Formit Services Pty Ltd

STRUCTURAL CERTIFICATION OF 2000 EFFLUENT TANK SKID FRAME

12 March 2025

Rev No. 1

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Revision	Issue Date	Revision Details
1	12/03/2025	Revised Drawings
0	08/02/2022	Original Certification

Author:	Benjamin Landers BEng(Civil) GradMIEAust Structural / Civil Engineer	Signed:	
Reviewed By:	Nicholas Diemar BEng(Civil)(Hons) MIEAust CPEng NER RPEQ Principal Engineer & Associate	Signed:	

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1. INTRODUCTION

In accordance with Formit Services' request to provide certification of the 2000L effluent tank frame supporting an amenities building structure, we submit the following information.

2. ENGINEER

Benjamin Landers
Bachelor of Engineering (Civil)(Hons)
University of Newcastle
Member of the Institution of Engineers Australia (Reg No. 4624777)

3. SUPERVISING ENGINEER

Nicholas Diemar
Bachelor of Engineering (Civil) (Hons)
University of Newcastle
Chartered Professional Engineer (NPER-3)
Member of the Institution of Engineers Australia (Reg No.2175285)
Registered Professional Engineer of Queensland (Registration No.10030)

4. GENERAL

This document should be read in conjunction with drawings listed below in Table 1, provided by Formit Services, located in Appendix A.

Table 1: Engineering Drawings

Drawing Number	Title
WT-1208-125	2000 Tank Frame Assembly
WT-1208-122	2000 Tank Frame Top
WT-1208-126	2000 Tank Frame Base
	100x50x4x1910RHS Skids
	50x50x2.5x1910_2000 Tank Top Frame Rails
	2000 Tank Frame Assembly

5. DESIGN BASIS

Our office was engaged to provide a design certification for the 2000L effluent tank skid frame which can be lifted by a forklift or a crane and dragged on ground. The tanks are to be completely emptied before being lifted or dragged. The loads are to be evenly distributed on the 2 forklift tines which are to penetrate at least halfway into the tine tubes, or evenly distributed on the 4 end-rod drag loops for lifting, and 2 end-rod drag loops for dragging.

This certification covers four situations for the fully assembled frame:
1) Skid frame located on the ground and supporting the effluent tanks and amenities block
2) Skid frame and tank (empty) being lifted by forklift
3) Skid frame and tank (empty) being lifted by crane with slings evenly arranged between the four end-rod drag loops
4) Skid frame and tank (empty) being dragged with slings evenly arranged between two end-rod drag loops.

All design loads are as determined by Australian Standards.

All design work was carried out in accordance with the following standards:

- AS/NZS 1170.0 General principles
- AS/NZS 1170.1 Permanent, imposed and other actions
- AS/NZS 1170.2 Wind loads
- AS 4100 Steel structures
- AS 1418.1 Cranes, hoists, and winches

For wind loading the structure is to be located in an environment equivalent to a (at worst) wind region A and terrain category 2 in accordance with AS1170.2. If the location of the structure is such that it will be subject to greater loads then an engineer must be consulted.

We have not assessed the suitability of the forklift or lifting devices. We believe this is to be the responsibility of others.

Tie downs and fixing of the of the amenities structures to the frame is considered responsibility of others.

6. DEFINED CRITERIA

Rational engineering judgment has been used to decide which components require checking with design certification calculations. A finite element analysis model was used to determine to distribution of loads and capacity of members.

7. DESIGN LOADINGS

The tank frame was certified to support an amenities structure with a uniform mass of 1500kg plus a maximum of 6 people uniformly distributed inside, in addition to other loading criteria as required by the Australian Standards.

One plastic effluent 2000L tank sits along the 2.4m frame. This weight is uniformly distributed along the square hollow sections of the bottom frame. The amenities building structure with a mass of 1500kg and considering 6 occupants, is supported as described above.

The tanks contents are mostly water. The sections used were 300 grade steel members and 350 grade galvanized steel members. The amenities structure is supported on rails 0.3m from the edge of the frame and is required to be fixed to the skid frame.

The maximum combined mass of the skid frame and empty waste tank to be lifted either by crane or forklift is 360kg.

Ultimate limit states design factors used in the design are as follows:

- Dead load (only) factor of 1.35
- Dead load factor of 1.2
- Live load factor of 1.5
- Dynamic factor of 1.8

8. STATEMENTS & DISCLAIMERS

We confirm that the 2000L effluent tank skid frame with tine tubes as detailed in the drawings noted in Table 1 (above) and shown in Appendix A, is structurally satisfactory for the Load Limits noted in Section 7 above, provided the following are adhered to;

- The structure is inspected every 12 months (maximum), or as otherwise required to ensure no structural damage is evident.
- The certificate is applicable only if the structures are not affected by heat, adverse chemicals, excessive vibrations, or other external factors unknown and not noted to the certifying engineer.
- All items constructed are in accordance with the drawings & specifications as referenced by this certificate.
- All construction and materials is to be in accordance with Australian Standards, particularly AS4100 Clause 2.2.
- All welding is a minimum of 3mm GP continuous fillet welds all around, UNO.
- No modifications shall be made from the drawings attached in Appendix A, which would significantly increase the mass, alter the stability, or affect the design strength of the structure.
- The amenities structure is removed before moving the skid frame.
- The forklift tines penetrate at least halfway into the tine tubes.
- The effluent tanks are pumped out such that they are empty before moving the skid frame.
- The allowable bearing capacity of the ground is to be at least 100kPa.
- The structure is located in no worse than wind region A and terrain category 2 as per AS 1170.2.

APPENDIX A DRAWINGS

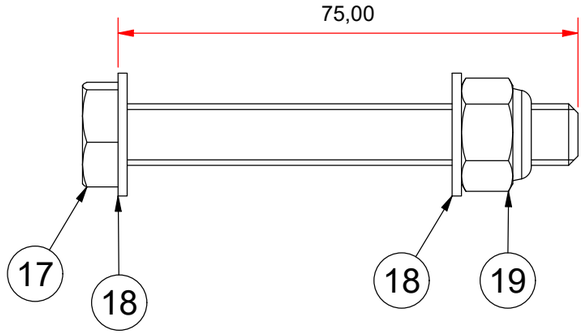
17-09-2021 Fix typo in part list for bolt size. Said 70mm but is 75mm

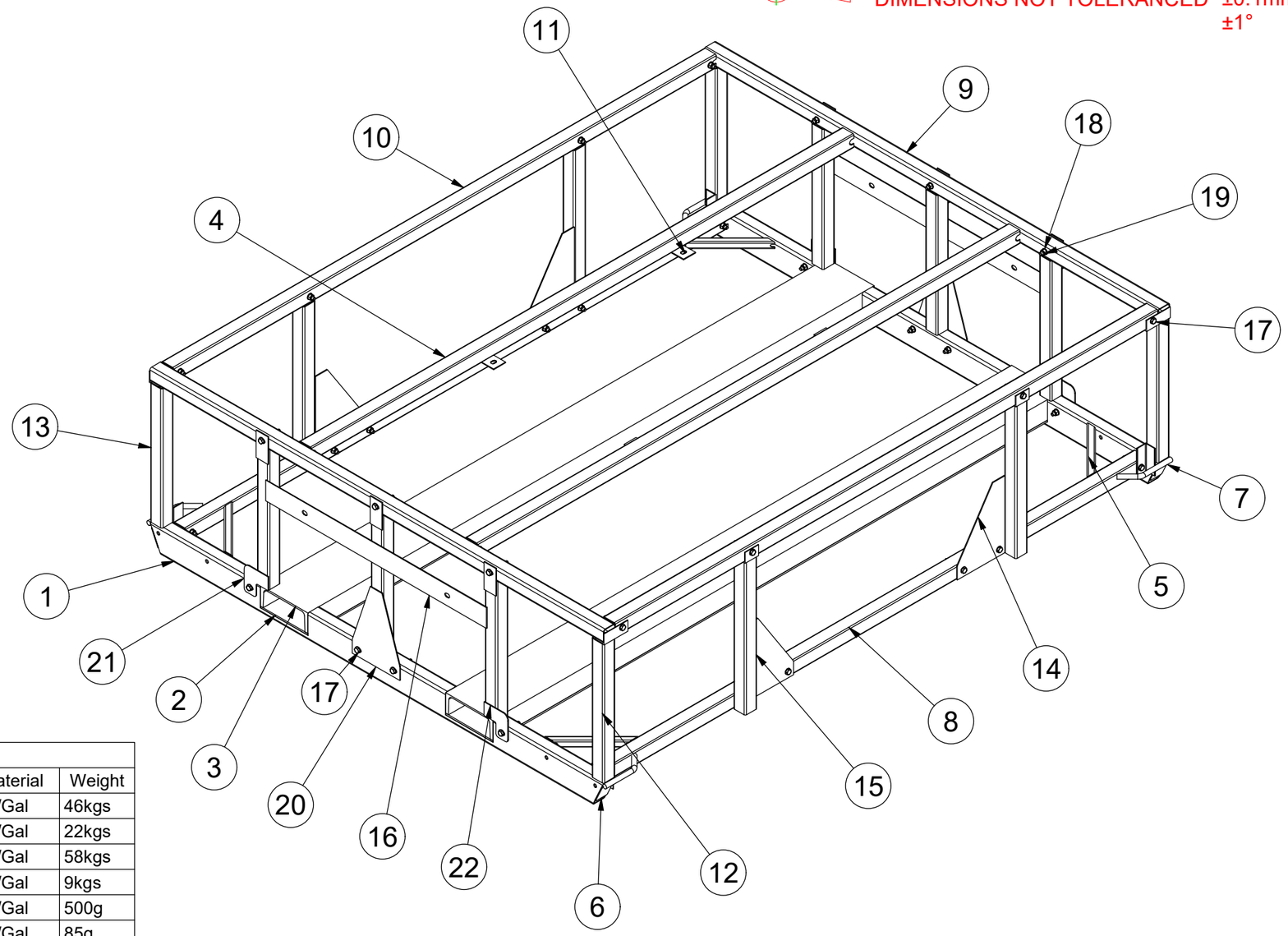
FOR MANUFACTURE

DO NOT SCALE

DIMENSIONS ARE METRIC
DIMENSIONS NOT TOLERANCED ±0.1mm
±1°

Bolts, Nuts & Washers to be hot dipped Galvanised grade





Parts List					
ITEM	QTY	REV	DESCRIPTION	Material	Weight
1	2		100x50x4x1910RHS Skids	MS/Gal	46kgs
2	2		2385x200x6 Tine Back Plate_Common Part	MS/Gal	22kgs
3	2		PFC 200 x 75 x 23_ Tine Pocket_Common Part	MS/Gal	58kgs
4	2		SHS50x50x2.6x2385_Base Cross Members_Common Part	MS/Gal	9kgs
5	4		25x25x3x280_Base Corner Brace_Common Part	MS/Gal	500g
6	4		End Plates for Skids_Common Part	MS/Gal	85g
7	4		16dia Bent Rod_Common Part	MS/Gal	310g
8	2		SHS50x50x2.6x2385_Base Cross Members Ends_Common Part	MS/Gal	7.8kgs
9	2		50x50x2.5x1910_2000 Tank Top Frame Rails	MS/Gal	20.5kgs
10	2		SHS50x50x2.6x2385_Top Cross Members Ends_Common Part	MS/Gal	8.5kgs
11	4		Top Frame Tank Attatchment_Common Part	MS/Gal	8g
12	2		Corner Post LH_Common Part	MS/Gal	2.2kgs
13	2		Corner Post RH_Common Part	MS/Gal	2.2kgs
14	2		End Mid Post RH_Common Part	MS/Gal	3kgs
15	2		End Mid Post LH_Common Part	MS/Gal	3kgs
16	2		930x75x3 Bridge Plate_Common Part	MS/Gal	1.6kgs
17	34		M10x75 Hex Bolt Hot Galvanised	Steel/Gal	55g
18	68		M10 Plain Washers Hot Galvanised	Steel/Gal	3g
19	34		M10 NYLOC Nut Hot Galvanised	Steel/Gal	10g
20	2		2000 Side Mid Post	MS/Gal	2.9kgs
21	2		2000 Mid Side Post RH	MS/Gal	2.1kgs
22	2		2000 Mid Side Post LH	MS/Gal	2.1kgs

BLESBOK Enterprises PTY. LIMITED

MATERIAL	Drawn: TK	Date: 9/01/2020	TITLE: 2000 Tank Frame Assembly
Material: MS/Galvanised Colour: Weight: 286-306kgs	REV Date:	REVISION	Stock No.: WT-1208-125
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	1 / 6 A3

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17-09-2021 Fix typo in part list for bolt size. Said 70mm but is 75mm

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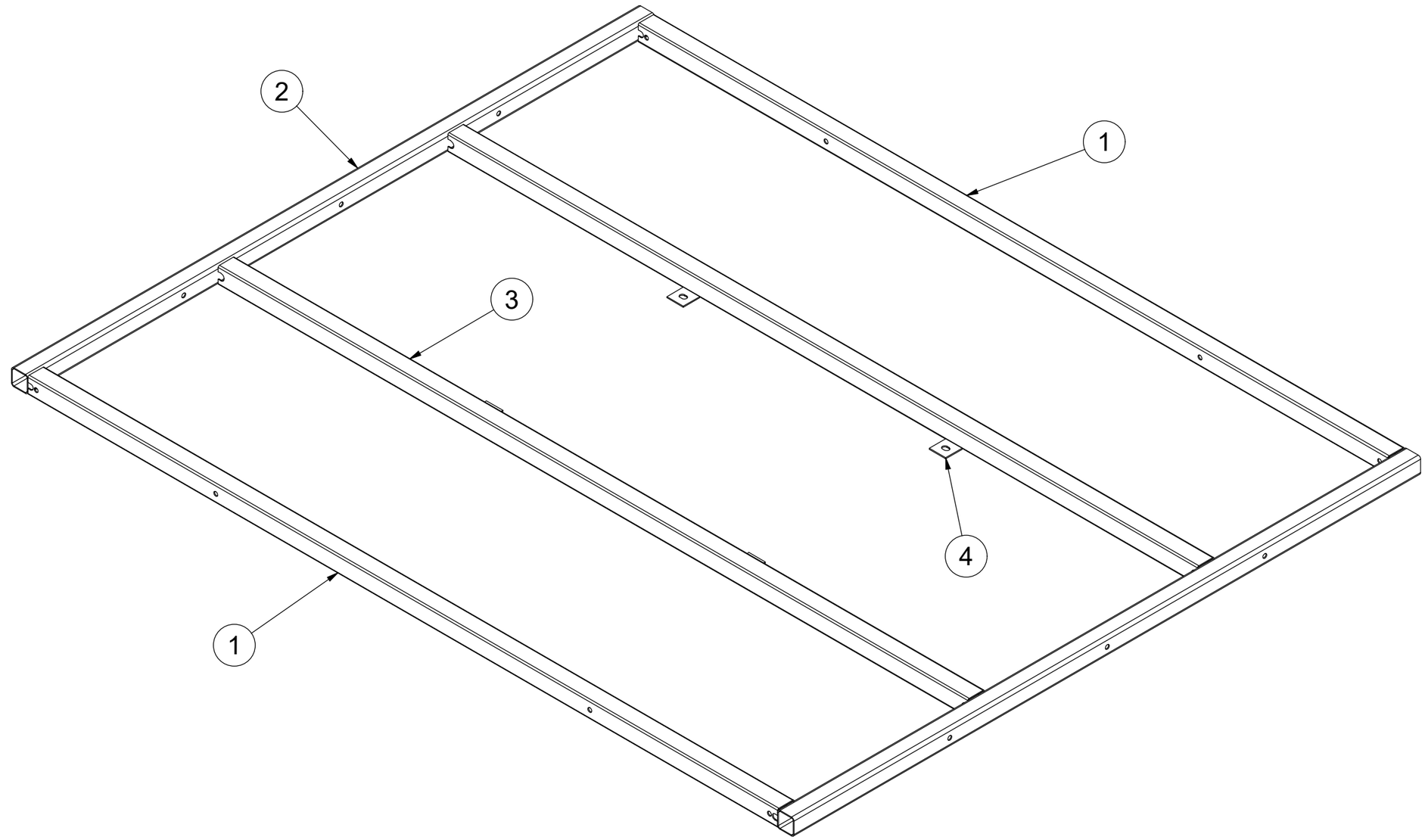

Parts List					
ITEM	QTY	REV	DESCRIPTION	Material	Weight
1	2		SHS50x50x2.6x2385_Top Cross Members Ends_Common Part	MS/Gal	8.5kgs
2	2		50x50x2.5x1910_2000 Tank Top Frame Rails	MS/Gal	20.5kgs
3	2		SHS50x50x2.6x2385_Base Cross Members_Common Part	MS/Gal	9kgs
4	4		Top Frame Tank Attatchment_Common Part	MS/Gal	8g

BLESBOK Enterprises PTY. LIMITED

MATERIAL	Drawn: TK	Date: 9/01/2020	TITLE: 2000 Tank Frame Top
Material: As Per Parts List Colour: As Per Parts List Weight: 48kgs	REV Date:	REVISION	Stock No.: WT-1208-122
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	2 / 6 A3

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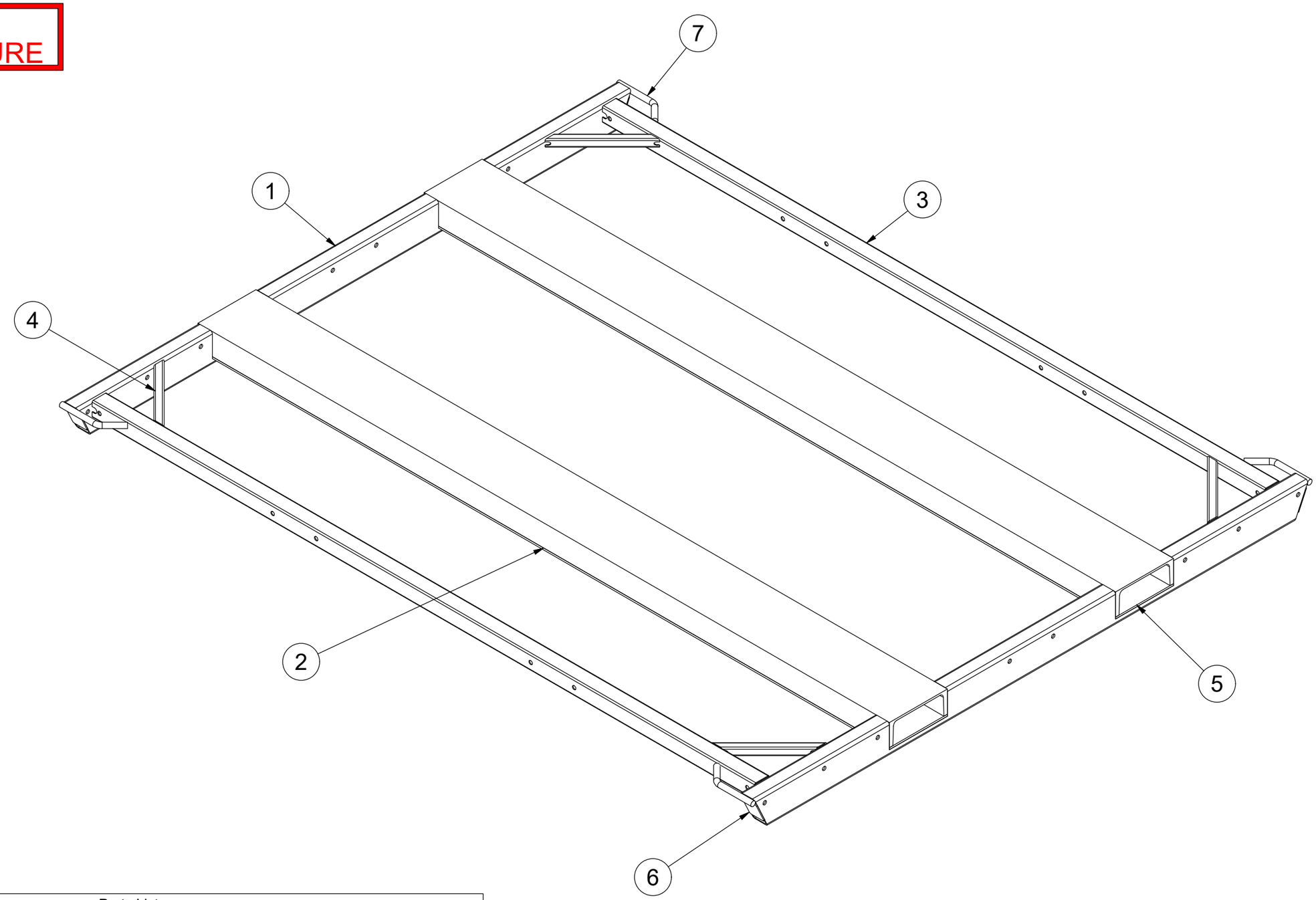

Parts List					
ITEM	QTY	REV	DESCRIPTION	Material	Weight
1	2		100x50x4x1910RHS Skids	MS/Gal	46kgs
2	2		PFC 200 x 75 x 23_ Tine Pocket_Common Part	MS/Gal	58kgs
3	2		SHS50x50x2.6x2385_Base Cross Members Ends_Common Part	MS/Gal	7.8kgs
4	4		25x25x3x280_Base Corner Brace_Common Part	MS/Gal	500g
5	2		2385x200x6 Tine Back Plate_Common Part	MS/Gal	22kgs
6	4		End Plates for Skids_Common Part	MS/Gal	85g
7	4		16dia Bent Rod_Common Part	MS/Gal	310g

BLESBOK Enterprises PTY. LIMITED

MATERIAL	Drawn: TK	Date: 9/01/2020	TITLE: 2000 Tank Frame Base
Material: As Per Parts List Colour: As Per Parts List Weight: 208kgs	REV Date:	REVISION	Stock No.: WT-1208-126
	DRAWING PRACTICE TO: AS1100		SCALE: N.T.S. 3 / 6 A3

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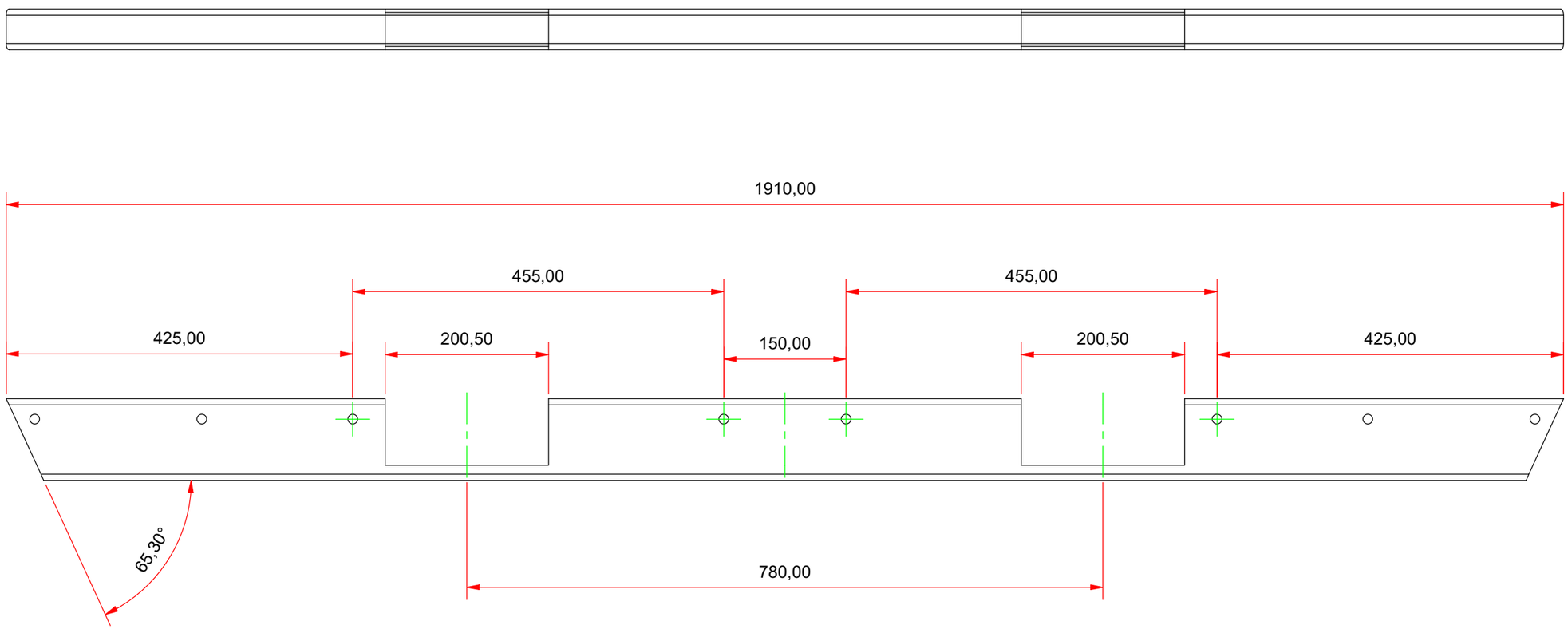

BLESBOK Enterprises PTY. LIMITED			
MATERIAL	Drawn: TK	Date: 9/01/2020	TITLE: 100x50x4x1910RHS Skids
Material: MS/Gal Colour: Weight: 46kgs	REV Date:	REVISION	PART No.:
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	4 / 6 A3

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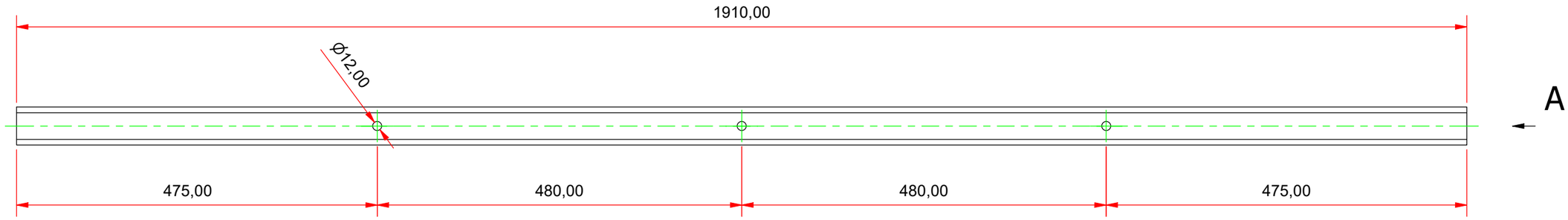

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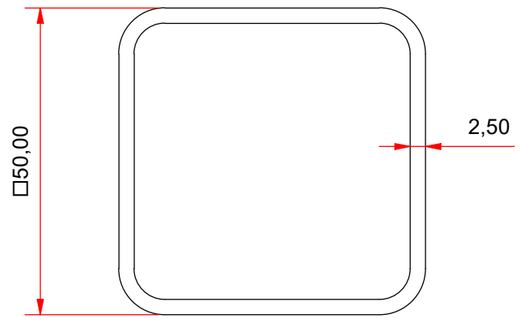

26-05-2021 Taken off Quotation Only- a few extra views added

FOR MANUFACTURE

BLESBOK Enterprises PTY. LIMITED

MATERIAL	Drawn: TK	Date: 9/01/2020	TITLE: 50x50x2.5x1910_2000 Tank Top Frame Rails
Material: MS/Gal Colour: Weight: 20.5kgs	REV Date:	REVISION	PART No.:
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	5 / 6 A3

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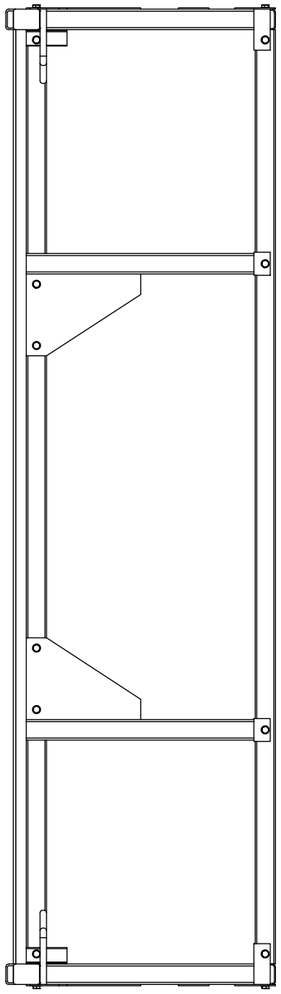

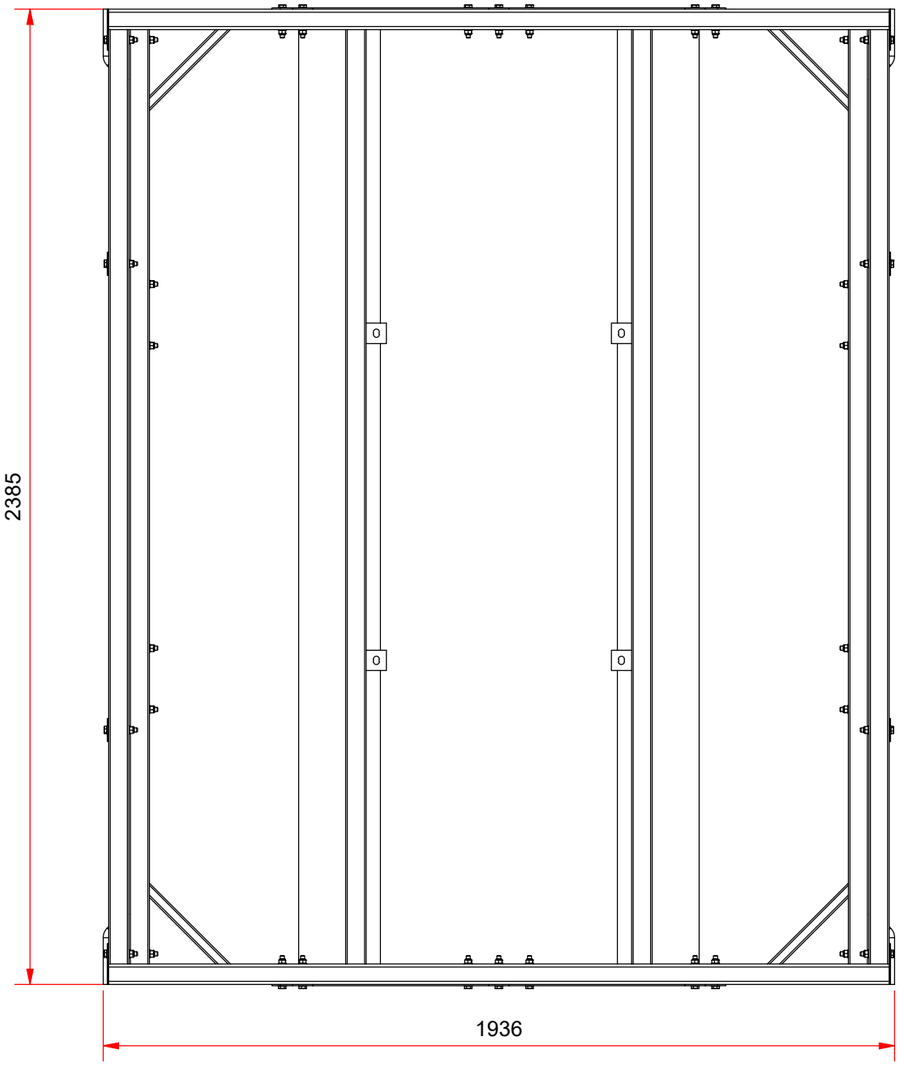

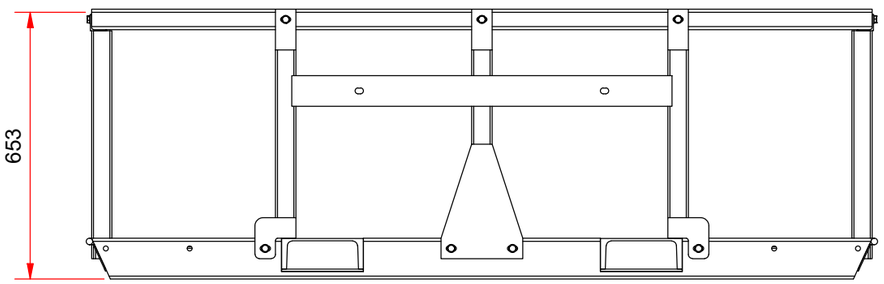

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Material: MS/Galvanised Colour: Weight: 286-306kgs	REV Date:	REVISION	Stock No.: WT-1208-125
	DRAWING PRACTICE TO: AS1100	SCALE: N.T.S.	6 / 6 A3

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