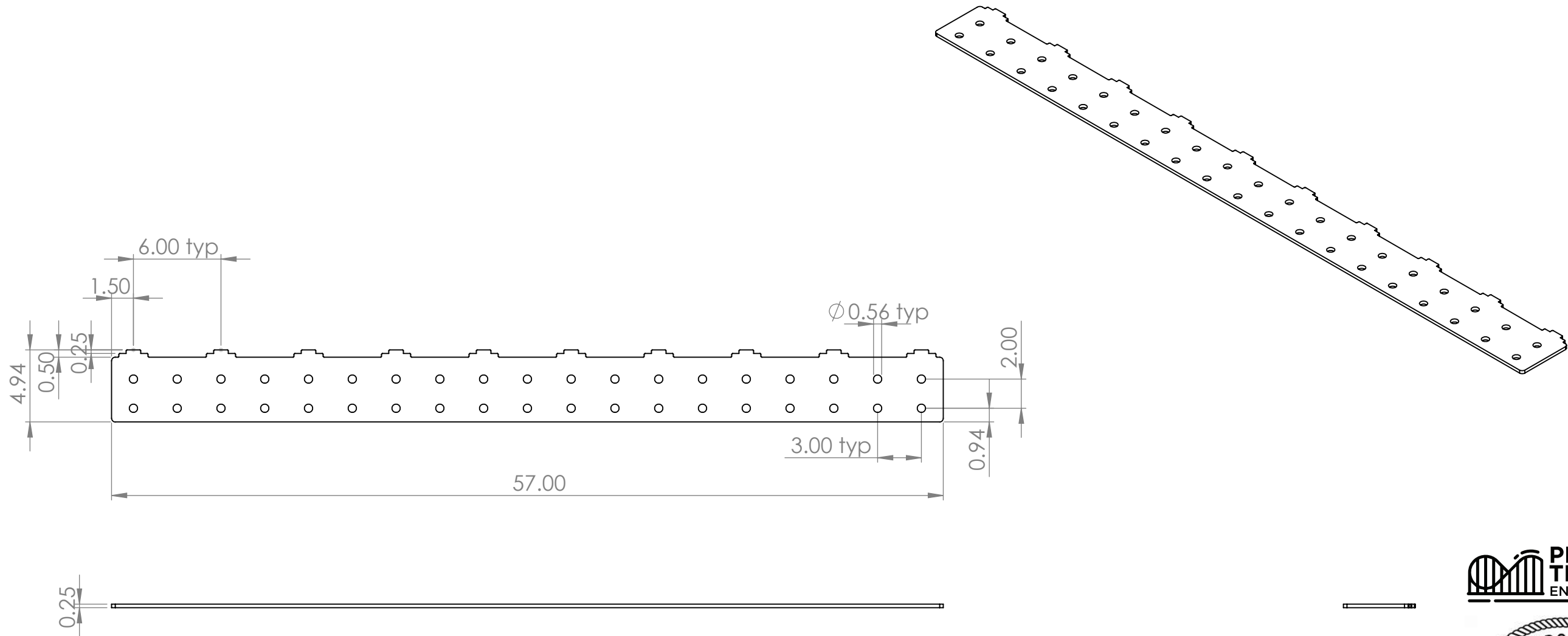
- Notes:
1. Manufacture from customer-supplied data (e.g. laser-cut from dxf file).
 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)	DO NOT SCALE DRAWING	REVISION	A
	NAME	SIGNATURE	DATE				TITLE: Ledger Plate One - 81in Long		
DRAWN	Mark Hemphil		4/10/2023						
CHK'D									
APPV'D									
MFG									
Q.A						MATERIAL: ASTM A36 Steel	DWG NO.	PWS-2.0-L12-81	B
						WEIGHT: 24.415838	SCALE: 1:8	SHEET 11 OF 12	



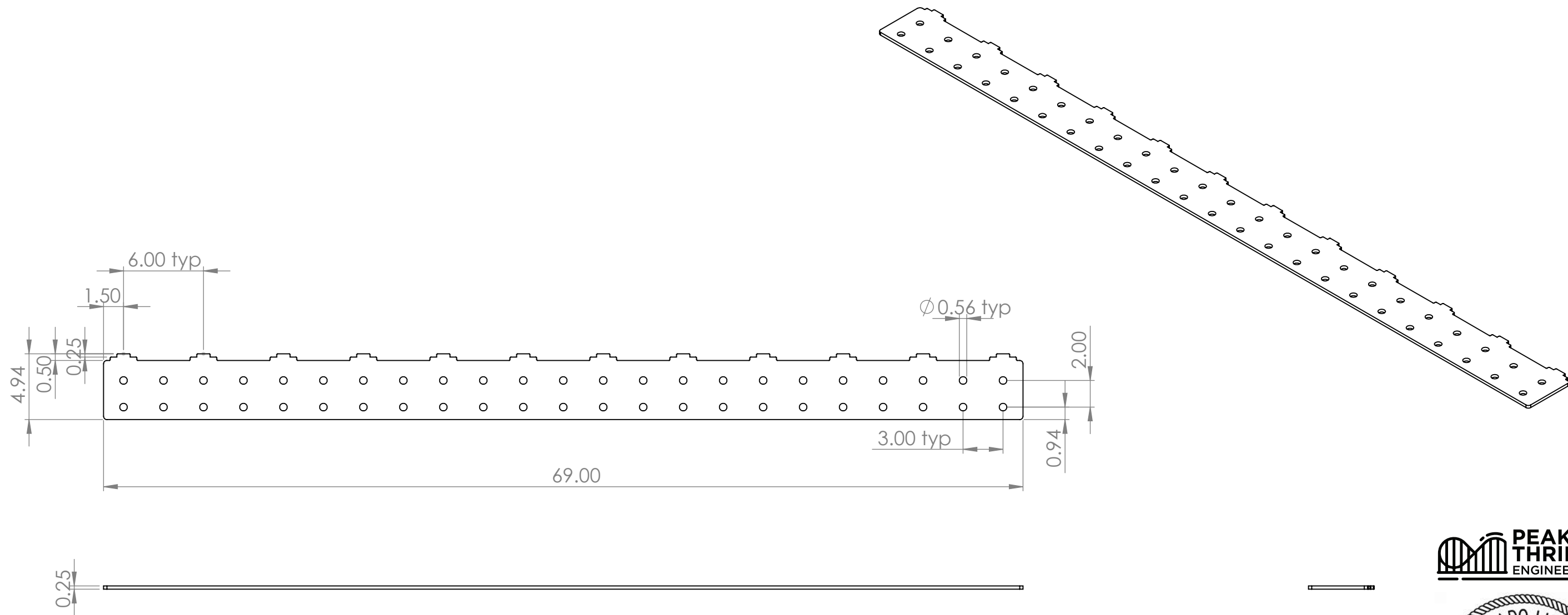
- Notes:
1. Manufacture from customer-supplied data (e.g. laser-cut from dxf file).
 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION C		
TITLE: Ledger Plate Two - 45in Long														
NAME			SIGNATURE			DATE			DWG NO.			B		
DRAWN			Mark Hemphil			4/10/2023			PWS-2.0-L13-45					
CHK'D														
APPV'D														
MFG														
Q.A						MATERIAL:			ASTM A36 Steel					



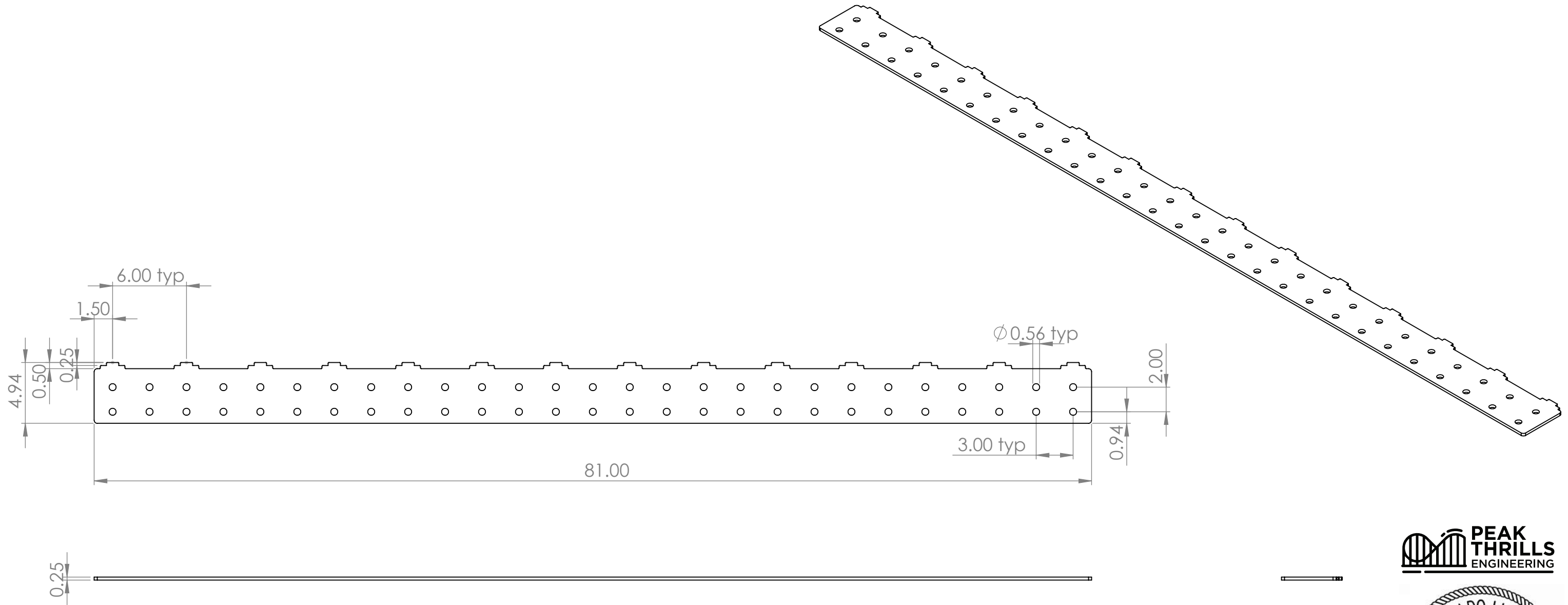
- Notes:
- 1. Manufacture from customer-supplied data (e.g. laser-cut from dxf file).
 - 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION C		
									TITLE: Ledger Plate Two - 57in Long					
NAME			SIGNATURE			DATE								
DRAWN			Mark Hemphil			4/10/2023								
CHK'D														
APPV'D														
MFG														
Q.A						MATERIAL: ASTM A36 Steel			DWG NO. PWS-2.0-L13-57			B		
						WEIGHT: 17.790452			SCALE: 1:8			SHEET 8 OF 12		



- Notes:
1. Manufacture from customer-supplied data (e.g. laser-cut from dxf file).
 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5			FINISH: None			Deburr and break sharp edges (if applicable)			DO NOT SCALE DRAWING			REVISION C								
			NAME			SIGNATURE			DATE			TITLE: Ledger Plate Two - 69in Long								
DRAWN			Mark Hemphil						4/10/2023											
CHK'D																				
APPV'D																				
MFG																				
Q.A									MATERIAL: ASTM A36 Steel			DWG NO.			PWS-2.0-L13-69			B		
									WEIGHT: 21.531026			SCALE: 1:8			SHEET 10 OF 12					



- Notes:
1. Manufacture from customer-supplied data (e.g. laser-cut from dxf file).
 2. Deburr and break all sharp edges.

Unless otherwise specified: Dimensions are in inches Surface finish: Tolerances: Linear: +/- 0.06 Angular: +/- 0.5				FINISH: None		Deburr and break sharp edges (if applicable)		DO NOT SCALE DRAWING		REVISION C	
		NAME		SIGNATURE		DATE				TITLE: Ledger Plate Two - 81in Long	
DRAWN		Mark Hemphil				4/10/2023					
CHK'D											
APPV'D											
MFG											
Q.A											
						MATERIAL:		DWG NO.		B	
						ASTM A36 Steel		PWS-2.0-L13-81			
								WEIGHT: 25.271600		SCALE: 1:8	
										SHEET 11 OF 12	



APPENDIX B

CALCULATIONS

Shot Rock Wall Analysis

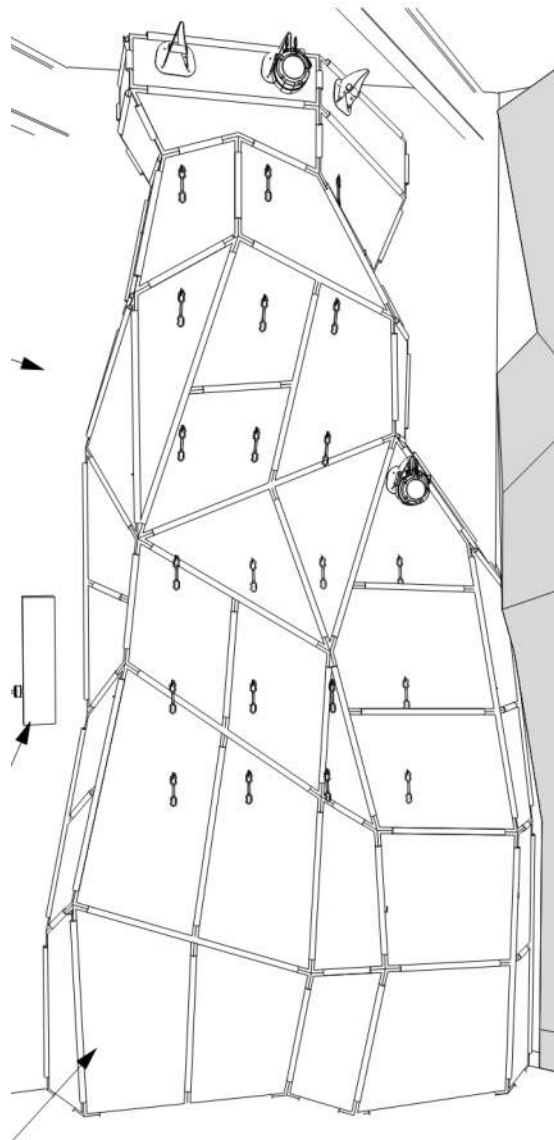
Location: Grand Junction, CO

Codes and Reference Standards

- 2018 International Building Code
- American Institute of Steel Construction, Steel Construction Manual 15th Edition
- American Society of Civil Engineers 7-16 (ASCE 7-16) "Minimum Design Loads for Buildings and Other Structures"
- ACI 318-14: Building Code Requirements for Structural Concrete
- General Specification for the Design and Engineering of Artificial Climbing Structures - First Edition

Project Description

- A new indoor shot rock climbing wall to be attached to an existing building.



Standard Variables:

Safety Factors:

Yield: $\Omega_{y.AISC} := 1.67$

Rupture: $\Omega_{r.AISC} := 2.0$

Weld Filler:

Shear: $F_{u.weld} := 70 \text{ ksi} \cdot 0.6 = 42.00 \text{ ksi}$

A36 Steel:

Yield: $F_{y.A36} := 36 \text{ ksi}$

Tensile: $F_{u.A36} := 58 \text{ ksi}$

A53 Steel:

Yield: $F_{y.A53} := 35 \text{ ksi}$

Tensile: $F_{u.A53} := 60 \text{ ksi}$

A500 Grade B Steel - Rectangular Shapes:

Yield: $F_{y.A500.rect} := 46 \text{ ksi}$

Tensile: $F_{u.A500.rect} := 58 \text{ ksi}$

A500 Grade B Steel - Round Shapes:

Yield: $F_{y.A500.rnd} := 42 \text{ ksi}$

Tensile: $F_{u.A500.rnd} := 58 \text{ ksi}$

A325 (Grade 5) Bolts:

Tensile: $F_{u.A325} := 120 \text{ ksi}$

A490 (Grade 8) Bolts:

Tensile: $F_{u.A490} := 150 \text{ ksi}$

Dead Load

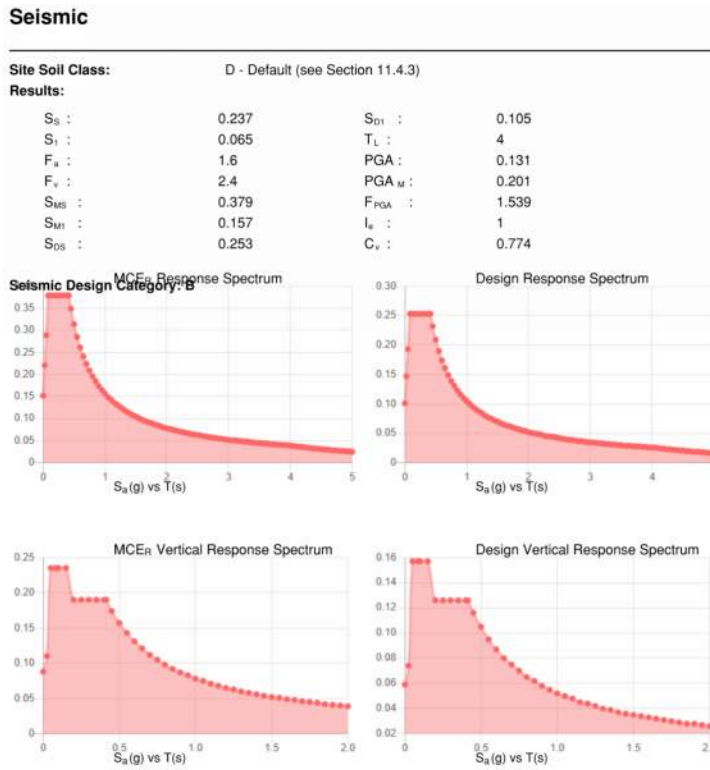
Concrete texture coat: $W_{\text{texture}} := 24.5 \text{ psf}$

Live Loads

Climber load: $W_{\text{patron}} := 270 \text{ lbf}$

Belay and lead line load: $P_{\text{belay}} := \frac{10 \text{ kN}}{1.67} = 1346 \text{ lbf}$

Seismic Criteria per ASCE 7-16



Seismic site class:

Class := **D (Default)** ▾

Mapped MCE, 5% damped, spectral response, acceleration parameter at short periods:

$S_S := 0.237$

Mapped MCE, 5% damped, spectral response, acceleration parameter at 1s:

$S_1 := 0.065$

Table 11.4-1 Short-Period Site Coefficient, F_a :

$$F_a := \text{Spline}(\text{Table}.F_a, \text{Class}, S_S) = 1.60$$

Table 11.4-2 Long-Period Site Coefficient, F_v :

$$F_v := \text{Spline}(\text{Table}.F_v, \text{Class}, S_1) = 2.40$$

Design 5% damped, spectral response,
acceleration parameter at short periods:

$$S_{DS} := S_S \cdot F_a \cdot \frac{2}{3}$$

$S_{DS} = 0.25$

Design 5% damped, spectral response,
acceleration parameter at 1s:

$$S_{D1} := S_1 \cdot F_v \cdot \frac{2}{3}$$

$S_{D1} = 0.10$

Seismic Review per ASCE 7-16 (Chapter 12/15)

Response modification factor:

$$R_{eq} := 2.0$$

Structural height (FT):

$$h_n := 30$$

Approximate period parameters
(Table 12.8-2, Page 90):

$$C_t := 0.02$$

Long period transition period
(Figure 22-12, Page 224):

$$T_L := 4$$

Importance factor:

$$I_e := 1.0$$

Which seismic chapter
of ASCE 7-16 applies?

Section := Chapter 15 ▾

Approximate Fundamental Period:

$$T_a := C_t \cdot h_n^{.75} = 0.26$$

Seismic response
coefficient (EQ 12.8-2):

$$C_{s,calc} := \frac{S_{DS}}{\left(\frac{R_{eq}}{I_e}\right)} = 0.13$$

Maximum seismic response
coefficient (EQ 12.8-3 & 12.8-4):

$$C_{s,max} := \frac{S_{D1}}{T_a \cdot \left(\frac{R_{eq}}{I_e}\right)} = 0.20$$

Minimum seismic response
coefficient (EQ 12.8-5 & 12.8-6):

$$C_{s,min} := \max(0.044 \cdot S_{DS} \cdot I_e, 0.03) = 0.03$$

Seismic response coefficient:

$$C_s := \min(\max(C_{s,calc}, C_{s,min}), C_{s,max})$$

$$C_s = 0.126$$

Vertical seismic load effect:

$$EQ_v := 0.2 \cdot S_{DS}$$

$$EQ_v = 0.051$$

Concrete Skin Capacity

Concrete compressive strength: $f'_c := 4500 \cdot \text{psi}$

Longitudinal steel yield strength: $f_y := 60 \cdot \text{ksi}$

Stirrup bar yield strength: $f_{yt} := 60 \cdot \text{ksi}$

Concrete thickness: $h_{bm} := 3 \cdot \text{in}$

Effective width: $b_{bm} := 12 \cdot \text{in}$

Longitudinal bar size: $d_{bar} := \#3 \downarrow$

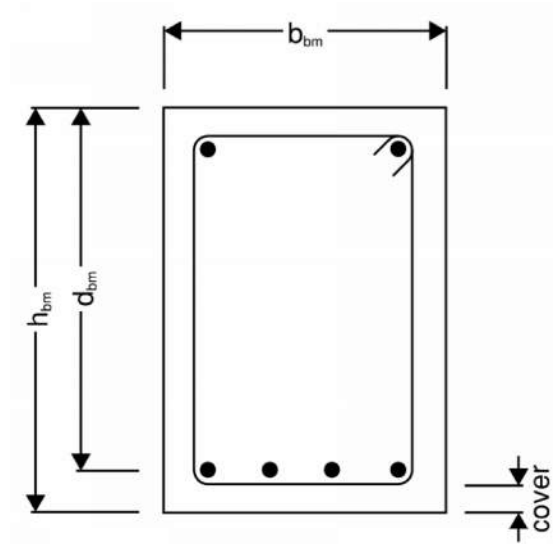
Number of bottom longitudinal bars: $n_{bar} := 1$

Stirrup bar size: $d_{stirrup} := \#3 \downarrow$

Number of stirrup bars per shear plane: $n_{stirrup} := 1$

Spacing between stirrups: $s_{stirrup} := 12 \cdot \text{in}$

Bottom clear cover: $cover := 1 \cdot \text{in}$



Miscellaneous Variables

Concrete compressive strain: $\epsilon_{cu} := 0.003$

Resistance factors: Flexure: $\phi_b := 0.9$

Shear: $\phi_v := 0.75$

Beam property checks

Depth of beam: $d_{bm} := h_{bm} - cover - \frac{d_{bar}}{2} = 1.81 \text{ in}$

Area of bottom steel: $A_s := d_{bar}^2 \cdot \frac{\pi}{4} \cdot n_{bar} = 0.11 \text{ in}^2$

Minimum reinforcement:

$$A_{s_min} := \left\| \begin{array}{l} \text{if } f'_c > 4444 \cdot \text{psi} \\ \left(\frac{3 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi}}{f_y} \cdot b_{bm} \cdot d_{bm} \right) \\ \text{else} \\ \left(\frac{200 \cdot \text{psi}}{f_y} \cdot b_{bm} \cdot d_{bm} \right) \end{array} \right\| = 0.07 \text{ in}^2$$

Minimum
reinforcement check:

$$\text{check_}A_s := \left\| \begin{array}{l} \text{if } A_s < A_{s_min} \\ \text{“Add Reinforcing”} \\ \text{else} \\ \text{“Minimum Reinforcing Met”} \end{array} \right\|$$

Stress block variables:

$$\text{check_}A_s = \text{“Minimum Reinforcing Met”}$$

$$\beta_1 := \left\| \begin{array}{l} \text{if } f'_c \leq 4 \cdot \text{ksi} \\ 0.85 \\ \text{also if } f'_c \geq 8 \cdot \text{ksi} \\ 0.65 \\ \text{else} \\ 0.85 - 0.05 \cdot \frac{f'_c - 4 \cdot \text{ksi}}{1 \cdot \text{ksi}} \end{array} \right\| = 0.825$$

$$a := \frac{A_s \cdot f_y}{0.85 \cdot f'_c \cdot b_{bm}} = 0.14 \text{ in} \quad c := \frac{a}{\beta_1} = 0.17 \text{ in}$$

Check if section is
tension controlled:

$$\epsilon_t := \frac{\epsilon_{cu}}{c} \cdot (d_{bm} - c) = 0.0281$$

$$\text{check_}\epsilon_t := \left\| \begin{array}{l} \text{if } \epsilon_t \geq 0.004 \\ \text{“OK – Tension Controlled”} \\ \text{else} \\ \text{“NG – Compression Controlled”} \end{array} \right\|$$

$$\text{check_}\epsilon_t = \text{“OK – Tension Controlled”}$$

Flexural capacity

Flexural capacity:

$$\phi M_n := \phi_b \cdot A_s \cdot f_y \cdot \left(d_{bm} - \frac{a}{2} \right)$$

$$\phi M_n = 865 \text{ lbf} \cdot \text{ft}$$

$$\frac{\phi M_n}{\text{ft}} = 72 \frac{\text{lbf} \cdot \text{ft}}{\text{in}}$$

Shear capacity

Concrete shear strength:

$$V_c := 2 \cdot \sqrt{\frac{f'_c}{\text{psi}}} \cdot \text{psi} \cdot b_{bm} \cdot d_{bm} = 2.92 \text{ kip}$$

Stirrup steel area:

$$A_v := d_{\text{stirrup}}^2 \cdot \frac{\pi}{4} \cdot n_{\text{stirrup}} = 0.11 \text{ in}^2$$

Stirrup shear strength:

$$V_{s,c} := \frac{A_v \cdot f_{yt} \cdot d_{bm}}{s_{\text{stirrup}}} = 1.00 \text{ kip}$$

Total shear strength:

$$\phi V_n := \phi_v \cdot (V_c + V_{s,c})$$

$$\phi V_n = 2939 \text{ lbf}$$

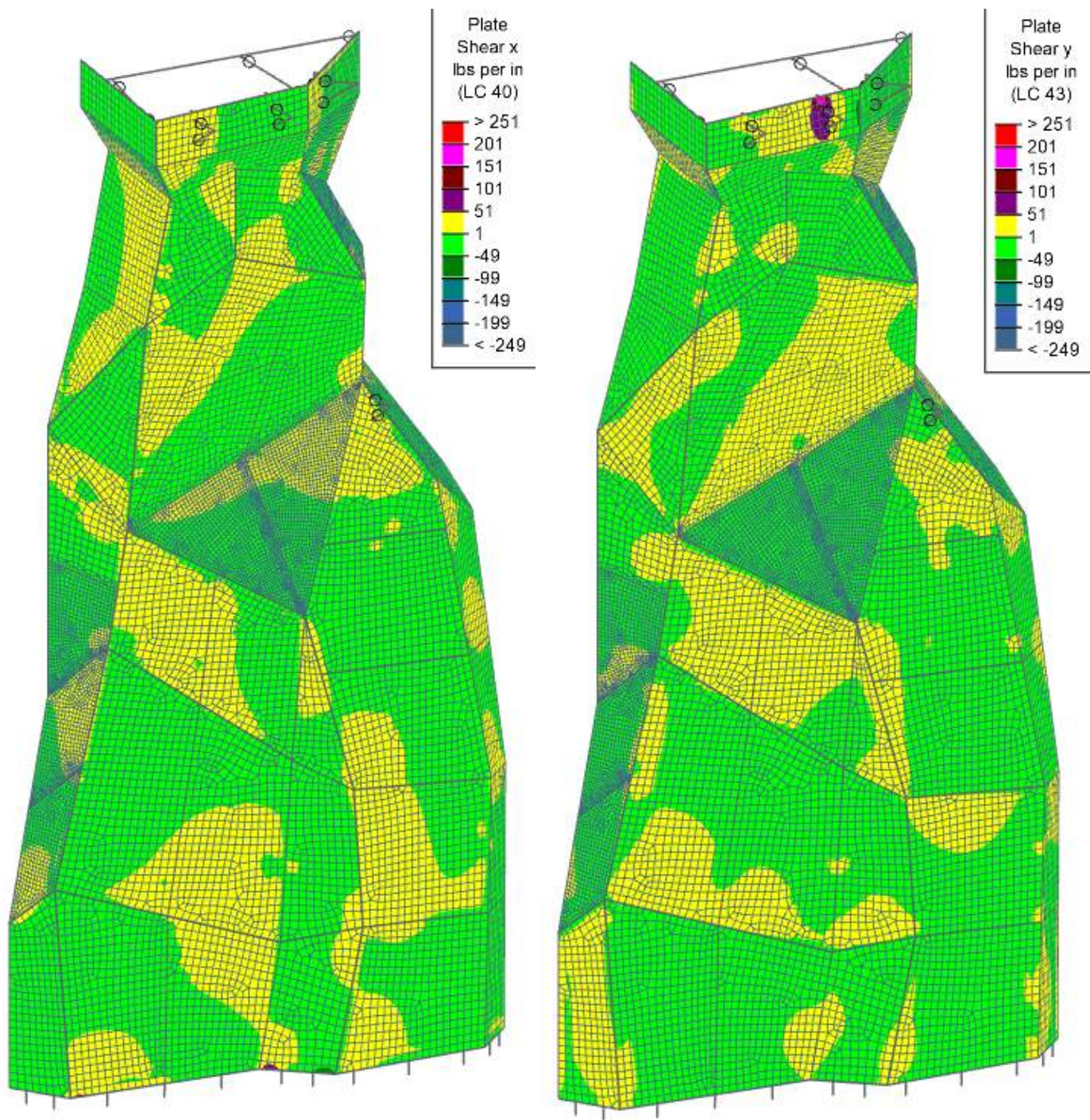
$$\frac{\phi V_n}{12 \text{ in}} = 245 \frac{\text{lbf}}{\text{in}}$$

Concrete Capacity Checks

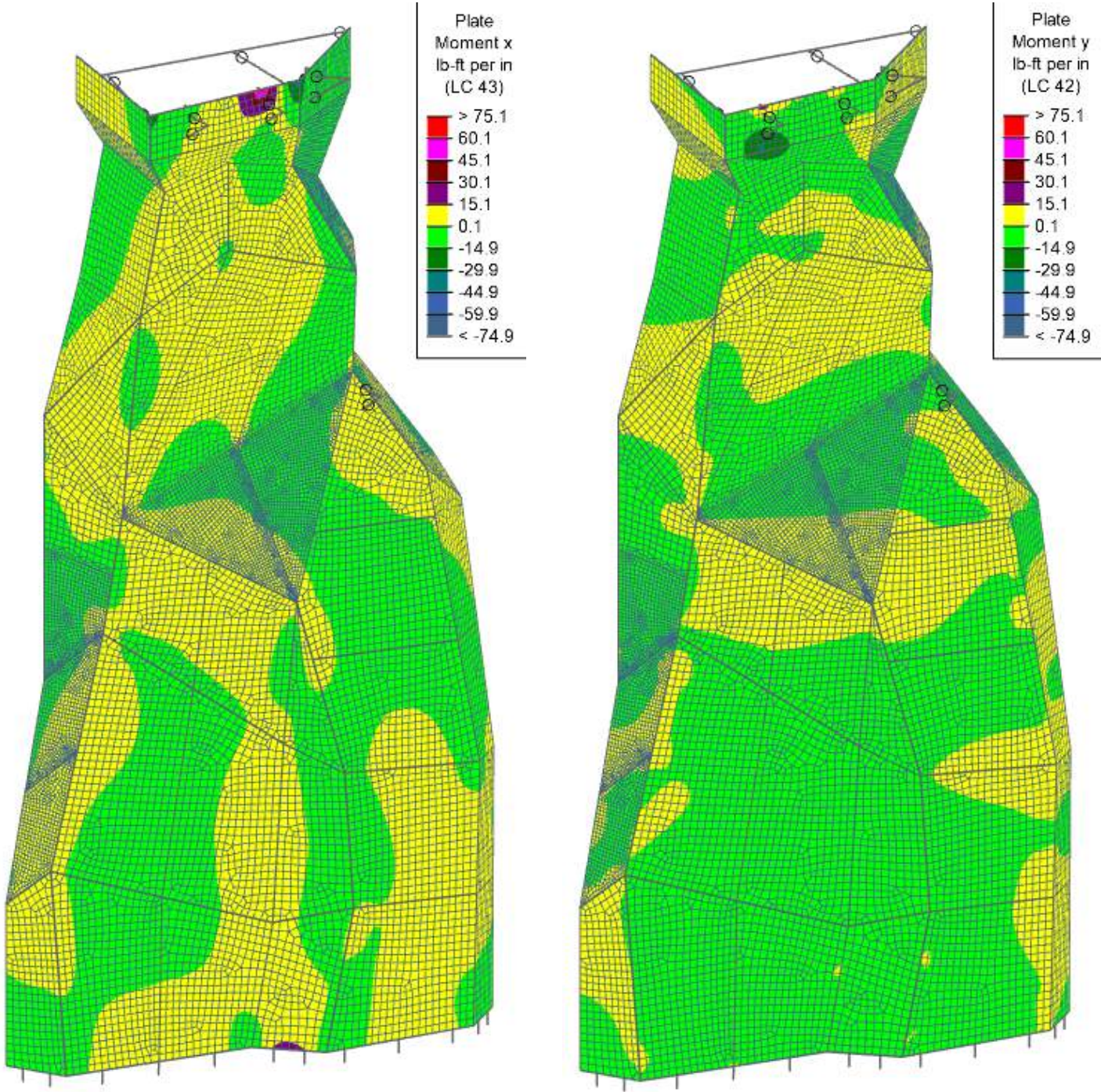
Note: The values calculated above are per linear foot. These values will be compared to the concrete shell forces taken from the RISA-3D model.

The flexural forces in the slab remain below the limit defined above.

The shear forces are exceeded in very small areas near the anchors at the base of the boulder.



Concrete Shear



Steel Pipe Connections

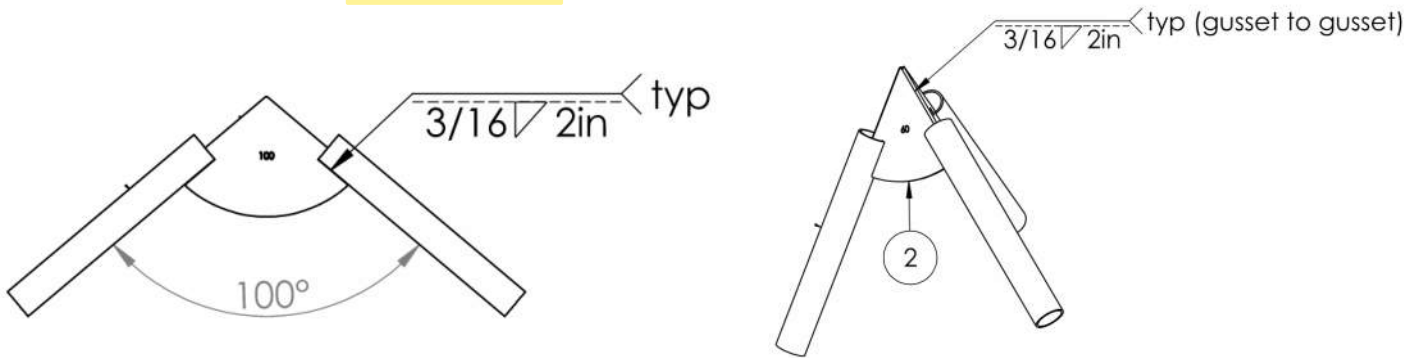
The steel pipes are connected to one another through custom plates. A 3/16" x 2" fillet weld connects the pipe to the plate.

Maximum pipe end forces

Tension:	$T_{\text{pipe}} := 390 \text{ lbf}$
Compression:	$P_{\text{pipe}} := 1000 \text{ lbf}$
Shear:	$V_{\text{pipe}} := 200 \text{ lbf}$
Flexure:	$M_{\text{pipe}} := 80 \text{ lbf} \cdot \text{ft}$

Weld properties

Weld length:	$L_{\text{weld}} := 2 \text{ in}$
Weld thickness:	$t_{\text{weld}} := 0.1875 \text{ in}$
Number of welds:	$n_{\text{weld}} := 2$



Weld area: $A_{\text{weld}} := L_{\text{weld}} \cdot t_{\text{weld}} \cdot 0.707 \cdot n_{\text{weld}} = 0.53 \text{ in}^2$

Weld section modulus: $S_{x,\text{weld}} := \frac{n_{\text{weld}}}{6} \cdot L_{\text{weld}}^2 \cdot t_{\text{weld}} \cdot 0.707 = 0.18 \text{ in}^3$

Weld stress: $f_{\text{weld}} := \sqrt{\left(\frac{T_{\text{pipe}}}{A_{\text{weld}}} + \frac{M_{\text{pipe}}}{S_{x,\text{weld}}}\right)^2 + \left(\frac{V_{\text{pipe}}}{A_{\text{weld}}}\right)^2} = 6.18 \text{ ksi}$

Weld strength ratio: $\text{Ratio}_{\text{weld}} := \frac{f_{\text{weld}} \cdot \Omega_{r,\text{AISC}}}{F_{u,\text{weld}}} = 0.29 < 1.0 \text{ OK}$

Base Anchors

Base anchors consist of 1/2"Ø Simpson Strong Bolt 2 set into concrete.

Note: The base anchors do not experience any net uplift. Only shear forces are considered.

Maximum base shear: $V_{\text{base}} := 300 \text{ lbf}$

Reference separate printout from Simpson Anchor Designer software.

Wall Anchors

Wall anchors consist of 3/8"Ø Simpson Strong Bolt 2 set into solid grouted CMU.

Anchor tension capacity: $T_{\text{a.anchor}} := 435 \text{ lbf}$

Anchor shear capacity: $V_{\text{a.anchor}} := 775 \text{ lbf}$

Anchor max tension: $T_{\text{anchor}} := 415 \text{ lbf}$

Anchor max shear: $V_{\text{anchor}} := 145 \text{ lbf}$

Anchor strength ratios: $\text{Ratio}_{\text{anchor.1}} := \max\left(\frac{T_{\text{anchor}}}{T_{\text{a.anchor}}}, \frac{V_{\text{anchor}}}{V_{\text{a.anchor}}}\right) = 0.95 < 1.0 \text{ OK}$

$\text{Ratio}_{\text{anchor.2}} := \left(\frac{T_{\text{anchor}}}{T_{\text{a.anchor}}}\right)^{1.67} + \left(\frac{V_{\text{anchor}}}{V_{\text{a.anchor}}}\right)^{1.67} = 0.99 < 1.0 \text{ OK}$

Zinc-Plated Carbon-Steel Strong-Bolt 2 Tension and Shear Loads in
8" Lightweight, Medium-Weight and Normal-Weight Grout-Filled CMU



Size in. (mm)	Drill Bit Diameter (in.)	Min. Embed. Depth in. (mm)	Install. Torque ft.-lb. (N-m)	Critical Edge Dist. in. (mm)	Critical End Dist. in. (mm)	Critical Spacing in. (mm)	Tension Load		Shear Load	
							Ultimate lb. (kN)	Allowable lb. (kN)	Ultimate lb. (kN)	Allowable lb. (kN)
Anchor Installed in the Face of the CMU Wall (See Figure 1)										
¼ (6.4)	¼	1¾ (45)	4 (5.4)	12 (305)	12 (305)	8 (203)	1,150 (5.1)	230 (1.0)	1,500 (6.7)	300 (1.3)
⅜ (9.5)	⅜	2⅝ (67)	20 (27.1)	12 (305)	12 (305)	8 (203)	2,185 (9.7)	435 (1.9)	3,875 (17.2)	775 (3.4)

Wall Braces

Note: The wall braces are reviewed natively in the RISA-3D model. The following checks apply to the end connections.

Maximum brace tension:

$$T_{\text{brace}} := 1260 \text{ lbf}$$

Maximum brace compression:

$$P_{\text{brace}} := 955 \text{ lbf}$$

Provide a minimum of 1" of 3/16" fillet weld each end of brace.

Weld thickness:

$$t_{\text{weld}} := 0.1875 \text{ in}$$

Weld length:

$$L_{\text{weld}} := 1 \text{ in}$$

Weld capacity:

$$V_{\text{a.weld}} := \frac{F_{\text{u.weld}}}{\Omega_{\text{r.AISC}}} \cdot L_{\text{weld}} \cdot t_{\text{weld}} \cdot 0.707 = 2.78 \text{ kip}$$

Weld strength ratio:

$$\text{Ratio}_{\text{weld.2}} := \frac{\max(T_{\text{brace}}, P_{\text{brace}})}{V_{\text{a.weld}}} = 0.45 < 1.0 \text{ OK}$$





Loads: BLC 1, Self-Weight



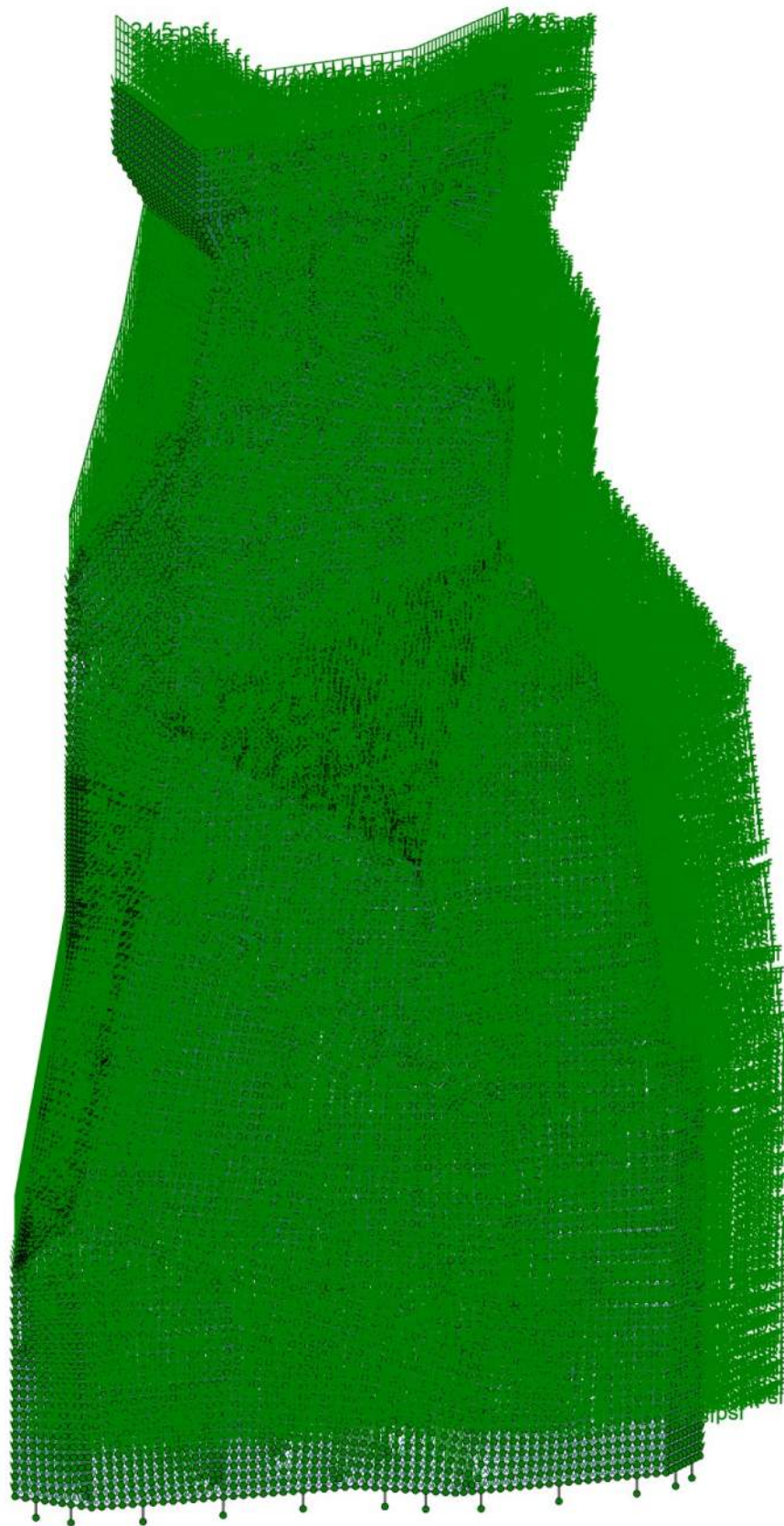
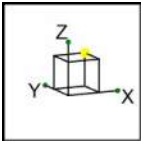
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall


Loads

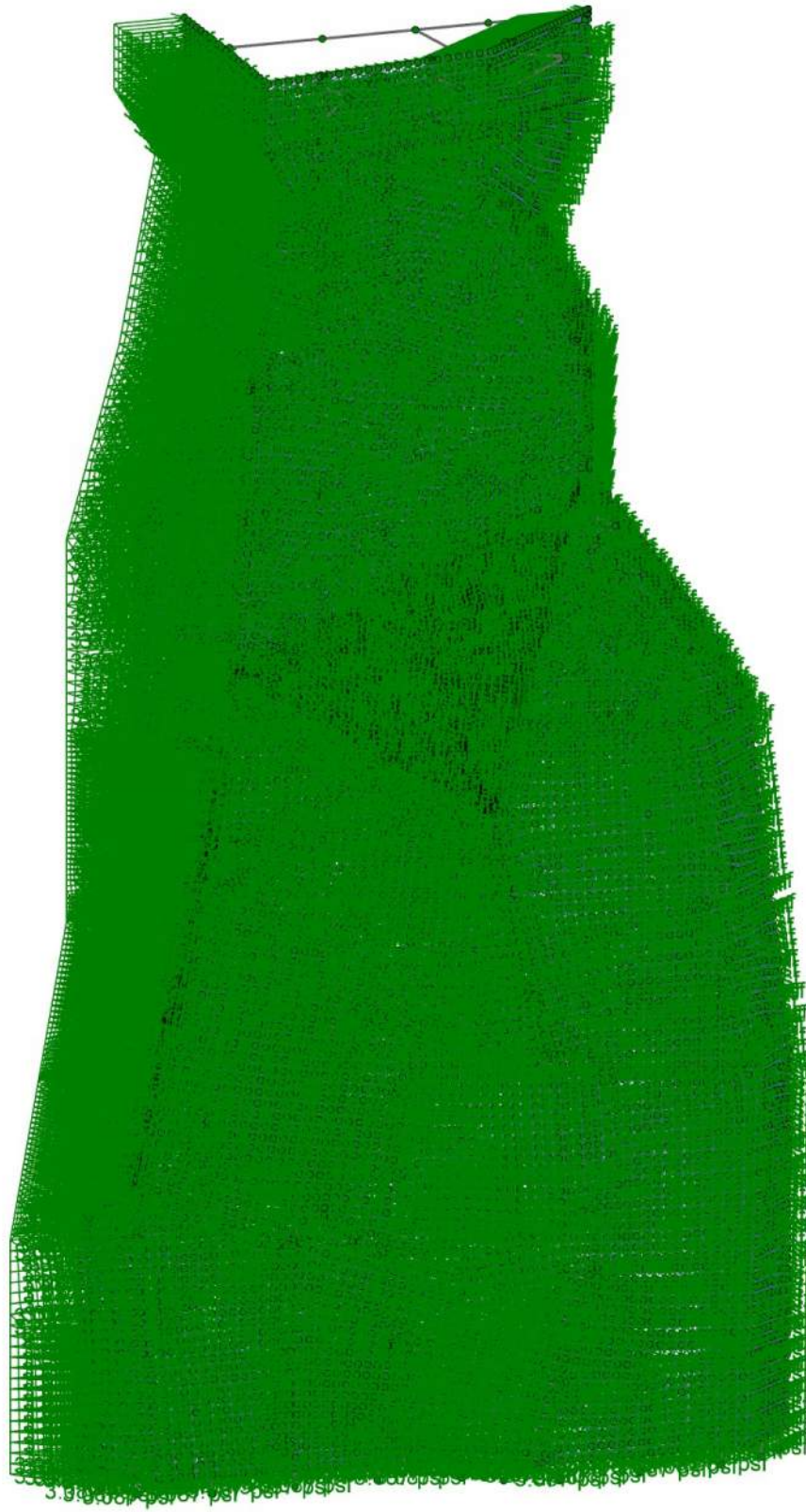
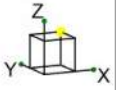
SK-2

Shot Rock Wall Model 03.r3d



Loads: BLC 2, Concrete Skin Weight

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-3
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		
		Loads	



Loads: BLC 6, Seismic X



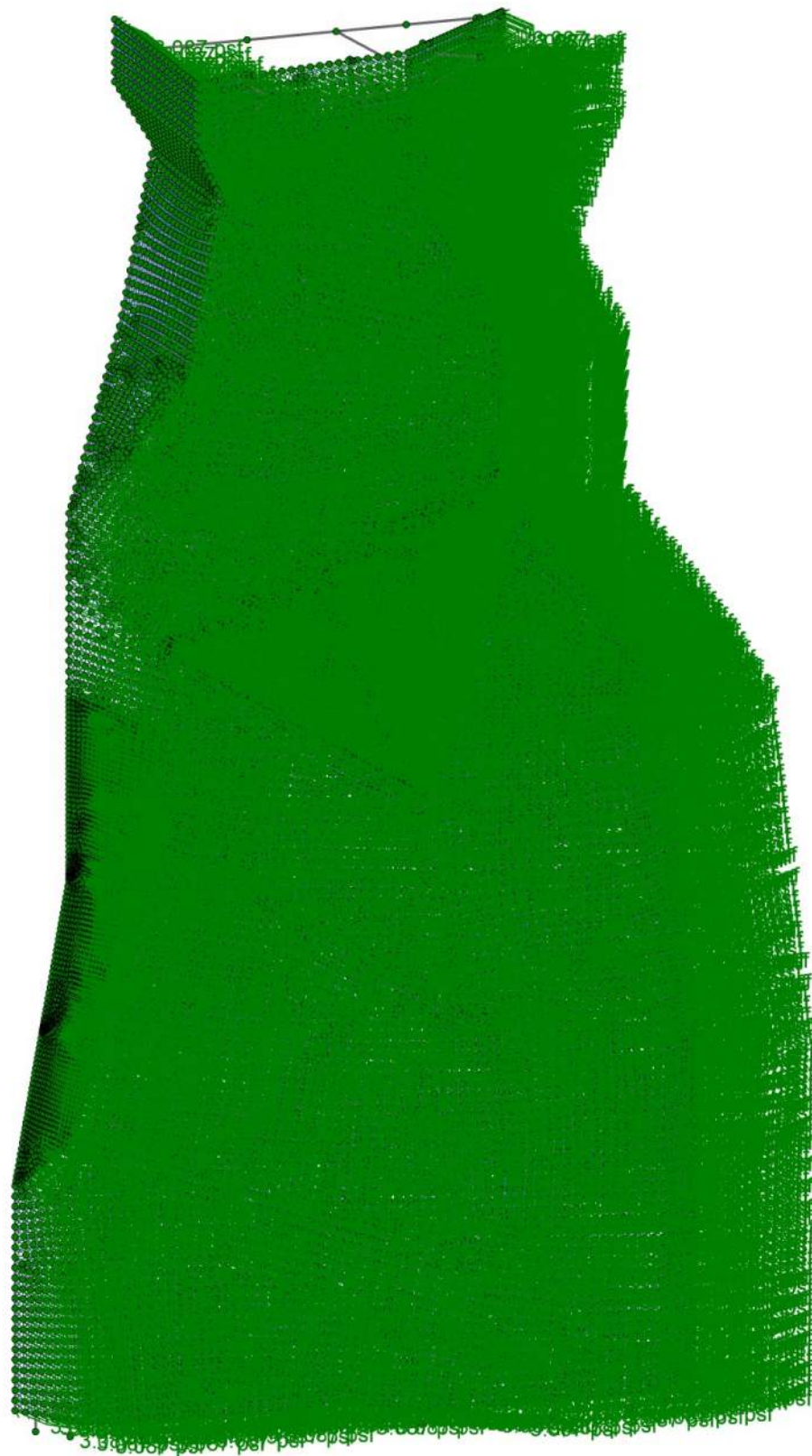
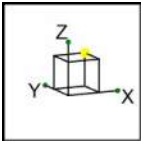
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-4

Shot Rock Wall Model 03.r3d



Loads: BLC 7, Seismic Y



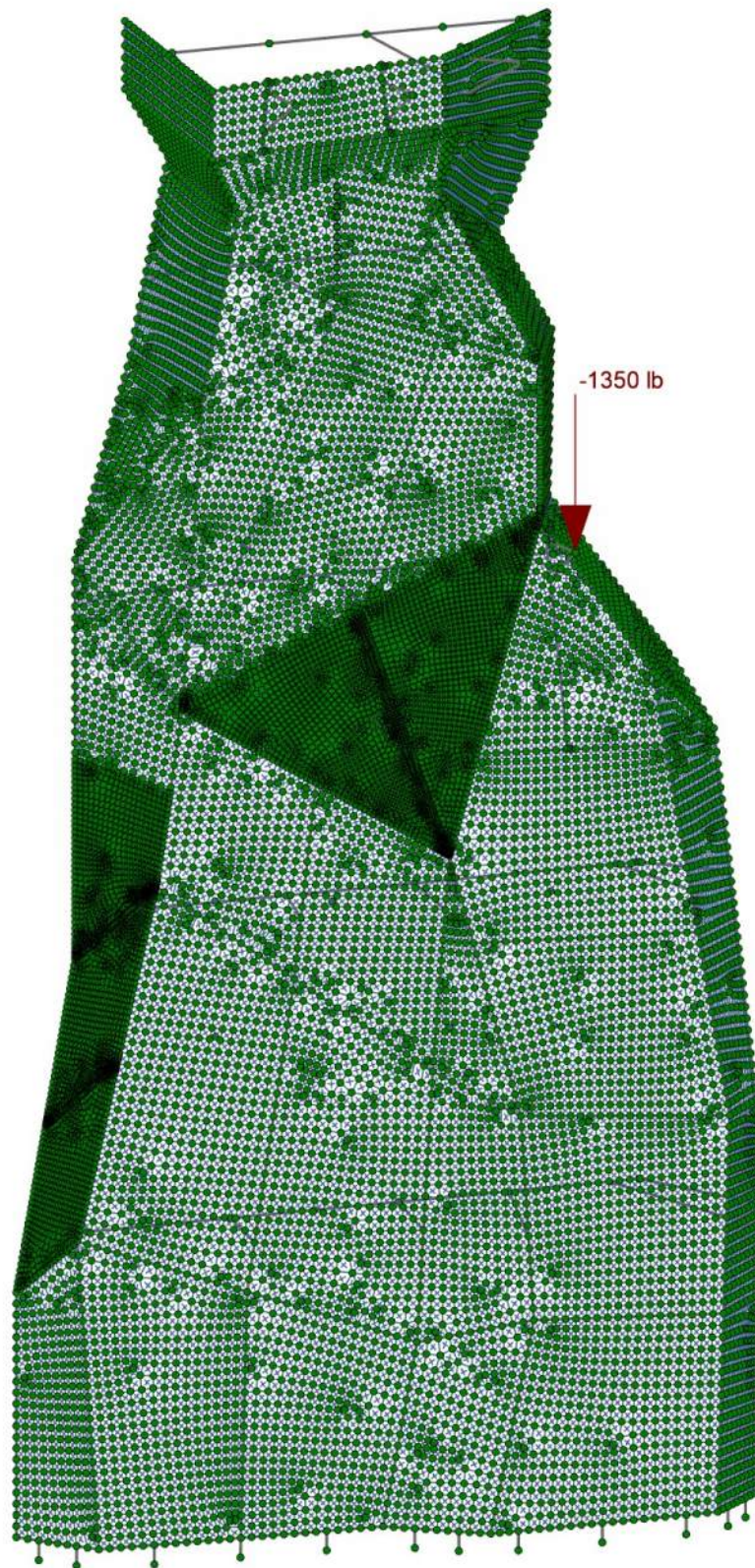
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-5

Shot Rock Wall Model 03.r3d



Loads: BLC 11, Belay 01



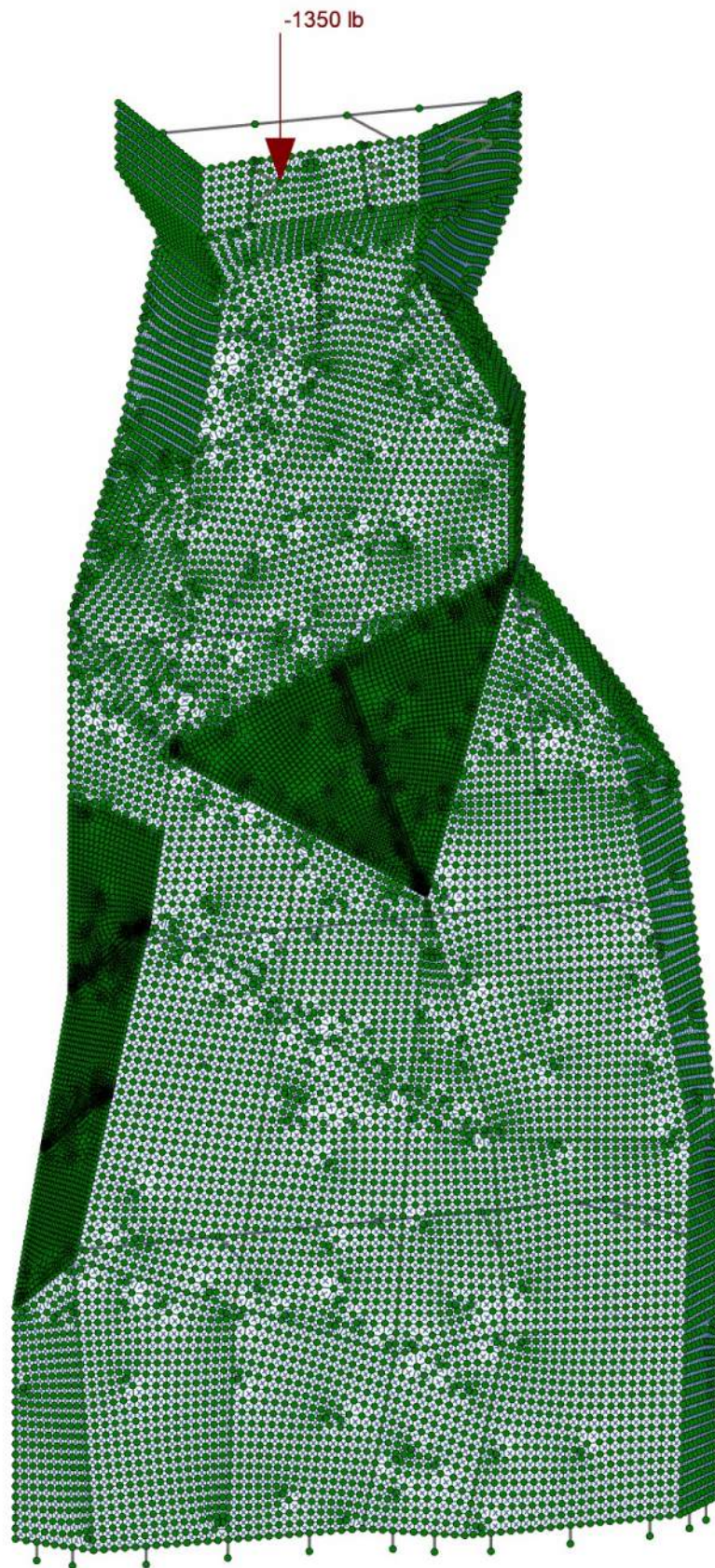
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-6

Shot Rock Wall Model 03.r3d



Loads: BLC 12, Belay 02



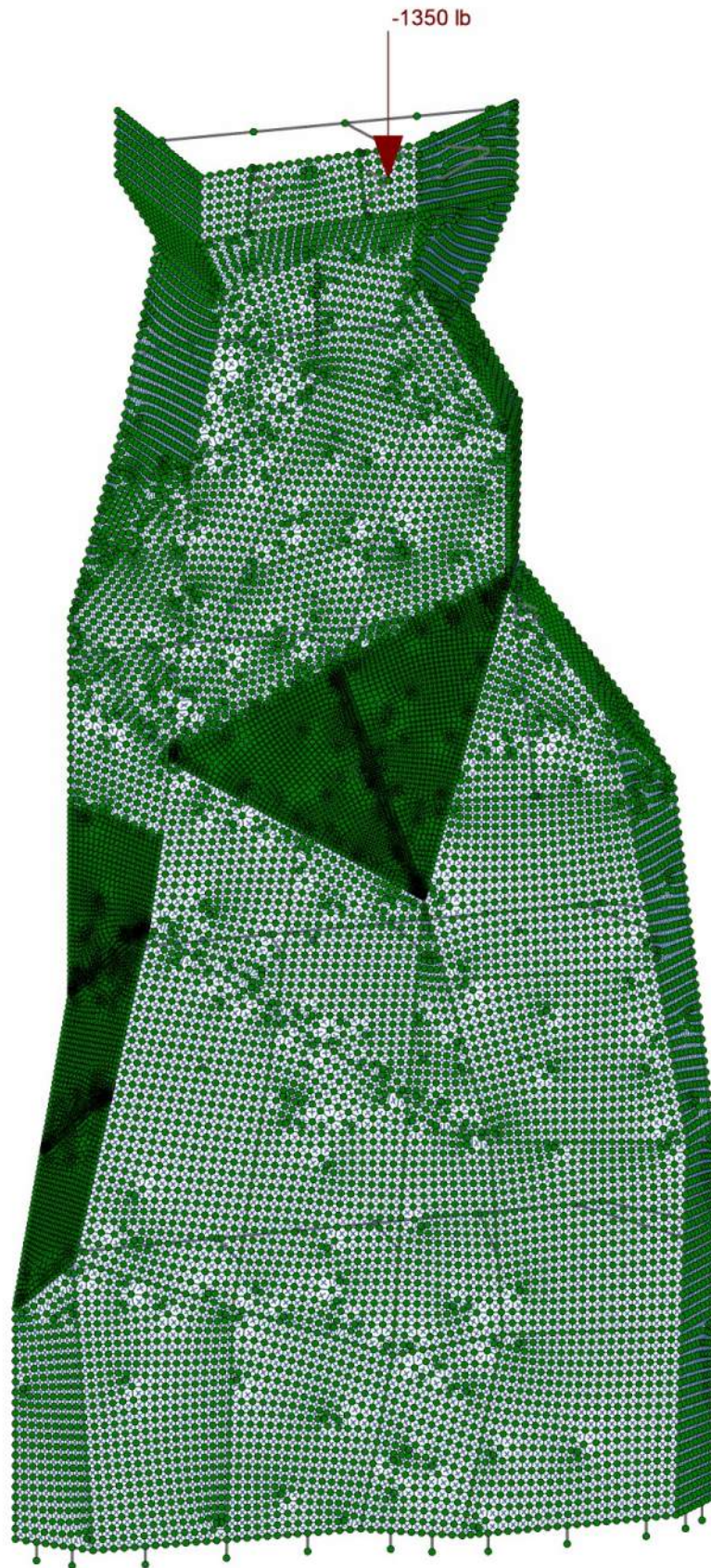
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-7

Shot Rock Wall Model 03.r3d



Loads: BLC 13, Belay 03



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-8

Shot Rock Wall Model 03.r3d



Loads: BLC 14, Belay 04



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-9

Shot Rock Wall Model 03.r3d



Loads: BLC 16, Lead 01



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall


Loads

SK-10

Shot Rock Wall Model 03.r3d




Loads: BLC 17, Lead 02

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-11
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		Loads



Loads: BLC 18, Lead 03

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-12
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		Loads



Loads: BLC 19, Lead 04



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall


Loads

SK-13

Shot Rock Wall Model 03.r3d



Loads: BLC 20, Lead 05

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-14
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		
		Loads	



Loads: BLC 21, Lead 06



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-15

Shot Rock Wall Model 03.r3d



Loads: BLC 22, Lead 07



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-16

Shot Rock Wall Model 03.r3d



Loads: BLC 23, Lead 08



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall


Loads

SK-17

Shot Rock Wall Model 03.r3d




Loads: BLC 24, Lead 09

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-18
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		Loads




Loads: BLC 25, Lead 10

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-19
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		Loads



Loads: BLC 26, Lead 11

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-20
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		Loads



Loads: BLC 27, Lead 12



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall


Loads

SK-21

Shot Rock Wall Model 03.r3d



Loads: BLC 28, Lead 13

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-22
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		
		Loads	



Loads: BLC 29, Lead 14



Peak Thrills Engineering
Dan Peak
003-0353


Grand Junction Rock Wall

Loads

SK-23
Shot Rock Wall Model 03.r3d




Loads: BLC 30, Lead 15

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-24
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		Loads



Loads: BLC 31, Lead 16

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-25
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		Loads



Loads: BLC 32, Lead 17



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall


Loads

SK-26

Shot Rock Wall Model 03.r3d



Loads: BLC 33, Lead 18

	Peak Thrills Engineering	Grand Junction Rock Wall	SK-27
	Dan Peak		Shot Rock Wall Model 03.r3d
	003-0353		
		Loads	



Loads: BLC 34, Lead 19



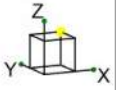
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-28

Shot Rock Wall Model 03.r3d



Loads: BLC 35, Lead 20



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Loads

SK-29

Shot Rock Wall Model 03.r3d



Loads: BLC 36, Lead 21



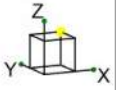
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

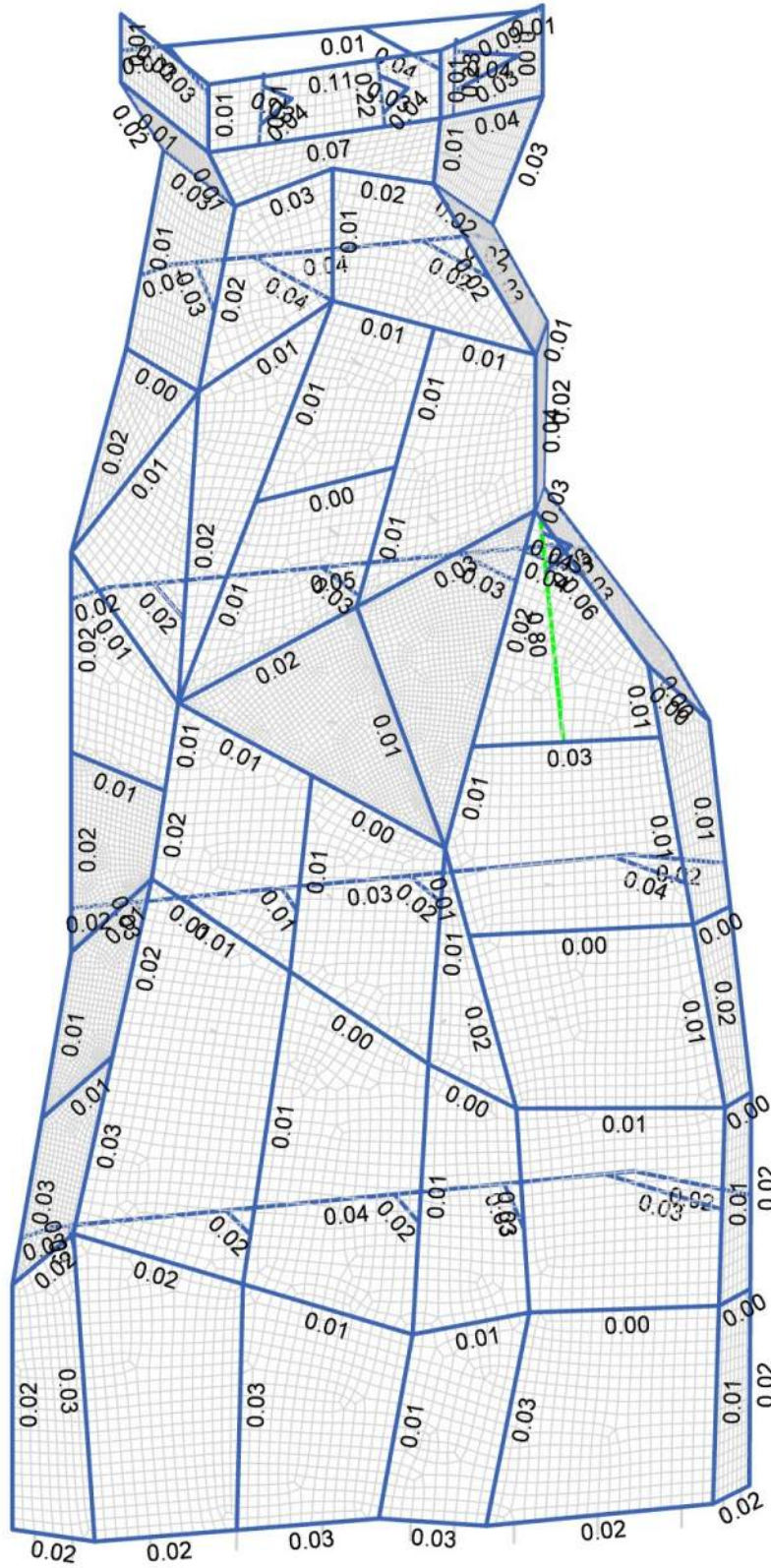
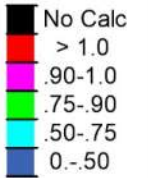
Loads

SK-30

Shot Rock Wall Model 03.r3d



Code Check
(Env)



Member Code Checks Displayed (Enveloped)



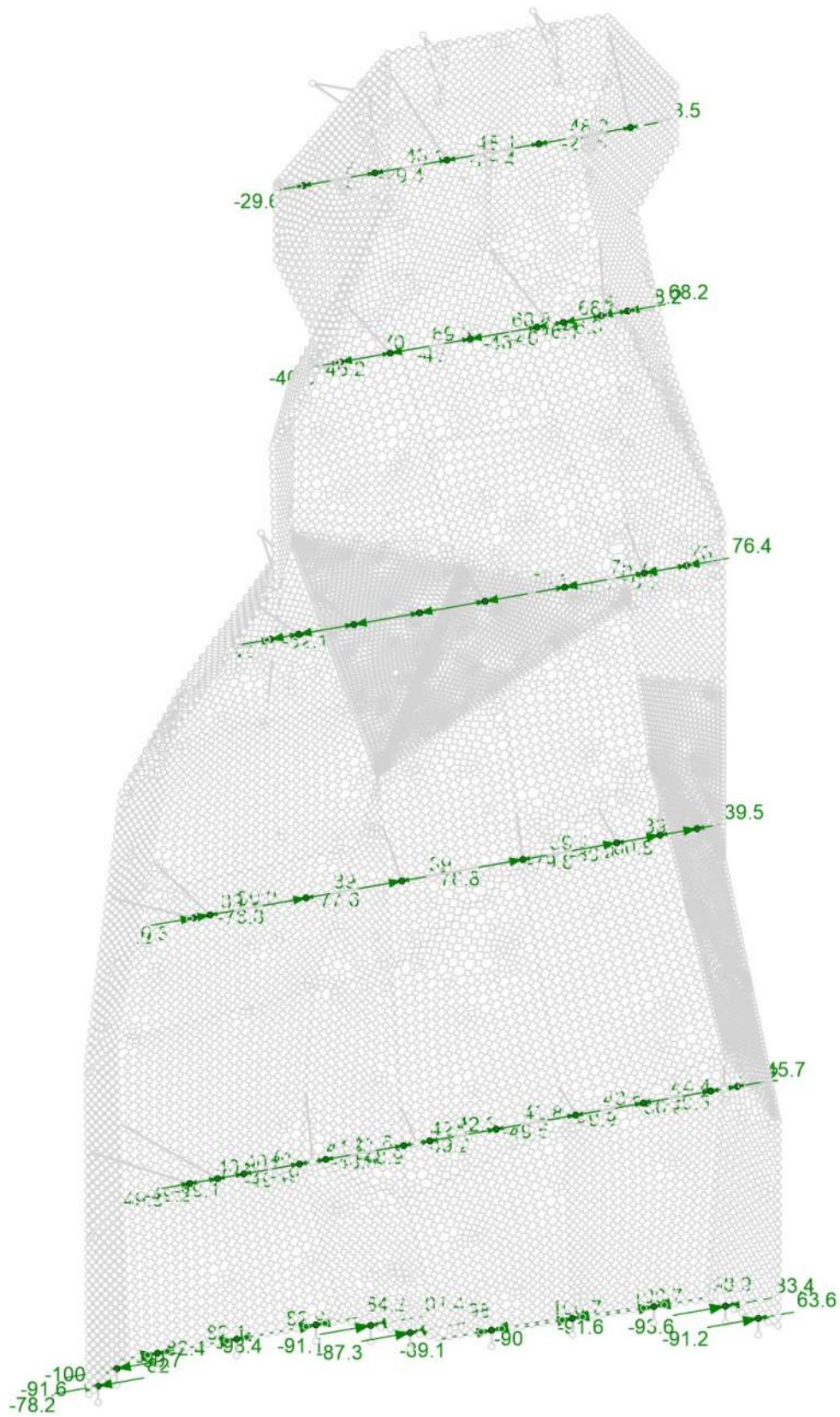
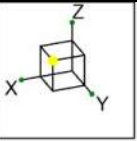
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Steel Strength Ratios

SK-31

Shot Rock Wall Model 03.r3d



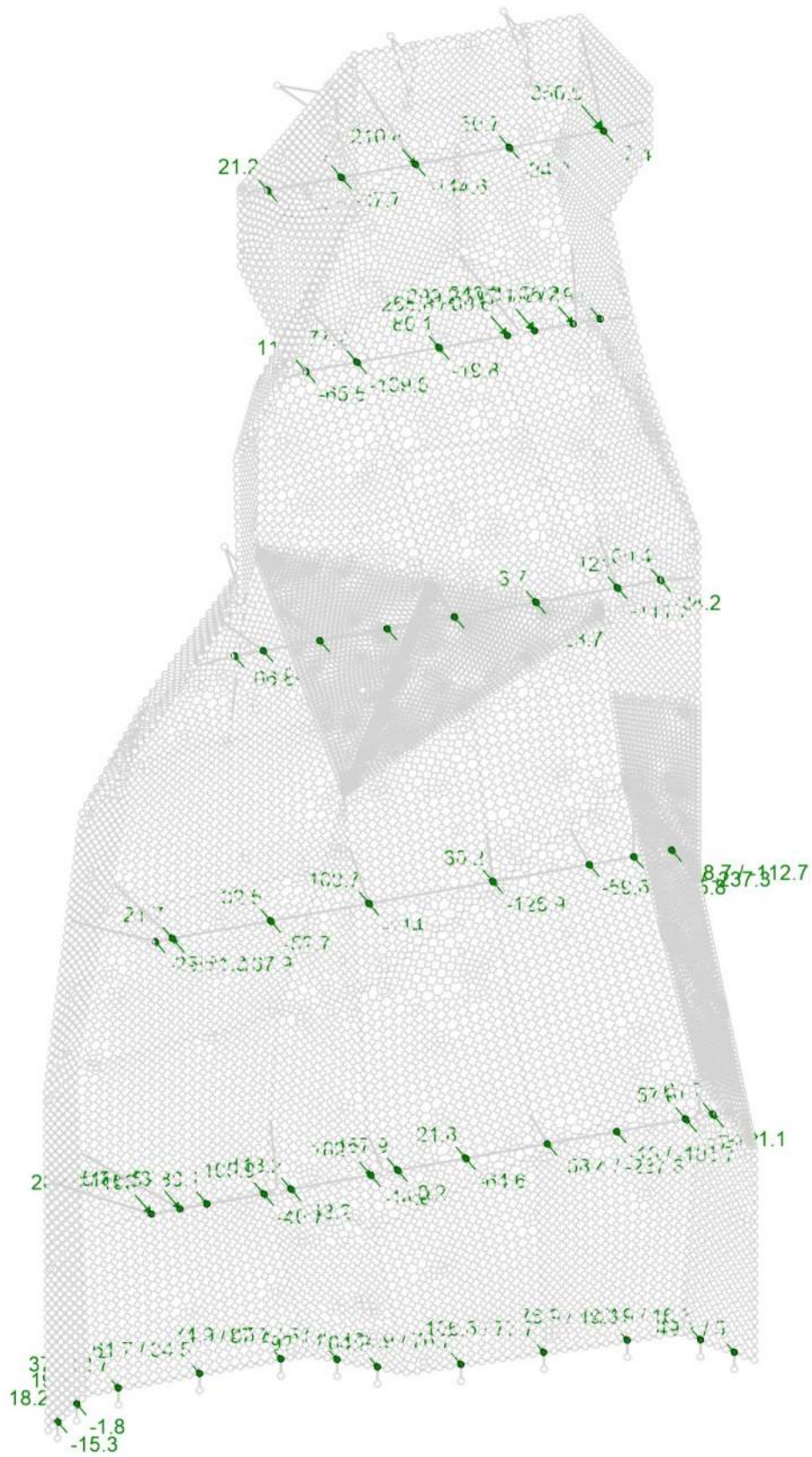
X-direction Reaction Units are lbs and lb-ft (Enveloped)



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall
Facility Reactions

SK-32
Shot Rock Wall Model 03.r3d



PEAK
THRILLS
ENGINEERING

003-0353

Facility Reactions

Shot Rock Wall Model 03.r3d

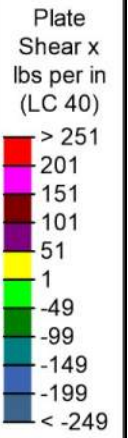
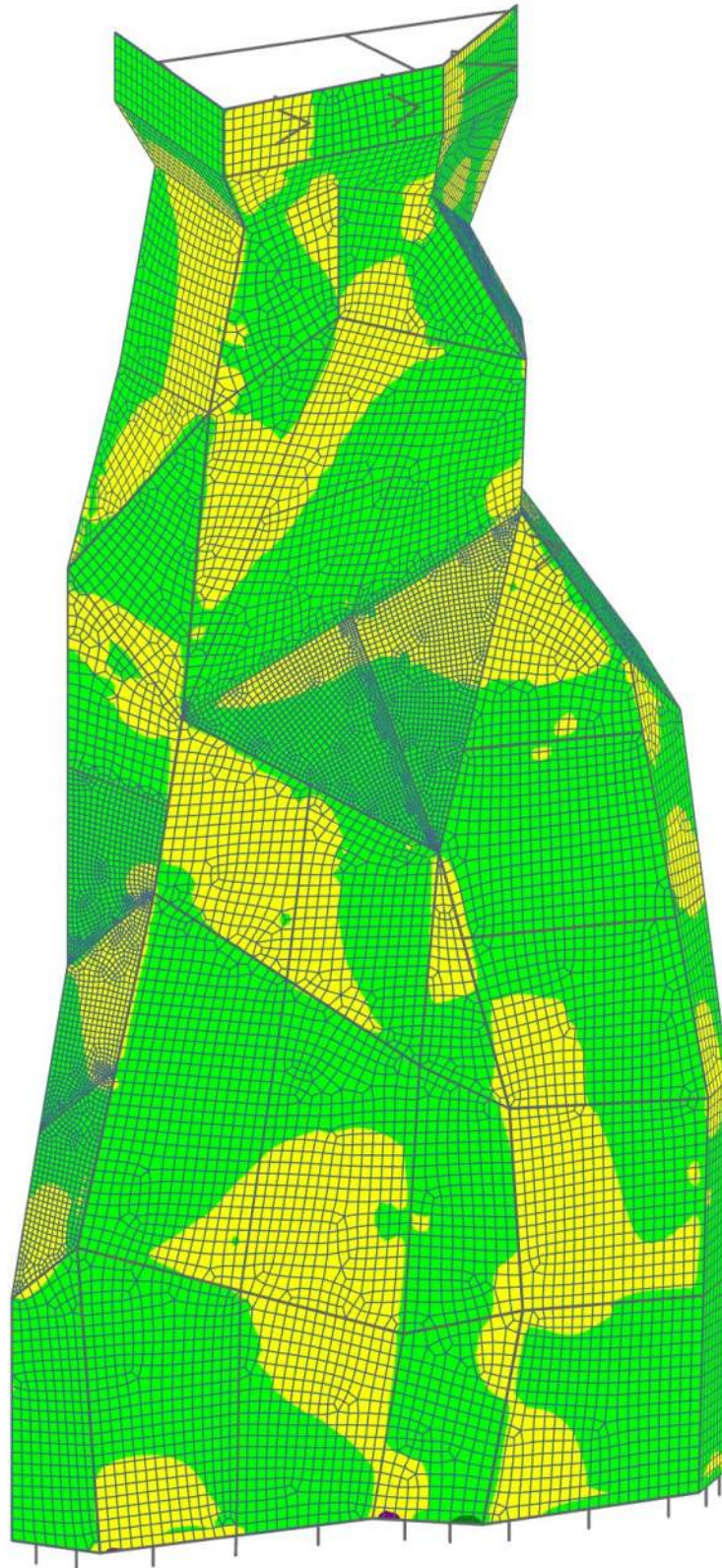
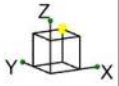


PEAK
THRILLS
ENGINEERING

003-0353

Facility Reactions

Shot Rock Wall Model 03.r3d



Results for LC 40, 1.2DL + (-EQY + EQZ)



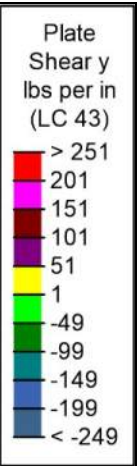
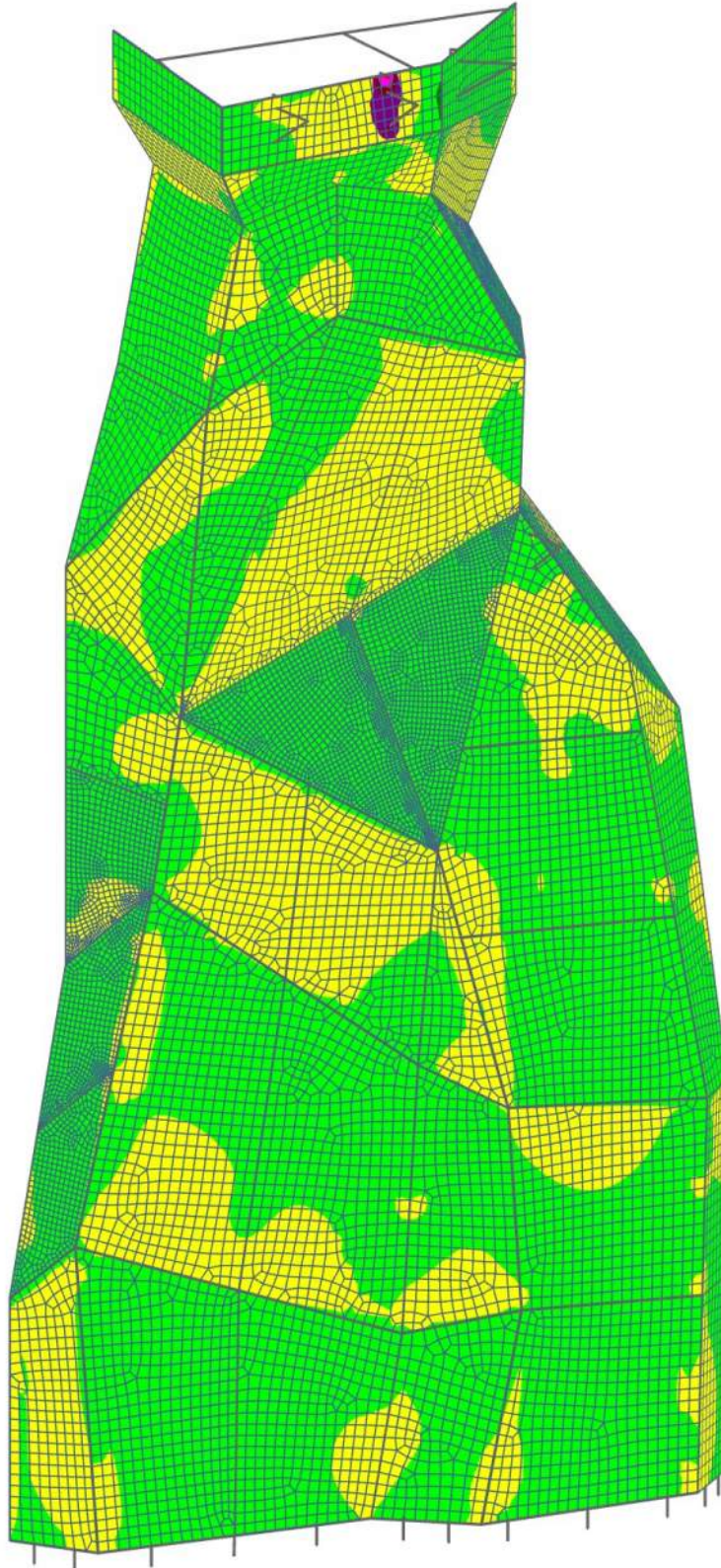
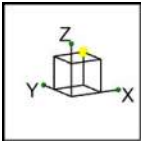
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Concrete Shear

SK-35

Shot Rock Wall Model 03.r3d



Results for LC 43, 1.2DL + 1.6Belay 03



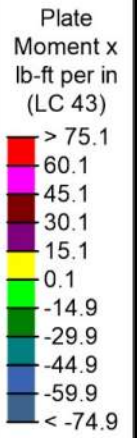
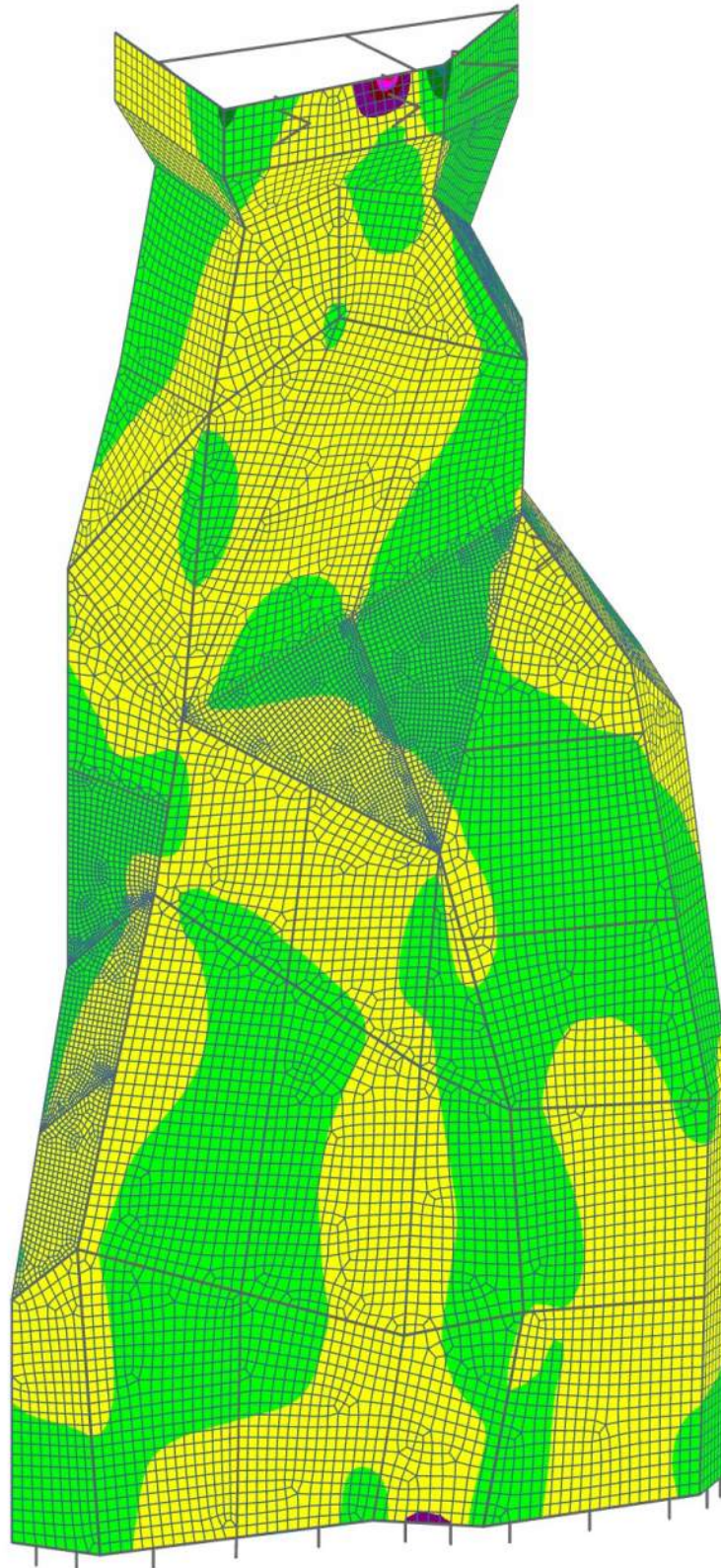
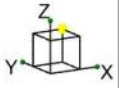
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Concrete Shear

SK-36

Shot Rock Wall Model 03.r3d



Results for LC 43, 1.2DL + 1.6Belay 03



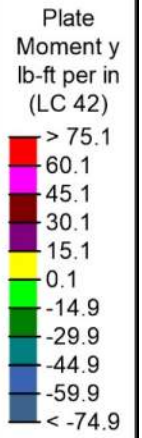
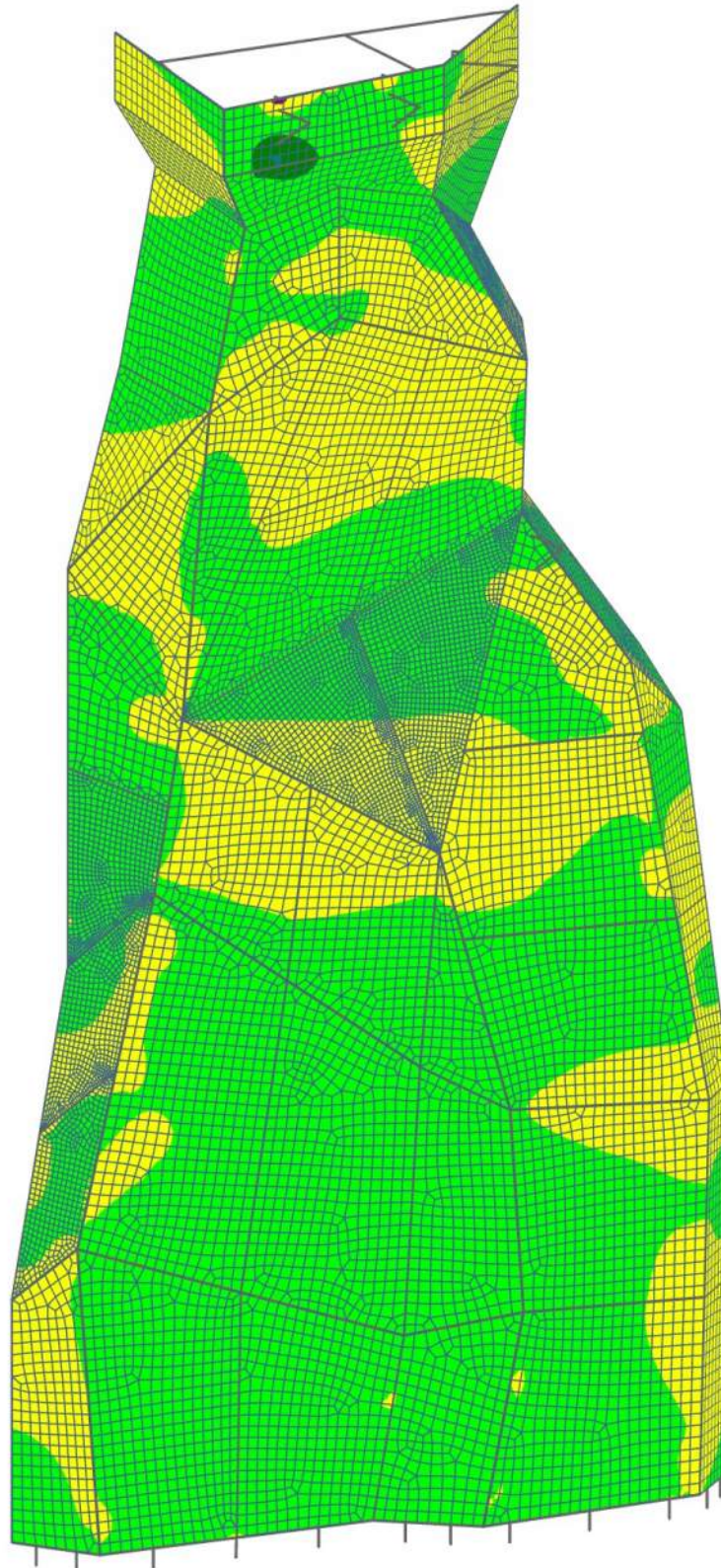
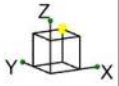
Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Concrete Flexure

SK-37

Shot Rock Wall Model 03.r3d



Results for LC 42, 1.2DL + 1.6Belay 02



Peak Thrills Engineering
Dan Peak
003-0353

Grand Junction Rock Wall

Concrete Flexure

SK-38

Shot Rock Wall Model 03.r3d