



seaperch

COURSE BUILD
2021 SEASON



Full Competition Course – Introduction

2021 SeaPerch SeaSeason

www.seaperch.org

For the 2021 season, we will be continuing with the same Waterway Cleanup theme and competition courses from the 2020 season that was cut short. Similar to past seasons, this year's competition will include two in-pool components: an obstacle course and a challenge course.

The Obstacle Course tests high-speed maneuverability and requires your SeaPerch to navigate the course as quickly as possible. The SeaPerch operator must develop the skill to turn and adjust the vertical position (dive or ascend) while driving in full or near full speed and must also be able to quickly reverse the SeaPerch to make corrections if it is off course. Please note there is no guarantee of the position of the obstacle course hoops at competitions, so operators should not try to memorize actions such as in playing a video game but should instead practice a variety of general high-speed maneuvers.

The Mission Course will incorporate a mission that teams must complete with their SeaPerch related to Waterway Cleanup.

In **Mission: Waterway Cleanup**, SeaPerch teams will be asked to assist with cleanup efforts in a particularly polluted waterway. Teams must disarm and secure underwater mines, remove trash floating on the water's surface, and dispose of submerged waste in an underwater vault. Specific technical challenges will include:

1. **The Active Mine:** A simulated active mine is submerged in the water and must be disarmed. The mine can be disarmed by rotating the arming device affixed to the mine. Additional points can be obtained by removing the arming device and disposing it on a platform in the vault. *(Please note, while we hope that this year's challenge will be "explosive," there will be no actual explosive materials used in the challenge.)*
2. **The Disposal Vault:** A disposal vault will be used to dispose of sunken trash, unexploded mines, and the active mine arming device. Specific tasks will include:
 - a. **Opening the Vault:** The vault will be closed at the start of the challenge must be opened by rotating a latch.
 - b. **Closing the Vault:** The disposal vault can be closed by hooking an unexploded mine onto the vault gate's closing arm. Additional points can be obtained by latching the gate after it is closed.
3. **The "Garbage Patch":** A debris field containing multiple pieces of floating trash will be confined by a floating containment ring. The trash must be removed from this ring and transported to the pool deck.
4. **Sunken Waste:** A platform will contain sunken trash and unexploded mines simulated by weighted balls with rope loops. Waste must be removed from the platform and transported to the disposal vault. Waste can be deposited on the disposal platform (without entering the vault) or released into the disposal vault for additional points.

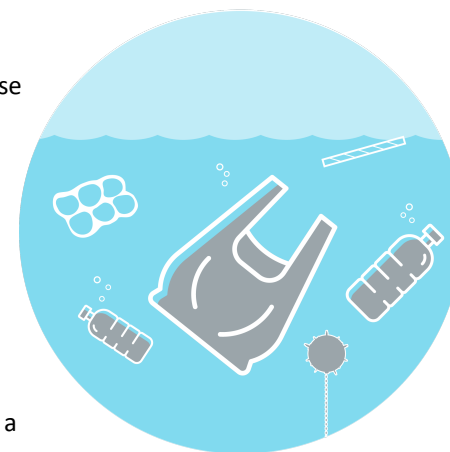


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2021 SeaPerch SeaSeason

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Drawing Part Number	Item	Unit	Qty.	Est. Cost Each	Extended Cost	Suggested Vendor	Part Number	Vendor Link
Pool Floor Obstacle Course								
BA1	1/2" Sch 40PVC Elbow	Each	2	\$ 0.20	\$ 0.40	PVC Fittings Online	406-005	PVC Fittings Online
BC1	1/2" Sch 40 PVC Cross	Each	4	\$ 0.74	\$ 2.96	PVC Fitting Online	420-005	PVC Fittings Online
BB1	1/2" Sch 40 PVC Tee	Each	3	\$ 0.24	\$ 0.72	PVC Fittings Online	401-005	PVC Fittings Online
AA6	1/2" Sch 40 PVC Pipe X 6" Lg	Each	2	\$ 0.11	\$ 0.22	Local/Home Depot		Home Depot
AA24	1/2" Sch 40 PVC Pipe X 24" Lg	Each	10	\$ 0.44	\$ 4.40	Local/Home Depot		Home Depot
AA12	1/2" Sch 40 PVC Pipe X 12" Lg	Each	9	\$ 0.22	\$ 1.98	Local/Home Depot		Home Depot
EA24	#4 Rebar (1/2" Dia.) X 24" Lg	Each	4	\$ 2.25	\$ 9.00	Local/Home Depot	106151	Home Depot
DA1	#8 X 1/2" Stainless Steel Flanged Head Self-Tapping Screw	Each	42	\$ 0.06	\$ 2.52	McMaster	90286A194	McMaster Carr
Suspended Obstacle Course								
BD1	3/4" X 1/2" Sch 40 PVC Reducing Bushing	Each	5	\$ 0.20	\$ 1.00	PVC Fittings Online	437-101	PVC Fittings Online
BH2	3/4" Formufit 5-Way PVC Furniture Grade Cross	Each	5	\$ 2.09	\$ 10.45			PVC Fittings Online
AA12	1/2" Sch 40 PVC Pipe X 12" Lg	Each	3	\$ 0.22	\$ 0.66	Local/Home Depot		Home Depot
AA24	1/2" Sch 40 PVC Pipe X 24" Lg	Each	2	\$ 0.44	\$ 0.88	Local/Home Depot		Home Depot
AB48	3/4" Sch 40 PVC Pipe X 48" Lg	Each	4	\$ 1.08	\$ 4.34	Local/Home Depot		Home Depot
AB36	3/4" Sch 40 PVC Pipe X 36" Lg	Each	10	\$ 0.81	\$ 8.13	Local/Home Depot		Home Depot
DA2	#8 X 5/8" Stainless Steel Flanged Head Self-Drilling Screw	Each	28	\$ 0.07	\$ 1.96	McMaster Carr	90822A345	McMaster Carr
Obstacle Course Hoops (per hoop)								
BB1	1/2" Sch 40 PVC Tee	Each	1	\$ 0.24	\$ 0.24	PVC Fittings Online	401-005	PVC Fittings Online
AA1	1/2" Sch 40 PVC Pipe X 1" Lg	Each	2	\$ 0.02	\$ 0.04	Local/Home Depot		Home Depot
AAP57	1/2" PEX Tubing (Red) X 57" Lg	Each	1	\$ 1.82	\$ 1.82	Local/Home Depot	1004706347	Home Depot
DA2	#8 X 5/8" Stainless Steel Flanged Head Self-Drilling Screw	Each	2	\$ 0.07	\$ 0.14	McMaster Carr	90822A345	McMaster Carr
2019 Mission Course Reconfiguration								
BL2	1" X 1/2" Sch 40 PVC Reducer Coupling	Each	2	\$ 0.81	\$ 1.62	PVC Fittings Online	429-130	PVC Fittings Online
BF1	1/2" Sch 40 PVC Snap-on Saddle Tee	Each	2	\$ 0.44	\$ 0.88	PVC Fittings Online	463-005	PVC Fittings Online
BA1	1/2" Sch 40 PVC Elbow	Each	4	\$ 0.20	\$ 0.80	PVC Fittings Online	406-005	PVC Fittings Online
BC1	1/2" Sch 40 PVC Cross	Each	2	\$ 0.74	\$ 1.48	PVC Fitting Online	420-005	PVC Fittings Online
AA2	1/2" Sch 40 PVC Pipe X 2" Lg	Each	1	\$ 0.46	\$ 0.46	Local/Home Depot		Home Depot
AA18	1/2" PVC Sch 40 Pipe X 18" Lg	Each	2	\$ 0.33	\$ 0.66	Local/Home Depot		Home Depot
AA28	1/2" PVC Sch 40 Pipe X 28" Lg	Each	2	\$ 0.51	\$ 1.03	Local/Home Depot		Home Depot
AA36	1/2" Sch 40 PVC Pipe X 36" Lg	Each	2	\$ 0.66	\$ 1.32	Local/Home Depot		Home Depot
AC12	1" Sch 40 PVC Pipe X 12" Lg	Each	2	\$ 0.40	\$ 0.79	Local/Home Depot		Home Depot
Ropes (Qty is per rope assembly)								
G3	5/16" X 3" Spring Link Carabiner	Each	2	\$ 0.98	\$ 1.96	Home Depot	1001280784	Home Depot
C8	8" Cable Tie (Buy per total qty needed)	Each	2	\$ 0.02	\$ 0.04	Local/Home Depot	748726	
H1	5/32" Polypropylene Diamond Braid Rope, 9'	Ft	9	\$ 0.05	\$ 0.41	Home Depot	285501	Home Depot

Drawing Part Number	Item	Unit	Qty.	Est. Cost Each	Extended Cost	Suggested Vendor	Part Number	Vendor Link
Disposal Platform								
F36x36	Polypropylene Sheet, .157 Thk, 36.0" X 36.0"	Each	1	\$ 6.99	\$ 6.99	Home Depot	527147	Home Depot
BF3	1" Sch 40 PVC Snap-on Saddle Tee	Each	1	\$ 0.93	\$ 0.93	PVC Fittings Online	463-010	Home Depot
BD2	1" X 1/2" PVC Reducing Bushing	Each	1	\$ 0.37	\$ 0.37	PVC Fittings Online	437-130	PVC Fittings Online
AC24	1" Sch 40 PVC Pipe X 24" Lg	Each	1	\$ 0.79	\$ 0.79	Local/Home Depot		PVC Fittings Online
AA20.75	1/2" Sch 40 PVC Pipe X 20.75" Lg	Each	1	\$ 0.38	\$ 0.38	Local/Home Depot		Home Depot
C8	8" Cable Tie (Buy per total qty needed)	Each	13	\$ 0.02	\$ 0.26	Local/Home Depot	748726	
Waste Platform								
F36x36	Polypropylene Sheet, .157 Thk, 36.0" X 36.0"	Each	1	\$ 6.99	\$ 6.99	Home Depot	527147	Home Depot
BF3	1" Sch 40 PVC Snap-on Saddle Tee	Each	1	\$ 0.93	\$ 0.93	PVC Fittings Online	463-010	Home Depot
AC52	1" Sch40 PVC Pipe X 52.0"	Each	2	\$ 1.72	\$ 3.44	Local/Home Depot		PVC Fittings Online
C8	8" Cable Tie (Buy per total qty needed)	Each	12	\$ 0.02	\$ 0.24	Local/Home Depot	748726	
Platform Frame (2 per lane)								
BB3	1" Sch 40 PVC Tee (DURA)	Each	8	\$ 0.51	\$ 4.08	PVC Fittings Online		PVC Fittings Online
AC16.5	1" Sch 40 PVC Pipe X 16.5" Lg	Each	12	\$ 0.55	\$ 6.55	Local/Home Depot		Home Depot
DA2	#8 X 5/8" Stainless Steel Flanged Head Self-Drilling Screw	Each	20	\$ 0.07	\$ 1.43	McMaster Carr	90822A345	McMaster Carr
Active Mine Arming Device								
BC4	1-1/4" Sch 40 PVC Cross (try to find the Dura brand locally)	Each	1	\$ 2.02	\$ 2.02	PVC Fittings Online	420-012	PVC Fittings Online
M12	12mm Diameter X 3.0mm Thick Neodymium Magnet	Each	3	\$ 0.71	\$ 2.14	Amazon		Amazon
Beacon Assembly (Does not include circuit components)								
BC2R	3/4" Sch 40 PVC Coupler	Each	1	\$ 0.18	\$ 0.18	PVC Fittings Online	429-007	PVC Fittings Online
BC2P	3/4" Sch 40 PVC Cap	Each	1	\$ 0.21	\$ 0.21	PVC Fittings Online	447-007	PVC Fittings Online
BA1	1/2" Sch 40 PVC Elbow	Each	1	\$ 0.20	\$ 0.20	PVC Fittings Online	406-005	PVC Fittings Online
BF1	1/2" PVC Sch 40 Snap-on Saddle Tee	Each	1	\$ 0.44	\$ 0.44	PVC Fittings Online	463-005	Home Depot
BD2	1" X 1/2" Sch 40 PVC Reducing Bushing	Each	1	\$ 0.37	\$ 0.37	PVC Fittings Online	437-130	PVC Fittings Online
BD3	1" X 3/4" Sch 40 PVC Reducing Bushing	Each	1	\$ 0.37	\$ 0.37	PVC Fitting Online	437-131	Home Depot
BK3	1" Spears PVC Compression Coupling S110-10	Each	1	\$ 4.74	\$ 4.74	PVC Fittings Online		PVC Fittings Online
AB4C	3/4" Sch 40 CLEAR PVC Pipe 4" Lg (see Beacon Guide for options)	Each	1	\$ 0.74	\$ 0.74	PVC Fittings Online		Home Depot
AA3	1/2" Sch 40 PVC Pipe X 3" Lg	Each	1	\$ 0.06	\$ 0.06	Local/Home Depot		PVC Fittings Online
AA2	1/2" Sch 40 PVC Pipe X 2" Lg	Each	1	\$ 0.04	\$ 0.04	Local/Home Depot		PVC Fittings Online
AB8	3/4" Sch 40 PVC Pipe X 8" Lg	Each	1	\$ 0.41	\$ 0.41	Local/Home Depot		PVC Fittings Online
AAP10	1/2" PEX Pipe X 10" Lg	Each	1	\$ 0.32	\$ 0.32	Local/Home Depot	1004706347	Home Depot

Drawing Part Number	Item	Unit	Qty.	Est. Cost Each	Extended Cost	Suggested Vendor	Part Number	Vendor Link
Vault								
F18x19	Polypropylene Sheet, .157 Thk, 18.0" X 19.0" (can use 18" x 18")	Each	1	\$ 5.98	\$ 5.98	Home Depot	628843	Home Depot
C8	8" Cable Tie (Buy per total qty needed)	Each	6	\$ 0.02	\$ 0.12	Local/Home Depot	748726	
Vault Hoop								
BC1	1/2" Sch 40 PVC Cross	Each	1	\$ 0.74	\$ 0.74	PVC Fitting Online	420-005	Home Depot
BL1	3/4" X 1/2" Sch 40 PVC Reducing Coupling	Each	1	\$ 0.30	\$ 0.30	PVC Fitting Online	429-101	Home Depot
BD3	1" X 3/4" Sch 40 PVC Reducing Bushing	Each	1	\$ 0.37	\$ 0.37	PVC Fitting Online	437-131	Home Depot
AB18	3/4" Sch 40 PVC Pipe X 18" Lg	Each	1	\$ 0.41	\$ 0.41	Local/Home Depot		PVC Fittings Online
AA2	1/2" Sch 40 PVC Pipe X 2" Lg	Each	2	\$ 0.04	\$ 0.07	Local/Home Depot		PVC Fittings Online
AA4	1/2" Sch 40 PVC Pipe X 4" Lg	Each	2	\$ 0.07	\$ 0.15	Local/Home Depot		PVC Fittings Online
AAP72	PEX Tubing (Red), 1/2" X 72" Lg	Each	1	\$ 2.27	\$ 2.27	Local/Home Depot	1004706347	Home Depot
DA2	#8 X 5/8" Stainless Steel Flanged Head Self-Drilling Screw	Each	8	\$ 0.07	\$ 0.57	McMaster Carr	90822A345	McMaster Carr
Vault Gate Frame								
BA1	1/2" Sch 40 PVC Elbow	Each	6	\$ 0.20	\$ 1.20	PVC Fittings Online	406-005	Home Depot
BB1	1/2" Sch 40 PVC Tee	Each	3	\$ 0.24	\$ 0.72	PVC Fittings Online	401-005	PVC Fittings Online
BG1	1/2" PVC Furniture Grade Sling Tee	Each	3	\$ 1.90	\$ 5.70	PVC Fittings Online		Home Depot
BC1R	1/2" Sch 40 PVC Coupler	Each	1	\$ 0.14	\$ 0.14	PVC Fittings Online	429-005	PVC Fittings Online
AA1.5	1/2" Sch 40 PVC Pipe X 1.5" Lg	Each	2	\$ 0.33	\$ 0.66	Local/Home Depot		PVC Fittings Online
AA2.5	1/2" Sch 40 PVC Pipe X 2.5" Lg	Each	3	\$ 0.05	\$ 0.14	Local/Home Depot		Home Depot
AA2.75	1/2" Sch 40 PVC Pipe X 2.75" Lg	Each	1	\$ 0.05	\$ 0.05	Local/Home Depot		Home Depot
AA3	1/2" Sch 40 PVC Pipe X 3" Lg	Each	1	\$ 0.06	\$ 0.06	Local/Home Depot		Home Depot
AA4	1/2" Sch 40 PVC Pipe X 4" Lg	Each	1	\$ 0.07	\$ 0.07	Local/Home Depot		Home Depot
AA4.25	1/2" Sch 40 PVC Pipe X 4.25" Lg	Each	2	\$ 0.16	\$ 0.31	Local/Home Depot		Home Depot
AA17	1/2" Sch 40 PVC Pipe X 17" Lg	Each	2	\$ 0.31	\$ 0.62	Local/Home Depot		Home Depot
AA3R	1/2" Sch 40 PVC Pipe X 3" Lg (Red) (can use plain pipe and paint or tape)	Each	1	\$ 0.37	\$ 0.37	Home Depot	P001FGP-RD-5	PVC Fittings Online
DA2	#8 X 5/8" Stainless Steel Flanged Head Self-Drilling Screw	Each	5	\$ 0.07	\$ 0.36	McMaster Carr	90822A345	McMaster Carr
Gate Closing Arm								
BF1	1/2" PVC Sch 40 Snap-on Saddle Tee	Each	1	\$ 0.44	\$ 0.44	PVC Fittings Online	463-005	PVC Fittings Online
BA1	1/2" Sch 40 PVC Elbow	Each	2	\$ 0.20	\$ 0.40	PVC Fittings Online	406-005	Home Depot
AA1.5	1/2" Sch 40 PVC Pipe X 1.5" Lg	Each	1	\$ 0.03	\$ 0.03	Local/Home Depot		Home Depot
AA7	1/2" Sch 40 PVC Pipe X 7" Lg	Each	1	\$ 0.13	\$ 0.13	Local/Home Depot		PVC Fittings Online
DA2	#8 X 5/8" Stainless Steel Flanged Head Self-Drilling Screw	Each	4	\$ 0.07	\$ 0.29	McMaster Carr	90822A345	McMaster Carr

Drawing Part Number	Item	Unit	Qty.	Est. Cost Each	Extended Cost	Suggested Vendor	Part Number	Vendor Link
Garbage Patch Ring								
BB1	1/2" Sch 40 PVC Tee	Each	2	\$ 0.24	\$ 0.48	PVC Fittings Online	401-005	PVC Fittings Online
BC1	1/2" Sch 40 PVC Cross	Each	3	\$ 0.74	\$ 2.22	PVC Fitting Online	420-005	PVC Fittings Online
AAP76.0	1/2" PEX Pipe X 76" Lg	Each	2	\$ 2.43	\$ 4.86	Local/Home Depot	1004706347	Home Depot
AA1	1/2" Sch 40 PVC Pipe 1" Lg	Each	4	\$ 0.02	\$ 0.07	Local/Home Depot		Home Depot
AA12	1/2" Sch 40 Pipe X 12" Lg	Each	2	\$ 0.07	\$ 0.14	Local/Home Depot		Home Depot
DA2	#8 X 5/8" Stainless Steel Flanged Head Self-Drilling Screw	Each	6	\$ 0.07	\$ 0.43	McMaster Carr	90822A345	McMaster Carr
C8	8" Cable Tie (Buy per total qty needed)	Each	3	\$ 0.02	\$ 0.06	Local/Home Depot	748726	
N2.5	Float, 2.5" Dia. X 2.5" Lg (Pool Noodle)	Each	1			Buy Locally		
N2	Float, 2.5" Dia. X 2" Lg (Pool Noodle)	Each	2			Buy Locally		
Weighted Wiffle Ball (each)								
W2.86	2.86 DIA. Wiffle Ball	Each	1	\$ 0.78	\$ 0.78	Amazon or Conn Store	Connecticut Store	Amazon
W3.86	3.75 to 3.86 DIA. Wiffle Ball	Each	1	\$ 0.80	\$ 0.80	Amazon or Conn Store	Connecticut Store	Amazon
P1	1/4" X 1.5" Dia. X .055" Thk. Stainless Steel Fender Washer	Each	6	\$ 0.22	\$ 1.33	McMaster or Amazon	McMaster	Amazon
H2	1/4 in. x 14" Polypropylene Twist Rope, Yellow	Each	1	\$ 0.48	\$ 0.48	Home Depot		Home Depot
C8	8" Cable Tie (Buy per total qty needed)	Each	5	\$ 0.02	\$ 0.10	Local/Home Depot	748726	

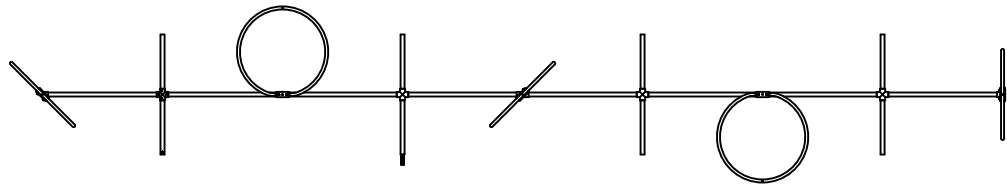
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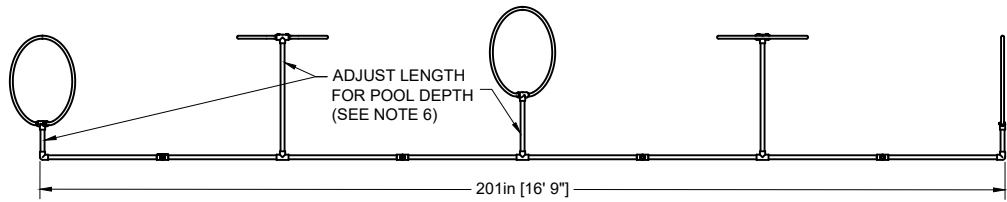
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1

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	2	BA1	1/2" SCH 40PVC ELBOW	PVC-PIPING
2	2	AA6	1/2" SCH 40 PVC PIPE X 6" LG	PVC-PIPING
3	10	AA24	1/2" SCH 40 PVC PIPE X 24" LG	PVC-PIPING
4	4	BC1	1/2" SCH 40 PVC CROSS	PVC-PIPING
5	3	BB1	1/2" SCH 40 PVC TEE	PVC-PIPING
6	9	AA12	1/2" SCH 40 PVC PIPE X 12" LG	PVC-PIPING
7	4	EA24	#4 REBAR (.5" DIA.) X 24" LG	STEEL
8	42	DA1	FLANGED HEX HEAD NO 8 SHEET METAL SCREW (MCMASTER 90286A194)	STAINLESS STEEL
9	3		OBSTACLE COURSE VERTICAL HOOP ASSEMBLY	
10	2		OBSTACLE COURSE HORIZONTAL HOOP ASSEMBLY	

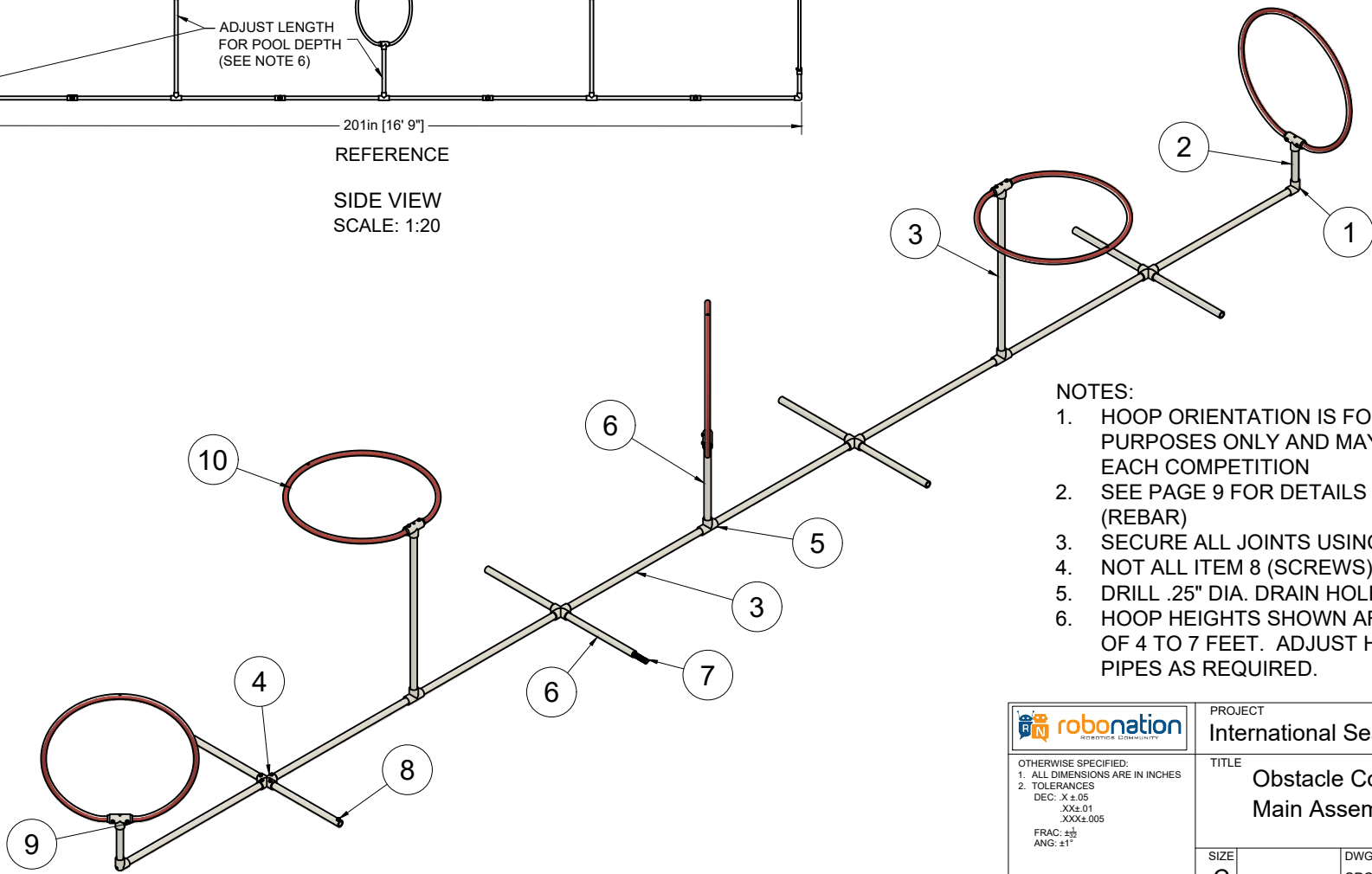


TOP VIEW
SCALE: 1:20



REFERENCE

SIDE VIEW
SCALE: 1:20



NOTES:

1. HOOP ORIENTATION IS FOR ILLUSTRATIVE PURPOSES ONLY AND MAY BE DIFFERENT AT EACH COMPETITION
2. SEE PAGE 9 FOR DETAILS ON SECURING ITEM 7 (REBAR)
3. SECURE ALL JOINTS USING ITEM 8
4. NOT ALL ITEM 8 (SCREWS) SHOWN IN DRAWING
5. DRILL .25" DIA. DRAIN HOLE IN ITEM 1
6. HOOP HEIGHTS SHOWN ARE FOR POOL DEPTHS OF 4 TO 7 FEET. ADJUST HOOP CONNECTING PIPES AS REQUIRED.



PROJECT
International SeaPerch Challenge

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ±.05
XXX: .01
XXX±.005
FRAC: 1/16
ANG: ±1°

TITLE
Obstacle Course - Floor
Main Assembly

SIZE C	DWG NO SPCXX-F-Obstacle-01	REV
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DATE 10/13/18	SCALE 1:10	SHEET 1/2
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4

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2

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3

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D

D

C

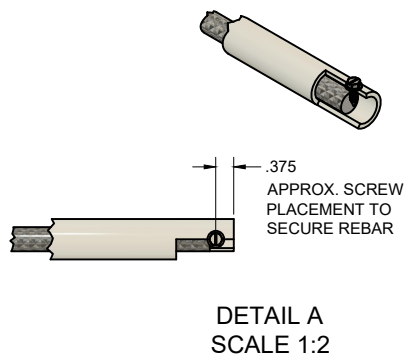
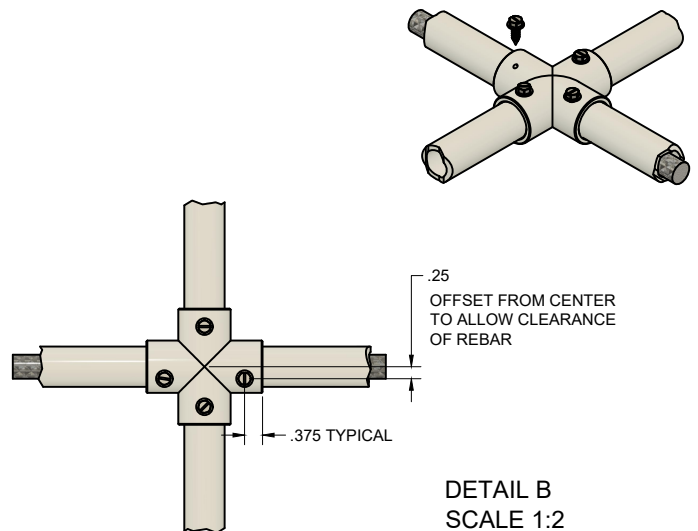
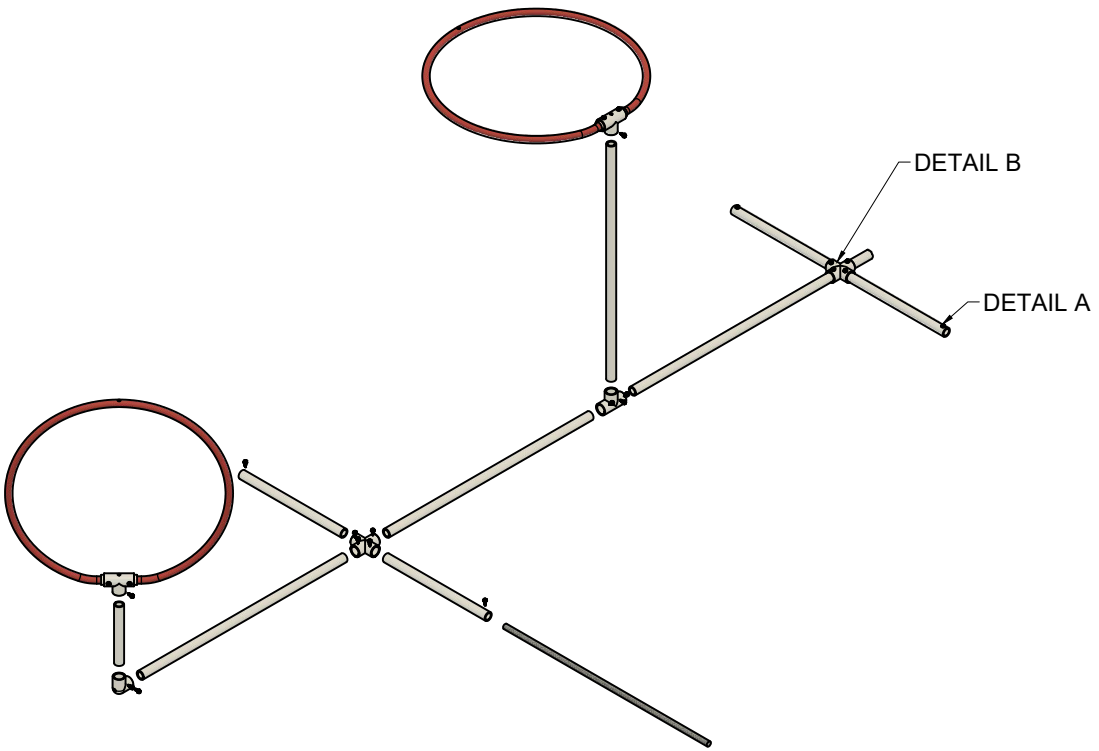
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B

B

A

A



robonation
ROBOTS IN SCHOOLS

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: $X \pm .05$
XXX: $.01$
XXX: $\pm .005$
FRAC: $\frac{1}{16}$
ANG: $\pm 1^\circ$

PROJECT
International SeaPerch Challenge

TITLE
Obstacle Course - Floor
Main Assembly Details

SIZE C	DWG NO SPCXX-F-Obstacle-01	REV
DATE 10/30/18	SCALE 1:8	SHEET 2/2

4

3

2

1

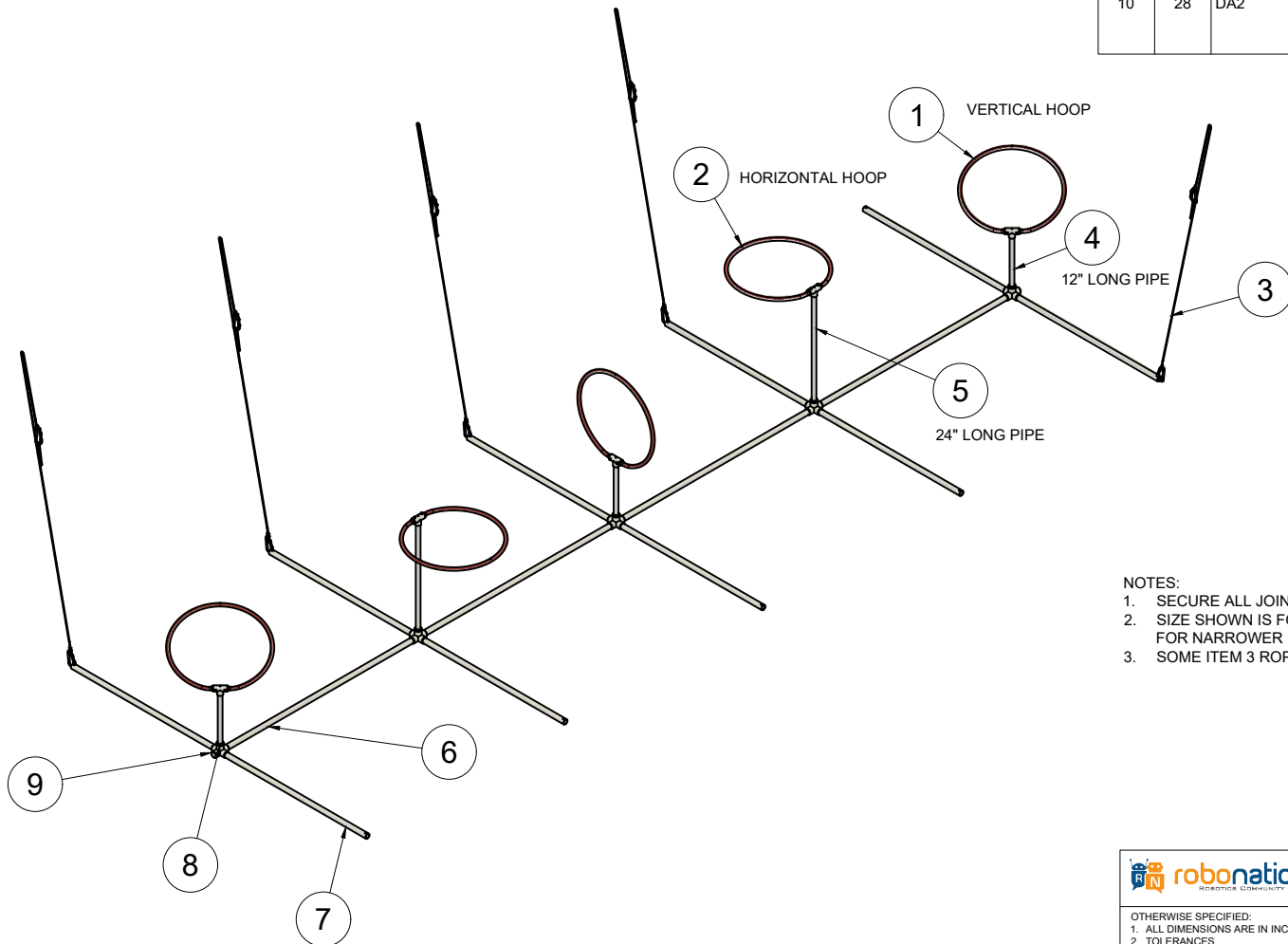
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3


2

1

REFERENCE	PARTS LIST				
	ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
Page 13	1	3		OBSTACLE COURSE VERTICAL HOOP ASSEMBLY	
Page 14	2	2		OBSTACLE COURSE HORIZONTAL HOOP ASSEMBLY	
Page 20	3	10		SUSPENSION ROPE ASSEMBLY	
	4	3	AA12	PVC SCH 40 PIPE, 1/2" X 12" LG	PVC-PIPING
	5	2	AA24	1/2" SCH 40 PVC PIPE X 24" LG	PVC-PIPING
	6	4	AB48	3/4" SCH 40 PVC PIPE X 48" LG	PVC-PIPING
	7	10	AB36	3/4" SCH 40 PVC PIPE X 36" LG	PVC-PIPING
	8	5	BD1	3/4" X 1/2" SCH 40 PVC REDUCING BUSHING	PVC-PIPING
	9	5	BH2	3/4" FORMUFIT 5-WAY PVC CROSS	PVC-PIPING
	10	28	DA2	#8 X 5/8" STAINLESS STEEL FLANGED HEAD SELF-DRILLING SCREW	STAINLESS STEEL



- NOTES:
1. SECURE ALL JOINTS USING ITEM 10 SCREWS (NOT SHOWN).
 2. SIZE SHOWN IS FOR 6' TO 9' WIDE LANES. ADJUST LENGTH OF ITEM 7 PIPES FOR NARROWER LANES.
 3. SOME ITEM 3 ROPES REMOVED FOR DRAWING CLARITY.

 <p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 XX: .01 XXX ±.005 FRAC: $\frac{1}{16}$ ANG: ±1°</p>	PROJECT International SeaPerch Challenge	
	TITLE Obstacle Course - Suspended Main Assembly	
SIZE C	DWG NO SPCXX-S-Obstacle-01	REV
DATE 9/7/19	SCALE 1:20	SHEET 1/3

4

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2

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2

1

D

D

C

C

B

B

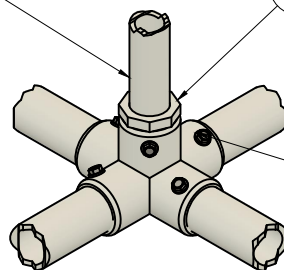
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A

HOOP SUPPORT PIPE

8

$\frac{3}{4}$ " x $\frac{1}{2}$ " REDUCING BUSHING



10

#8 X $\frac{5}{8}$ " FLANGED HEAD SEAL-DRILLING SCREWS

RECOMMENDED FRAME CONNECTION JOINT
SCALE: 1:2



3

SUSPENSION ROPE ASSEMBLY

SUSPENSION ROPE CONNECTION

7

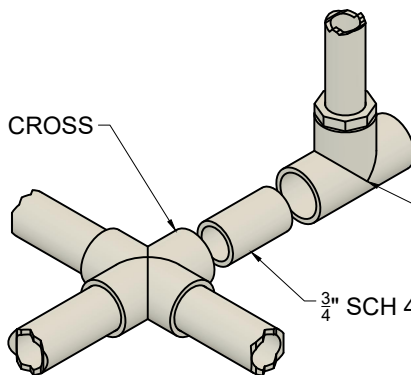
OUTRIGGER PIPES



DRILL $.375$ ($\frac{3}{8}$)
DIA. THRU TOP
WALL ONLY

CARABINER HOLE DETAILS
SCALE: 1:1


CROSS



TEE

$\frac{3}{4}$ " SCH 40 PVC PIPE X 1.75" LG

OPTIONAL JOINT MAKEUP REPLACING 5-WAY CROSS
(USING 5-WAY CROSSES REQUIRES FEWER PARTS
AND LESS TIME TO ASSEMBLE)
SCALE: 1:2

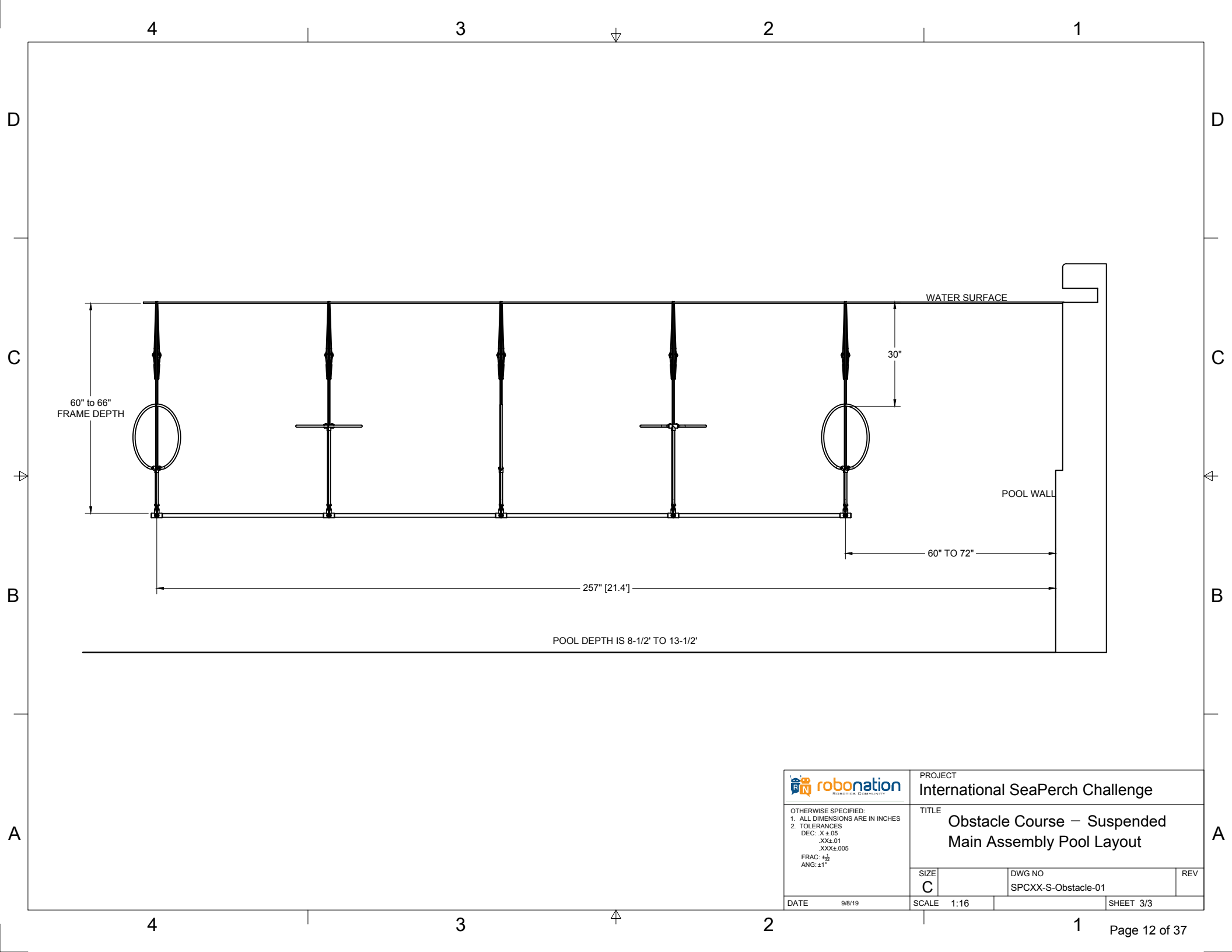
 <p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 XX: .01 XXX: ±.005 FRAC: $\pm\frac{1}{32}$ ANG: ±1°</p>	PROJECT International SeaPerch Challenge	
	TITLE Obstacle Course - Suspended Main Assembly Details	
DATE 9/8/19	SCALE 1:1	REV SHEET 2/3

4

3

2

1



60" to 66"
FRAME DEPTH

WATER SURFACE

30"

POOL WALL

60" TO 72"

257" [21.4']

POOL DEPTH IS 8-1/2' TO 13-1/2'



PROJECT
International SeaPerch Challenge

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: $\pm .05$
XXX: $\pm .01$
XXX: $\pm .005$
FRAC: $\pm \frac{1}{32}$
ANG: $\pm 1^\circ$

TITLE
Obstacle Course – Suspended
Main Assembly Pool Layout

SIZE C	DWG NO SPCXX-S-Obstacle-01	REV
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DATE 9/8/19	SCALE 1:16	SHEET 3/3
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4

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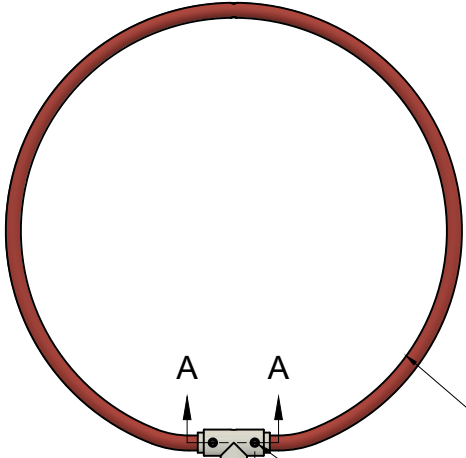
2

1

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	BB1	1/2" SCH 40 PVC TEE	PVC-PIPING
2	2	AA1	1/2" SCH 40 PVC PIPE X 1" LG	PVC-PIPING
3	1	AAP57	1/2" PEX TUBING (RED) X 57" LG	POLYETHYLENE, HIGH DENSITY
4	2	DA2	#8 X 5/8" STAINLESS STEEL FLANGED HEAD SELF-DRILLING SCREW	STAINLESS STEEL



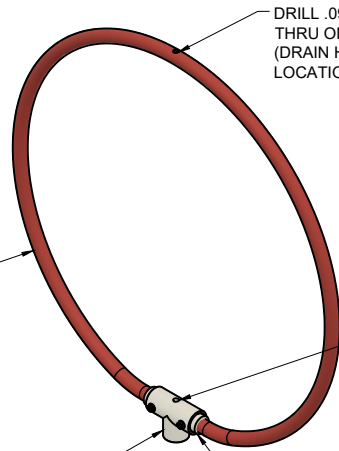
TOP VIEW



FRONT VIEW

.375 TYPICAL
(DRILL $\frac{3}{32}$ " PILOT
2 PLACES)

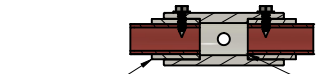
18" DIAMETER
(NOMINAL)



DRILL .09375 ($\frac{3}{32}$ ") DIA. HOLE
THRU ONE WALL ONLY
(DRAIN HOLE,
LOCATION NOT CRITICAL)

DRILL .25 DIA. HOLE
(DRAIN HOLE,
LOCATION NOT CRITICAL)

PEX PIPE SHOWN
FULLY INSERTED INTO
1" LONG PVC PIPE



SECTION A-A
SCALE 1:2

ITEM 3 (PEX PIPE)
FULLY INSERTED IN
ITEM 2 (1" LONG PVC
PIPE)

EXPLODED ASSEMBLY
DETAIL
SCALE 1:2

NOTES:

1. PEX PIPE MAY NOT SLIDE EASILY INTO PVC PIPE. PVC PIPE CAN BE DRILLED USING .625 DIA DRILL BIT.



OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ±.05
XX: .01
XXX: .005
FRAC: $\frac{+}{-}$
ANG: ±1°

PROJECT
International SeaPerch Challenge

TITLE
Obstacle Course
Vertical Hoop Assembly

SIZE C	DWG NO SPCXX-U-Obstacle-02	REV
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DATE 10/22/18	SCALE 1:4	SHEET 1/1
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4

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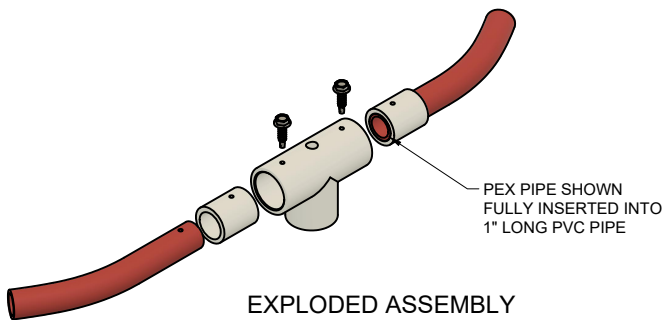
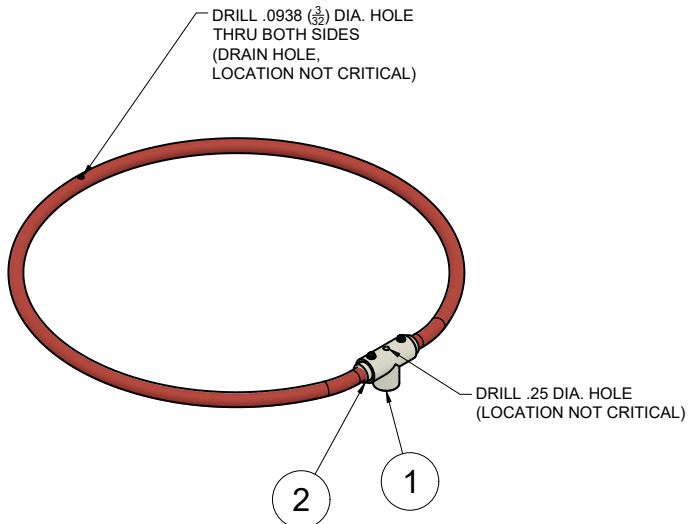
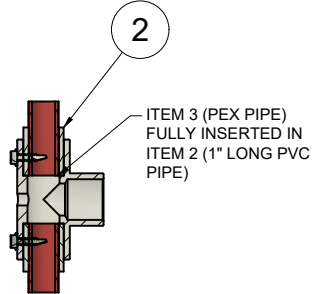
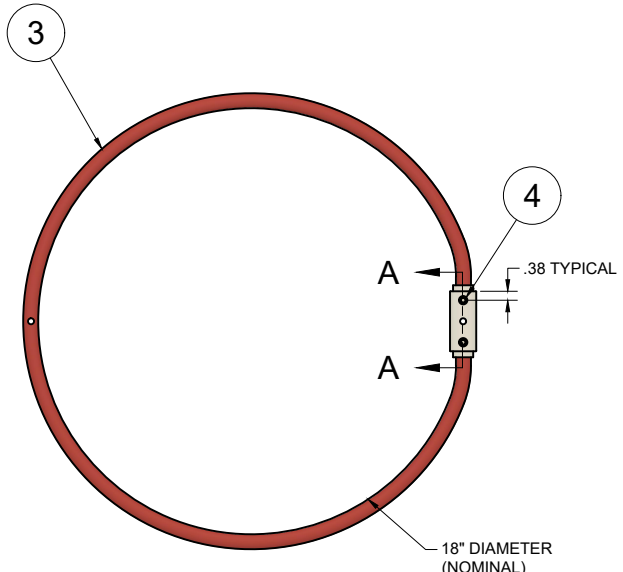
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3

2

1

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	BB1	1/2" SCH 40 PVC TEE	PVC-PIPING
2	2	AA1	1/2" SCH 40 PVC PIPE X 1" LG	PVC-PIPING
3	1	AAP57	1/2" PEX TUBING (RED) X 57" LG	POLYETHYLENE, HIGH DENSITY
4	4	DA2	#8 X 5/8" STAINLESS STEEL FLANGED HEAD SELF-DRILLING SCREW	STAINLESS STEEL



NOTES:
1. PEX PIPE MAY NOT SLIDE EASILY INTO PVC PIPE. PVC PIPE CAN BE DRILLED USING .625 DIA DRILL BIT.

robonation
ROBOTIC EDUCATION

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ±.05
 XX: .01
 XXX: ±.005
FRAC: $\frac{+}{-}$
ANG: ±1°

PROJECT International SeaPerch Challenge		
TITLE Obstacle Course Horizontal Hoop Assembly		
SIZE C	DWG NO SPCXX-U-Obstacle-03	REV
DATE 10/22/18	SCALE 1:2	SHEET 1/1

4

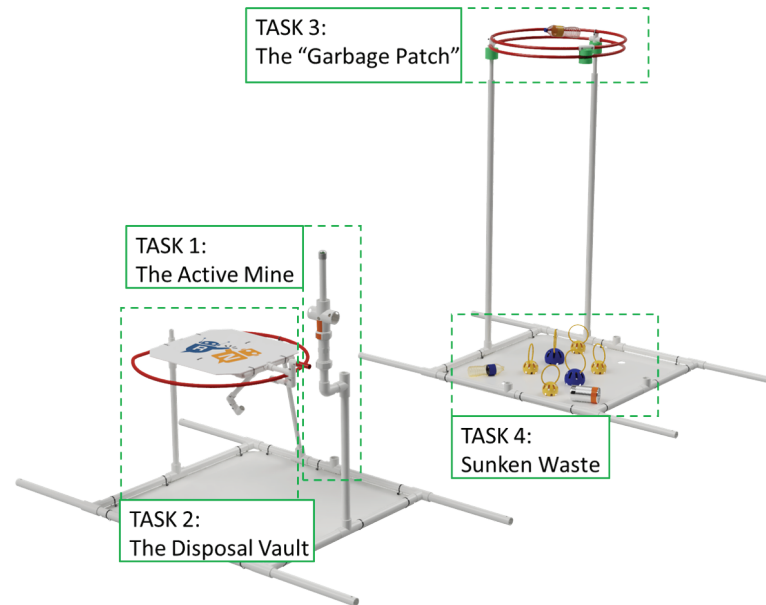
3

2

1

Mission Course Assembly

4. Course Build Engineering Drawings.....	8 - 37
4.2. <i>Mission Course Assembly.....</i>	<i>15 - 25</i>
- <i>Main Assembly.....</i>	<i>16 - 25</i>
> <i>Reconfiguring the 2019 Mission Course.....</i>	<i>17</i>
> <i>Suspended Assembly.....</i>	<i>18 - 20</i>
> <i>Task Platforms.....</i>	<i>21 - 25</i>
- <i>Task Assembly.....</i>	<i>26 - 37</i>
> <i>Task #1: Active Mine.....</i>	<i>26 - 30</i>
> <i>Task #2: Disposal Vault.....</i>	<i>31 - 35</i>
> <i>Task #3: Garbage Patch.....</i>	<i>36</i>
> <i>Task #4: Sunken Waste.....</i>	<i>37</i>



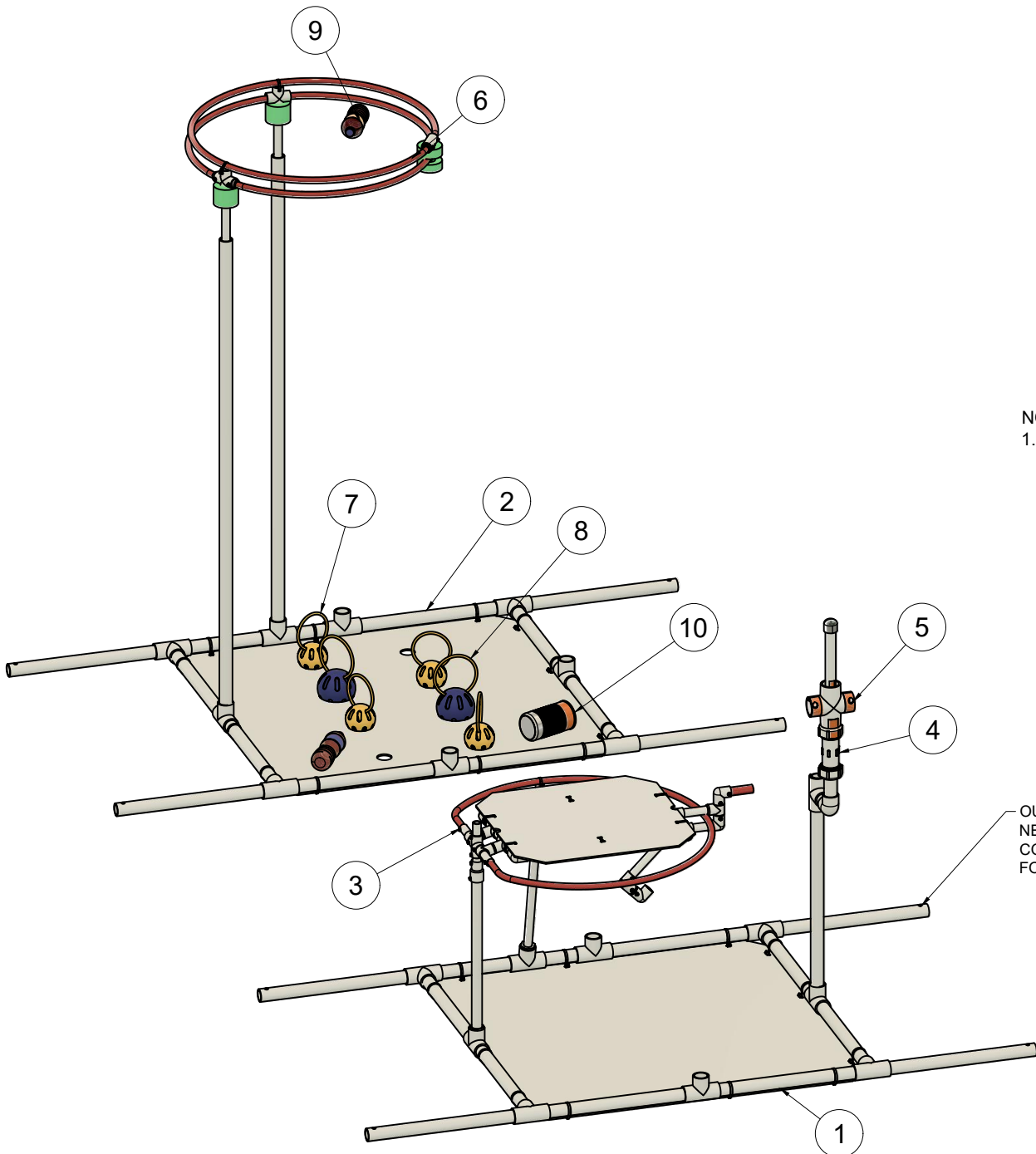
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2

1

PARTS LIST			
ITEM	QTY	REFERENCE	DESCRIPTION
1	1	Page 19	DISPOSAL PLATFORM ASSEMBLY
2	1	Page 20	WASTE PLATFORM ASSEMBLY
4	1	Page 29	DISPOSAL VAULT ASSEMBLY
5	1	Pages 24 - 28	ACTIVE MINE ASSEMBLY
6	1	Pages 24 & 25	ACTIVE MINE ARMING DEVICE ASSEMBLY
7	1	Page 34	GARBAGE PATCH RING ASSEMBLY
8	2	Page 35	MEDIUM SIZE MINE ASSEMBLY
9	4	Page 35	LARGE SIZE MINE ASSEMBLY
10	TBD		FLOATING DEBRIS
11	TBD		SUNKEN DEBRIS



NOTE:
 1. THE MISSION COURSE CAN BE USED ON THE POOL FLOOR OR SUSPENDED BY USING SUSPENSION ROPES (SEE PAGE 18)

OUT RIGGER PIPES NOT NEEDED IF MISSION COURSE IS CONFIGURED FOR USE ON POOL FLOOR.

	PROJECT International SeaPerch Challenge		
	TITLE Mission Course Main Assembly		
OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 .XX: .01 .XXX: ±.005 FRAC: ± $\frac{1}{16}$ ANG: ±1°	SIZE C	DWG NO SPC20-X-Mission-01	REV
DATE 9/8/19	SCALE 1:10	SHEET 1/3	

4

3

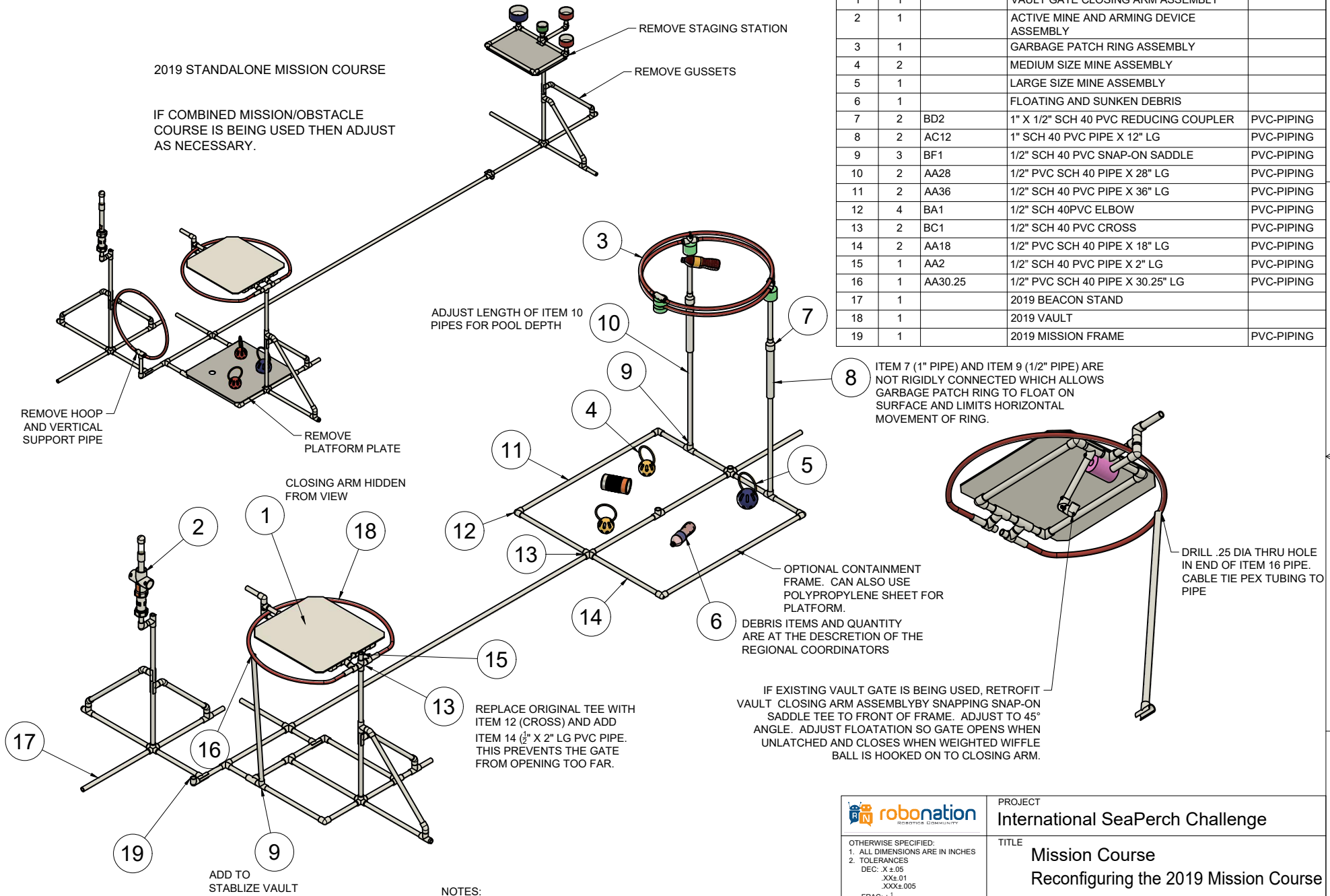
2

1

RECONFIGURING 2019 MISSION COURSE FOR 2020 MISSION

2019 STANDALONE MISSION COURSE

IF COMBINED MISSION/OBSTACLE COURSE IS BEING USED THEN ADJUST AS NECESSARY.



PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1		VAULT GATE CLOSING ARM ASSEMBLY	
2	1		ACTIVE MINE AND ARMING DEVICE ASSEMBLY	
3	1		GARBAGE PATCH RING ASSEMBLY	
4	2		MEDIUM SIZE MINE ASSEMBLY	
5	1		LARGE SIZE MINE ASSEMBLY	
6	1		FLOATING AND SUNKEN DEBRIS	
7	2	BD2	1" X 1/2" SCH 40 PVC REDUCING COUPLER	PVC-PIPING
8	2	AC12	1" SCH 40 PVC PIPE X 12" LG	PVC-PIPING
9	3	BF1	1/2" SCH 40 PVC SNAP-ON SADDLE	PVC-PIPING
10	2	AA28	1/2" PVC SCH 40 PIPE X 28" LG	PVC-PIPING
11	2	AA36	1/2" SCH 40 PVC PIPE X 36" LG	PVC-PIPING
12	4	BA1	1/2" SCH 40 PVC ELBOW	PVC-PIPING
13	2	BC1	1/2" SCH 40 PVC CROSS	PVC-PIPING
14	2	AA18	1/2" PVC SCH 40 PIPE X 18" LG	PVC-PIPING
15	1	AA2	1/2" SCH 40 PVC PIPE X 2" LG	PVC-PIPING
16	1	AA30.25	1/2" PVC SCH 40 PIPE X 30.25" LG	PVC-PIPING
17	1		2019 BEACON STAND	
18	1		2019 VAULT	
19	1		2019 MISSION FRAME	PVC-PIPING

- NOTES:
1. SECURING PIPE JOINTS WITH #8 X 1/2" OR 5/8" LONG SELF DRILLING STAINLESS STEEL SCREWS IS RECOMMENDED.

<p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ± .05 XX: .01 XXX: ± .005 FRAC: ± 1/32 ANG: ± 1°</p>	PROJECT International SeaPerch Challenge	
	TITLE Mission Course Reconfiguring the 2019 Mission Course	
DATE 9/10/19	SCALE 1:16	DWG NO SPC20-F-Mission-01
		REV SHEET 1/1

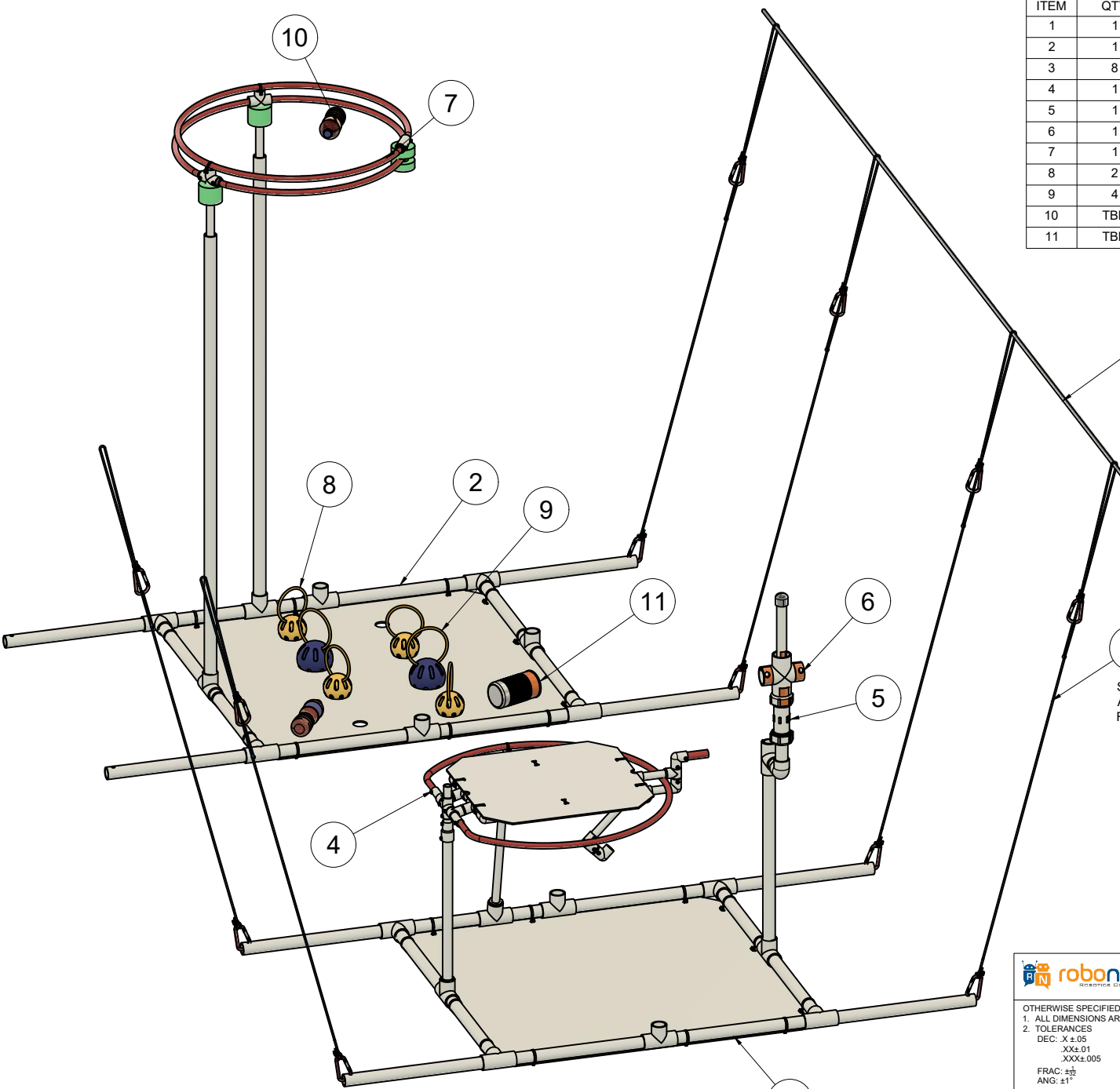
4

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1

PARTS LIST			
ITEM	QTY	REFERENCE	DESCRIPTION
1	1	Page 19	DISPOSAL PLATFORM ASSEMBLY
2	1	Page 20	WASTE PLATFORM ASSEMBLY
3	8	Page 18	SUSPENSION ROPES ASSEMBLY
4	1	Page 29	DISPOSAL VAULT ASSEMBLY
5	1	Pages 24 - 28	ACTIVE MINE ASSEMBLY
6	1	Pages 24 & 25	ACTIVE MINE ARMING DEVICE ASSEMBLY
7	1	Page 34	GARBAGE PATCH RING ASSEMBLY
8	2	Page 35	MEDIUM SIZE MINE ASSEMBLY
9	4	Page 35	LARGE SIZE MINE ASSEMBLY
10	TBD		FLOATING DEBRIS
11	TBD		SUNKEN DEBRIS



LANE DIVIDER CABLES
(LEFT SIDE CABLE REMOVED
FOR DRAWING CLARITY)

SOME SUSPENSION ROPE
ASSEMBLIES REMOVED
FOR DRAWING CLARITY

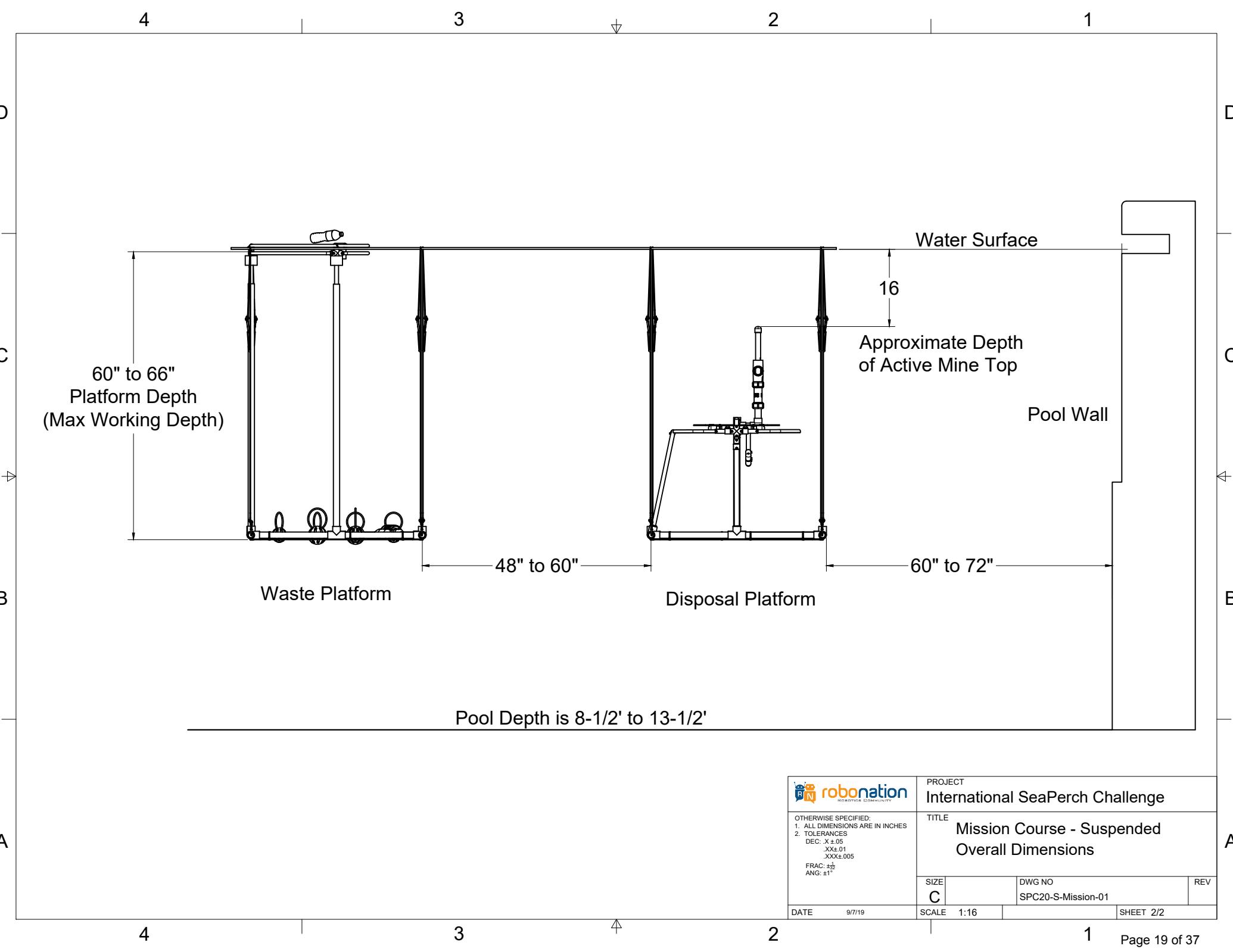
	PROJECT International SeaPerch Challenge		
	TITLE Mission Course - Suspended Main Assembly		
OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 .XX ±.01 .XXX ±.005 FRAC: $\frac{1}{16}$ ANG: ±1°	SIZE C	DWG NO SPC20-S-Mission-01	REV
DATE 9/8/19	SCALE 1:10	SHEET 1/2	

4

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2

1



60" to 66"
Platform Depth
(Max Working Depth)

Waste Platform

48" to 60"

Disposal Platform


16
Approximate Depth
of Active Mine Top

Water Surface

Pool Wall

60" to 72"

Pool Depth is 8-1/2' to 13-1/2'

		PROJECT	
		International SeaPerch Challenge	
OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 XX: .01 XXX: ±.005 FRAC: $\frac{1}{16}$ ANG: ±1°		TITLE	
		Mission Course - Suspended Overall Dimensions	
		SIZE	DWG NO
C	SPC20-S-Mission-01		
DATE	9/7/19	SCALE	1:16
		SHEET 2/2	

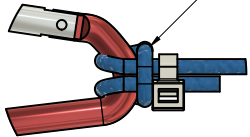
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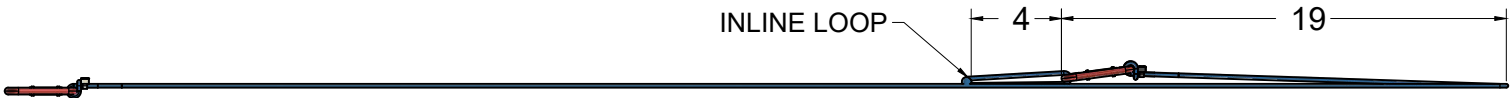
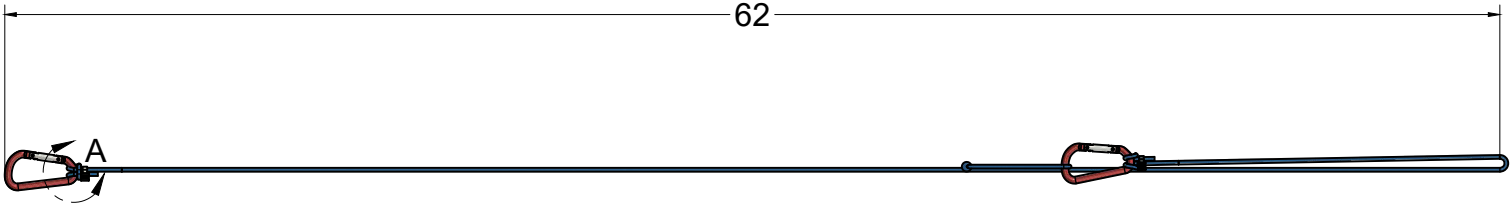
PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	2	G3	5/16" X 3" SPRING LINK CARABINER	ALUMINUM
2	2	C8	8" CABLE TIE	NYLON 6
3	1	H1	5/32" POLYPROPYLENE DIAMOND BRAID ROPE	POLYPROPYLENE



TIE ACCEPTABLE KNOT.
SECURE USING CABLE TIE.

DETAIL A
SCALE 1:1

ADJUST OVERALL LENGTH AS NECESSARY TO ACHIEVE
DESIRED PLATFORM DEPTH. THIS LENGTH SHOULD BE HELD
TO WITHIN .5" TO 1" BETWEEN ALL PLATFORM ROPES.



INLINE LOOP

THIS LENGTH IS NOT CRITICAL AND
VARIATIONS BETWEEN ROPE SETS ARE
ACCEPTABLE. THE OVERALL LENGTH
DETERMINES THE PLATFORM DEPTH.



OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ±.05
XX: .01
XXX: .005
FRAC: ± $\frac{1}{32}$
ANG: ±1°

PROJECT
International SeaPerch Challenge

TITLE
Mission Course - Suspended
Suspension Rope Assembly Details

SIZE C	DWG NO SPCXX-S-Mission-Ropes-01	REV
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DATE 8/30/19	SCALE 1:5	SHEET 1/1
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4

3

2

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4

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REFERENCE	ITEM	QTY	PART NUMBER	PARTS LIST	
				DESCRIPTION	MATERIAL
Page 23	1	1		PLATFORM FRAME ASSEMBLY	
Page 24	2	1	F36X36	POLYPROPYLENE SHEET, .157" THICK, 36" X 36"	POLYPROPYLENE
Page 31	3	1		VAULT ASSEMBLY	
Page 26	4	1		ACTIVE MINE ASSEMBLY	
Page 27	5	1		ACTIVE MINE ARMING DEVICE	
	6	1	AA24	1" SCH 40 PVC PIPE X 24" LG	PVC-PIPING
	7	1	BF3	1" SCH 40 PVC SNAP-ON SADDLE TEE	PVC-PIPING
	8	1	BD2	1" X 1/2" SCH 40 PVC REDUCING BUSHING	PVC-PIPING
	9	1	AA20.75	1/2" SCH 40 PVC PIPE X 20.75" LG	PVC-PIPING
	10	1	C8	8" CABLE TIE	NYLON 6
	11	12	C8	8" CABLE TIE	NYLON 6

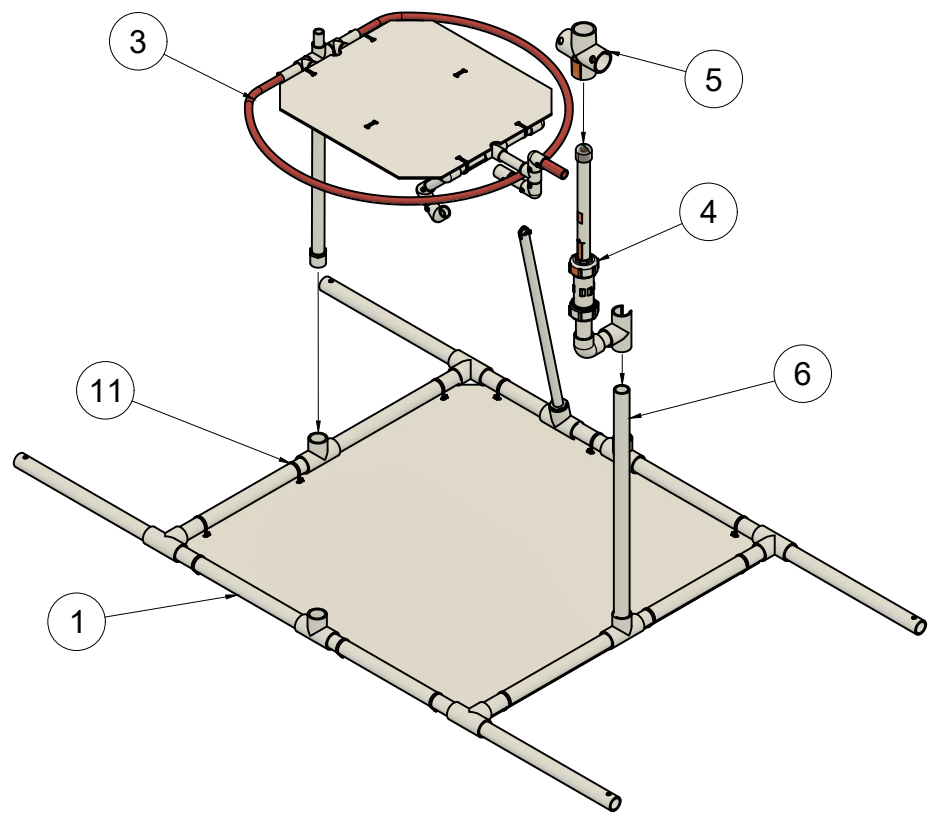
70 REF
39.5 REF


38 REF

TOP VIEW

23 REF

SIDE VIEW



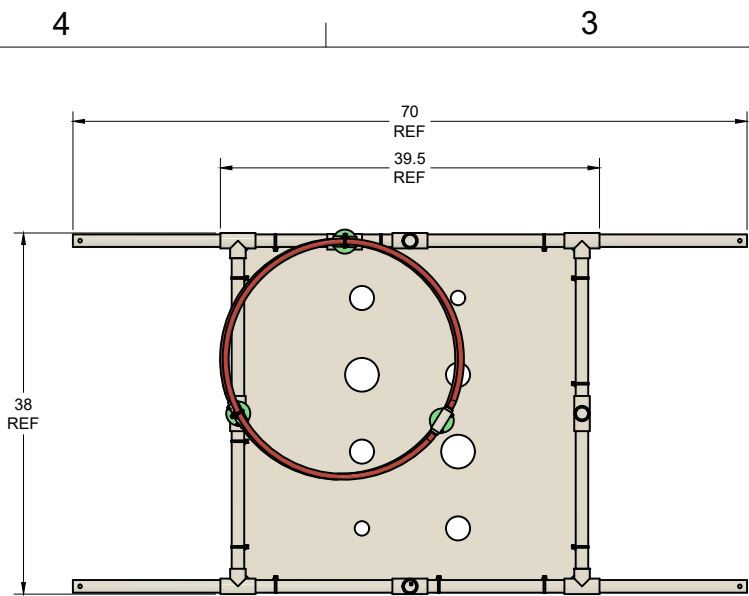
 <p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 XX: .01 XXX ±.005 FRAC: $\frac{1}{16}$ ANG: ±1°</p>	PROJECT International SeaPerch Challenge	
	TITLE Mission Course Disposal Platform Details	
SIZE C	DWG NO SPC20-U-Mission-01	REV
DATE 9/7/19	SCALE 1:8	SHEET 2/3

4

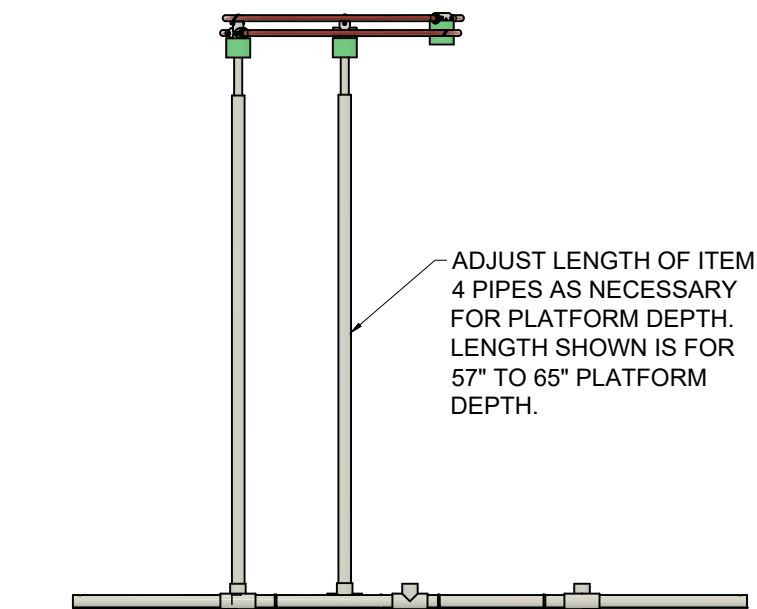
3

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TOP VIEW



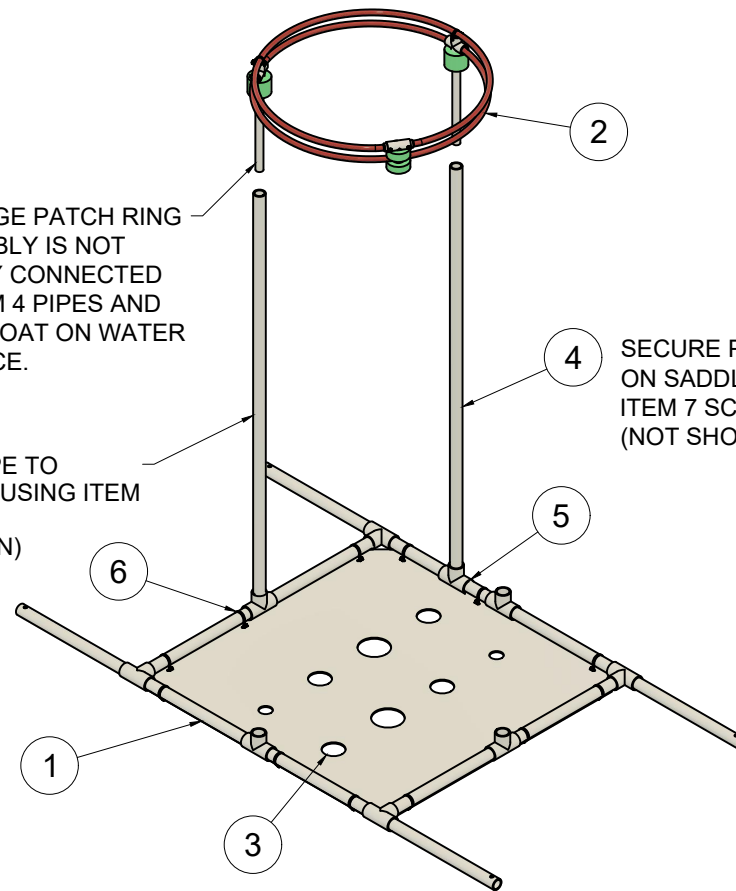
SIDE VIEW

PARTS LIST					
REFERENCE PAGE	ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
Page 23	1	1		PLATFORM FRAME ASSEMBLY	
Page 36	2	1		GARBAGE PATCH RING ASSEMBLY	
Page 25	3	1	F36X36	POLYPROPYLENE SHEET, .157\"/>	
	4	2	AC52	1\"/>	
	5	1	BF3	1\"/>	
	6	12	C8	8\"/>	
	7	7	DA2	#8 X 5/8\"/>	

GARBAGE PATCH RING ASSEMBLY IS NOT RIGIDLY CONNECTED TO ITEM 4 PIPES AND WILL FLOAT ON WATER SURFACE.

SECURE PIPE TO FRAME TEE USING ITEM 7 SCREWS (NOT SHOWN)

SECURE PIPE TO SNAP ON SADDLE TEE USING ITEM 7 SCREWS (NOT SHOWN)



		PROJECT	
OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 .XX ±.01 .XXX ±.005 FRAC: 1/16 ANG: ±1°		International SeaPerch Challenge	
TITLE		REV	
Mission Course		SPC20-U-Mission-01	
Waste Platform Details		3	
SIZE	DWG NO	REV	
C	SPC20-U-Mission-01	3	
DATE	SCALE	SHEET	
9/7/19	1:10	3/3	

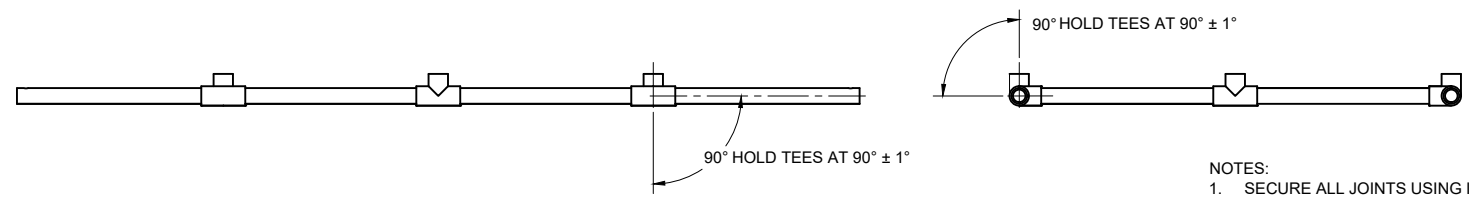
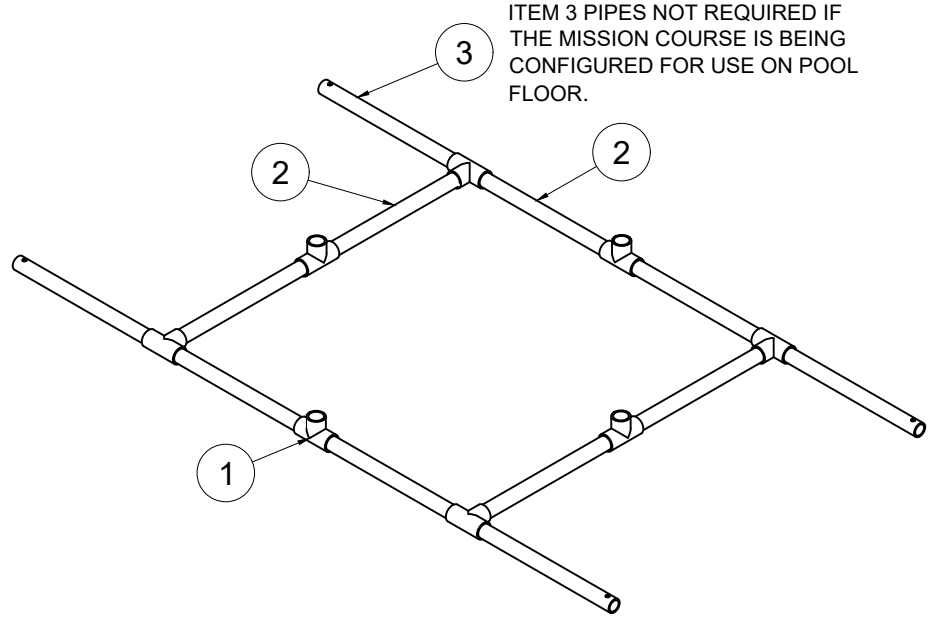
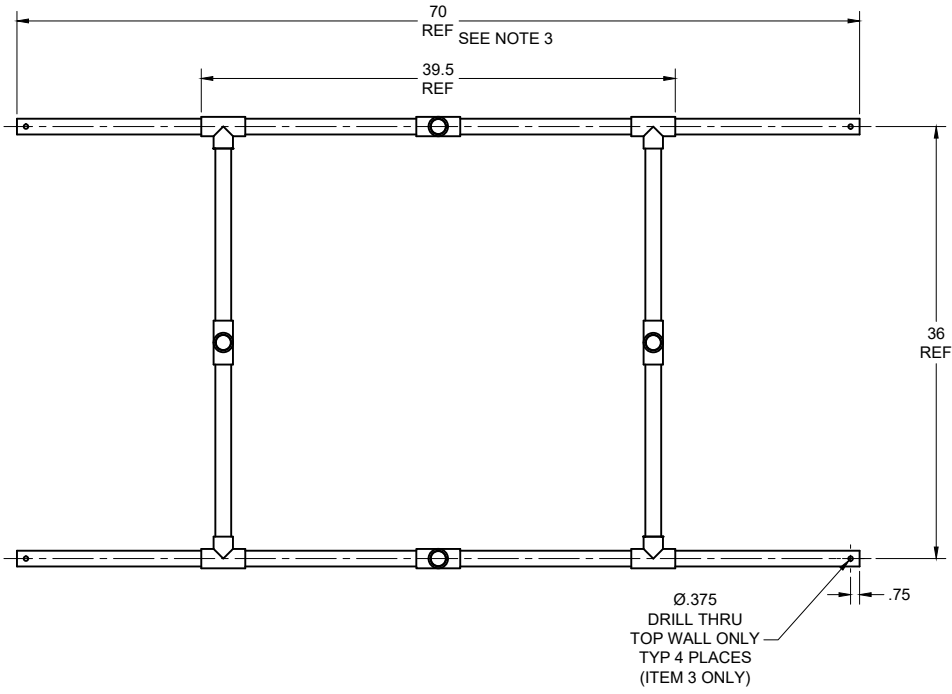
4

3

2

1

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	8	BB3	1" SCH 40 PVC TEE (DURA)	PVC-PIPING
2	8	AC16.5	1" SCH 40 PVC PIPE X 16.5" LG	PVC-PIPING
3	4	AC16.5	1" SCH 40 PVC PIPE X 16.5" LG	PVC-PIPING
4	20	DA2	#8 X 5/8" STAINLESS STEEL FLANGED HEAD SELF-DRILLING SCREW	STAINLESS STEEL



- NOTES:
1. SECURE ALL JOINTS USING ITEM 4 SCREWS (NOT SHOWN)
 2. DEBUR ALL SHARP EDGES
 3. SIZE SHOWN IS FOR 6' TO 9' WIDE LANES. ADJUST LENGTH OF ITEM 3 FOR NARROWER LANES.

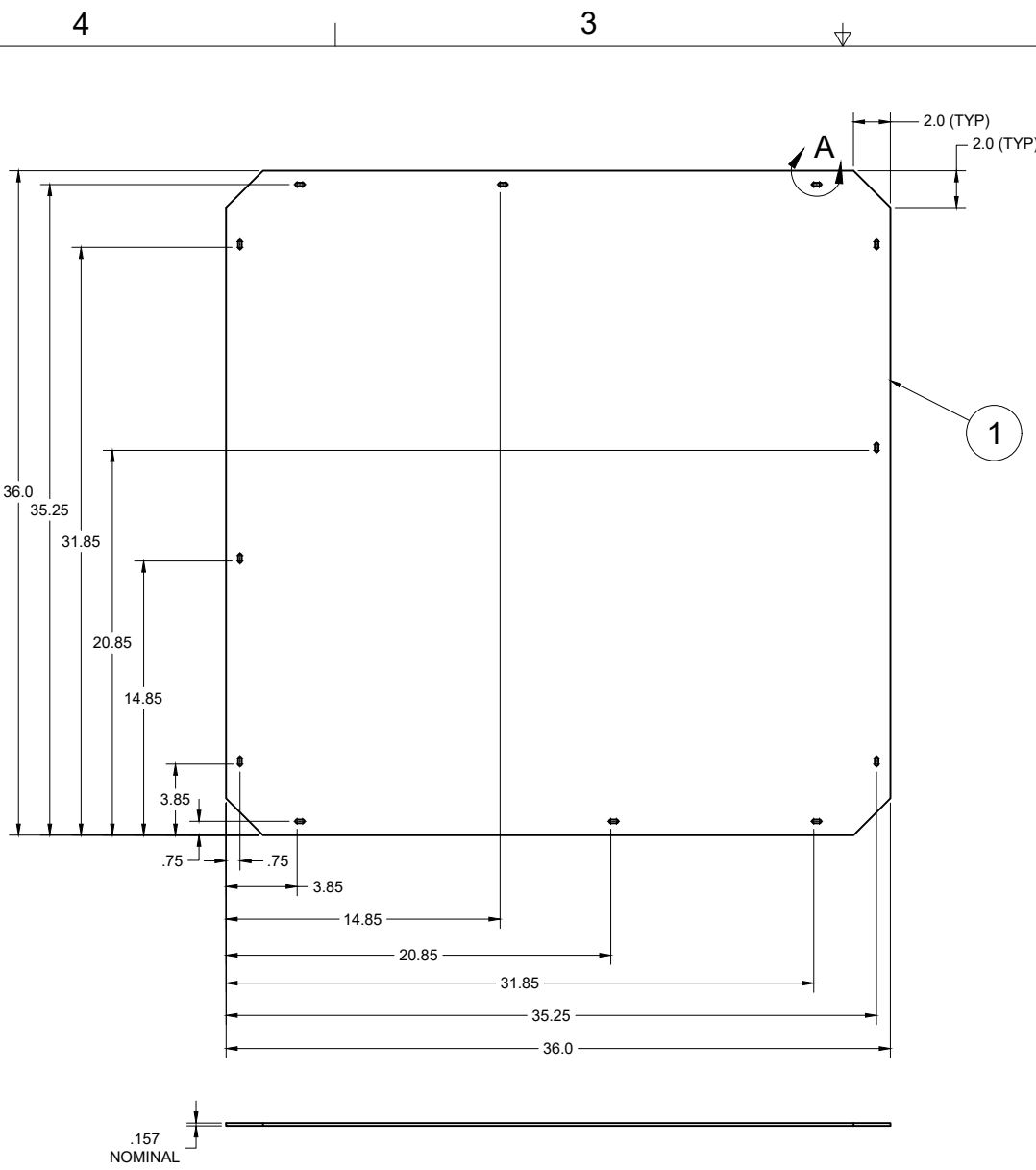
	PROJECT International SeaPerch Challenge	
	TITLE Mission Course Platform Frame Assembly Details	
OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: .X ± .125 .XX ± .01 .XXX ± .005 FRAC: $\frac{1}{16}$ ANG: ±1°	SIZE C	DWG NO SPCXX-U-Mission-PlatformFrame-01
DATE 8/19/19	SCALE 1:8	REV SHEET 1/1

4

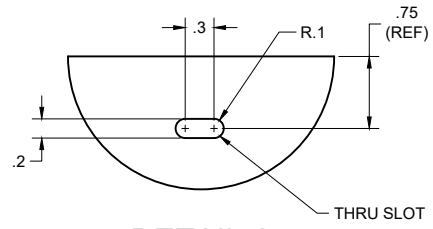
3

2

1



PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	F36X36	POLYPROPYLENE SHEET, .157" THICK, 36" X 36"	POLYPROPYLENE



DETAIL A
SCALE 1:1
(TYP 12 PLACES)

- NOTES:
- THE 12 ELONGATED SLOTS ARE FOR CABLE TIES AND ARE SPECIFIED FOR WATERJET CUTTING. IF THE PLATE IS BEING MADE MANUALLY, SIMPLY PUNCH THE SLOTS USING A LARGE FLAT BLADE SCREWDRIVER.

 <p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 .XX ±.01 .XXX ±.005 FRAC: $\frac{1}{16}$ ANG: ±1°</p>	PROJECT International SeaPerch Challenge	
	TITLE Mission Course Platform Plate (Solid)	
SIZE C	DWG NO SPCXX-U-Mission-PlatformPlate-01	REV
DATE 8/22/19	SCALE 1:5	SHEET 1/1

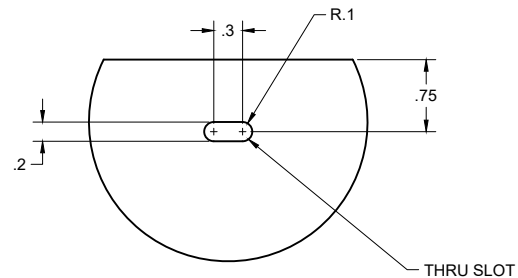
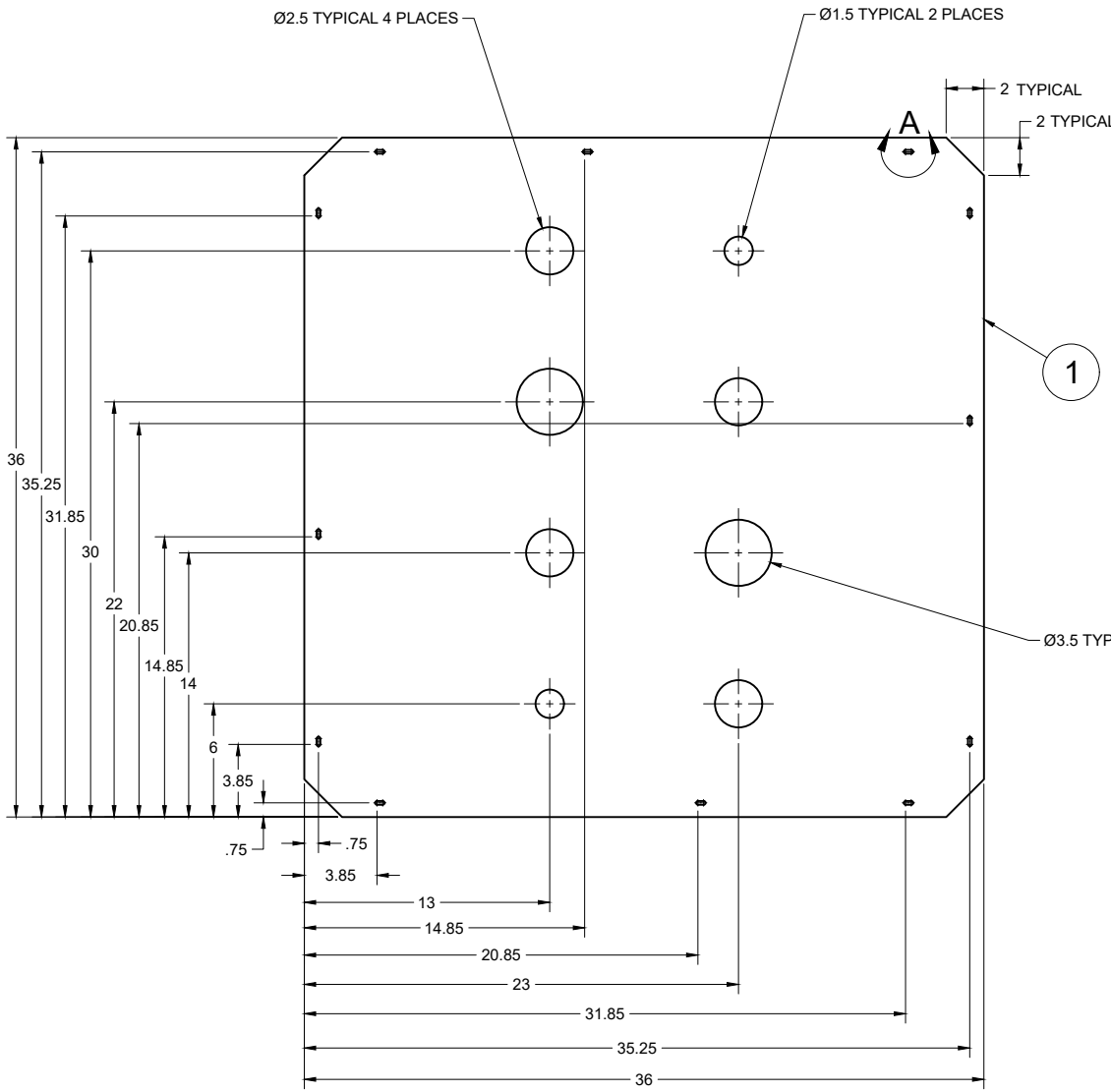
4

3

2

1


PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	F36X36	POLYPROPYLENE SHEET, .157" THICK, 36" X 36"	POLYPROPYLENE



DETAIL A
SCALE 1:1
(TYP 12 PLACES)

NOTES:
1. THE 12 ELONGATED SLOTS ARE FOR CABLE TIES AND ARE SPECIFIED FOR WATERJET CUTTING. IF THE PLATE IS BEING MADE MANUALLY, SIMPLY PUNCH THE SLOTS USING A LARGE FLAT BLADE SCREWDRIVER.

.157
NOMINAL

	PROJECT International SeaPerch Challenge		
	TITLE Mission Course Platform Plate (w/ Holes)		
OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ± .05 XX: .01 XXX ± .005 FRAC: $\frac{1}{16}$ ANG: ± 1°	SIZE C	DWG NO SPCXX-U-Mission-PlatformPlate-02	REV
DATE 9/2/19	SCALE 1:5	SHEET 1/1	

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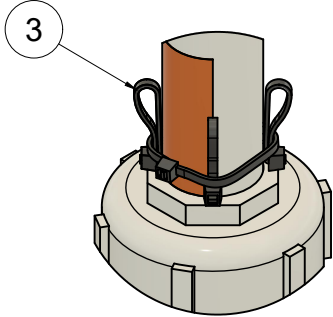
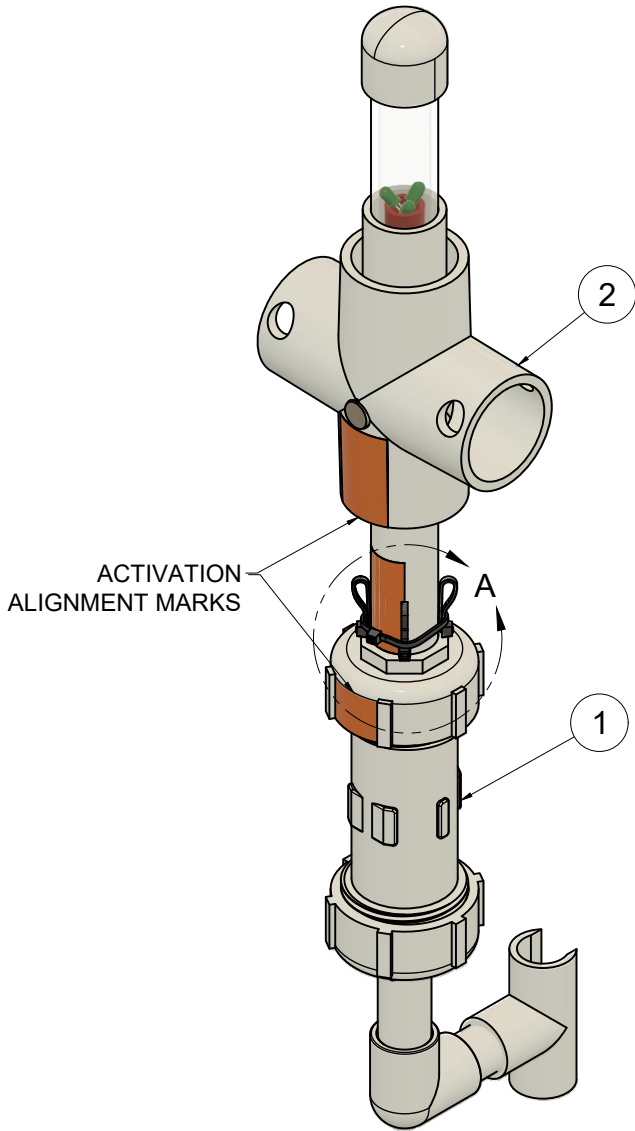
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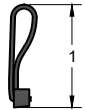
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PARTS LIST					
REFERENCE PAGE	ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
Page 28	1	1		BEACON	
Page 27	2	1		ACTIVE MINE ARMING DEVICE	
	3	5	C6	6" CABLE TIE	NYLON 6



DETAIL A
SCALE 1:1



PRE-FORM 4 CABLE TIES AND SECURE TO THE BEACON MAIN PIPE USING A CABLE TIE AS SHOWN. ADJUST CABLE TIE LOOPS TO ALLOW ARMING DEVICE TO SLIDE FULLY TO COMPRESSION FITTING WHILE STILL PROVIDING RESTRICTION TO HORIZONTAL MOVEMENT OF ARMING DEVICE.

 <p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 XX: .01 XXX ±.005 FRAC: $\frac{1}{16}$ ANG: ±1°</p>	PROJECT International SeaPerch Challenge	
	TITLE Mission Course - Task 1 Active Mine Main Assembly	
SIZE C	DWG NO SPCX20-U-Mission-ActiveMine-01	REV
DATE 9/10/19	SCALE 1:2	SHEET 1/2

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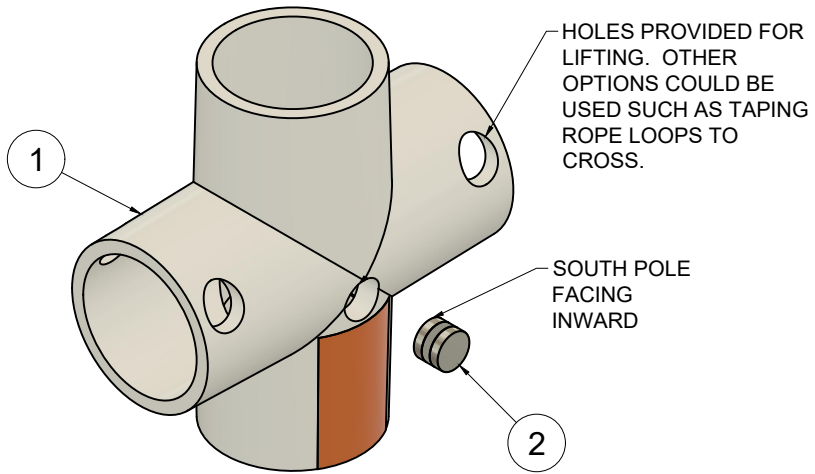
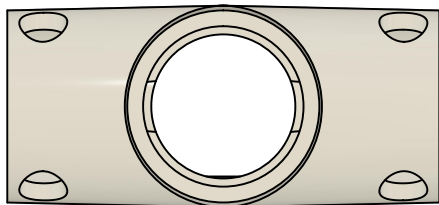
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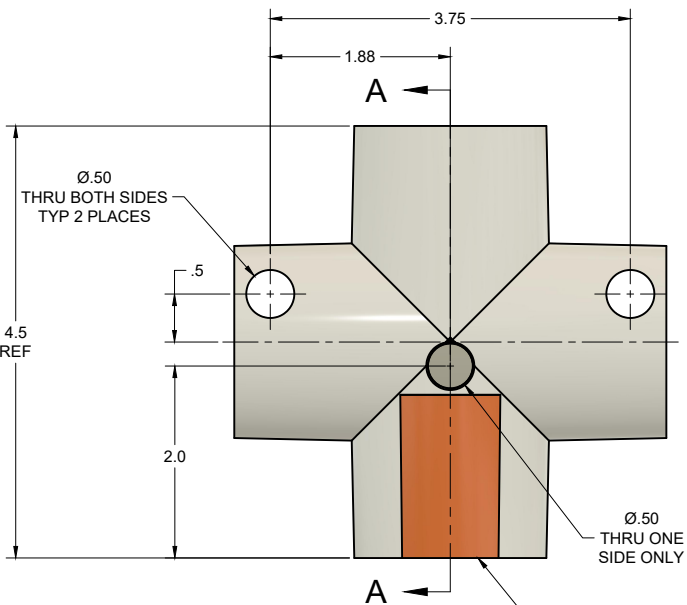
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PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	BC4	1-1/4" SCH 40 PVC CROSS (DURA)	PVC-PIPING
2	3	M12	12MM DIA X 3.0MM THK NEODYMIUM MAGNET	NEODYMIUM



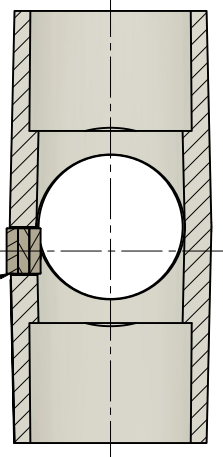
HOLES PROVIDED FOR LIFTING. OTHER OPTIONS COULD BE USED SUCH AS TAPING ROPE LOOPS TO CROSS.

SOUTH POLE FACING INWARD



EPOXY MAGNETS IN PLACE SEE NOTE 2

TAPE, PAINT, OR MARK 1" WIDE X 1.75"



SECTION A-A SCALE 1:1

NOTES:

1. SIZES OF FITTING MAY DIFFERENT BETWEEN MANUFACTURERS. ADJUST LOCATION OF MAGNETS ACCORDINGLY.
2. MAGNETS ONLY NEEDED IF USING BEACON WITH ELECTRONIC CIRCUIT.
3. OTHER MAGNETS SUCH AS STRIP MAGNETS COULD OPTIONALLY BE TAPED INSIDE CROSS IF DRILLING AND EPOXYING ARE NOT DESIRABLE.
4. EPOXY OR SEAL MAGNETS IN PLACE WITH SOUTH POLE FACING INWARD AND INNER FACE FLUSH WITH INSIDE OF FITTING. USE MARINE EPOXY, MARINE ADHESIVE SEALANT, OR OTHER SUITABLE MEANS TO SECURE MAGNET TO FITTING.
5. APPROXIMATE WEIGHTS: 170 GRAMS IN AIR, 56 GRAMS IN WATER (MEASURED IN POOL WATER).

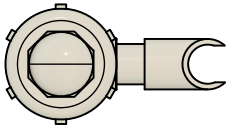
	PROJECT International SeaPerch Challenge		
	TITLE Mission Course - Task 1 Active Mine Arming Device Details		
OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 .XX±.01 .XXX±.005 FRAC: 1/16 ANG: ±1°	SIZE C	DWG NO SPC20-U-Mission-ActiveMine-01	REV
DATE 9/9/19	SCALE 1:1	SHEET 2/2	

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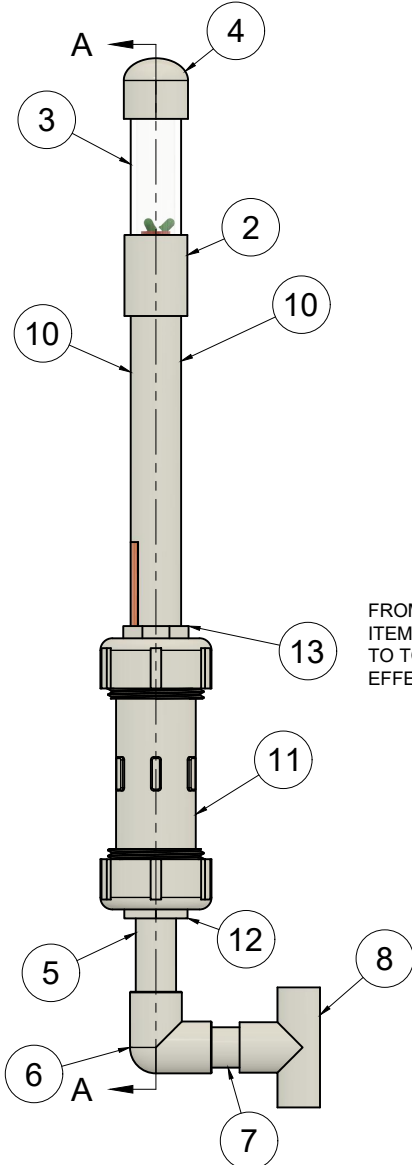
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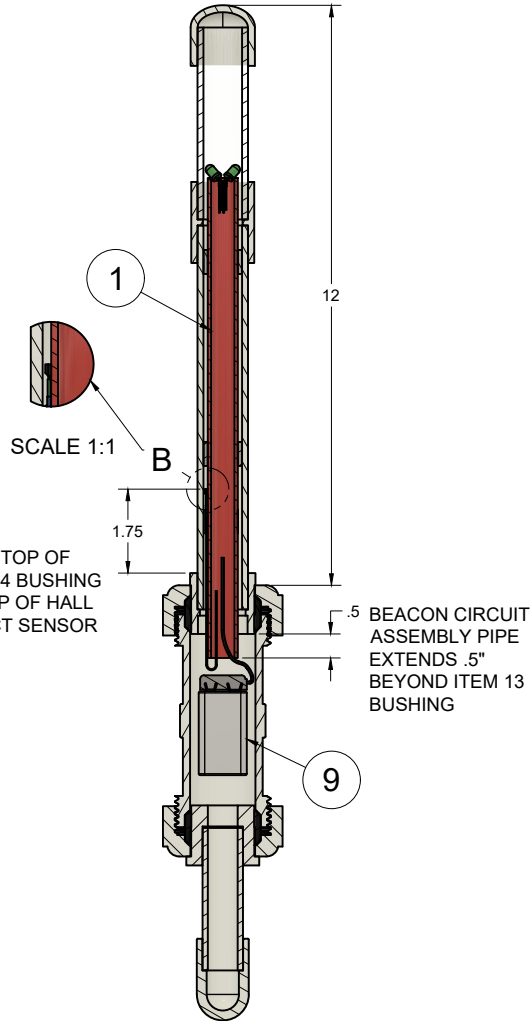
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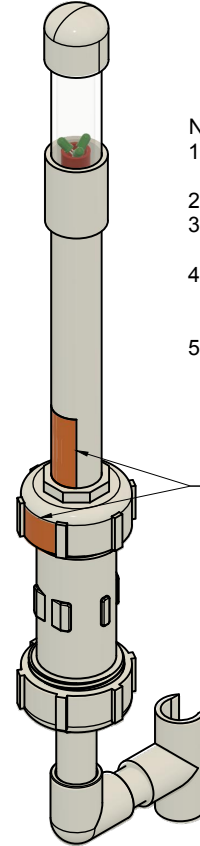
TOP VIEW



FRONT VIEW



SECTION A-A
SCALE 1:2



NOTES:

1. GLUE ALL SOCKET FITTINGS USING SUITABLE PVC SOLVENT CEMENT FOR WATER TIGHT SEAL.
2. DO NOT LUBRICATE COMPRESSION FITTING GASKET.
3. ITEM 8 SNAP-ON-SADDLE TEE MUST BE SEALED TYPE WITH NO OUTLET HOLE.
4. SPEARS BRAND COMPRESSION FITTINGS (ITEM 11) HAVE BEEN TESTED AND ARE LEAK PROOF. SOME OTHER BRANDS HAVE LEAKED WITH LOW EXTERNAL PRESSURE.
5. SEE BEACON CIRCUIT BUILD GUIDE AT WWW.SEAPERCH.ORG/BEACONBUILD FOR DETAILED INSTRUCTIONS FOR BUILDING THE BEACON CIRCUIT.

TAPE, PAINT, OR MARK 1" WIDE X 1.75" TALL TO INDICATE TOP OF HALL EFFECT SENSOR AND AREA BETWEEN TWO RAISED RIBS. ALIGN MARKS DURING ASSEMBLY.

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1		BEACON CIRCUIT ASSEMBLY	
2	1	BE2	3/4" SCH 40 PVC COUPLER	PVC-PIPING
3	1	AB4C	3/4" SCH 40 CLEAR PVC PIPE 4" LG	PVC-PIPING
4	1	PF0.75-CP	3/4" SCH 40 PVC CAP	PVC-PIPING
5	1	AA3	1/2" SCH 40 PVC PIPE X 3" LG	PVC-PIPING
6	1	BA1	1/2" SCH 40 PVC ELBOW	PVC-PIPING
7	1	AA2	1/2" SCH 40 PVC PIPE X 2" LG	PVC-PIPING
8	1	BF1	1/2" PVC SCH 40 SNAP-ON SADDLE	PVC-PIPING
9	1		9V BATTERY	
10	1	AB8	3/4" SCH 40 PVC PIPE X 8" LG	PVC-PIPING
11	1	BK3	1" PVC COMPRESSION FITTING (SPEARS S110-10)	
12	1	BD2	1" X 1/2" SCH 40 PVC REDUCING BUSHING	PVC-PIPING
13	1	BD1	1" X 3/4" SCH 40 PVC REDUCING BUSHING (WITH FLATS)	PVC-PIPING



PROJECT
International SeaPerch Challenge

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ±.05
 XX: .01
 XXX: ±.005
FRAC: 1/16
ANG: ±1°

TITLE
Mission Course - Task 1
Beacon Assembly

SIZE C	DWG NO SPCXX-U-Mission-Beacon-01	REV
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DATE 11/14/18	SCALE 1/2 (From parent)	SHEET 1/3
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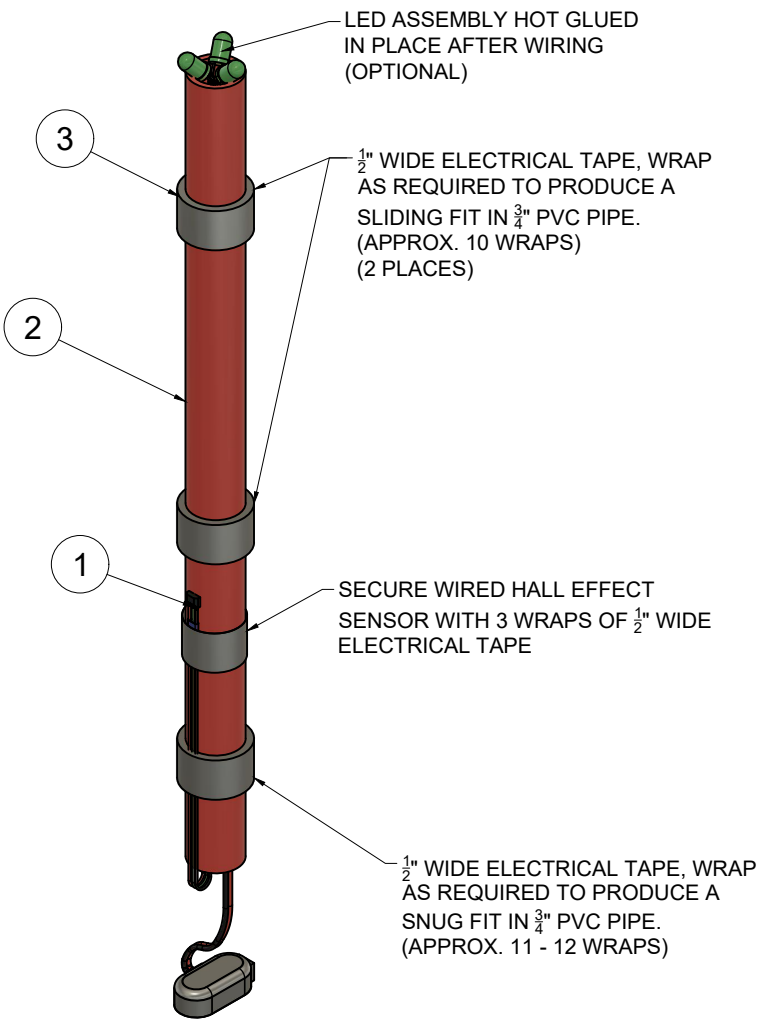
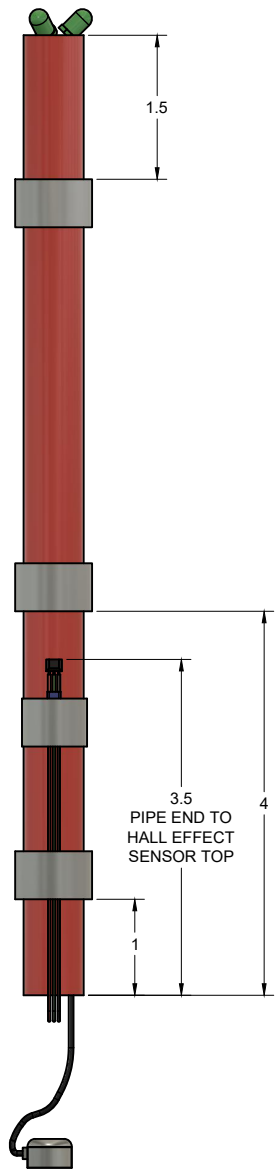
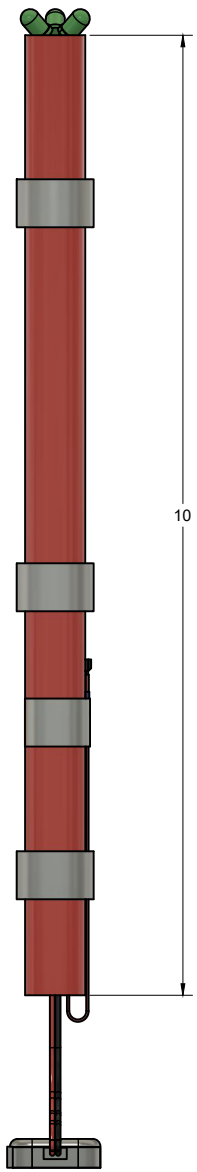
4

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PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1		BEACON CIRCUIT	
2	1	AAP10	1/2" PEX PIPE X 10" LG	POLYETHYLENE, HIGH DENSITY
3	1		ELECTRICAL TAPE, 1/2" WIDE, LENGTH AS REQUIRED	STEEL



robonation
ROBOTIC COMMUNITY

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ±.05
XX: .01
XXX ±.005
FRAC: ±1/16
ANG: ±1°

PROJECT International SeaPerch Challenge		
TITLE Mission Course - Task 1 Beacon Sensor Assembly		
SIZE C	DWG NO SPCXX-U-Mission-Beacon-01	REV
DATE 11/13/18	SCALE 1:1	SHEET 2/3

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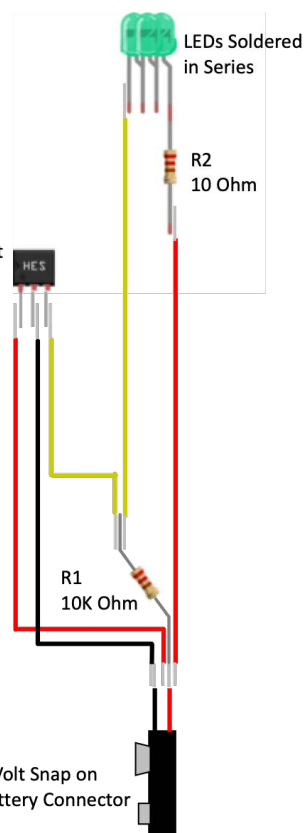
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Hall Effect Sensor

9 Volt Snap on Battery Connector

2019 Beacon Circuit



Single LED

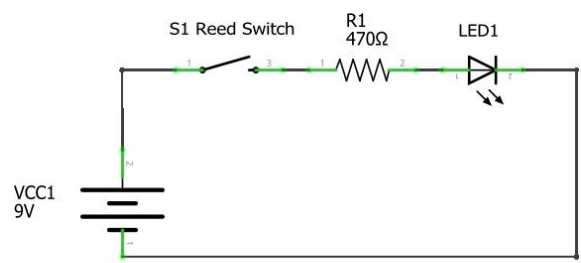
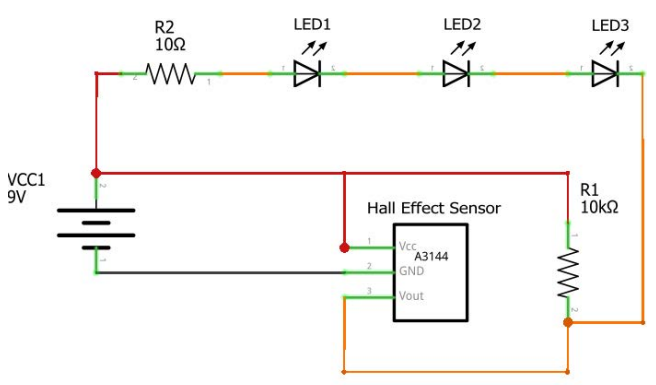
R1
470 Ohm

Reed Switch
(Normally Open -
Plastic Molded Type)

9 Volt Snap on
Battery Connector

Simplified Beacon Circuit

The 2019 Beacon circuit will work for the 2020 SeaPerch Challenge, however if you are building a new beacon circuit you may want to consider the simplified circuit.



OTHERWISE SPECIFIED:
 1. ALL DIMENSIONS ARE IN INCHES
 2. TOLERANCES
 DEC: X ±.05
 .XX ±.01
 .XXX ±.005
 FRAC: 1/16
 ANG: ±1°

PROJECT International SeaPerch Challenge		
TITLE Mission Course - Task 1 Beacon Schematic Options		
SIZE C	DWG NO SPCXX-U-Mission-Beacon-01	REV
DATE 11/15/18	SCALE	SHEET 3/3

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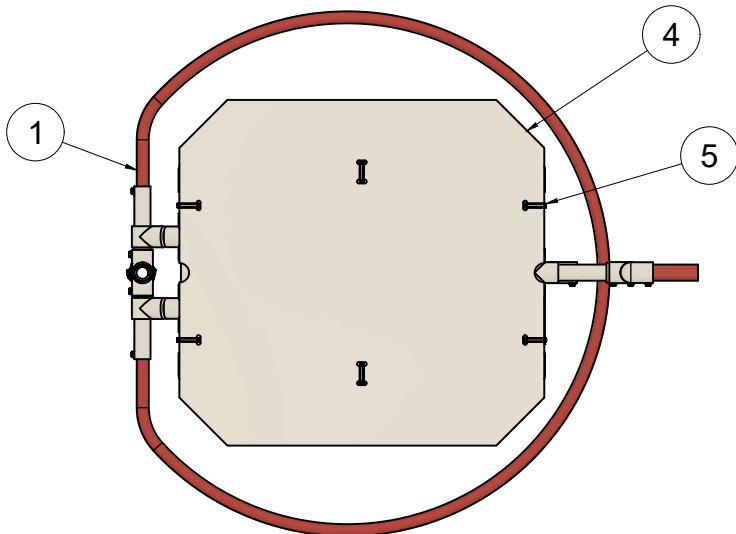
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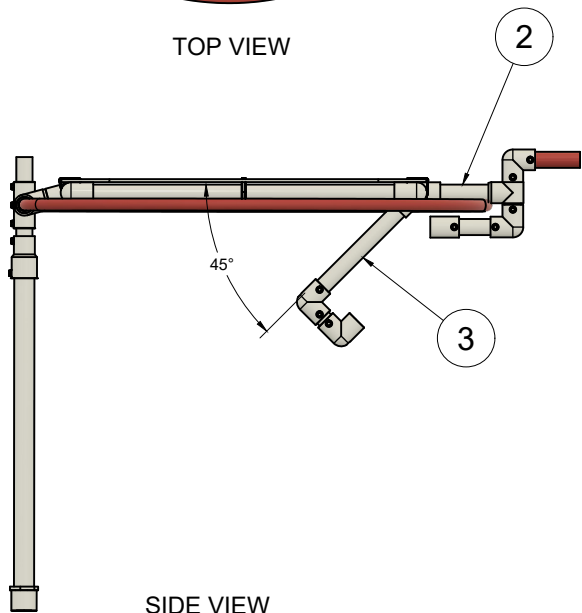
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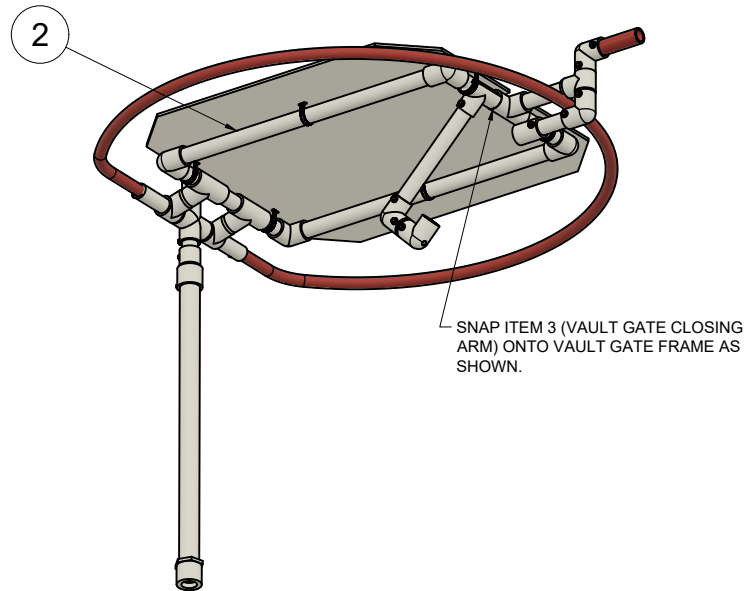
PARTS LIST					
PAGE REFERENCE	ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
Page 33	1	1		VAULT HOOP ASSEMBLY	
Page 34	2	1		VAULT GATE FRAME ASSEMBLY	
Page 35	3	1		VAULT GATE CLOSING ARM ASSEMBLY	
Page 32	4	1	F18X19	POLYPROPYLENE SHEET, .157" THK, 19" X 18" (COROPLAST WHITE CORRUGATED PLASTIC SHEET)	POLYPROPYLENE
	5	6	C8	8" CABLE TIE	



TOP VIEW



SIDE VIEW



PROJECT
International SeaPerch Challenge

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ± .05
 XX: .01
 XXX: .005
FRAC: ± 1/16
ANG: ± 1°

TITLE
Mission Course - Task 2
Vault Assembly

SIZE C	DWG NO SPCXX-U-Mission-Vault-01	REV
DATE 9/2/19	SCALE 1:4	SHEET 1/2

4

3

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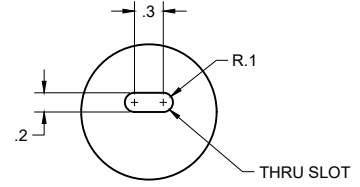
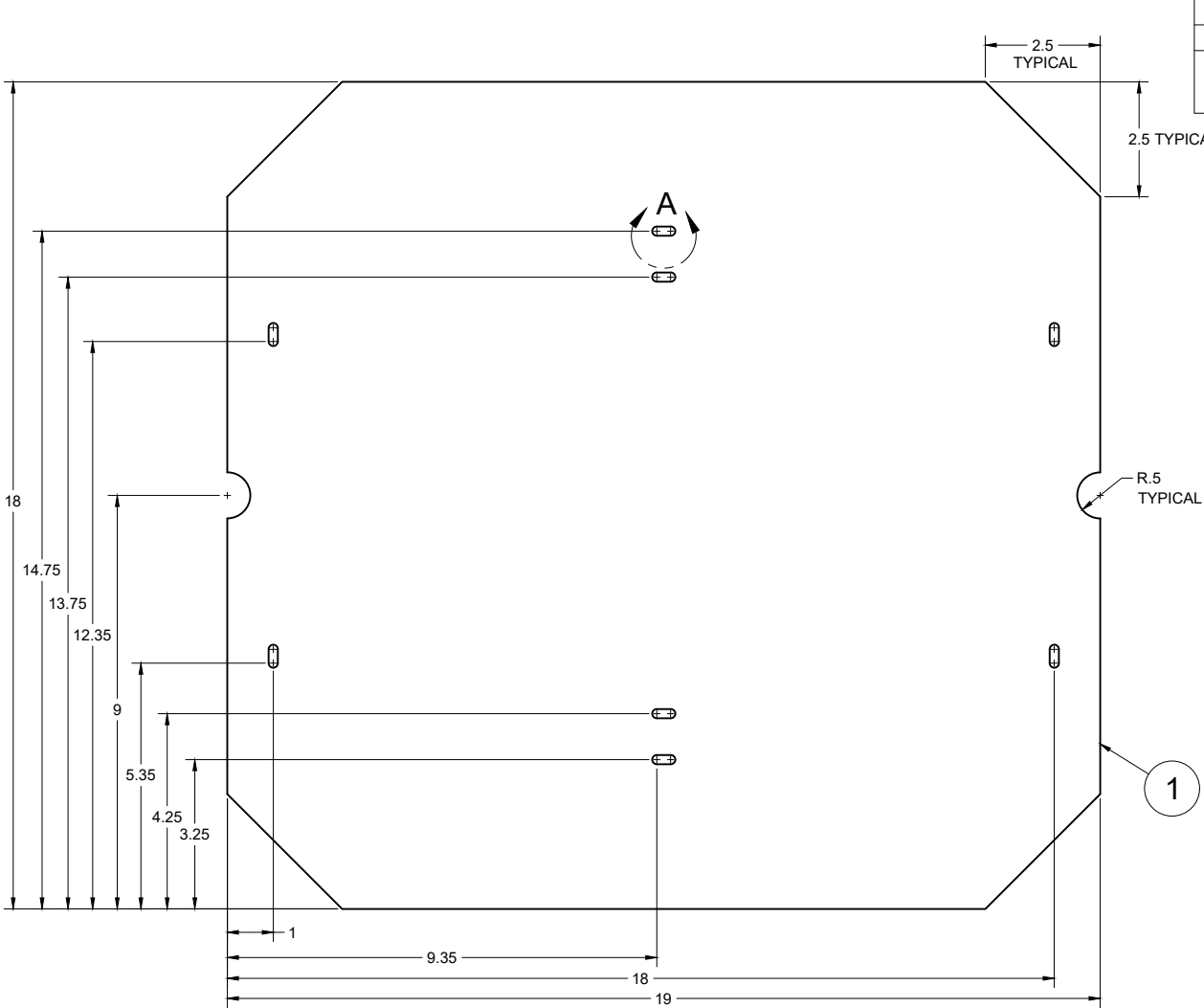
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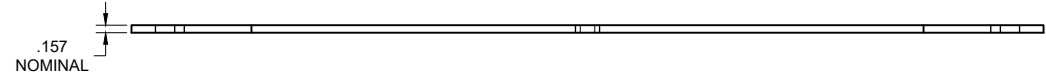
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PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	F18-19	POLYPROPYLENE SHEET, .157" THK, 19" X 18" (COROPLAST WHITE CORRUGATED PLASTIC SHEET)	POLYPROPYLENE



DETAIL A
SCALE 1:1
(TYP 8PLACES)

NOTES:
1. THE 8 ELONGATED SLOTS ARE FOR CABLE TIES AND ARE SPECIFIED FOR WATERJET CUTTING. IF THE PLATE IS BEING MADE MANUALLY, SIMPLY PUNCH THE SLOTS USING A LARGE FLAT BLADE SCREWDRIVER.



 <p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ± .05 .XX ± .01 .XXX ± .005 FRAC: $\frac{1}{16}$ ANG: ± 1°</p>	PROJECT International SeaPerch Challenge	
	TITLE Mission Course - Task 2 Vault Gate Cover Plate Details	
SIZE C	DWG NO SPCXX-U-Mission-Vault-01	REV
DATE 9/2/19	SCALE 1:2	SHEET 2/2

4

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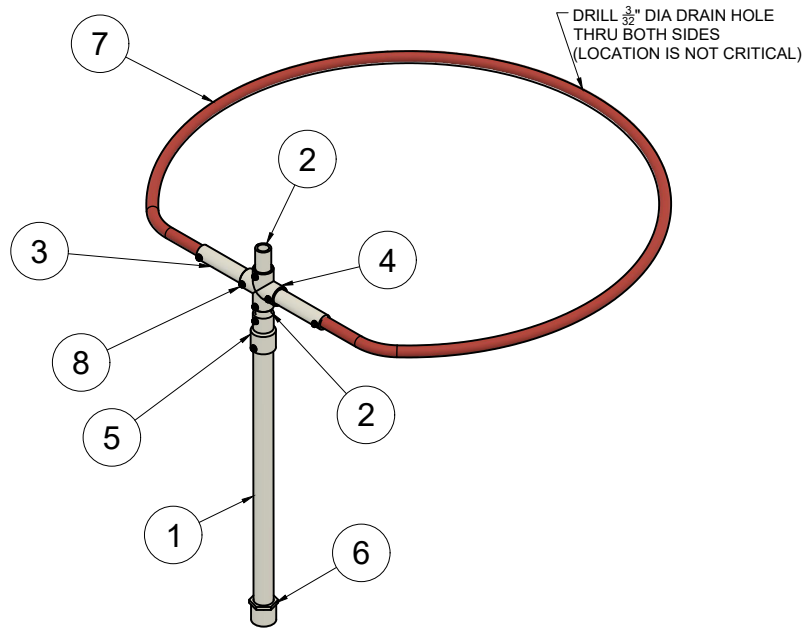
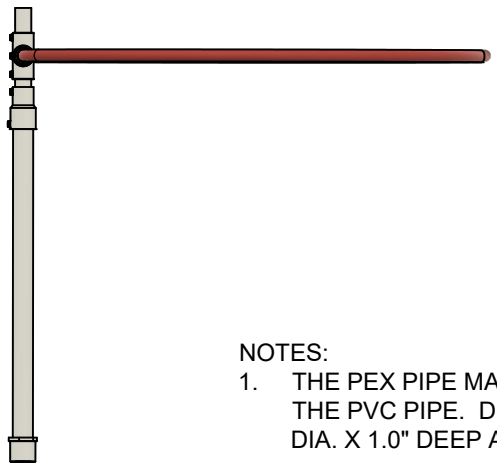
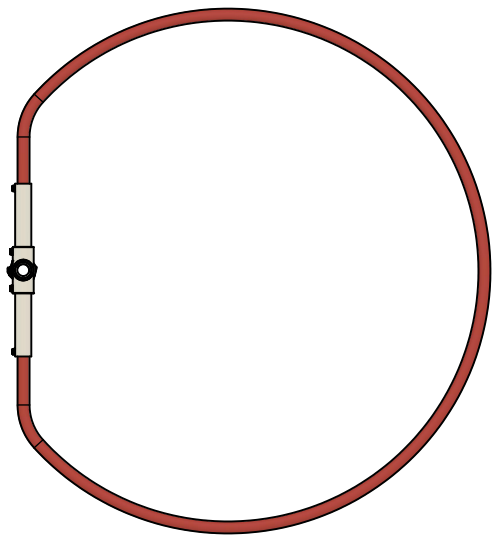
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PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	AB18	3/4" SCH 40 PVC PIPE X 18" LG	PVC-PIPING
2	2	AA2	1/2" SCH 40 PVC PIPE X 2" LG	PVC-PIPING
3	2	AA4	1/2" SCH 40 PVC PIPE X 4" LG	PVC-PIPING
4	1	BC1	1/2" SCH 40 PVC CROSS	PVC-PIPING
5	1	BL1	3/4" X 1/2" SCH 40 PVC REDUCING COUPLER	PVC-PIPING
6	1	BD2	1" X 3/4" PVC REDUCING BUSHING	PVC-PIPING
7	1	AAP72	PEX TUBING (RED), 1/2" X 72" LG	POLYETHYLENE, HIGH DENSITY
8	8	DA2	#8 X 5/8" STAINLESS STEEL FLANGED HEAD SELF-DRILLING SCREW	STAINLESS STEEL



NOTES:
 1. THE PEX PIPE MAY NOT SLIDE EASILY INTO THE PVC PIPE. DRILL THE PIPE OUT 0.625" DIA. X 1.0" DEEP AS NECESSARY.

	PROJECT International SeaPerch Challenge		
	TITLE Mission Course - Task 2 Vault Hoop Assembly		
OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 .XX ±.01 .XXX ±.005 FRAC: ±1/16 ANG: ±1°	SIZE C	DWG NO SPCXX-U-Mission-Vault-02	REV
DATE 9/2/19	SCALE 1:5	SHEET 1/1	

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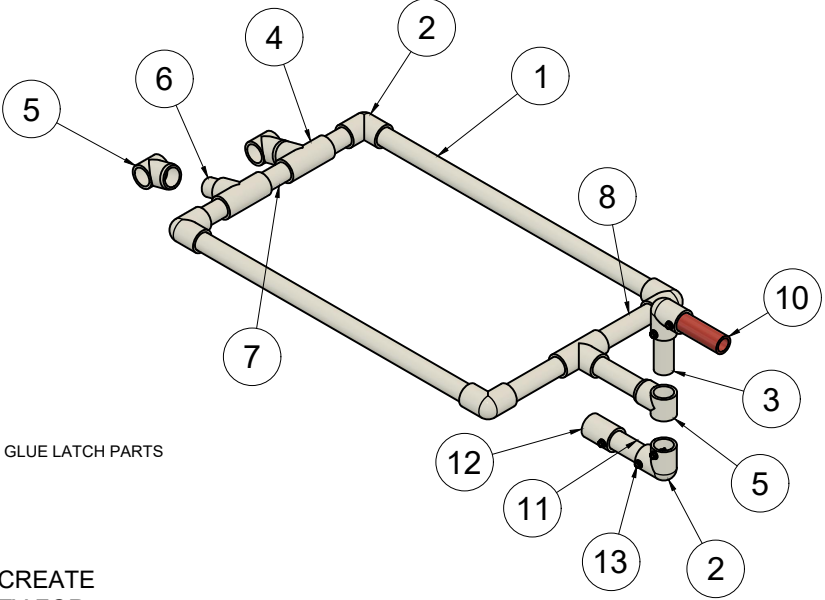
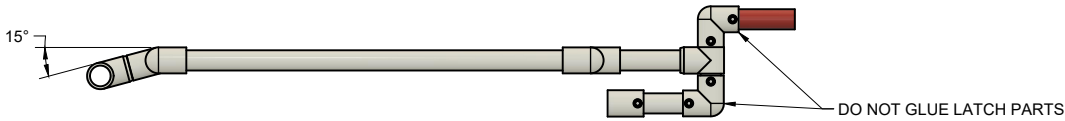
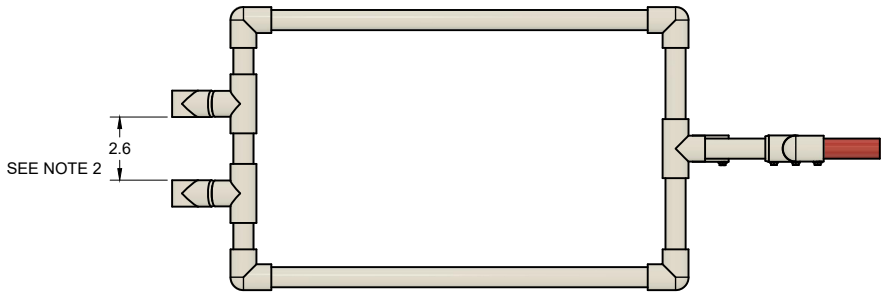
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PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	2	AA17	1/2" SCH 40 PVC PIPE X 17" LG	PVC-PIPING
2	6	BA1	1/2" SCH 40 PVC ELBOW	PVC-PIPING
3	3	AA2.5	1/2" SCH 40 PVC PIPE X 2.5" LG	PVC-PIPING
4	3	BB1	1/2" SCH 40 PVC TEE	PVC-PIPING
5	3	BG1	1/2" PVC FURNITURE GRADE SLING TEE	PVC-PIPING
6	2	AA1.5	1/2" SCH 40 PVC PIPE X 1.5" LG	PVC-PIPING
7	1	AA2.75	1/2" SCH 40 PVC PIPE X 2.75" LG	PVC-PIPING
8	2	AA4.25	1/2" SCH 40 PVC PIPE X 4.25" LG	PVC-PIPING
9	1	AA4	1/2" SCH 40 PVC PIPE X 4" LG	PVC-PIPING
10	1	AA3R	1/2" SCH 40 PVC PIPE X 3" LG (RED)	PVC-PIPING
11	1	AA3	1/2" SCH 40 PVC PIPE X 3" LG	PVC-PIPING
12	1	BE1	1/2" SCH 40 PVC COUPLER	PVC-PIPING
13	5	DA2	#8 X 5/8" STAINLESS STEEL FLANGED HEAD SELF-DRILLING SCREW	STAINLESS STEEL



NOTES:

1. GLUE ALL JOINTS OF FRAME (EXCEPT AS NOTED) USING PVC CEMENT TO CREATE AIR-TIGHT SEALS. FOLLOWING THIS PROCEDURE NEGATES THE NECESSITY FOR ADDITIONAL FLOATATION FOR THE GATE.
2. PIPE FITTINGS MAY VARY BETWEEN DIFFERENT MANUFACTURERS. ITEMS 4, 7, & 8 MAY HAVE TO BE ADJUSTED TO ASSURE SPACING BETWEEN SLING TEES IS ADEQUATE TO ACCOMODATE THE PVC CROSS ON THE VAULT HOOP AND TO KEEP ITEM 1 PIPES PARALLEL.
3. ASSURE SLING TEES HAVE ADEQUATE CLEARANCE SO PIPES ROTATE FREELY.
4. OPTIONALLY PAINT OR TAPE ITEM 10 INSTEAD OF PURCHASING RED PVC PIPE.

 <p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 XXX: .01 XXX ±.005 FRAC: ±$\frac{1}{32}$ ANG: ±1°</p>	PROJECT International SeaPerch Challenge	
	TITLE Mission Course - Task 2 Vault Gate Frame Assembly	
SIZE C	DWG NO SPCXX-U-Mission-Vault-03	REV
DATE 9/2/19	SCALE 1:4	SHEET 1/1

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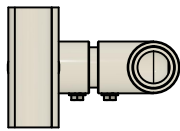
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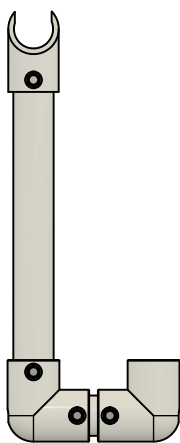
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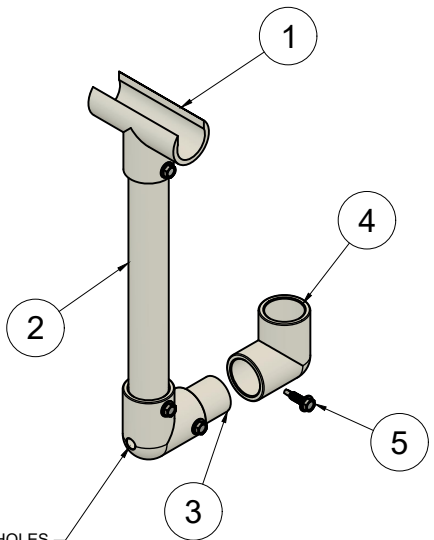
PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	BF1	1/2" PVC SCH 40 SNAP-ON SADDLE TEE	PVC-PIPING
2	1	AA7	1/2" SCH 40 PVC PIPE X 7" LG	PVC-PIPING
3	1	AA1.5	1/2" SCH 40 PVC PIPE X 1.5" LG	PVC-PIPING
4	2	BA1	1/2" SCH 40 PVC ELBOW	PVC-PIPING
5	4	DA2	#8 X 5/8" STAINLESS STEEL FLANGED HEAD SELF-DRILLING SCREW	STAINLESS STEEL



TOP VIEW



SIDE VIEW



DRILL .25 DIA. DRAIN HOLES IN BOTH ELBOWS (LOCATION IS NOT CRITICAL)

PARTIALLY EXPLODED VIEW



PROJECT
International SeaPerch Challenge

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ±.05
XX: .01
XXX: .005
FRAC: $\frac{1}{16}$
ANG: ±1°

TITLE
Mission Course - Task 2
Vault Gate Closing Arm Assembly Details

SIZE C	DWG NO SPCXX-U-Mission-Vault-04	REV
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DATE 9/1/19	SCALE 1:2	SHEET 1/1
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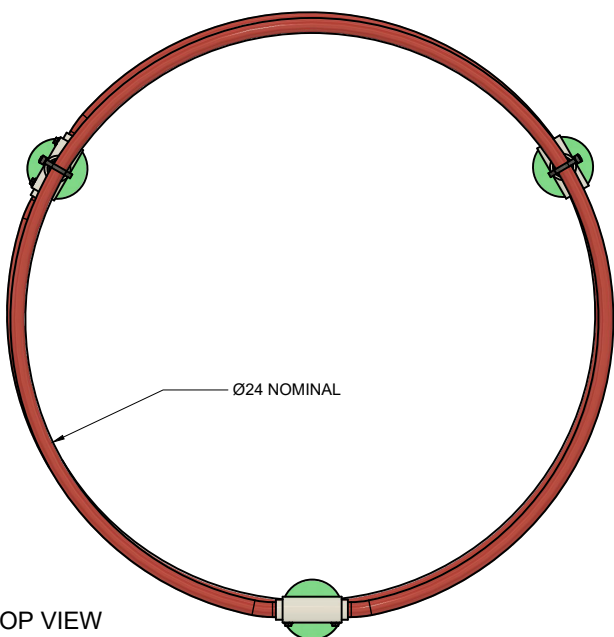
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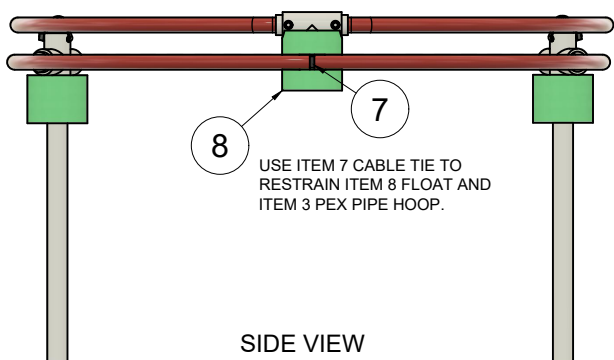
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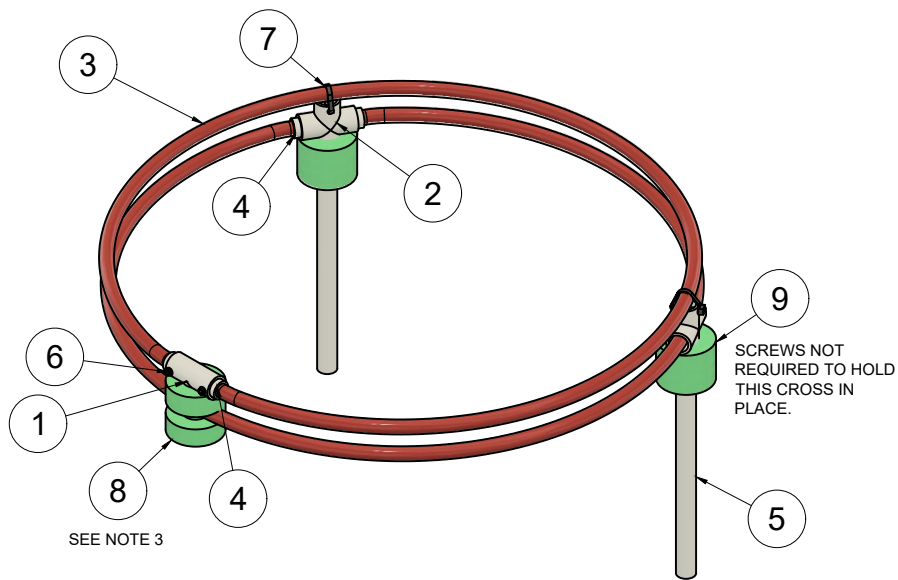
PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	2	BB1	1/2" SCH 40 PVC TEE	PVC-PIPING
2	3	BC1	1/2" SCH 40 PVC CROSS	PVC-PIPING
3	2	AAP76	1/2" PEX PIPE X 76" LG	POLYETHYLENE, HIGH DENSITY
4	4	AA1	1/2" SCH 40 PVC PIPE X 1" LG	PVC-PIPING
5	2	AA12	1/2" PVC SCH 40 PIPE X 12" LG	PVC-PIPING
6	6	DA2	#8 X 5/8" STAINLESS STEEL FLANGED HEAD SELF-DRILLING SCREW	STAINLESS STEEL
7	3	C8	8" CABLE TIE	NYLON
8	1	N2.5	FLOAT 2.5" DIA X 2.5" LG (POOL NOODLE)	POLYETHYLENE FOAM
9	2	N2	FLOAT 2.5" DIA X 2" LG (POOL NOODLE)	POLYETHYLENE FOAM



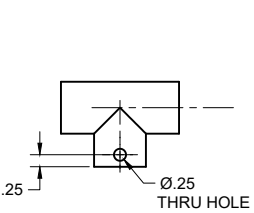
TOP VIEW



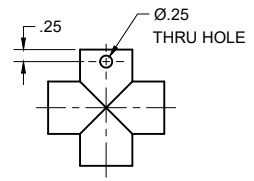
SIDE VIEW



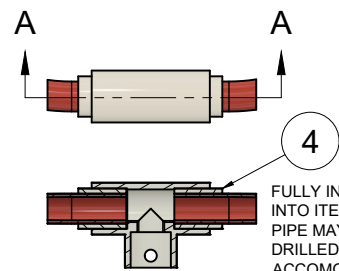
- NOTES:
- ADJUST FLOAT LENGTHS AS NEEDED TO ACHIEVE DESIRED FLOATATION.
 - SECURE PIPE JOINTS USING ITEM 6 SCREWS AS NECESSARY.
 - CUT ITEM 8 FLOAT AS NECESSARY.



ITEM 1 DETAIL SCALE: 1:2



ITEM 2 DETAIL SCALE: 1:2



SECTION A-A SCALE 1:2

robonation
Robotics Community

OTHERWISE SPECIFIED:
1. ALL DIMENSIONS ARE IN INCHES
2. TOLERANCES
DEC: X ±.05
XXX: .03
XXX±.005
FRAC: 1/16
ANG: ±1°

PROJECT International SeaPerch Challenge		
TITLE Mission Course - Task 3 Garbage Patch Ring Assembly		
SIZE C	DWG NO SPC20-U-Mission-GarbagePatch-01	REV
DATE 8/28/19	SCALE 1:4	SHEET 1/1

4

3

2

1

4

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2


1

PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
1	1	W2.86	2.86" DIA. WIFFLE BALL	POLYPROPYLENE
2	1	W3.86	3.86" DIA. WIFFLE BALL	POLYPROPYLENE
3	12	P1	1/4" X 1.5" X .055" THK. STAINLESS STEEL FENDER WASHER	STAINLESS STEEL AISI 304
4	2	H2	1/4" DIA. POLYPROPYLENE ROPE X 14" LG	POLYPROPYLENE
5	10	C8	8" CABLE TIE	NYLON 6

APPROXIMATE WEIGHTS (FULLY ASSEMBLED)		
BALL DIAMETER	WEIGHT IN AIR	APPARENT WEIGHT IN WATER
2.86	100 GRAMS	61 GRAMS
3.86	126 GRAMS	61 GRAMS



- NOTES:**
1. SECURE ROPE ENDS TOGETHER USING CABLE TIES (NOT SHOWN ON DRAWING).
 2. CUT SLIT BETWEEN HOLES IN WIFFLE BALLS TO INSERT WASHERS.
 3. SECURE WASHERS IN BALLS USING CABLE TIES (NOT SHOWN ON DRAWING).
 4. BALLS WEIGHED IN POOL WATER. WATER TEMPERATURE, WATER DENSITY, AND OTHER FACTORS WILL EFFECT APPARENT WEIGHT.
 5. SEE CANISTER BUILD GUIDE FOR DETAILED INSTRUCTIONS FOR BUILDING WEIGHTEDWIFFLE BALLS, WWW.SEAPERCH.ORG/CANISTERBUILD

 <p>OTHERWISE SPECIFIED: 1. ALL DIMENSIONS ARE IN INCHES 2. TOLERANCES DEC: X ±.05 XX: .01 XXX: ±.005 FRAC: 1/16 ANG: ±1°</p>	PROJECT International SeaPerch Challenge		
	TITLE Mission Course - Task 4 Weighted Wiffle Balls Assembly Details		
SIZE C	DWG NO SPCXX-U-Mission-WeightedBalls-01	REV	
DATE 9/7/19	SCALE 1:1	SHEET 1/1	

4

3

2

1