

**Site Technical Query - Form**

SN1809-0000/XE.FRM/0001 Rev 4 03/02/2021

TQ Number:		Project:	
CW2148472	-A010- 0103	Oyu Tolgoi Underground Project	
A. To be completed by or on behalf of the Contractor			
Contractor/Sub-Contractor Name:	MCS International	Date Response	08/09/2022
Contract Title:	Haulage Truck Workshop /C-004D/	Plant Area &	1883
Contract No.	CW2148472	Contractor TQ Number:	TWS-0415-TQ-0103
Discipline Codes (Mandatory) <input type="checkbox"/> D1 (CSA) - <input checked="" type="checkbox"/> D2 (MP) - <input checked="" type="checkbox"/> D3 (E&I) - <input type="checkbox"/> D4 (Other) - <input type="checkbox"/>			

*Description of Technical Query (List affected drawings and specifications):***SD-101 support length issue**

Contractor will install oil hydraulic pipe class S4B with stauff clamp on SD-101 support. Clamps shall be welded on support all around, height is 6mm as per SP-50-017. However, support length is 1300mm and clamp plates length is 135mm. 8ea clamps don't fit the SD-101 support type due to longer than normal stauff clamp size.

 Routine Urgent

Refer Technical Query instructions

Proposed Action (List all attachments)

Therefore, the contractor proposes to hang the pipe support SD-101 with chain and D shackle from cleat plate to fit the clamps on support beam. Simulation results on 2 options are attached.

Option 1: Make hole (D20) on cleat plate and hang supports from drilled hole (attachment 3).

Option 2: Additionally Weld 100x100x8 plate on cleat plate. Then drill hole on cleat plate and hang supports from drilled hole (attachment 4).

Effect on cost (USD):	NO		
Effect on schedule (Days):	NO		
Effect on quality:	NO		
Requested by (Name):	Delgersuren N.	Position:	SMP Field Engineer
Signature:		Date: (dd/mm/yyyy)	06/09/2022

B. To be completed by Jacobs Field Engineer*Comments/recommendations by Engineering*

Contractor's proposal#1 is acceptable subject to:

- Shackles shall be above or higher WLL than the Note 13 on 0000-50-N1-1110.
- Chain slings to be installed as vertical as possible within +/-15 degree tolerance.

Note. Contractor shall double-check detailed specifications and dimensions of any off-brand identical items to prevent such issue from arising.

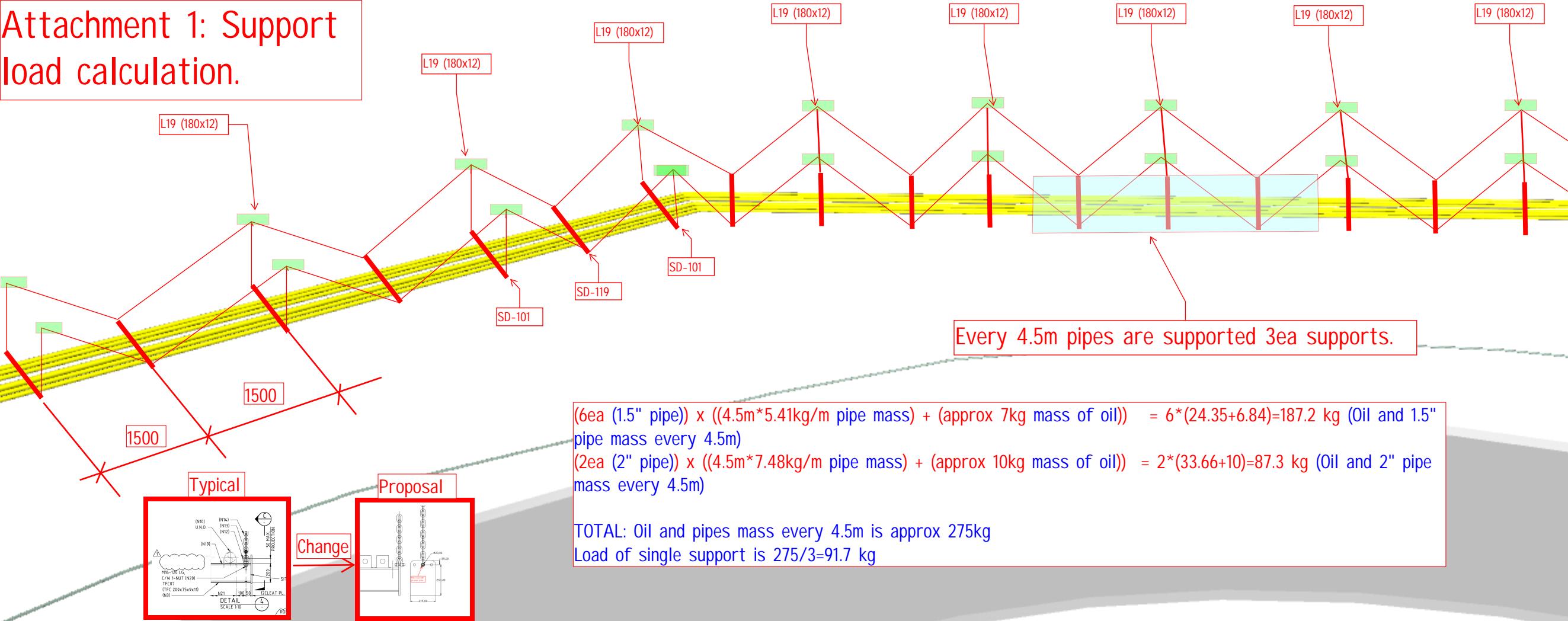
*Disclaimer:**Acceptance or rejection of this TQ is only related with technical aspects.**If Cost or Schedule Impact are associated with this TQ, it must be discussed separately with Jacobs Contract team.*

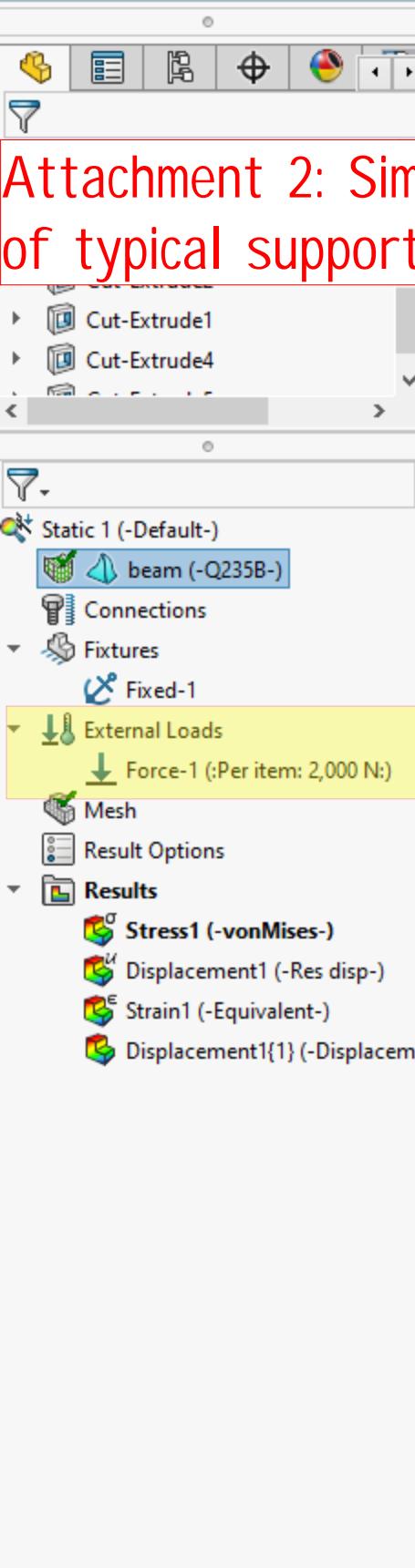
C. Engineering Decision		D. Information		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accept with comments	Reject	Design Change Distribute to: Design Author DA	Cost Impact Distribute to: Contracts, Proj. Controls & Construction Manager	Schedule Impact Distribute to: Proj. Controls & Construction Manager

REVIEWER		APPROVER		CONSTRUCTION MANAGER	
Field Engineer OR Lead Engineer		Lead Engineer OR Chief of Engineering		(If Cost and/or Schedule Impact)	
Date: (dd/mm/yyyy)		Date: (dd/mm/yyyy)		Date: (dd/mm/yyyy)	

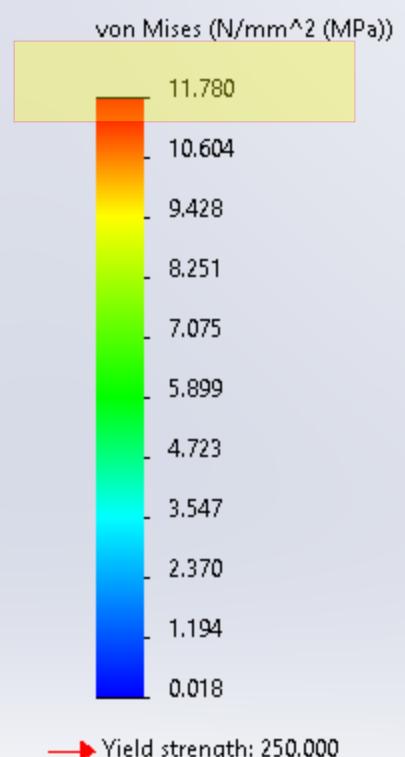
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Attachment 1: Support load calculation.



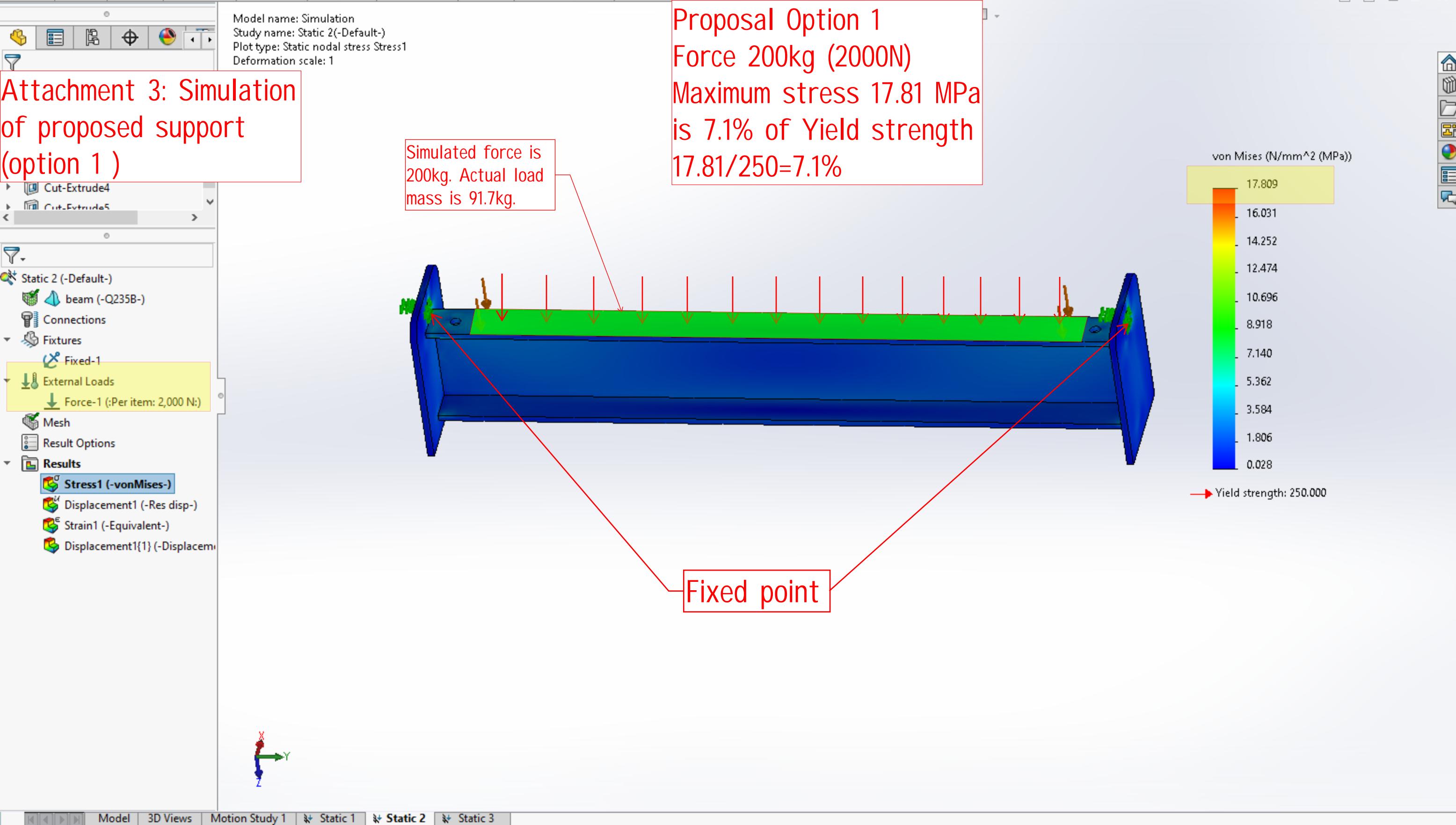


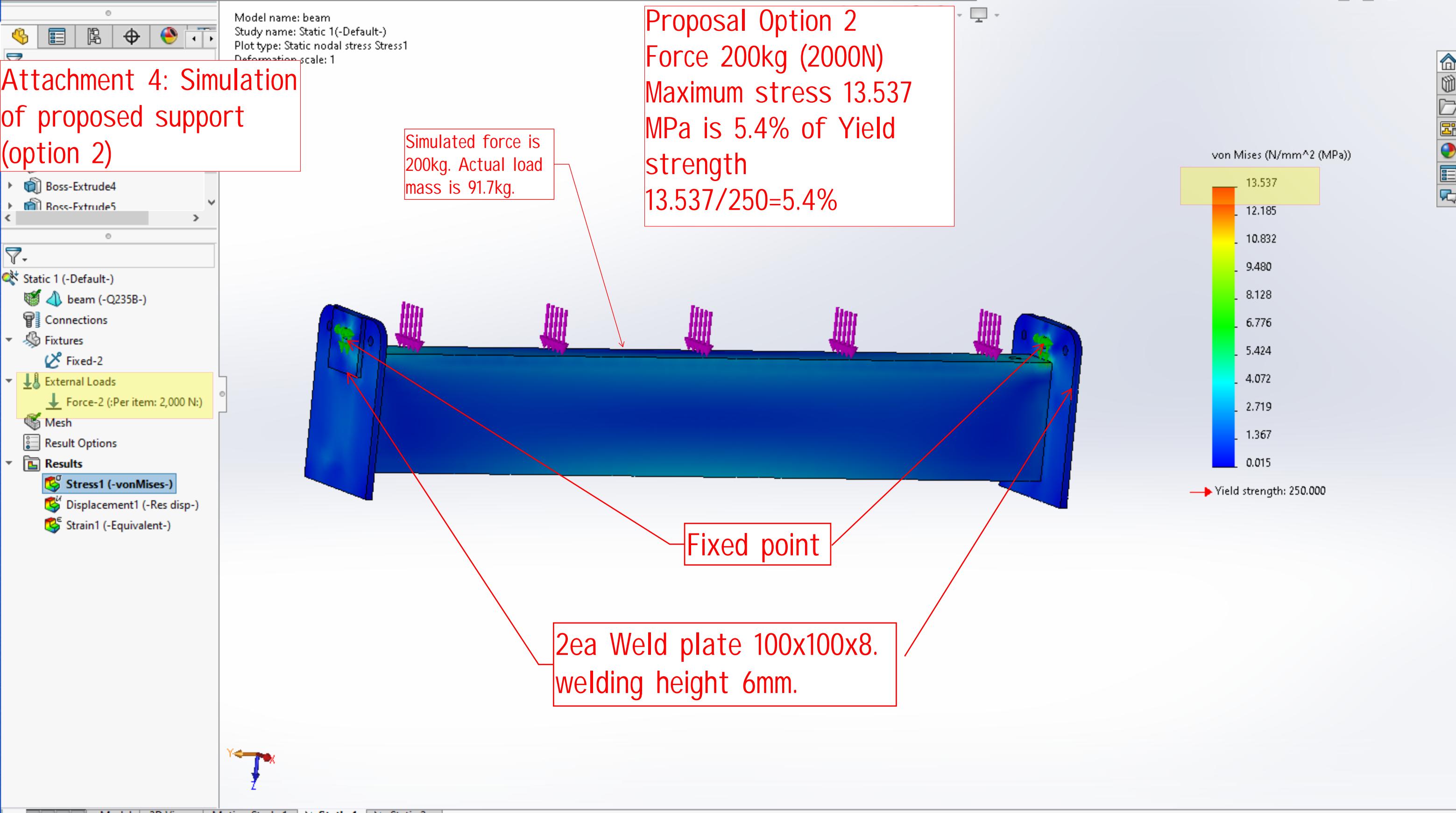
Force 200kg (2000N)
Maximum stress 11.78 MPa
is 4.7% of Yield strength
 $11.78/250=4.7\%$



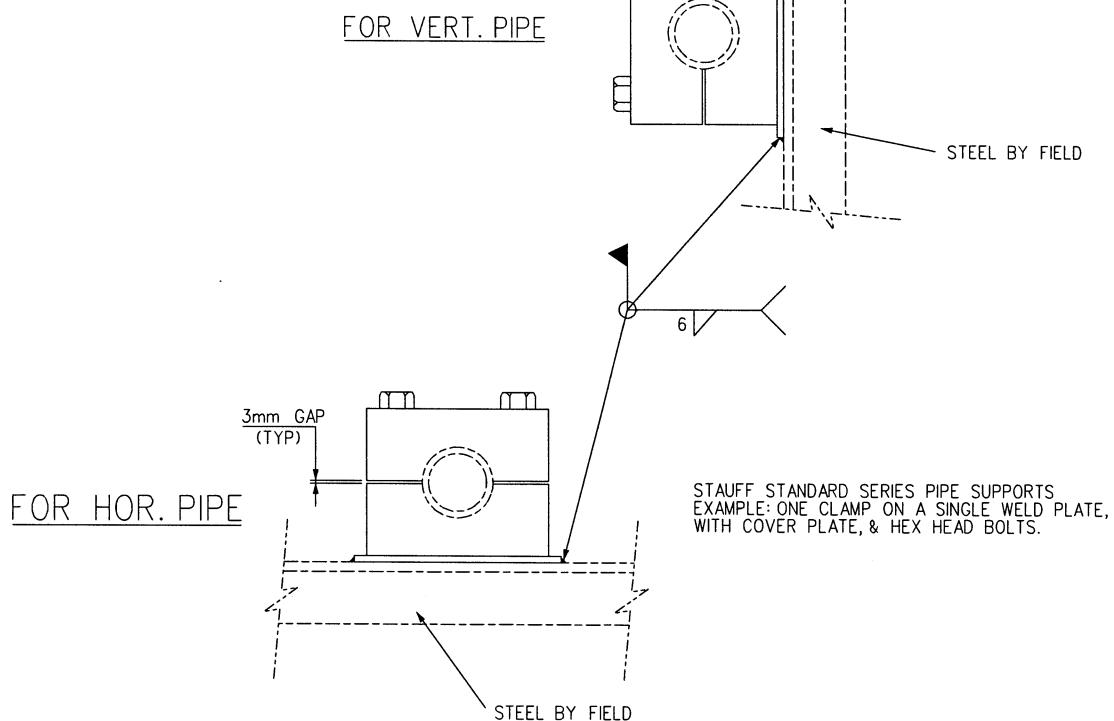
Simulated force is 200kg. Actual load mass is 91.7kg.

Fixed point





Attachment 5: SP-50-017



STAUFF STANDARD SERIES PIPE SUPPORTS OR EQUIVALENT

HYDRAULIC PIPE CLAMP

FOR PIPE SIZES: $\frac{3}{4}$ ", 1", 1-1/4", 1-1/2", 2"
CLAMP MATERIAL: POLYPROPYLENE

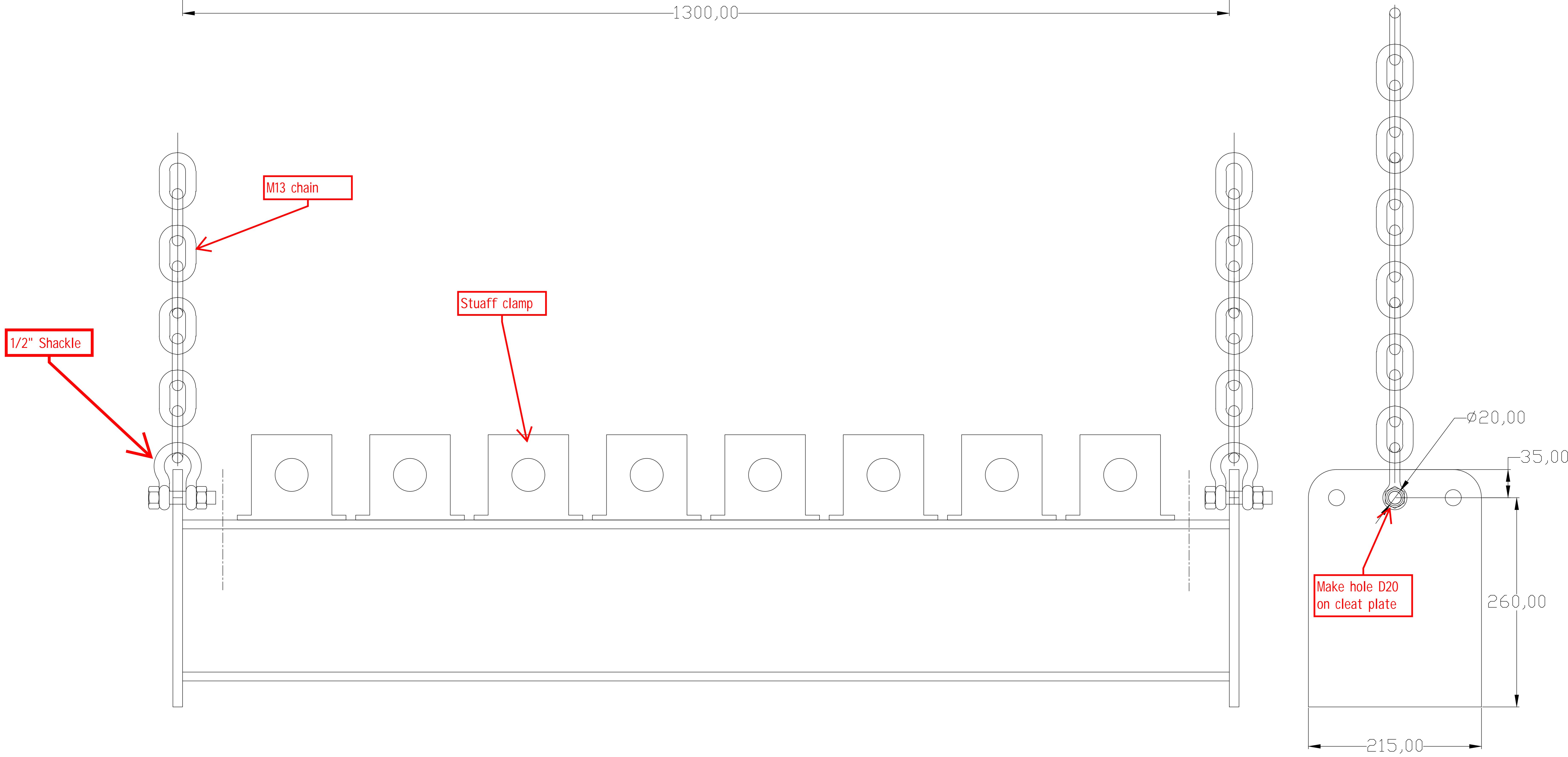
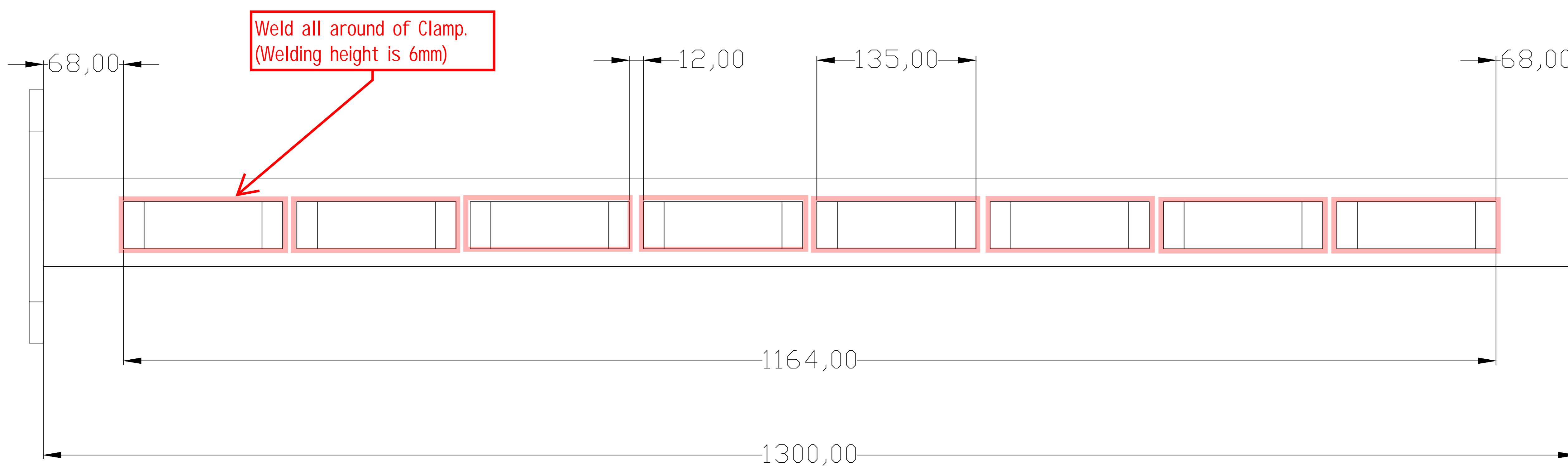
FLUOR®

SPECIAL DESIGN PIPE SUPPORT

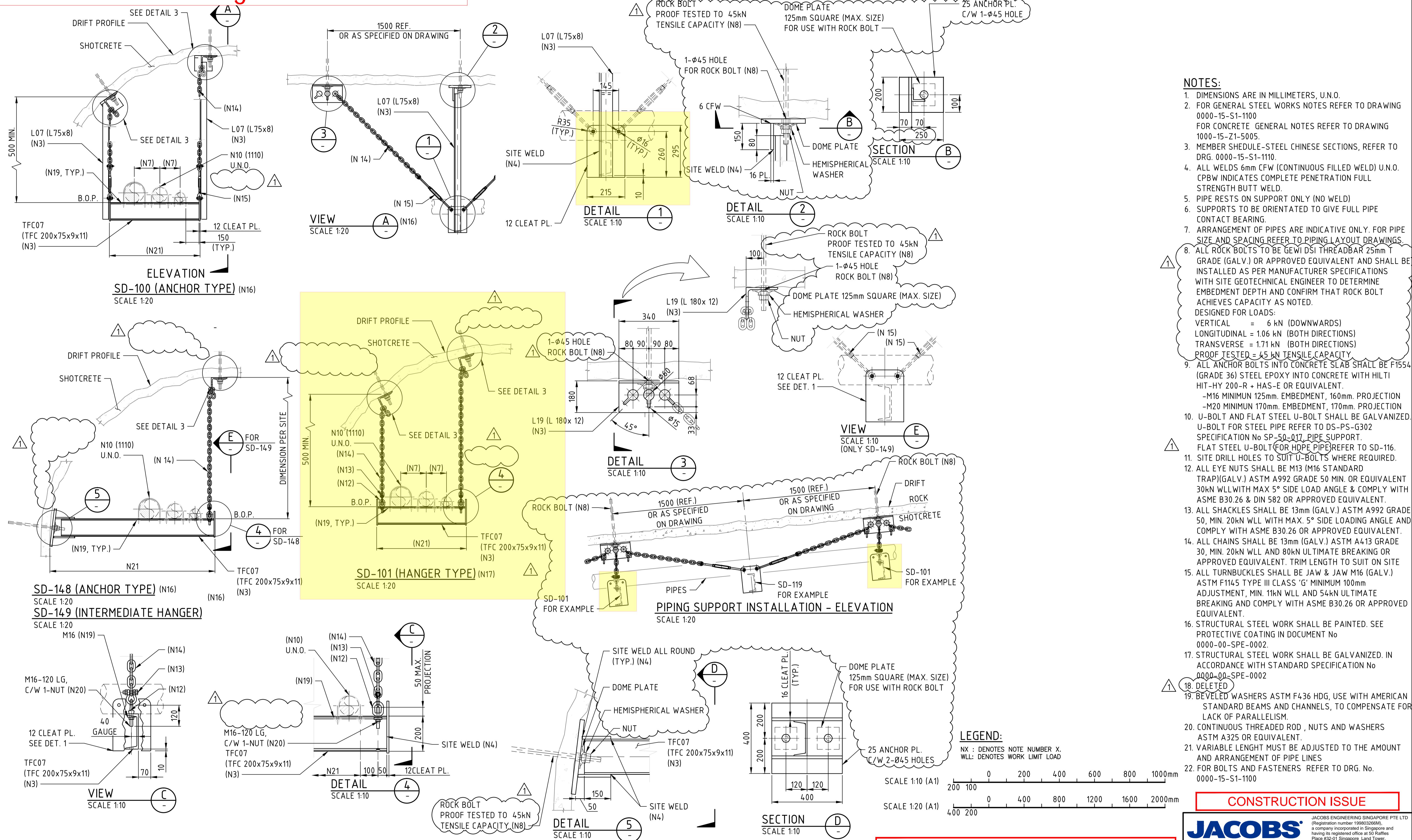
REF. STANDARDS

REV.	BY	DATE	REVISION	CHK	APP	DES.	WL	DESIGNATION	SPECIAL SUPPORT	REV.
0	WV <i>ANTONIY</i>		ISSUED FOR CONSTRUCTION			CH.	BC			
						SUP.	BP		DESIGN STANDARD NO.	
						DATE	80511		DS-PS-SD029	0

Attachment 6: Proposal arrangement



Attachment 7: Drawing 0000-50-N1-1110



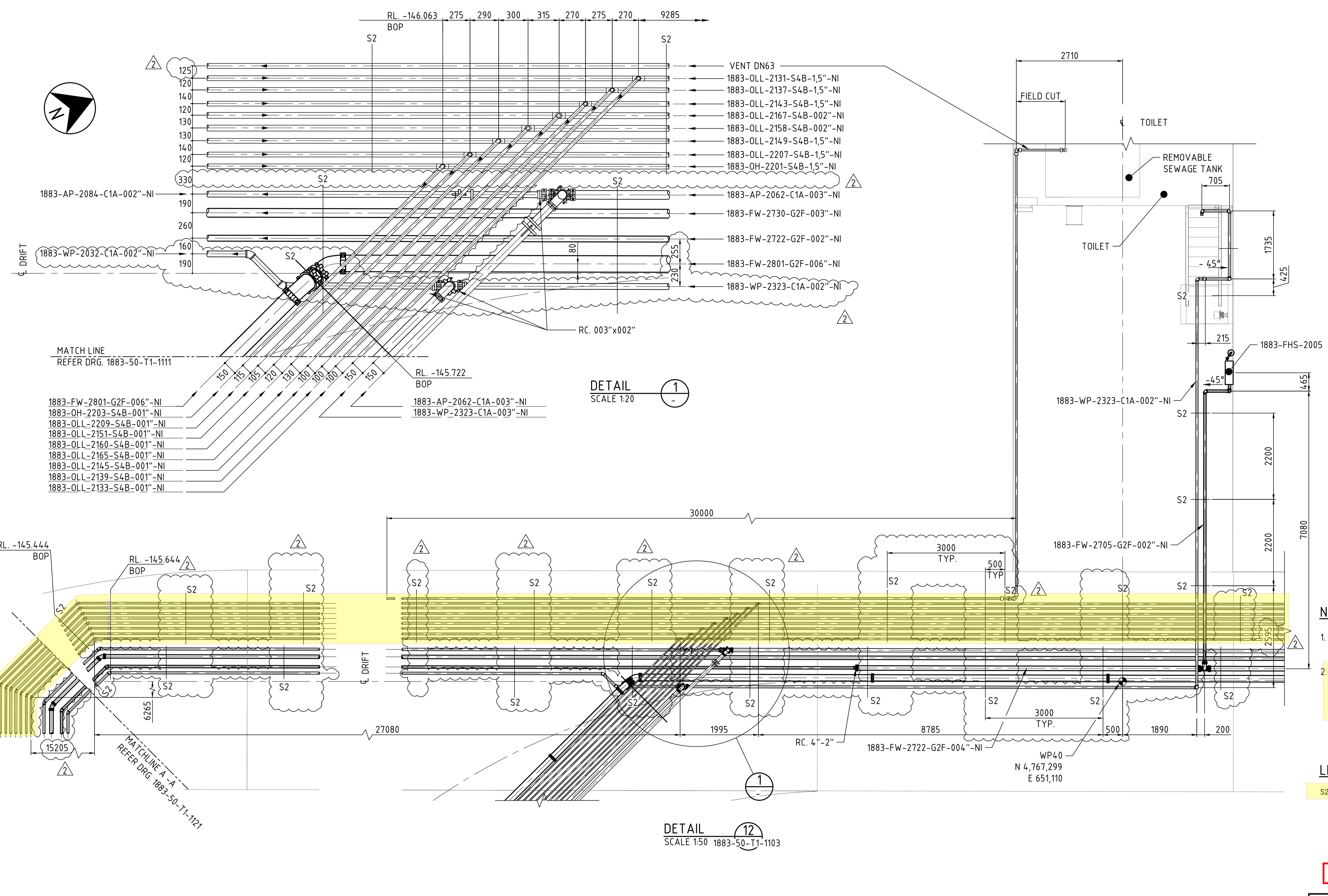
CAUTION - PROJECT DRAWING - NOT AS BUILT



OYU TOLGOI LLC

JACOBS		JACOBS ENGINEERING SINGAPORE PTE LTD (Registration number 199803266M), a company incorporated in Singapore and having its registered office at 50 Raffles Place #32-01 Singapore Land Tower, Singapore, 048623 (the offshore Contractor)	
Jacobs Document No. SN1809-0000/PP.DRG/1110		Web: www.jacobs.com	
ILT			
I BY			
ODRIGUEZ			
DRAWING			
AUREIRA			
VAL DATE			
8.18			
ERING MANAGER			
ARIN			
VAL DATE			
8.18			
VAL DATE	SCALE	DRAWING NUMBER	REV.
	AS SHOWN	0000-50-N1-1110	1RL

Attachment 8: Drawing 1883-50-T1-1112



CAUTION - PROJECT DRAWING - NOT AS BUILT

SCALE 1:50 (A1)  0 1000 2000 3000 4000 5000m

SCALE 1:20 (A1)  0 400 800 1200 1600 2000m





**Oyu
Tolgoi**

OYU TOLGOI LLC
ОЮУ ТОЛГОЙ ХХК

Disclaimer: Drawings, plans, models, designs or any other information displayed, contained in, made or used in connection with this document (or its part or attachment) is owned by Oyu Tolgoi LLC and may be a proprietary of Oyu Tolgoi LLC. Internal use of Oyu Tolgoi LLC only. Making a copy or reproduction thereof in any form or giving an unauthorized copy to any third party without Oyu Tolgoi LLC's written consent or permission shall be strictly prohibited. Any violation of the above restrictions and prohibitions shall be subject legal liabilities and Oyu Tolgoi LLC reserves its rights and entitlements under the law.

CONSTRUCTION ISSUE

JACOBS

Jacobs Document No. SN1809-1883/PP.DRG/1110 Place #32-01 Singapore Land Tower,
Singapore, 048623 (the offshore Contractor)
Web: www.jacobs.com

OYU TOLGOI UNDERGROUND PROJECT

UNDERGROUND WORKSHOPS

UNDERGROUND WORKSHOPS
FRANCIS GIBB MALLINCKRODT

TRUCK SHOP HAULAGE LEVEL

TOILET - DETAILS

ANSWER The answer is 1000.

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For more information about the study, please contact Dr. John P. Morrissey at (212) 305-6000 or via email at jmorrissey@nyp.edu.

Digitized by srujanika@gmail.com

SCALE	DRAWING NUMBER	REV.
AS SHOWN	100-56-74-1142	

Attachment 9: Drawing 1883-50-LST-1101

TRUCK SHOP - PIPING - LINES																Jacobs Document No.: SN1809-1883/PP.LST/1101 Client Document No.: 1883-50-LST-1101 Revision: 0				JACOBS®	
WBS	Line No.	P&ID N°	P&ID Rev	Fluid Code	Material Class	Line ID	FROM	TO	Fluid SG (kg/m³)	Design Temp Min (T°)	Design Temp Max (T°)	Operational Pressure (kPa)	Design Pressure (kPa)	Test Pressure (kPa)	Test Medium	Insulation Thickness	Remarks / Comments	Rev			
1883	1883-FW-2732-G2F-001"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2732	1883-FW-2730-G2F-003"-NI	SPRINKLER	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2733-G2F-001"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2733	1883-FW-2730-G2F-003"-NI	SPRINKLER	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2740-G2F-003"-NI	1883-25-J1-1127,1883-25-J1-1129	1,0	FW	G2F	1883-FW-2740	1883-SKD-2002	CAP	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2741-G2F-001"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2741	1883-FW-2740-G2F-003"-NI	SPRINKLER	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2742-G2F-001"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2742	1883-FW-2740-G2F-003"-NI	SPRINKLER	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2743-G2F-001"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2743	1883-FW-2740-G2F-003"-NI	SPRINKLER	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2744-G2F-001"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2744	1883-FW-2740-G2F-003"-NI	SPRINKLER	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2745-G2F-001"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2745	1883-FW-2740-G2F-003"-NI	SPRINKLER	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2746-G2F-001"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2746	1883-FW-2740-G2F-003"-NI	SPRINKLER	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2800-G2F-006"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2800	1862-FW-2028-G2F-008"-NI	1883-SKD-2001	1000	15	35	1015	1200	1380	Water						
1883	1883-FW-2900-G2F-004"-NI	1883-25-J1-1127	1	FW	G2F	1883-FW-2900	1862-FW-2028-G2F-008"-NI	1883-SKD-2002	1000	15	35	1015	1200	1380	Water						
1883	1883-OH-2201-S4B-1.5"-NI	1883-25-J1-1118,1883-25-J1-1123	0.1	OH	S4B	1883-OH-2201	1883-LUS-2001	1883-EQP-2003	885	20	45	9000	9930	13500	Oil						
1883	1883-OH-2203-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1122	0.2	OH	S4B	1883-OH-2203	1883-OH-2201-S4B-1.5"-NI	1883-EQP-2001	885	20	45	9000	9930	13500	Oil						
1883	1883-OH-2204-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1122	0.2	OH	S4B	1883-OH-2204	1883-OH-2201-S4B-1.5"-NI	1883-EQP-2004	885	20	45	9000	9930	13500	Oil						
1883	1883-OH-2206-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1123	0.1	OH	S4B	1883-OH-2206	1883-OH-2201-S4B-1.5"-NI	1883-EQP-2002	885	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2131-S4B-1.5"-NI	1883-25-J1-1118,1883-25-J1-1123	0.1	OLL	S4B	1883-OLL-2131	1883-OLL-2002	1883-EQP-2003	885	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2133-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1122	0.2	OLL	S4B	1883-OLL-2133	1883-OLL-2131-S4B-1.5"-NI	1883-EQP-2001	885	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2134-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1122	0.2	OLL	S4B	1883-OLL-2134	1883-OLL-2131-S4B-1.5"-NI	1883-EQP-2002	885	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2136-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1123	0.1	OLL	S4B	1883-OLL-2136	1883-OLL-2131-S4B-1.5"-NI	1883-EQP-2004	885	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2137-S4B-1.5"-NI	1883-25-J1-1118,1883-25-J1-1123	0.1	OLL	S4B	1883-OLL-2137	1883-LUS-2003	1883-EQP-2003	1068	20	45	700	9930	1050	Oil						
1883	1883-OLL-2139-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1122	0.2	OLL	S4B	1883-OLL-2139	1883-OLL-2137-S4B-1.5"-NI	1883-EQP-2001	1068	20	45	700	9930	1050	Oil						
1883	1883-OLL-2140-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1122	0.2	OLL	S4B	1883-OLL-2140	1883-OLL-2137-S4B-1.5"-NI	1883-EQP-2002	1068	20	45	700	9930	1050	Oil						
1883	1883-OLL-2142-S4B-001"-NI	1883-25-J1-1118,1883-25-J1-1123	0.1	OLL	S4B	1883-OLL-2142	1883-OLL-2137-S4B-1.5"-NI	1883-EQP-2004	1068	20	45	700	9930	1050	Oil						
1883	1883-OLL-2143-S4B-1.5"-NI	1883-25-J1-1118,1883-25-J1-1123	1.1	OLL	S4B	1883-OLL-2143	1883-LUS-2005	1883-EQP-2003	882	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2145-S4B-001"-NI	1883-25-J1-1119,1883-25-J1-1122	1.2	OLL	S4B	1883-OLL-2145	1883-OLL-2143-S4B-1.5"-NI	1883-EQP-2001	882	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2146-S4B-001"-NI	1883-25-J1-1119,1883-25-J1-1122	1.2	OLL	S4B	1883-OLL-2146	1883-OLL-2143-S4B-1.5"-NI	1883-EQP-2002	882	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2148-S4B-001"-NI	1883-25-J1-1119,1883-25-J1-1123	1.1	OLL	S4B	1883-OLL-2148	1883-OLL-2143-S4B-1.5"-NI	1883-EQP-2004	882	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2149-S4B-1.5"-NI	1883-25-J1-1119,1883-25-J1-1123	1.1	OLL	S4B	1883-OLL-2149	1883-LUS-2007	1883-EQP-2003	885	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2151-S4B-001"-NI	1883-25-J1-1119,1883-25-J1-1122	1.2	OLL	S4B	1883-OLL-2151	1883-OLL-2149-S4B-1.5"-NI	1883-EQP-2001	885	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2152-S4B-001"-NI	1883-25-J1-1119,1883-25-J1-1122	1.2	OLL	S4B	1883-OLL-2152	1883-OLL-2149-S4B-1.5"-NI	1883-EQP-2002	885	20	45	9000	9930	13500	Oil						
1883	1883-OLL-2154-S4B-001"-NI	1883-25-J1-1119,1883-25-J1-1123	1.1	OLL	S4B	1883-OLL-21															

Attachment 10: 000-50-SPE-0001 Pipe Specification

Oyu Tolgoi LLC

Document No. 000-50-SPE-0001 Pipe Specification

Appendix 2 Piping Line Class

Seq No	Rev	Note No	Item Name	Item Code	Size Range / Small End Sizes	Description	Reference / Large End Sizes	Notes
						***** VALVE *****		NR1 SIZES SHOWN IN SIZE COLUMNS ARE THE SMALL END OF REDUCERS AND THE BRANCH SIZE OF OLETS AND TEES.
1			BA-6018	1/2" - 2"	BALL 2000 PSI, THRD, 316SS		JAMESBURY Serie 3000	
1			BA-6019	3" - 6"	BALL 600# RF, SS, HNDLDP		APOLLO 87A-F00	
1			CH-6025	1/2" - 2"	CHECK 600# SCRD 316SS		VOGT 13718	
					***** PIPE *****			
			TUB	5960051	1/8" - 3/8"	TUBE .035 WALL 304 SS A269		
1			PIP	5364090	1/2" - 6"	PIPE SCH 80S SMLS 304/304L SS A312		
1				5364086	3" - 6"	PIPE SCH 40S SMLS 304/304L SS A312		
					***** FITTINGS *****			
				5960001	1/8" - 3/8"	UNION ELBOW 316 SS T X T	PARKER EBTX-SS	UNDERGROUND SERVICES: LUBE OIL HYDRAULIC OIL COOLANT ADBBLUE DESIGN PRESSURE: 9930 kPag @ 38 C DESIGN CODE: ASME B31.3
		NR1		5960002	1/8" - 3/8"	UNION TEE 316 SS T X T X T	1/8 - 3/8	
				5960003	1/8" - 3/8"	UNION 316 SS T X T	PARKER HBTX-SS	
				5960004	1/8" - 3/8"	UNION CROSS 316 SS T X T X T X T	PARKER KBTX-SS	
	NR1			5960005	1/8" - 3/8"	UNION REDUCER 316 SS T X T	1/2" - 1/4"	
				5960007	1/8" - 3/8"	FLARED TUBE END NUT 316 SS	PARKER BTX-SS	
				5960008	1/8" - 3/8"	PLUG TUBE 316 SS	PARKER PNBTX-SS	
	NR1			5960013	1/8" - 3/8"	BULKHEAD CONNECTOR 316 SS TUBE X MALE NPTF	1/4 - 1/2	
	NR1			5960014	1/8" - 3/8"	BULKHEAD CONNECTOR 316 SS TUBE X FEMALE NPTF	1/4 - 1/2	
			ELL	600210	1/2" - 2"	ELL 90 DEG 3000# SCRD 304/304L SS		MATERIAL: 304/304L SS FLANGE RATING: 600 TEMPERATURE RANGE: 5 / 38 °C COMMENT:
			45L	600211	1/2" - 2"	ELL 45 DEG 3000# SCRD 304/304L SS		
	NR1		TEE	600212	1/2" - 2"	TEE 3000# SCRD 304/304L SS	1/2" - 2"	
Oyu Tolgoi LLC - Oyu Tolgoi Project		CONSTRUCTION						
		<1/2" - 37 DEG FLARED COMPRESSION TUBE FITTINGS 1/2" to 2" - SCREWED > 2" - BUTTWELD				CORRO ALLOW 0.0 MM	DATE 19.JUL.18	BY RR REV 1 SHEET 1 OF 3 CLASS S4B

Attachment 10: 000-50-SPE-0001 Pipe Specification

Oyu Tolgoi LLC

Document No. 000-50-SPE-0001 Pipe Specification

Appendix 2 Piping Line Class

Seq No	Rev	Note No	Item Name	Item Code	Size Range / Small End Sizes	Description	Reference / Large End Sizes	Notes		
			COU	600213	½" - 2"	COUPLING 3000# SCRD 304/304L SS				
			CAP	5497779	½" - 2"	CAP 3000# SCRD 304/304L SS				
			PLG	5497727	½" - 2"	PLUG HEX HEAD SCRD 304 SS				
			UNI	600214	½" - 2"	UNION 3000# SCRD 304/304L SS				
			ELL	5439138	3" - 6"	ELL 90 DEG LR SCH 80S 304/304L SS A403				
			45L	5439144	3" - 6"	ELL 45 DEG SCH 80S 304/304L SS A403				
			TEE	5439147	3" - 6"	TEE SCH 80S 304/304L SS A403				
				5439148	3" - 6"	CAP SCH 80S 304/304L SS A403				
	NR1			5439149	3" - 4"	REDUCER CONC SCH 80S 304/304L SS A403	4" - 6"			
	NR1			5439150	3" - 4"	REDUCER ECC SCH 80S 304/304L SS A403	4" - 6"			
				6000160	3" - 4"	REDUCING TEE, SCH 80S - SCH 80S, SMLS, A403 WP304/304L	4" - 6"			
	NR1			5515571	½" - 2"	THREDOLET 3000# 304/304L SS	3" - 6"			
						***** PIPE FLANGES *****				
			SFL	600215	½" - 2"	FLG SCRD 600# RF 304/304L SS				
			WNK	5577721	3" - 6"	FLG WN 600# RF 304/304L SS 80S BORE				
			BLF	5616379	½" - 6"	FLG BLIND 600# RF 304/304L SS				
						***** SWAGE NIPPLES *****				
	NR1			600217	½" - 1 ½"	SWAGE CONC SCH 80S 304/304L SS TBE	¾" - 2"			
	NR1			600218	½" - 1 ½"	SWAGE ECC SCH 80S 304/304L SS TBE	¾" - 2"			
	NR1	SWACTS		5546092	½" - 2"	SWAGE CONC SCH 80S 304/304L SS TSE	3" - 4"			
	NR1	SWAETS		5551182	½" - 2"	SWAGE ECC SCH 80S 304/304L SS TSE	3" - 4"			
Oyu Tolgoi LLC - Oyu Tolgoi Project				CONSTRUCTION						
				<small><1/2" - 37 DEG FLARED COMPRESSION TUBE FITTINGS ½" to 2" - SCREWED > 2" - BUTTWELD</small>	CORRO ALLOW 0.0 MM	DATE	BY RR	REV 1	SHEET 2 OF 3	CLASS S4B

Attachment 10: 000-50-SPE-0001 Pipe Specification

Oyu Tolgoi LLC

Document No. 000-50-SPE-0001 Pipe Specification

Appendix 2 Piping Line Class

Attachment 11: Pipe dimension



Philadelphia Regional Center
2450 Wheatsheaf Lane
Philadelphia, PA 19137
O 215-831-0700
F 215-533-1645
E sales@tiogapipe.com

Houston Regional Center
14950 Heathrow Forest Parkway,
Suite 390, Houston, TX 77032
O 713-433-2111
F 281-397-0132
E sales@tiogapipe.com

Chattanooga Regional Center
1301 Riverfront Parkway, Suite 108
Chattanooga, TN 37402
O 423-899-3398
F 423-899-9695
E sales@tiogapipe.com

PIPE DIMENSIONS AND WEIGHTS

Available in commercial and nuclear

U.S./METRIC

NOMINAL PIPE SIZE	OD	SCHEDULE DESIGNATIONS		WALL THICKNESS		WEIGHT		ID		
		INCH MM	INCH MM	ASME		INCH MM	LBS/ FOOT KG/ METER	INCH MM		
1/8 6	0.405 10.3	10 STD XS	40 80	10S 80S	0.049 0.068 0.095	1.24 1.73 2.41	0.19 0.37 0.47	0.28 0.37 0.47	0.307 0.269 0.215	7.82 6.84 5.84
1/4 8	0.540 13.7	10 STD XS	40 80	10S 80S	0.065 0.088 0.119	1.65 2.24 3.02	0.33 0.43 0.54	0.49 0.63 0.80	0.410 0.364 0.302	10.40 9.22 7.66
3/8 10	0.675 17.1	10 STD XS	40 80	10S 80S	0.065 0.091 0.126	1.65 2.31 3.20	0.42 0.57 0.74	0.63 0.84 1.10	0.545 0.493 0.423	13.80 12.48 10.70
1/2 15	0.840 21.3	5 10 STD XS	40 80	5S 10S 40S 80S	0.065 0.083 0.109 0.147	1.65 2.11 2.77 3.73	0.54 0.67 0.85 1.09	0.80 1.00 1.27 1.62	0.710 0.674 0.622 0.546	18.00 17.08 15.76 13.84
1/2 15	0.840 21.3	160 XX			0.188 0.294	4.78 7.47	1.31 1.72	1.95 2.55	0.464 0.252	11.74 6.36
3/4 20	1.050 26.7	5 10 STD XS	40 80	5S 10S 40S 80S	0.065 0.083 0.113 0.154	1.65 2.11 2.87 3.91	0.69 0.86 1.13 1.48	1.03 1.28 1.69 2.20	0.920 0.884 0.824 0.742	23.40 22.48 20.96 18.88
3/4 20	1.050 26.7	160 XX			0.219 0.308	5.56 7.82	1.95 2.44	2.90 3.64	0.612 0.434	15.58 11.06
1 25	1.315 33.4	5 10 STD XS	40 80	5S 10S 40S 80S	0.065 0.109 0.133 0.179	1.65 2.77 3.38 4.55	0.87 1.41 1.68 2.17	1.29 2.09 2.50 3.24	1.185 1.097 1.049 0.957	30.10 27.86 26.64 24.30
1 25	1.315 33.4	160 XX			0.250 0.358	6.35 9.09	2.85 3.66	4.24 5.45	0.815 0.599	20.70 15.22
1-1/4 32	1.660 42.2	5 10 STD XS	40 80	5S 10S 40S 80S	0.065 0.109 0.140 0.191	1.65 2.77 3.56 4.85	1.11 1.81 2.27 3.00	1.65 2.69 3.39 4.47	1.530 1.442 1.380 1.278	38.90 36.66 35.08 32.50
1-1/4 32	1.660 42.2	160 XX			0.250 0.382	6.35 9.70	3.77 5.22	5.61 7.77	1.160 0.896	29.50 22.80
1-1/2 40	1.900 48.3	5 10 STD XS	40 80	5S 10S 40S 80S	0.065 0.109 0.145 0.200	1.65 2.77 3.68 5.08	1.28 2.09 2.72 3.63	1.90 3.11 4.05 5.41	1.770 1.682 1.610 1.500	45.00 42.76 40.94 38.14
1-1/2 40	1.900 48.3	160 XX			0.281 0.400	7.14 10.15	4.86 10.15	7.25 9.55	1.338 1.100	34.02 28.00
2 50	2.375 60.3	5 10 STD XS	40 80	5S 10S 40S 80S	0.065 0.109 0.154 0.218	1.65 2.77 3.91 5.54	1.61 2.64 3.93 5.03	2.39 3.93 5.44 7.48	2.245 2.157 2.067 1.939	57.00 54.76 52.48 49.22
2 50	2.375 60.3	160 XX			0.344 0.436	8.74 11.07	7.47 9.04	11.11 13.44	1.687 1.503	42.82 38.16
2-1/2 65	2.875 73.0	5 10 STD XS	40 80	5S 10S 40S 80S	0.083 0.120 0.203 0.276	2.11 3.05 5.16 7.01	2.48 3.53 5.26 7.67	3.69 5.26 8.63 11.41	2.709 2.635 2.469 2.323	68.78 66.90 62.68 58.98
2-1/2 65	2.875 73.0	160 XX			0.375 0.552	9.53 14.02	10.02 13.71	14.92 20.39	2.125 1.771	53.94 44.96
3 80	3.500 88.9	5 10 STD XS	40 80	5S 10S 40S 80S	0.083 0.120 0.216 0.300	2.11 3.05 5.49 7.62	3.03 4.34 6.46 10.26	4.52 6.46 8.28 15.27	3.334 3.260 2.900 2.900	84.68 82.80 77.92 73.66
3 80	3.500 88.9	160 XX			0.438 0.600	11.13 15.24	14.34 18.60	21.35 27.68	2.624 2.300	66.64 58.42
3-1/2 90	4.000 101.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.083 0.120 0.226 0.318	2.11 3.05 5.74 8.08	3.48 4.98 7.41 12.52	5.18 7.41 13.57 18.64	3.834 3.760 3.548 3.364	97.38 95.50 90.12 85.44
3-1/2 90	4.000 101.6	160 XX			0.636	16.15	22.87	34.03	2.728	69.30
4 100	4.500 114.3	5 10 STD XS	40 80	5S 10S 40S 80S	0.083 0.120 0.156 0.188	2.11 3.05 3.96 4.78	3.92 5.62 7.24 8.67	5.84 8.37 10.78 12.91	4.334 4.260 4.188 4.124	110.08 108.20 106.38 104.74
4 100	4.500 114.3	120 160 XX			0.237 0.337 0.438	6.02 8.56 11.13	10.80 15.00 19.02	16.08 22.32 28.32	4.026 3.826 3.624	102.26 97.18 92.04
4-1/2 115	5.000 127.0	5 10 STD XS	40 80	5S 10S 40S 80S	0.247 0.355 0.395 0.710	6.27 9.02 13.49 18.03	12.55 17.63 22.53 32.56	18.67 26.24 33.54 48.45	4.506 4.290 3.938 3.580	114.46 108.96 90.94

NOMINAL PIPE SIZE	OD	SCHEDULE DESIGNATIONS		WALL THICKNESS		WEIGHT		ID		
		INCH MM	INCH MM	ASME		INCH MM	LBS/ FOOT KG/ METER	INCH MM		
5 125	5.563 141.3	5 10 STD XS	40 80	5S 10S 40S 80S	0.109 0.134 0.258 0.375	2.77 3.40 6.55 9.53	6.36 7.78 14.63 20.80	9.46 11.56 21.77 30.97	5.345 5.295 5.047 4.813	135.76 134.50 128.20 122.24
6 150	6.625 168.3	5 10 STD XS	40 80	5S 10S 40S 80S	0.109 0.134 0.188 0.280	2.77 3.40 4.78 7.11	6.36 7.78 12.94 18.99	11.31 13.83 19.28 28.26	6.407 6.357 6.249 6.065	162.76 161.50 158.74 154.08
7 175	7.625 193.7	5 10 STD XS	40 80	5S 10S 40S 80S	0.109 0.134 0.280 0.322	2.77 3.40 4.78 8.18	6.36 7.78 12.94 28.60	14.78 16.42 24.25 36.43	5.501 5.501 5.501 5.501	115.90 109.54 103.20 102.24
8 200	8.625 219.1	5 10 STD XS	40 80	5S 10S 40S 80S	0.109 0.148 0.250 0.322	2.77 3.40 4.78 8.18	6.36 7.78 12.94 28.58	14.78 16.42 24.25 36.43	8.407 8.329 8.125 8.071	213.56 211.58 206.40 205.02
9 225	9.625 244.5	5 10 STD XS	40 80	5S 10S 40S 80S	0.109 0.148 0.250 0.322	2.77 3.40 4.78 8.18	6.36 7.78 12.94 28.58	14.78 16.42 24.25 36.43	8.941 8.625 8.125 8.071	227.12 219.10 205.04 200.04
10 250	10.750 273.0	5 10 STD XS	40 80	5S 10S 40S 80S	0.134 0.165 0.188 0.200	3.40 4.19 4.78 5.07	15.21 18.67 21.23 24.72	22.61 27.78 31.62 36.82	10.482 10.420 10.374 10.250	266.20 264.62 263.44 260.30
11 275	11.750 298.5	5 10 STD XS	40 80	5S 10S 40S 80S	0.134 0.165 0.188 0.200	3.40 4.19 4.78 5.07	15.21 18.67 21.23 24.72	22.61 27.78 31.62 36.82	10.482 10.420 10.374 10.250	266.20 264.62 263.44 260.30
12 300	12.750 323.8	5 10 STD XS	40 80	5S 10S 40S 80S	0.156 0.180 0.188 0.200	3.40 4.19 4.78 5.07	15.21 18.67 21.23 24.72	22.61 27.78 31.62 36.82	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.78 5.07	21.00 24.19 25.25 31.31	31.24 35.98 37.61 49.71	12.438 12.390 12.374 12.374	315.88 314.66 314.24 314.24
14 350	14.000 355.6	5 10 STD XS	40 80	5S 10S 40S 80S	0.188 0.250 0.312 0.375	3.40 4.19 4.				

Attachment 11: Pipe dimension

NOMINAL PIPE SIZE	OD	SCHEDULE DESIGNATIONS	WALL THICKNESS		WEIGHT		ID	
			INCH MM	INCH MM	ASME	INCH MM	LBS/ FOOT	KG/ METER
16 400	16.000 406.4	10S 10 20 STD 30 40S XS 40 80S 60 80 100 120 140 160	0.188	4.78	31.78	47.34	15.624	396.84
			0.250	6.35	42.09	62.65	15.500	393.70
			0.312	7.92	52.32	77.83	15.376	390.56
			0.375	9.53	62.64	93.27	15.250	387.34
			0.500	12.70	82.85	123.31	15.000	381.00
			0.656	16.66	107.60	160.13	14.688	373.08
			0.844	21.44	136.74	203.54	14.312	363.52
			1.031	26.19	164.98	245.57	13.938	354.02
			1.219	30.96	192.61	286.66	13.562	344.48
			1.438	36.53	223.85	333.21	13.124	333.34
			1.594	40.49	245.48	365.38	12.812	325.42
			1.781	45.24	308.79	459.39	14.438	366.52
			2.000	508	10S	5.54	46.10	68.61
			0.250	6.35	52.78	78.56	19.500	495.30
			0.375	9.53	78.67	117.15	19.250	488.94
			0.500	12.70	104.23	155.13	19.000	482.60
			0.594	15.09	123.23	183.43	18.812	477.82
			0.812	20.62	166.56	247.84	18.376	466.76
			1.031	26.19	209.06	311.19	17.938	455.62
			1.281	32.54	256.34	381.55	17.438	442.92
			1.500	38.10	296.65	441.52	17.000	431.80
			1.750	44.45	341.41	508.15	16.500	419.10
			1.969	50.01	379.53	564.85	16.062	407.98
22 550	22.000 559	10S 10 STD 20 40S XS 30 80S 60 80 100 120 140 160	0.218	5.54	50.76	75.55	21.564	547.92
			0.250	6.35	58.13	86.55	21.500	546.30
			0.375	9.53	86.69	129.14	21.250	539.94
			0.500	12.70	114.92	171.10	21.000	533.60
			0.875	22.23	197.60	294.27	20.250	514.54
			1.125	28.58	251.05	373.85	19.750	501.84
			1.375	34.93	303.16	451.45	19.250	489.14
			1.625	41.28	353.94	527.05	18.750	476.44
			1.875	47.63	403.38	606.67	18.250	463.74
			2.125	53.98	451.49	672.30	17.750	451.04

NOMINAL PIPE SIZE	OD	SCHEDULE DESIGNATIONS	WALL THICKNESS		WEIGHT		ID	
			INCH MM	INCH MM	ASME	INCH MM	LBS/ FOOT	KG/ METER
24 600	24.000 610	10S 10 STD 20 40S XS 80S 40 60 80 100 120 140 160	0.250	6.35	63.47	94.53	23.500	597.30
			0.375	9.53	94.71	141.12	23.250	590.94
			0.500	12.70	125.61	187.07	23.000	584.60
			0.562	14.27	140.81	209.65	22.876	581.46
			0.688	17.48	171.45	255.43	22.624	575.04
			0.969	24.61	238.57	355.28	22.062	560.78
			1.219	30.96	296.86	442.11	21.562	548.08
			1.531	38.89	367.74	547.74	20.938	532.22
			1.812	46.02	429.79	640.07	20.376	517.96
			2.062	52.37	483.57	720.19	19.876	505.26
			2.344	59.54	542.64	808.27	19.312	490.92
			2.600	660	10	0.312	7.92	85.68
			0.375	9.53	102.72	152.88	25.250	640.94
			0.500	12.70	136.30	202.74	25.000	634.60
			28 700	711	10	0.312	7.92	92.35
			0.375	9.53	110.74	164.86	27.250	691.94
			0.500	12.70	146.99	218.71	27.000	685.60
			0.625	15.88	182.90	272.23	26.750	679.24
			30 750	762	10	0.312	7.92	99.02
			0.375	9.53	118.76	176.85	29.250	742.94
			0.500	12.70	157.68	234.68	29.000	736.60
			0.625	15.88	196.26	292.20	28.750	730.24
			32 800	813	10	0.312	7.92	105.69
			0.375	9.53	126.78	188.83	31.250	793.94
			0.500	12.70	168.37	250.65	31.000	787.60
			0.625	15.88	209.62	312.17	30.750	781.24
			0.688	17.48	230.29	342.94	30.624	778.04
			34 850	864	10	0.312	7.92	112.36
			0.375	9.53	134.79	200.82	33.250	844.94
			0.500	12.70	179.06	266.63	33.000	838.60
			0.625	15.88	222.99	332.14	32.750	832.24
			0.688	17.48	245.00	364.92	32.624	829.04
			36 900	914	10	0.312	7.92	119.03
			0.375	9.53	142.81	212.57	35.250	894.94
			0.500	12.70	189.75	282.29	35.000	888.60
			42 1050	1067	10	0.375	9.53	166.86
			0.500	12.70	221.82	330.21	41.000	1041.60
			0.625	15.88	276.44	411.64	40.750	1035.24
			0.750	19.05	330.72	492.33	40.500	1028.90
			48 1200	1219	10	0.375	9.53	190.92
			0.500	12.70	253.89	377.81	47.000	1199.94
			48 1200	1219	10	0.375	9.53	190.92
			0.500	12.70	253.89	377.81	47.000	1193.60

PIPING • TUBING • FITTINGS FLANGES • RELATED PRODUCTS

Type	Seamless & Welded
Commodity	Chrome • Stainless • Carbon • Low Temperature
Specifications	A/SA335 • A/SA312 • A/SA213 • A/SA106 • A/SA53/API5L • A/SA333
Sizes (O.D.)	1/8" (3.175mm) - 60" (1524mm) (Larger ODs Available)
Grades	Chrome: P1 • P5 • P9 • P11 • P22 • P91 Stainless: 304 • 304H • 304L • 316 • 316H • 316L • 316LN • 321 • 321H • 347 • 347H • 310 • 310s • 309 • Alloy 20 Low Temp: Grade 1/6 • Grade 3 Carbon: Grade B • Grade C • Galvanized

MILITARY SPEC PIPE & TUBING

Program	MIL-I-45208A Quality Program • Approved Level 1 Supplier
Contact Tioga for	U.S. Navy Specifications • Navy Nuclear • MIC Level 1 • Ultrasonic Testing
Fittings & Flanges	All Fittings & Flanges to Match the Pipe

NUCLEAR MATERIALS

Program	ASME Section III - ASME QSC 467
Specifications	10CFR50 Appendix B • N45.2 • NQA-1 • U.S. Navy Nuclear Specifications
Products	Pipe • Tubing • Fittings • Flanges • Structural • Fasteners • Forgings • Castings • Weld Rod • Plate
Grades	Carbon • Stainless • Chrome Moly • Nickel Alloys • Duplex • 6 Moly Alloys • Low Temperature • Special Melts • Copper & Titanium

TIOGA SPECIALTIES

• Project Management	• Dedicated Project Solution Teams