

Drawing & Specification Package for Quadrupedal Robot Treadmill

Indented Bill of Materials

Assembly Level	Part Number	Description					Qty	Cost	Total Cost	Source	More Info
		Lv0	Lv1	Lv2	Lv3	Lv4					
0		Final Assembly					////////	////////	////////	////////	////////
1	A		Top Assembly				////////	////////	////////	////////	////////
2	C		-----> Chassis				////////	////////	////////	////////	////////
3	C-1		-----> ----->	Frame			////////	////////	////////	////////	////////
4	C-1-L1		-----> ----->	----->	8020 Extrusion - 1903 mm		4	\$68.51	\$274.04	8020.net	Item # 40-4040
4	C-1-L2		-----> ----->	----->	8020 Extrusion - 662 mm		8	\$23.83	\$190.64	8020.net	Item #40-4040
3	C-2		-----> ----->	L Bracket			8	\$20	\$160.00	Custom	Waterjet
3	C-3		-----> ----->	Caster Wheels			4	\$71.91	\$287.64	8020.net	Item # 65-2337
3	C-4		-----> ----->	M8 screws			3	\$6.44	\$19.32	McMaster	Item # 91290A422
3	C-5		-----> ----->	M8 washers			1	\$12.57	\$12.57	McMaster	Item # 96505A116
3	C-6		-----> ----->	T-Slotted Framing (M8)			7	\$5.45	\$38.15	McMaster	Item # 5537T688
3	C-7		-----> ----->	M6 screws			1	\$14.37	\$14.37	McMaster	Item # 91290A318
3	C-8		-----> ----->	8020 hammer nuts (m6)			25	\$1.20	\$30.00	McMaster	Item # 6000N218
3	C-9		-----> ----->	M6 Nuts			1	\$5.21	\$5.21	McMaster	Item # 90592A016
3	C-10		-----> ----->	M6 Washers			1	\$11.34	\$11.34	McMaster	Item # 94630A111
2	F		-----> Fall Prevention				////////	////////	////////	////////	////////
3	F-1		-----> ----->	Spring Plate			1	\$19.71	\$39.41	Custom	Waterjet
3	F-2		-----> ----->	Pipe Gusset			1	\$0.00	\$0.00	Custom	3D Printed
3	F-3		-----> ----->	Clear Pipe			1	\$25.45	\$25.45	Amazon	2.5 inch clear pipe
3	F-4		-----> ----->	Rubber Stop			1	\$2.75	\$2.75	Home Depot	1.25 inch stopper
3	F-5		-----> ----->	Spring			1	\$14.90	\$14.90	thespringstore.com	PE135-750-45519-MW -7000-MH-N-IN
3	F-6		-----> ----->	M6 eye bolts			4	\$6.34	\$25.36	McMaster	Item # 3040T11
3	F-7		-----> ----->	Double Pulley			1	\$11.99	\$11.99	e-rigging.com	Item # 51646805
3	F-8		-----> ----->	Winch			1	\$89.99	\$89.99	Harbor Freight	Badland 2500 ZXR
3	F-9		-----> ----->	Support L-Bracket			4	\$4.41	\$17.64	McMaster	Item # 5537T586
3	F-10		-----> ----->	Rope			25	\$1.17	\$29.25	McMaster	Item # 3790T12
3	F-11		-----> ----->	Single Pulley			4	\$4.81	\$19.24	McMaster	Item # 374253
2	T		-----> Treadmill				1	\$350	\$350	Craigslist	Landice 8700 Sprint
2	S		-----> Strain Gage				3	\$8.06	\$24.18	Amazon	Model RP-C10-ST

Purchased Parts Table

Part #	Part Name	Vendor	Vendor Part #	Price (per unit)	Key Features/Specs	Website
C-1	8020 Extrusion	8020.net	40-4040	\$68.51	Bars with grooves on all 4 sides in which items can be attached	https://8020.net/40-4040.html
C-3	Caster Wheels	8020.net	65-2337	\$71.91	Locking wheels that can specifically be mounted to 8020	https://8020.net/65-2337.html
C-4	M8 Screws	McMaster	91290A422	\$6.44	Screws with M8 Threads	https://www.mcmaster.com/91290A422/
C-5	M8 Washers	McMaster	96505A116	\$12.57	Washer for M8 screws	https://www.mcmaster.com/96505A116/
C-6	T-slotted Framing	McMaster	5537T688	\$5.45	Sliders that can fit in grooves of 8020 which can accept M6 threads	https://www.mcmaster.com/5537T688
C-7	M6 Screws	McMaster	91290A318	\$14.37	Screws with M6 Threads	https://www.mcmaster.com/91290A318/
C-8	8020 Hammer Nuts	McMaster	6000N218	\$1.20	Sliders that can fit in grooves of 8020 which can accept M8 threads	https://www.mcmaster.com/6000N128
C-9	M6 Nuts	McMaster	90592A016	\$5.21	Nut for an M6 screw	https://www.mcmaster.com/90592A016
C-10	M6 Washers	McMaster	94630A111	\$11.34	Washer for an M6 screw	https://www.mcmaster.com/94630A111
F-3	Clear Pipe	Amazon	N/A	\$25.45	Pipe where it is possible to see through	https://www.amazon.com/Diameter-Clear-Schedule-Inches-approximately/dp/B07TX4DCY4?th=1&pldnSite=1
F-4	Rubber Stopper	Home Depot	N/A	\$2.75	Anything that can be used to decelerate a spring	https://www.homedepot.com/p/Everbilt-1-1-4-in-x-1-in-Black-Rubber-Stopper-808278/204273370
F-5	Spring	thespringstore.com	PE135-750-45519-MW-7000-MH-N-IN	\$14.90	Spring of stiffness 2.304 lbf/in	https://www.thespringstore.com/catalog/product/view/id/122960/s/pe135-750-45519-mw-7000-mh-n-in/category/2/
F-6	M6 eye bolts	McMaster	Item # 3040T11	\$6.34	Eyebolt with M6 threads	https://www.mcmaster.com/3040T11
F-7	Double Pulley	e-rigging.com	Item # 51646805	\$11.99	Pulley that can support two ropes	https://e-rigging.com/collections/stainless-steel-blocks-pulleys/products/stainless-double-sheave-swivel-eye-blocks?variant=39721889333321

F-8	Winch	Harbor Freight	2500 ZXR	\$89.99	Device that can tension a rope	https://www.harborfreight.com/2500-lb-atvutility-winch-with-wire-rope-and-wireless-remote-control-56258.html
F-9	Support L-Bracket	McMaster	Item # 5537T586	\$4.41	Brackets in the shape of an L	https://www.mcmaster.com/5537T586
F-10	Rope	McMaster	Item # 3790T12	\$1.17	Rope capable of withstanding at least 150 lbf	https://www.mcmaster.com/3790T12/
F-11	Single Pulley	McMaster	Item # 374253	\$4.81	Anything that a rope can easily slide through	https://www.mcmaster.com/3742T53
T	Treadmill	Craig's List	N/A	\$350	A device with revolving tread	N/A
S	Strain Gauge	Amazon	N/A	\$8.06	A device capable of measuring deflection of a material	https://www.amazon.com/dp/B07T1CHY58/ref=sspa_dk_detail_1?psc=1&pd_rd_i=B07T1CHY58&pd_rd_w=nLQSZ&content-id=amzn1.sym.88097cb9-5064-44ef-891b-abfacbc1c44b&pf_rd_p=88097cb9-5064-44ef-891b-abfacbc1c44b&pf_rd_r=TDD2TFH1MMFSBN SYY38K&pd_rd_wg=MQu1O&pd_rd_r=cc57b3e5-e366-43ef-a5b9-84396d3012e4&s=hi&sp_csd=d2lkZ2V0TmFtZT1zcF9kZXRhaWw&smid=A2KRDO1AI5Y5G6&spLa=ZW5jcnlwdGVkUXVhbGlmaWVyPUEyMEICRDJaOFRCVE80JmVuY3J5cHRlZEIkPUEwOTYyODAwMTVPVkc3QTdLN04zUyZlbnNyeXB0ZWRBZEIkPUEwNjYxMjg0MkNXNlU4NEtFMTVWMyZ3aWRnZXR OYW1lPjNwX2RldGFpbCZlY3Rpb249Y2xpY2tSZWRpcmVjdCZkb05vdExvZ0NsaWNrPXRydWU=

4

3

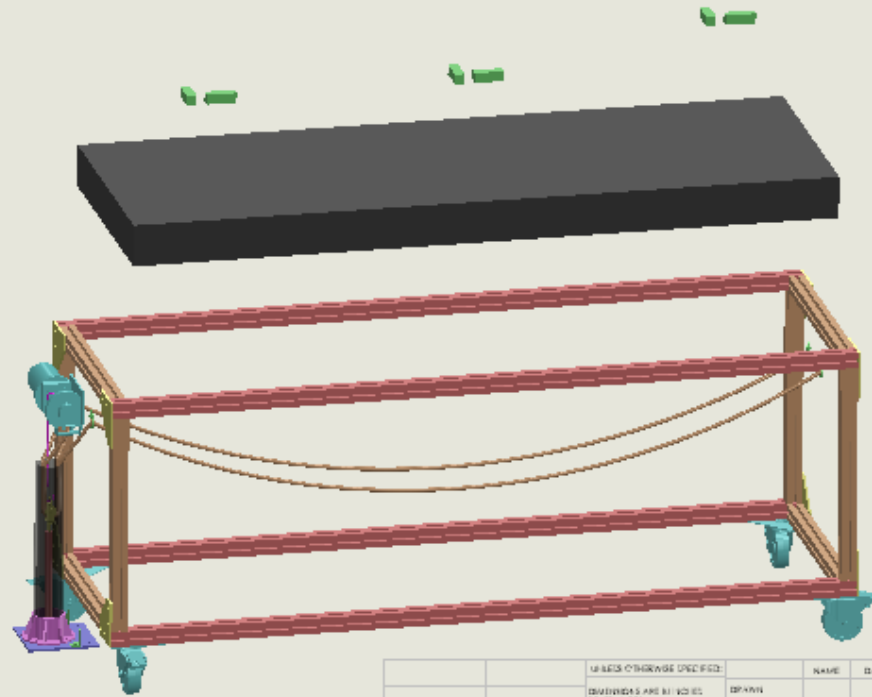
2

1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	C	Chassis	1
2	F	Fall Prevention Mechanism	1
3	T	Treadmill	1
4	S	Strain Gauges	1

B

B



A

A

PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED HEREIN IS
 THE PROPERTY OF HANSON COMPANY AND IS NOT TO BE
 REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY
 MEANS, ELECTRONIC OR MECHANICAL, INCLUDING
 PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION
 STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE
 EXPRESS WRITTEN PERMISSION OF HANSON COMPANY.

UNIT	DESCRIPTION	NAME	DATE
	DESIGNER'S ARE BY VOICES		
	FRAC DECIMAL		
	ANGULAR MATCH		
	TWO PLACE DECIMAL		
	THREE PLACE DECIMAL		
	STANDARD QUANTITIES TO ONE PLACE		
	MATERIAL		
	FINISH		
NEXT ASY	USED ON		
APPLICATION	DO NOT SCALE DRAWING		

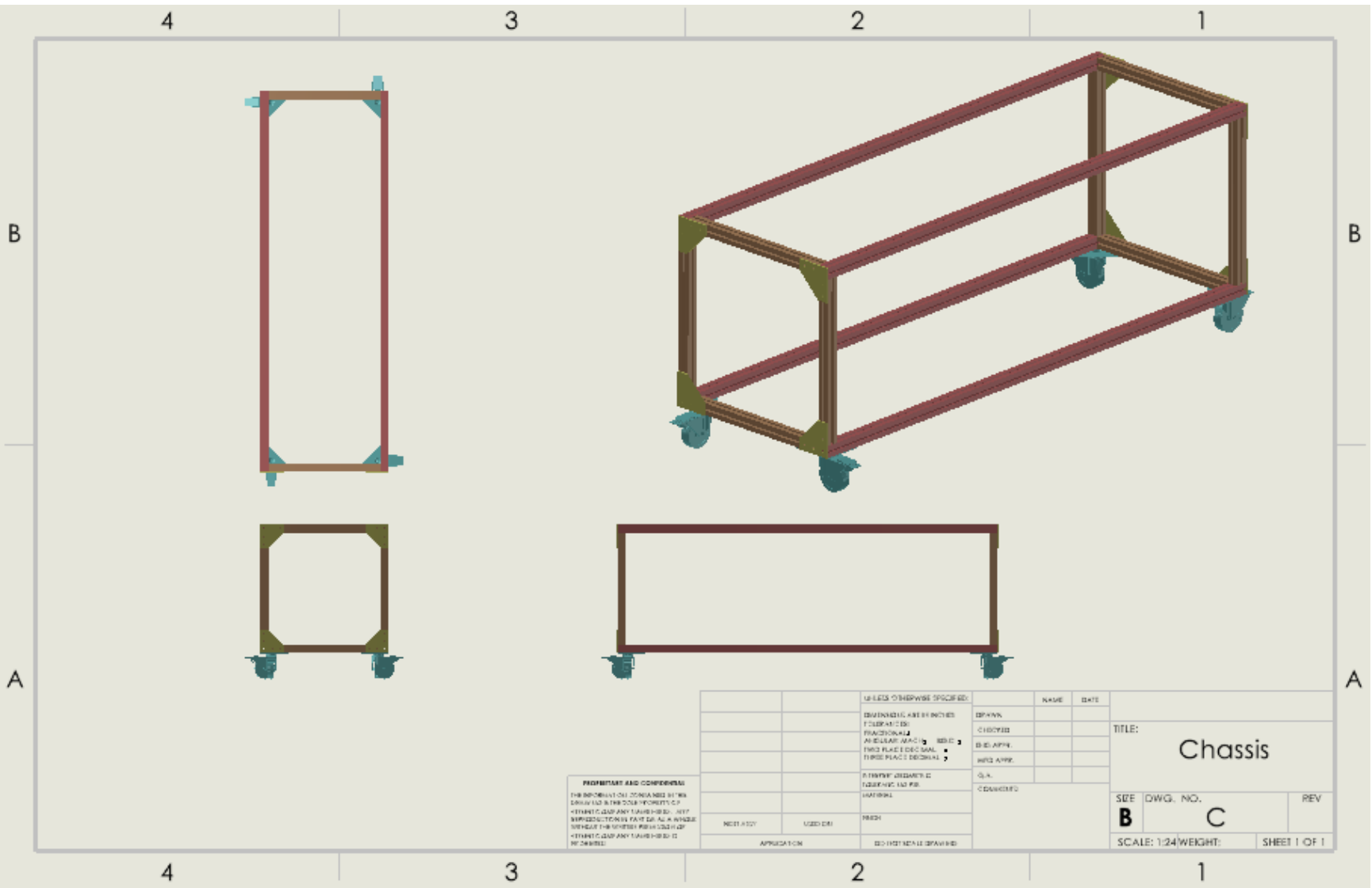
TITLE:		
Full Assembly (Exploded View)		
SHEET NO.	DWG. NO.	REV
B	AE	
SCALE: 1:32/WEIGHT:		SHEET 1 OF 1

4

3

2

1



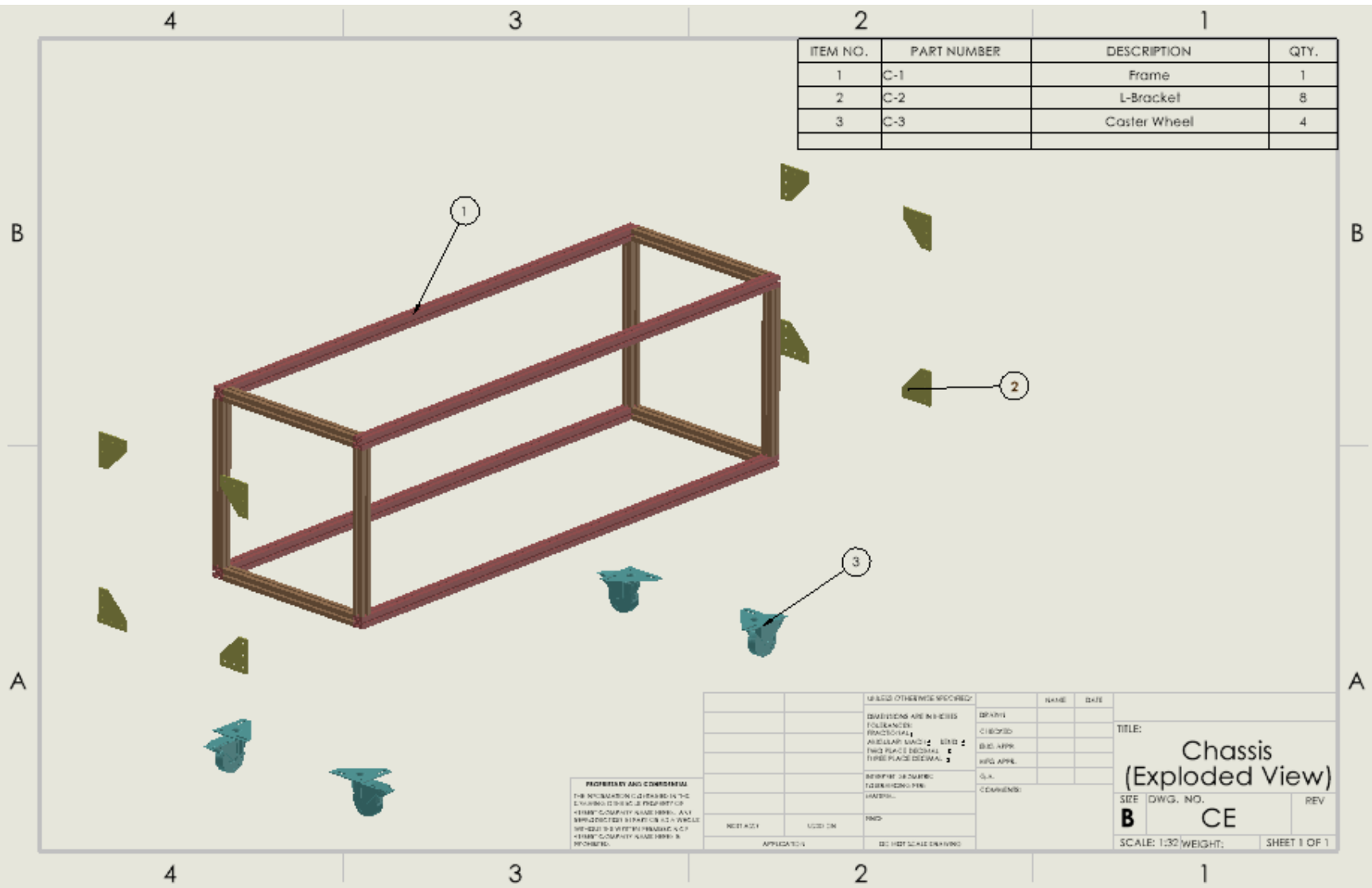
PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE. ANY REPRODUCTION OF THIS INFORMATION IS STRICTLY PROHIBITED WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE U.S. GOVERNMENT.

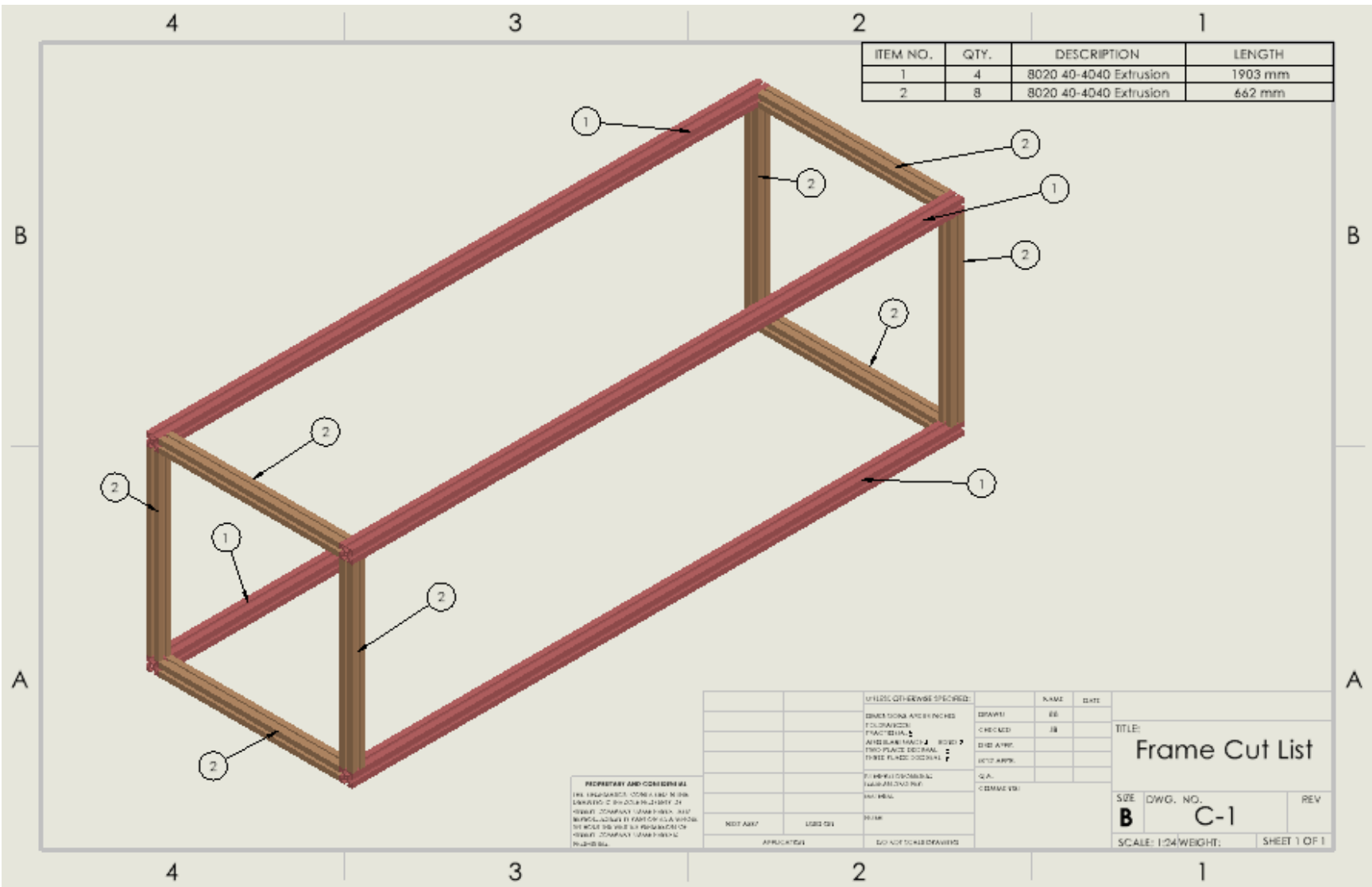
NO.	DATE	BY	DESCRIPTION

UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 TOLERANCES
 FRACTIONS 1/16" 1/32" 1/64"
 DECIMALS .001" .002" .005"
 ANGLES .1° .2° .5° .015"
 HOLE POSITION .010"
 SURFACE FINISH
 UNLESS OTHERWISE SPECIFIED
 UNLESS OTHERWISE SPECIFIED
 UNLESS OTHERWISE SPECIFIED

NAME	DATE
DESIGNED	
CHECKED	
DESIGNED	
DESIGNED	
DESIGNED	
DESIGNED	
DESIGNED	
DESIGNED	

TITLE: Chassis		
SIZE B	DWG. NO. C	REV
SCALE: 1:24/WEIGHT:		SHEET 1 OF 1





ITEM NO.	QTY.	DESCRIPTION	LENGTH
1	4	8020 40-4040 Extrusion	1903 mm
2	8	8020 40-4040 Extrusion	662 mm

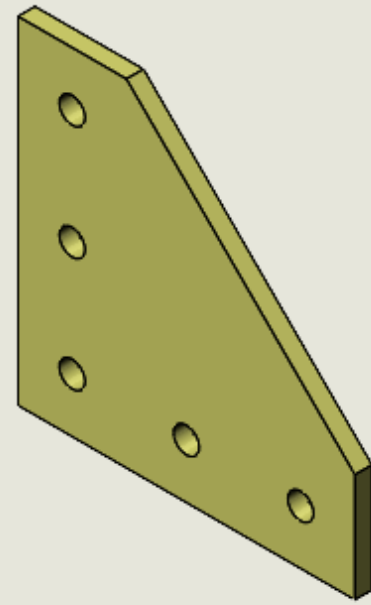
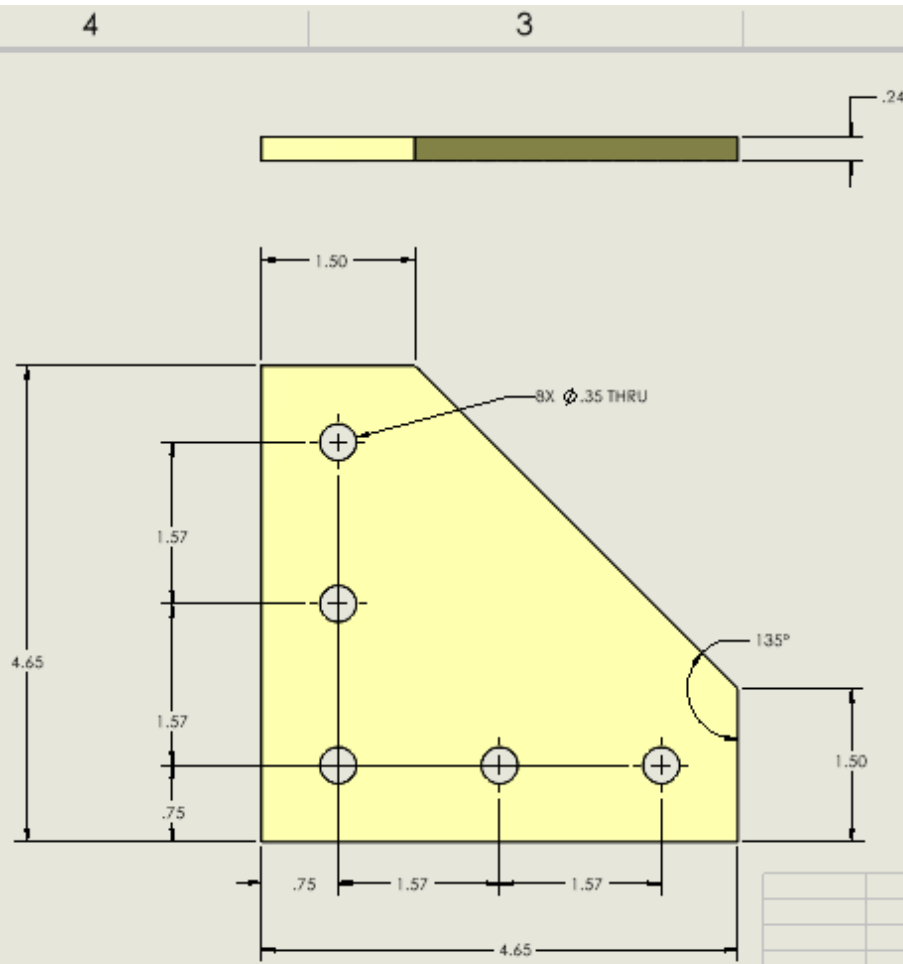
PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED HEREIN IS UNCLASSIFIED EXCEPT WHERE SHOWN OTHERWISE BY THIS OR ANY OTHER DOCUMENTATION
 © 2013 HOK COMPANY
 HOK COMPANY, HOK PARTNERSHIP AND HOK ASSOCIATES IS PART OF A GROUP OF COMPANIES OWNED BY HOK GROUP LLC. HOK GROUP LLC IS A REGISTERED SERVICE MARK OF HOK GROUP LLC.
 HOK GROUP LLC

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DESIGNING AND DETAILED		EB	
CHECKED		JR	
DATE APPR.			
BY APPR.			
Q.A.			
CONTRACTOR			

TITLE:
Frame Cut List

SIZE DWG. NO. **REV**
B **C-1**

SCALE: 1/32"=1'-0" SHEET 1 OF 1

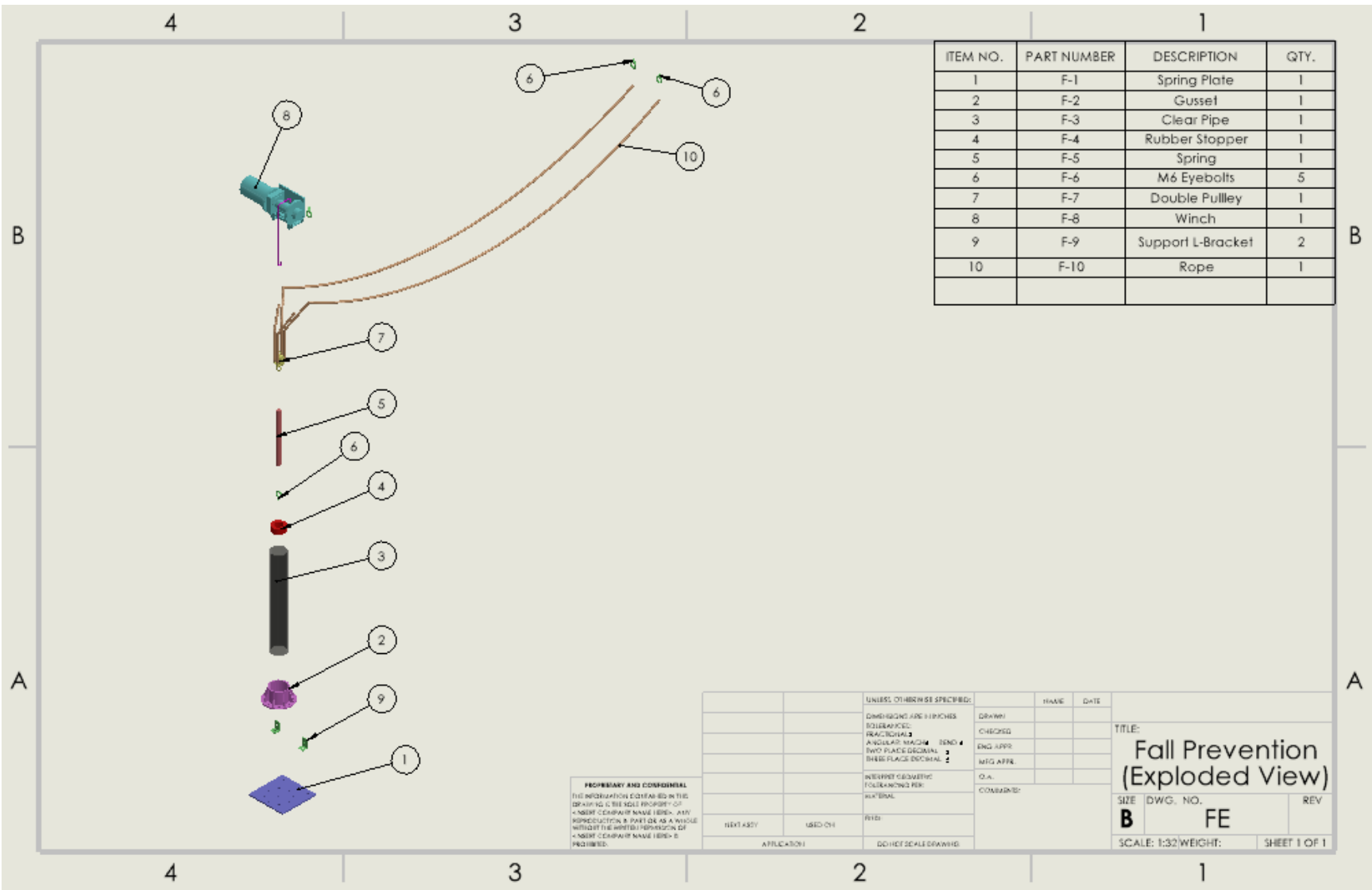


PROFESIONALS AND CONDITIONS:
 I, THE UNDERSIGNED, CERTIFY THAT I AM A LICENSED PROFESSIONAL ENGINEER IN THE STATE OF CALIFORNIA, LICENSE NO. 45678, AND THAT I AM THE DESIGNER OF THE ABOVE DRAWING. I AM NOT PROVIDING ANY DESIGN SERVICES TO THE CLIENT UNDER THIS DRAWING. I AM NOT PROVIDING ANY DESIGN SERVICES TO THE CLIENT UNDER THIS DRAWING. I AM NOT PROVIDING ANY DESIGN SERVICES TO THE CLIENT UNDER THIS DRAWING.

DATE	DESCRIPTION	BY	CHKD
	DESIGNED AND DRAWN BY		
	CHECKED BY		
	APPROVED BY		
	DATE		

UNLESS OTHERWISE SPECIFIED:	NAME	DATE
FINISHES AND TOLERANCES		
ALL DIMENSIONS IN INCHES		
UNLESS OTHERWISE SPECIFIED:		
MATERIAL	Aluminum	
FINISH	PAINT	

TITLE: L-Bracket		
SIZE: B	DWG. NO.: C-2	REV:
SCALE: 1:1	WEIGHT:	SHEET 1 OF 1



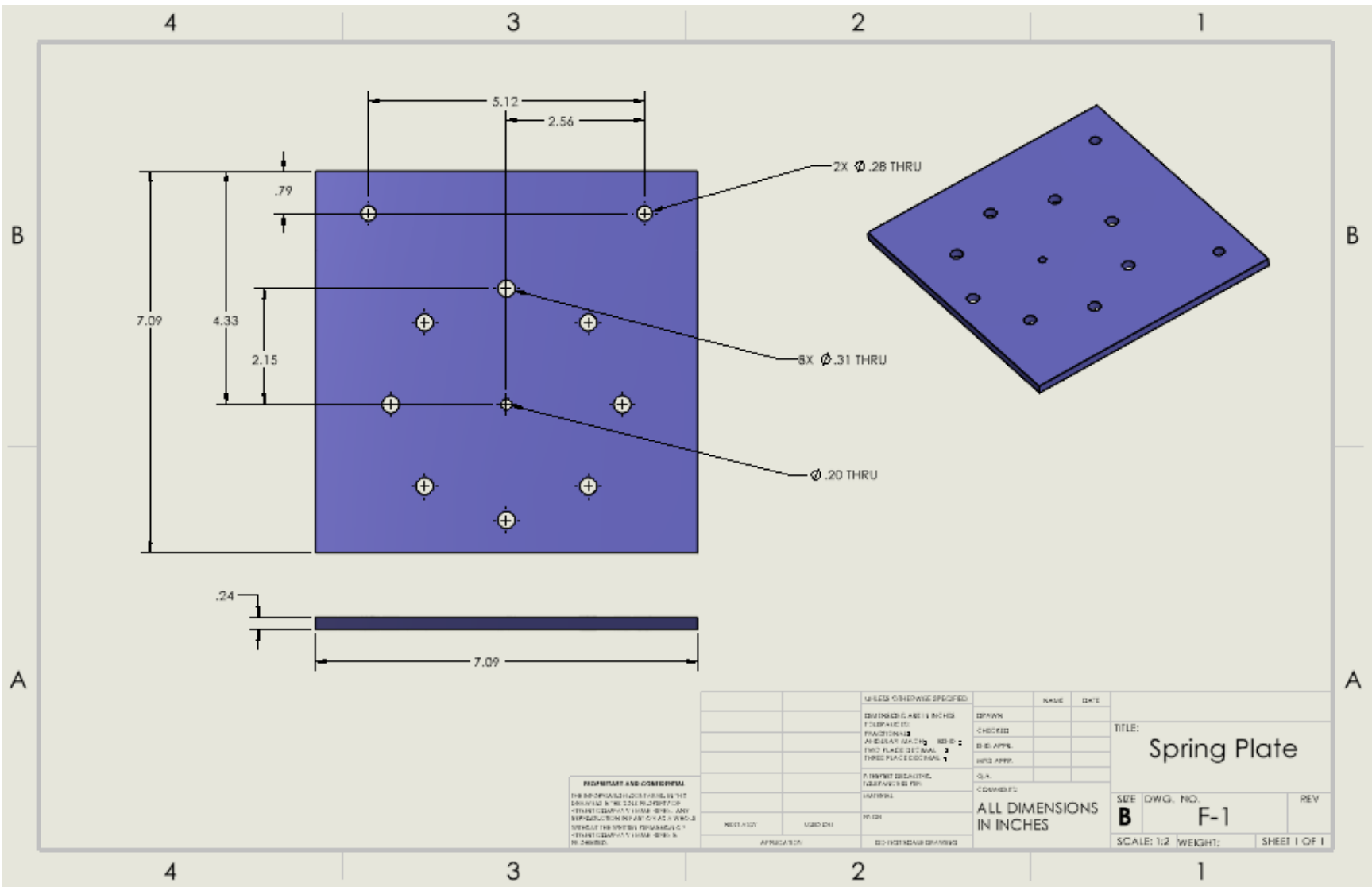
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	F-1	Spring Plate	1
2	F-2	Gusset	1
3	F-3	Clear Pipe	1
4	F-4	Rubber Stopper	1
5	F-5	Spring	1
6	F-6	M6 Eyebolts	5
7	F-7	Double Pulley	1
8	F-8	Winch	1
9	F-9	Support L-Bracket	2
10	F-10	Rope	1

PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF...
 REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF...
 IS PROHIBITED.

UNLESS OTHERWISE SPECIFIED:		DATE
DIMENSIONS ARE IN INCHES	DRAWN	
DECIMALS ARE FIFTHS	CHECKED	
FRACTIONS ARE 1/16	ENG APPR	
ANGULARS: MINOR 1/16	MFG APPR	
TWO PLACE DECIMAL 1/32	D.A.	
THREE PLACE DECIMAL 1/64	COMMENTS:	
INTERPRET GEOMETRIC TOLERANCING PER: ASME Y14.5		
ALL TOLERANCES PER: ASME Y14.5		
TEXT SIZE: 1/8" MIN		
USED ON: THIS DRAWING		
APPLICATION: FALL PREVENTION		

TITLE:
Fall Prevention (Exploded View)

SIZE B	DWG. NO. FE	REV
SCALE: 1:32/WEIGHT:		SHEET 1 OF 1



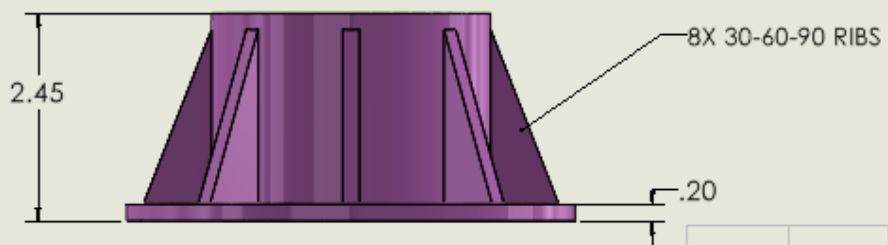
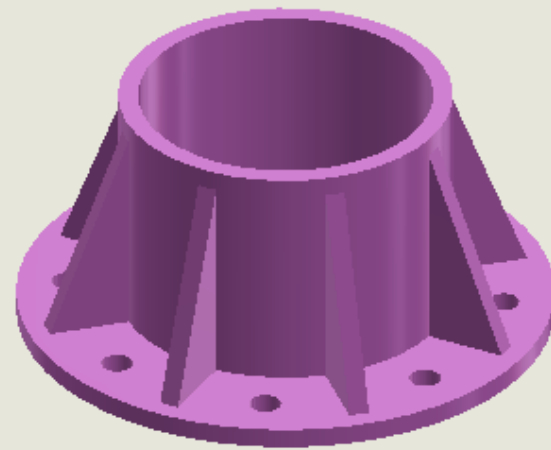
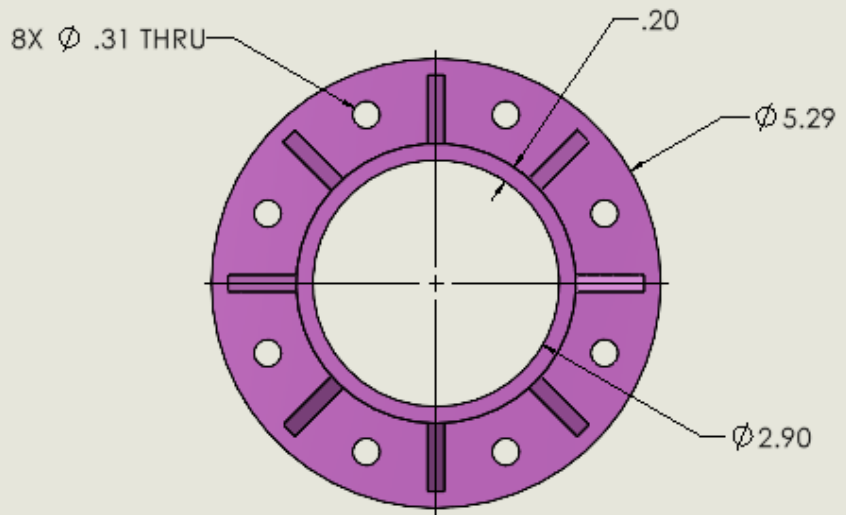
PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED HEREIN IS THE
 PROPERTY OF THE COMPANY AND IS NOT TO BE
 DISCLOSED TO ANY OTHER PARTY WITHOUT
 THE WRITTEN PERMISSION OF THE COMPANY.
 ALL RIGHTS RESERVED.

UNLESS OTHERWISE SPECIFIED:	NAME	DATE
DIMENSIONS ARE IN INCHES	DESIGNER	
FRACTIONS $\frac{1}{8}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ 1	CHECKED	
DECIMALS .125 .25 .375 .5 .75 1	DESIGNER	
ANGLES 15° 30° 45° 60° 90° 120° 150° 180°	DATE	
TOLERANCES UNLESS OTHERWISE SPECIFIED:		
FRACTIONS $\pm .005$		
DECIMALS $\pm .005$		
ANGLES $\pm .005$		
FINISHES UNLESS OTHERWISE SPECIFIED:		
ALL DIMENSIONS IN INCHES		

TITLE:
Spring Plate

SHEET NO. **B** DWG. NO. **F-1** REV

SCALE: 1:2 WEIGHT: SHEET 1 OF 1



PROPRIETARY AND CONFIDENTIAL
 THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF HERBERT COMPANY MACHINERY, AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE WRITTEN PERMISSION OF HERBERT COMPANY MACHINERY. © 2010

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DESIGNED & PREPARED BY	FOR EXAMINER	DESIGNED	
DRAWN BY	APPROVED BY	BID APPR.	
ANALYZED BY	TESTED BY	WGT APPR.	
QUANTITY	TO SERVICE	QA	
MATERIAL	COMMENTS:		
DATE		ALL DIMENSIONS IN INCHES	
APP. NO.	DATE	SCALE: 1:2	WEIGHT:
TITLE: Gusset		SHEET: B	DWG. NO. F-2
			REV
			SHEET 1 OF 1