



# Hydraulic Tower Assembly Manual



## Introduction and Safety Guidelines

### **Important!**

- Read through the manual in its entirety prior to assembly and installation of the hydraulic tower.
- **WARNING:** Improper use may cause property damage, serious injury or death; therefore, it is highly recommended that trained professionals install the towers and operate the hydraulic system.

### **Safety**

- This manual covers primary procedures for the installation and use of the hydraulic system and tower. Contact Ambor Structures for more information regarding the installation.
- Hydraulic Systems should be operated by personnel with proper training or knowledge.
- All planning should take place prior to installation to determine the required clearance and ensure proper space for raising and lowering the tower.
- The work area should be kept clean and free from trip hazards.
- Products should be inspected for damage prior to use. If any damage is noted, parts must be replaced or repaired immediately, per the manufacturer's recommendation.
- When construction or erection of free-standing objects is planned, it must be in compliance with local ordinances and local design specifications (i.e. wind speed requirements)
- During tower installation, all operators must wear head protection and take adequate safety precautions.
- **NEVER** stand or walk beneath a tower in the middle of the installation. Operators must remain a minimum of two meters from the pole when operating the equipment.
- Installation and/or assembly during severe weather conditions must be avoided, especially electrical storm activity (lightning).
- Maximum allowable wind speed during installation or maintenance is 17m/s (38mph).
- **SAFETY FIRST!** Caution and common sense must be used when installing/using this product.

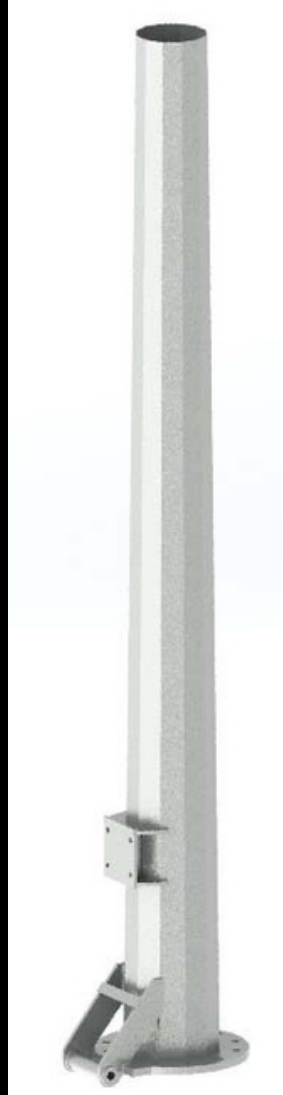
## Bill of Materials: Hydraulic Pole



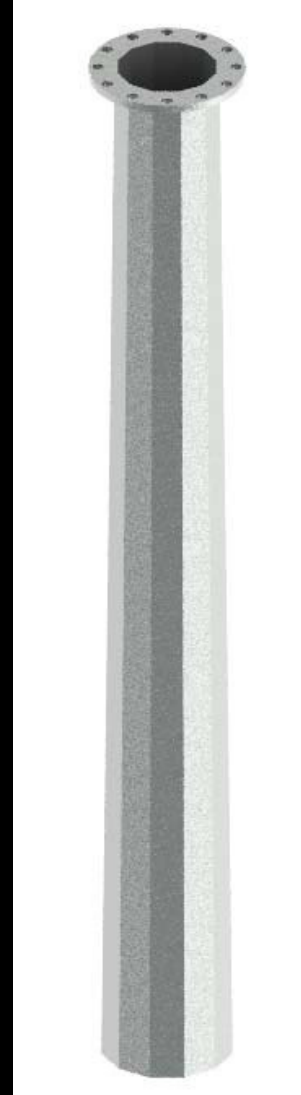
Bottom Section x1



Pivot Axis x1



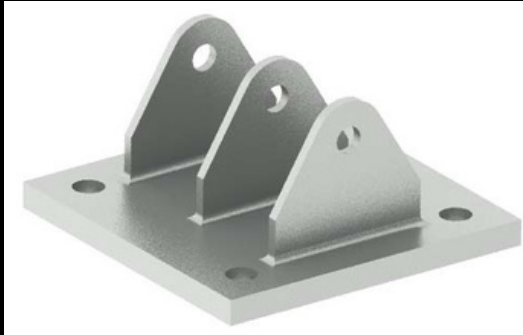
Second Section x1



Other Section x1...

11	PQT0002	6mm Allen Wrench	/	1
10	ALS3601	Bolts set M36x480x90 2N1W	/	1
9	ALS3302	Bolts set M33x160x90 2N2W	/	12
8	PLS1602	Bolts M16x40	/	14
7	W140701Z07	Flange 12M16xø170x50	11	1
6	PLS0801	M8x30 Socket Head Cap Screw	/	2
5	AMB0011	Hand hole Cover Assembly	2.2	1
4	W140701Z04	Section	128	1
3	W140701Z03	Section	148	1
2	W141131Z02	Section	358	1
1	W141131Z01	Section	227	1
NO	PART NO.	DESCRIPTION	WEIGHT	QTY

# Bill of Materials: Brackets for Hydraulic Ram



Bottom Connection Bracket x1



Top Connection Bracket x1



Pivot Axis x2



R-Shape Pin  $\phi 4$  x2

5	PQT0005	R-shape pin $\phi 4$	/	2
4	W140700104	Pivot Axis	1.8	2
3	ALS2006	Bolt set M20x70x50 1N2W	/	4
2	W140700102	Bottom Connecting	40	1
1	W140700101	Top connecting	8.6	1
NO	PART NO.	DESCRIPTION	WEIGHT	QTY

## Bill of Materials: Hydraulic System

**Important!**

Usually hydraulic system is provided by the hydraulic supplier, please read the operation instructions before using it.



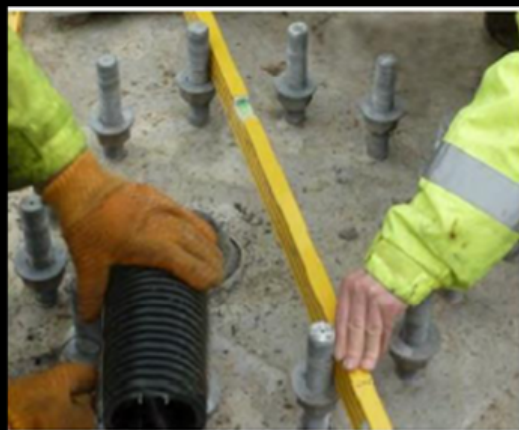
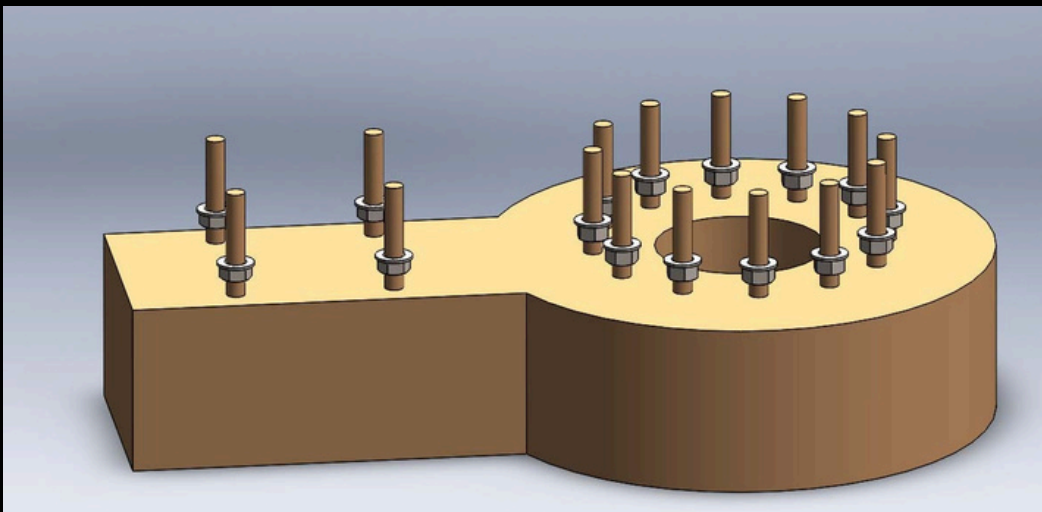
Hydraulic cylinder x2



Hydraulic Handcart x1

## Prior to Tower Assembly:

1. Check the bill of materials and make sure everything is present to begin assembly.
2. Discuss picking options with your Crane Operating Engineer. Make sure to discuss and plan out the proper pick points and complete tower erection.
3. Measure the bolts from the concrete and set each of the leveling nuts to 70mm above the concrete. Adjust each of the leveling nuts to make sure the leveling nuts of secondary foundation and tower foundation are same level surface.
4. Place a washer on each of the leveling nuts.



# Assembly of Pole

1. Check the bill of materials and make sure everything is present to begin assembly.

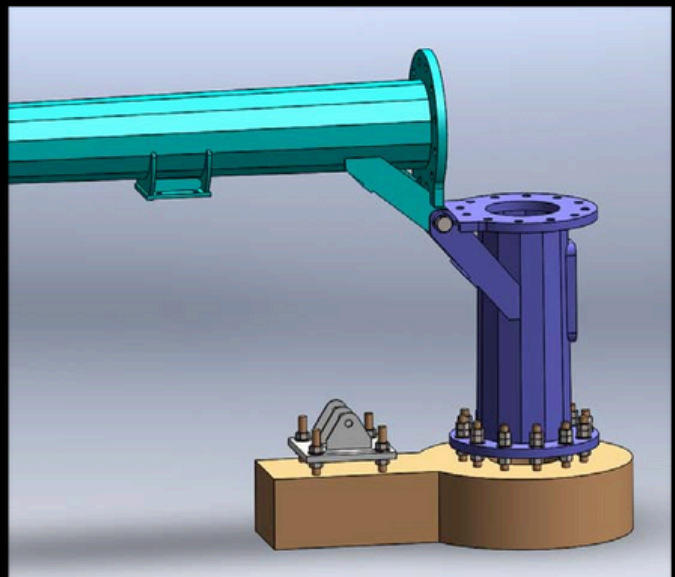
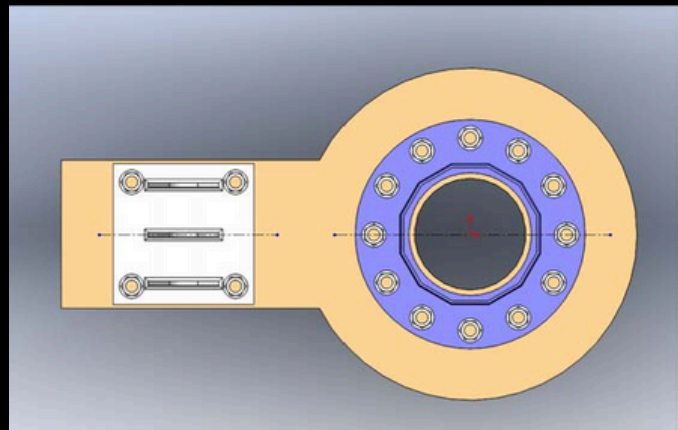
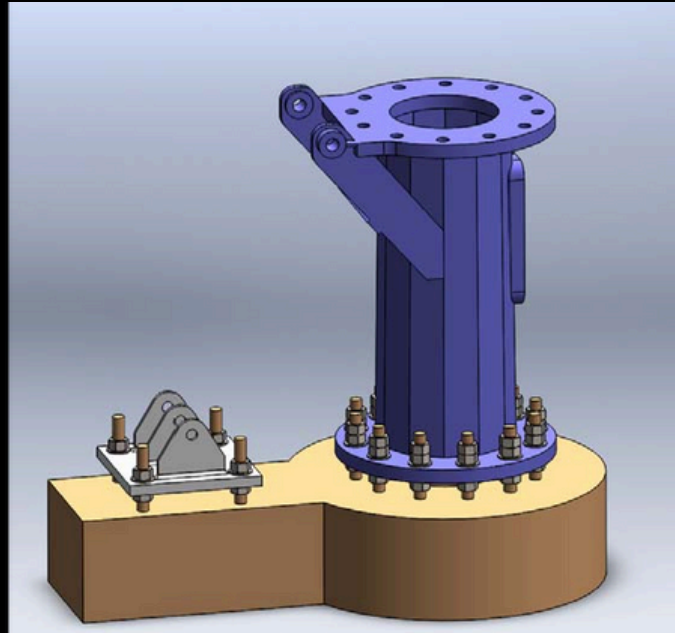
2. Put the bottom section and bottom bracket above the leveling nuts of the anchor bolts.

3. Adjust the bottom section and the bottom bracket to make sure their center line in the same line.

4. Fasten all anchor bolts down with the washer and nuts.

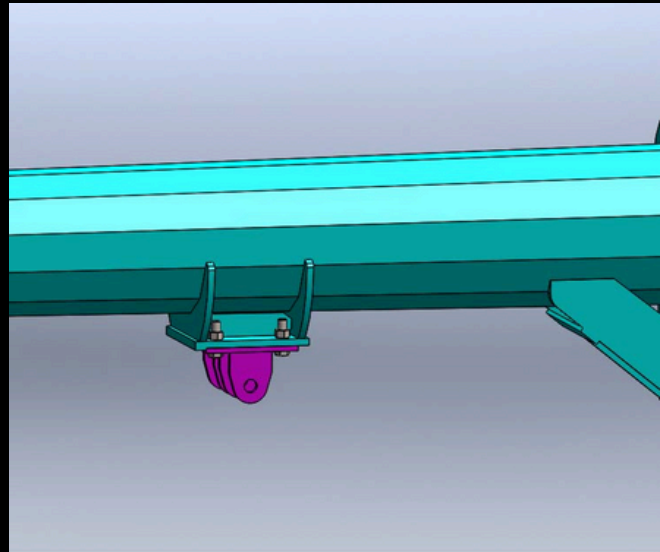
5. After all anchor bolt nuts are in place, tighten each to meet recommended bolt torque specifications found on last page of this manual.

6. Using the pivot axis or bolt to connect the second section to bottom section.

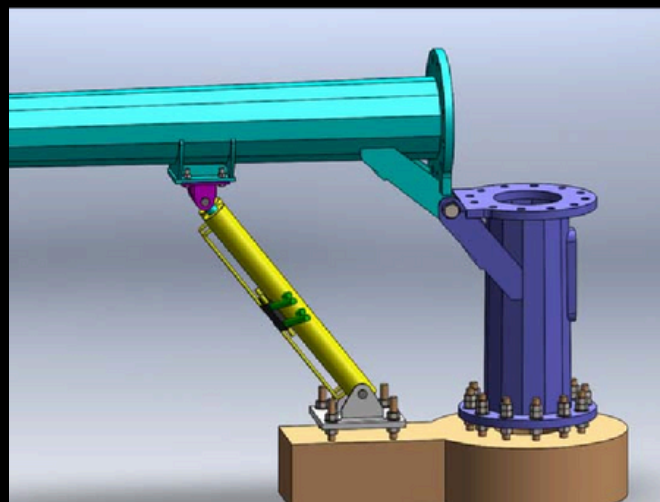


# Assembly of Pole

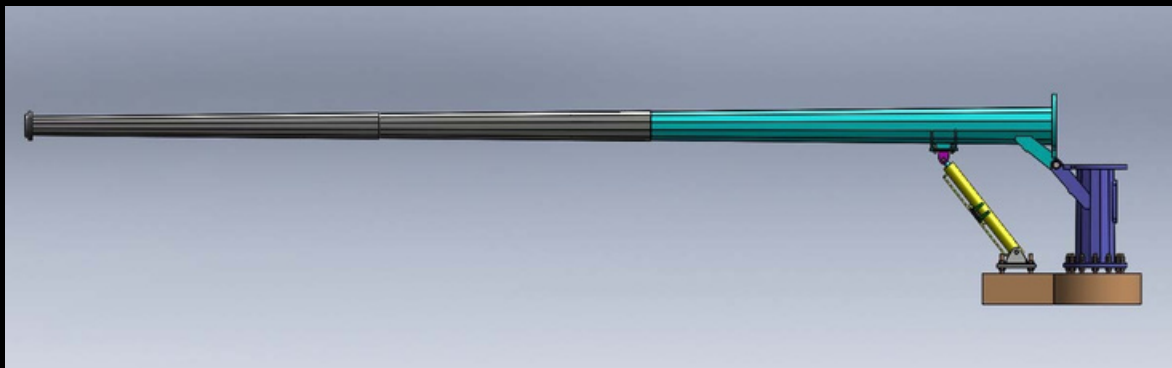
7. Using the bolts to connect the top bracket to the second section, tighten all bolts.



8. Put the hydraulic rams in place, using the pivot axis to connect the hydraulic rams to the top bracket and bottom bracket. And then plug the R-shaped pin.



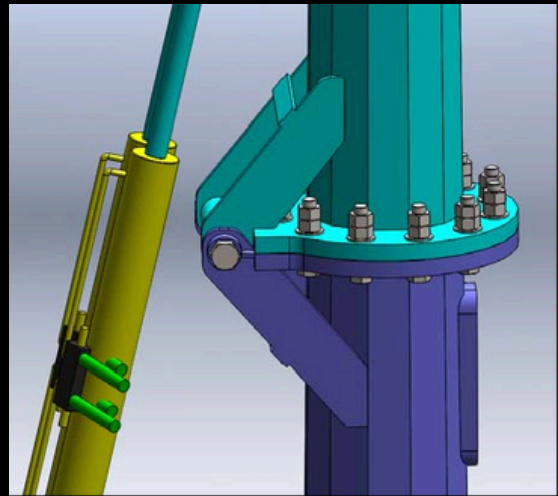
9. Assemble the other section to the second section using the crane or other machine. Measure and mark all slip distances. This is to make sure the tower meets the minimum slip distance and does not exceed the maximum.



## Raising and Lowering the Pole

### Raising the Pole

1. Using the hydraulic controls begin to raise the pole, ensure the pole lifts smoothly as possible.
2. When the pole is in the full upright position, insert the bolts around the flange connection and tighten the nuts to secure tower.
3. Remove the hydraulic rams and brackets if need when the all bolts are tighten.



### Lowering the Pole

1. Assemble the brackets and hydraulic rams attached the tower.
2. Loose the middle connection bolts, and make sure all bolts remove before lowering the pole.
3. Using the hydraulic controls to lowering the pole, ensure the pole lifts smoothly as possible.



## Hydraulic Pole BOM Reference Drawings

MAX SLIP: 1036mm  
DES SLIP: 883mm  
MIN SLIP: 355mm

MAX SLIP: 1086mm  
DES SLIP: 933mm  
MIN SLIP: 416mm

Hand hole cover-400x130

NO	PART NO.	DESCRIPTION	WEIGHT	QTY
11	PQ10002	6mm Allen Wrench		1
10	AS53601	Bolts set M35x480x90 2N1W		1
9	AS53302	Bolts set M33x160x90 2N2W		12
8	PI51602	Bolts M16x40		14
7	W14070707	Flange 12M16x170x50	11	1
6	PI50801	M8x30 Socket Head Cap Screw		2
5	AM80011	Hand hole Cover Assembly	2.2	1
4	W14070704	Section	128	1
3	W14070703	Section	148	1
2	W14131202	Section	358	1
1	W14131201	Section	227	1

AMBOR		Ambor Structures	
		amborstructures.com	
CLIENT		/	
TITLE		WP 11m	
DRAWN	ZI	2015/10/12	MATERIAL
ENGR	HL S	2015/10/12	THK(mm)
CHECKED	LI	2015/10/12	WT(kg)
SPECIFICATIONS		SCALE	BRO
			P/N: W141312

NO	PART NO.	DESCRIPTION	WEIGHT	QTY
5	PI5002	1- piece 20 #4		1
4	W1407004	Pivot Axis	1.8	2
3	AS53003	Top set M10x160x10 1N1W		4
2	W1407002	Bottom Connecting	45	1
1	W1407001	Top connecting	5.5	1

AMBOR		Ambor Structures	
		amborstructures.com	
CLIENT		/	
TITLE		2x900mm Hydraulic System	
DRAWN	ZI	2015/08/12	MATERIAL
ENGR	HL S	2015/08/12	THK(mm)
CHECKED	LI	2015/10/12	WT(kg)
SPECIFICATIONS		SCALE	50
			P/N: W1411301

## Recommended Bolt Torque

Recommended Bolt Torque for Grade 8.8 Connection Bolts						
Bolt Size (mm)	Width Across Flats (mm)	Net Area (mm <sup>2</sup> )	Yield Stress (Mpa)	Tension Force (N)	Recommended Torque N*m	Pretension Force (N)
10	16	58	640 (8.8)	37120	37 (27 lb.ft.)	18560
12	18	84	641 (8.8)	53952	65 (48 lb.ft.)	26976
16	24	157	642 (8.8)	100480	161 (119 lb.ft.)	50240
20	30	245	643 (8.8)	156672	313 (231 lb.ft.)	78336
24	36	353	644 (8.8)	225600	541 (400 lb.ft.)	112800
27	41	459	645 (8.8)	294016	794 (586 lb.ft.)	147008
30	46	561	646 (8.8)	358784	1076 (795 lb.ft.)	1179392
33	50	694	647 (8.8)	444160	1466 (1083 lb.ft.)	222080
36	55	817	648 (8.8)	522688	1882 (1390 lb.ft.)	261344
42	65	1121	649 (8.8)	717440	3013 (2225 lb.ft.)	358720
48	75	1473	650 (8.8)	942720	4525 (3342 lb.ft.)	471360
56	85	2030	651 (8.8)	1299200	7276 (5373 lb.ft.)	469600
Recommended Bolt Torque for Anchor Bolts						
Bolt Size (mm)	Width Across Flats (mm)	Net Area (mm <sup>2</sup> )	Yield Stress (Mpa)	Tension Force (N)	Recommended Torque (N*m)	Pretension Force (N)
20	30	245	355 (45#)	86904	174 (128 lb.ft.)	43452
24	36	353	356 (45#)	125138	300 (222 lb.ft.)	62569
27	41	459	357 (45#)	163087	440 (325 lb.ft.)	81544
30	46	561	358 (45#)	199013	597 (441 lb.ft.)	99507
33	50	694	380 (GR55)	263720	870 (643 lb.ft.)	131860
36	55	817	358 (45#)	289929	1044 (777 lb.ft.)	144964
42	65	1121	359 (45#)	397955	1671 (1234 lb.ft.)	198978
48	75	1473	360 (45#)	522915	2510 (1854 lb.ft.)	261458
56	85	2030	361 (45#)	720650	4036 (2981 lb.ft.)	360325

### Notes:

1. In our experience, we would prefer to apply 50% of maximum tension of the bolt as pretension force.

2. Pretension Torque:  $T_c = k \cdot D \cdot P_c$

$K=0.2$  (According to the Machine Design Handbook)

$D$  - Bolt Diameter

$P_c$  - Pretension force