

LiftPlanner Software LLC Customer Lift Plans

Generated with LiftPlanner Software

10/2014

Mr. Crane – LiftPlanner Software Lift Plans and brief comments

Pipe racks at Boron plant - required stamped drawings, and detailed rigging plan with instructions. MC23194HL STAMPED SET - REV-1.pdf

This example was the subject of American Crane & Transport 8/2014 magazine article (pg. 47). MC22803HL - Candy Cane Pipe -loc2 Rev-4.pdf

Elk hills gas refinery -four of these monsters to put up. MC22293HL - PICK T-408 - REV-2.pdf

Space Shuttle lift: MC22650HL - Space Shuttle - Rev-1.pdf

Good simple example that we commonly do. MC23438HL - Telecom Shelter - Artic - REV-3-Layout1.pdf

Here is a much more typical lift. We do this type of thing all day long. A fairly simple model of the piece, and a clearance drawing for the customer. MC22787HL - Glatt tower - Rev-2.pdf

Wind power sample. MC23671WP - 68.5M TWR 56K GEAROX M2250-Layout1.pdf

Northern Crane Services Group - LiftPlanner Software Lift Plans

De-Methanizer Tower Set: 2572-NCSG140722 rev00

Deproponizer Tower: 1633-NCSG130408 revD

MLSB Module 35 with Liebherr LG1550: 1719-NCS130606 rev01

HLS Dome: 1896-NCSG130809 rev01

IPS Unit Loading: 1994-NCSG131007 rev00

Beaver River Pipe Pull: 2021-NCSG131017 rev00

Thrust Block: 2073-NCSG131108 rev00

Hydraulic Boot: 2110-NCSG131206 rev01

Energy Transportation - LiftPlanner Software Lift Plans

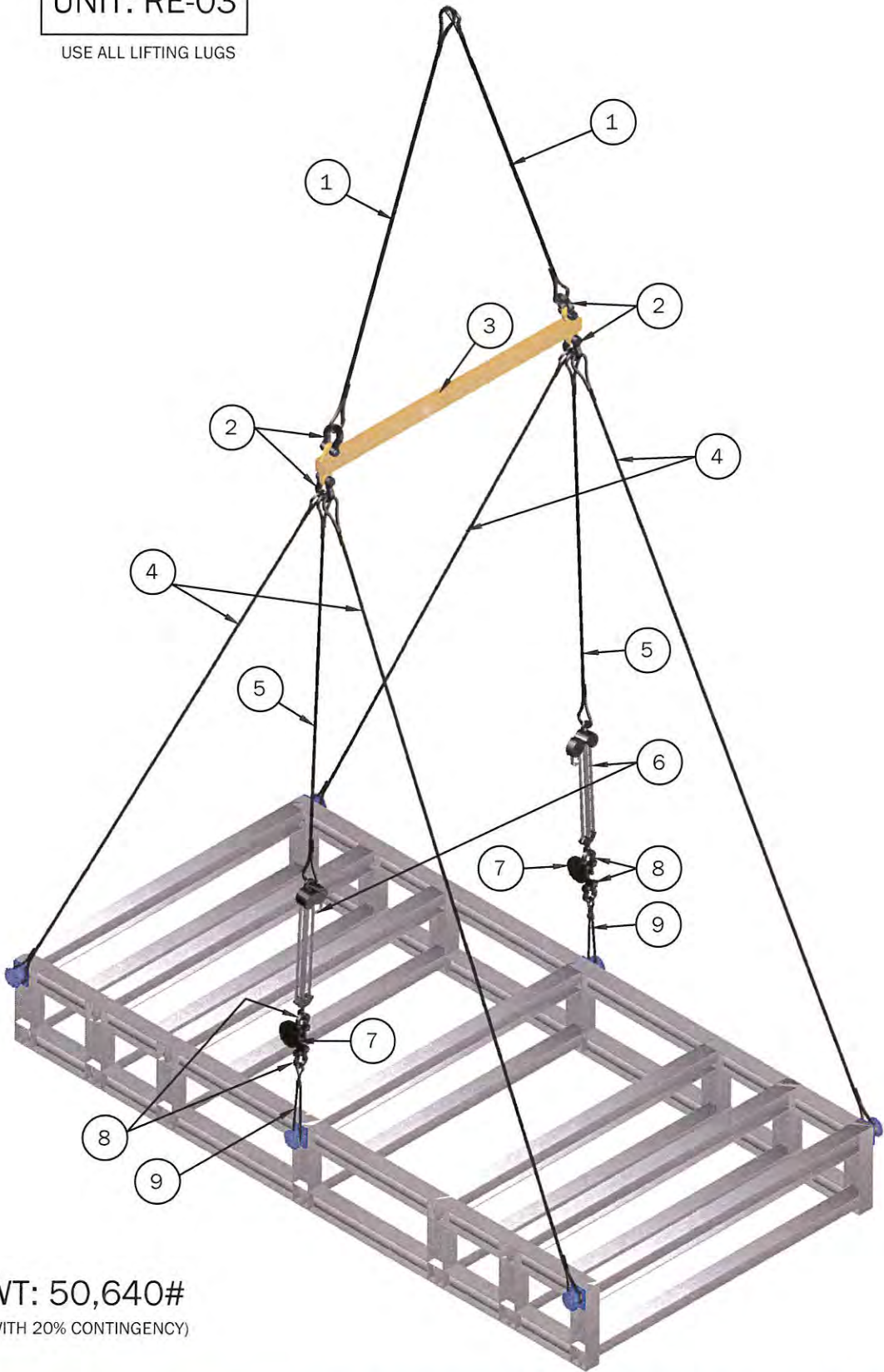
Drum Lift

Naptha Splitter Lift

Vessel Lift

UNIT: RE-03

USE ALL LIFTING LUGS



WT: 50,640#

(WITH 20% CONTINGENCY)

RIGGING DETAILS

NO.	QTY	ITEM	REQUIRED CAPACITY(LBS)	WT.(LBS)
1	2	16' 1.25"Ø W.R. SLINGS	27.6K	93
2	4	25T SHACKLES	27.6K	59
3	1	12'-6" SPREADER BAR	52K	331
4	4	30' 1"Ø W.R. SLINGS	27.6K	222
5	2	16' 1"Ø W.R. SLINGS	13K	60
6	2	10T CHAIN HOISTS	13K	462
7	2	LOAD CELLS	13K	100
8	4	17T SHACKLES	13K	69
9	2	5' 1.00"Ø W.R. SLING	13K	19
TOTAL				1,415 LBS

SLING CALCULATION: RE-03

UPPER SLINGS

WT: 50,640 LBS + RIGGING BELOW & BAR (1,322 LBS)= 51,962 LBS
SLING ANGLE: 70°

WT. EACH SLING: $51,962 / 2 = 25,981 / \sin 70^\circ = 27,649 \text{ LBS EA. TENSION}$

WIRE ROPE SINGS USED ARE 1.25"Ø EIPS, MAX. TENSION: 30,000 LBS

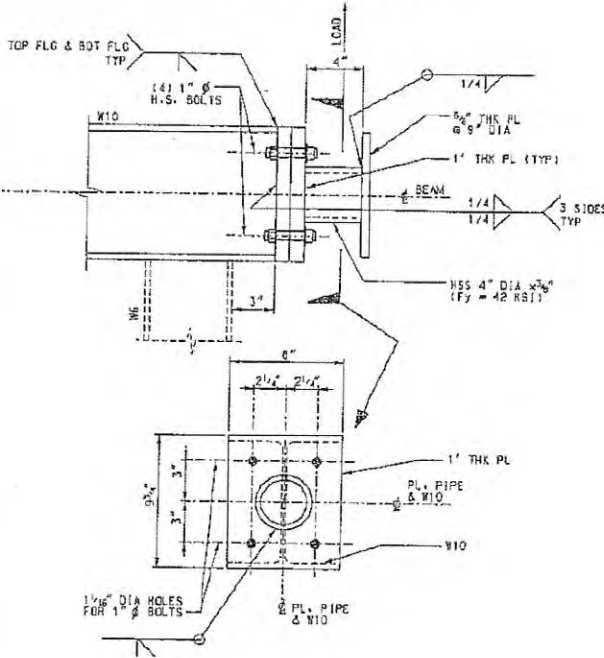
LOWER SLINGS

WT: 50,640 LBS
SLING ANGLE: 63°
NOT CONSIDERING LOAD TAKEN BY CENTER SLINGS
WT. EACH SLING: $50,640 / 4 = 12,660 / \sin 63^\circ = 14,209 \text{ LBS EA. TENSION}$

WIRE ROPE SINGS USED ARE 1.00"Ø EIPS, MAX. TENSION: 19,600 LBS

NOTE: LIFT TRUNIONS BY CUSTOMER

C.G. APPROXIMATED. TO BE FIELD VERIFIED.

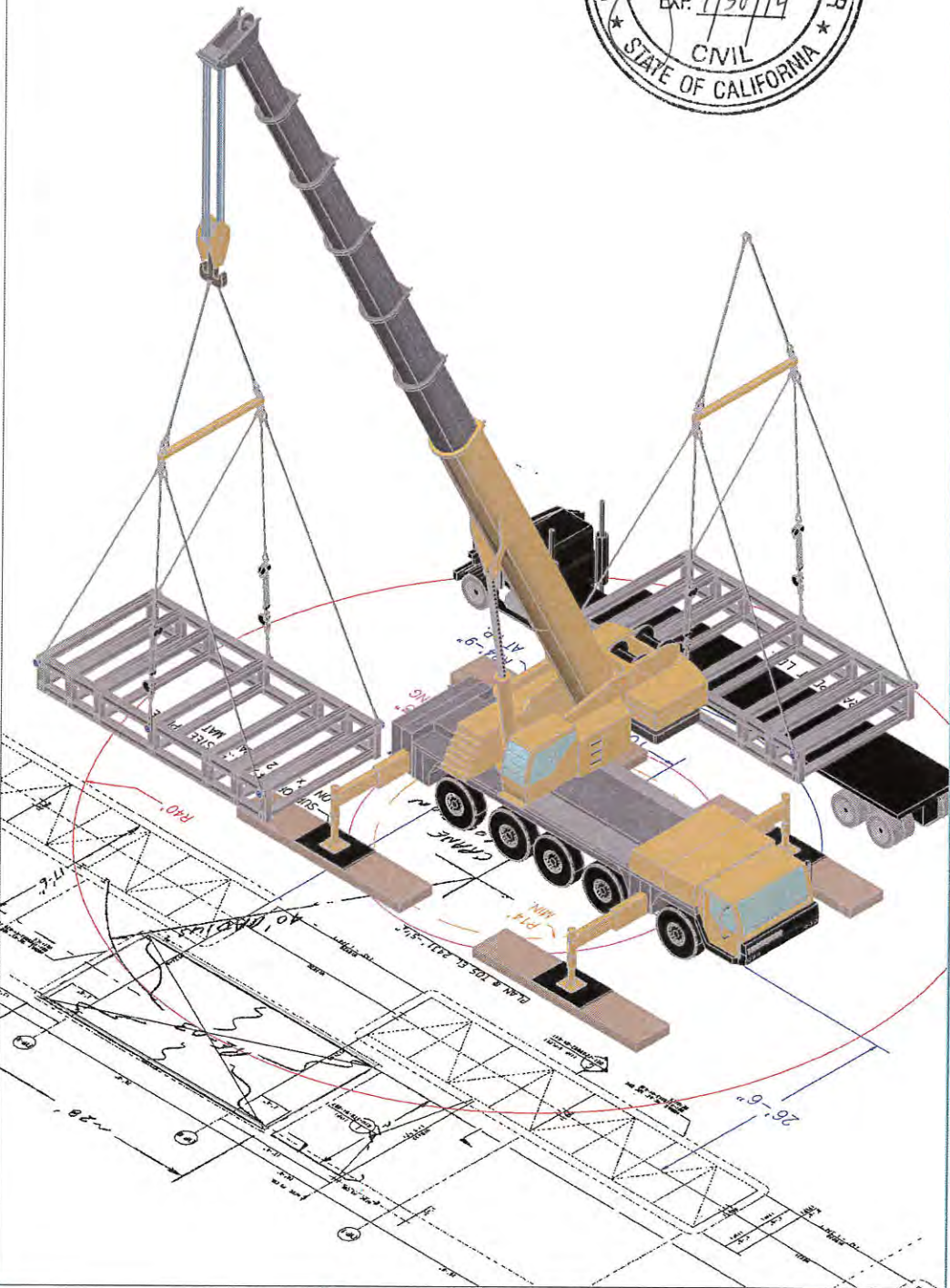


LIFTING TRUNNION

DETAIL 2
SCALE: 2"= 1'-0"

NARRATIVE OF LIFT:

1. SNUG CHAINFALLS, BUT DO NOT TENSION
2. COME UP ON LIFT
3. ADJUST CHAIN FALLS TO TAKE OUT DEFLECTION
NO MORE THAN APPROX. 13K EA.



MR. CRANE

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1	7.9.13	ISSUE FOR REVIEW
2		
3		
4		
5		
No.	Date	Revision

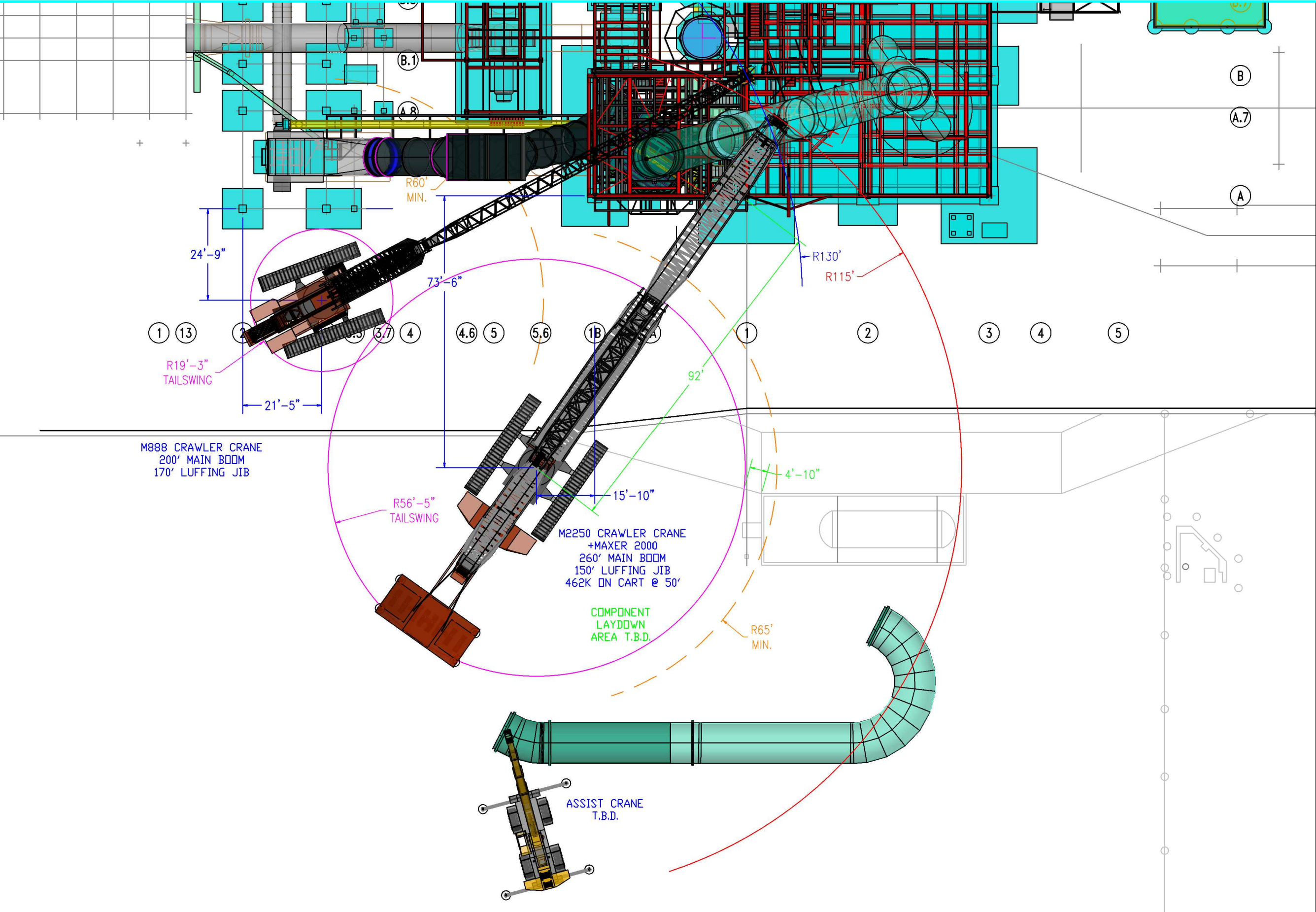
Project:

RIO TINTO
BORON
RACK SECTION
RE-03

Dwg Title:

LTM1220-5.1 TRUCK CRANE
100' MAIN BOOM
75,000 LBS CTWT
FULL OUTRIGGERS

Date: 7.9.13 Drawn By: MS Scale: NTS Dwg No.: MC23194HL Sht No.: 2



M2250 CRAWLER CRANE + MAXER 2000
260' MAIN BOOM NO. 79 @ 80°
150' LUFFING JIB NO. 44
130' DERRICK MAST NO. 44
169,200 LBS CRANE CTWT
60,000 LBS CARBODY CTWT
BALLAST CARRIAGE AT 50' POSITION
462,000 LBS CTWT ON CARRIAGE
360° CHART

J-TUBE "CANDY CANE" PIPE SECTION

PICK WEIGHT: 84,000 LBS
HOOK BLOCK: 5,600 LBS
RIGGING: 350 LBS
LOAD LINE: 4,680 LBS*
TOTAL WEIGHT: 94,630 LBS

CAPACITY @ 115': 153,000 LBS
PERCENT CAPACITY: 61.8%

*LINE IS 400' OF 2.34 LB/FT x 5 PARTS

M888CRAWLER CRANE (SERIES II)
200' MAIN BOOM NO. 22EL @ 83°
170' LUFFING JIB NO. 135
179,100 LBS CRANE CTWT
44,000 LBS CARBODY CTWT
360° CHART

MANBASKET

PICK WEIGHT: 5,000 LBS
HOOK BLOCK: 2,218 LBS
RIGGING: 150 LBS
LOAD LINE: 1,800 LBS
TOTAL WEIGHT: 9,168 LBS

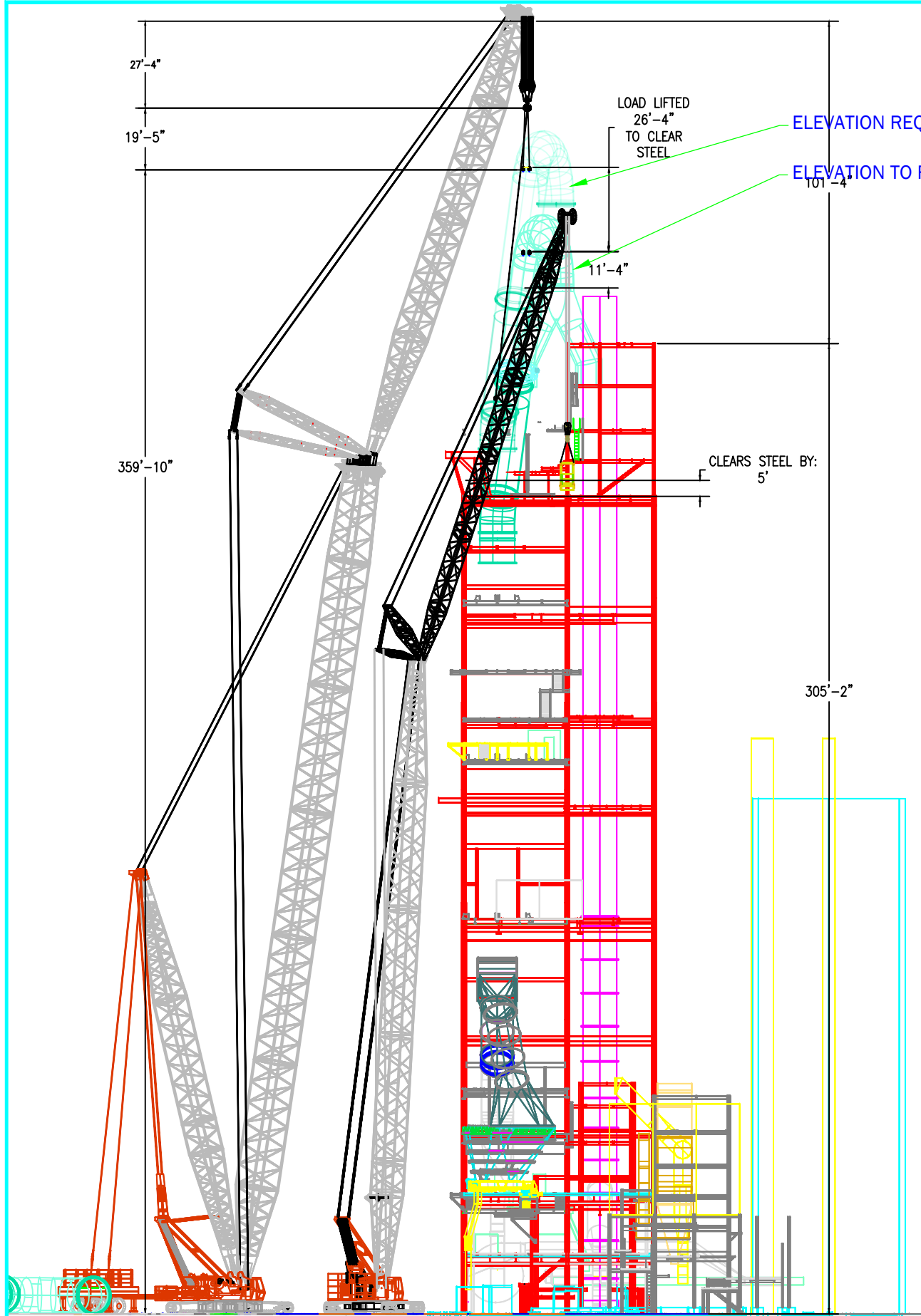
CAPACITY @ 130': 22,800 LBS
PERCENT CAPACITY: 40.2%

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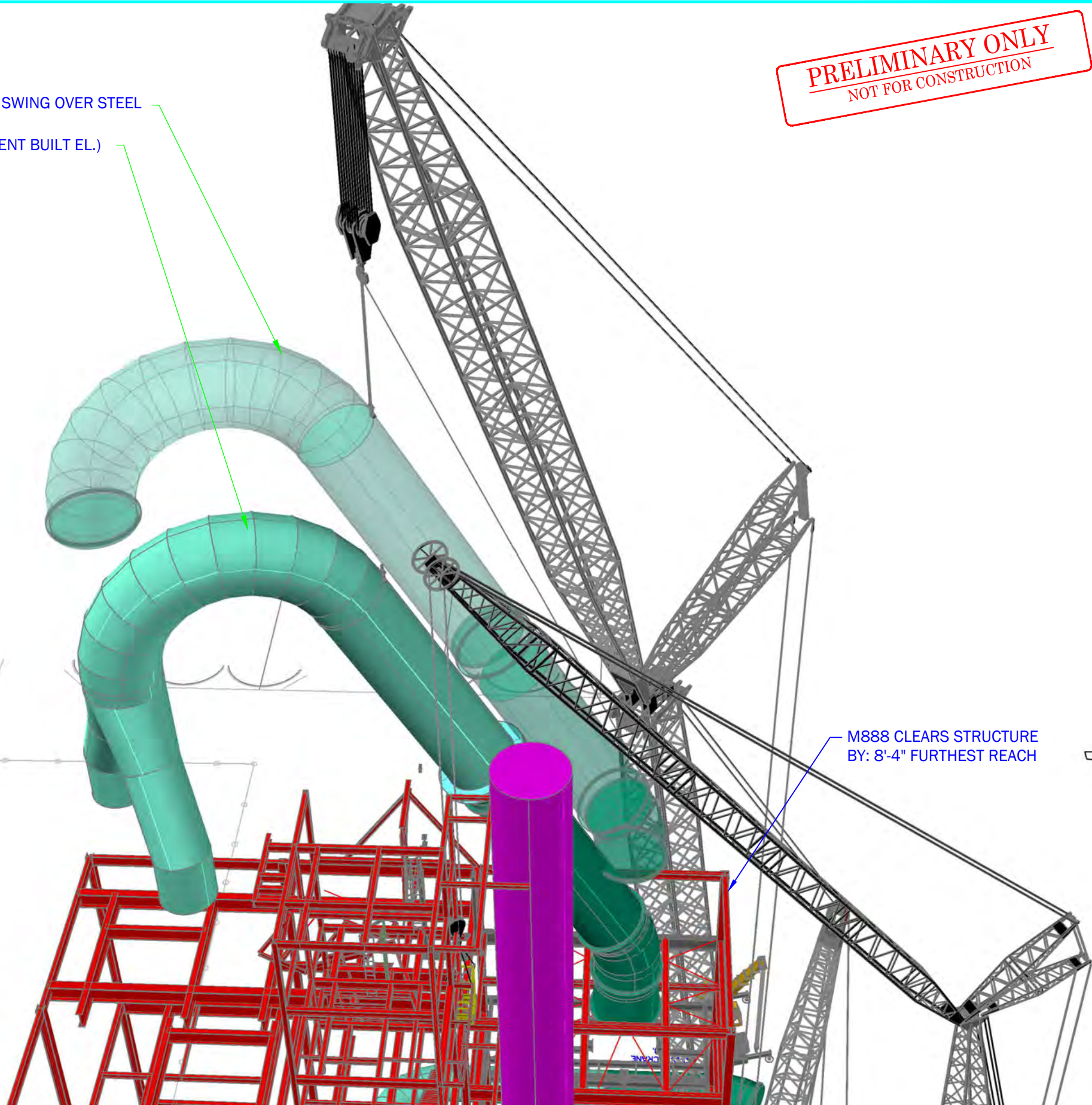
1	10.1.12	ISSUE FOR REVIEW
2	11.9.12	SITE REV.
3	12.17.12	TRACKS ROTATED
4	1.15.13	M888 LOCATION
5		
No.	Date	Revision

Project:	MOJAVE TREATMENT TOWER J-TUBE UNIT WEIGHT: 77,000 LBS		
Date:	10.1.12	Drawn By:	MS
Scale:	NTS		

Dwg Title:	M2250 CRAWLER WITH MAXER 2000 260' MAIN BOOM 150' LUFFING JIB 462K ON CART AT 50' POS.		
Dwg No.:	MC22803HL	Sht No.:	1



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1	10.1.12	ISSUE FOR REVIEW
2	11.9.12	SITE REV.
3	12.17.12	TRACKS ROTATED
4	1.15.13	M888 LOCATION
5		
No.	Date	Revision

Project:

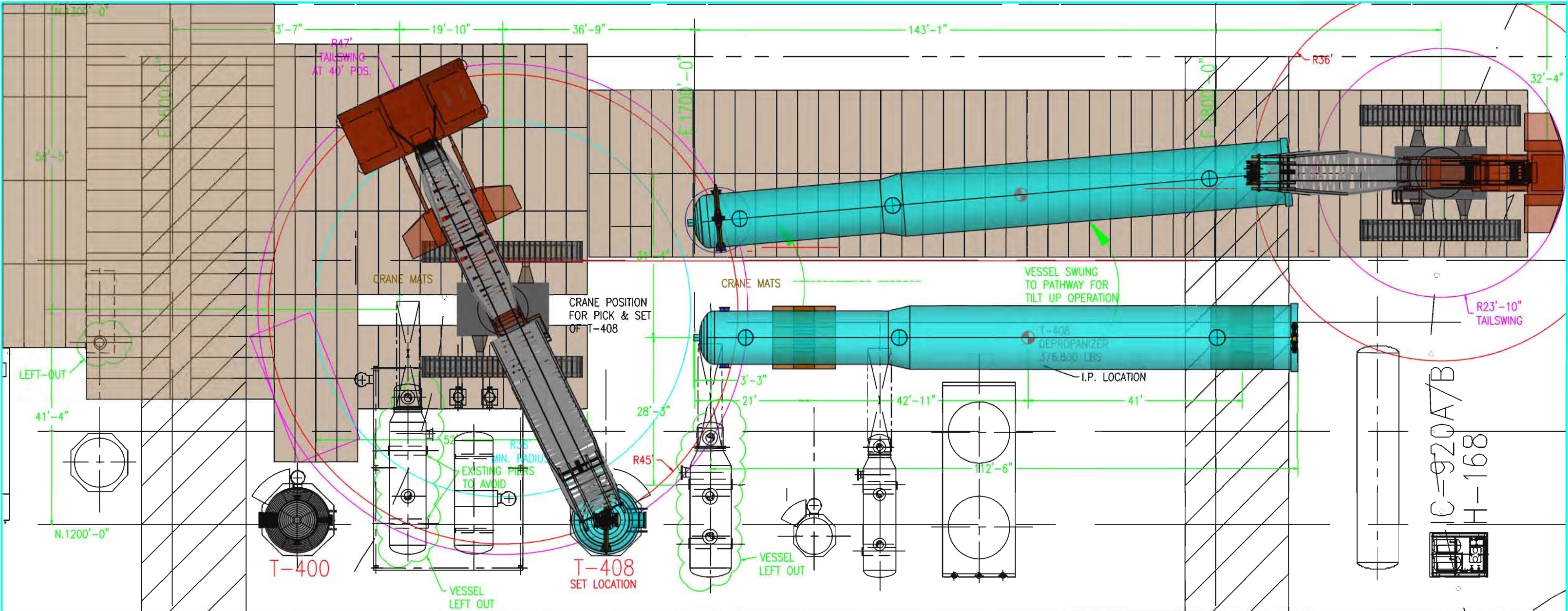
MOJAVE
TREATMENT TOWER
J-TUBE
UNIT WEIGHT: 77,000 LBS

Date: 10.1.12 Drawn By: MS Scale: NTS

Dwg Title:

M2250 CRAWLER WITH MAXER 2000
260' MAIN BOOM
150' LUFFING JIB
462K ON CART AT 50' POS.

Dwg No.: MC22803HL Sht No.: 2



PRIMARY CRANE
M2250 MAXER CRAWLER CRANE
220' MAIN BOOM NO. 79
130' MAST NO. 44
169,200 LBS CRANE CTWT
60,000 LBS CARBODY CTWT
462,000 LBS WHEELED CTWT AT 40' POS.
360° RATING

PICK / SET OF VESSEL T-408 (FULL WEIGHT)
DRESSED OUT WEIGHT: 376,800 LBS
HOOK BLOCK(250T): 14,190 LBS
RIGGING & SPREADER BAR: 9,100 LBS
LOAD LINE(14 PARTS 1-1/8"Ø): 5,570 LBS*
TOTAL WEIGHT: 405,660 LBS

CAPACITY @ 45': 561,000 LBS
PERCENT CAPACITY: 72.3%

*APPROX. 170' OF 14 PARTS OF LINE AT TIME
OF PICKING VESSEL.

TAILING CRANE
M2250 CRAWLER CRANE SERIES III
70' MAIN BOOM NO. 44
249,200 LBS CRANE CTWT
120,000 LBS CARBODY CTWT
360° RATING

TAILING OF VESSEL T-408(MAX TAILING WEIGHT)
TAILING WEIGHT: 200,940 LBS
HOOK BLOCK: 7,400 LBS
RIGGING: 1,218 LBS
LOAD LINE(10 PARTS 1-1/8"Ø): 468 LBS
TOTAL WEIGHT: 210,026 LBS

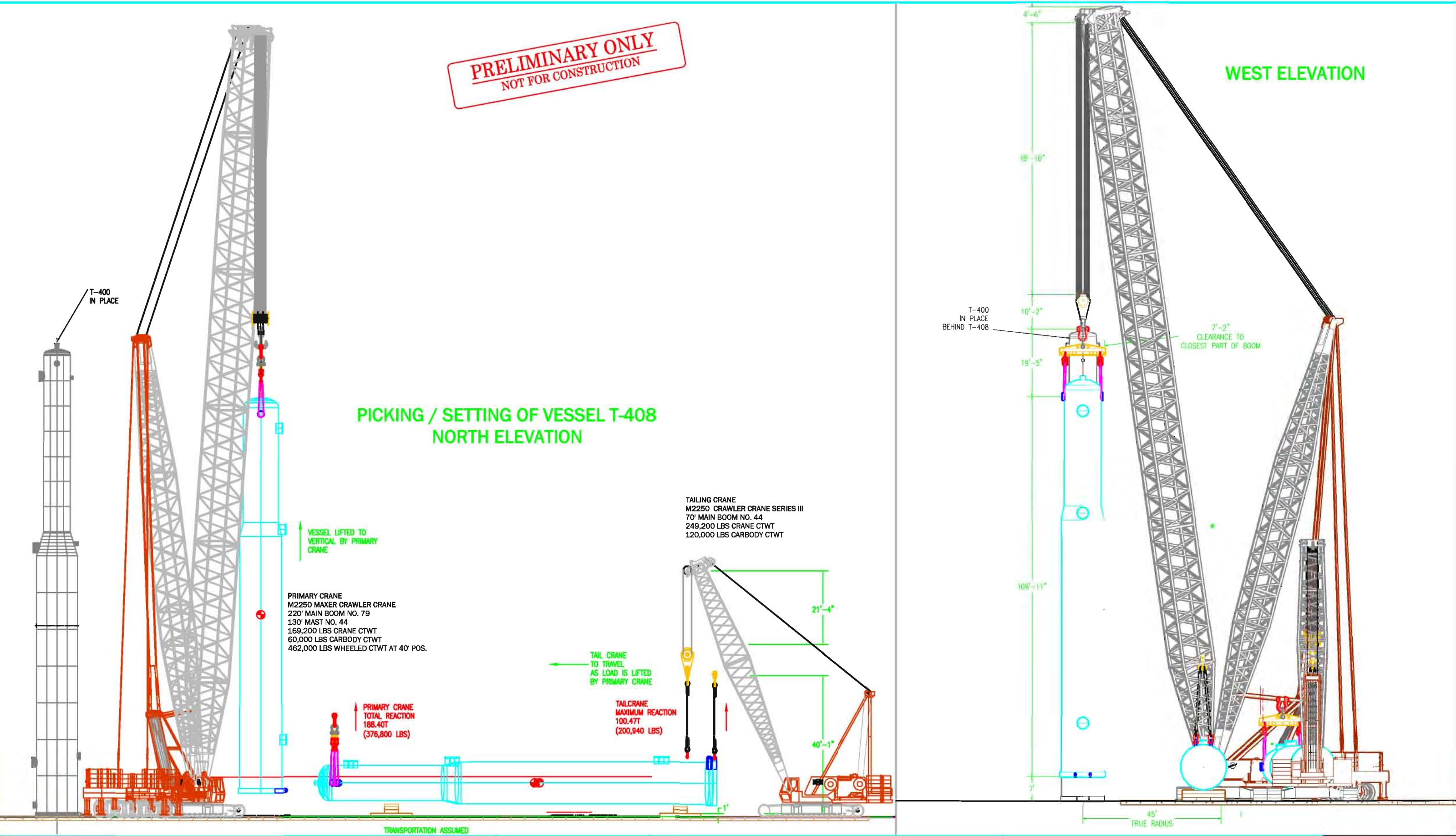
CAPACITY @ 36': 340,900 LBS
PERCENT CAPACITY: 61.6%

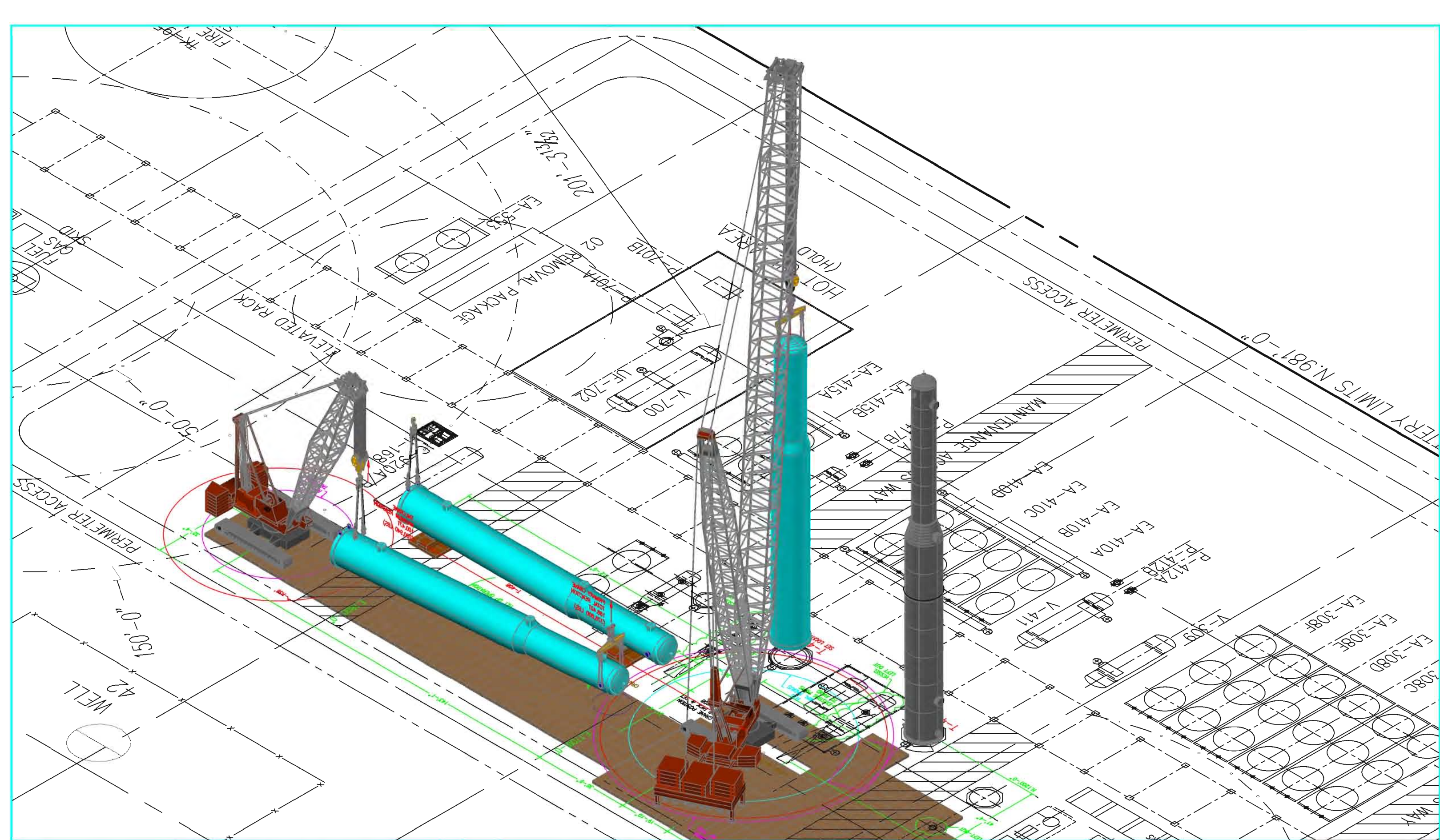
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PICKING / SETTING OF VESSEL T-408
NORTH ELEVATION

WEST ELEVATION





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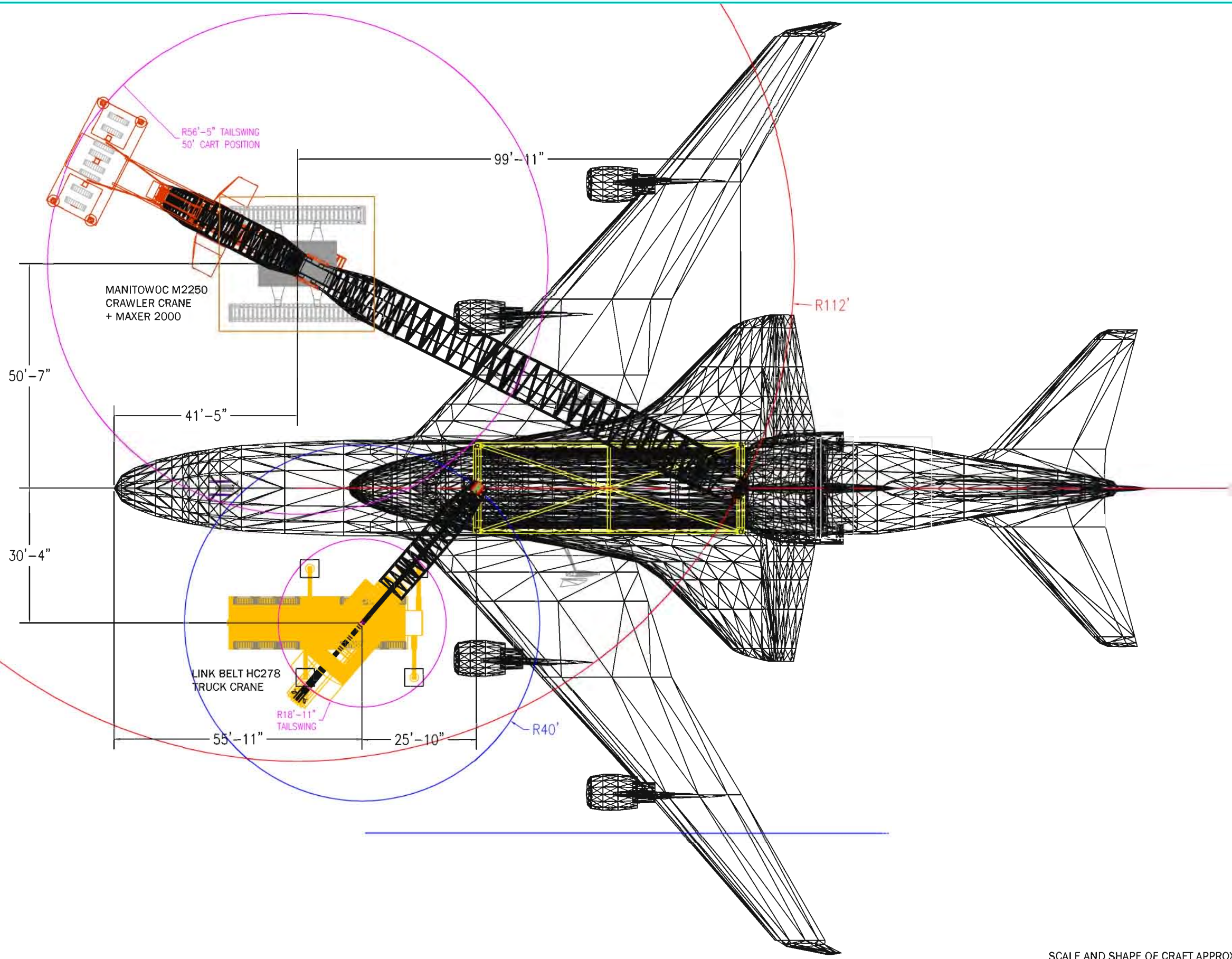
1	7.1.11	ISSUE FOR REVIEW
2	9.28.11	WT. CHANGE
3		
4		
No.	Date	Revision

Project: OCCIDENTAL OF ELK HILLS
CRYOGENIC GAS &
FRACTIONING FACILITY
T-408 (376,800 LBS) PICK PLAN

Date: 7.1.11 Drawn By: MS Scale: NTS

Dwg Title: M2250 CRAWLER CRANE WITH MAXER 2000 @ 40'
220' MAIN BOOM
M2250 CRAWLER CRANE SERIES 3 (TAILING)
70' MAIN BOOM

Dwg No.: MC22293HL Sht No.: 3



MANITOWOC M2250 CRAWLER CRANE + MAXER 2000
 200' MAIN BOOM NO. 79
 130' MAST NO. 44
 169,200 LBS CRANE CTWT
 60,000 LBS CARBODY CTWT
 462,000 LBS WHEELED CTWT AT 50' POS.
 360° RATING

AFT END OF SHUTTLE
 WEIGHT: 155,000 LBS
 HOOK BLOCK: 6,800 LBS
 RIGGING: INCLUDED
 LOAD LINE(7 PARTS 1-1/8"Ø): 1,840 LBS*
 TOTAL WEIGHT: 163,640 LBS

CAPACITY @ 112': 239,940 LBS
 PERCENT CAPACITY: 68.2%

*APPROX. 112' OF 7 PARTS OF 1-1/8" LINE AT TIME OF PICKING VESSEL.

LINK BELT HC278 TRUCK CRANE
 120' OPEN THROAT BOOM
 ABCD+A COUNTWEIGHT CONFIGURATION
 FULL OURIGGERS
 360° RATING

FORE END OF SHUTTLE
 WEIGHT: 67,000 LBS
 HOOK BLOCK: 4,400 LBS
 RIGGING: INCLUDED
 LOAD LINE(4 PARTS 1-1/8"Ø): 480 LBS*
 TOTAL WEIGHT: 71,880 LBS

CAPACITY @ 40': 151,800 LBS
 PERCENT CAPACITY: 47.4%

*APPROX. 50' OF 4 PARTS OF 1-1/8" LINE AT TIME OF PICKING VESSEL.

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SCALE AND SHAPE OF CRAFT APPROXIMATE

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1	6.1.12	ISSUE FOR REVIEW
2		
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No.	Date	Revision

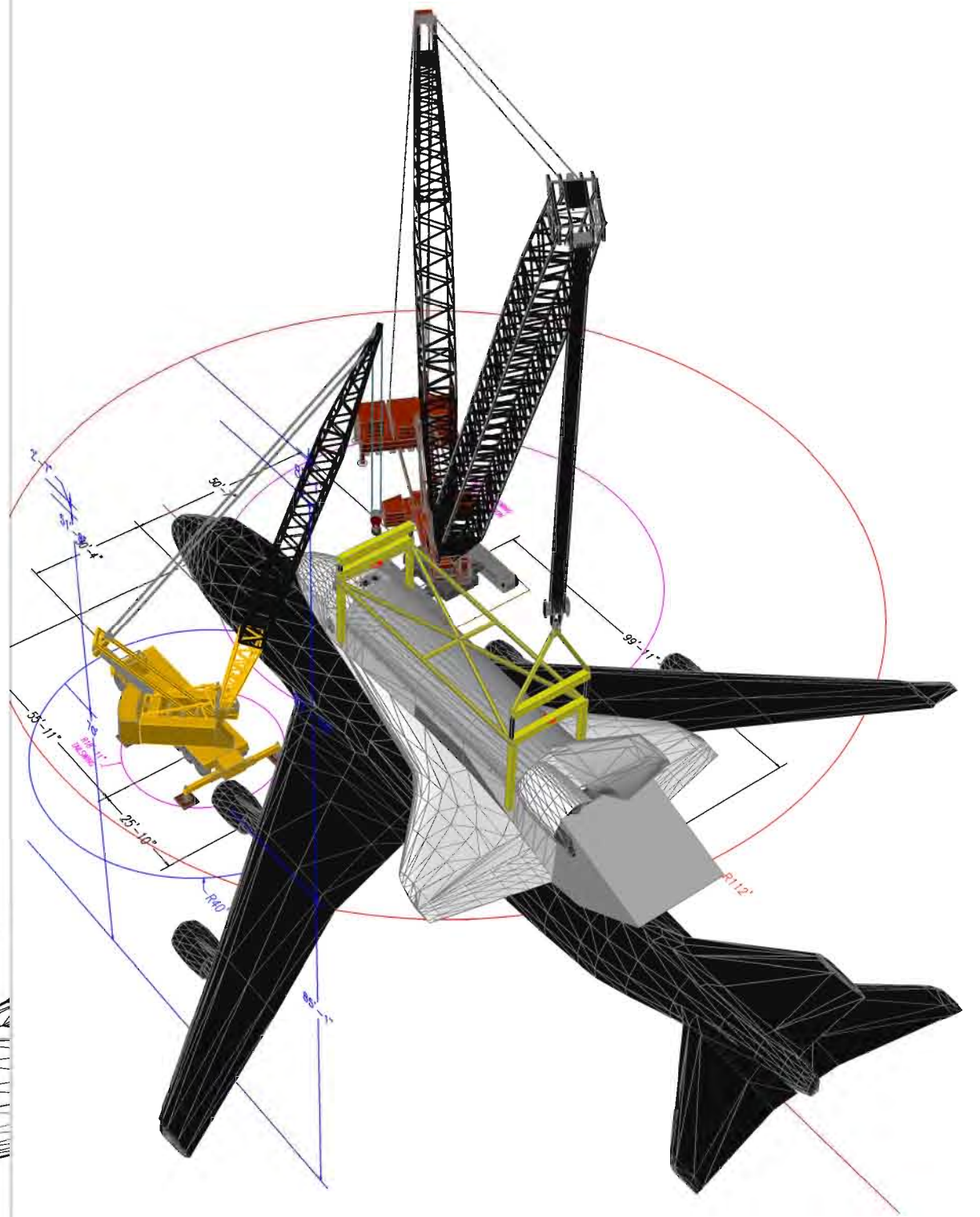
Project: SPACE SHUTTLE CRANE PLAN PICK AT LAX

Date: 6.1.12 Drawn By: MS Scale: NTS

Dwg Title: M2250 CRAWLER WITH MAXER 2000 HC278 TRUCK CRANE CONFIGURED AS SPECIFIED

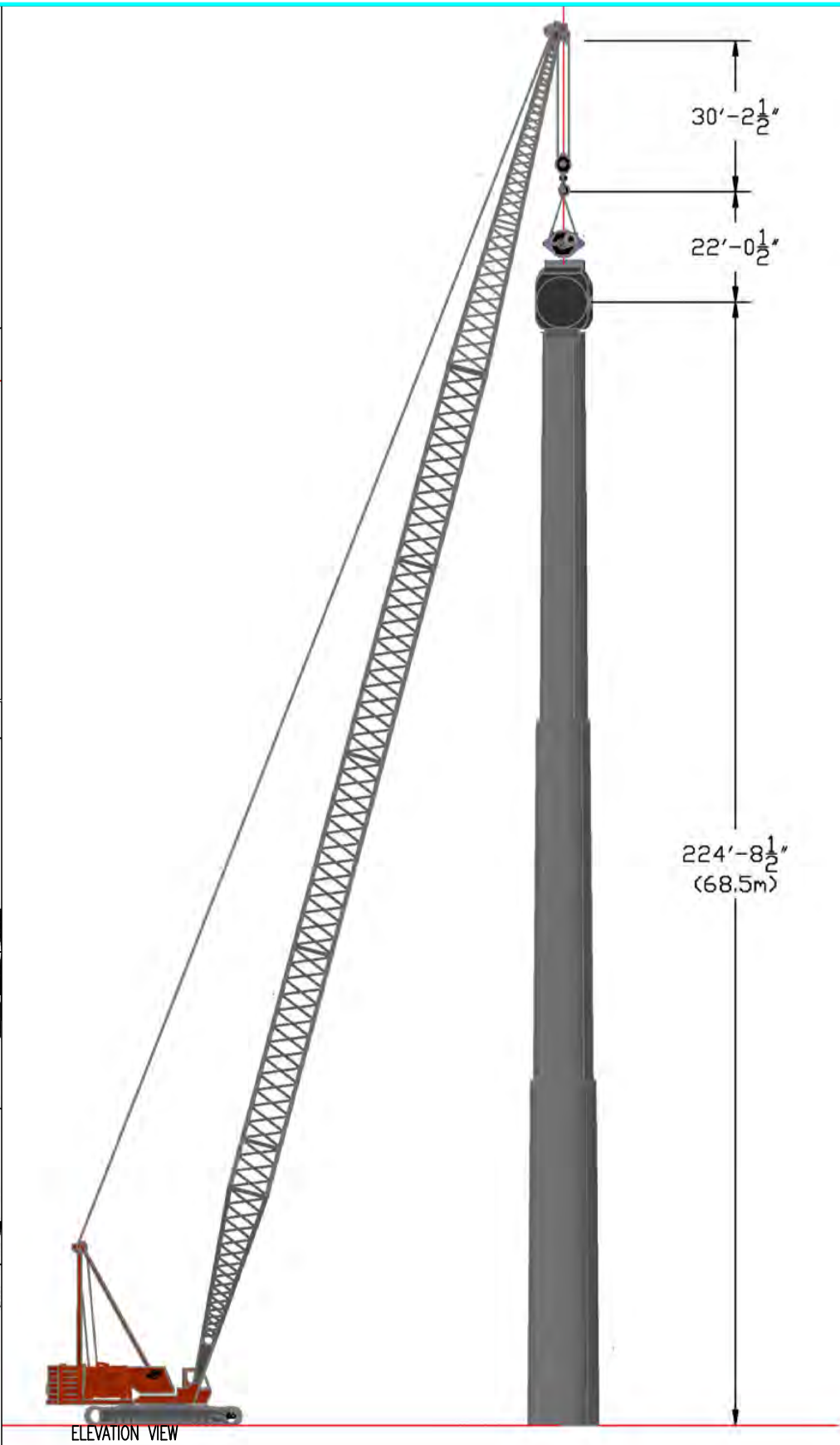
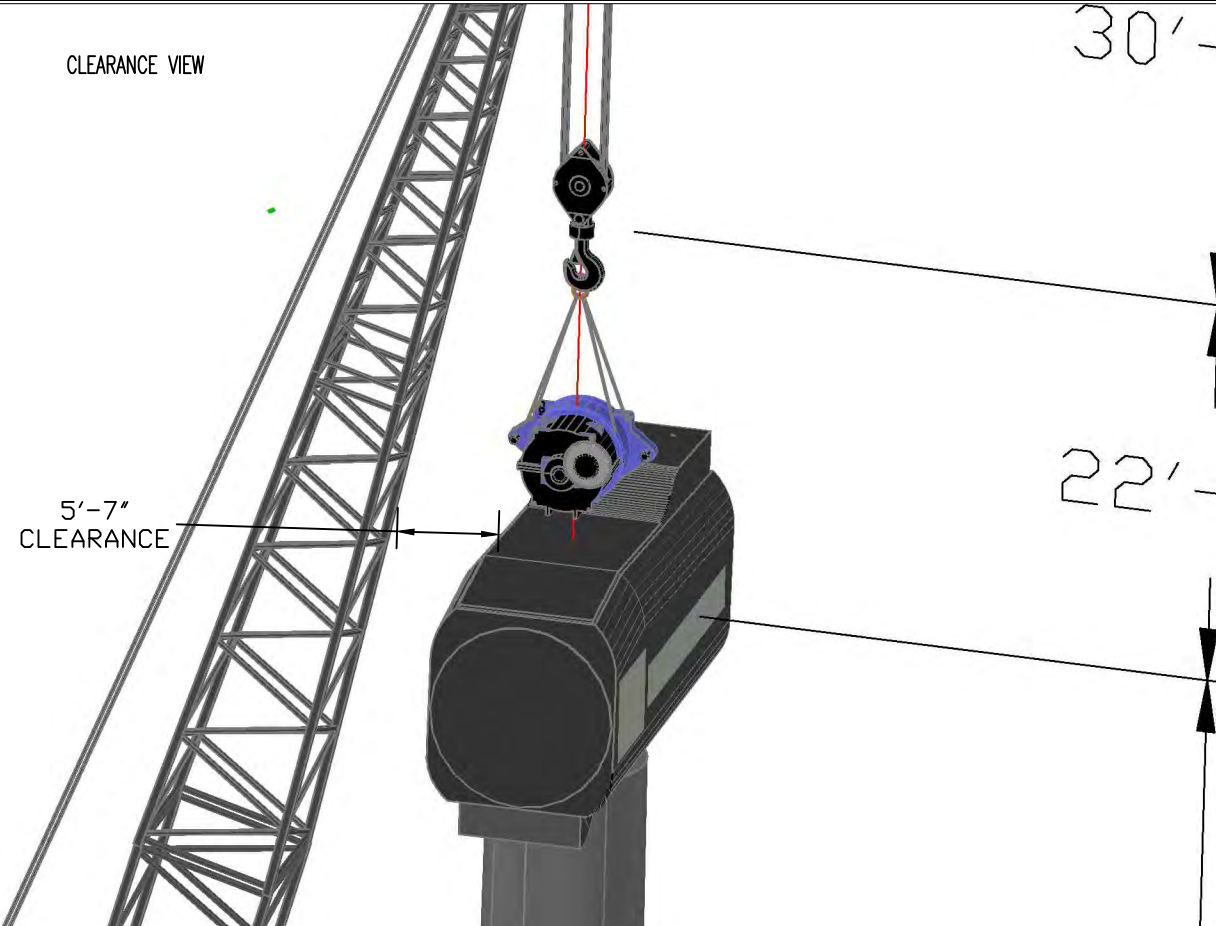
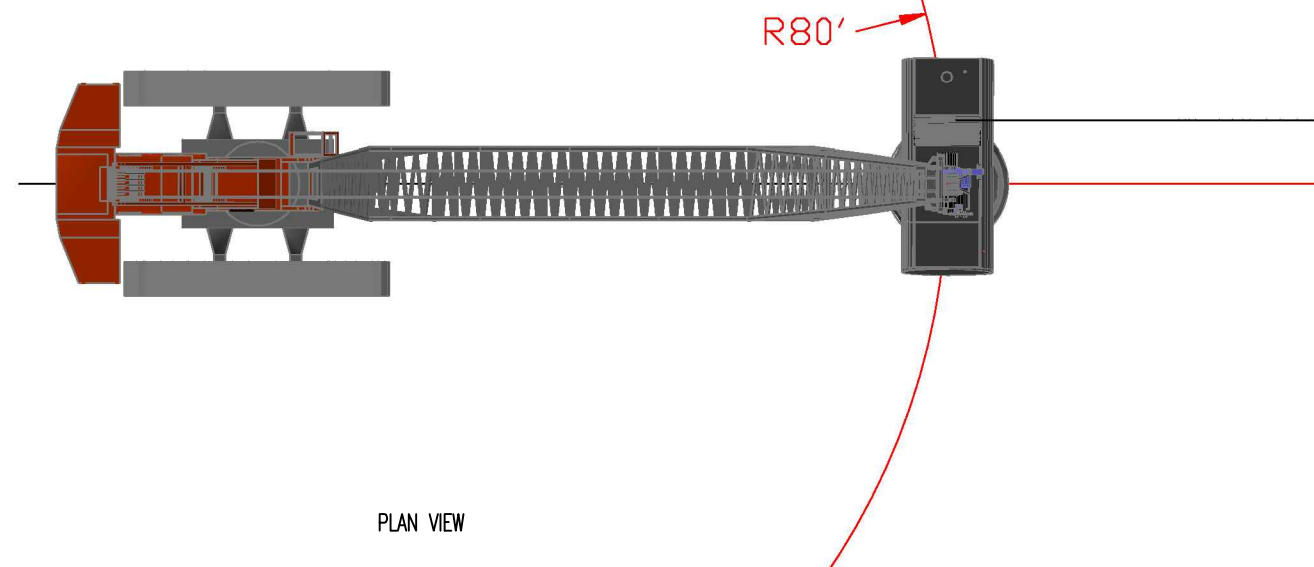
Dwg No.: MC22650HL Sht No.: 1

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Date:	6.1.12	Drawn By:	MS	Scale:	NTS	Dwg No.:	MC22650HL	Sht No.:	2
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M2250 CRAWLER CRANE SERIES II
280' MAIN BOOM NO. 44
LONG REACH TIP
209,200 LBS CRANE CTWT
60,000 LBS CARBODY CTWT
360° CHART

GEARBOX
PICK WEIGHT: 56,000 LBS
HOOK BLOCK: 3,500 LBS
RIGGING: 550 LBS
LOAD LINE: 1,615 LBS
TOTAL WEIGHT: 61,665 LBS

CAPACITY @ 80': 90,900 LBS
PERCENT CAPACITY: 67.8%

OPTION WITH SERIES III COUNTERWEIGHT
CAPACITY @ 80': 110,200 LBS
PERCENT CAPACITY: 56%

MR. CRANE

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1	8.20.14	ISSUE FOR REVIEW
2		
3		
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No.	Date	Revision

Project:

68.5M TOWER
GEARBOX LIFT

UNIT WEIGHT: 56,000 LBS

Date:

8.20.14

Drawn By:

MS

Scale:

NTS

Dwg Title:

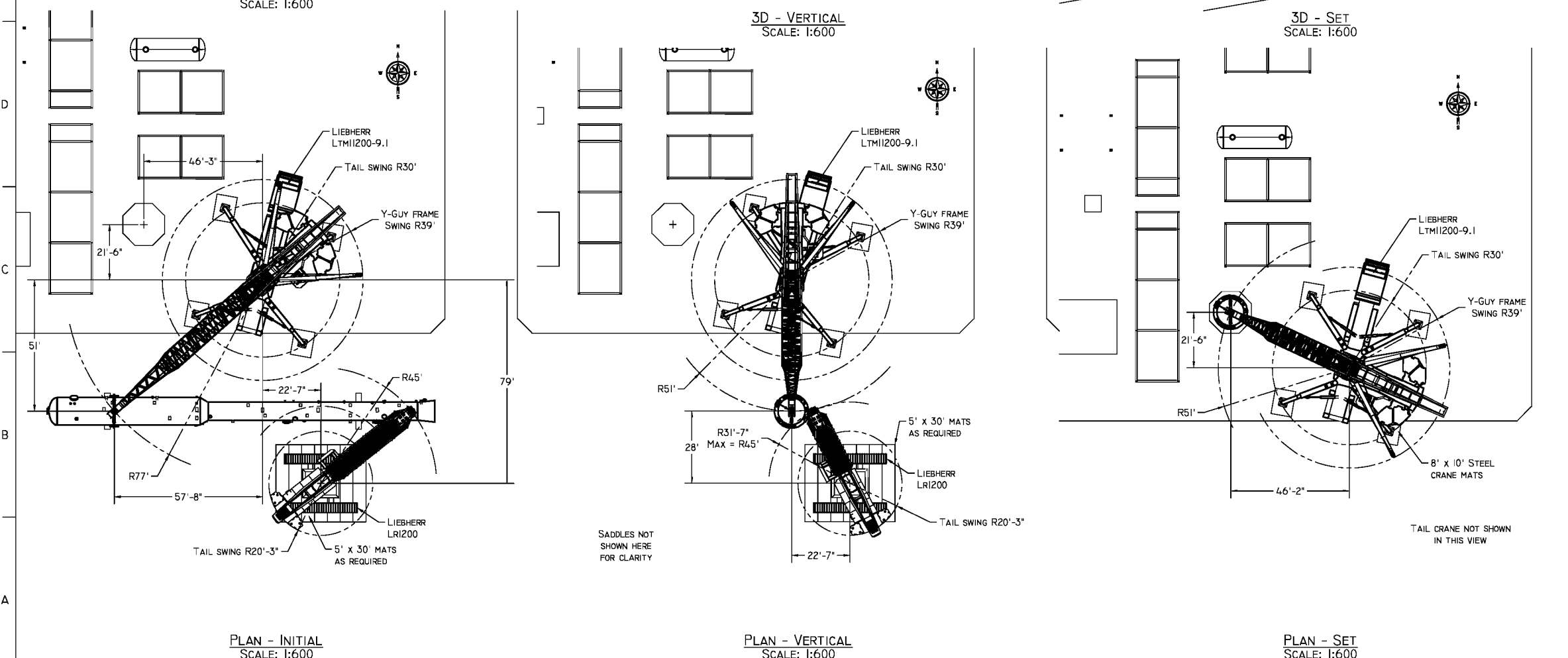
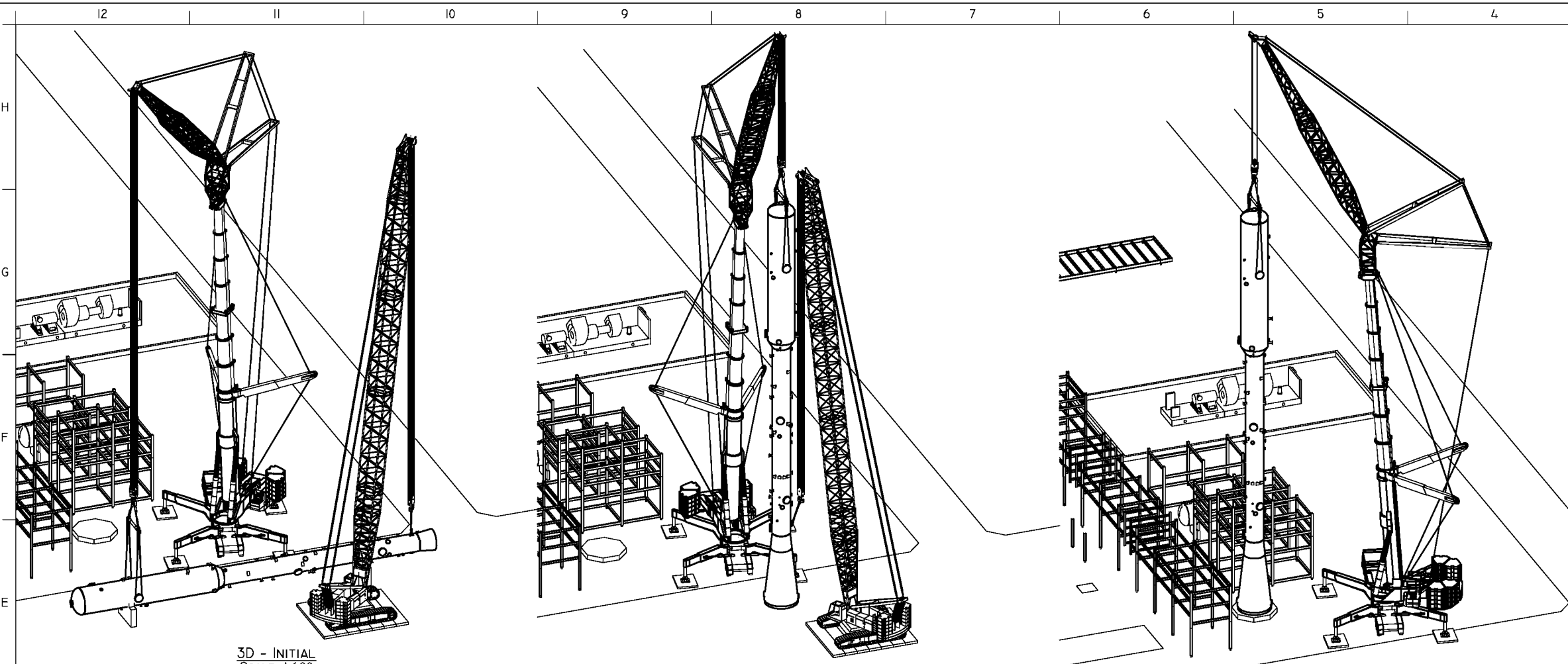
M2250 CRAWLER CRANE
280' LONG REACH BOOM
SERIES II / III CTWT

Dwg No.:

MC23671WP

Sht No.:

1



CRANE INFORMATION

LIFT	CRANE ONE	CRANE TWO
CRANE TYPE:	LTM1200-9.1	LIEBHERR LRI200
NOMINAL CAPACITY:	1,350 Ton	250 Ton
COUNTERWEIGHT:	357,100 LBS	178,600 LBS
CARBODY CTWT:	—	79,400 LBS
SUPERLIFT CTWT:	—	—
CTWT POSITION:	—	—
OUTRIGGERS/TRACKS:	43 x 43 STANCE	2-WIDE TRACKS
BOOM LENGTH:	133' T3Y (50+,100+,50+)	184'
PARTS OF LINE:	MINIMUM ELEVEN	MINIMUM SIX
LUFFER/JIB:	79'	—
LIFT RADIUS:	51'	45'
CAPACITY:	369,800 LBS	148,400 LBS

LOAD INFO

LOAD:	313,828 LBS	114,923 LBS
RIGGING:	3,847 LBS	224 LBS
HOOK/LOAD BLOCK:	16,768 LBS	5,070 LBS
LOAD LINE:	INCL.	1,885 LBS
HEADACHE BALL:	—	—
EFFECTIVE JIB WEIGHT:	—	—
AUXILIARY BOOM HEAD:	—	—
ADDITIONAL WEIGHT:	—	2306 LBS

LIFT INFO

TOTAL LIFT WEIGHT:	334,443 LBS	124,408 LBS
PERCENT CAPACITY:	90.4 %	83.8%
MAX. OUTRIGGER FORCE:	445,000 LBS	—
MAX. GROUND PRESSURE:	38.6 PSI / 5,563 PSF	16.2 PSI / 2,329 PSF

GENERAL NOTES:

1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM IPS & INWC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC...
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNNIONS, ETC.... TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE
10. LARGER RIGGING MAY BE SUBSTITUTED AS LONG AS THE FIT UP OF THE COMPONENTS ARE NOT AFFECTED
11. LARGER CRANES MAY BE SUBSTITUTED PROVIDING THE PERCENT OF CHART CAPACITY IS NOT EXCEEDED AND THE INCREASED GROUND BEARING PRESSURES ARE ACCOUNTED FOR
12. TRAVELING INEVITABLY PRODUCES CERTAIN DYNAMIC EFFECTS ON LIEBHERR CRANES THEREFORE LIEBHERR CRANES LOAD MUST ALWAYS BE REDUCED BEFORE THE CRANE STARTS TO TRAVEL. THE LOAD REDUCTION IS AS FOLLOWS: LOAD CAPACITY - 10% OR LOAD CAPACITY - 2200 LBS; THE LOWER VALUE MUST BE USED; CONTACT ENGINEERING FOR OTHER CRANE MANUFACTURERS
13. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES

PROFESSIONAL ENGINEER ALBERTA

JOSEPH KOSA

14/08/25

rev.00

PERMIT TO PRACTICE

Northern Crane Services Inc.

Signature: *Joseph Kosa*

Date: **August 25, 2014**

PERMIT NUMBER: P-9723

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV.	DATE	DESCRIPTION	BY	CHK.	ENG.	APP.
0	14/08/25	ISSUED FOR LIFT	AJG	JK	JK	JK
A	14/07/22	ISSUED FOR REVIEW	AJG	—	—	—

CLIENT: PILLAR OILFIELD PROJECTS

PROJECT: PEMBINA - SATURN II DEEP CUT TRAIN

NCSG ENGINEERING LTD.

www.ncsg.com

#811, 53016 HIGHWAY 60, ACHESON, AB, T7X-5A7

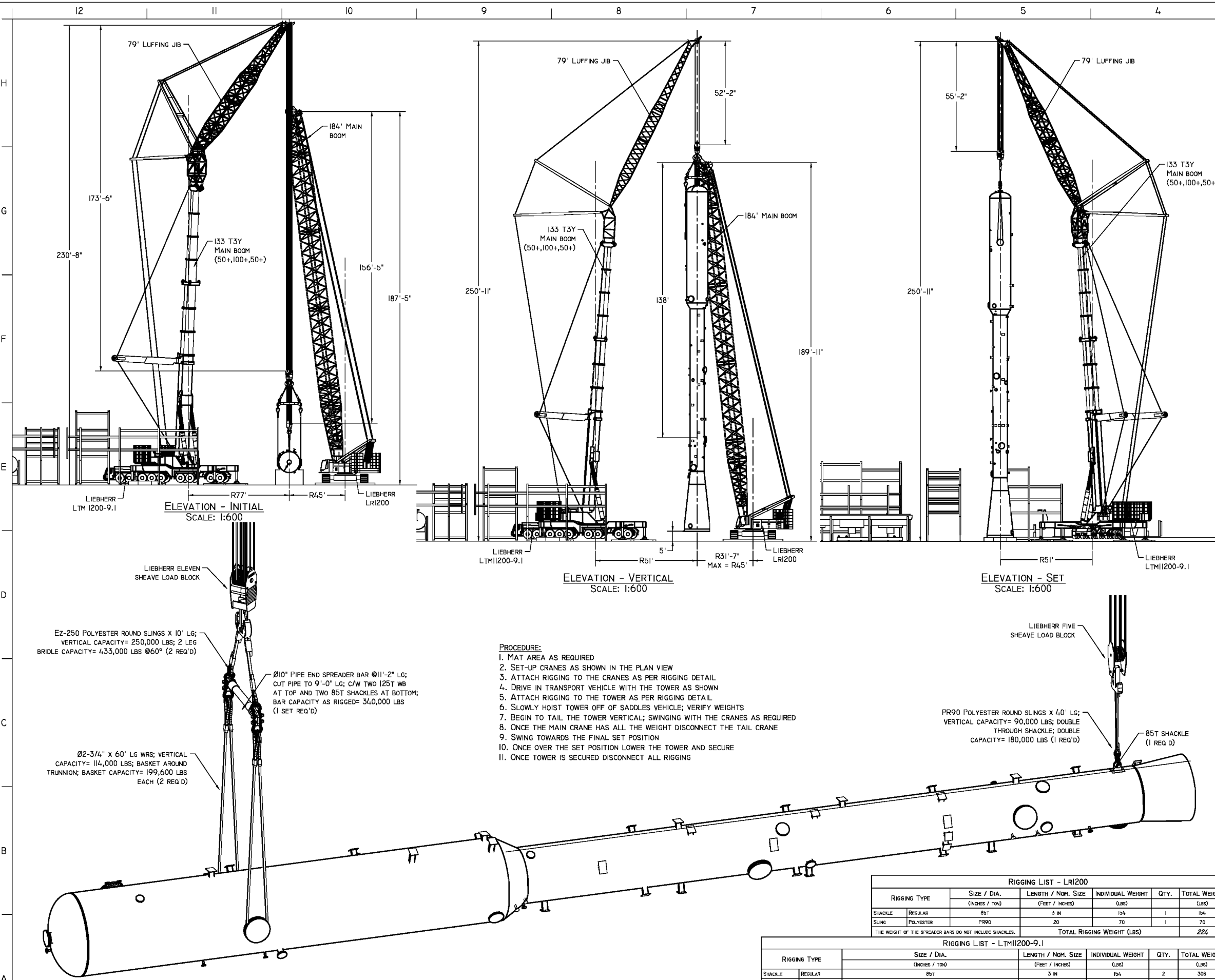
PH: (780) 447-4440

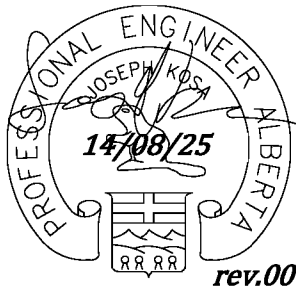


FAX: (780) 447-4645

TITLE: DE-METHANIZER SET USING LIEBHERR LTM1200-9.1 AND LRI160

PAPER	JOB No.	DRAWING NUMBER	SHEET	REV.
B	11-023-0069	2572-NCSG140722	1 OF 2	0

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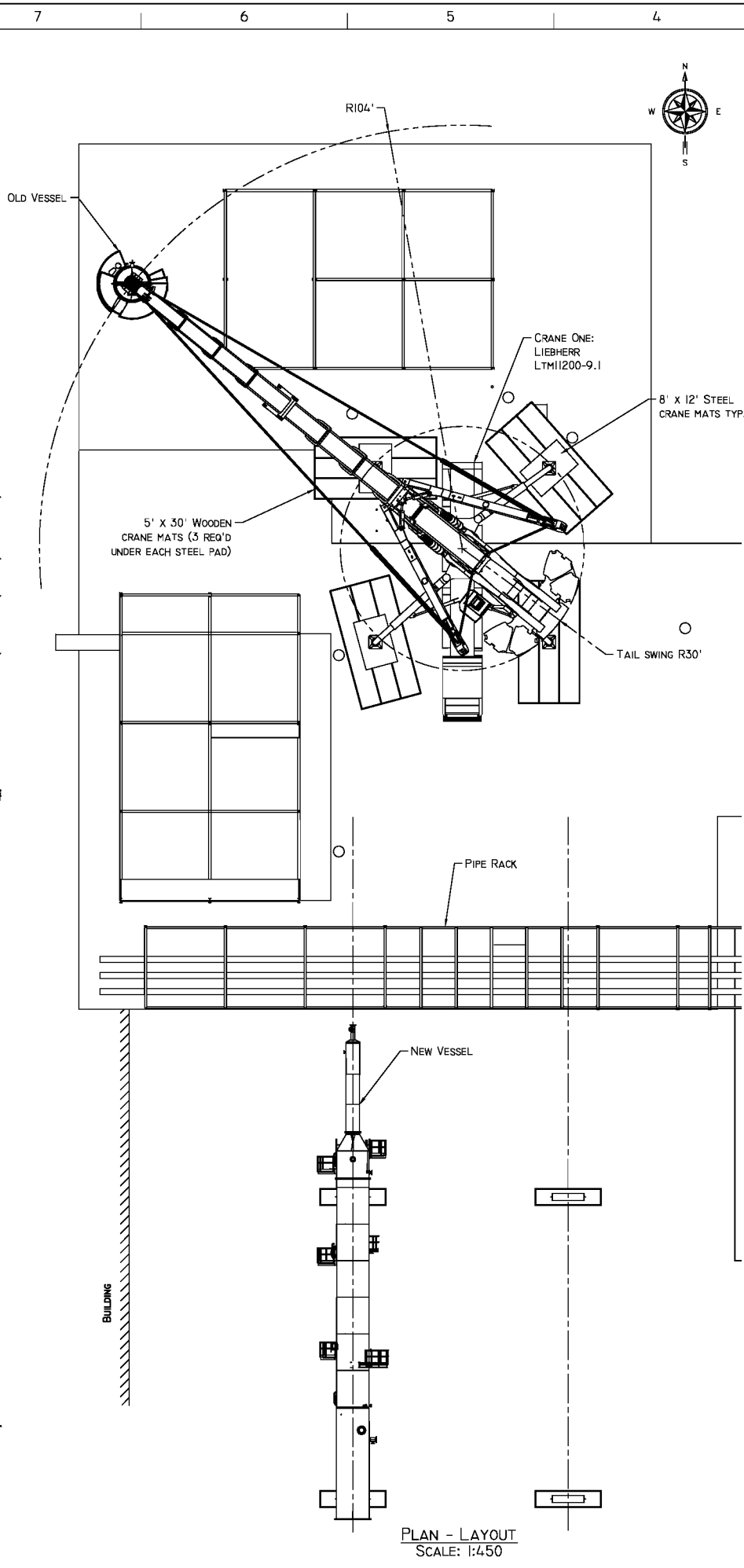
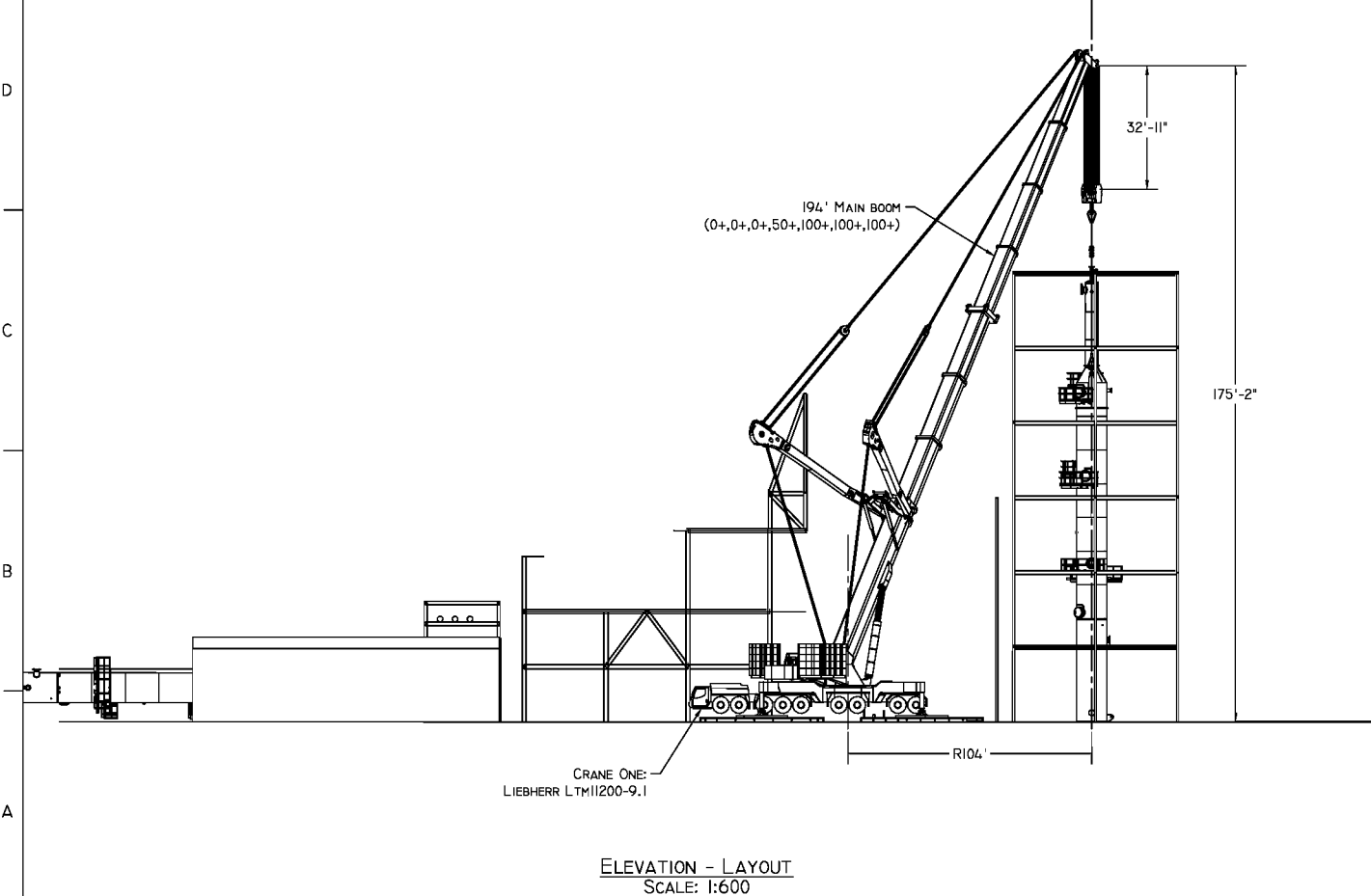
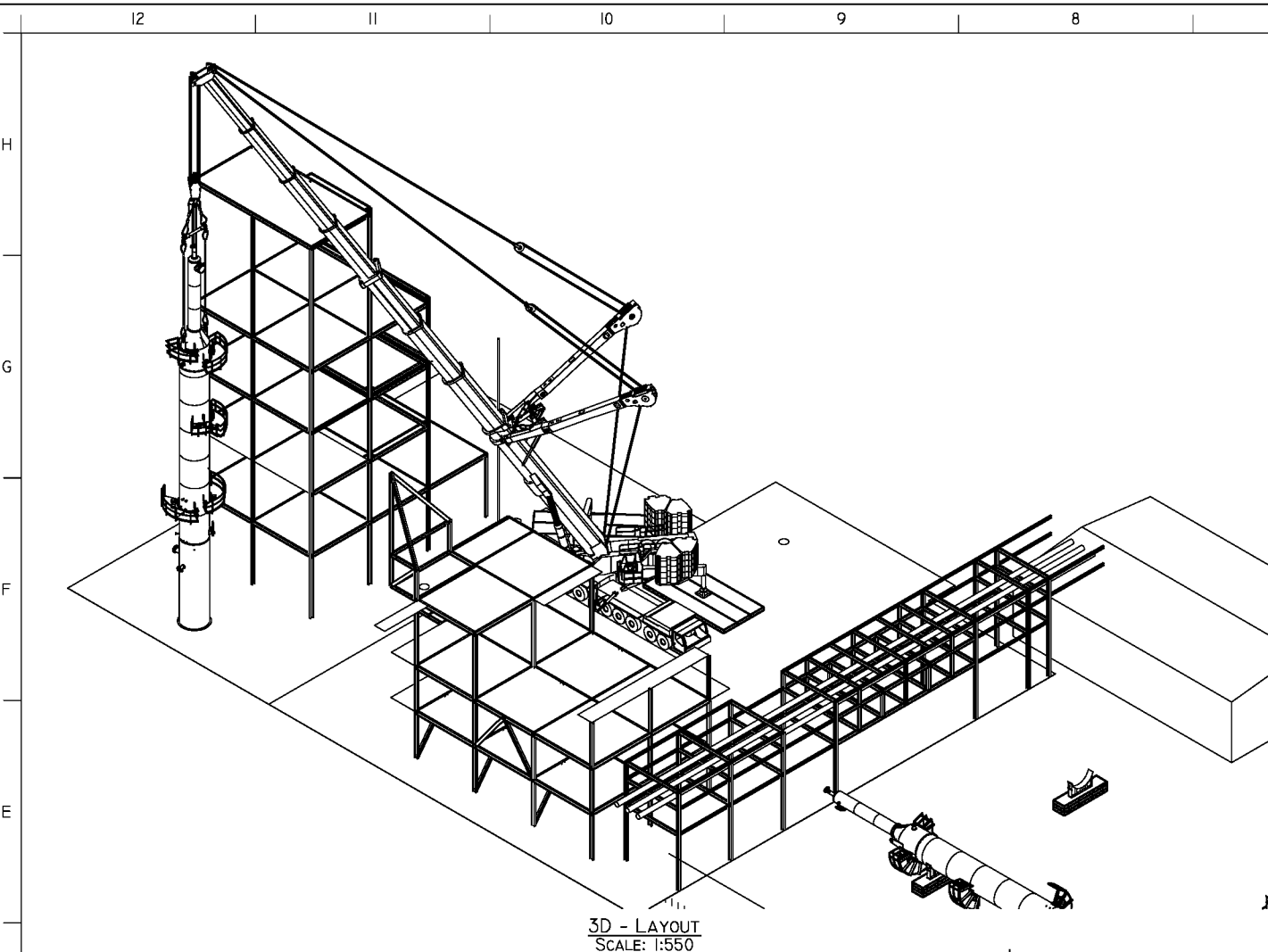


CRANE INFORMATION																			
LIFT				CRANE ONE				CRANE TWO											
CRANE TYPE:				LTM1200-9.1				LIEBHERR LRI200											
NOMINAL CAPACITY:				1,350 TON				220 TON											
COUNTERWEIGHT:				357,100 LBS				178,600 LBS											
CARBODY CTWT:				---				79,400 LBS											
SUPERLIFT CTWT:				---				---											
CTWT POSITION:				---				---											
OUTRIGGERS/TRACKS:				43 x 43 STANCE				2-WIDE TRACKS											
BOOM LENGTH:				133' T3Y (50+,100+,50+)				184'											
PARTS OF LINE:				MINIMUM ELEVEN				MINIMUM FIVE											
LUFFER/JIB:				79'				---											
LIFT RADIUS:				51'				45'											
CAPACITY:				369,800 LBS				148,400 LBS											
LOAD INFO																			
LOAD:				313,828 LBS				114,923 LBS											
RIGGING:				3,847 LBS				454 LBS											
HOOK/LOAD BLOCK:				16,768 LBS				5,070 LBS											
LOAD LINE:				INCL.				1,885 LBS											
HEADACHE BALL:				---				---											
EFFECTIVE JIB WEIGHT:				---				---											
AUXILIARY BOOM HEAD:				---				---											
ADDITIONAL WEIGHT:				---				---											
LIFT INFO																			
TOTAL LIFT WEIGHT:				334,443 LBS				122,332 LBS											
PERCENT CAPACITY:				90.4 %				82.4%											
MAX. OUTRIGGER FORCE:				445,000 LBS				---											
MAX. GROUND PRESSURE:				38.6 PSI / 5,563 PSF				15.7 PSI / 2265 PSF											
GENERAL NOTES:																			
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE																			
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC																			
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE																			
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC...																			
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING																			
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNNIONS, ETC..., TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR																			
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING																			
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI																			
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE																			
10. LARGER RIGGING MAY BE SUBSTITUTED AS LONG AS THE FIT UP OF THE COMPONENTS ARE NOT AFFECTED																			
11. LARGER CRANES MAY BE SUBSTITUTED PROVIDING THE PERCENT OF CHART CAPACITY IS NOT EXCEEDED AND THE INCREASED GROUND BEARING PRESSURES ARE ACCOUNTED FOR																			
12. TRAVELING INEVITABLY PRODUCES CERTAIN DYNAMIC EFFECTS ON LIEBHERR CRANES THEREFORE LIEBHERR CRANES LOAD MUST ALWAYS BE REDUCED BEFORE THE CRANE STARTS TO TRAVEL. THE LOAD REDUCTION IS AS FOLLOWS: LOAD CAPACITY - 10% OR LOAD CAPACITY - 2200 LBS; THE LOWER VALUE MUST BE USED; CONTACT ENGINEERING FOR OTHER CRANE MANUFACTURERS																			
13. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES																			
				<div>PERMIT TO PRACTICE Northern Crane Services Inc. Signature:  Date: August 25, 2014 PERMIT NUMBER: P-9723 The Association of Professional Engineers, Geologists and Geophysicists of Alberta</div>															
0 14 08 25				ISSUED FOR LIFT				AJG JK JK JK											
A 14 07 22				ISSUED FOR REVIEW				AJG -- -- --											
REV. Y M D DATE				DESCRIPTION				BY. CHK. ENG. APP.											
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SHOWN				A.GOULD		14/07/22		J.KOSA		14/08/25		J.KOSA		14/08/25		J.KOSA		14/08/25	
CLIENT: PILLAR OILFIELD PROJECTS																			
PROJECT: PEMBINA - SATURN II DEEP CUT TRAIN																			
										NCSG ENGINEERING LTD. WWW.NCSG.COM #811, 53016 HIGHWAY 60, ACHESON, AB, T7X-5A7 PH: (780) 447-4440 FAX: (780) 447-4645									
TITLE: DE-METHANIZER SET USING LIEBHERR LTM1200-9.1 AND LRI160																			
PAPER				JOB NO.				DRAWING NUMBER				SHEET				REV.			
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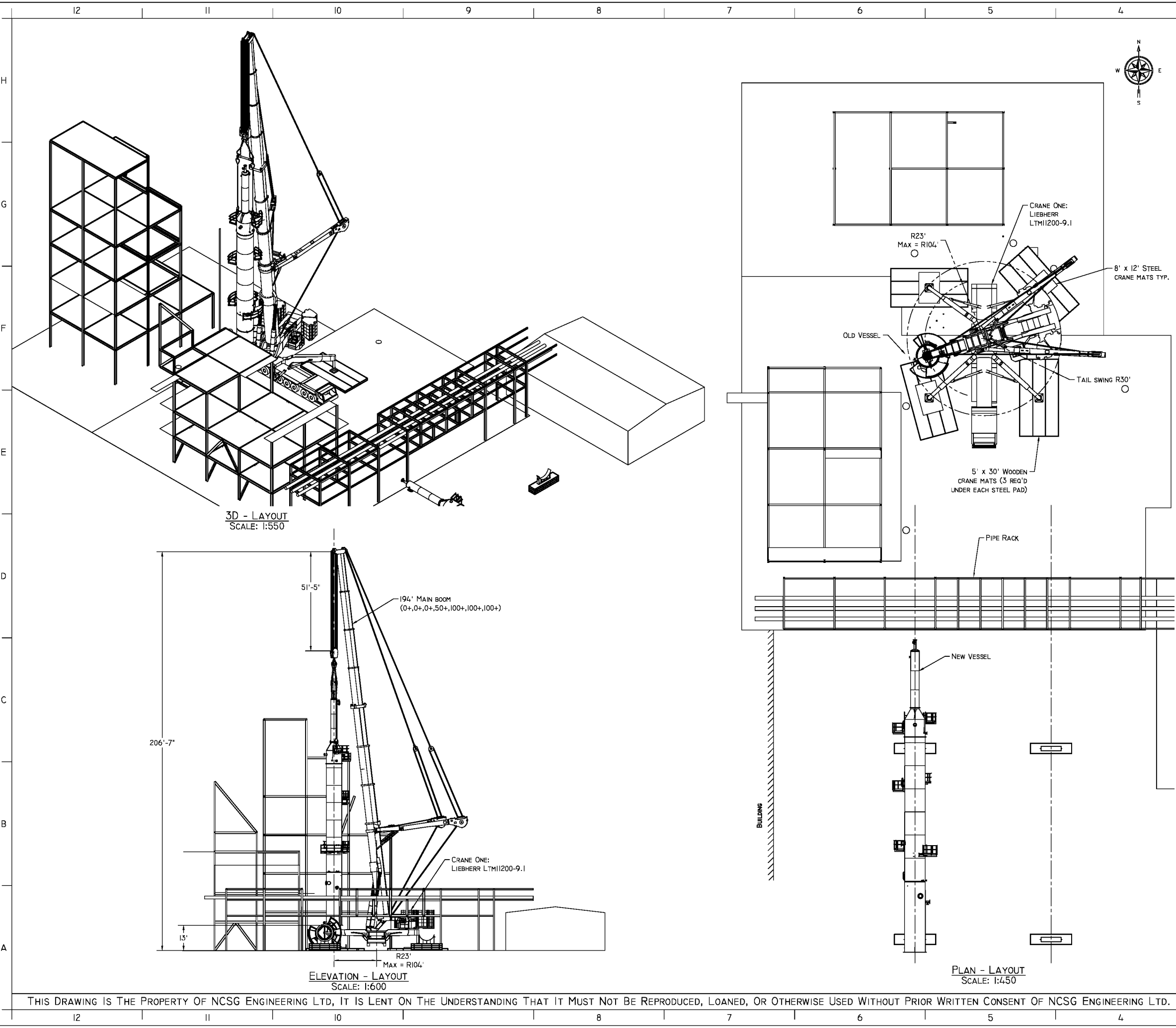
LIFT STUDY BASED ON INFORMATION CONTAINED IN THE REFERENCE DRAWINGS LISTED BELOW:
DACRO INDUSTRIES INC. CALCULATIONS - V5046 DP LIFT ENG 9 JUL14
DACRO INDUSTRIES INC. DRAWING - 5046 CG WITH PIPING


RIGGING DETAIL
SCALE: 1:150

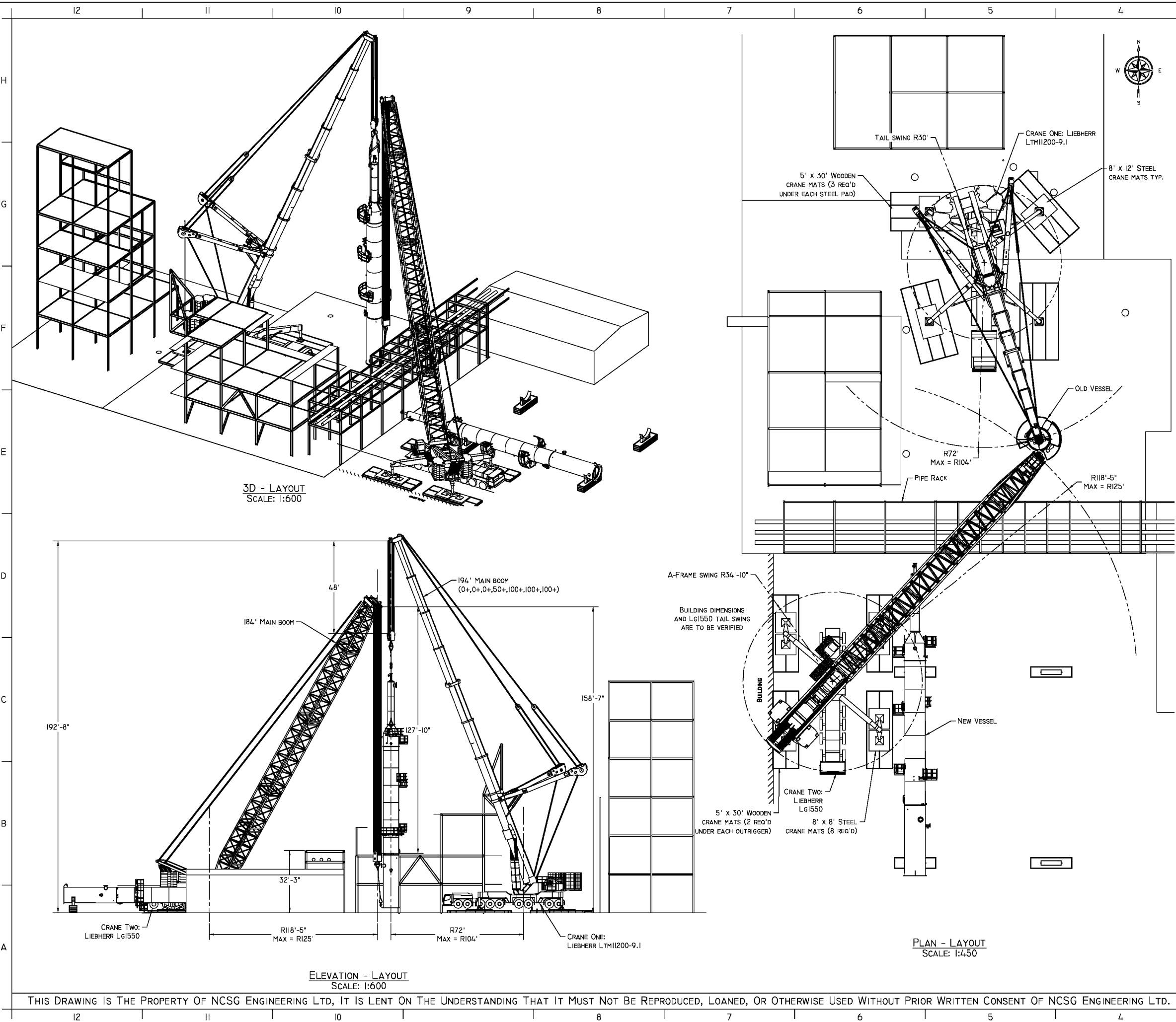
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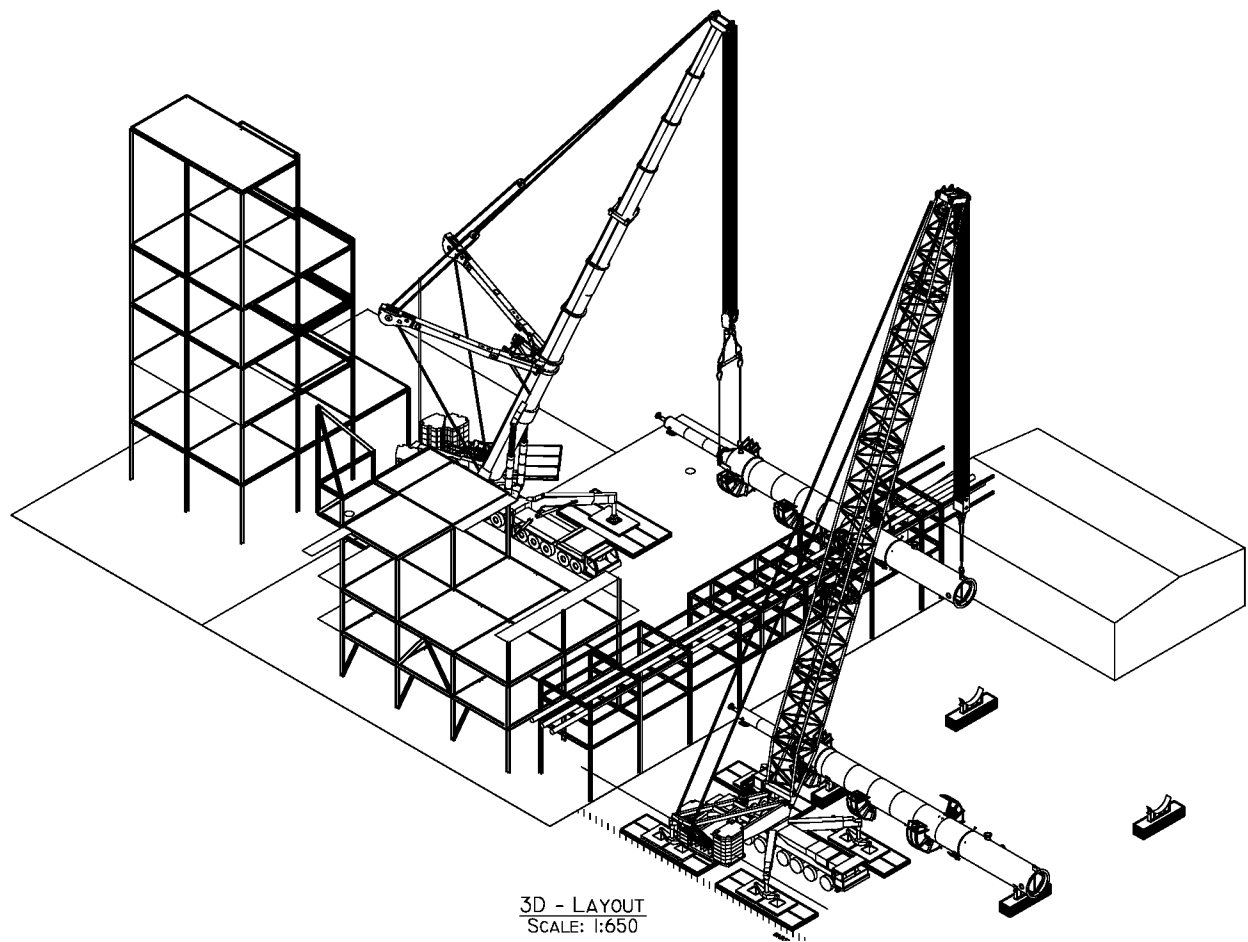
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CRANE INFORMATION																																			
LIFT												CRANE ONE												CRANE TWO											
CRANE TYPE:												LIEBHERR LTM1200-9.1												LIEBHERR LG1550											
NOMINAL CAPACITY:												1350 TON												600 TON											
COUNTERWEIGHT:												445,300 LBS												353,000 LBS											
CARBODY CTWT:												---												---											
SUPERLIFT CTWT:												---												---											
CTWT POSITION:												---												---											
OUTRIGGERS/TRACKS:												43' x 43' STANCE												43' x 43' STANCE											
BOOM LENGTH:												194' (0+,0+,0+,50+,100+,100+,100+)												184'											
PARTS OF LINE:												MINIMUM SIX												MINIMUM SIX											
LUFFER/JIB:												---												---											
LIFT RADIUS:												MAX. 104'												---											
CAPACITY:												200,000 LBS												---											
LOAD INFO																																			
LOAD:												160,000 LBS												---											
RIGGING:												2,966 LBS												---											
HOOK/LOAD BLOCK:												9,923 LBS												---											
LOAD LINE:												INCL.												---											
HEADACHE BALL:												---												---											
EFFECTIVE JIB WEIGHT:												---												---											
AUXILIARY BOOM HEAD:												---												---											
ADDITIONAL WEIGHT:												---												---											
LIFT INFO																																			
TOTAL LIFT WEIGHT:												172,889 LBS												---											
PERCENT CAPACITY:												86.4%												---											
MAX. OUTRIGGER FORCE:												488,000 LBS												---											
MAX. GROUND PRESSURE:												7.53 PSI / 1084 PSF (51.9 KPA)												---											
GENERAL NOTES:																																			
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE																																			
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC																																			
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE																																			
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13. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES																																			
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ACHESON, AB, T7X-5A7																																			
PH: (780) 447-4440																																			
FAX: (780) 447-4645																																			
TITLE: CRANE POSITIONS FOR DEPROPANIZER LIFT																																			
USING LIEBHERR LTM1200-9.1 AND LG1550 CRANES																																			
PAPER NCSG-Eng Job No. DRAWING NUMBER SHEET REV.																																			



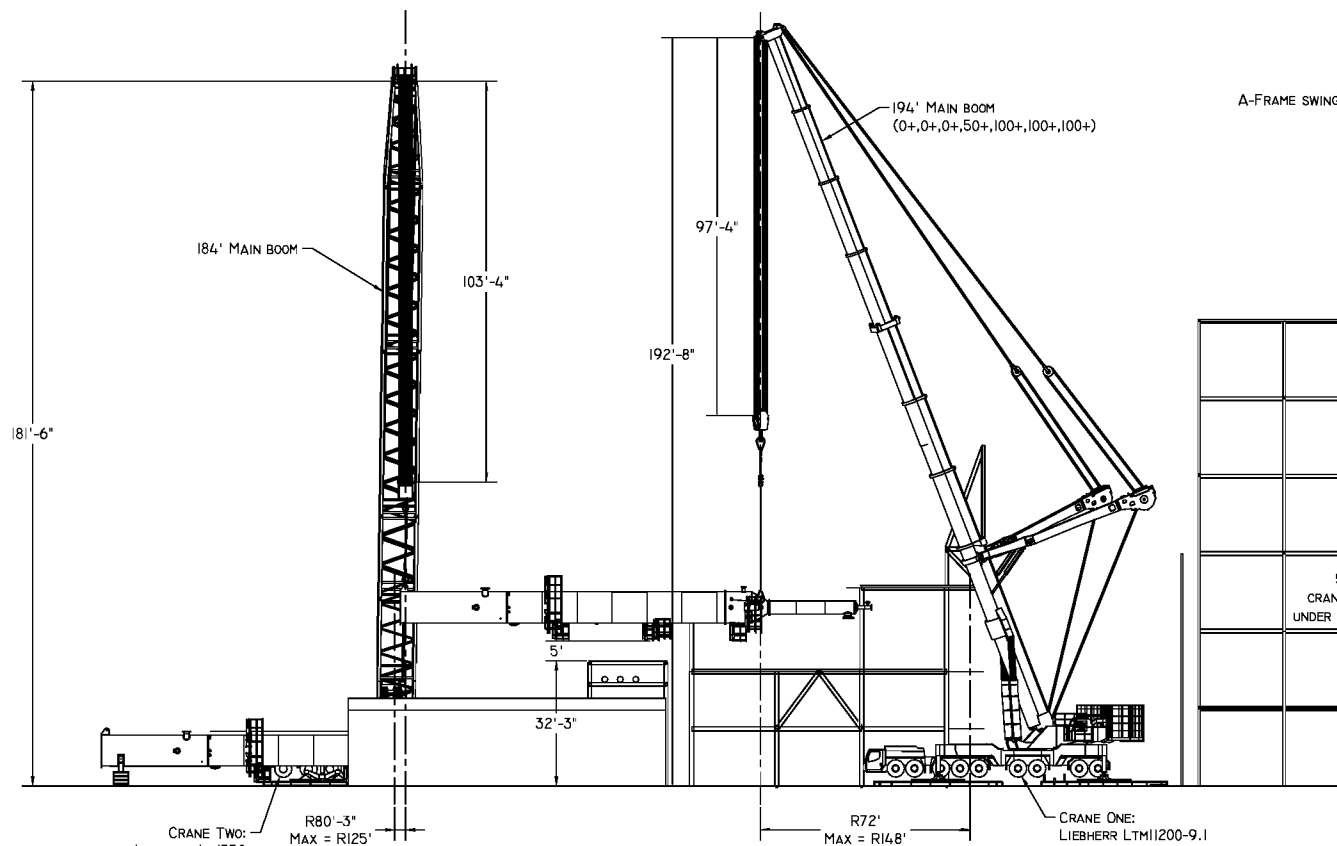
CRANE INFORMATION																			
LIFT				CRANE ONE				CRANE TWO											
CRANE TYPE:				LIEBHERR LTM1200-9.1				LIEBHERR LG1550											
NOMINAL CAPACITY:				1350 TON				600 TON											
COUNTERWEIGHT:				445,300 LBS				353,000 LBS											
CARBODY CTWT:				---				---											
SUPERLIFT CTWT:				---				---											
CTWT POSITION:				---				---											
OUTRIGGERS/TRACKS:				43' x 43' STANCE				43' x 43' STANCE											
BOOM LENGTH:				194' (0+,0+,0+,50+,100+,100+,100+)				184'											
PARTS OF LINE:				MINIMUM SIX				MINIMUM SIX											
LUFFER/JIB:				---				---											
LIFT RADIUS:				MAX. 104'				---											
CAPACITY:				200,000 LBS				---											
LOAD INFO																			
LOAD:				160,000 LBS				---											
RIGGING:				2,966 LBS				---											
HOOK/LOAD BLOCK:				9,923 LBS				---											
LOAD LINE:				INCL.				---											
HEADACHE BALL:				---				---											
EFFECTIVE JIB WEIGHT:				---				---											
AUXILIARY BOOM HEAD:				---				---											
ADDITIONAL WEIGHT:				---				---											
LIFT INFO																			
TOTAL LIFT WEIGHT:				172,889 LBS				---											
PERCENT CAPACITY:				86.4%				---											
MAX. OUTRIGGER FORCE:				488,000 LBS				---											
MAX. GROUND PRESSURE:				7.53 PSI / 1084 PSF (51.9 KPA)				---											
GENERAL NOTES:																			
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE																			
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC																			
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE																			
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC...																			
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING																			
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNIONS, ETC..., TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR																			
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING																			
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI																			
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE																			
10. LARGER RIGGING MAY BE SUBSTITUTED AS LONG AS THE FIT UP OF THE COMPONENTS ARE NOT AFFECTED																			
11. LARGER CRANES MAY BE SUBSTITUTED PROVIDING THE PERCENT OF CHART CAPACITY IS NOT EXCEEDED AND THE INCREASED GROUND BEARING PRESSURES ARE ACCOUNTED FOR																			
12. TRAVELING INEVITABLY PRODUCES CERTAIN DYNAMIC EFFECTS ON LIEBHERR CRANES THEREFORE LIEBHERR CRANES LOAD MUST ALWAYS BE REDUCED BEFORE THE CRANE STARTS TO TRAVEL. THE LOAD REDUCTION IS AS FOLLOWS: LOAD CAPACITY - 10% OR LOAD CAPACITY - 2200 LBS; THE LOWER VALUE MUST BE USED; CONTACT ENGINEERING FOR OTHER CRANE MANUFACTURERS																			
13. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES																			
ISSUED FOR DISCUSSION																			
D	14	07	14	RELOCATED LG1550 AND ADDED UNDERGROUND PIPING					AJG	--	--	--							
C	14	04	14	ADDED WOODEN MATS TO LOWER RESULTING GROUND PRESSURES					JK	--	--	--							
B	14	02	25	CHANGED TAIL CRANE; RE-ISSUED FOR DISCUSSION					JK	--	--	--							
A	13	08	20	ISSUED FOR DISCUSSION PURPOSES ONLY					LPB	--	--	--							
REV.	Y	M	D	DATE DESCRIPTION								BY.	CHK.	ENG.	APP.				
SCALE				DRAWN BY		DATE		CHECKED		DATE		ENGINEER		DATE		APPROVED		DATE	
SHOWN				L.BERGMAN		13/08/20		--		YY/MM/DD		--		YY/MM/DD		--		YY/MM/DD	
CLIENT: SHELL CANADA LTD.																			
PROJECT: DEPROPANIZER TOWER V-22511 EXCHANGE																			
SCOTFORD PLANT SITE																			
								NCSG ENGINEERING LTD.											
								WWW.NCSG.COM											
								#811, 53016 HIGHWAY 60,											
								ACHESON, AB, T7X-5A7											
								PH: (780) 447-4440											
								FAX: (780) 447-4645											
TITLE: OLD DEPROPANIZER LIFT OVER OUTRIGGERS																			
USING LIEBHERR LTM1200-9.1 AND LG1550 CRANES																			
PAPER				NCSG-ENG JOB NO.				DRAWING NUMBER				SHEET		REV.					
B				11-043-0053				1633-NCSG130408				3 OF 7		D					
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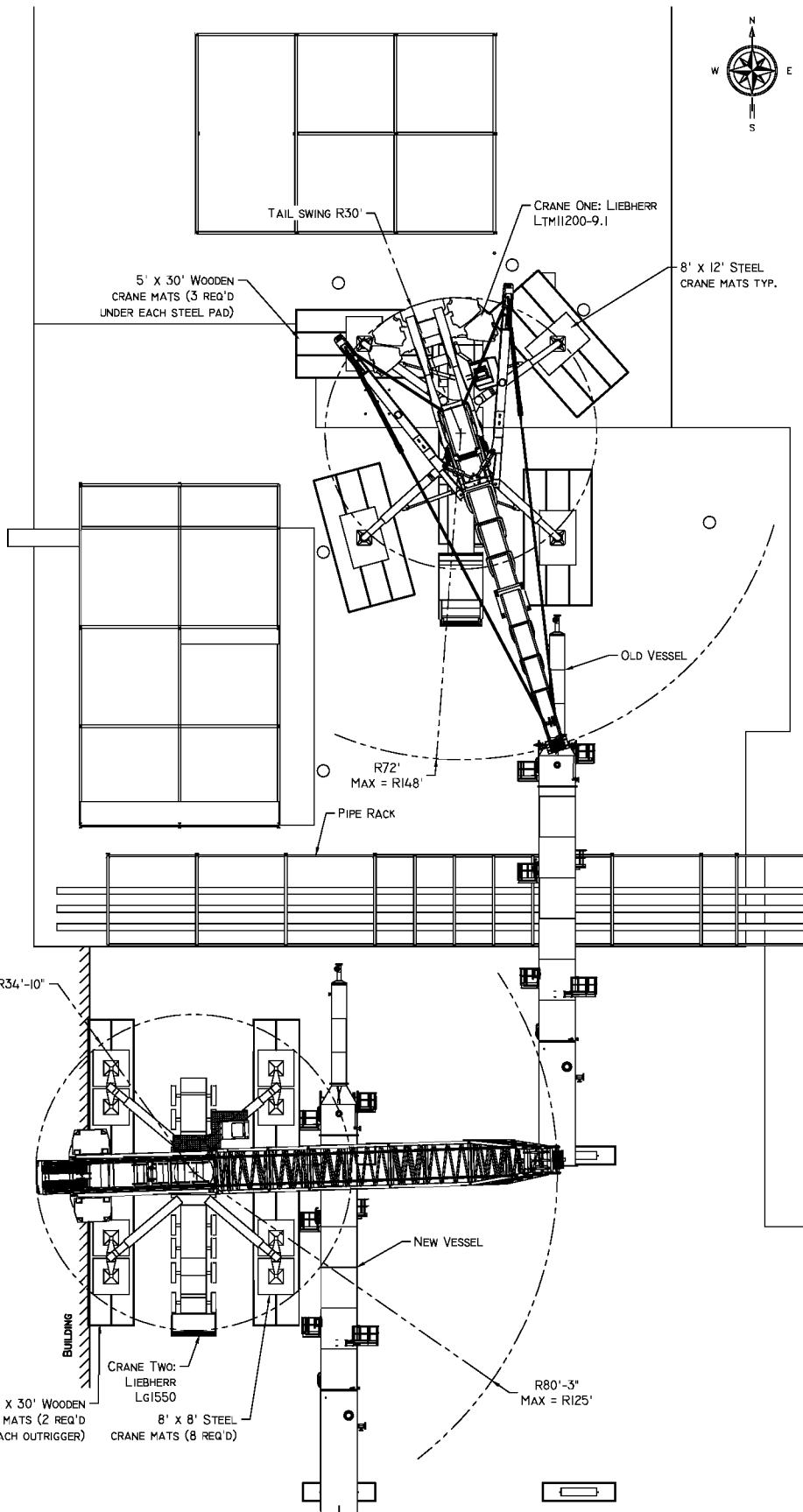
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CRANE INFORMATION																													
LIFT										CRANE ONE										CRANE TWO									
CRANE TYPE:										LIEBHERR LTM1200-9.1										LIEBHERR LG1550									
NOMINAL CAPACITY:										1350 TON										600 TON									
COUNTERWEIGHT:										445,300 LBS										353,000 LBS									
CARBODY CTWT:										---										---									
SUPERLIFT CTWT:										---										---									
CTWT POSITION:										---										---									
OUTRIGGERS/TRACKS:										43' x 43' STANCE										43' x 43' STANCE									
BOOM LENGTH:										194' (0+,0+,0+,50+,100+,100+,100+)										184'									
PARTS OF LINE:										MINIMUM SIX										MINIMUM SIX									
LUFFER/JIB:										---										---									
LIFT RADIUS:										MAX. 104'										125'									
CAPACITY:										200,000 LBS										127,000 LBS									
LOAD INFO																													
LOAD:										160,000 LBS										62,439 LBS									
RIGGING:										2,966 LBS										860 LBS									
HOOK/LOAD BLOCK:										9,923 LBS										11,000 LBS									
LOAD LINE:										INCL.										INCL.									
HEADACHE BALL:										---										---									
EFFECTIVE JIB WEIGHT:										---										---									
AUXILIARY BOOM HEAD:										---										---									
ADDITIONAL WEIGHT:										---										---									
LIFT INFO																													
TOTAL LIFT WEIGHT:										172,889 LBS										74,299 LBS									
PERCENT CAPACITY:										86.4%										58.5%									
MAX. OUTRIGGER FORCE:										488,000 LBS										344,000 LBS									
MAX. GROUND PRESSURE:										7.53 PSI / 1084 PSF (51.9 KPA)										7.96 PSI / 1147 PSF (46.1 KPA)									
GENERAL NOTES:																													
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE																													
2. ALL WIRE ROPE TO BE MINIMUM IPS 8 IWRC																													
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE																													
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5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING																													
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNIONS, ETC..., TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR																													
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING																													
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI																													
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11. LARGER CRANES MAY BE SUBSTITUTED PROVIDING THE PERCENT OF CHART CAPACITY IS NOT EXCEEDED AND THE INCREASED GROUND BEARING PRESSURES ARE ACCOUNTED FOR																													
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13. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES																													
ISSUED FOR DISCUSSION																													



3D - LAYOUT
SCALE: 1:650



ELEVATION - LAYOUT
SCALE: 1:600



PLAN - LAYOUT
SCALE: 1:450

CRANE INFORMATION

LIFT	CRANE ONE	CRANE TWO
CRANE TYPE:	LIEBHERR LTM11200-9.1	LIEBHERR LG1550
NOMINAL CAPACITY:	1350 TON	600 TON
COUNTERWEIGHT:	445,300 LBS	353,000 LBS
CARBODY CTWT:	---	---
SUPERLIFT CTWT:	---	---
CTWT POSITION:	---	---
OUTRIGGERS/TRACKS:	43' x 43' STANCE	43' x 43' STANCE
BOOM LENGTH:	194' (0+,0+,0+,50+,100+,100+,100+)	184'
PARTS OF LINE:	MINIMUM SIX	MINIMUM SIX
LUFFER/JIB:	---	---
LIFT RADIUS:	MAX. 148'	125'
CAPACITY:	121,600 LBS	127,000 LBS

LOAD INFO		
LOAD:	97,561 LBS	62,439 LBS
RIGGING:	2,966 LBS	860 LBS
HOOK/LOAD BLOCK:	9,923 LBS	11,000 LBS
LOAD LINE:	INCL.	INCL.
HEADACHE BALL:	---	---
EFFECTIVE JIB WEIGHT:	---	---
AUXILIARY BOOM HEAD:	---	---
ADDITIONAL WEIGHT:	---	---

LIFT INFO		
TOTAL LIFT WEIGHT:	110,450 LBS	74,299 LBS
PERCENT CAPACITY:	90.8%	58.5%
MAX. OUTRIGGER FORCE:	498,000 LBS	344,000 LBS
MAX. GROUND PRESSURE:	7.69 PSI / 1107 PSF (53.5 KPA)	7.96 PSI / 1147 PSF (46.1 KPA)

GENERAL NOTES:
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM IPS 8 IWRC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC...
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNNIONS, ETC... TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE
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13. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES

ISSUED FOR DISCUSSION

REV.	DATE	DESCRIPTION	BY	CHK.	ENG.	APP.
D	14 07 14	RELOCATED LG1550 AND ADDED UNDERGROUND PIPING	AJG	---	---	---
C	14 04 14	ADDED WOODEN MATS TO LOWER RESULTING GROUND PRESSURES	JK	---	---	---
B	14 02 25	CHANGED TAIL CRANE; RE-ISSUED FOR DISCUSSION	JK	---	---	---
A	13 08 20	ISSUED FOR DISCUSSION PURPOSES ONLY	LPB	---	---	---

SCALE	DRAWN BY	DATE	CHECKED	DATE	ENGINEER	DATE	APPROVED	DATE
SHOWN	L.BERGMAN	13/08/20	---	YY/MM/DD	---	YY/MM/DD	---	YY/MM/DD

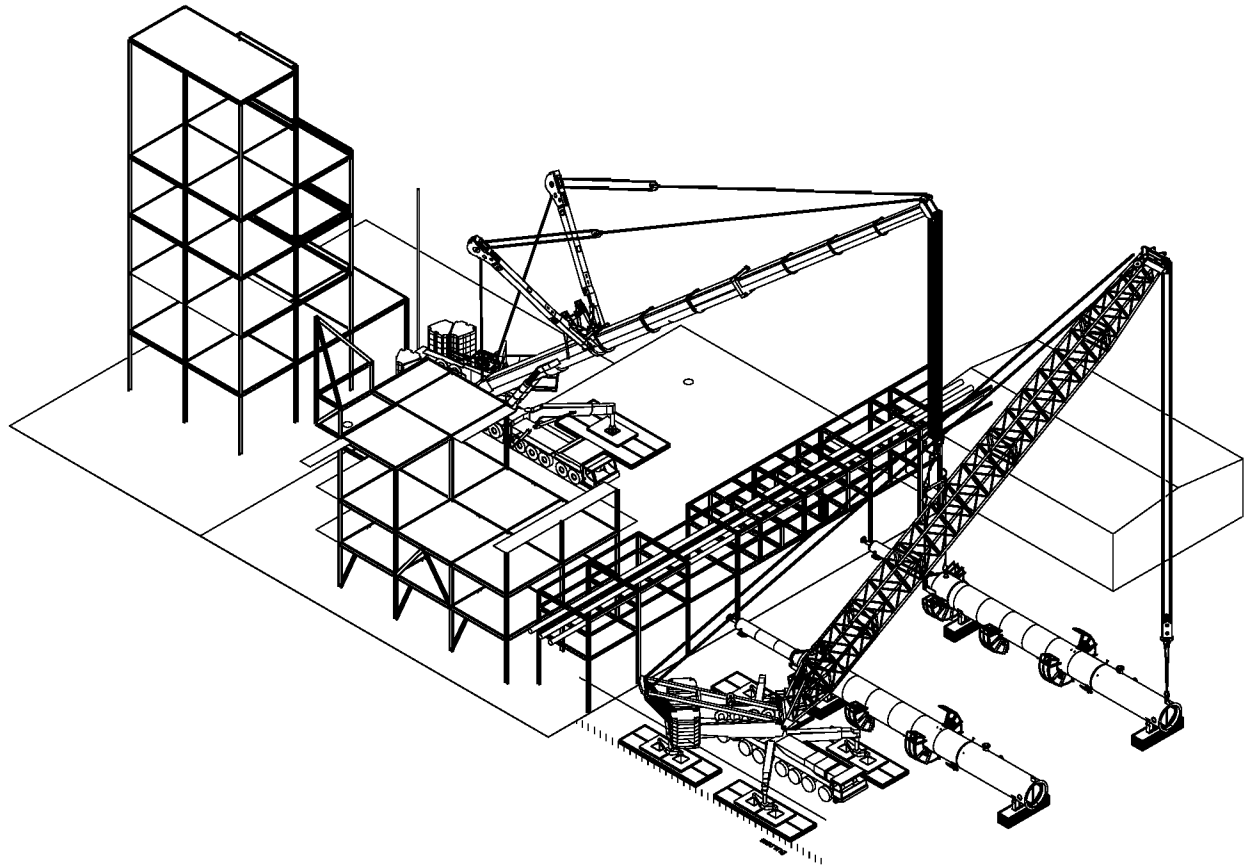
CLIENT: SHELL CANADA LTD.
PROJECT: DEPROPANIZER TOWER V-22511 EXCHANGE
SCOTFORD PLANT SITE



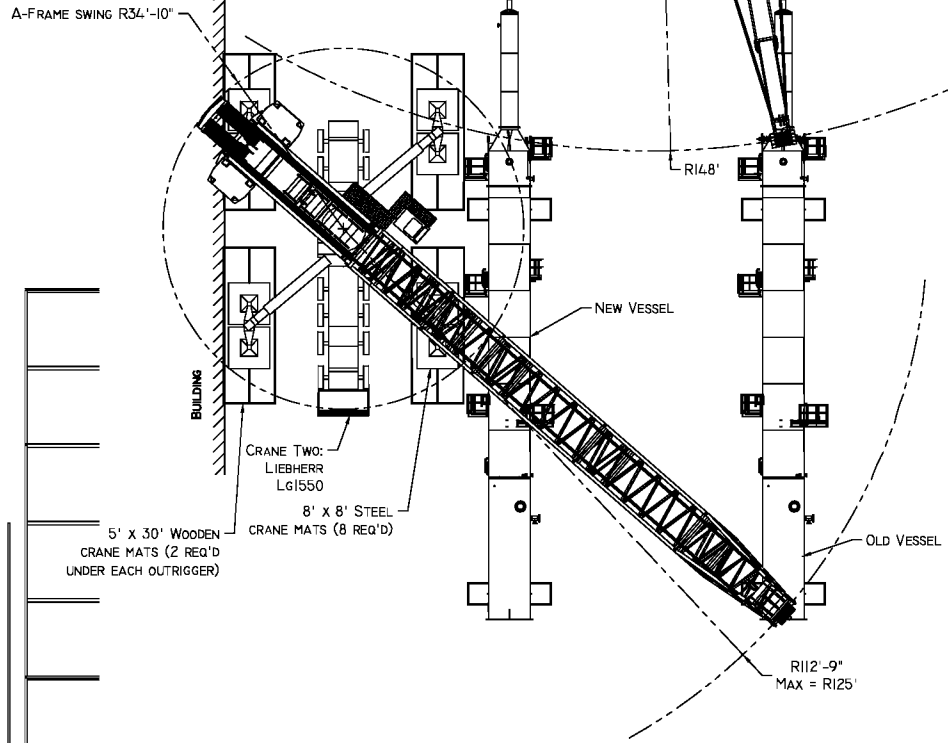
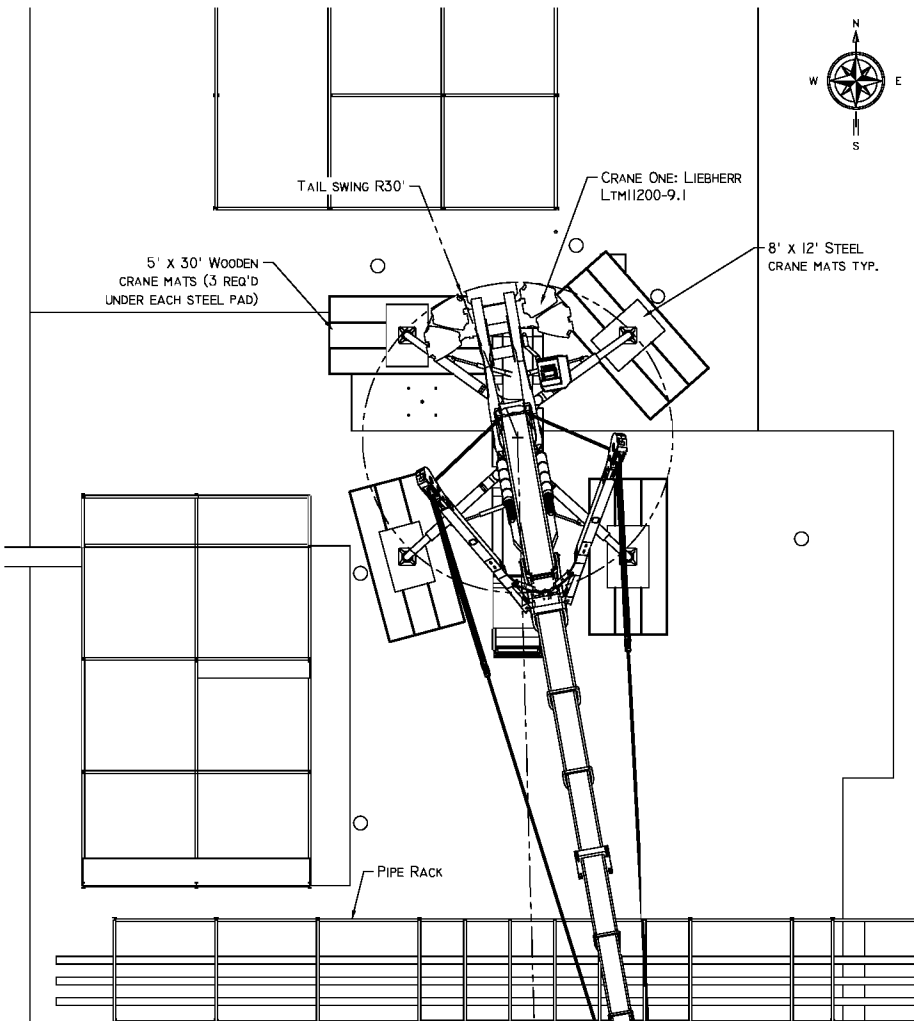
NCSG ENGINEERING LTD.
WWW.NCSG.COM
#811, 53016 HIGHWAY 60,
ACHESON, AB, T7X-5A7
PH: (780) 447-4440
FAX: (780) 447-4645

OLD DEPROPANIZER TANDEM LIFT OVER THE PIPE RACK
USING LIEBHERR LTM11200-9.1 AND LG1550 CRANES

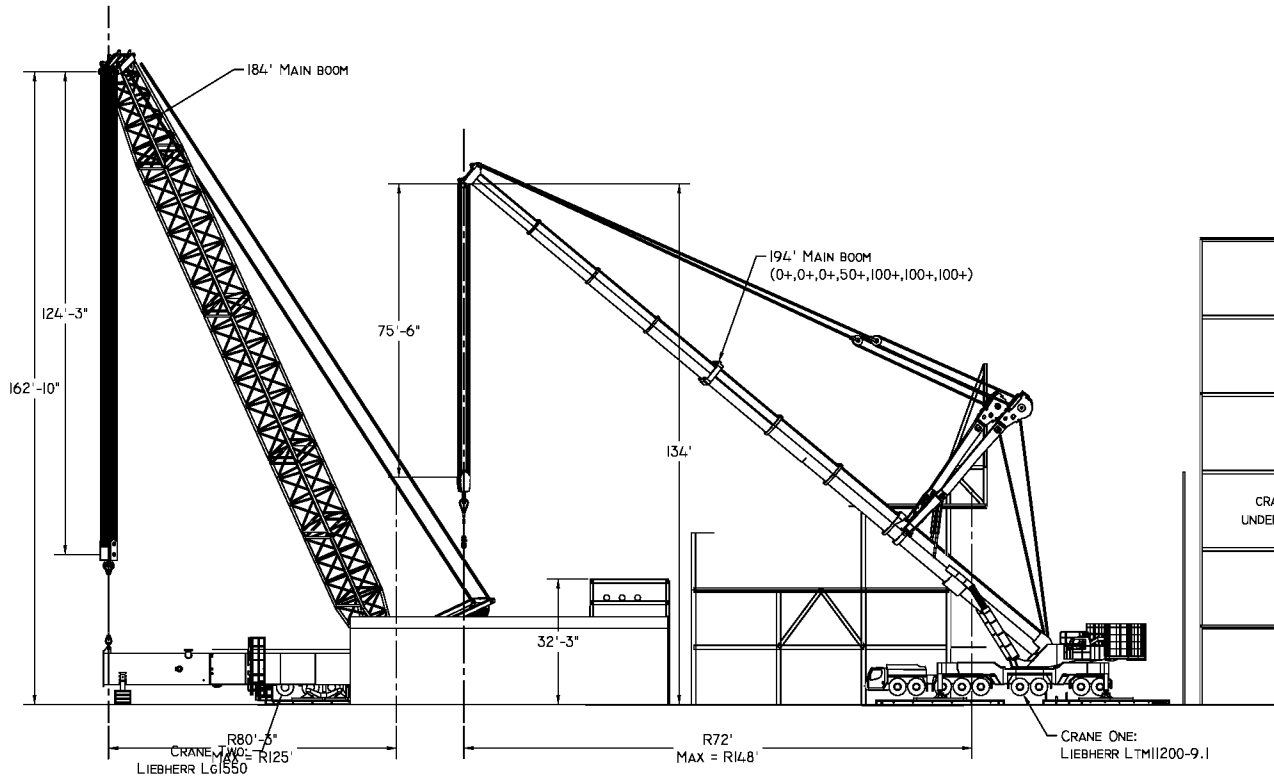
PAPER	NCSG-ENG Job No.	DRAWING NUMBER	SHEET	REV.
B	11-043-0053	1633-NCSG130408	5 OF 7	D



3D - LAYOUT
SCALE: 1:650



PLAN - LAYOUT
SCALE: 1:450



ELEVATION - LAYOUT
SCALE: 1:600

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CRANE INFORMATION

LIFT	CRANE ONE	CRANE TWO
CRANE TYPE:	LIEBHERR LTM1200-9.1	LIEBHERR LG1550
NOMINAL CAPACITY:	1350 TON	600 TON
COUNTERWEIGHT:	445,300 LBS	353,000 LBS
CARBODY CTWT:	—	—
SUPERLIFT CTWT:	—	—
CTWT POSITION:	—	—
OUTRIGGERS/TRACKS:	43' x 43' STANCE	43' x 43' STANCE
BOOM LENGTH:	194' (0+,0+,0+,50+,100+,100+,100+)	184'
PARTS OF LINE:	MINIMUM SIX	MINIMUM SIX
LUFFER/JIB:	—	—
LIFT RADIUS:	MAX. 148'	125'
CAPACITY:	121,600 LBS	127,000 LBS
LOAD INFO		
LOAD:	97,561 LBS	62,439 LBS
RIGGING:	2,966 LBS	860 LBS
HOOK/LOAD BLOCK:	9,923 LBS	11,000 LBS
LOAD LINE:	INCL.	INCL.
HEADACHE BALL:	—	—
EFFECTIVE JIB WEIGHT:	—	—
AUXILIARY BOOM HEAD:	—	—
ADDITIONAL WEIGHT:	—	—
LIFT INFO		
TOTAL LIFT WEIGHT:	110,450 LBS	74,299 LBS
PERCENT CAPACITY:	90.8%	58.5%
MAX. OUTRIGGER FORCE:	498,000 LBS	344,000 LBS
MAX. GROUND PRESSURE:	7.69 PSI / 1107 PSF (53.5 KPA)	7.96 PSI / 1147 PSF (46.1 KPA)

GENERAL NOTES:
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC...
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNNIONS, ETC... TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE
10. LARGER RIGGING MAY BE SUBSTITUTED AS LONG AS THE FIT UP OF THE COMPONENTS ARE NOT AFFECTED
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ISSUED FOR DISCUSSION

REV.	Y	M	D	DATE	DESCRIPTION	BY.	CHK.	ENG.	APP.
D	14	07	14		RELOCATED LG1550 AND ADDED UNDERGROUND PIPING	AJG	—	—	—
C	14	04	14		ADDED WOODEN MATS TO LOWER RESULTING GROUND PRESSURES	JK	—	—	—
B	14	02	25		CHANGED TAIL CRANE; RE-ISSUED FOR DISCUSSION	JK	—	—	—
A	13	08	20		ISSUED FOR DISCUSSION PURPOSES ONLY	LPB	—	—	—

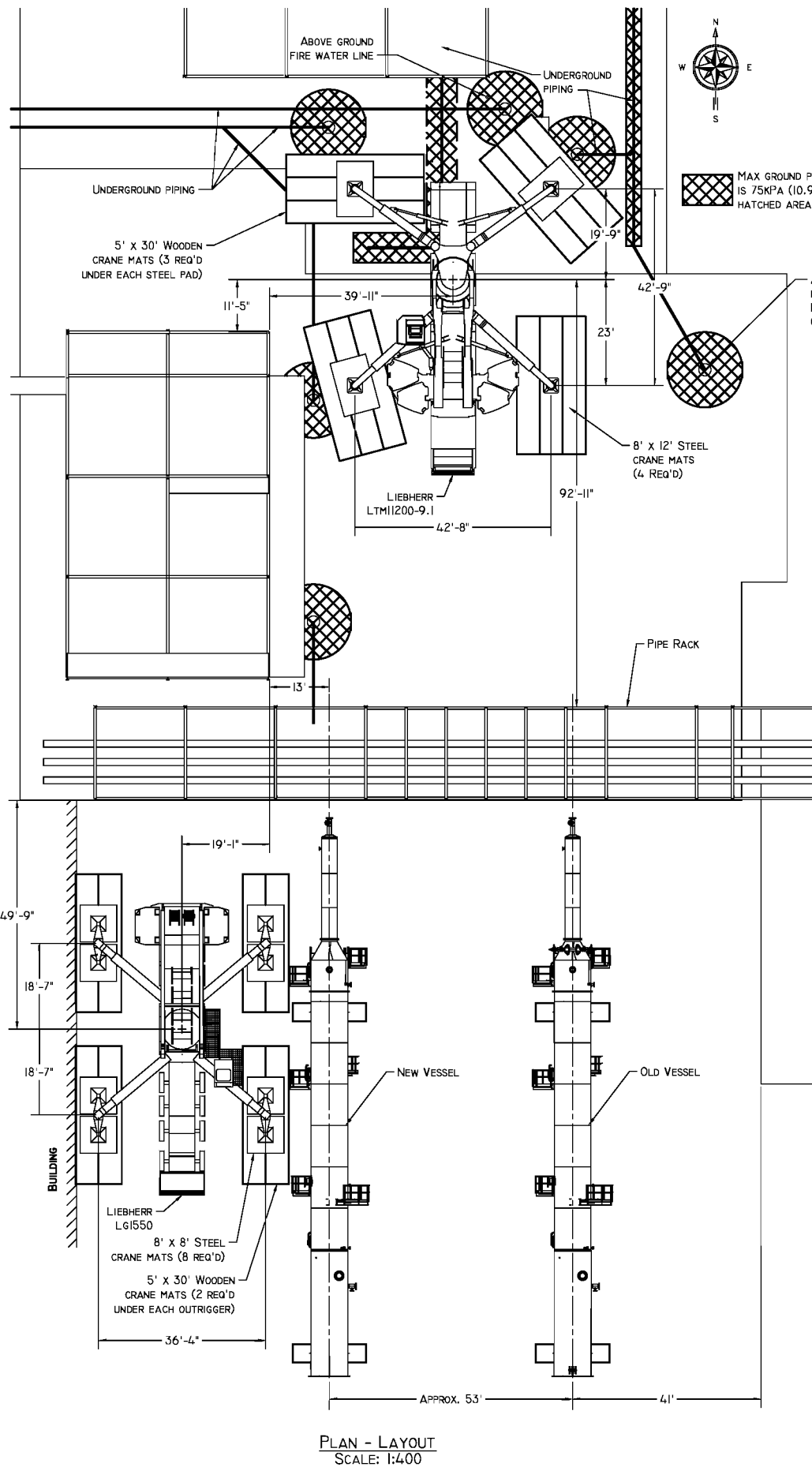
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PROJECT: DEPROPANIZER TOWER V-225II EXCHANGE
SCOTFORD PLANT SITE



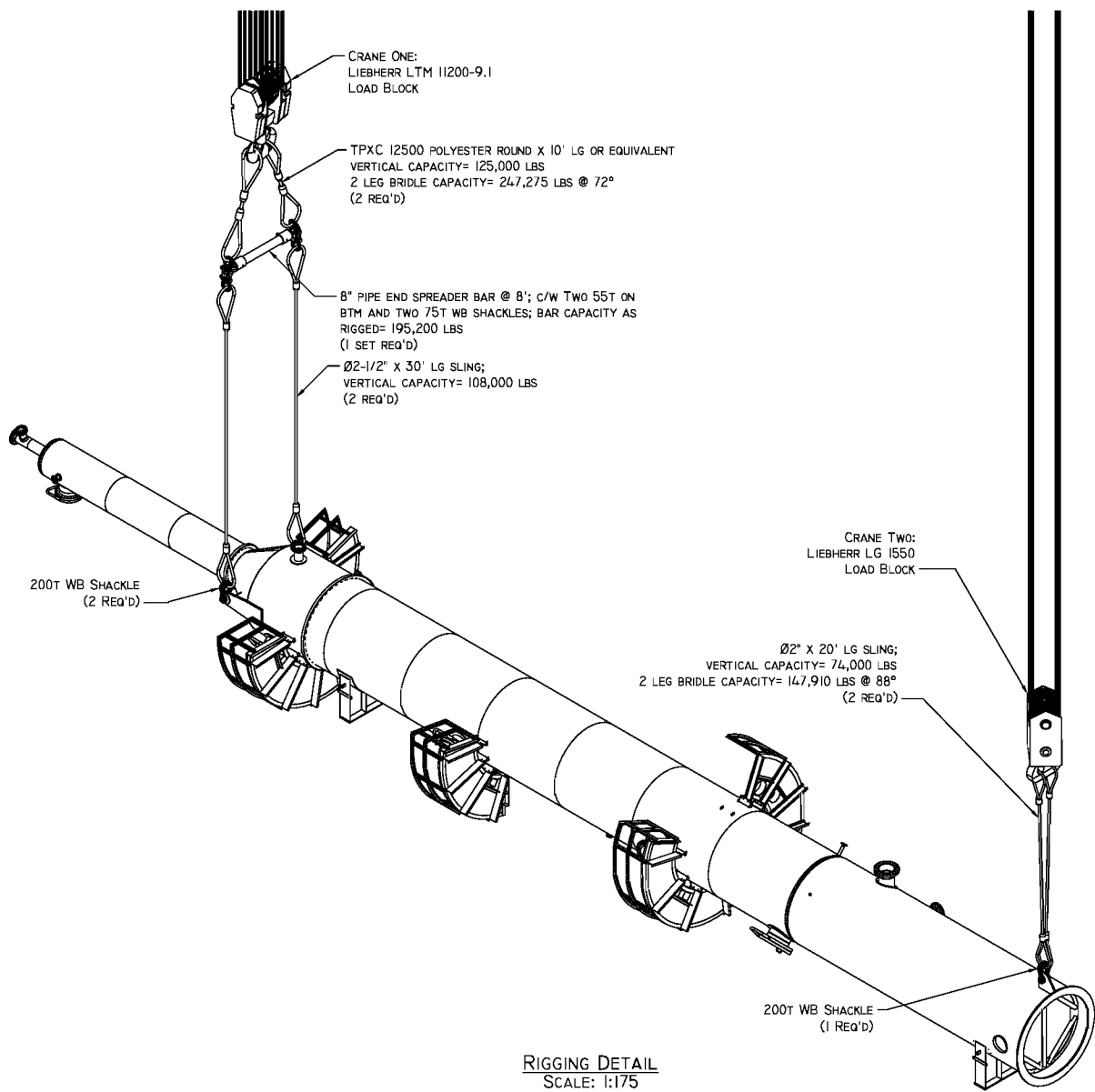
NCSG ENGINEERING LTD.
WWW.NCSG.COM
#811, 53016 HIGHWAY 60,
ADESON, AB, T7X-5A7
PH: (780) 447-4440
FAX: (780) 447-4645

TITLE: FINAL POSITION OF THE OLD DEPROPANIZER LIFT
USING LIEBHERR LTM1200-9.1 AND LG1550 CRANES

PAPER	NCSG-ENG Job No.	DRAWING NUMBER	SHEET	REV.
B	11-043-0053	1633-NCSG130408	6 OF 7	D



PLAN - LAYOUT
SCALE: 1:400



RIGGING DETAIL
SCALE: 1:175

RIGGING LIST - CRANE ONE: LIEBHERR LTM 11200-9.1							
RIGGING TYPE		SIZE / DIA.	LENGTH /	INDIVIDUAL	QTY.	TOTAL	PIPE CUT
		(INCHES / TON)	(FEET / INCHES)	WEIGHT		WEIGHT	LENGTH
SHACKLE	REGULAR	55T	2-1/2 IN	98	2	197	
SHACKLE	WIDE BODY	75T W.B.	-	99	2	198	
SHACKLE	WIDE BODY	200T W.B.	-	401	2	802	
SLING	POLYESTER	TPXC 12500	10	24	2	47	
SLING	WIRE ROPE	2-1/2 IN	30	511	2	1,022	
SPREADER BAR	NCSG PIPE ENDS	8IN PIPE END SPREADER BAR - POST 2013 (USE WITH 4 - 55T SHACKLES)	8	700	1	700	6.29
THE WEIGHT OF THE SPREADER BARS DO NOT INCLUDE SHACKLES.			TOTAL RIGGING WEIGHT (LBS)		2,966		

RIGGING LIST - CRANE TWO: LIEBHERR LG 1550						
RIGGING TYPE		SIZE / DIA.	LENGTH /	INDIVIDUAL	QTY.	TOTAL
		(INCHES / TON)	(FEET / INCHES)	WEIGHT		WEIGHT
SHACKLE	WIDE BODY	200T W.B.	-	401	1	401
SLING	WIRE ROPE	2 IN	20	230	2	459
THE WEIGHT OF THE SPREADER BARS DO NOT INCLUDE SHACKLES.			TOTAL RIGGING WEIGHT (LBS)		860	

ISSUED FOR DISCUSSION

REV.	DATE	DESCRIPTION	BY.	CHK.	ENG.	APP.
D	14 07 14	RELOCATED LG1550 AND ADDED UNDERGROUND PIPING	AJG	--	--	--
C	14 04 14	ADDED WOODEN MATS TO LOWER RESULTING GROUND PRESSURES	JK	--	--	--
B	14 02 25	CHANGED TAIL CRANE; RE-ISSUED FOR DISCUSSION	JK	--	--	--
A	13 08 20	ISSUED FOR DISCUSSION PURPOSES ONLY	LPB	--	--	--

SCALE	DRAWN BY	DATE	CHECKED	DATE	ENGINEER	DATE	APPROVED	DATE
SHOWN	L.BERGMAN	13/08/20	--	YY/MM/DD	--	YY/MM/DD	--	YY/MM/DD

CLIENT: SHELL CANADA LTD.
PROJECT: DEPROPANIZER TOWER V-225II EXCHANGE
SCOTFORD PLANT SITE



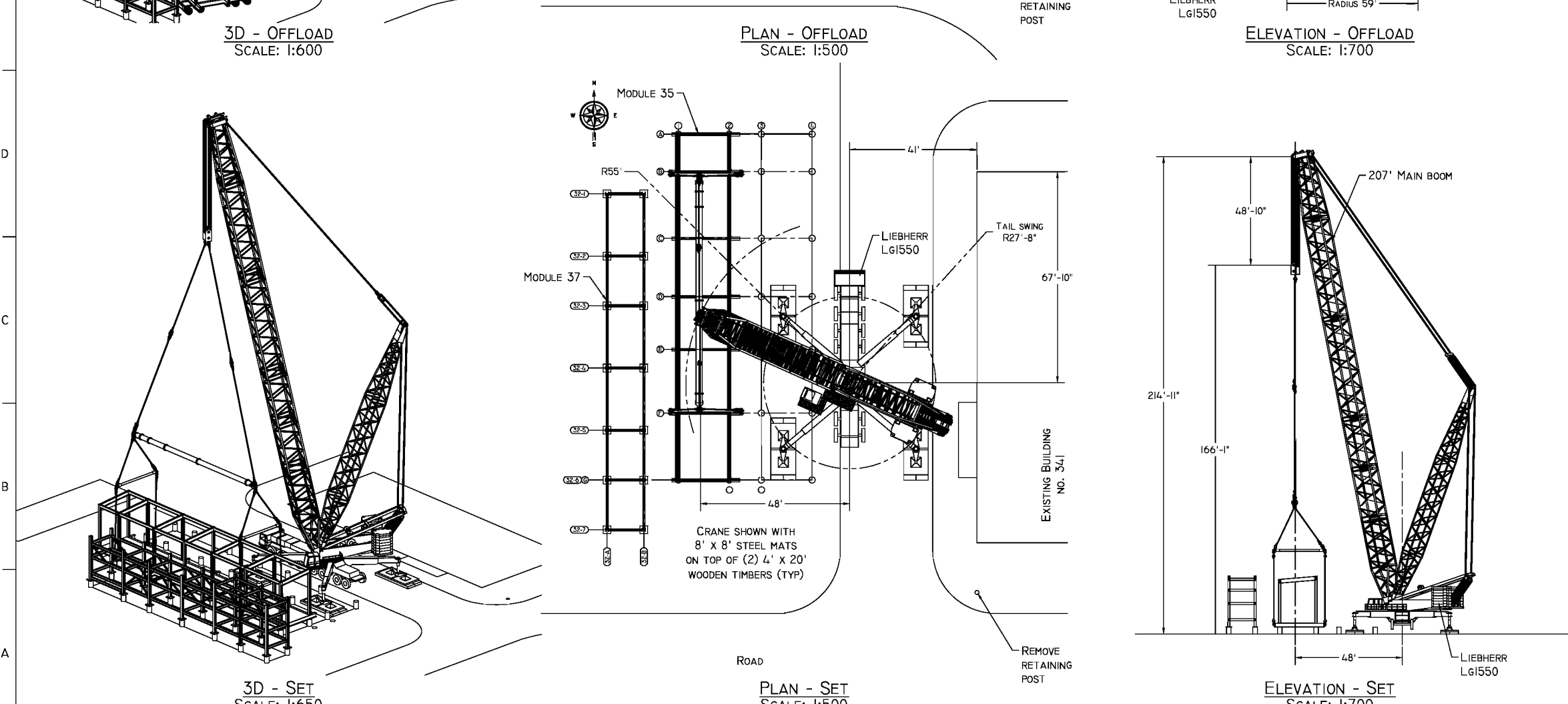
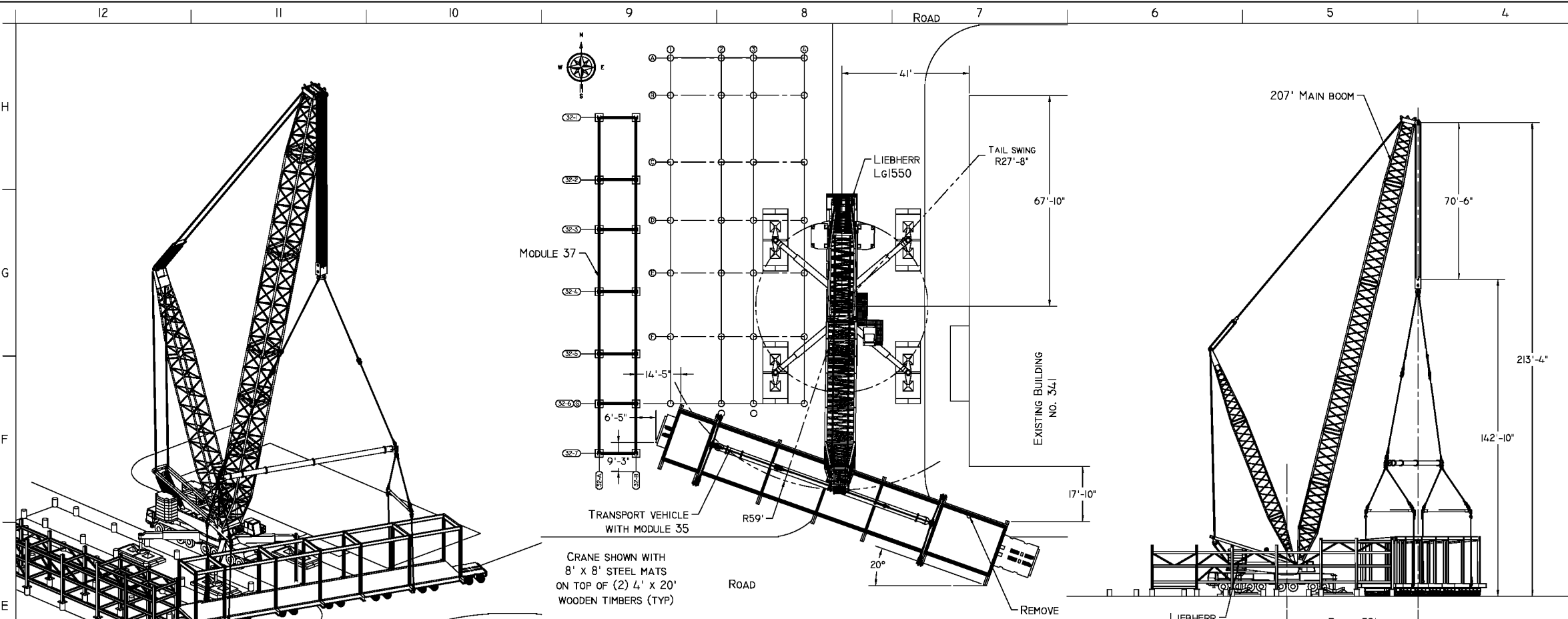
NCSG ENGINEERING LTD.

WWW.NCSG.COM

#811, 53016 HIGHWAY 60,
AQUESON, AB, T7X-5A7
PH: (780) 447-4440
FAX: (780) 447-4645

TITLE: CRANE POSITIONS & RIGGING DETAIL FOR DEPROPANIZER
LIFT USING LIEBHERR LTM11200-9.1 AND LG1550 CRANES

PAPER	NCSG-ENG Job No.	DRAWING NUMBER	SHEET	REV.
B	11-043-0053	1633-NCSG130408	7 OF 7	D



CRANE INFORMATION

LIFT	CRANE ONE	CRANE TWO
CRANE TYPE:	LIEBHERR LG1550	--
NOMINAL CAPACITY:	600 TON	--
COUNTERWEIGHT:	441,000 LBS	--
CARBODY CTWT:	--	--
SUPERLIFT CTWT:	--	--
CTWT POSITION:	--	--
OUTRIGGERS/TRACKS:	43' x 43' STANCE	--
BOOM LENGTH:	207' SLD	--
PARTS OF LINE:	FOURTEEN	--
LUFFER/JIB:	--	--
LIFT RADIUS:	59'	--
CAPACITY:	352,200 LBS	--

LOAD INFO

LOAD:	252,500 LBS	--
RIGGING:	47,391 LBS	--
HOOK/LOAD BLOCK:	13,200 LBS	--
LOAD LINE:	INCL.	--
HEADACHE BALL:	--	--
EFFECTIVE JIB WEIGHT:	--	--
AUXILIARY BOOM HEAD:	--	--
ADDITIONAL WEIGHT:	--	--

LIFT INFO

TOTAL LIFT WEIGHT:	313,091 LBS	--
PERCENT CAPACITY:	88.9%	--
MAX. OUTRIGGER FORCE:	494,000 LBS	--
MAX. GROUND PRESSURE:	23.2 PSI / 3338 PSF	--

GENERAL NOTES:

1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM EIPS & IWRC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC...
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNIONS, ETC... TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE
10. LARGER CRANES MAY BE SUBSTITUTED PROVIDING THE PERCENT OF CHART CAPACITY IS NOT EXCEEDED AND THE INCREASED GROUND BEARING PRESSURES ARE ACCOUNTED FOR
11. TRAVELING INEVITABLY PRODUCES CERTAIN DYNAMIC EFFECTS ON LIEBHERR CRANES THEREFORE LIEBHERR CRANES LOAD MUST ALWAYS BE REDUCED BEFORE THE CRANE STARTS TO TRAVEL. THE LOAD REDUCTION IS AS FOLLOWS: LOAD CAPACITY - 10% OR LOAD CAPACITY - 2200 LBS; THE LOWER VALUE MUST BE USED; CONTACT ENGINEERING FOR OTHER CRANE MANUFACTURERS
12. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES

PROFESSIONAL ENGINEER ALBERTA

JOSEPH KOSA

13/06/12

rev.01

PERMIT TO PRACTICE

Northern Crane Services Inc.

Signature: *Joseph Kosa*

Date: **June 12, 2013**

PERMIT NUMBER: P-9723

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV.	DATE	DESCRIPTION	BY	CHK.	ENG.	APP.
I	13 06 12	BOOM SHORTENED TO 207'; RE-ISSUED FOR LIFT	JK	JW	JK	JN
O	13 06 06	ISSUED FOR LIFT	JK	JW	JK	JN
A	13 05 30	ISSUED FOR DISCUSSION	JK	JW	--	--

SCALE	DRAWN BY	DATE	CHECKED	DATE	ENGINEER	DATE	APPROVED	DATE
SHOWN	J.KOSA	13/06/06	J.WOLFE	13/06/06	J.KOSA	13/06/06	J.NELSON	13/06/06

CLIENT: COLONY MANAGEMENT INC.

PROJECT: SYNCRUDE MLMR PROJECT

NENGINEERING

A DIVISION OF NORTHERN CRANE SERVICES INC.

NORTHERN CRANE SERVICES

WWW.NORTHERNCRANE.COM

#811, 53016 HIGHWAY 60, ACHESON, AB, T7X-5A7
PH: (780) 447-4440
FAX: (780) 447-4645

RUTH LAKE SITE, Box 5667, FORT MCMURRAY, AB, T9H-3G6
PH: (780) 791-0424
FAX: (780) 447-4645

TITLE: MLSB MODULE 35 SET USING LIEBHERR LG1550 CRANE

PAPER	JOB NO.	DRAWING NUMBER	SHEET	REV.
B	--	1719-NCIS30606	1 OF 2	I

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12

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2

1

CRANE INFORMATION

LIFT	CRANE ONE	CRANE TWO
CRANE TYPE:	LIEBHERR LR 1300	--
NOMINAL CAPACITY:	350 TON	--
COUNTERWEIGHT:	273,400 LBS	--
CARBODY CTWT:	125,700 LBS	--
SUPERLIFT CTWT:	--	--
CTWT POSITION:	--	--
OUTRIGGERS/TRACKS:	2-WIDE TRACK	--
BOOM LENGTH:	213' SX	--
PARTS OF LINE:	MINIMUM EIGHT PARTS	--
LUFFER/JIB:	--	--
LIFT RADIUS:	50'	--
CAPACITY:	217,400 LBS	--

LOAD INFO

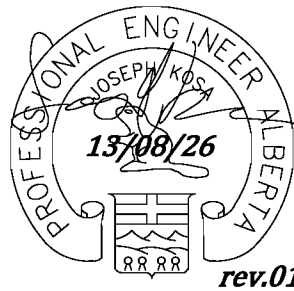
LOAD:	170,000 LBS	--
RIGGING:	5,061 LBS	--
HOOK/LOAD BLOCK:	8,800 LBS	--
LOAD LINE:	3,067 LBS	--
HEADACHE BALL:	--	--
EFFECTIVE JIB WEIGHT:	--	--
AUXILIARY BOOM HEAD:	--	--
ADDITIONAL WEIGHT:	--	--

LIFT INFO

TOTAL LIFT WEIGHT:	186,928 LBS	--
PERCENT CAPACITY:	86.0%	--
MAX. OUTRIGGER FORCE:	--	--
MAX. GROUND PRESSURE:	20.1 PSI / 2891 PSF	--

GENERAL NOTES:

1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC.
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNNIONS, ETC., TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LM
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE
10. LARGER RIGGING MAY BE SUBSTITUTED AS LONG AS THE FIT UP OF THE COMPONENTS ARE NOT AFFECTED
11. LARGER CRANES MAY BE SUBSTITUTED PROVIDING THE PERCENT OF CHART CAPACITY IS NOT EXCEEDED AND THE INCREASED GROUND BEARING PRESSURES ARE ACCOUNTED FOR
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13. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES

PERMIT TO PRACTICE
NCSG Engineering Ltd.Signature: *Joseph Kosa*Date: **August 26, 2013**

PERMIT NUMBER: P-12182

The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

REV.	DATE	DESCRIPTION	BY	CHK.	ENG.	APP.
I	13 08 26	UPDATED BOOM CONFIGURATION / RE-ISSUED FOR LIFT	AJG	JK	JK	JK
O	13 08 22	ISSUED FOR LIFT	AJG	BB	BB	JK
B	13 08 21	UPDATED CRANE AND RIGGING / RE-ISSUED FOR REVIEW	AJG	--	--	--
A	13 08 09	ISSUED FOR REVIEW	AJG	--	--	--

CLIENT: DEVON

PROJECT: JACKFISH 3
ANZAC, AB

NCSG ENGINEERING LTD.

WWW.NCSG.COM

#811, 53016 HIGHWAY 60,
ACHESON, AB, T7X-5A7
PH: (780) 447-4440
FAX: (780) 447-4645TITLE: HOT LIME SOFTENER DOME (TAG #: V-3220)
LIFT USING A LIEBHERR LR 1300 CRANE

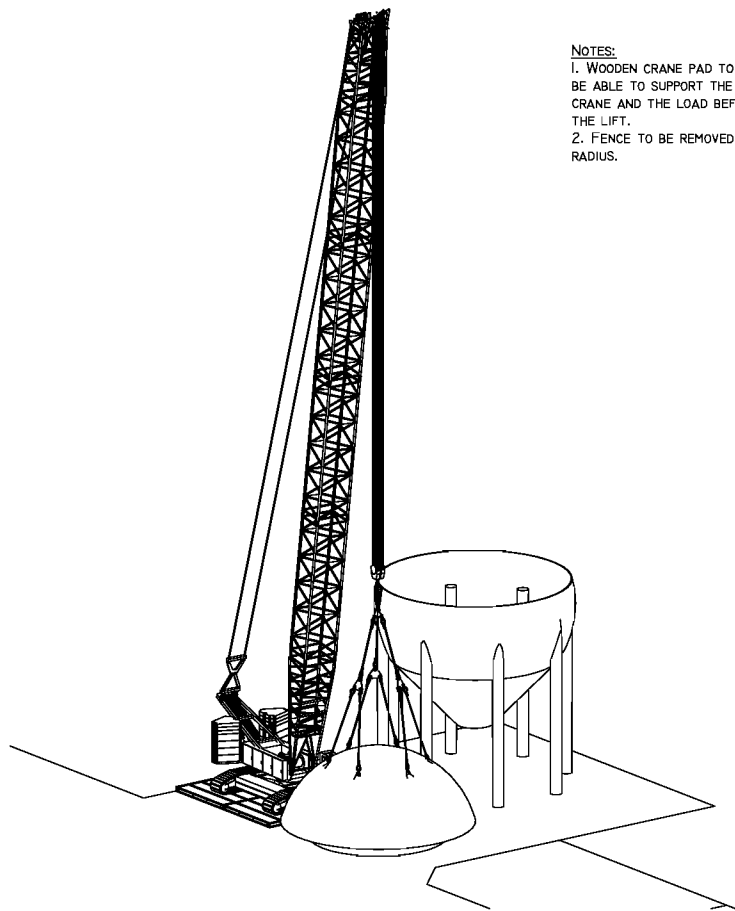
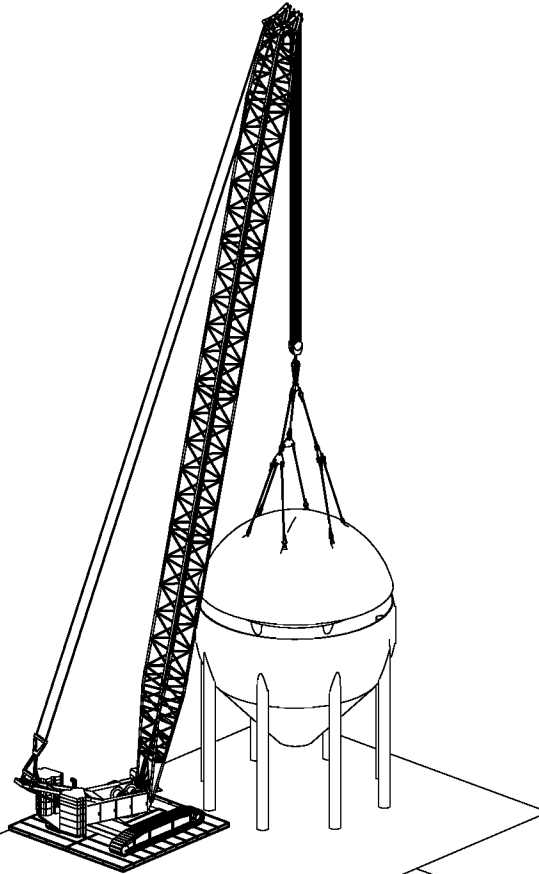
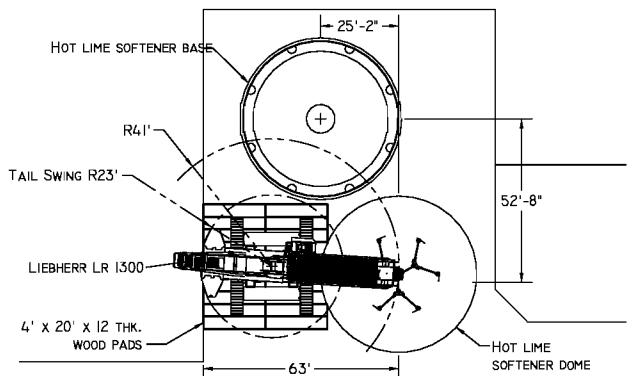
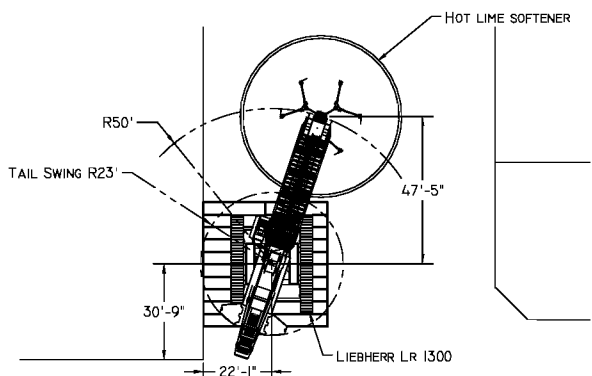
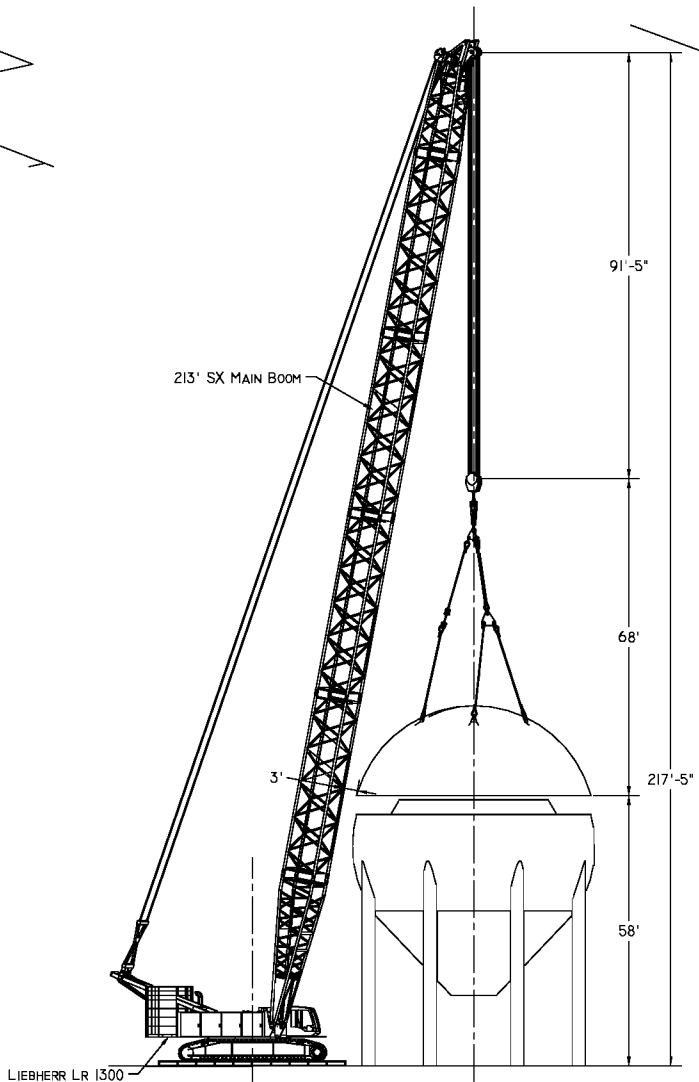
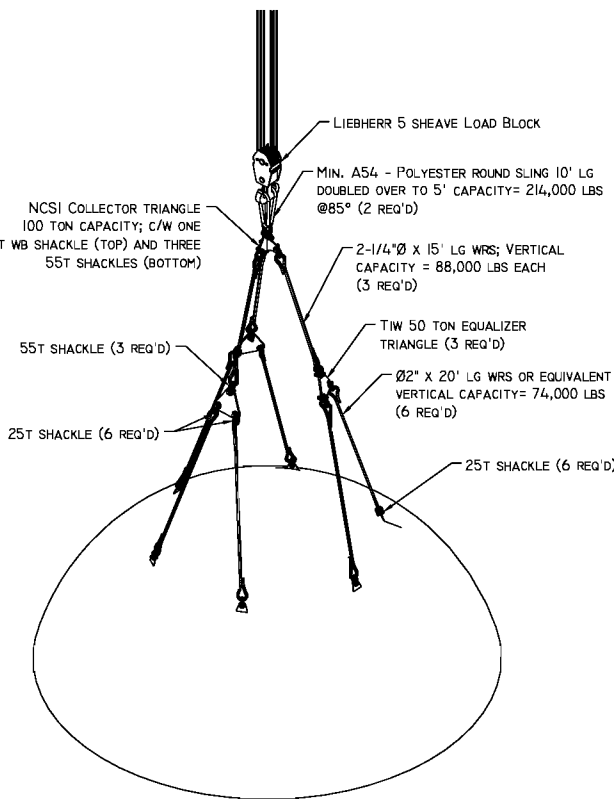
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B	--	1896-NCSGI30809	1 OF 1	1

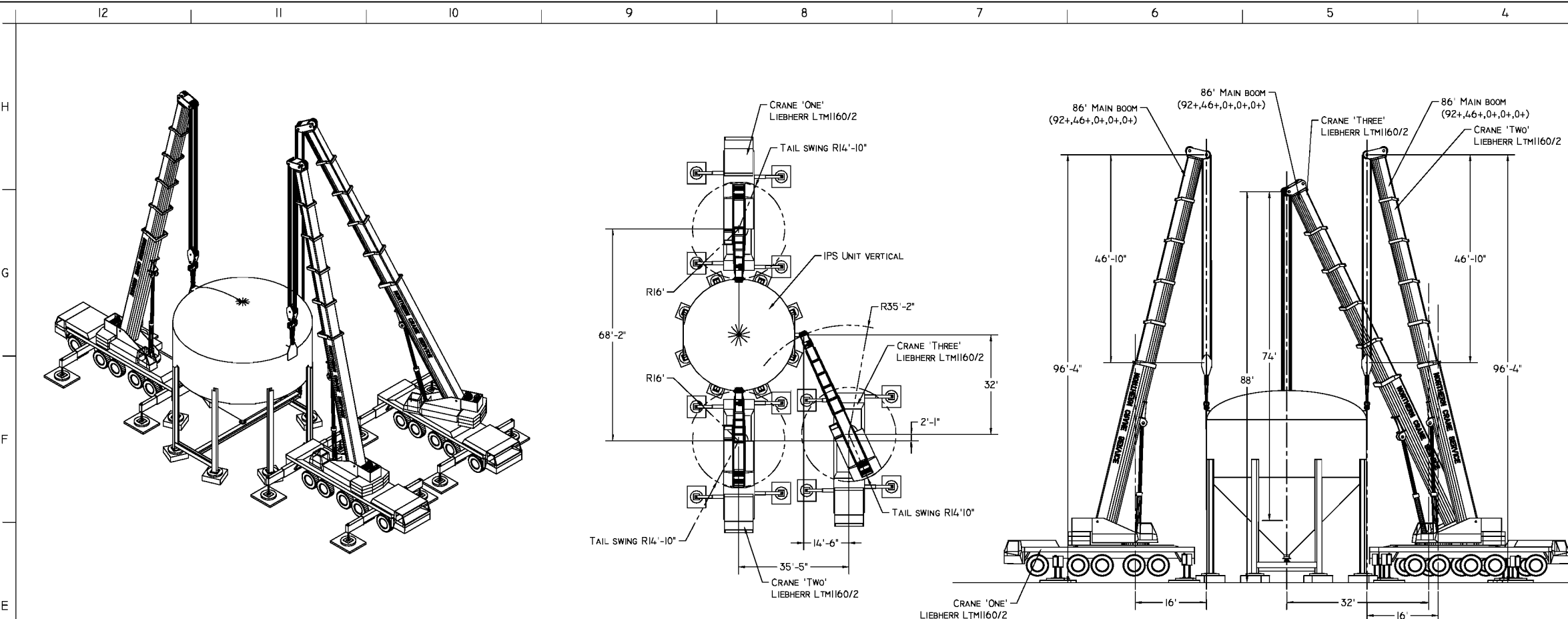
NOTES:

1. WOODEN CRANE PAD TO BE LEVEL AND BE ABLE TO SUPPORT THE WEIGHT OF THE CRANE AND THE LOAD BEFORE AND DURING THE LIFT.
2. FENCE TO BE REMOVED FOR TAIL SWING RADIUS.

PROCEDURE:

1. PREPARE CRANE PAD PRIOR TO CRANE ARRIVAL (BY OTHERS)
2. SET UP CRANE ON PROVIDED CRANE PAD NEAR THE DOME
3. ATTACH RIGGING TO THE CRANE AS PER RIGGING DETAIL
4. SWING OVER DOME AND ATTACH RIGGING AS PER RIGGING DETAIL
5. SLOWLY HOIST DOME OFF OF GROUND
6. HOIST DOME HIGH ENOUGH TO CLEAR THE BASE OF THE DOME BUT UNDER 45° HIGH TO ENSURE THE DOME DOES NOT COME IN CONTACT WITH THE CRANE
7. SWING DOME CLOCKWISE TILL THE DOME IS CLEAR OF THE SILO
8. INCREASE THE RADIUS OF THE LIFT WHILE INCREASING THE HEIGHT OF THE DOME UNTIL THE HEIGHT AND RADIUS IS NEEDED FOR TO ACHIEVE THE FINAL POSITION
9. CONTINUE TO SWING THE DOME CLOCKWISE TO THE FINAL SET POSITION
10. ONCE OVER FINAL SET POSITION LOWER THE DOME IN PLACE AND SECURE
11. ONCE DOME IS SECURE DISCONNECT ALL RIGGING

ORIENTATION - INITIAL PICK
SCALE: 1:500ORIENTATION - FINAL POSITION
SCALE: 1:500PLAN - INITIAL PICK
SCALE: 1:750PLAN - FINAL POSITION
SCALE: 1:750ELEVATION - FINAL POSITION
SCALE: 1:500RIGGING DETAIL
SCALE: 1:250

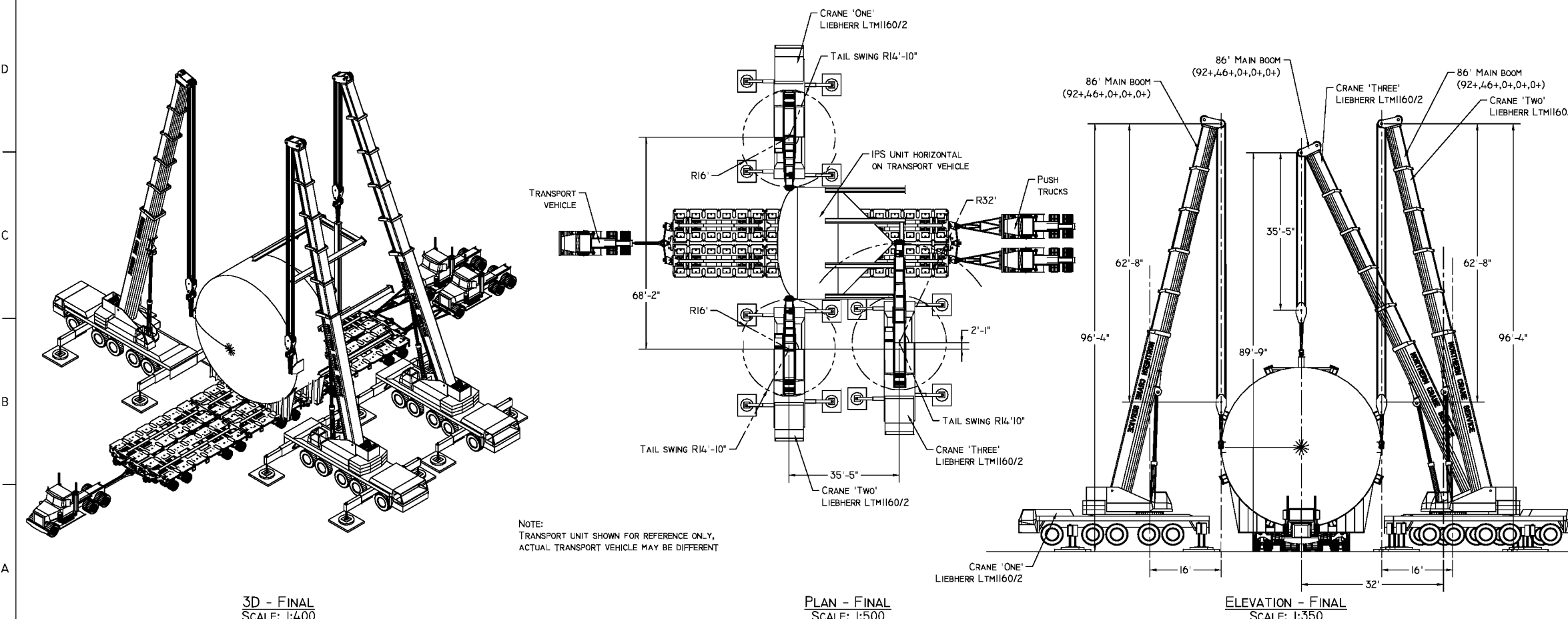


3D - INITIAL
SCALE: 1:400

NOTE:
CRANES SHOWN WITH STANDARD
6' X 7' STEEL CRANE MATS ALONG
WITH Ø48" WOODEN MAT (TYPICAL)

PLAN - INITIAL
SCALE: 1:500

ELEVATION - INITIAL
SCALE: 1:350



3D - FINAL
SCALE: 1:400

NOTE:
TRANSPORT UNIT SHOWN FOR REFERENCE ONLY,
ACTUAL TRANSPORT VEHICLE MAY BE DIFFERENT

PLAN - FINAL
SCALE: 1:500

ELEVATION - FINAL
SCALE: 1:350

CRANE INFORMATION

LIFT	CRANE ONE & TWO	CRANE THREE
CRANE TYPE:	LIEBHERR LTM1160/2	LIEBHERR LTM1160/2
NOMINAL CAPACITY:	200 TON	200 TON
COUNTERWEIGHT:	77,000 LBS	110,000 LBS
CARBODY CTWT:	—	—
SUPERLIFT CTWT:	—	—
CTWT POSITION:	—	—
OUTRIGGERS/TRACKS:	29' x 27' STANCE	29' x 27' STANCE
BOOM LENGTH:	86' (92+46+0+0+0+)	86' (92+46+0+0+0+)
PARTS OF LINE:	MINIMUM EIGHT	MINIMUM FIVE
LUFFER/JIB:	—	—
LIFT RADIUS:	16'	32'
CAPACITY:	189,000 LBS	115,000 LBS

LOAD INFO

LOAD:	158,000 LBS	102,000 LBS
RIGGING:	191 LBS	129 LBS
HOOK/LOAD BLOCK:	2760 LBS	2760 LBS
HEAD LINE:	INCL.	INCL.
HEADACHE BALL:	—	—
EFFECTIVE JIB WEIGHT:	REMOVED	REMOVED
AUXILIARY BOOM HEAD:	—	—
ADDITIONAL WEIGHT:	—	—

LIFT INFO

TOTAL LIFT WEIGHT:	160,951 LBS	104,889 LBS
PERCENT CAPACITY:	85.2%	91.2%
MAX. OUTRIGGER FORCE:	171,000 LBS	191,000 LBS
MAX. GROUND PRESSURE:	28.3 PSI / 4071 PSF	31.6 PSI / 4548 PSF

GENERAL NOTES:
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 25 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
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PROFESSIONAL ENGINEER
ALBERTA
JOSEPH KOSA
13/10/08
rev.00

PERMIT TO PRACTICE
NCSG Engineering Ltd.
Signature: *Joseph Kosa*
Date: **October 08, 2013**
PERMIT NUMBER: P-12182
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

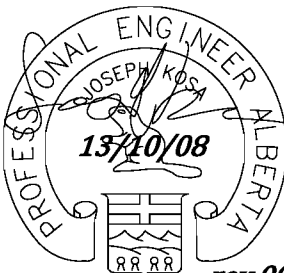


REV.	DATE	DESCRIPTION	BY	CHK.	ENG.	APP.
0	13 10 08	ISSUED FOR LIFT	JK	HY	JK	HY
A	13 10 08	ISSUED FOR REVIEW	JK	—	—	—

CLIENT: PARKSON CORPORATION
PROJECT: CNRL FROTH TREATMENT PLANT TRAIN TWO

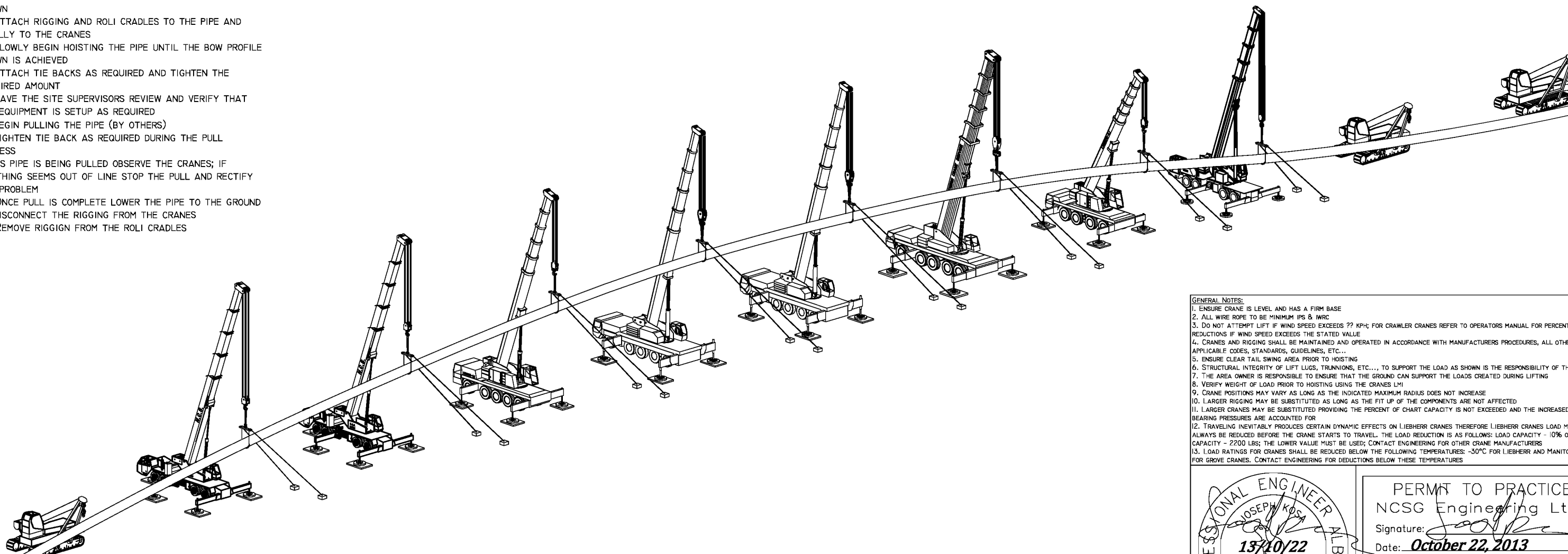
NCSG ENGINEERING LTD.
WWW.NCSG.COM
#811, 53016 HIGHWAY 60,
ACHESON, AB, T7X-5A7
PH: (780) 447-4440
FAX: (780) 447-4645

TITLE: IPS UNIT LOADING USING THREE LIEBHERR LTM1160/2 CRANES

PAPER	JOB NO.	DRAWING NUMBER	SHEET	REV.
B	—	1994-NCSG131007	1 OF 2	0

 <div style="position: absolute; top: 0; right: 0; text-align: right;"> PERMIT TO PRACTICE NCSG Engineering Ltd. Signature: _____ Date: October 08, 2013 PERMIT NUMBER: P-12182 The Association of Professional Engineers, Geologists and Geophysicists of Alberta </div>																																																																					
 rev.00																																																																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>0</td><td>13</td><td>10</td><td>08</td><td>ISSUED FOR LIFT</td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>A</td><td>13</td><td>10</td><td>08</td><td>ISSUED FOR REVIEW</td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>REV.</td><td>Y</td><td>M</td><td>D</td><td>DESCRIPTION</td><td>BY.</td><td>CHK.</td><td>ENG.</td><td>APP.</td><td></td> </tr> <tr> <td></td><td colspan="3">DATE</td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>SCALE</td><td colspan="2">DRAWN BY</td><td>DATE</td><td>CHECKED</td><td>DATE</td><td>ENGINEER</td><td>DATE</td><td>APPROVED</td><td>DATE</td> </tr> <tr> <td></td><td colspan="2">J.KOSA</td><td>13/10/07</td><td>H.YAKE</td><td>13/10/08</td><td>J.KOSA</td><td>13/10/08</td><td>H.YAKE</td><td>13/10/08</td> </tr> </table>										0	13	10	08	ISSUED FOR LIFT						A	13	10	08	ISSUED FOR REVIEW						REV.	Y	M	D	DESCRIPTION	BY.	CHK.	ENG.	APP.			DATE									SCALE	DRAWN BY		DATE	CHECKED	DATE	ENGINEER	DATE	APPROVED	DATE		J.KOSA		13/10/07	H.YAKE	13/10/08	J.KOSA	13/10/08	H.YAKE	13/10/08
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CLIENT: PARKSON CORPORATION																																																																					
PROJECT: CNRL FROTH TREATMENT																																																																					
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					NCSG ENGINEERING LTD. www.NCSG.COM #811, 53016 HIGHWAY 60, ACHESON, AB, T7X-5A7 PH: (780) 447-4440 FAX: (780) 447-4645																																																																
TITLE: IPS UNIT LOADING USING THREE LIEBHERR LTM1160/2 CRANES																																																																					
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>PAPER</td><td colspan="2">JOB NO.</td><td colspan="4">DRAWING NUMBER</td><td colspan="2">SHEET</td><td>REV.</td> </tr> <tr> <td>B</td><td colspan="2">--</td><td colspan="4">1994-NCSG131007</td><td colspan="2">2 OF 2</td><td>0</td> </tr> </table>										PAPER	JOB NO.		DRAWING NUMBER				SHEET		REV.	B	--		1994-NCSG131007				2 OF 2		0																																								
PAPER	JOB NO.		DRAWING NUMBER				SHEET		REV.																																																												
B	--		1994-NCSG131007				2 OF 2		0																																																												

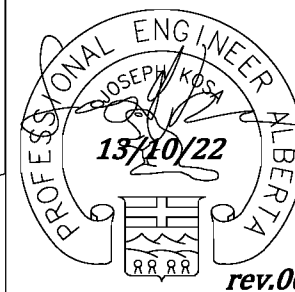
1. ASSUMING PIPE IS LAYED OUT AS SHOWN/REQUIRED
2. SET UP CRANES AS SHOWN IN THE PLAN VIEW WITHIN RADIUS SHOWN
3. ATTACH RIGGING AND ROLI CRADLES TO THE PIPE AND FINALLY TO THE CRANES
4. SLOWLY BEGIN HOISTING THE PIPE UNTIL THE BOW PROFILE SHOWN IS ACHIEVED
5. ATTACH TIE BACKS AS REQUIRED AND TIGHTEN THE REQUIRED AMOUNT
6. HAVE THE SITE SUPERVISORS REVIEW AND VERIFY THAT ALL EQUIPMENT IS SETUP AS REQUIRED
7. BEGIN PULLING THE PIPE (BY OTHERS)
8. TIGHTEN TIE BACK AS REQUIRED DURING THE PULL PROCESS
9. AS PIPE IS BEING PULLED OBSERVE THE CRANES; IF ANYTHING SEEMS OUT OF LINE STOP THE PULL AND RECTIFY THE PROBLEM
10. ONCE PULL IS COMPLETE LOWER THE PIPE TO THE GROUND
11. DISCONNECT THE RIGGING FROM THE CRANES
12. REMOVE RIGGING FROM THE ROLI CRADLES



3D - PIPE PULL SET-UP
SCALE: 1:400

No.	MODEL	TONNAGE
SB1	BY OTHERS	
CR1	LINK-BELT HTC3140LB	140
CR2	LINK-BELT HTC3140LB	140
CR3	LIEBHERR LTM1095-5.1	120
CR4	LIEBHERR LTM1100-5.2	130
CR5	LIEBHERR LTM1100-5.2	130
CR6	LIEBHERR LTM1130-5.1	160
CR7	LIEBHERR LTF11045-4.1	55
CR8	GROVE TMS800E	80
SB2	BY OTHERS	
SB3	BY OTHERS	

1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS ?? KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC...
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNNIONS, ETC..., TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE
10. LARGER RIGGING MAY BE SUBSTITUTED AS LONG AS THE FIT UP OF THE COMPONENTS ARE NOT AFFECTED
11. LARGER CRANES MAY BE SUBSTITUTED PROVIDING THE PERCENT OF CHART CAPACITY IS NOT EXCEEDED AND THE INCREASED GROUND BEARING PRESSURES ARE ACCOUNTED FOR
12. TRAVELING INEVITABLY PRODUCES CERTAIN DYNAMIC EFFECTS ON LIEBHERR CRANES THEREFORE LIEBHERR CRANES LOAD MUST ALWAYS BE REDUCED BEFORE THE CRANE STARTS TO TRAVEL. THE LOAD REDUCTION IS AS FOLLOWS: LOAD CAPACITY - 10% OR LOAD CAPACITY - 2200 LBS; THE LOWER VALUE MUST BE USED; CONTACT ENGINEERING FOR OTHER CRANE MANUFACTURERS
13. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES



The Association of Professional Engineers
Geologists and Geophysicists of Alberta

[illegible]

PROJECT:	ATHABASCA PIPELINE TWINNING PROJECT BEAVER RIVER NW2-63-4 W4M
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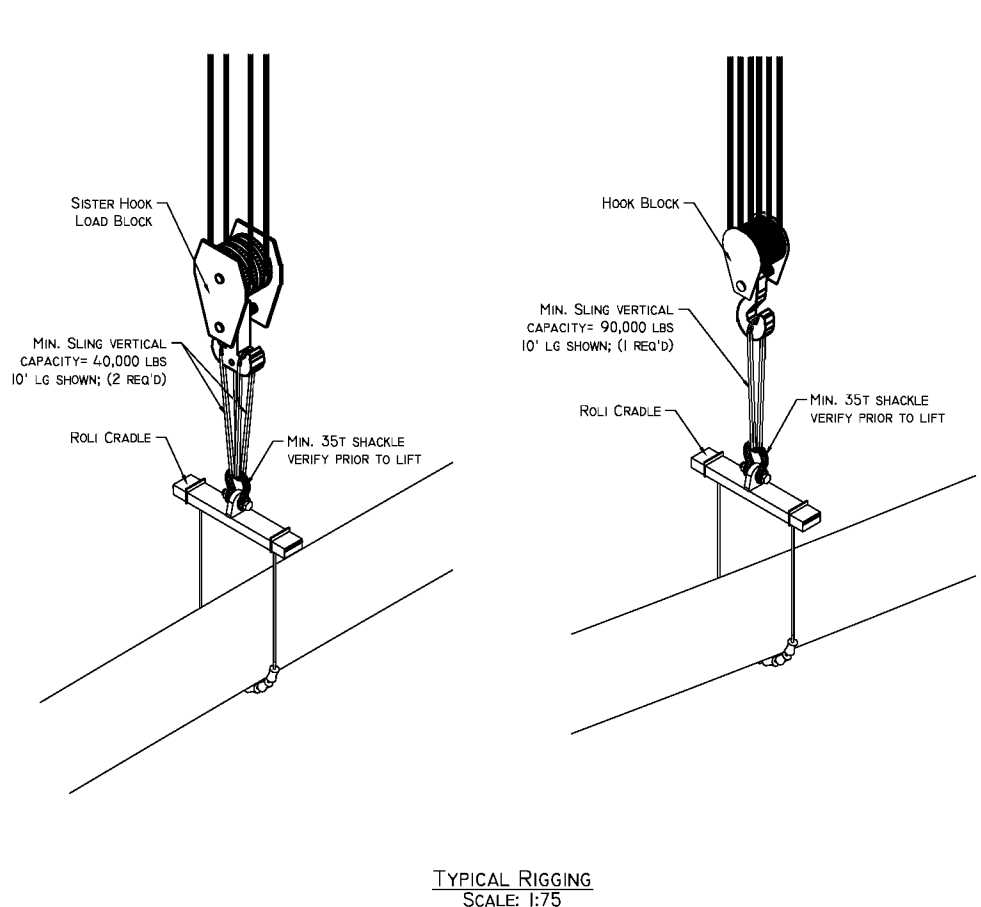
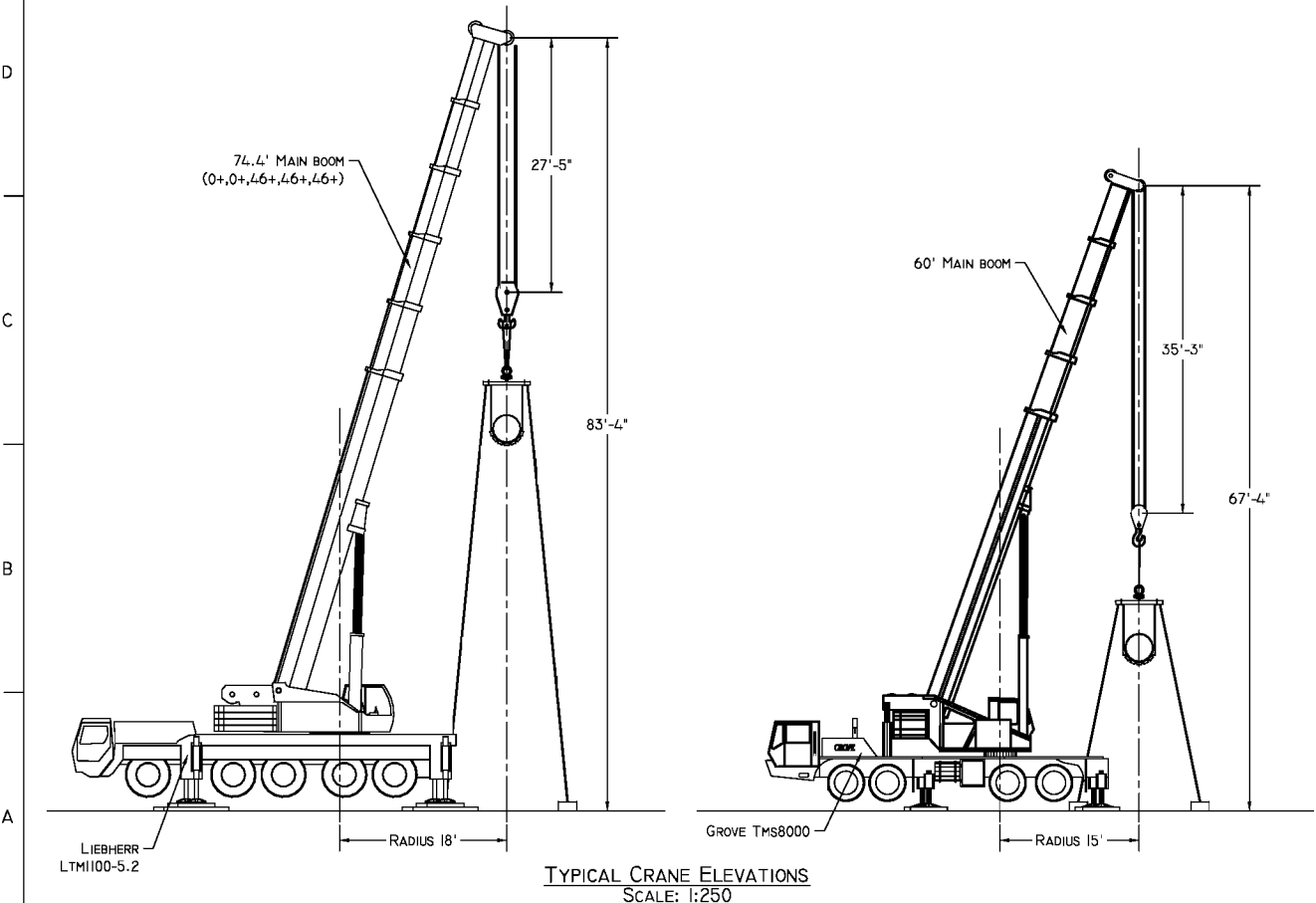
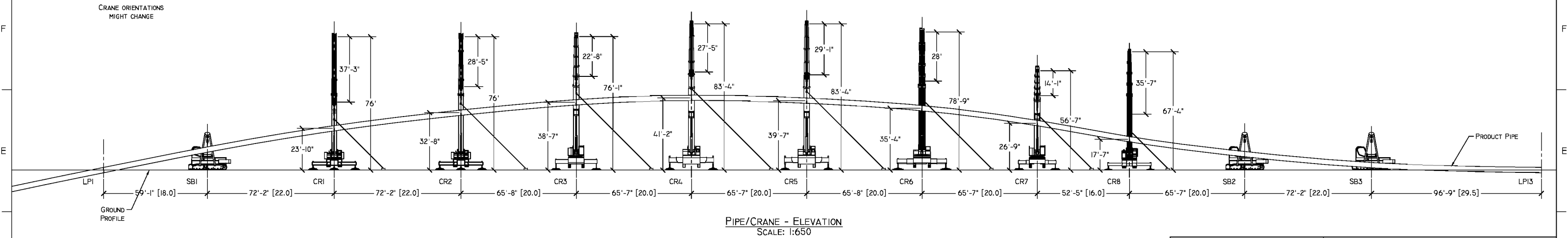
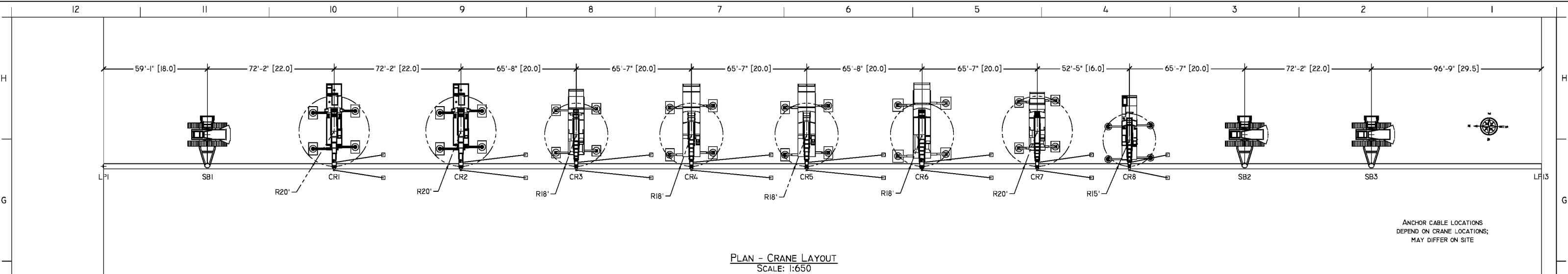


#811, 53016 HIGHWAY 60
ACHESON, AB, T7X-5A7
PH.: (780) 447-4440
FAX.: (780) 447-4645

TITLE:	ATHABASCA PIPELINE TWINNING PROJECT PIPE PULL USING EIGHT CRANES
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PAPER	JOB NO.	DRAWING NUMBER	SHEET	REV.
B	--	2021-NCSG131017	1 OF 3	0

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PERMIT TO PRACTICE
NCSG Engineering Ltd.
Signature: *Joseph Kosa*
Date: **October 22, 2013**
PERMIT NUMBER: P-12182
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

REV.	DATE	DESCRIPTION	BY.	CHK.	ENG.	APP.
0	13 10 22	ISSUED FOR LIFT	JK	HY	JK	TJ
A	13 10 22	ISSUED FOR REVIEW	JK	--	--	--

SCALE	DRAWN BY	DATE	CHECKED	DATE	ENGINEER	DATE	APPROVED	DATE
SHOWN	J.KOSA	13/10/17	H.YAKE	13/10/22	J.KOSA	13/10/22	T.JORGENSEN	13/10/22

CLIENT: BANISTER PIPELINES

PROJECT: ATHABASCA PIPELINE TWINNING PROJECT
BEAVER RIVER NW2-63-4 W4M

NCSG ENGINEERING LTD.
WWW.NCSG.COM
#811, 53016 HIGHWAY 60,
AQUINON, AB, T7X-5A7
PH: (780) 447-4440
FAX: (780) 447-4645

TITLE: ATHABASCA PIPELINE TWINNING PROJECT
PIPE PULL USING EIGHT CRANES

PAPER	JOB NO.	DRAWING NUMBER	SHEET	REV.
B	--	2021-NCSG131017	2 OF 3	0

CRANE INFORMATION	
LIFT	CRANE ONE (CR1)
CRANE TYPE:	LINK-BELT HTC3/40LB
NOMINAL CAPACITY:	140 TON
COUNTERWEIGHT:	0 LBS
CARBODY CTWT:	--
SUPERLIFT CTWT:	--
CTWT POSITION:	--
OUTRIGGERS/TRACKS:	FULLY EXTENDED
BOOM LENGTH:	71.3'
PARTS OF LINE:	MINIMUM SIX
LUFFER/JIB:	--
LIFT RADIUS:	20'
CAPACITY:	118,300 LBS
LOAD INFO	
LOAD:	37,660 LBS
RIGGING:	6850 LBS (EST)
HOOK/LOAD BLOCK:	1410 LBS
LOAD LINE:	200 LBS
HEADACHE BALL:	720 LBS
EFFECTIVE JIB WEIGHT:	--
AUXILIARY BOOM HEAD:	100 LBS
ADDITIONAL WEIGHT:	150 LBS
LIFT INFO	
TOTAL LIFT WEIGHT:	47,090 LBS
PERCENT CAPACITY:	39.8%
MAX. OUTRIGGER FORCE:	58,800 LBS
MAX. GROUND PRESSURE:	11.7 PSI / 1680 PSF*

* Using 5' x 7' STEEL CRANE MATS

CRANE INFORMATION	
LIFT	CRANE TWO (CR2)
CRANE TYPE:	LINK-BELT HTC3/40LB
NOMINAL CAPACITY:	140 TON
COUNTERWEIGHT:	0 LBS
CARBODY CTWT:	--
SUPERLIFT CTWT:	--
CTWT POSITION:	--
OUTRIGGERS/TRACKS:	FULLY EXTENDED
BOOM LENGTH:	71.3'
PARTS OF LINE:	MINIMUM SIX
LUFFER/JIB:	--
LIFT RADIUS:	20'
CAPACITY:	118,300 LBS
LOAD INFO	
LOAD:	35,200 LBS
RIGGING:	6850 LBS (EST)
HOOK/LOAD BLOCK:	1410 LBS
LOAD LINE:	200 LBS
HEADACHE BALL:	720 LBS
EFFECTIVE JIB WEIGHT:	--
AUXILIARY BOOM HEAD:	100 LBS
ADDITIONAL WEIGHT:	150 LBS
LIFT INFO	
TOTAL LIFT WEIGHT:	44,630 LBS
PERCENT CAPACITY:	37.7%
MAX. OUTRIGGER FORCE:	58,000 LBS
MAX. GROUND PRESSURE:	11.5 PSI / 1657 PSF*

* Using 5' x 7' STEEL CRANE MATS

CRANE INFORMATION	
LIFT	CRANE THREE (CR3)
CRANE TYPE:	LIEBHERR LTM1095-S.1
NOMINAL CAPACITY:	120 TON
COUNTERWEIGHT:	0 LBS
CARBODY CTWT:	--
SUPERLIFT CTWT:	--
CTWT POSITION:	--
OUTRIGGERS/TRACKS:	FULLY EXTENDED
BOOM LENGTH:	68' (0+0+46+46+0+)
PARTS OF LINE:	MINIMUM SEVEN
LUFFER/JIB:	--
LIFT RADIUS:	18'
CAPACITY:	74,000 LBS
LOAD INFO	
LOAD:	32,630 LBS
RIGGING:	6850 LBS (EST)
HOOK/LOAD BLOCK:	992 LBS
LOAD LINE:	INCL.
HEADACHE BALL:	--
EFFECTIVE JIB WEIGHT:	123 LBS
AUXILIARY BOOM HEAD:	--
ADDITIONAL WEIGHT:	--
LIFT INFO	
TOTAL LIFT WEIGHT:	41,685 LBS
PERCENT CAPACITY:	56.3%
MAX. OUTRIGGER FORCE:	66,000 LBS
MAX. GROUND PRESSURE:	15.3 PSI / 2200 PSF*

* Using 5' x 6' STEEL CRANE MATS

CRANE INFORMATION	
LIFT	CRANE FOUR (CR4)
CRANE TYPE:	LIEBHERR LTM1100-S.2
NOMINAL CAPACITY:	130 TON
COUNTERWEIGHT:	0 LBS
CARBODY CTWT:	--
SUPERLIFT CTWT:	--
CTWT POSITION:	--
OUTRIGGERS/TRACKS:	FULLY EXTENDED
BOOM LENGTH:	74.4' (0+0+46+46+46+)
PARTS OF LINE:	MINIMUM FIVE
LUFFER/JIB:	--
LIFT RADIUS:	18'
CAPACITY:	80,300 LBS
LOAD INFO	
LOAD:	33,310 LBS
RIGGING:	6850 LBS (EST)
HOOK/LOAD BLOCK:	1103 LBS
LOAD LINE:	INCL.
HEADACHE BALL:	--
EFFECTIVE JIB WEIGHT:	993 LBS
AUXILIARY BOOM HEAD:	--
ADDITIONAL WEIGHT:	--
LIFT INFO	
TOTAL LIFT WEIGHT:	42,256 LBS
PERCENT CAPACITY:	52.6%
MAX. OUTRIGGER FORCE:	70,000 LBS
MAX. GROUND PRESSURE:	13.9 PSI / 2000 PSF*

* Using 5' x 7' STEEL CRANE MATS

CRANE INFORMATION	
LIFT	CRANE FIVE (CR5)
CRANE TYPE:	LIEBHERR LTM1100-S.2
NOMINAL CAPACITY:	130 TON
COUNTERWEIGHT:	0 LBS
CARBODY CTWT:	--
SUPERLIFT CTWT:	--
CTWT POSITION:	--
OUTRIGGERS/TRACKS:	FULLY EXTENDED
BOOM LENGTH:	74.4' (0+0+46+46+46+)
PARTS OF LINE:	MINIMUM FIVE
LUFFER/JIB:	--
LIFT RADIUS:	18'
CAPACITY:	80,300 LBS
LOAD INFO	
LOAD:	32,823 LBS
RIGGING:	6850 LBS (EST)
HOOK/LOAD BLOCK:	1103 LBS
LOAD LINE:	INCL.
HEADACHE BALL:	--
EFFECTIVE JIB WEIGHT:	993 LBS
AUXILIARY BOOM HEAD:	--
ADDITIONAL WEIGHT:	--
LIFT INFO	
TOTAL LIFT WEIGHT:	41,771 LBS
PERCENT CAPACITY:	52.0%
MAX. OUTRIGGER FORCE:	69,000 LBS
MAX. GROUND PRESSURE:	13.7 PSI / 1971 PSF*

* Using 5' x 7' STEEL CRANE MATS

CRANE INFORMATION	
LIFT	CRANE SIX (CR6)
CRANE TYPE:	LIEBHERR LTM1130-S.1
NOMINAL CAPACITY:	60 TON
COUNTERWEIGHT:	0 LBS
CARBODY CTWT:	--
SUPERLIFT CTWT:	--
CTWT POSITION:	--
OUTRIGGERS/TRACKS:	FULLY EXTENDED
BOOM LENGTH:	70' (0+0+0+46+46+)
PARTS OF LINE:	MINIMUM SIX
LUFFER/JIB:	--
LIFT RADIUS:	8'
CAPACITY:	103,000 LBS
LOAD INFO	
LOAD:	34,300 LBS
RIGGING:	6850 LBS (EST)
HOOK/LOAD BLOCK:	544 LBS
LOAD LINE:	INCL.
HEADACHE BALL:	--
EFFECTIVE JIB WEIGHT:	882 LBS
AUXILIARY BOOM HEAD:	--
ADDITIONAL WEIGHT:	--
LIFT INFO	
TOTAL LIFT WEIGHT:	43,576 LBS
PERCENT CAPACITY:	42.3%
MAX. OUTRIGGER FORCE:	70,000 LBS
MAX. GROUND PRESSURE:	13.9 PSI / 2000 PSF*

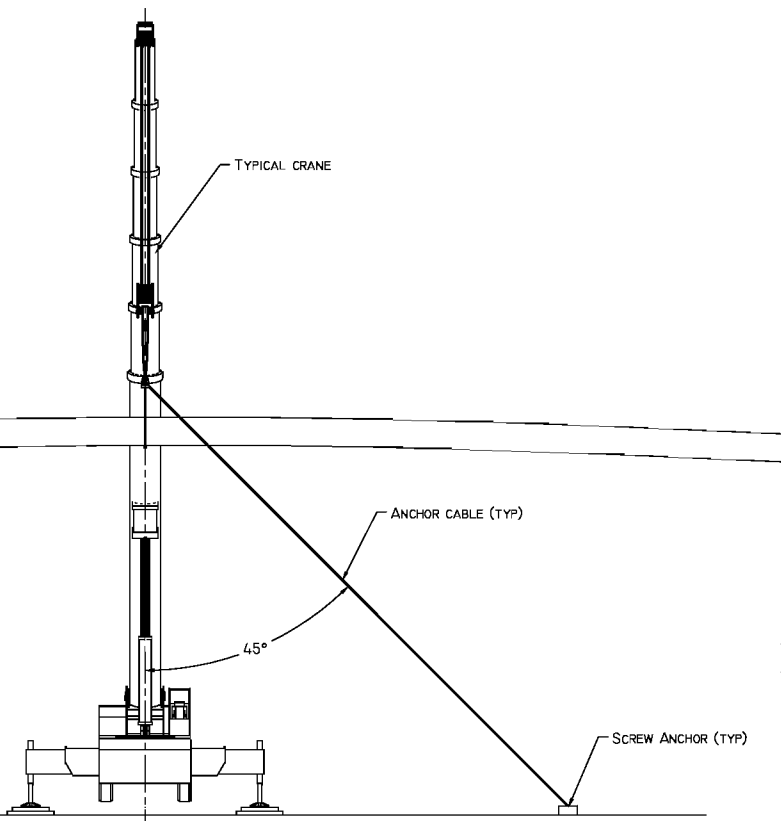
* Using 5' x 7' STEEL CRANE MATS

CRANE INFORMATION	
LIFT	CRANE SEVEN (CR7)
CRANE TYPE:	LIEBHERR LTM1045-4.1
NOMINAL CAPACITY:	55 TON
COUNTERWEIGHT:	19,800 LBS
CARBODY CTWT:	--
SUPERLIFT CTWT:	--
CTWT POSITION:	--
OUTRIGGERS/TRACKS:	FULLY EXTENDED
BOOM LENGTH:	51' (0+0+0+46+46+)
PARTS OF LINE:	MINIMUM FIVE
LUFFER/JIB:	--
LIFT RADIUS:	20'
CAPACITY:	48,100 LBS
LOAD INFO	
LOAD:	28,900 LBS
RIGGING:	6850 LBS (EST)
HOOK/LOAD BLOCK:	397 LBS
LOAD LINE:	INCL.
HEADACHE BALL:	--
EFFECTIVE JIB WEIGHT:	617 LBS
AUXILIARY BOOM HEAD:	--
ADDITIONAL WEIGHT:	--
LIFT INFO	
TOTAL LIFT WEIGHT:	36,764 LBS
PERCENT CAPACITY:	76.4%
MAX. OUTRIGGER FORCE:	55,000 LBS
MAX. GROUND PRESSURE:	30.4 PSI / 4377 PSF*

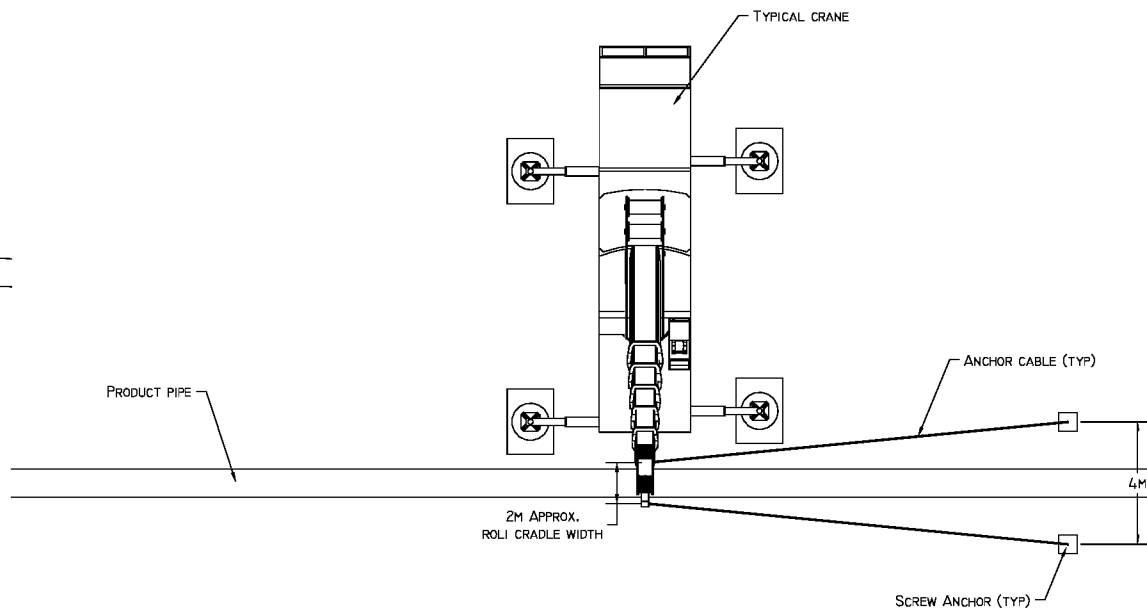
* Using 8/8" ROUND WOODEN CRANE MATS

CRANE INFORMATION	
LIFT	CRANE EIGHT (CR8)
CRANE TYPE:	GROVE TMS800E
NOMINAL CAPACITY:	80 TON
COUNTERWEIGHT:	0 LBS
CARBODY CTWT:	--
SUPERLIFT CTWT:	--
CTWT POSITION:	--
OUTRIGGERS/TRACKS:	FULLY EXTENDED
BOOM LENGTH:	60'
PARTS OF LINE:	MINIMUM SIX
LUFFER/JIB:	--
LIFT RADIUS:	15'
CAPACITY:	86,000 LBS
LOAD INFO	
LOAD:	29,320 LBS
RIGGING:	6850 LBS (EST)
HOOK/LOAD BLOCK:	1281 LBS
LOAD LINE:	200 LBS
HEADACHE BALL:	568 LBS
EFFECTIVE JIB WEIGHT:	--
AUXILIARY BOOM HEAD:	136 LBS
ADDITIONAL WEIGHT:	--
LIFT INFO	
TOTAL LIFT WEIGHT:	38,355 LBS
PERCENT CAPACITY:	44.6%
MAX. OUTRIGGER FORCE:	51,700 LBS
MAX. GROUND PRESSURE:	17.3 PSI / 5374 PSF*

* Using 8/2" ROUND WOODEN CRANE MATS



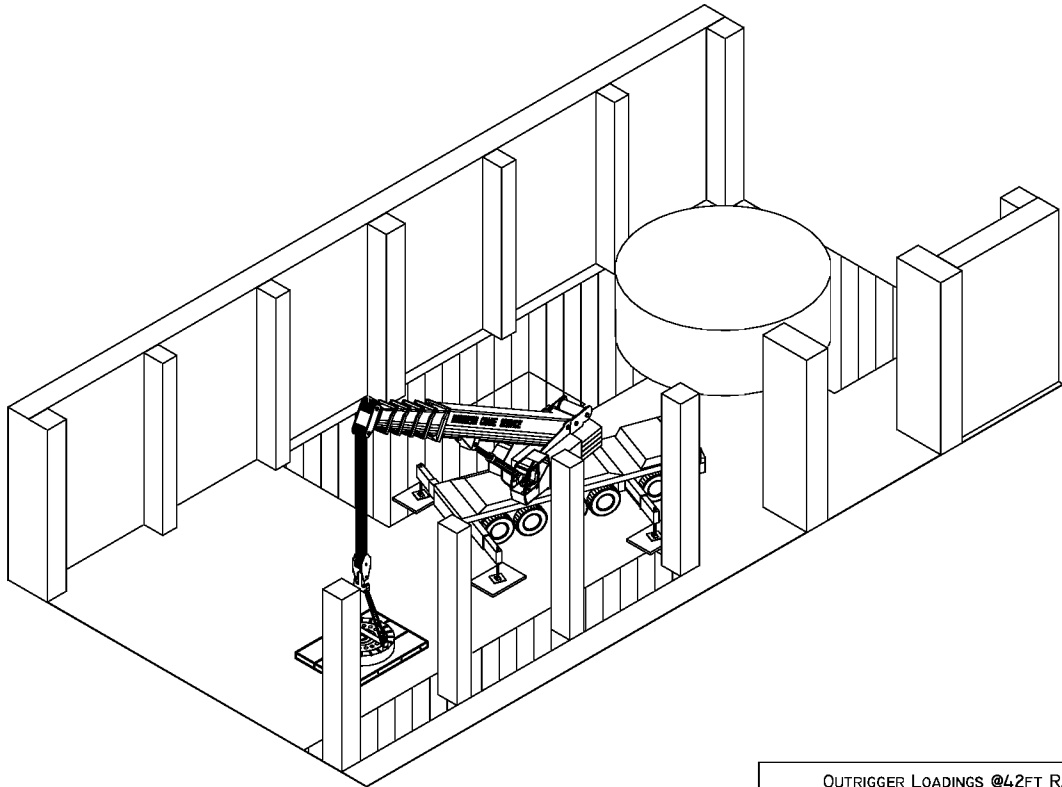
ANCHOR CABLE ELEVATIONS
SCALE: 1:250



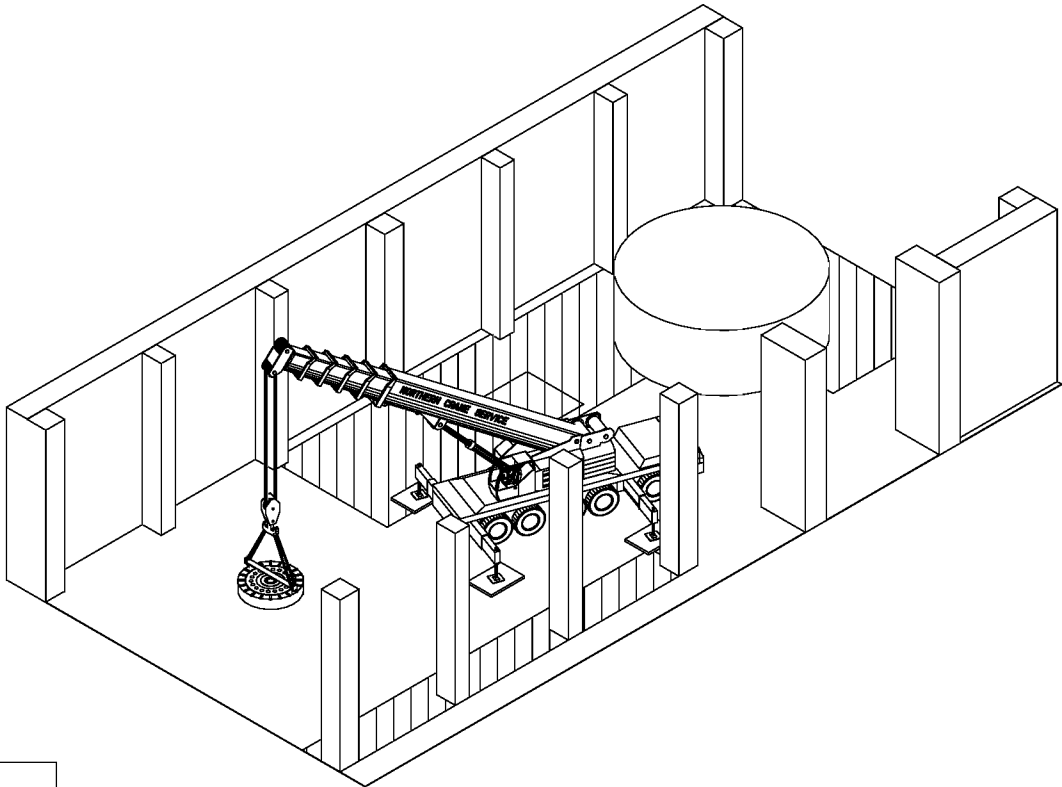
TYPICAL CRANE ELEVATIONS
SCALE: 1:250

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0	13	10	22	ISSUED FOR LIFT	JK	HY	JK	TJ	
A	13	10	22	ISSUED FOR REVIEW	JK	--	--	--	
REV.	Y	M	D	DATE	DESCRIPTION	BY	CHK	ENG	APP.
SCALE	DRAWN BY	DATE	CHECKED	DATE	ENGINEER	DATE	APPROVED	DATE	
SHOWN	J.KOSA	13/10/22	H.YAKE	13/10/22	J.KOSA	13/10/22	T.JORGENSEN	13/10/22	
CLIENT: BANISTER PIPELINES									
PROJECT: ATHABASCA PIPELINE TWINNING PROJECT BEAVER RIVER NW2-63-4 W4M									
					NCSG ENGINEERING LTD. WWW.NCSG.COM #811, 53016 HIGHWAY 60, ACHESON, AB, T7X-5A7 PH: (780) 447-4440 FAX: (780) 447-4645				
TITLE: ATHABASCA PIPELINE TWINNING PROJECT PIPE PULL USING EIGHT CRANES									
PAPER	JOB NO.	DRAWING NUMBER				SHEET	REV.		
B	--	2021-NCSG131017				3 OF 3	0		



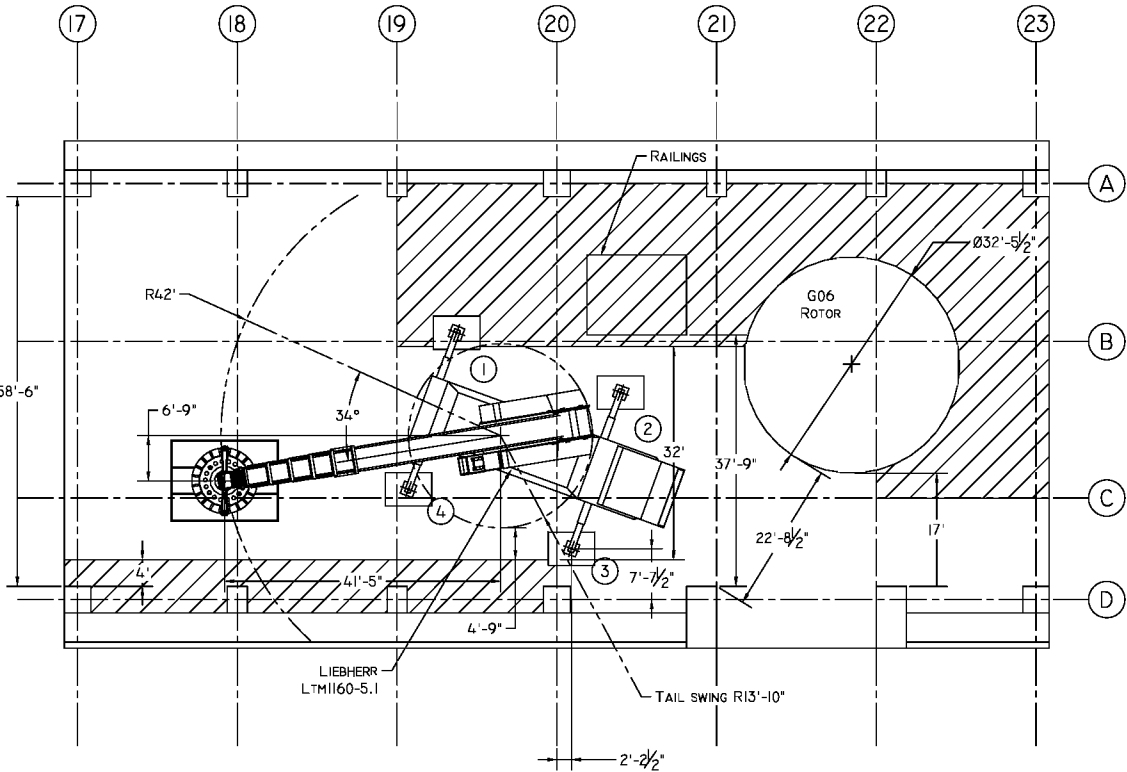
ISOMETRIC - INITIAL
SCALE: 1:350



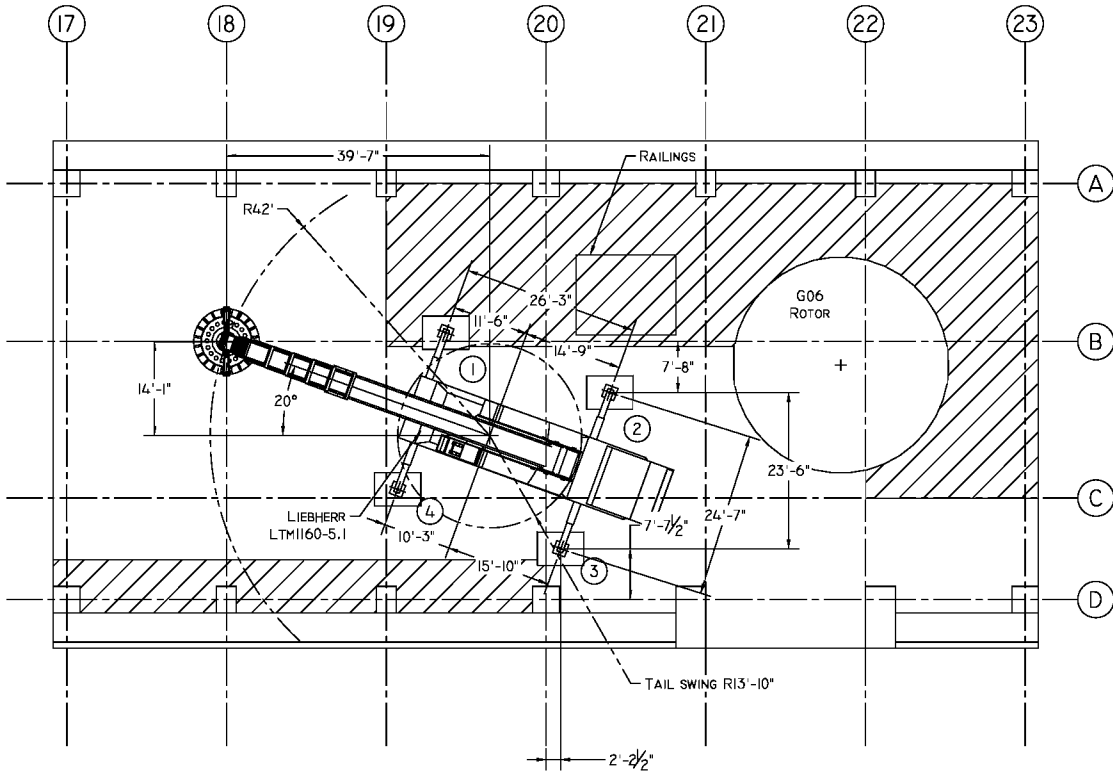
ISOMETRIC - FINAL
SCALE: 1:350

- CRANE IS SHOWN WITH 5' X 6' STEEL
OUTRIGGER PADS AND ARE CENTERED UNDER
OUTRIGGERS
- COMPRISED OF 5" X 5" X 1/4" HSS, 44W
- APPROXIMATE WEIGHT= 1160 LBS EACH

OUTRIGGER LOADINGS @42FT RADIUS (POUNDS)					
OUTRIGGER	FULL LOAD		NO LOAD		
	INITIAL	FINAL	INITIAL	FINAL	
1	82,000	119,000	59,000	48,000	
2	20,000	30,000	71,000	68,000	
3	52,000	30,000	62,000	68,000	
4	144,000	119,000	40,000	48,000	



PLAN - INITIAL
SCALE: 1:350



PLAN - FINAL
SCALE: 1:350

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CRANE INFORMATION

LIFT	CRANE ONE	CRANE TWO
CRANE TYPE:	LIEBHERR LTM1160-5.1	--
NOMINAL CAPACITY:	180 TON	--
COUNTERWEIGHT:	102,500 LBS	--
CARBODY CTWT:	--	--
SUPERLIFT CTWT:	--	--
CTWT POSITION:	--	--
OUTRIGGERS/TRACKS:	26' x 25' STANCE	--
BOOM LENGTH:	57' (0+,0+,0+,46+,0+)	--
PARTS OF LINE:	MINIMUM FIVE	--
LUFFER/JIB:	--	--
LIFT RADIUS:	42'	--
CAPACITY:	76,600 LBS	--

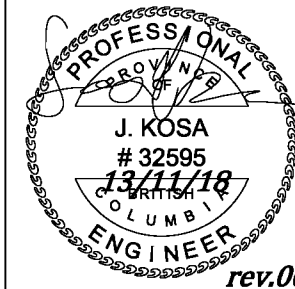
LOAD INFO

LOAD:	60,848 LBS	--
RIGGING:	708 LBS	--
HOOK/LOAD BLOCK:	1544 LBS	--
LOAD LINE:	INCL.	--
HEADACHE BALL:	--	--
EFFECTIVE JIB WEIGHT:	REMOVED	--
AUXILIARY BOOM HEAD:	--	--
ADDITIONAL WEIGHT:	--	--

LIFT INFO

TOTAL LIFT WEIGHT:	63,100 LBS	--
PERCENT CAPACITY:	82.4%	--
MAX. OUTRIGGER FORCE:	144,000 LBS	--
MAX. GROUND PRESSURE:	33.3 PSI / 4800 PSF	--

GENERAL NOTES:
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 40 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC....
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNNIONS, ETC.... TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE
10. LARGER RIGGING MAY BE SUBSTITUTED AS LONG AS THE FIT UP OF THE COMPONENTS ARE NOT AFFECTED
11. TRAVELING INEVITABLY PRODUCES CERTAIN DYNAMIC EFFECTS ON LIEBHERR CRANES THEREFORE LIEBHERR CRANES LOAD MUST ALWAYS BE REDUCED BEFORE THE CRANE STARTS TO TRAVEL. THE LOAD REDUCTION IS AS FOLLOWS: LOAD CAPACITY - 10% OR LOAD CAPACITY - 2200 LBS; THE LOWER VALUE MUST BE USED; CONTACT ENGINEERING FOR OTHER CRANE MANUFACTURERS
12. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES



0	13	11	18	CRANE ROTATED 20° CW; ISSUED FOR LIFT				JK	RT/BM	JK	RT						
E	13	11	13	MAXIMUM CWT USED; RE-ISSUED FOR INFORMATION/REVIEW				JK	--	--	--						
D	13	11	13	CRANE MOVED NORTH/EAST; CWT REDUCED; RE-ISSUED FOR INFORMATION/REVIEW				JK	--	--	--						
C	13	11	12	THRUST BLOCK RELOCATED TO CROSSING OF B18; RE-ISSUED FOR INFORMATION/REVIEW				JK	--	--	--						
B	13	11	12	COMMENTS ADDRESSED; RE-ISSUED FOR INFORMATION/REVIEW				JK	--	--	--						
A	13	11	08	ISSUED FOR INFORMATION				JK	--	--	--						
REV.	Y	M	D	DATE				DESCRIPTION				BY.	CHK.	ENG.	APP.		
SCALE		DRAWN BY		DATE		CHECKED		DATE		ENGINEER		DATE		APPROVED		DATE	
SHOWN		J.KOSA		13/11/08		B.McRANN		13/11/18		J.KOSA		13/11/18		R.TROTTIER		13/11/18	

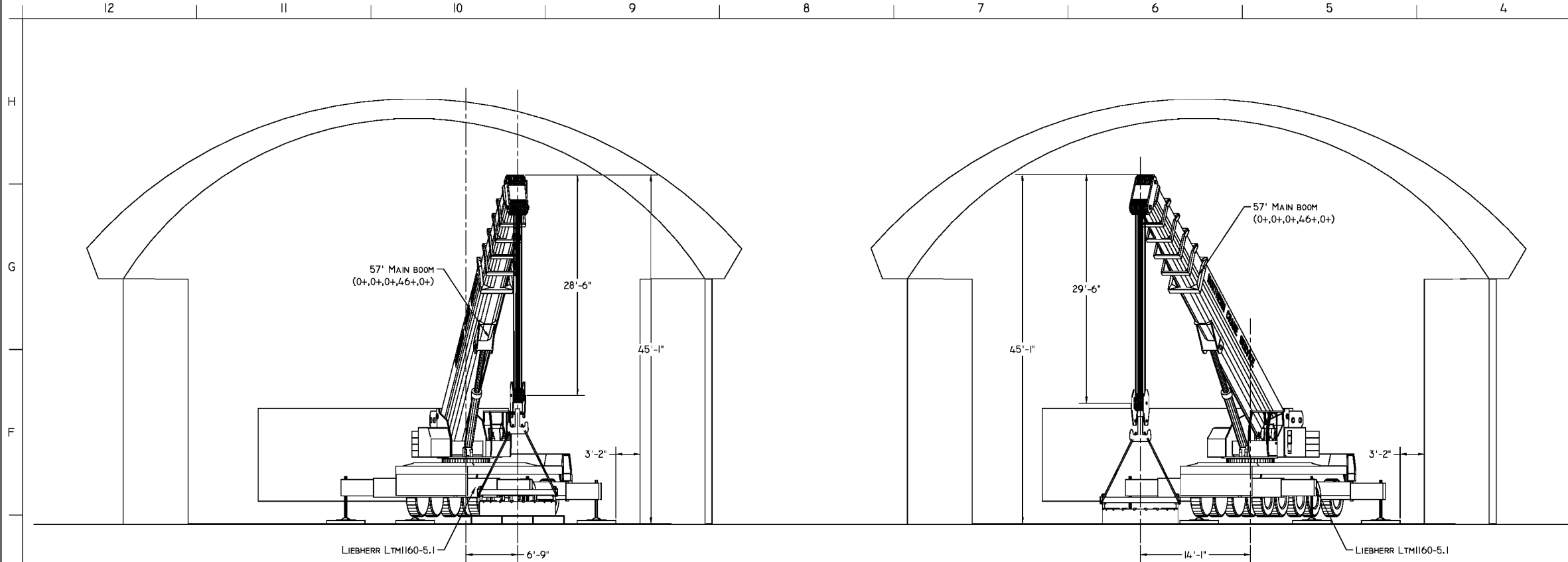
CLIENT: BBA INC.

PROJECT: B.C. HYDRO GMS
HUDSON'S HOPE - BRITISH COLUMBIA

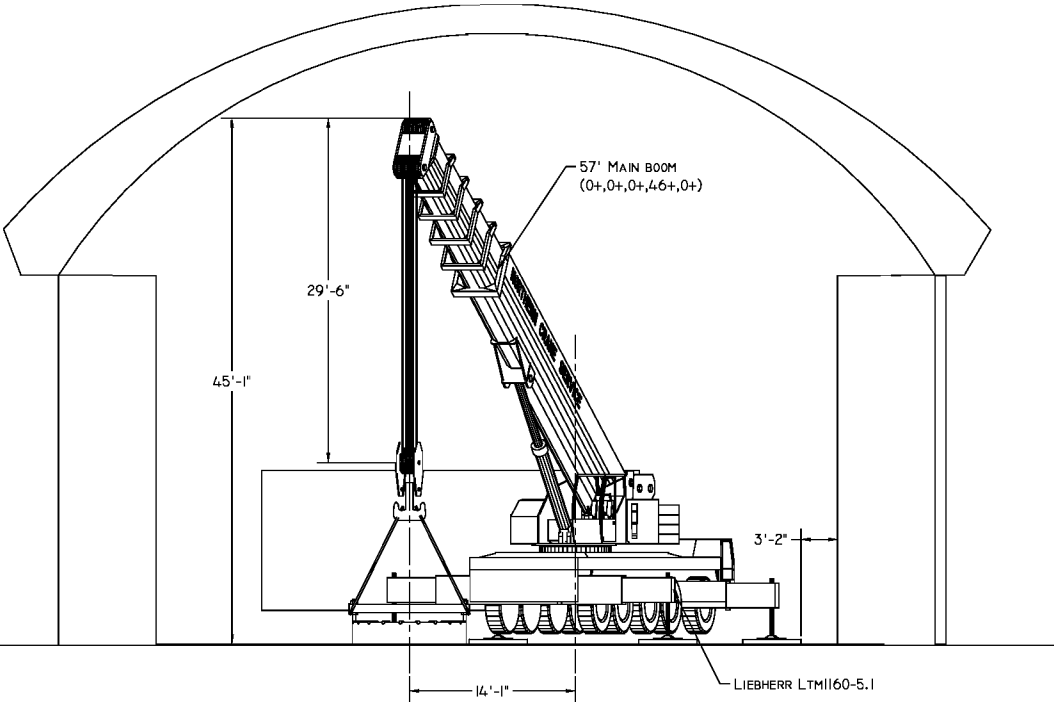


TITLE: THRUST BLOCK LIFT USING
LIEBHERR LTM1160-5.1

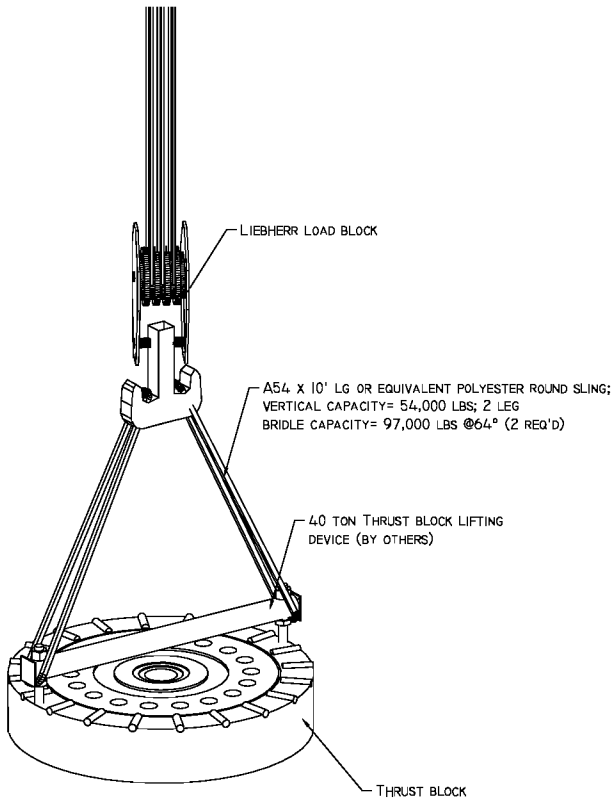
PAPER	JOB NO.	DRAWING NUMBER	SHEET	REV.
B	13-025-0024	2073-NCSG1311108	1 OF 2	0



ELEVATION - INITIAL
SCALE: 1:200



ELEVATION - FINAL
SCALE: 1:200



RIGGING DETAIL
SCALE: 1:75

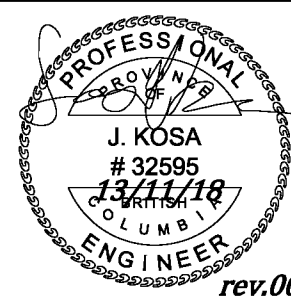
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CRANE INFORMATION		
LIFT	CRANE ONE	CRANE TWO
CRANE TYPE:	LIEBHERR LTM1160-5.1	--
NOMINAL CAPACITY:	180 TON	--
COUNTERWEIGHT:	102,500 LBS	--
CARBODY CTWT:	--	--
SUPERLIFT CTWT:	--	--
CTWT POSITION:	--	--
OUTRIGGERS/TRACKS:	26' x 25' STANCE	--
BOOM LENGTH:	57' (0+,0+,0+,46+,0+)	--
PARTS OF LINE:	MINIMUM FIVE	--
LUFFER/JIB:	--	--
LIFT RADIUS:	42'	--
CAPACITY:	76,600 LBS	--


LOAD INFO		
LOAD:	60,848 LBS	--
RIGGING:	708 LBS	--
HOOK/LOAD BLOCK:	1544 LBS	--
LOAD LINE:	INCL.	--
HEADACHE BALL:	--	--
EFFECTIVE JIB WEIGHT:	REMOVED	--
AUXILIARY BOOM HEAD:	--	--
ADDITIONAL WEIGHT:	--	--

LIFT INFO		
TOTAL LIFT WEIGHT:	63,100 LBS	--
PERCENT CAPACITY:	82.4%	--
MAX. OUTRIGGER FORCE:	144,000 LBS	--
MAX. GROUND PRESSURE:	33.3 PSI / 4800 PSF	--

GENERAL NOTES:
1. ENSURE CRANE IS LEVEL AND HAS A FIRM BASE
2. ALL WIRE ROPE TO BE MINIMUM IPS & IWRC
3. DO NOT ATTEMPT LIFT IF WIND SPEED EXCEEDS 40 KPH; FOR CRAWLER CRANES REFER TO OPERATORS MANUAL FOR PERCENT REDUCTIONS IF WIND SPEED EXCEEDS THE STATED VALUE
4. CRANES AND RIGGING SHALL BE MAINTAINED AND OPERATED IN ACCORDANCE WITH MANUFACTURERS PROCEDURES, ALL OTHER APPLICABLE CODES, STANDARDS, GUIDELINES, ETC...
5. ENSURE CLEAR TAIL SWING AREA PRIOR TO HOISTING
6. STRUCTURAL INTEGRITY OF LIFT LUGS, TRUNNIONS, ETC.... TO SUPPORT THE LOAD AS SHOWN IS THE RESPONSIBILITY OF THE VENDOR
7. THE AREA OWNER IS RESPONSIBLE TO ENSURE THAT THE GROUND CAN SUPPORT THE LOADS CREATED DURING LIFTING
8. VERIFY WEIGHT OF LOAD PRIOR TO HOISTING USING THE CRANES LMI
9. CRANE POSITIONS MAY VARY AS LONG AS THE INDICATED MAXIMUM RADIUS DOES NOT INCREASE
10. LARGER RIGGING MAY BE SUBSTITUTED AS LONG AS THE FIT UP OF THE COMPONENTS ARE NOT AFFECTED
11. TRAVELING INEVITABLY PRODUCES CERTAIN DYNAMIC EFFECTS ON LIEBHERR CRANES THEREFORE LIEBHERR CRANES LOAD MUST ALWAYS BE REDUCED BEFORE THE CRANE STARTS TO TRAVEL. THE LOAD REDUCTION IS AS FOLLOWS: LOAD CAPACITY - 10% OR LOAD CAPACITY - 2200 LBS; THE LOWER VALUE MUST BE USED; CONTACT ENGINEERING FOR OTHER CRANE MANUFACTURERS
12. LOAD RATINGS FOR CRANES SHALL BE REDUCED BELOW THE FOLLOWING TEMPERATURES: -30°C FOR LIEBHERR AND MANITOWOC, -18° FOR GROVE CRANES. CONTACT ENGINEERING FOR DEDUCTIONS BELOW THESE TEMPERATURES

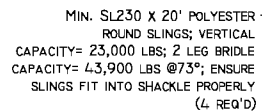
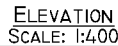


O	I3	II	I8	CRANE ROTATED 20° CW; ISSUED FOR LIFT	JK	RT/BM	JK	RT	
E	I3	II	I3	MAXIMUM CWT USED; RE-ISSUED FOR INFORMATION/REVIEW	JK	--	--	--	
D	I3	II	I3	CRANE MOVED NORTH/EAST; CWT REDUCED; RE-ISSUED FOR INFORMATION/REVIEW	JK	--	--	--	
C	I3	II	I2	THRUST BLOCK RELOCATED TO CROSSING OF B18; RE-ISSUED FOR INFORMATION/REVIEW	JK	--	--	--	
B	I3	II	I2	COMMENTS ADDRESSED; RE-ISSUED FOR INFORMATION/REVIEW	JK	--	--	--	
A	I3	II	08	ISSUED FOR INFORMATION	JK	--	--	--	
REV.	Y	M	D	DATE	DESCRIPTION	BY.	CHK.	ENG.	APP.
SCALE	DRAWN BY			DATE	CHECKED	DATE	ENGINEER	DATE	APPROVED
SHOWN	J.KOSA			13/11/08	B.MCRANN	13/11/18	J.KOSA	13/11/18	R.TROTTIER
								13/11/18	

CLIENT:	BBA INC.				
PROJECT:	B.C. HYDRO GMS HUDSON'S HOPE - BRITISH COLUMBIA				
			NCSG ENGINEERING LTD. www.ncsg.com #811, 53016 HIGHWAY 60, ADESON, AB, T7X-5A7 PH: (780) 447-4440 FAX: (780) 447-4645		
TITLE:	THRUST BLOCK LIFT USING LIEBHERR LTM1160-5.1				
PAPER	JOB No.	DRAWING NUMBER		SHEET	REV.
B	13-025-0024	2073-NCSG1311108		2 OF 2	0



3D - FINAL
SCALE: 1:350

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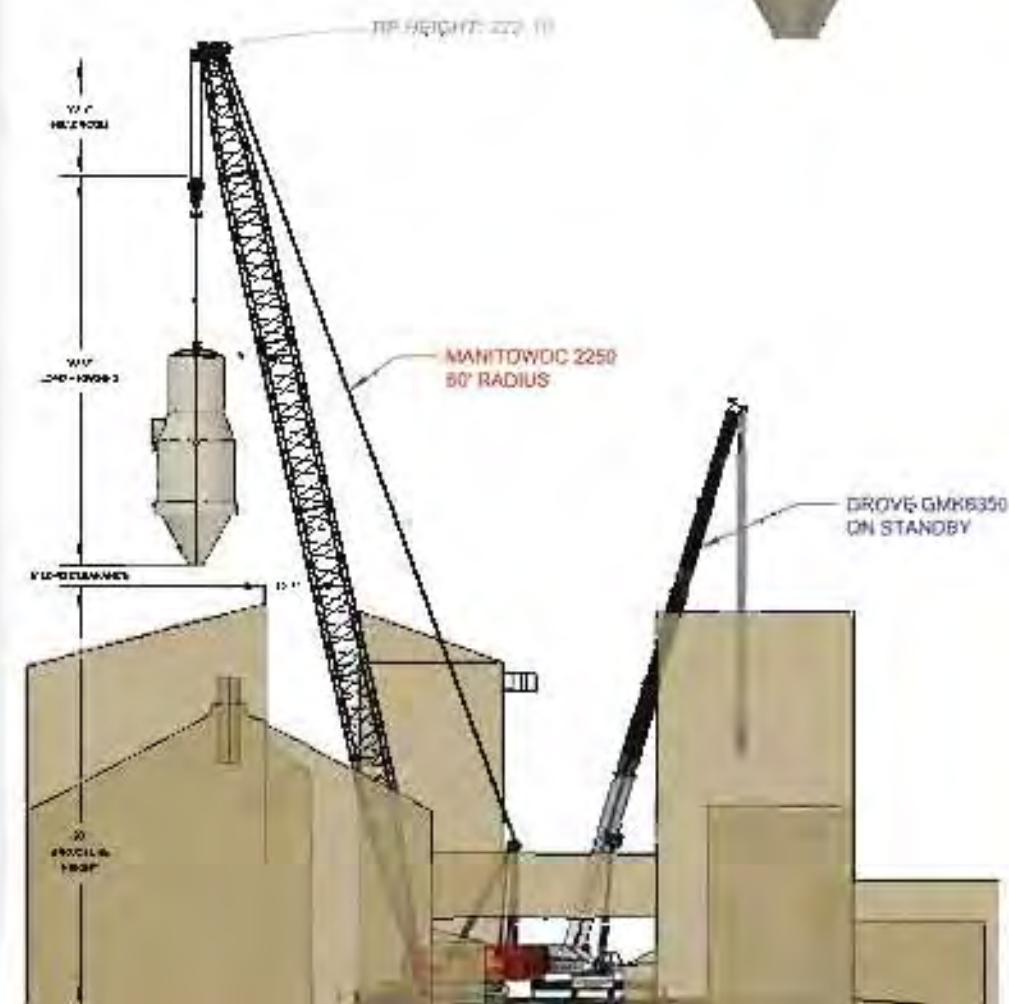
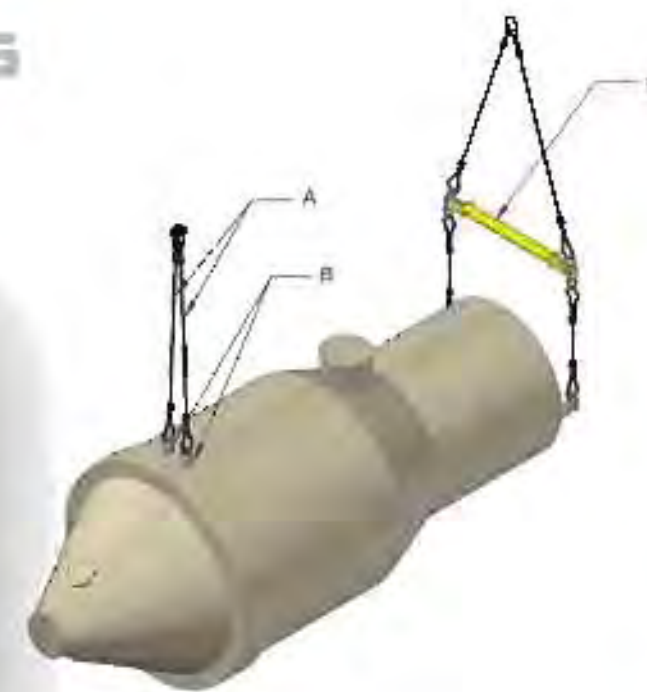
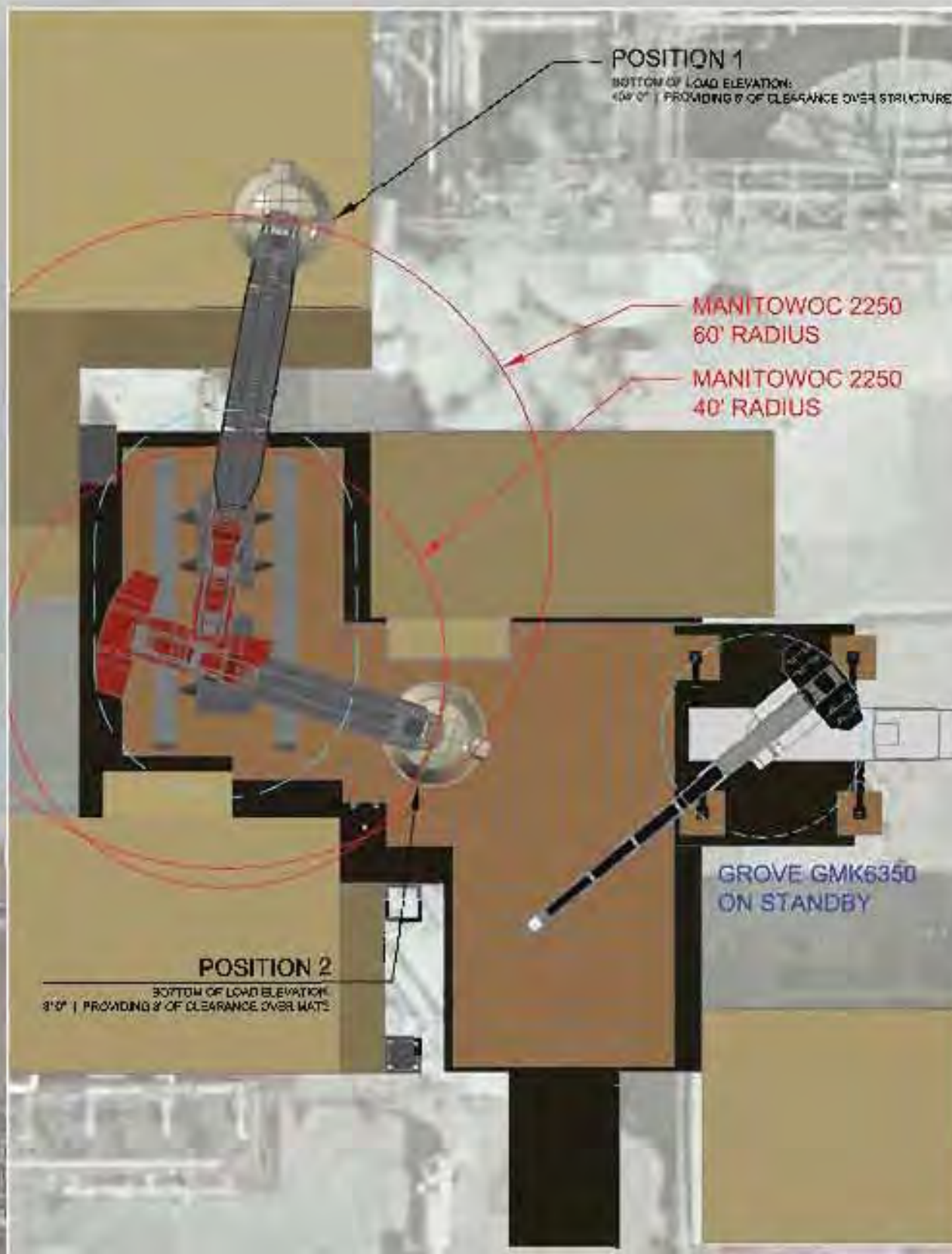
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**ENERGY
TRANSPORTATION
INC.**

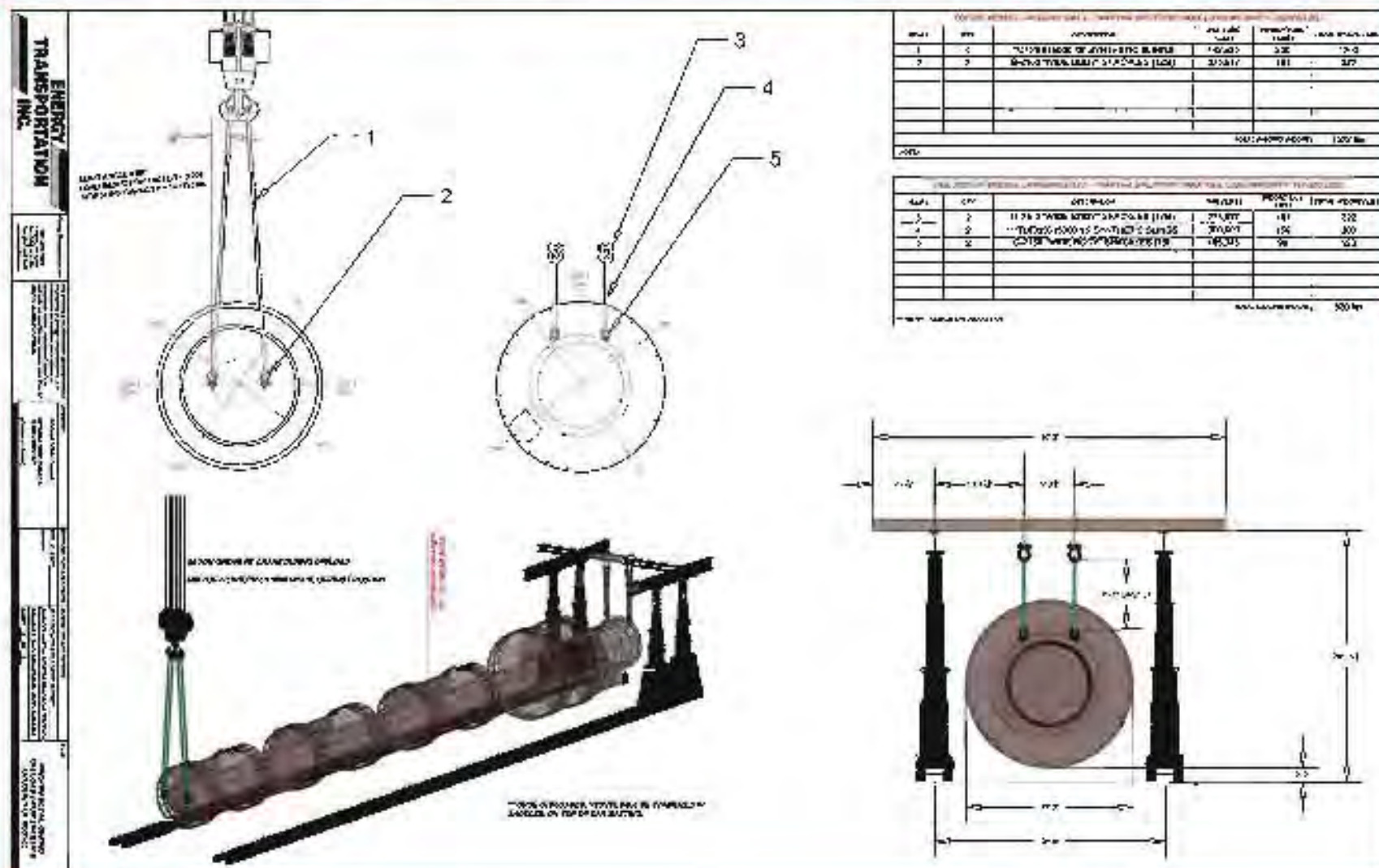
ENERGY
CRANE & RIGGING

SPECIALIZED TRANSPORT & LIFTING SOLUTIONS

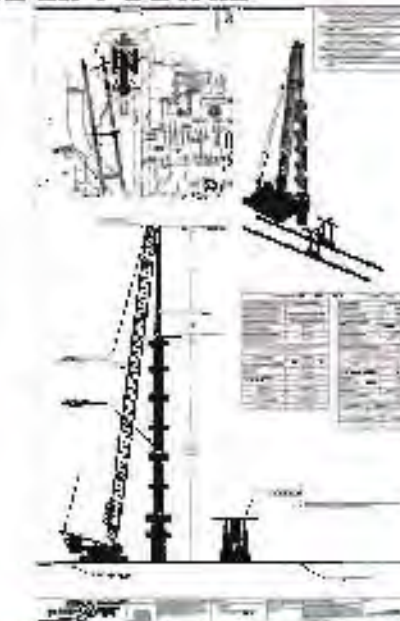
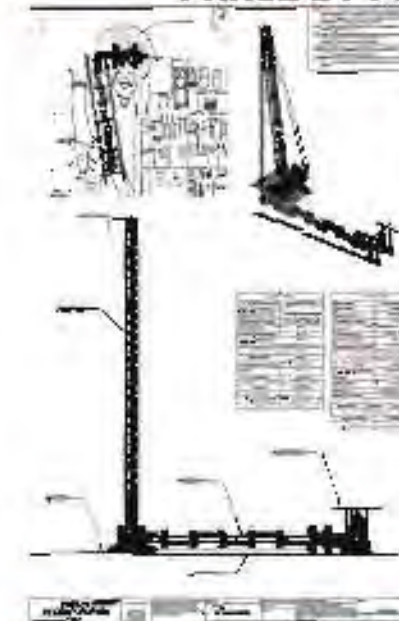
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PHASE BY PHASE LIFT DETAIL

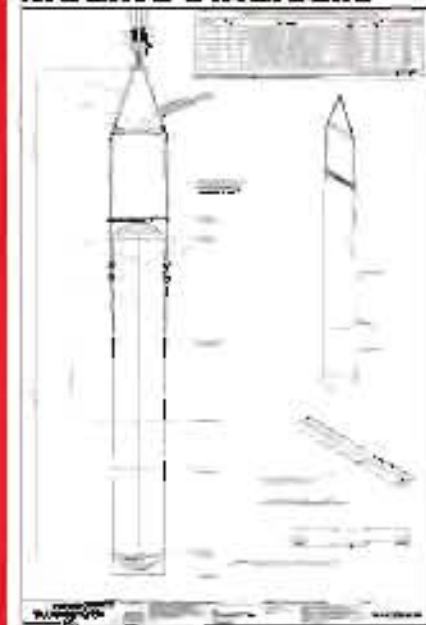




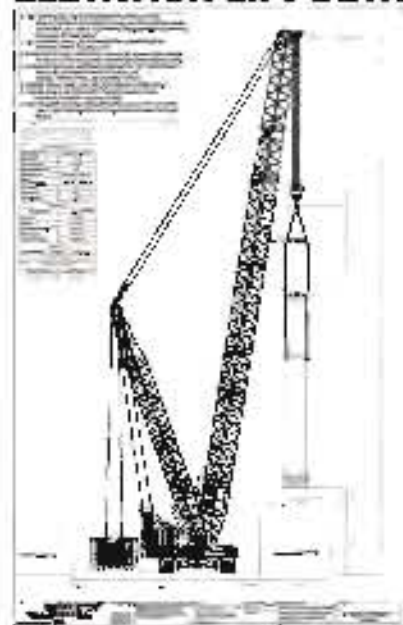
"I wanted to congratulate you and the team on a successful project at Dyno Nobel Plant in Cheyenne, WY. The Energy Transportation crew, in its entirety, displayed the most professional and safety conscious activities I have ever seen in my 35 years of experience. I have worked with dozens of crane companies all over the United States and I have never seen any company better. From your sales and support, to scheduling, lift planning, and site execution, I was absolutely amazed. The supervision of every lift done is commended. I say this from first-hand experience of being on the job and seeing it with my own eyes. It just does not get any better than that."

-Titus D. Roberts, Project Manager, The Roberts Company

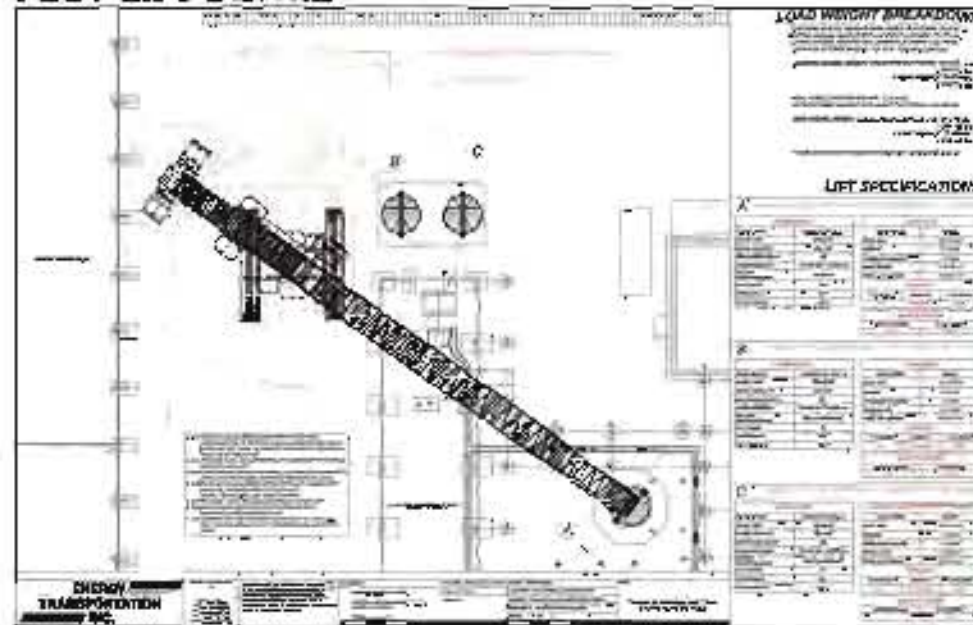
RIGGING DIAGRAMS



ELEVATION LIFT DETAIL



PLOT LIFT DETAIL



GROUND BEARING PRESSURE DETAILS

