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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	initial release	7/15/13	MGC



AFS 500 Installation Manual

Telecom-Small Wind (Above Grade)

CAD-generated drawing
do not manually update

 1043 Grand Ave., #213
St Paul, MN 55105 (651) 330 1263

APPROVALS	DATE
DRAWN MGC	7/15/13
CHECKED	
RESP ENG	
MFG ENG	
QUAL ENG	

AFS-500

CAD file :

Part #



MATERIAL See Notes
FINISH

DO NOT SCALE DRAWING

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Design Codes

- IEC 61400-1: Wind Turbines – Part 1: Design Requirements
- EN 1993 Eurocode 3: Design of steel structures – Part 1-1 & Part 1-8
- BS EN 1090-2:2008 Execution of steel structures and aluminum structures - Part 2: Technical requirements for steel structures
- EN 14399 High-strength structural bolting assemblies for preloading
- EN 1997 Eurocode 7: Geotechnical design
- TIA-222-G
- AISC & RCSC
- ASCE/SEI 7-05

Design Loadings

- Backfill / Ballast Material – Bulk Dry Density assumed to be **16 kN/m³**
- Minimum allowable soil bearing pressure shall be no less than **80 kPa**
- Steel Structure Self Weight – **1335 kg - 2100 kg** w/ side walls.
- Tower Reactions (unfactored):
 - Vertical (Fz) = **17.8 kN**
 - Horizontal (Fx) = **21.2 kN**
 - Moment (My) = **174 kNm**
- The above tower reactions are service loads for the Load Combination 1.0 Dead + 1.0 Wind and are applied to the buried foundation structure at the base of the tower (Ground Level)

Design Load Combinations.

- Dead: Tower Self Weight + Steel Structure Self Weight + Backfill Material Self Wt
- Wind: Tower Horizontal Reaction + Tower Moment Reaction
- Service: 0.9 Dead + 1.35 Wind
- Ultimate: 0.9 Dead +1.35 Wind

Geotechnical Investigation

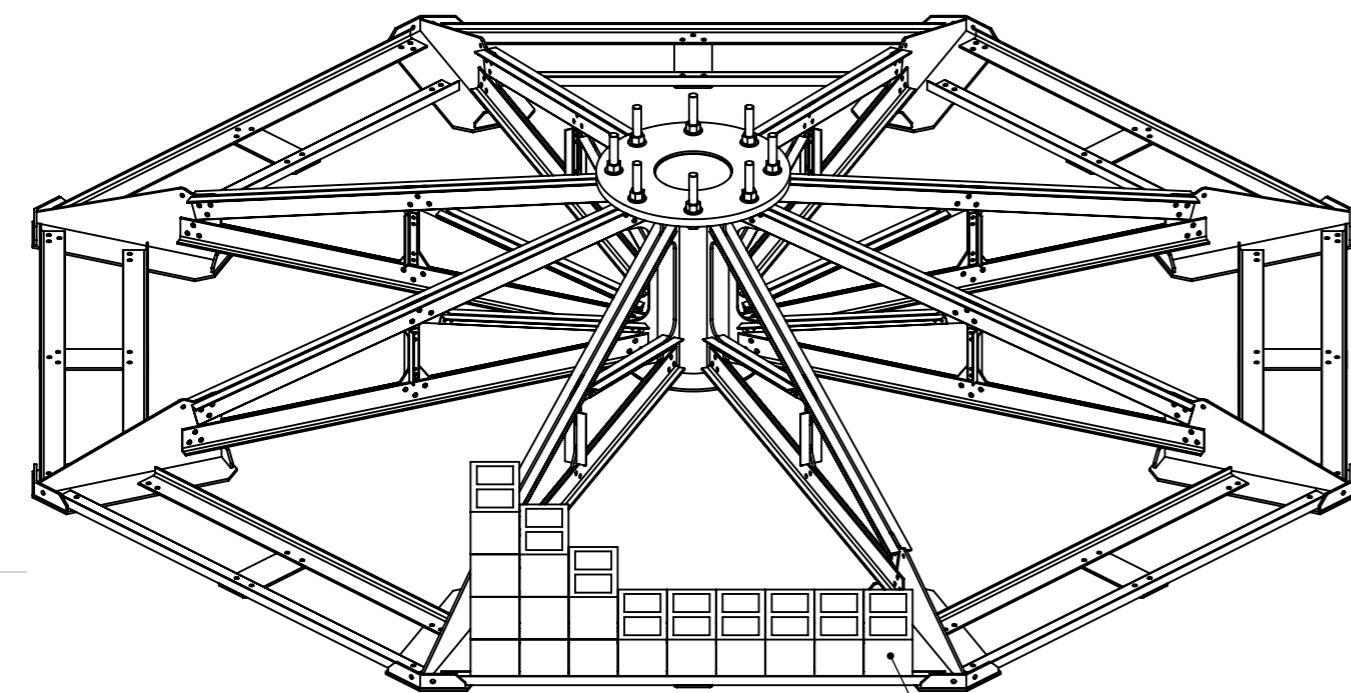
- It is recommended that a site study be conducted to verify that the soil parameters equal or exceed the requirements shown above.

Important Note:

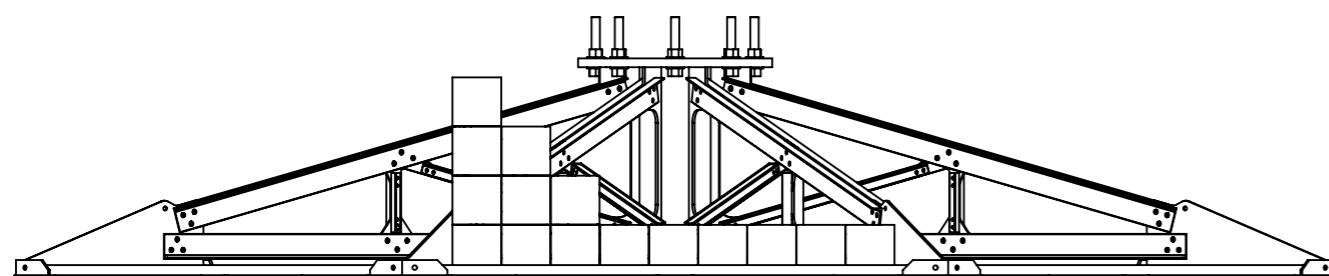
Please contact ARE directly with questions or concerns, or if just unsure about the aforementioned details and requirements.

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Concrete Block Ballast



Concrete Block

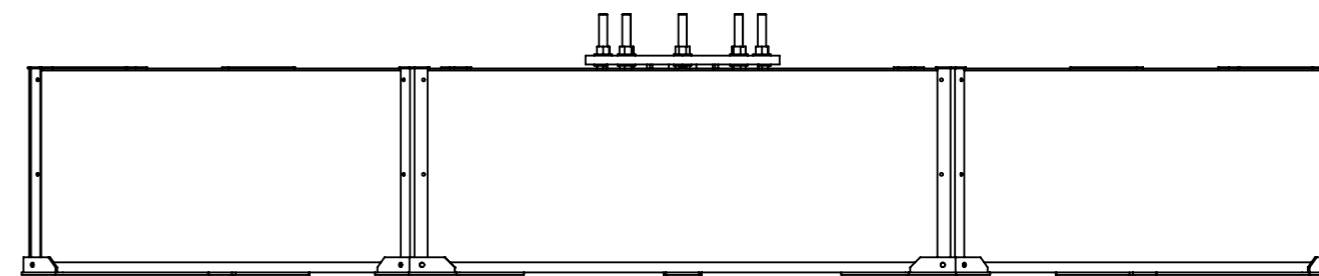
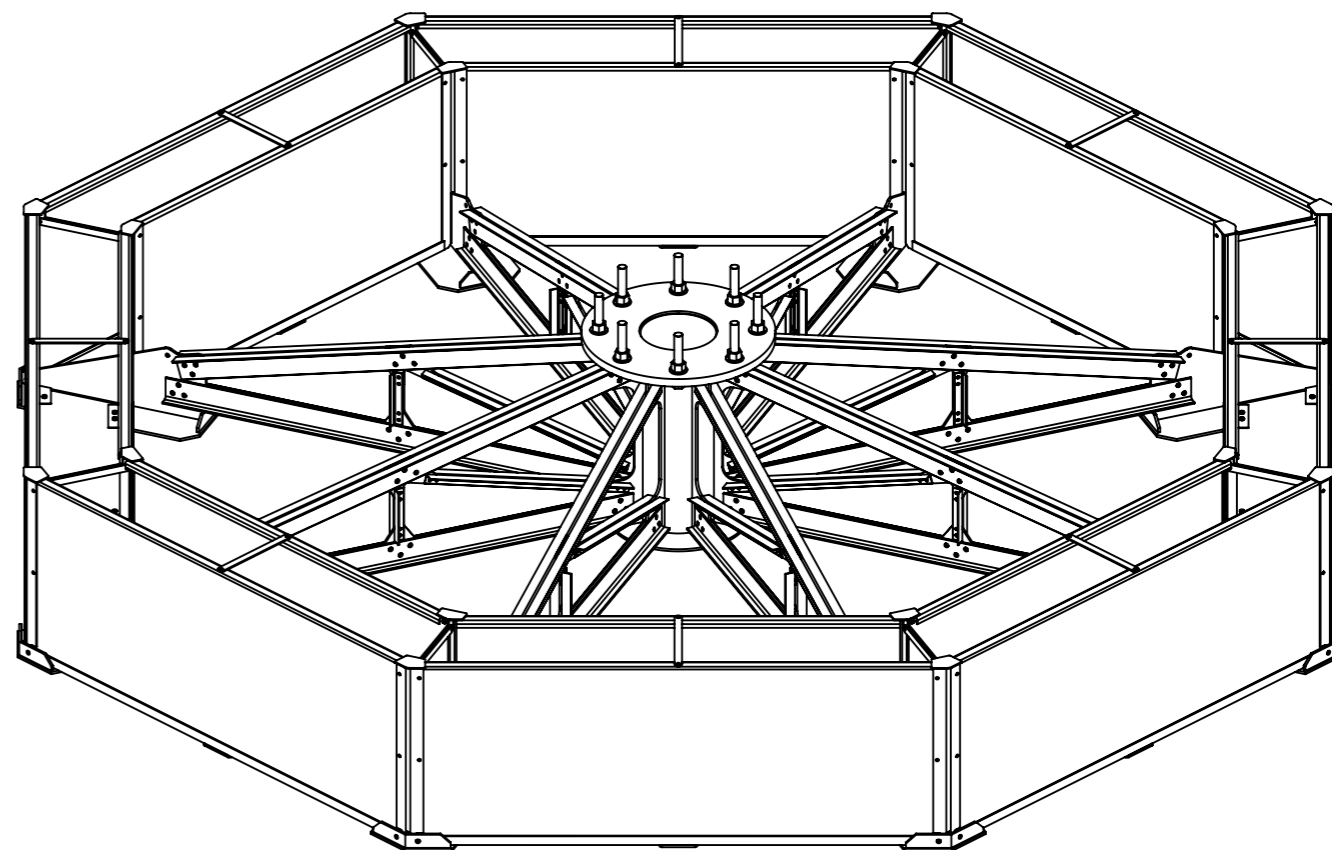


- Block weight = **17kg**
- Block dimensions = **397mm x 194mm 194mm**
- Maximum # of blocks = **288**

Note:

- Other options for ballast include GEO-BAGs, Concrete pavers, Direct Burial etc.
- Contact ARE for site specific requirements

Ballast Trough



- Trough holds **5.28 m3** of ballast material
- Minimum bulk density of ballast = **16kN/ m3**

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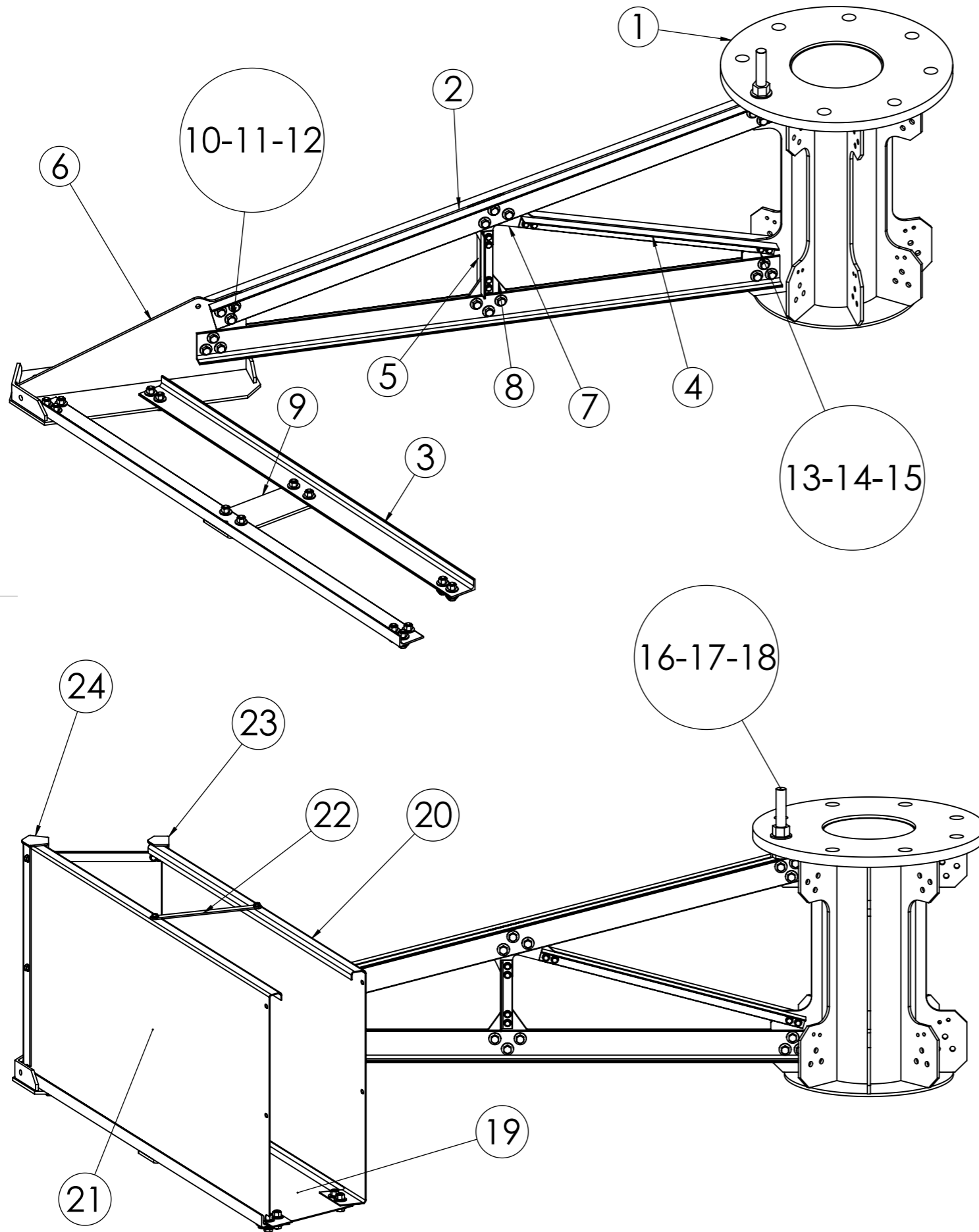
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Bill of Materials

#	Description	Qty	Part #
1	Kingpost	1	
2	RA 2000x100x40x6	40	
3	RA 1700x100x40x6	8	
4	RA 905x40x40x4	16	
5	RA 235x40x40x4	16	
6	Truss Heel	8	
7	Upper Gusset Plate	8	
8	Lower Gusset Plate	8	
9	Bearing Plate	8	
10	M16 x 50mm Hex Bolt gr8.8	256	
11	M16 Hex Nut	256	
12	M16 Washer	512	
13	M10 x 35mm Hex Bolt gr8.8	160	
14	M10 Hex Nut	160	
15	M10 Washer	320	
16	M33 x 200mm Rod gr8.8	8	
17	M33 Hex Nut	32	
18	M33 Washer	32	
19	Floor Plate	8	
20	Inside Wall	8	
21	Outside Wall	8	
22	Link (367mm)	24	
23	Inside Brace	8	
24	Outside Brace	8	

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Preloaded High Strength Structural bolts

- The bolts shall be in accordance with **DIN 6914 / ISO 7412**.
- The bolts shall be installed and preloaded in accordance with **BS EN 1090-2:2008** Execution of steel structures and aluminum structures - Part 2: Technical requirements for steel structures.
- The slip resistances of the structural bolts were calculated in accordance with **EN 1993-8: 2005**.
- Steel will be hot dipped galvanized after fabrication.
- The friction coefficient factor is taken as **0.2** which is recommended for hot dipped galvanized surfaces.

Preloaded bolt installation

- The contact surfaces shall be free from all contaminants, such as oil, dirt or paint.
- Burrs that would prevent solid seating of the connecting parts shall be removed.
- Preload bolts using the torque control method or other methods described in **EN 1090-2:2008**.

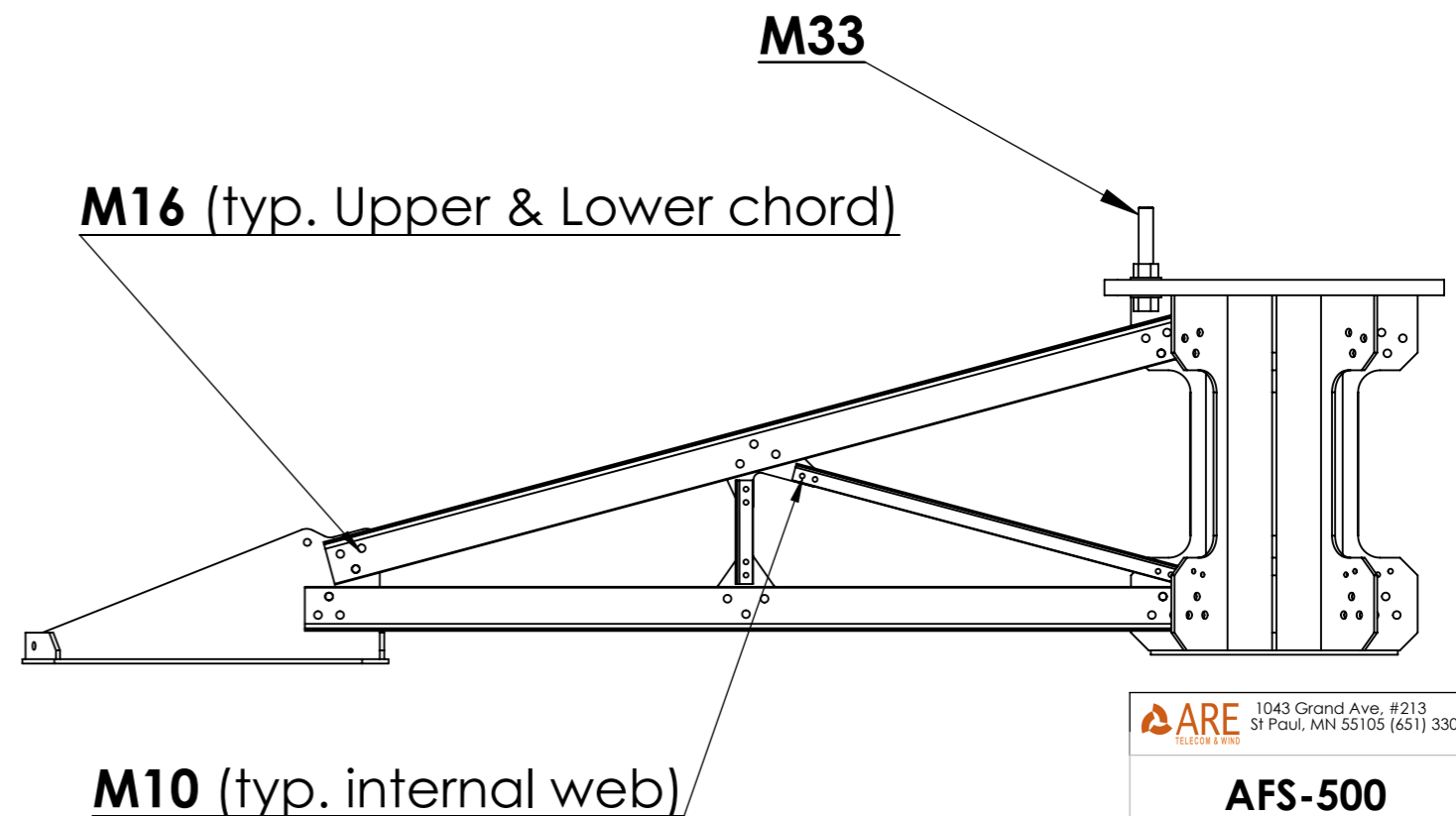
- **Torque control method**

- In the torque control method the torque is applied in two steps.
 1. The first step, after bedding of the joint, is to apply a torque of up to **75%** of the required torque value to all the bolts.
 2. The second step is to apply an additional torque to each bolt such that the total applied to the bolt is up to **110%** of the required nominal torque value.

The **extra 10%** is to offset the subsequent torsional relaxation of preload in the connection when the tightening wrench is removed.

Bolt Torque and Preload Requirements

Bolt Size (Gr 8.8)	Torque Coefficient	Torque (N-m)	Torque 75% (N-m)	Torque 110% (N-m)	Preload (kN)
M33x3.5	0.2	1900	1425	2090	289
M16x2	0.2	220	165	242	69
M10x1.5	0.2	50	37.5	55	25




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