

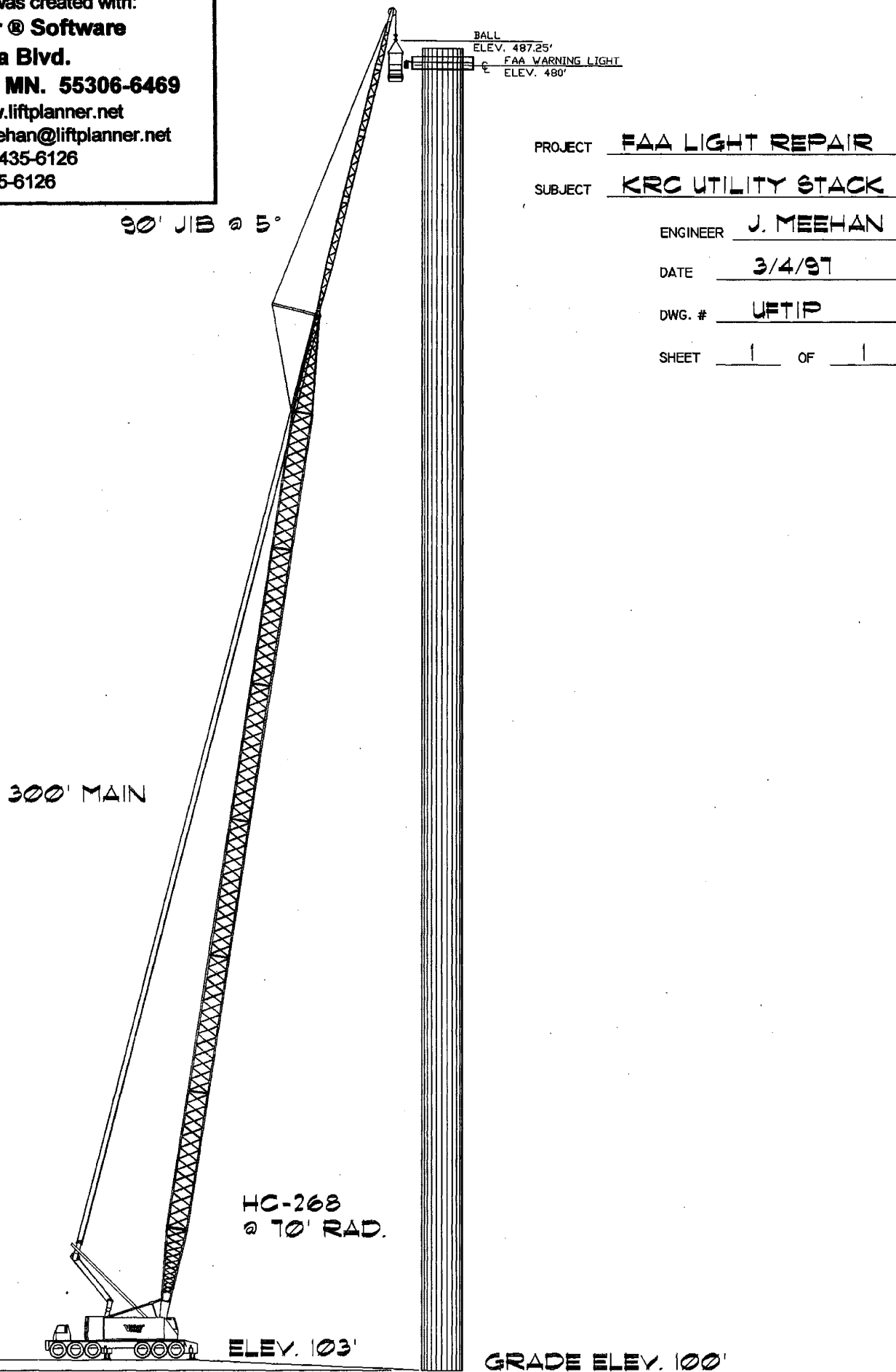
LiftPlanner Software

**Sample Lift Diagrams
& Features**

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Email: jimmeehan@liftplanner.net
Phone: (952) 435-6126
Fax: (952) 435-6126



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JIB TIP SHEAVE - EL. 354'

ENGINEER J. MEEHAN

DATE 5/22/95

PROJECT THE POINTE - ST. PAUL

DWG. # POINTE1

SUBJECT EQUIPMENT LIFT

SHEET 1 OF 1

TIP EL. 304'
 FLOOR EL. 293'-8"

70' JIB @ 25°

ISOMETRIC
SCALE : NONE

300' BOOM

10th ST.

POINTE BLDG.

42'-8"

R120'-0"

PLAN
SCALE : 1" = 30'

CHURCH

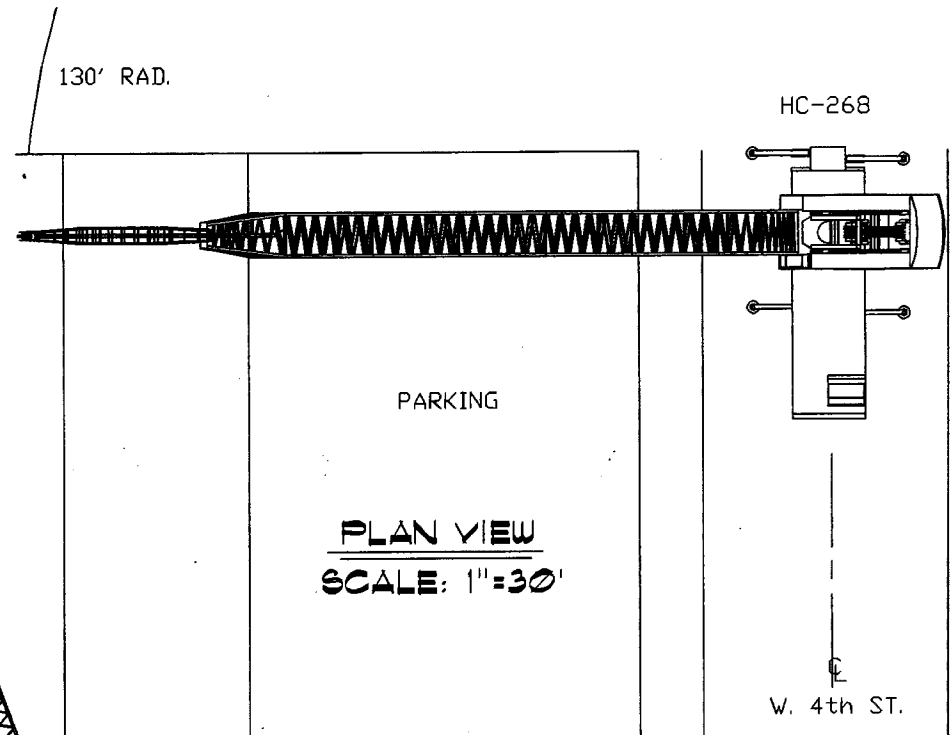
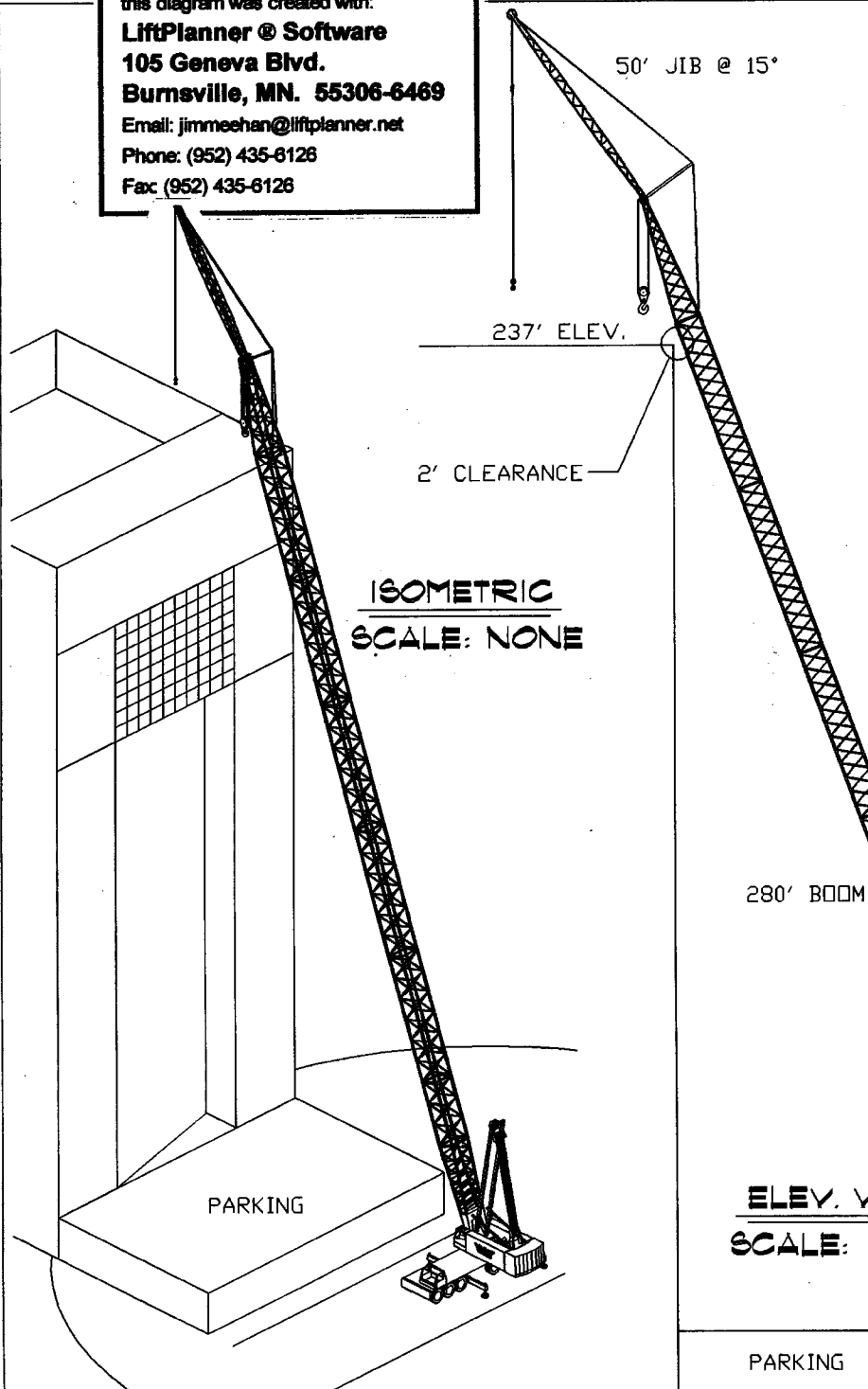
CHURCH

LINKBELT HC-268		
AB UPPER & BUMPER CWTs.		
300' BOOM & 70' JIB @ 25°		
360° LIFT CAPACITY CHART		
LBS.		
RADIUS	ANGLE	CAPACITY
120'-0"	76.0°	10,100
130'-0"	74.8°	9,000

ELEV. LOOKING N.E.
SCALE : 1" = 60'

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ENGINEER J. MEEHAN DATE 7/6/95
 PROJECT U.S.WEST - ST. PAUL DWG. # USWEST
 SUBJECT EQUIPMENT LIFT SHEET 1 OF 1



LINKBELT HC-268 AB UPPER & "A" BUMPER CWTs. 280' BOOM & 50' JIB @ 15° 360° LIFT CAPACITY CHART LBS.		
RADIUS	ANGLE	CAPACITY
120'-0"	71.6°	18,300
130'-0"	69.7°	16,800
140'-0"	67.8°	15,400

LINKBELT HC-268

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ENGINEER J. MEEHAN
 PROJECT 21H-1 ECONOMIZER
 SUBJECT BOX - CRITICAL LIFT CALCS.

DATE 6/12/96
 DWG. # 21H-1EBOX
 W.O. # 96-99100
 SHEET 1 OF 1

NOTES

- PICK & SWING LOAD "OVER SIDE"
AT 80' RAD. OR LESS.
- SET ECON. BOX "OVER REAR" AT 84' RAD.

LINKBELT HC-268
 AB UPPER & BUMPER CWTs.
 170' BOOM

360° LIFT CAPACITY CHART LBS.

RADIUS	ANGLE	CAPACITY
50'-0"	74.0°	108,100
60'-0"	70.5°	83,100
70'-0"	66.9°	67,200
80'-0"	63.1°	55,700
90'-0"	59.3°	47,200
100'-0"	55.3°	40,600

LINKBELT HC-268
 AB UPPER & BUMPER CWTs.
 170' BOOM & "OVER REAR"

LIFT CAPACITY CHART LBS.

RADIUS	ANGLE	CAPACITY
50'-0"	74.0°	112,100
60'-0"	70.5°	91,800
70'-0"	66.9°	76,900
80'-0"	63.1°	66,200
90'-0"	59.3°	57,500
100'-0"	55.3°	50,500

DEDUCTIONS

LOAD	40,000
BLOCK	3,140
SPREADER FRAME	2,500
RIGGING	300

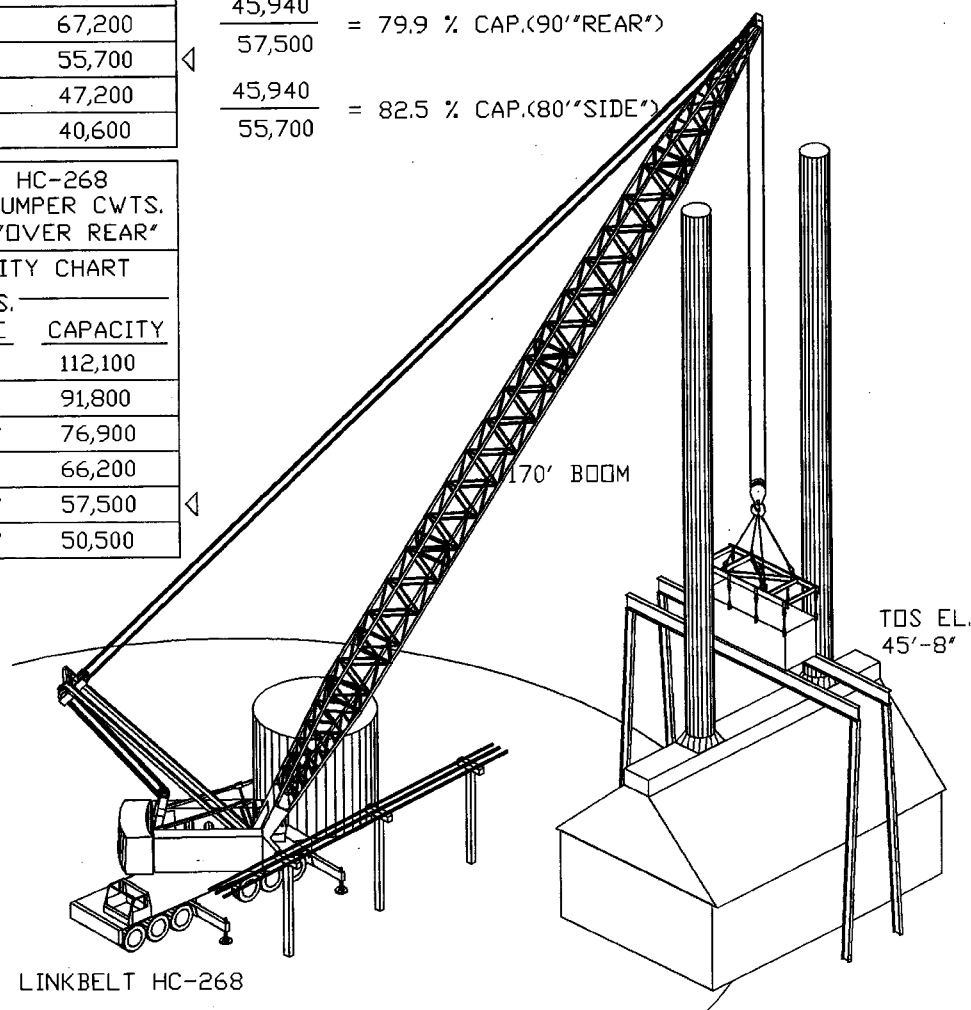
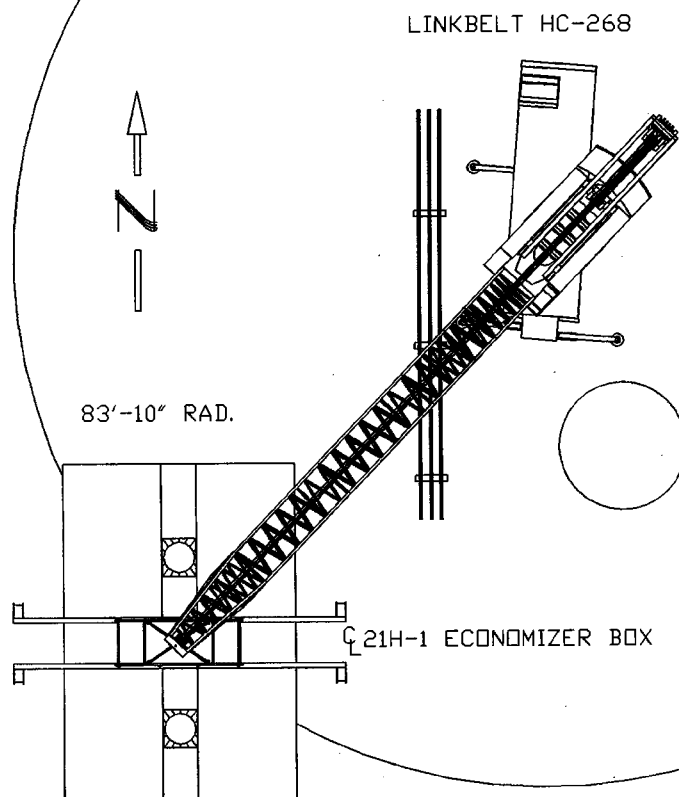
TOTAL 45,940

45,940 = 79.9 % CAP.(90°"REAR")

57,500

45,940 = 82.5 % CAP.(80°"SIDE")

55,700



5



5

- 5

5



5

55

5

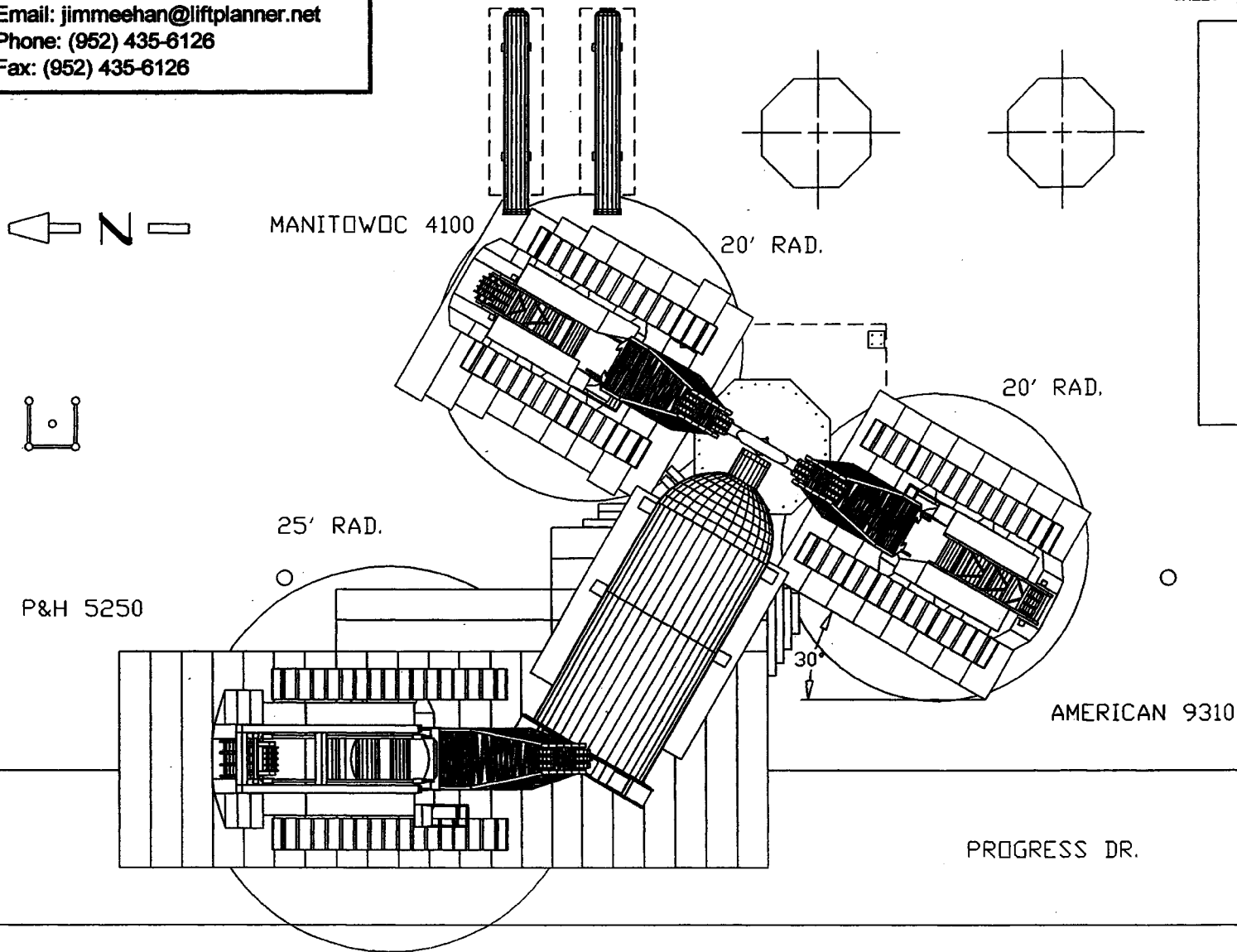
5



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ENGINEER J. Meehan
PROJECT Plan View
SUBJECT 38 Unit Rx Lift
Scale: 1" = 20'

DATE 7/15/93
DWG. # 38Lift1
REV # 2
SHEET 1 OF 6



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ENGINEER J. Meehan
 PROJECT Elev. looking East
 SUBJECT 38 Unit Rx Lift
Scale: 1" = 20'

DATE 7/15/93
 DWG. # 38Lift4
 REV # 2
 SHEET 4 OF 6

VESSEL <44.2%> 210,953
 TAIL LUG 31,519
 500 TON SHACKLE 1,550
 SLING 260
 BLOCK 3,620
 INSULATION <50%> 2,750
 TOTAL TAIL LOAD 250,652

P&H 5250 250 TON FOUR COUNTERWEIGHTS AND 2 CARBODY COUNTERWEIGHTS		
LIFT CAPACITY CHART		
— LBS. —		
RADIUS	ANGLE	CAPACITY
24'-0"	79.7°	468,800
25'-0"	79.0°	436,200
26'-0"	78.2°	408,000

$\frac{250,652 \text{ LBS.}}{436,200 \text{ LBS.}} = 57.5 \% \text{ CAP.}$

MANITOWOC MODEL 4100W 3 REAR, 2 SIDE AND TWO CARBODY COUNTERWEIGHTS		
LIFT CAPACITY CHART		
— LBS. —		
RADIUS	ANGLE	CAPACITY
19'-0"	79.2°	361,800
20'-0"	78.5°	346,100
22'-0"	77.0°	318,400

$\frac{274,718 \text{ LBS.}}{346,100 \text{ LBS.}} = 79.4 \% \text{ CAP.}$

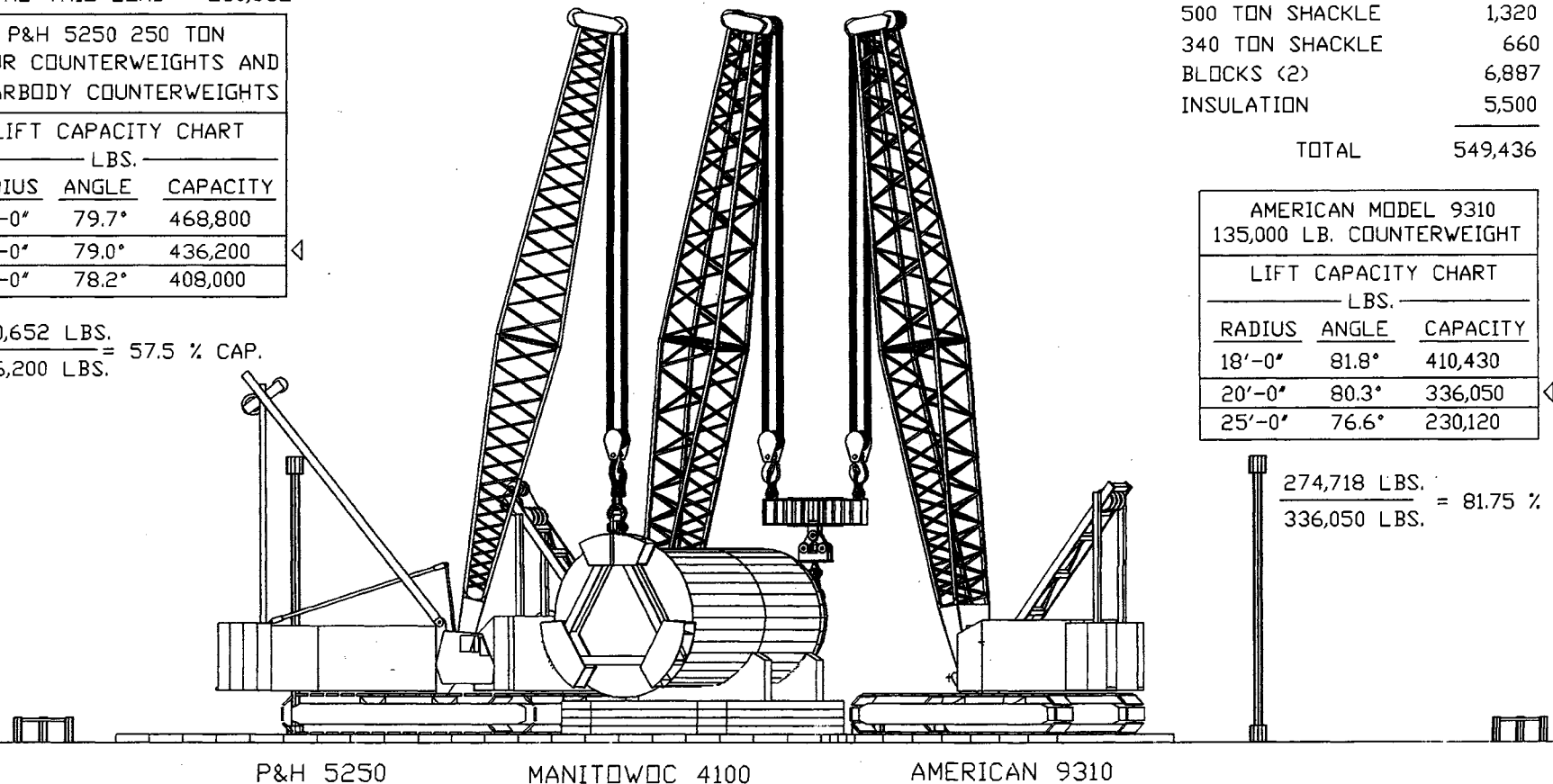
CEN. OF GRAVITY/LOAD DISTRIBUTION

24.661'/44.193' = 55.8% OF LOAD TO TIP
 19.532'/44.193' = 44.2% OF LOAD TO TAIL

VESSEL 477,300
 TAIL LUG 31,519
 LIFT LUG 6,450
 SWIVEL BEAM 18,600
 250 TON SHACKLE <2> 1,200
 500 TON SHACKLE 1,320
 340 TON SHACKLE 660
 BLOCKS <2> 6,887
 INSULATION 5,500
 TOTAL 549,436

AMERICAN MODEL 9310 135,000 LB. COUNTERWEIGHT		
LIFT CAPACITY CHART		
— LBS. —		
RADIUS	ANGLE	CAPACITY
18'-0"	81.8°	410,430
20'-0"	80.3°	336,050
25'-0"	76.6°	230,120

$\frac{274,718 \text{ LBS.}}{336,050 \text{ LBS.}} = 81.75 \% \text{ CAP.}$



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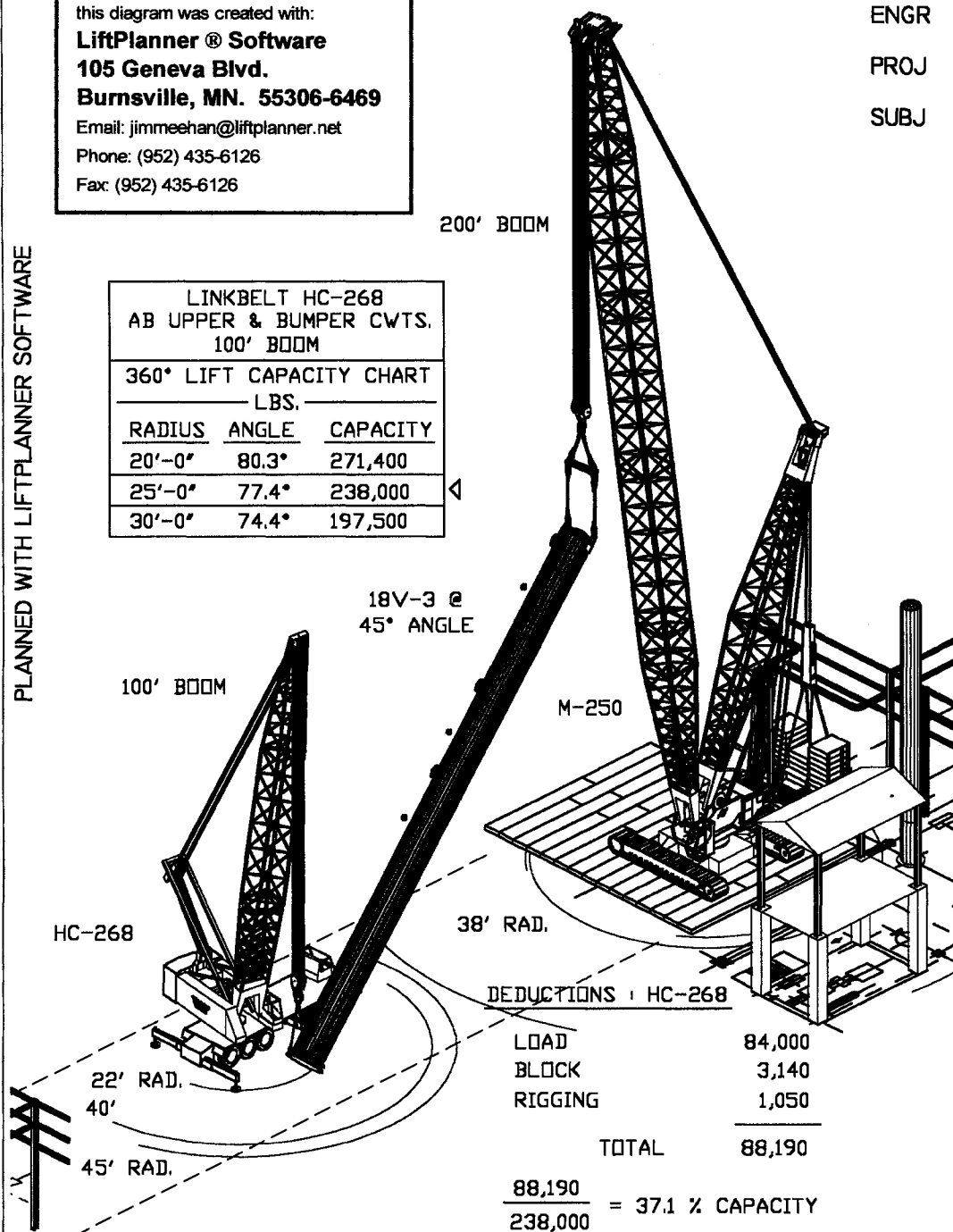
ENGR J. MEEHAN DATE 5/3/99
 PROJ 18V-3 LIFT & SET DWG. # 18V3SET2
 SUBJ VESSEL @ 45° & SHEET 2 OF 5
LOAD DIST. CALCS.

LINKBELT HC-268 AB UPPER & BUMPER CWTs. 100' BOOM		
360° LIFT CAPACITY CHART LBS.		
RADIUS	ANGLE	CAPACITY
20'-0"	80.3°	271,400
25'-0"	77.4°	238,000
30'-0"	74.4°	197,500

ANGLE TO HORIZON (DEGREES)	TAIL LOAD (TONS)	MAIN LOAD (TONS)
0	43.4	49.1
5	43.2	49.3
10	43.1	49.4
15	43.0	49.5
20	42.9	49.6
25	42.7	49.8
30	42.6	49.9
35	42.4	50.1
40	42.2	50.3
45	42.0	50.5
50	41.8	50.7
55	41.5	51.0
60	41.1	51.4
65	40.6	51.9
70	39.9	51.6
72	39.6	52.6
74	39.1	53.4
76	38.6	53.9
78	37.8	54.7
80	36.9	55.6
82	35.5	57.0
84	33.5	59.0
86	30.2	62.3
88	23.3	69.2
90	2.0	90.5

MANITOWOC M-250, MAXER 400 BOOM #44, HEAVY LIFT TOP 400,000 LB. WHEELED CWT.		
200' BOOM-CAPACITY CHART LBS.		
RADIUS	ANGLE	CAPACITY
34'	82.6°	462,000
36'	82.0°	458,000
38'	81.5°	454,600
40'	80.9°	431,700
42'	80.3°	410,800
44'	79.7°	391,800
46'	79.1°	374,300
48'	78.5°	358,200
50'	78.0°	343,400
55'	76.5°	310,900
60'	75.0°	283,500
65'	73.5°	260,300
70'	72.0°	240,300
75'	70.5°	222,800
80'	68.9°	207,500
85'	67.4°	194,000
90'	65.8°	180,000
95'	64.2°	167,500
100'	62.6°	156,400

PLANNED WITH LIFTPLANNER SOFTWARE



DEDUCTIONS : HC-268	
LOAD	84,000
BLOCK	3,140
RIGGING	1,050
TOTAL	88,190

$$\frac{88,190}{238,000} = 37.1 \% \text{ CAPACITY}$$

DEDUCTIONS : M-250	
LOAD	101,000
BLOCK	6,400
SPREADER BAR	1,050
RIGGING	1,850
P.O. LINE	3,750
TOTAL	114,050

$$\frac{114,050}{454,600} = 25.1 \% \text{ CAPACITY}$$

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ENGR J. MEEHAN
 PROJ 18V-3 LIFT & SET
 SUBJ FINAL POSITION &
RIGGING DETAIL

DATE 5/3/99
 DWG. # 18V3SET5
 SHEET 5 OF 5

ISOMETRIC
NO SCALE

200' BOOM

MAXER 400
 ATTACHMENT

70' RAD.

175T SHACKLE
 2.5"Ø CHOKER 8' LG. (TYP. 2)
 140T SHACKLE (TYP. 2)
 200T SPREADER BAR
 85T SHACKLE (TYP. 2)
 2.5"Ø CHOKER 12' LG. (TYP. 2)
 75T SHACKLE (TYP. 2)

RIGGING DETAIL
NO SCALE

A plot plan (2D) was supplied
 by the client and used as the
 starting point for this lift plan.

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ENGINEER J. MEEHAN

DATE 7/12/95

PROJECT 16H-1 REVAMP PROJECT

DWG. # 16H-1 SH1

SUBJECT MAIN CRANE & MATTING

JOB # WO #95-83154

SCALE: 1"=30'

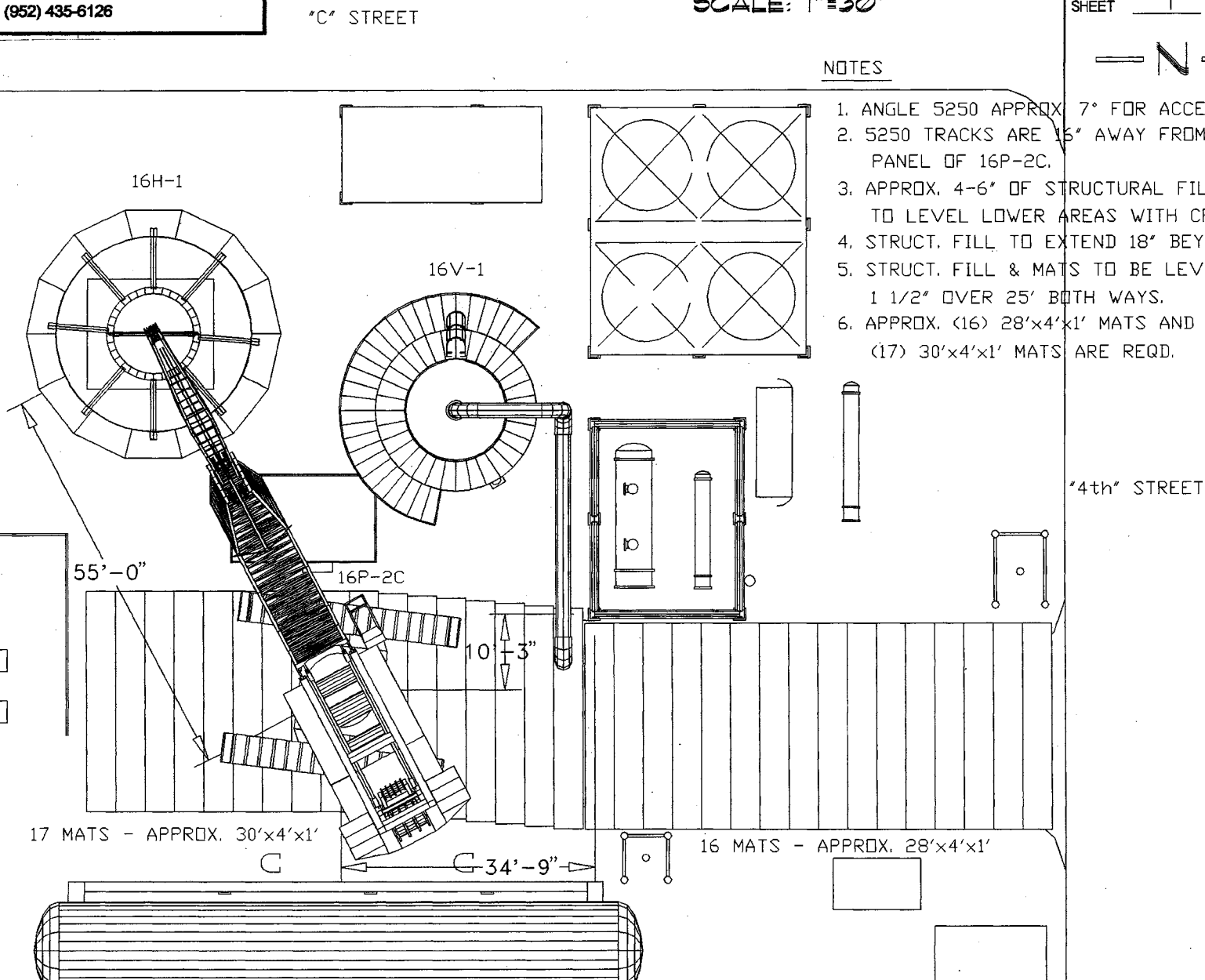
SHEET 1 OF

NOTES

1. ANGLE 5250 APPROX 7° FOR ACCESS/EGRESS.
2. 5250 TRACKS ARE 15' AWAY FROM CONTROL PANEL OF 16P-2C.
3. APPROX. 4-6" OF STRUCTURAL FILL IS REQD. TO LEVEL LOWER AREAS WITH CROWN.
4. STRUCT. FILL TO EXTEND 18" BEYOND MATTING.
5. STRUCT. FILL & MATS TO BE LEVEL WITHIN 1 1/2" OVER 25' BOTH WAYS.
6. APPROX. (16) 28'x4'x1' MATS AND (17) 30'x4'x1' MATS ARE REQD.



10



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40' JIB @ 25°

CL TIP SHEAVE: EL. 218'-4"

CL HOOK: EL. 205'

SUBJECT SWINGING 87' STACK PAST 16V-1

PROJECT 16H-1 RE-VAMP

ENGINEER J. MEEHAN

DATE 7/13/95

DWG. # 16H-1 SH2

JOB # WO #95-83154

SHEET 2 OF 6

STACK @ 58' RAD.

STACK WEIGHT

1/4" PLATE 10.4 #/FT.

PI x 11' = 34.558' x 10.4 = 359.4 #/FT.

359.4 #/FT. x 86.75' = 31,178 LB.

STACK REFRACTORY = 30,000 LB.

SKIRT STEEL = 1,756 LB.

TOTAL 62,934 LB.

P&H 5250- 180' BOOM, 40' JIB
 25° OFFSET
 360° LIFT CAPACITY CHART
 LBS.

RADIUS	CAPACITY
53'-0"	103,400
55'-0"	98,300
60'-0"	86,500
65'-0"	77,200
70'-0"	69,100
75'-0"	62,300

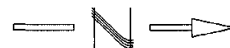
DEDUCTIONS

LOAD	62,934
BLOCK	3,620
SPREADER BAR	320
12' LG. 2" DIA. CHOKERS	370
(2) 17 TON SHACKLES	42
BALL / LINE	1,250
TOTAL	68,536

$\frac{68,536 \text{ LBS.}}{86,500 \text{ LBS.}} = 79.2 \% \text{ CAP.}$

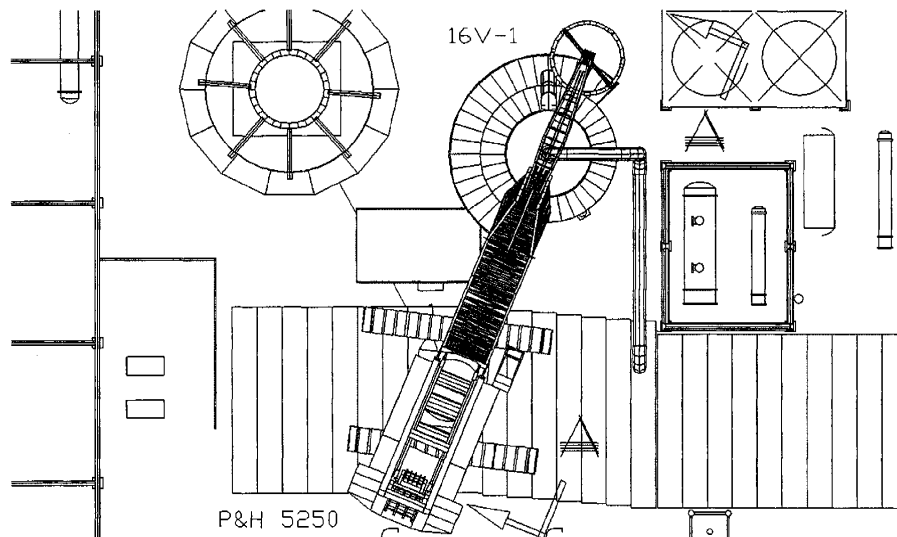
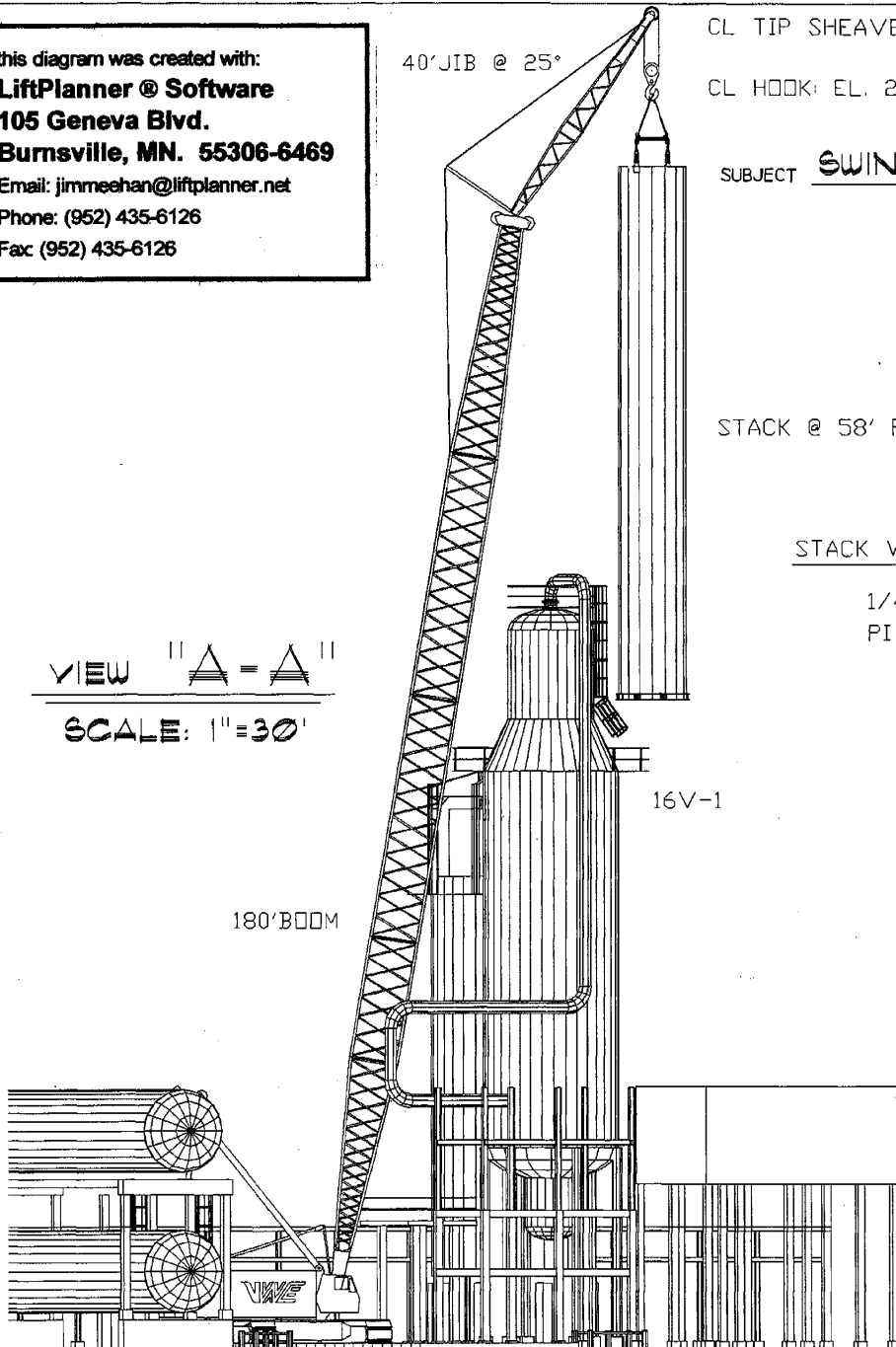
PARTIAL PLAN

SCALE: 1"=30'



VIEW $\triangle = \triangle$

SCALE: 1"=30'



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ENGINEER J. MEEHAN

DATE 10/9/95

PROJECT 16H-1 REVAMP PROJECT

DWG. # 16H-1 SH3

SUBJECT STACK LAYDOWN CALCS.

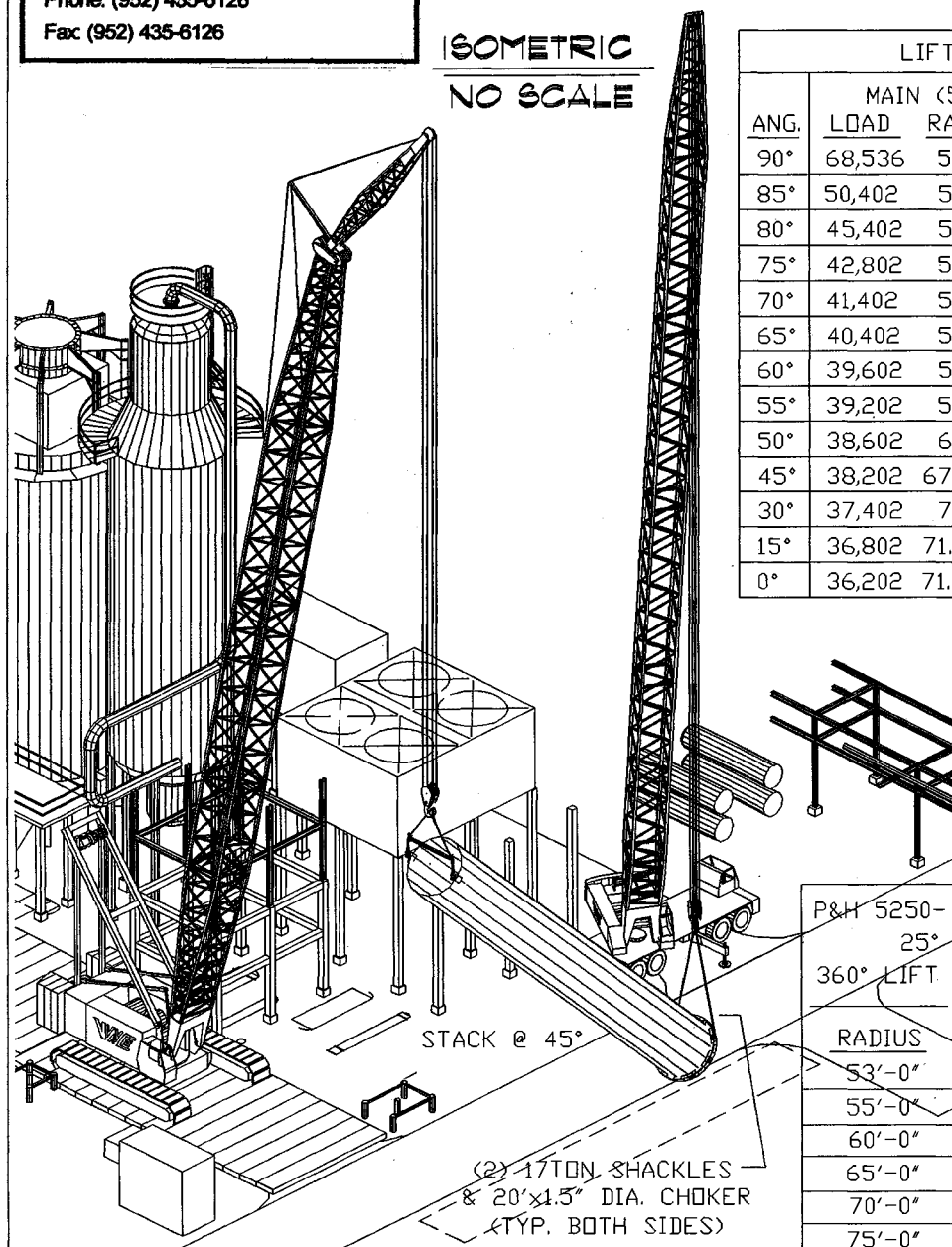
JOB # WO #95-83154

SHEET 3 OF 6

ISOMETRIC
NO SCALE

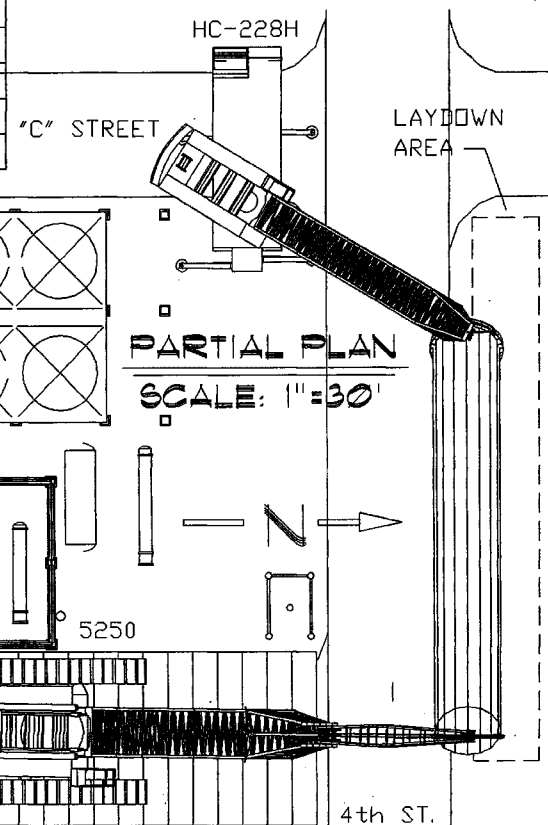
LIFT LOAD DISTRIBUTION						
ANG.	MAIN (5250)			TAIL (228H)		
	LOAD	RAD.	%CAP.	LOAD	RAD.	%CAP.
90°	68,536	55'	69.7	0	83.25'	N/A
85°	50,402	55'	51.3	18,330	76'	67.9
80°	45,402	55'	46.2	23,530	69'	71.1
75°	42,802	55'	43.5	26,130	62'	78.9
70°	41,402	55'	42.1	27,530	55.5'	74.0
65°	40,402	55'	41.1	28,530	49.25'	69.1
60°	39,602	55'	40.3	29,130	45'	70.5
55°	39,202	59'	45.3	29,730	42.25'	72.0
50°	38,602	65'	50.0	30,130	42.67'	68.6
45°	38,202	67.33'	55.3	30,530	42'	69.5
30°	37,402	71'	60.0	31,330	42'	71.4
15°	36,802	71.67'	59.1	32,530	42'	74.1
0°	36,202	71.67'	58.1	32,730	42'	74.6

LINKBELT HC-228H AB UPPER & BUMPER CWTS. 220' BOOM - LIFT CAP. CHART (LBS.)			
		"OVER REAR" 360°	
RADIUS	ANGLE	CAPACITY	CAPACITY
42'-0"	79.8°	43,900	43,900
50'-0"	77.1°	41,300	41,300
60'-0"	74.2°	37,200	32,900
70'-0"	71.4°	33,100	25,700
80'-0"	68.5°	27,000	20,900
90'-0"	65.5°	22,400	17,100



P&H 5250-180' BOOM, 40' JIB
 25° OFFSET
 360° LIFT CAPACITY CHART
 LBS.

RADIUS	CAPACITY
53'-0"	103,400
55'-0"	98,300
60'-0"	86,500
65'-0"	77,200
70'-0"	69,100
75'-0"	62,300



PARTIAL PLAN
SCALE: 1"=30'

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40' JIB @ 25°

CL TIP SHEAVE: EL. 218'-4"

SUBJECT **SWINGING EXISTING CONV. BOX &**

SPIDER PAST 16V-1

PROJECT **16H-1 RE-VAMP**

ENGINEER **J. MEEHAN**

DATE **7/27/95**

DWG. # **16H-1 SH4**

JOB # **WO #95-83154**

SHEET **4** OF **6**

CL HOOK: EL. 175'

56.8° (TYP.)

SPIDER @ 55' RAD.

VIEW "A-A"

SCALE: 1"=30'

SPIDER/CONV. WEIGHT

SPIDER FRAME	22,312 LB.
CONVECTION BOX	21,768 LB.
STACK BASE REFRACTORY	4,200 LB.
CONV. BOX REFRACTORY	10,720 LB.
HAIRPIN TUBES	8,620 LB.
TOTAL	67,620 LB.

P&H 5250- 180' BOOM, 40' JIB
 25° OFFSET
 360° LIFT CAPACITY CHART
 LBS.

RADIUS	CAPACITY
53'-0"	103,400
55'-0"	98,300
60'-0"	86,500
65'-0"	77,200
70'-0"	69,100
75'-0"	62,300

DEDUCTIONS

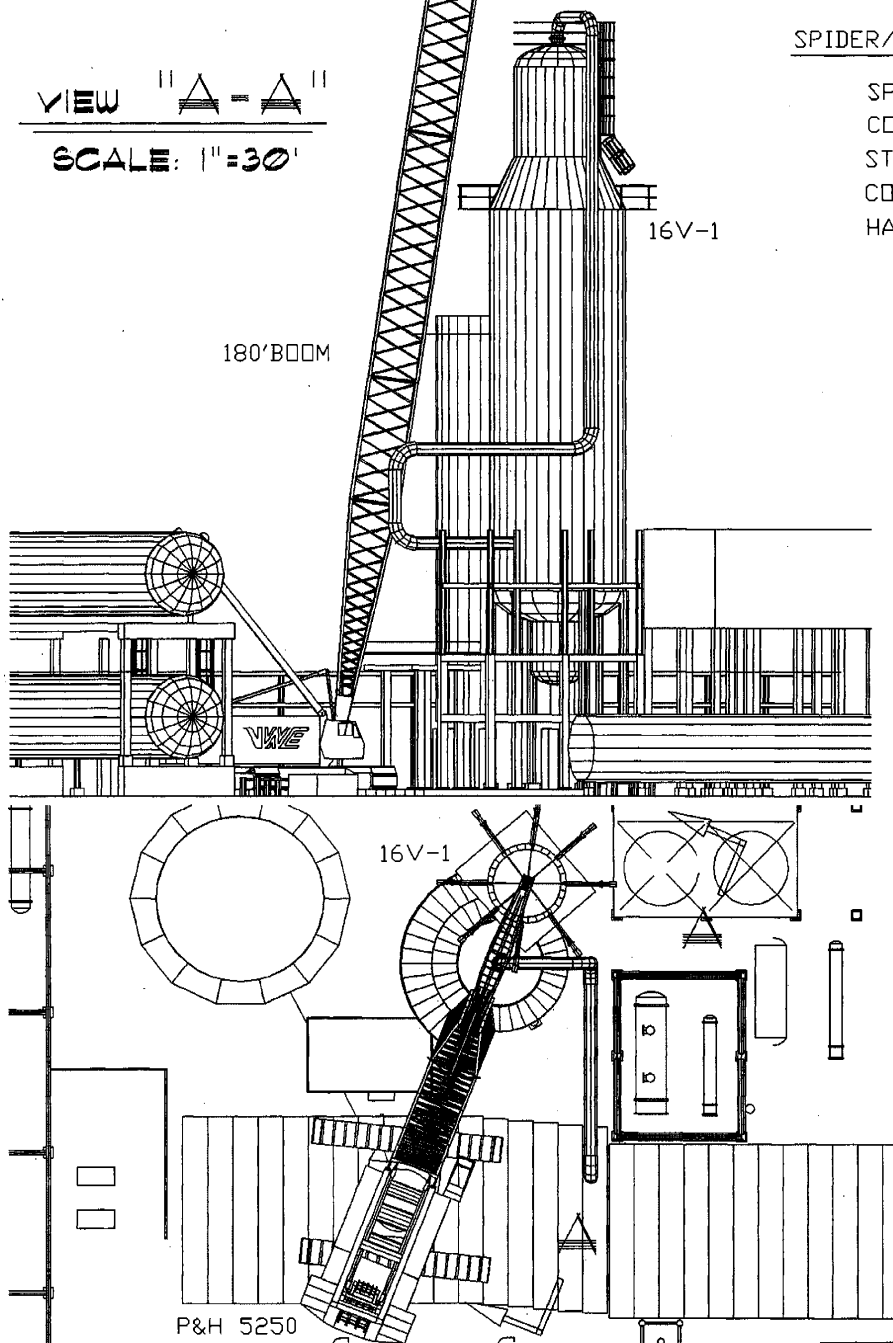
LOAD	67,620
BLOCK	3,620
BALL / LINE	1,250
150 TON SHACKLE	338
20' LG. 1.25" DIA. CHOK(8)	660
8 LIFTING LUGS	402
(8) 13 TON SHACKLES	127

TOTAL 74,017

74,017 LBS.
 98,300 LBS. = 75.3 % CAP.

PARTIAL PLAN

SCALE: 1"=30'



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40' JIB @ 25°

CL TIP SHEAVE: EL. 218'-4"

SUBJECT **SWINGING NEW CONV. BOX**

PAST 16V-1

PROJECT **16H-1 RE-VAMP**

ENGINEER **J. MEEHAN**

DATE **10/9/95**

DWG. # **16H-1 SH5**

JOB # **WO #95-83154**

SHEET **5** OF **6**

CL HOOK: EL. 175'

21' LG. 2.5" DIA. CHOK<2>

60° ANGLE (TYP.)

20' LG. 1.5" DIA. CHOK<4>

NEW CONV. BOX @ 55' RAD.

CONV. BOX WEIGHTS (ACTUAL)

UPPER SECTION 65,880 LB.

LOWER SECTION 81,260 LB.

(SECTIONS LIFTED INDEPENDENTLY)

VIEW "A-A"
 SCALE: 1"=30'

180' BOOM

16V-1

P&H 5250- 180' BOOM, 40' JIB
 25° OFFSET
 360° LIFT CAPACITY CHART
 LBS.

RADIUS	CAPACITY
53'-0"	103,400
55'-0"	98,300
60'-0"	86,500
65'-0"	77,200
70'-0"	69,100
75'-0"	62,300

DEDUCTIONS

LOAD	81,260
BLOCK	3,620
150 TON SHACKLE	338
17.5' LG.-8" SCH 40 BAR	650
15' LG.-6" SCH 40 BARS<2>	772
21' LG. 2.5" DIA. CHOK<2>	880
20' LG. 1.5" DIA. CHOK<4>	495
<2> 35 TON SHACKLES	105
<4> 17 TON SHACKLES	84
BALL / LINE	1,250

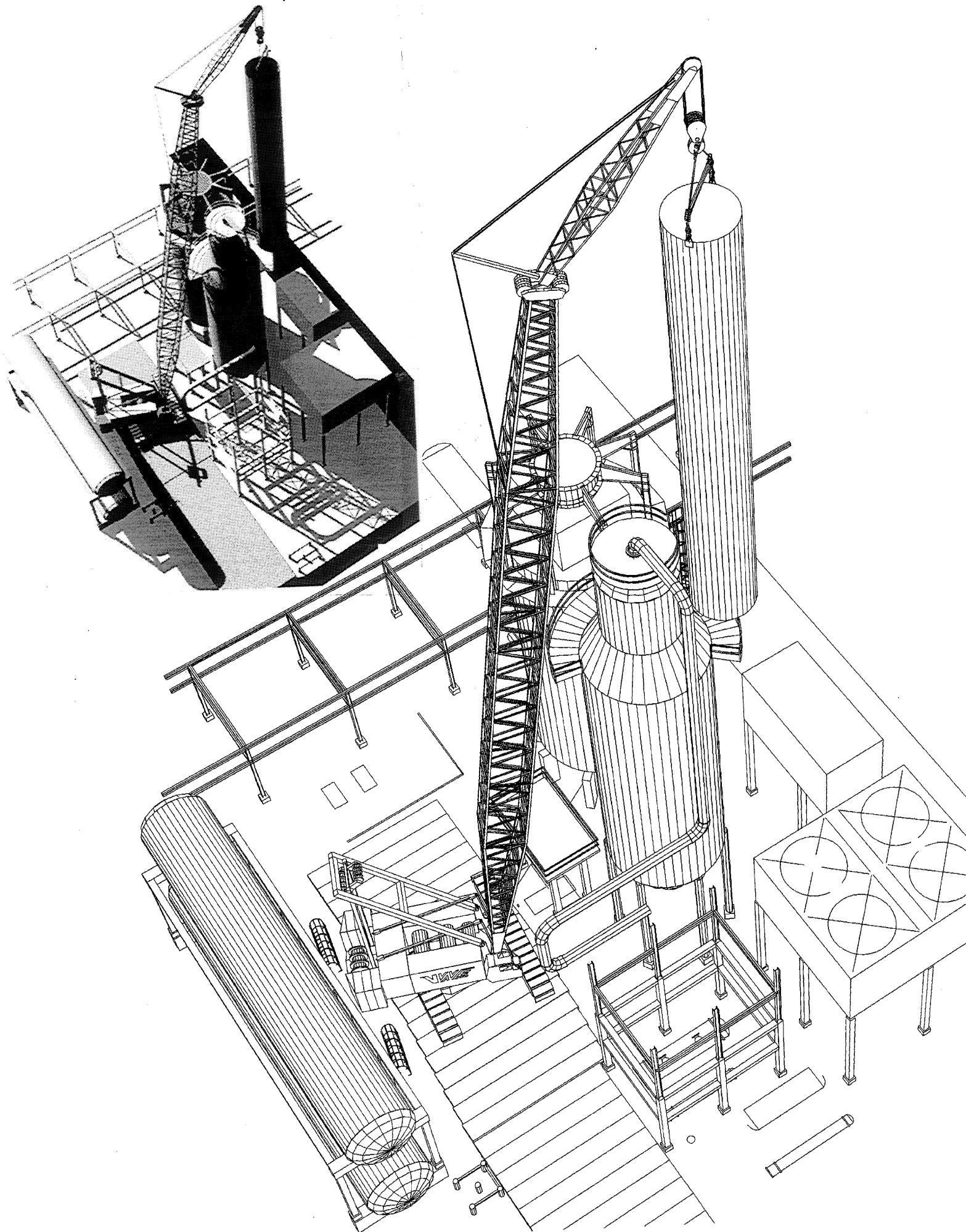
TOTAL 89,454

89,454 LBS.
 98,300 LBS. = 91.0 % CAP.

PARTIAL PLAN

SCALE: 1"=30'





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207' BOOM

200 TON SPREADER
(TYP. 2)

LTM 1100

75 TON SNATCH BLOCK
(TYP. 2)

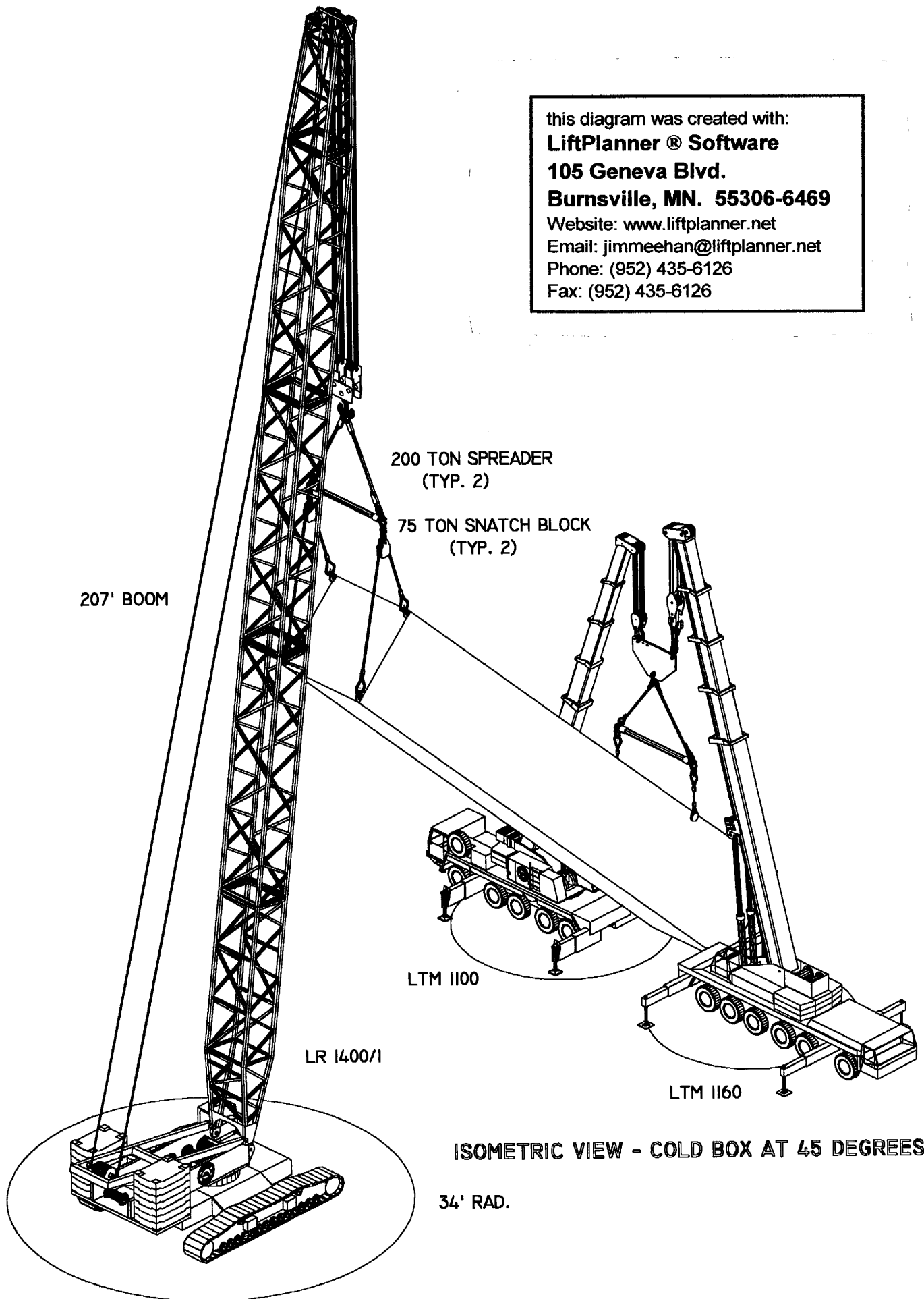
LTM 1160

34' RAD.

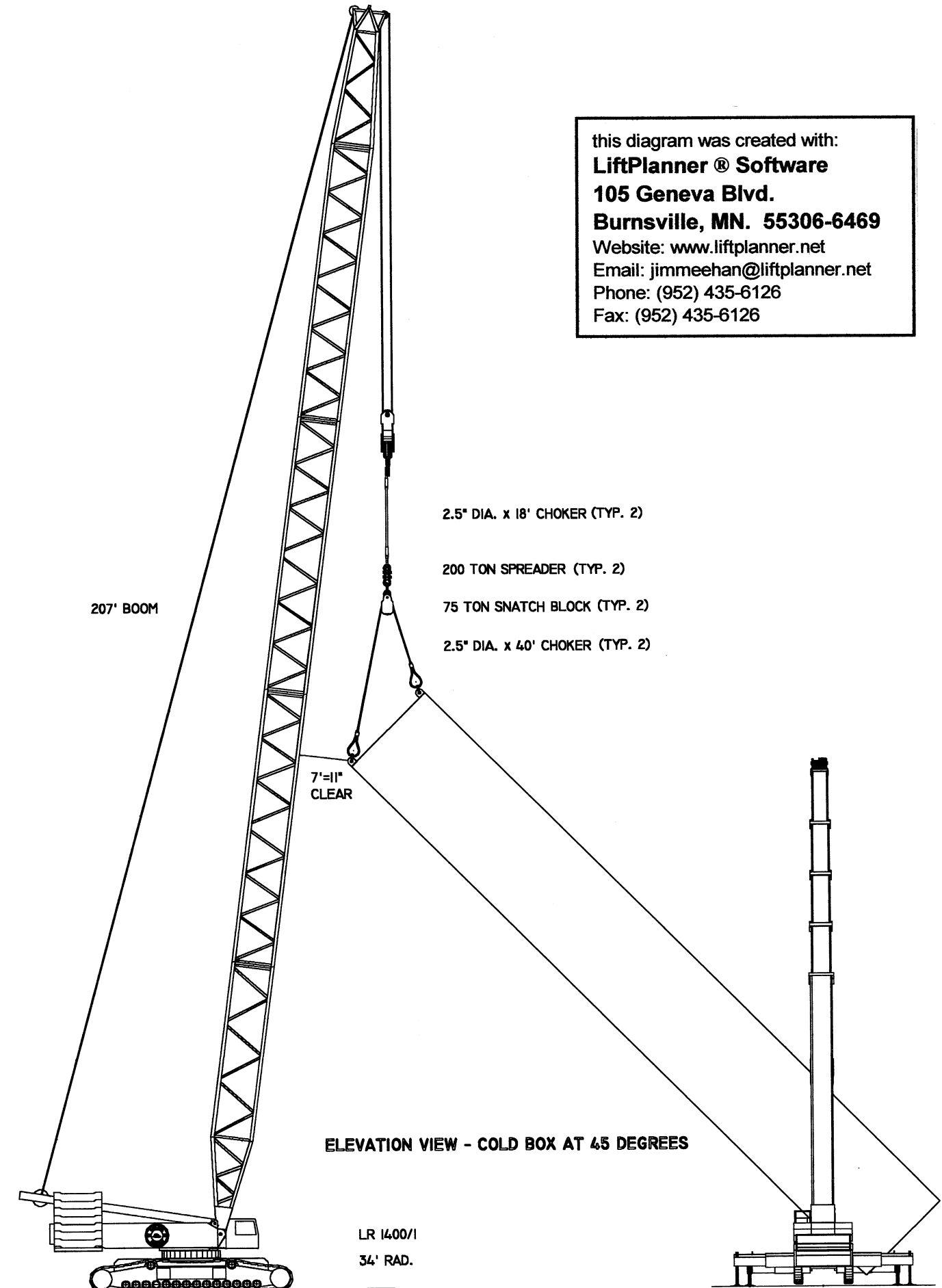
LR 1400/I

ISOMETRIC VIEW - COLD BOX HORIZONTAL

this diagram was created with:
LiftPlanner® Software
105 Geneva Blvd.
Burnsville, MN. 55306-6469
Website: www.liftplanner.net
Email: jimmeehan@liftplanner.net
Phone: (952) 435-6126
Fax: (952) 435-6126



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207' BOOM

1'-10" CLEAR

COLD BOX IS
 3' ABOVE GRADE

LIEBHERR LR 1400/1
 297,700 LB. COUNTERWEIGHT
 94,800 LB. CARBODY CWT.
 360° LIFT CAPACITY - KIPS.

207 FT. BOOM LENGTH

RAD.	KIPS.	75%
34'	317	
36'	312	
38'	307	
40'	229	
45'	267	
50'	239	
55'	216	
60'	196	
65'	179	
70'	165	
75'	152	
80'	140	
85'	128	
90'	118	
95'	109	
100'	101	
105'	94.5	
110'	88	
115'	82.5	
120'	77.5	
125'	72.5	
130'	68.5	
135'	64.5	
140'	61	
150'	54.6	
160'	49.1	
170'	44.3	
180'	40.3	

LR 1400/1 DEDUCTIONS

COLD BOX	300,000 LBS.
SPREADER BAR	2,120 LBS.
SNATCH BLOCKS (2) (75/80 TON - EST.)	4,000 LBS.
18' - 2.5" DIA. CHOKERS (2)	810 LBS.
40' - 2.5" DIA. CHOKERS (2)	1,320 LBS.
55 & 85 TON SHACKLES	1,250 LBS.

TOTAL 309,500 LBS.

309,500 LBS.
 = 97.6 % CAPACITY
 317,000 LBS.

ELEVATION VIEW - COLD BOX VERTICAL

this diagram was created with:
LiftPlanner® Software
105 Geneva Blvd.
Burnsville, MN. 55306-6469
 Website: www.liftplanner.net
 Email: jimmeehan@liftplanner.net
 Phone: (952) 435-6126
 Fax: (952) 435-6126

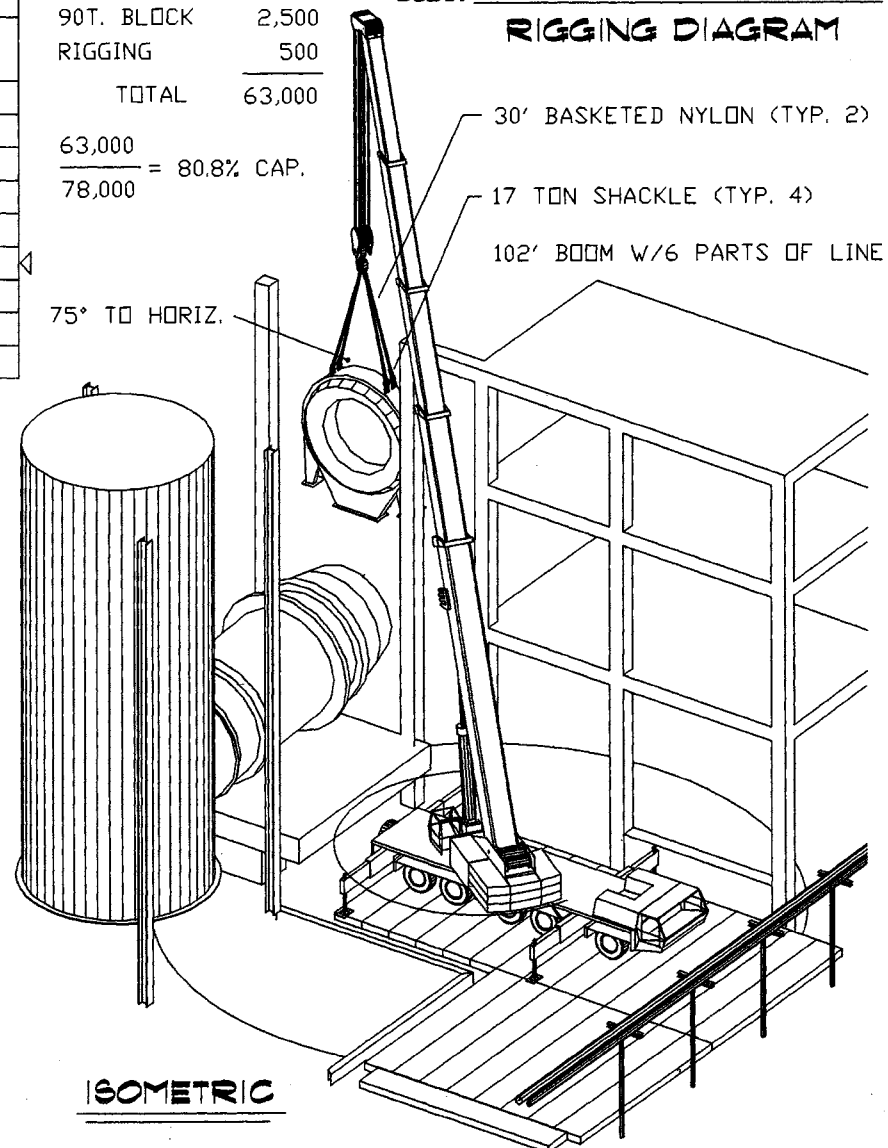
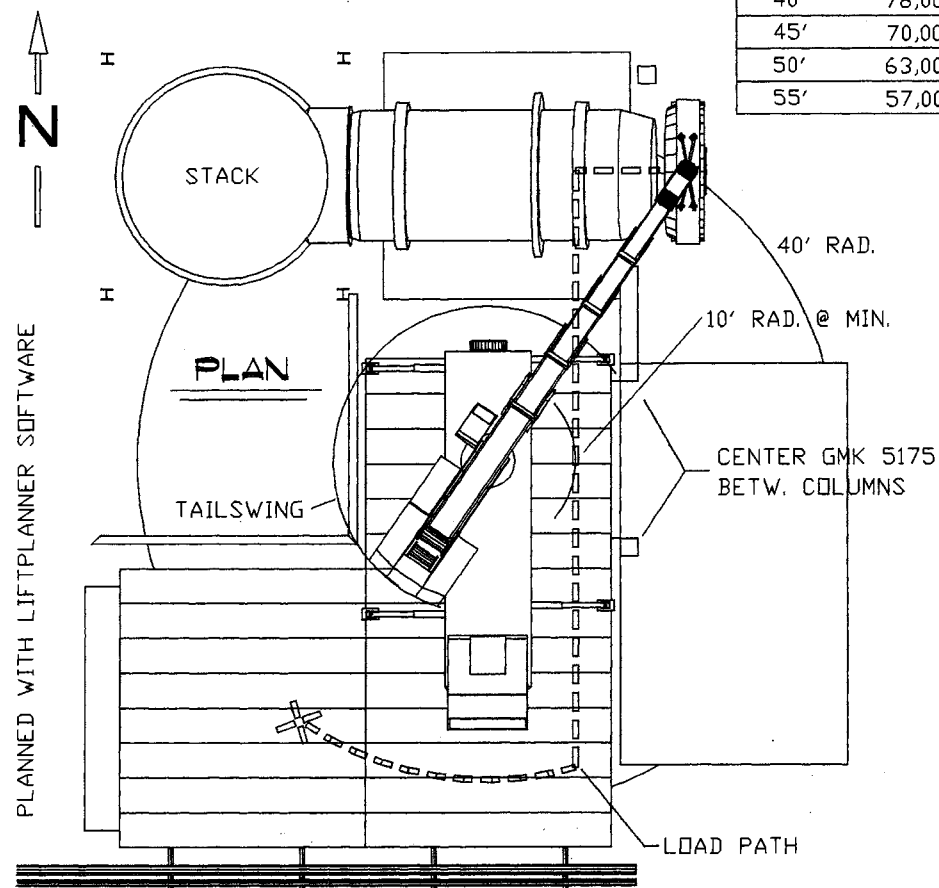
GMK5175 - 102' BOOM 99,200# C'WEIGHT	
LIFT CAP. - LBS.	
RAD.	360° CAP.
10'	110,000
15'	110,000
20'	110,000
25'	110,000
30'	100,000
35'	89,000
40'	78,000
45'	70,000
50'	63,000
55'	57,000

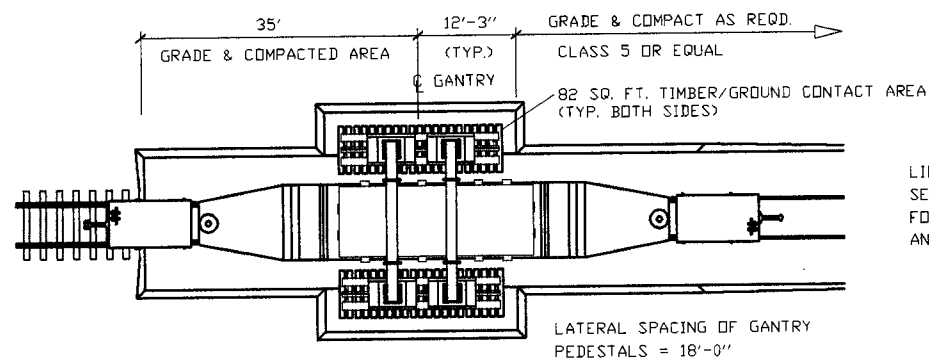
DEDUCTIONS	
FRONTWALL	60,000
90T. BLOCK	2,500
RIGGING	500
TOTAL	63,000

$$\frac{63,000}{78,000} = 80.8\% \text{ CAP.}$$

PROJ. DRYER FRONTWALL LIFT

SUBJ. CRANE POSITION & RIGGING DIAGRAM





PLAN

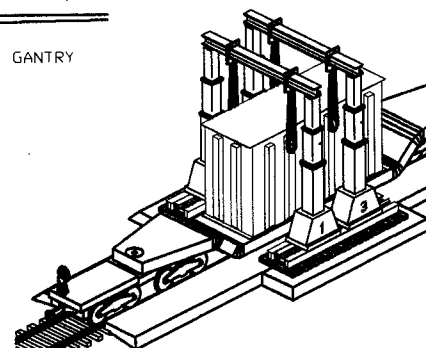
SCALE: 1/16" = 1'-0"

TTX CO. DEPRESSED CENTER FLAT CAR
CLASSES DDH27 & HDH27
SEE TTX DWG. B-9919-C

LIFT SYSTEMS #44A GANTRY
SEE LIFT SYSTEMS SPECS.
FOR GANTRY, 100T LIFT LINK
AND HEAVY DUTY RAIL

OSHKOSH PRIME MOVER
SEE PERMIT
DWG. L00A178

SCHEUERLE 10 AXLE PLATFORM TRAILER
SEE PERMIT
DWG. L00A178

ISOMETRIC
NO SCALE

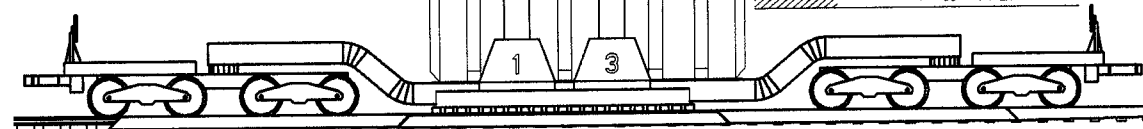
CONVERTER TRANSFORMER
SEE ABB DWG. XSE 200004-AFM

100 TON LIFT LINKS ON
W14x233 HEADER BEAMS

GANTRY EXTENSION = 20'-11 5/8"
AS SHOWN

6'-6" OF GANTRY LIFT IS REQUIRED
TO PROVIDE 12" CLEARANCE FOR
RAILCAR TO PASS UNDERNEATH

7'-11" FROM TOP OF RAIL



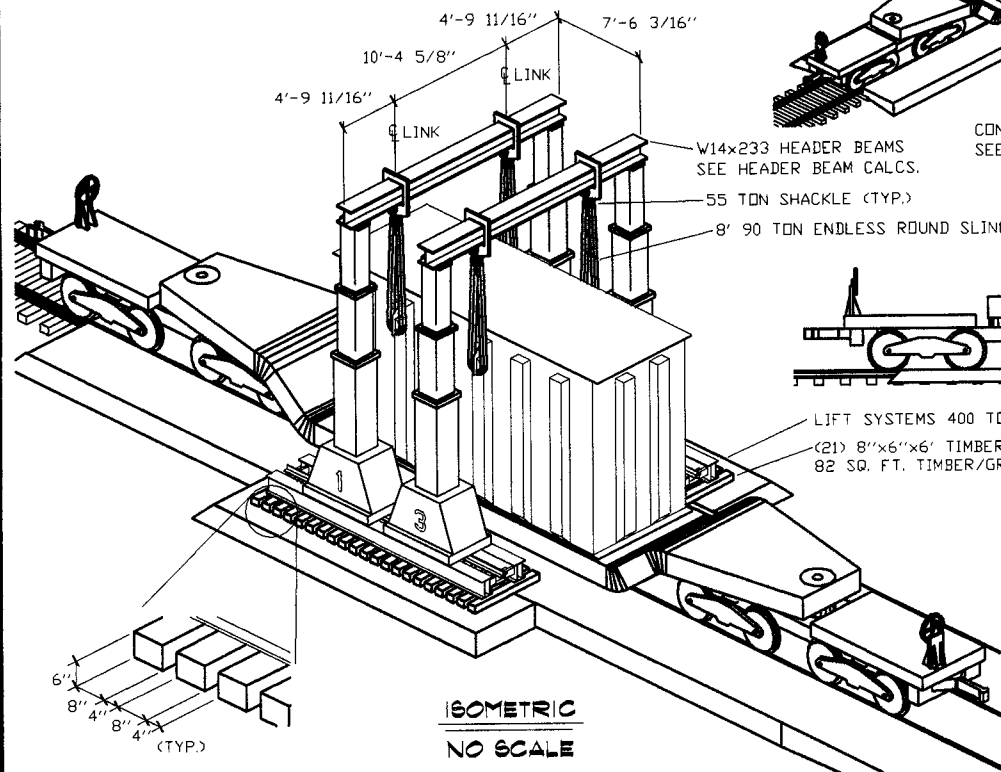
ELEV

SCALE: 1" = 10'

GANTRY BASE GROUND LOADING CALCULATION

TRANSFORMER	277,562/2	138,781
PEDESTALS	7,300 x 2	14,600
HEADER BEAMS	9,320/2	4,660
20' RAIL SECTION		6,000
LIFT LINKS	280 EA. x 2	560
TIMBERS, RIGGING, MISC.		2,000
10% SAFETY MARGIN		16,660
TOTAL WEIGHT		183,261

183,261/82 SQ. FT. = 2,235 LB. PER SQ. FT.
GROUND LOADING

ISOMETRIC
NO SCALELIFTPLANNER SOFTWARE
WWW.LIFTPLANNER.NET

105 GENEVA BLVD. (952) 435-6126
BURNSVILLE, MN. 55306 FAX: (952) 435-6126

DESCRIPTION: TYPICAL RAIL SETUP	SCALE: ***** DRAWN BY: JIM	GENERIC ELECTRIC POWER COOPERATIVE
JOB NO.	DATE: *****	POWER PROJECT
DWG NO. RAIL-UNLOAD	SHEET: 1 of 1	

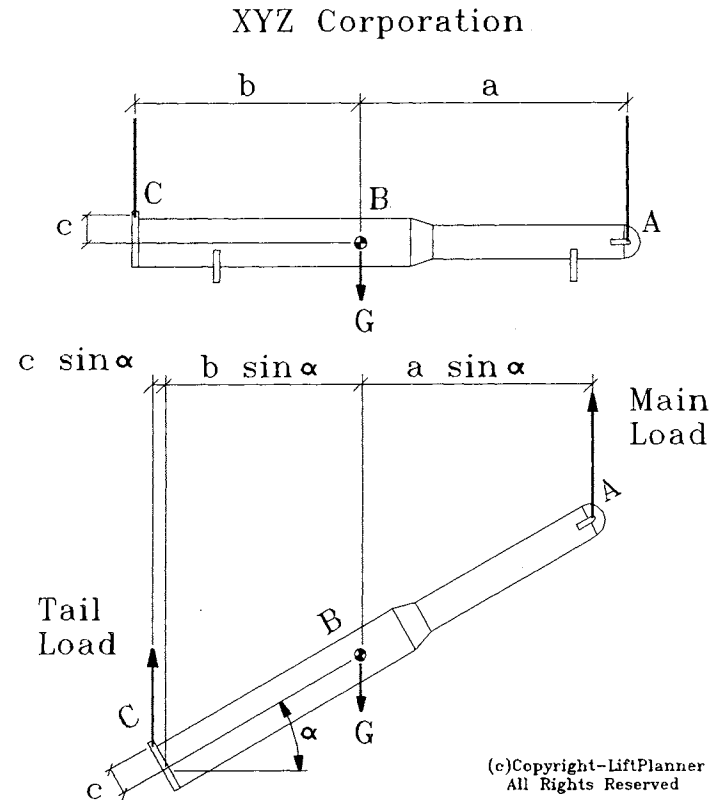
Tailload.xls
(EXCEL SPREADSHEET #150.-)

Dist. a 135 ft
Dist. b 95 ft
Offset c 9 ft
Weight G 288 ton

Main deductions 22 ton
Tail deductions 10 ton

Angle to Horizon in
Degrees Tail Load Ton Main Load Ton

0	179.0	141.0
5	178.5	141.5
10	177.9	142.1
15	177.3	142.7
20	176.7	143.3
25	176.0	144.0
30	175.3	144.7
35	174.5	145.5
40	173.7	146.3
45	172.7	147.3
50	171.5	148.5
55	170.1	149.9
60	168.3	151.7
65	166.0	154.0
70	162.6	157.4
72	160.9	159.1
74	158.7	161.3
76	156.1	163.9
78	152.8	167.2
80	148.3	171.7
82	142.2	177.8
84	133.2	186.8
86	118.4	201.6
88	89.7	230.3
90	10.0	310.0



Variables

a = distance from main lift point A to CG

b = distance from tail lift point C to CG

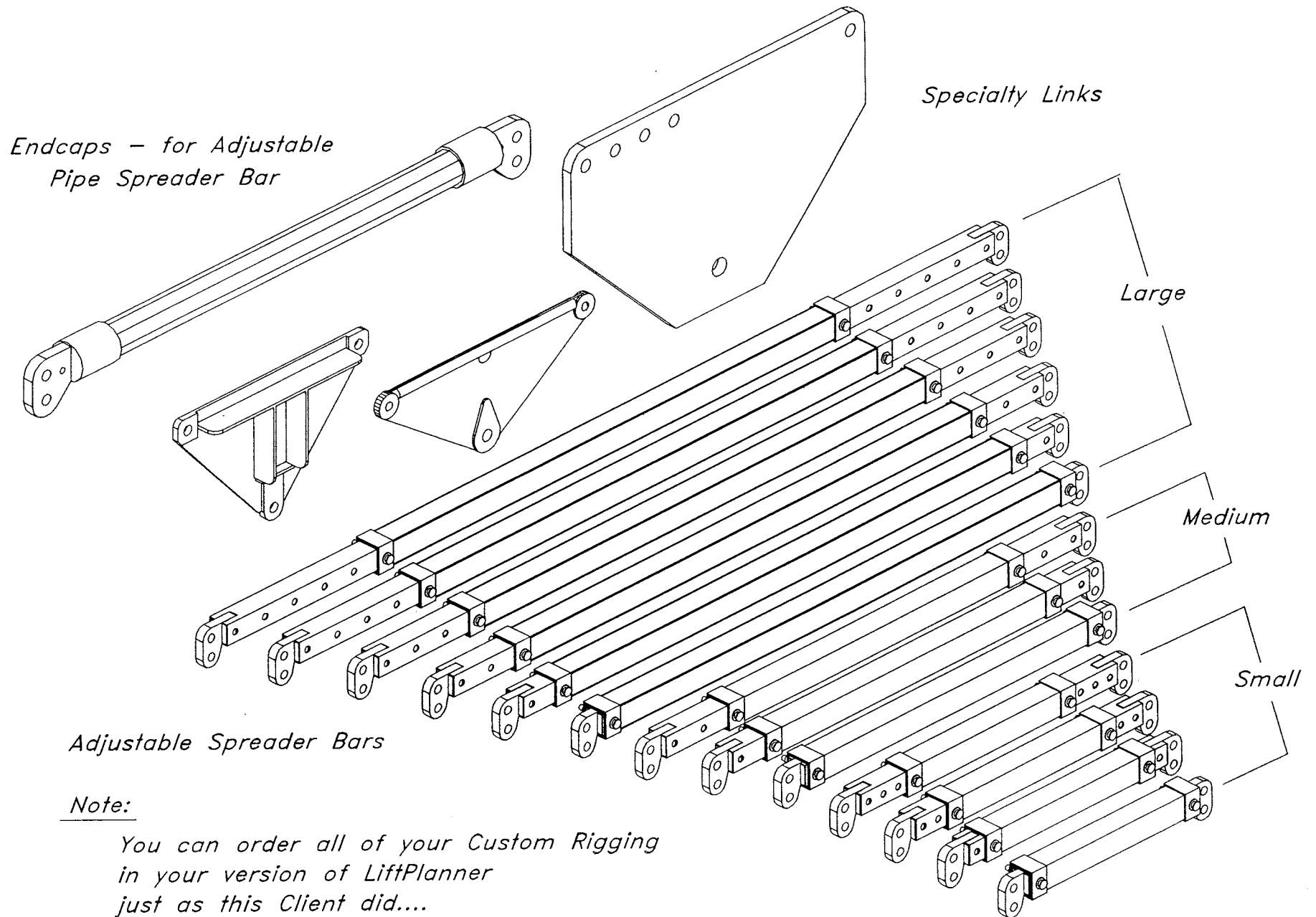
c = offset distance of tail lift point C to centerline

angle = lift angle to horizon

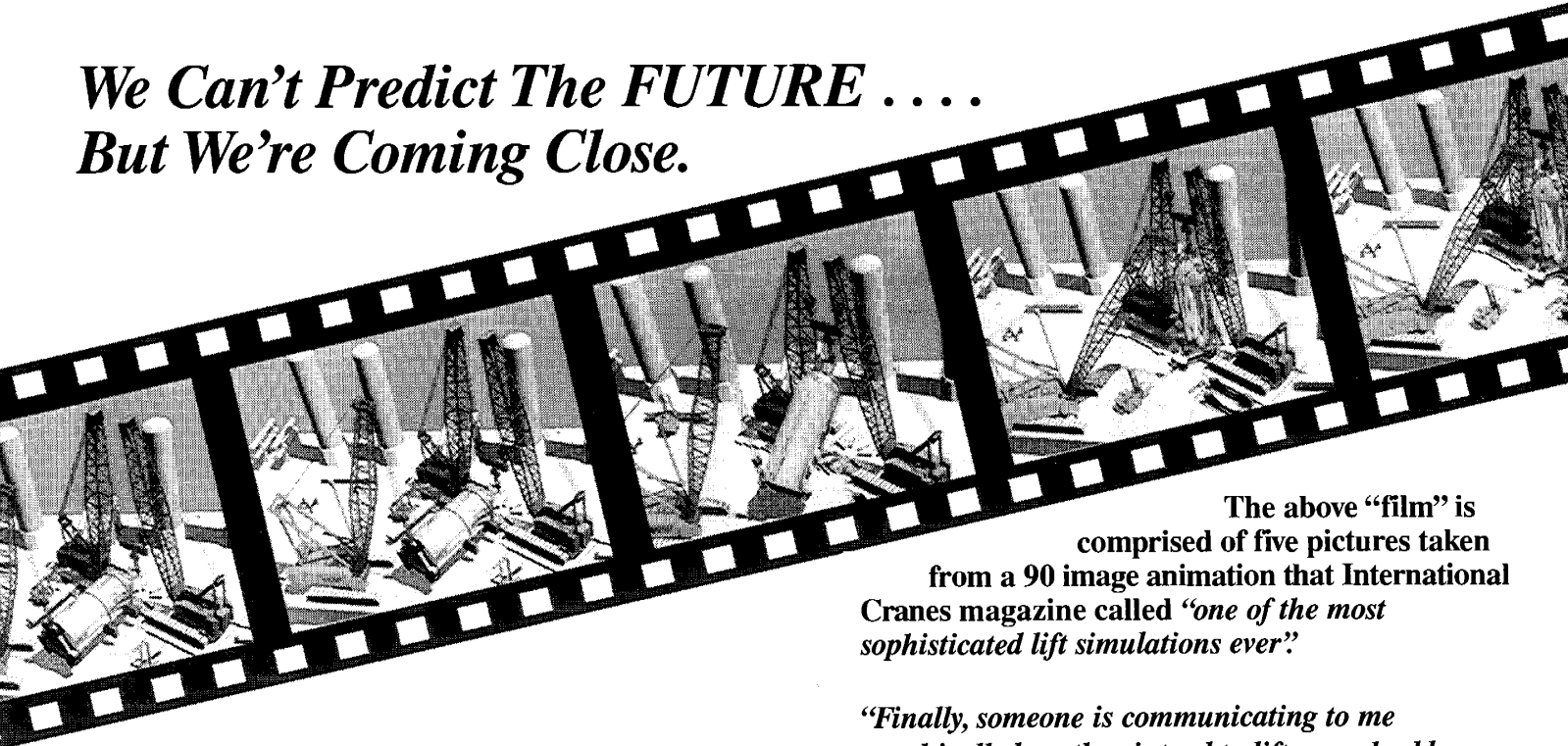
G = Gross weight of vessel

Main deductions - add deductions for gross load on Main crane (optional)

Tail deductions - add deductions for gross load on Tail crane (optional)



We Can't Predict The FUTURE But We're Coming Close.



The above "film" is comprised of five pictures taken from a 90 image animation that International Cranes magazine called "one of the most sophisticated lift simulations ever"

"Finally, someone is communicating to me graphically how they intend to lift my valuable components."

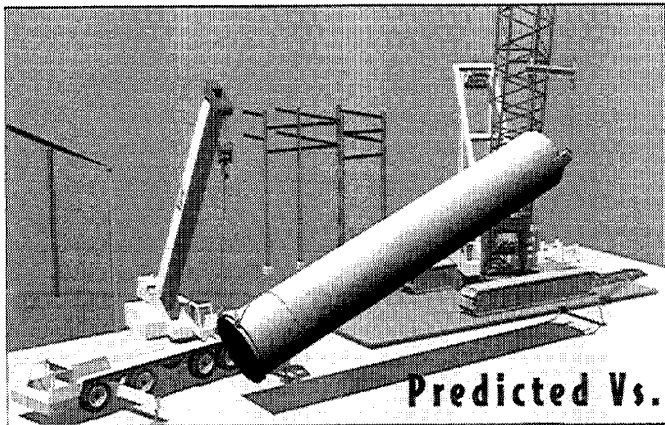
Lewis Green - Praxair, Inc.

"Seeing is believing. Having the capability to watch and discuss your critical lifts before they happen leaves little to chance in both planning and safety."

Brian Roos - Koch Refining Co.

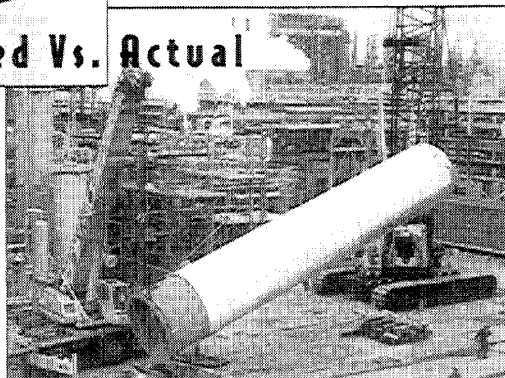
"One job that turned out to be a big attraction was the removal of the primary absorber tower, which VIC'S extracted with only inches to spare on all sides. Unbeknown to most of the onlookers, the lift had already been made many times over through the use of a computer simulation."

Ashland Petroleum newsletter



Predicted Vs. Actual

This 92 ton reactor was the first lift planned with LiftPlanner. A P&H 5250, 250 ton crawler and a Grove 110 ton truck crane were used in the lift.



LiftPlanner Customer List

**Adam Crane Service
Canada**

**American Heavy
Rigging
Richmond, VA**

**ASCG
Anchorage, AK**

**ASI RCC
Buena Vista, CO**

**Barney Skanska
New York, NY**

**Barnhart Crane &
Rigging
Memphis, TN**

**Bechtel
Singapore**

**Belmont Constructors
LaPorte, TX**

**British Petroleum
Alaska**

**Brambles
Australia**

**Burkhalter Rigging
Columbus, MS**

**Cain Service Corp.
Houston, TX**

**Canada Crane
Nisku, Alberta**

**Cherne Contracting
Minneapolis, MN**

**Conoco Refining
Billings, MT**

**Consolidated Edison
New York, NY**

**Crane & Lift
Inspection
Anchorage, Alaska**

**Craneworks, Inc.
Birmingham, AL**

**Dofasco
Hamilton, Canada**

**Dutcher Phipps Crane
Monahans, TX**

**Exxon Mobil
Baton Rouge, LA**

**Falco
Sarnia, ONT**

**Fluor
Sugarland, TX**

**Fletcher's
New Zealand**

**Gould Erectors &
Riggers
Glenmount, NY**

**Guindastes Ltd.
Brazil**

**H.B. Zachry
San Antonio, TX**

**Hill Crane Service
Long Beach, CA**

**Hohl Industries
Tonawanda, NY**

**Isemoto Contracting Ltd.
Hilo, HI**

**J.F. White
Newton, MA**

**Kamtech
Brazil**

**Mammoet
Edmonton, Alberta**

**Megalift
Houston, TX**

**Middlesex
Quincy, MA**

**Mr. Crane
Los Angeles, CA**

**Mullen Crane
Soda Springs, ID**

**New Zealand Crane
Specialists
New Zealand**

**Paramount Transport
Trinidad, West Indies**

**Phillips 66
Borger, TX**

**Raytheon
Boston, MA**

**Sagadore Cranes
Dartmouth, NS**

**Sarnia Cranes
Sarnia, ONT**

**Shaw Industries
Baton Rouge, LA**

**Sickelsteel Cranes
Mt. Vernon, WA**

**Southern Tier Crane
Baldwinsville, NY**

**Sullivan Crane
Hobbs, NM**

**Tekfen
Baku, Azerbaijan**

**The Industrial Co. (TIC)
Casper, WY**

**United Crane
Houston, TX**

**Valero Energy
LaPlace, LA**

www.litlink.com

CraneWorks

THE MAGAZINE FOR CRANE AND RIGGING PROFESSIONALS

May-June 2001

Arctic Challenge

Software helps plan critical crane lifts

Safe and Secure with Wire Rope

Weighing the Benefits of Plastic Sheaves

ARCTIC CHALLENGE



Alaska Interstate Construction used Manitowoc and Terex American crawler cranes to help build the infrastructure needed to drill oil wells on an artificial island in Alaska's Prudhoe Bay.

Alaskan construction project utilizes lift planning software

The project was unusual, to say the least. A gravel, artificial drilling island called "Northstar" was being constructed for British Petroleum Alaska, Inc., approximately six miles north of Prudhoe Bay in Alaska. Prudhoe Bay is among the country's most remote areas, 300 miles north of the Arctic Circle.

To handle the job, Alaska Interstate Construction (A.I.C.), located in Anchorage, chose a Manitowoc 888 S-2 230-ton crawler crane, a Manitowoc 777 truck crane, and a Terex American 11320 450-ton crawler crane. The 888 S-2 had a 180-foot boom and 179,100-pound counterweight; the 11320 used a 170-foot boom with 230,000-pound counterweight.

Each crane would be making several lifts to build the infrastructure needed to drill oil wells. Modular pipe rack sections, process modules, and drill rig lifts were conducted.

The A.I.C./Northstar project team, headed by Dave Thomas, knew the construction weather window was a short one. Thomas also knew that it was critical to preplan every aspect of the lifts well beforehand. For that purpose, A.I.C. hired Managed Integrity Services (M.I.S.), a wholly-owned subsidiary of one of the Arctic Slope

Continues on page 20 ➔

Regional Corp. family of companies, also located in Anchorage, to design lift gear and manage and plan a number of critical lifts for Northstar Island.

To help plan his lifts, Eric Paivio, M.I.S. lift group manager, chose LiftPlanner®, a software program designed expressly to help plan critical crane lifts. In addition to the diagrams available to detail each stage of the lift, the software has a companion product called Lift Movie. This add-on creates simulations of the critical lifts that can be transferred to video-tape and used as a crew training and rehearsal tool.

Once the decision was made, Paivio commissioned Jim Meehan, owner and

The technical aspects of the lift are planned in meticulous detail in a series of seven lift drawings. This enlargement of the "Rigging Detail" shows the linkage of the spreader bars to the block assembly.

developer of LiftPlanner, Burnsville, Minn., to generate lift diagrams for approximately 80 critical lifts and several lift simulations.

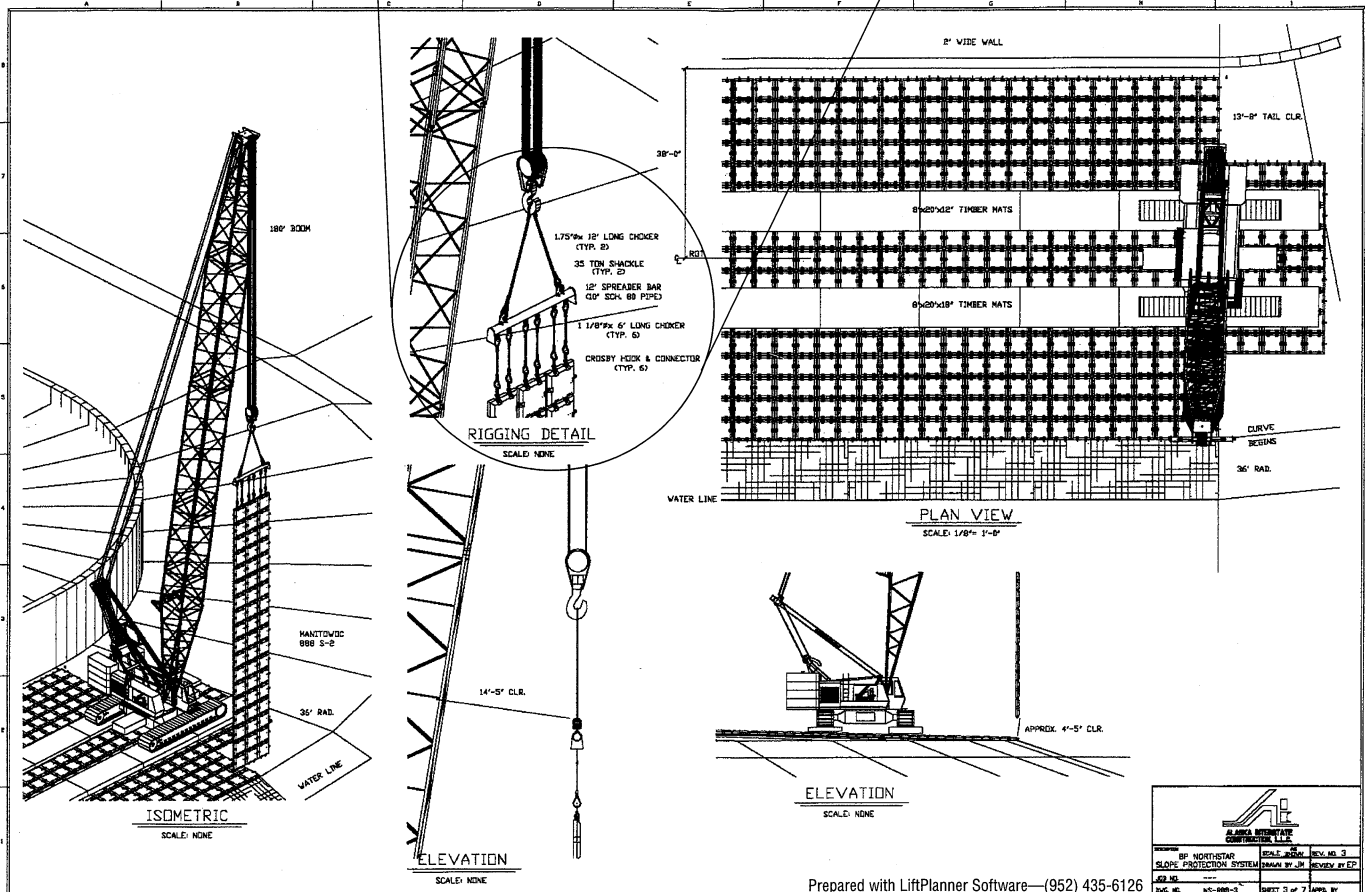
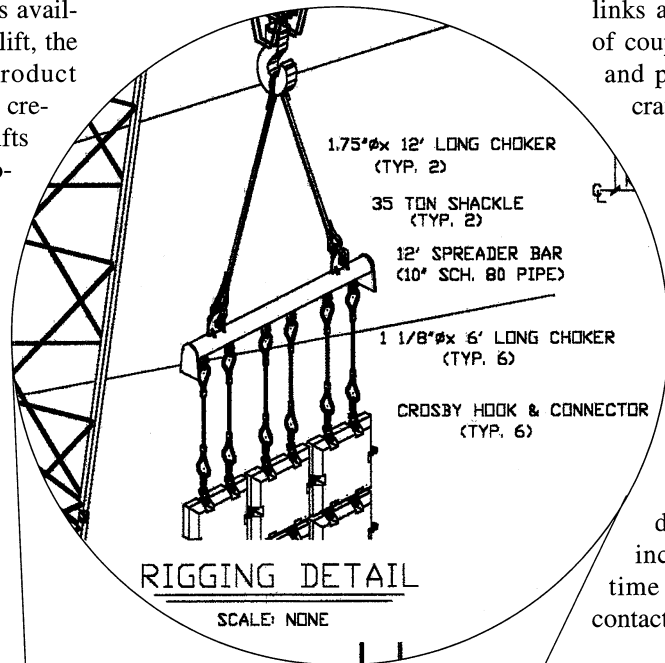
Block by block

The first lifts would be an assem-

blage of concrete blocks to be used as shore protection against the erosive action of waves and the impact of multi-year ice floes. Each block weighed 1,550 pounds and was approximately 4 feet square and 9 inches thick. The blocks would be interlinked using Crosby specialty links and alloy shackles. Assemblies of coupled blocks would be made up and positioned strategically for the crawler crane.

From the starting position, the crane would lift the block assembly while walking, swing the load over the retaining wall, link to the existing mat apron, then play the load out into the water, where divers would disconnect the spreader bar underwater. As the mats were laid down and made ground contact, the load on the hook decreased but the radius increased. So, essentially, every time a set of blocks made ground contact, the crane load capacity needed

Continues on page 22 →



to be rechecked. This was further complicated by the fact that the ground surface was sloped.

Because everything in LiftPlanner is drawn to full scale and the motion of the lifts can be replicated on the computer, the loading on the crane throughout its range of lifting motion could be checked. As a result, LiftPlanner made short work of what would have been very tedious calculations.

In the plans

LiftPlanner began commercial sales in 1995, so using software to plan crane lifts is relatively new. For those exploring this option, however, the benefits are significant, from con-

trolling insurance costs to improving on-site safety and productivity.

Lift Planner helps you attain greater assurance that the crane will be able to handle the job without interference. LiftPlanner is "custom built" to reflect the cranes in a customer's fleet. The fact that LiftPlanner utilizes the AutoCAD program is beneficial because clients will often share drawings of their loads and site plot plans that have been prepared in AutoCAD. Using AutoCAD as the common software design tool to exchange information makes sense, as it is the most prevalent CAD software with a 70 percent market share.

Paivio remarks: "We evaluated LiftPlanner as the best software for planning our lifts. It offers multiple crane lifts, rigging planning, and professional presentation. The fact that the lift designs can be animated through Lift Movie is an added bonus. LiftPlanner met and exceeded our expectations."

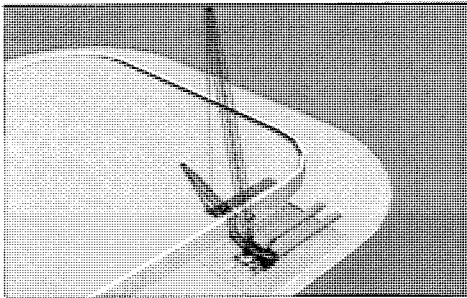
As we move into the 21st century, crane owners need to take advantage of all the latest tools, including software, to become more efficient.

In addition, being able to demonstrate computer-based planning capabilities to potential customers will undoubtedly set apart your company in the marketplace. ■

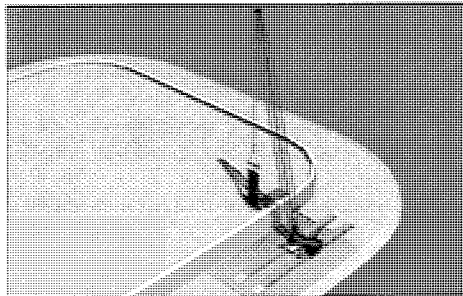
Use 629 for Reader Service Information

LIFT MOVIE ANIMATION

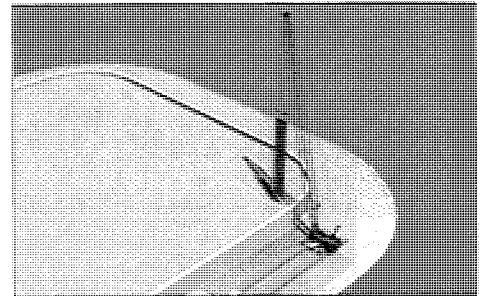
Once the technical aspects of the lifts have been communicated with the LiftPlanner® drawings, the "action" is communicated to the lift team and client with the aid of Lift Movie. The action in Lift Movie approaches photo-realistic quality. Visual cues, such as shadows, reinforce the realism.



The Manitowoc 888 S-2 is positioned to begin the lift.

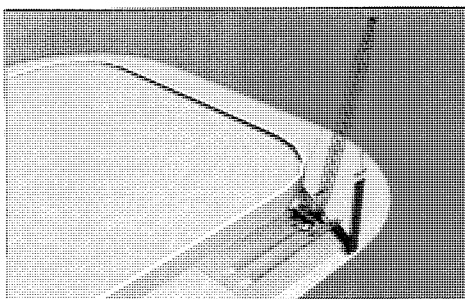


The crane walks, lifts, walks, lifts, etc.

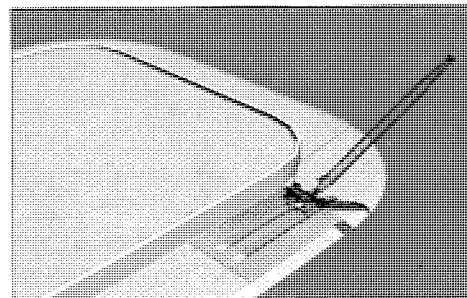


The mat assembly is uprighted.

After viewing Lift Movie, the lift team has a better understanding of how each part of the lift will occur. This results in more confidence. One rigger remarked that doing the actual lift was like déjà vu after seeing Lift Movie because it is like conducting the lift for a second time.



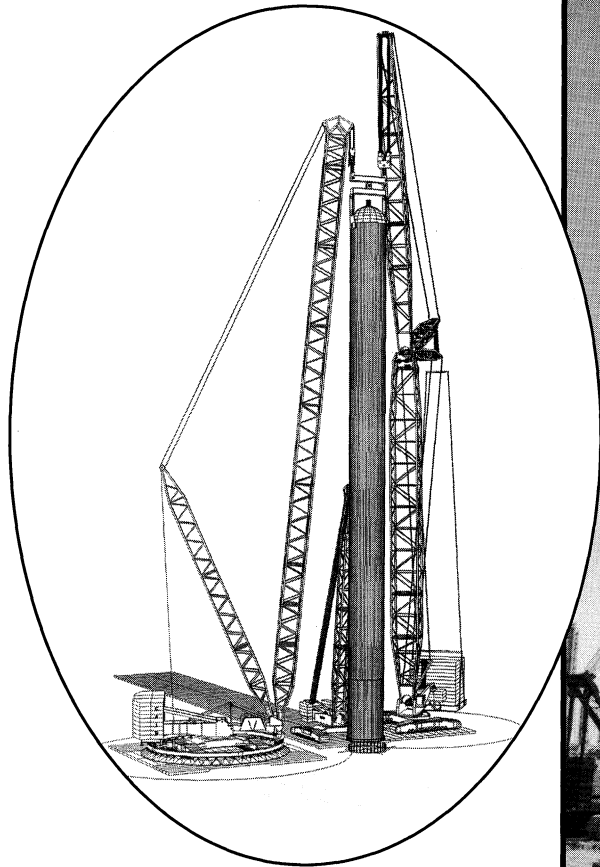
The load is linked to the existing mats.



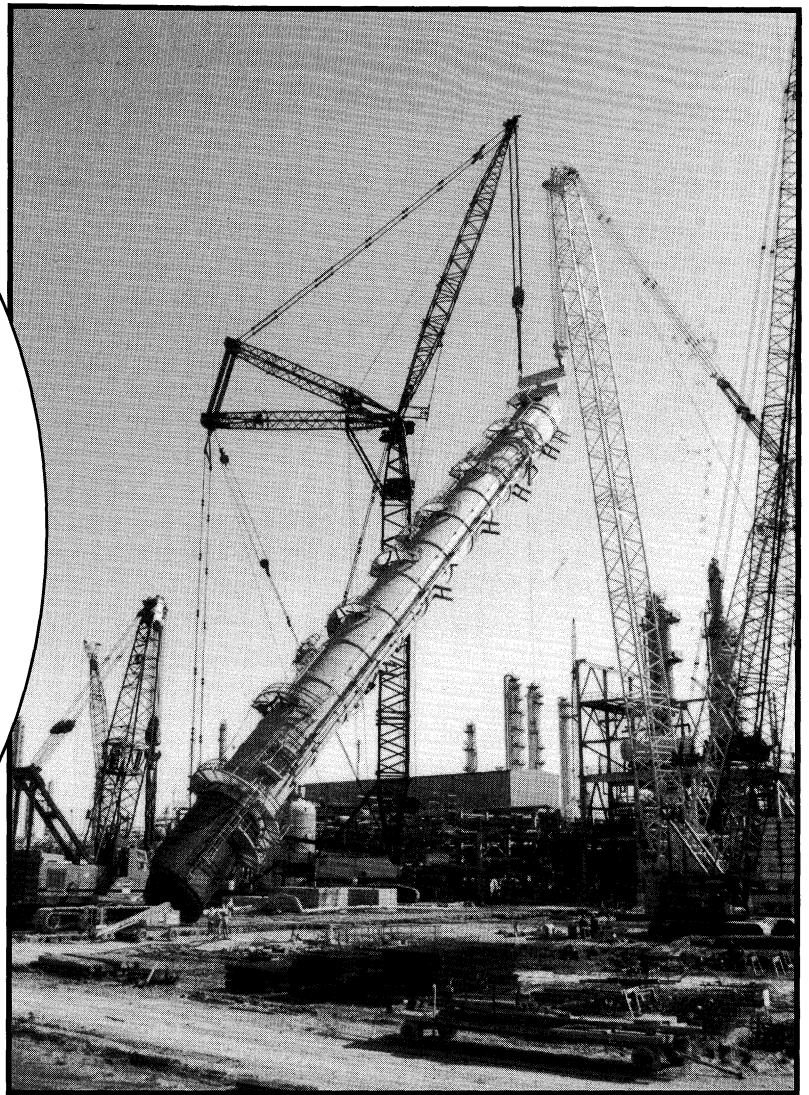
With the mats fully extended, the divers will disconnect the rigging.

LiftPlanner®
105 Geneva Blvd.
Burnsville, MN 55306
website: www.liftplanner.net
Email: jimmeehan@liftplanner.net
Tel/fax: (952) 435-6126

Amazing, from page 7



The final lift at the Baytown refinery was successfully completed, as previously planned using LiftPlanner software.



Crane trio lifts 900-ton vessel

Recently Cain Service Corp., Houston, Texas completed erection of an ethylene unit at a refinery in Baytown, Texas. The final lift required the company to use its Demag CC4000RL crane with a ring-lift attachment and a Liebherr LR1600 with a luffing jib to lift a 900-ton C2 Splitter vessel in a multiple crane lift.

The Demag was equipped with 297 feet of main boom, 64 parts of line, 900 metric tons of counterweight and a 66-foot diameter ring attachment to equal a 1,960-ton capacity. The Demag lifted the vessel at 85 percent of its capacity.

The LR1600 boom+jib combination was 185'+165'. It completed the lift at 80 percent of its capacity. A specialized equalizing beam was designed for the lift, which included 45,000 pounds of rigging. The tail crane used was the company's American 11320.

Joe Cain, owner of the rental service company, says the company chose to use two cranes to allow for greater versatility during erection. The Demag with ring attachment was chosen not only for its added capacity but because it has little ground bearing pressure.

In addition to the close lifting capacities, Cain says he was

concerned about headroom and block clearance during the lift. He commissioned Jim Meehan, of LiftPlanner, to simulate the job using LiftPlanner computer software (See page 19). From the program, Cain was able to get a better indication of the two-foot clearance and 10-foot headroom.

For information on Cain's Service Corp:
Write in 892 on inquiry card

Crane service: Cain Service Corp., Houston, Texas

Equipment: Demag CC4000RL with ring lift configuration, Liebherr LR1600 with luffing jib and American 11320

Job description: Lift more than 20 heavy components, the largest a 900-ton, 240' unit, at refinery in Baytown, Texas.

Time involved: Entire job took five months; largest lift took four hours.

Continues on page 10 →

March-April 1997 CraneWorks 9

Lift simulations made simple

Planning software gains dominance in lift industry

By Suzanne A. Harbison

The explosion of lift planning software in the crane and rigging industry may be due to improvements in technology, a higher demand for safety—or both. *CraneWorks* reviews two popular computer programs on the market today.

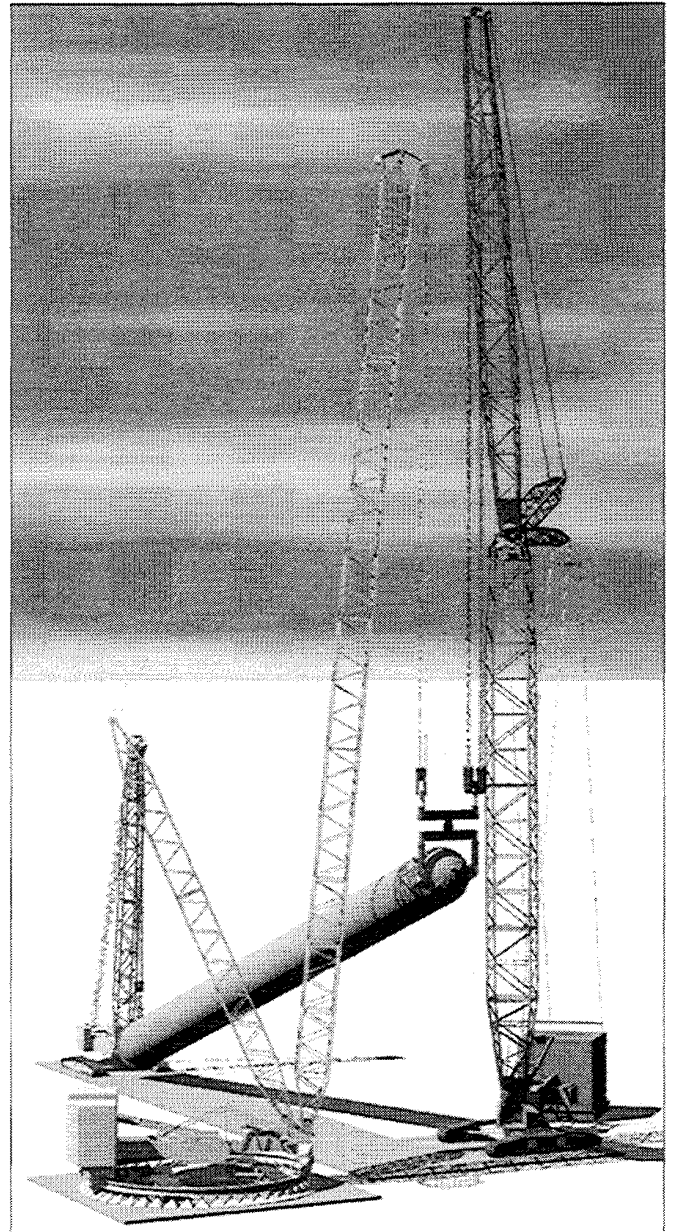
LiftPlanner

Jim Meehan, project manager at Vic's Crane Service, Rosemount, Minn., originally created LiftPlanner to use for planning in-house lifts. However, the program generated so much interest that he decided to market it to the industry. The three-dimensional crane and rigging program offers multiple simultaneous views and extensive libraries of rigging and beams, as well as programs to create vessels, trunnions, lugs and other objects.

**"LiftPlanner is
a good vehicle
for the smaller rental
house to compete."**

LiftPlanner runs inside of Auto CAD Release 12 or 13 under Windows 95 or DOS programs. It includes programs for generating the lift environment as well as cranes and rigging. Vessels, exchangers, towers, steel, supports, lugs, trunnions, chokers, shackles, lifting beams and piping can be created with the system. Drawings are created to plan and document critical lifts.

LiftPlanner includes pre-built 3D models of the user's crane fleet. The user inputs known or trial data such as boom length, radius and hook elevation. Then the program automatically returns the appropriate boom angle and tip height to the user. It also includes a program to retrieve the load chart for the crane configuration. The programs are written to warn the user of boom extension limits, two blocking and angle limitations.



A view from LiftPlanner shows its 3-D effects. This illustration was done for a heavy lift in Texas. The client was concerned about boom clearance and headroom.

In the rigging aspect of the program, LiftPlanner includes 275 pre-built chokers and 6- through 700-ton pre-built shackles with weight and rating data. A program can insert skewed chokers and calculate the safe working load due to angle. Another program can sum the rigging weights and deductions.

Continues on page 20 →

March-April 1997 *CraneWorks* 19

Lift simulations, from page 19

The current library includes more than 40 specific crane models from nine crane manufacturers. Customers can specify any crane to be built into the LiftPlanner program.

Customers such as rental service companies can either commission Meehan to build their crane fleet and simulate a planned job, or they can buy the software program for use by their own in-house staff. Even though the system is based on AutoCAD, Meehan says it is not as complex to use as it may seem. "I had a case in Canada where a person who operated a crane 50 percent of the time learned how to use the program."

One customer that found the program to be imperative to a critical lift is Joe Cain, of Cain Service Corporation, Houston, Texas. He had planned several lifts using two-dimensional software, but wanted to get the 3-D aspect. Meehan says Cain was nervous about boom clearance and headroom, particularly, and the LiftMovie of the planned lift eased his fears.

"LiftPlanner is more comprehensive than other programs and offers real-world situations," says Cain. "It is the most versatile and comprehensive rigging plan program available." (See page 9 for job description.)

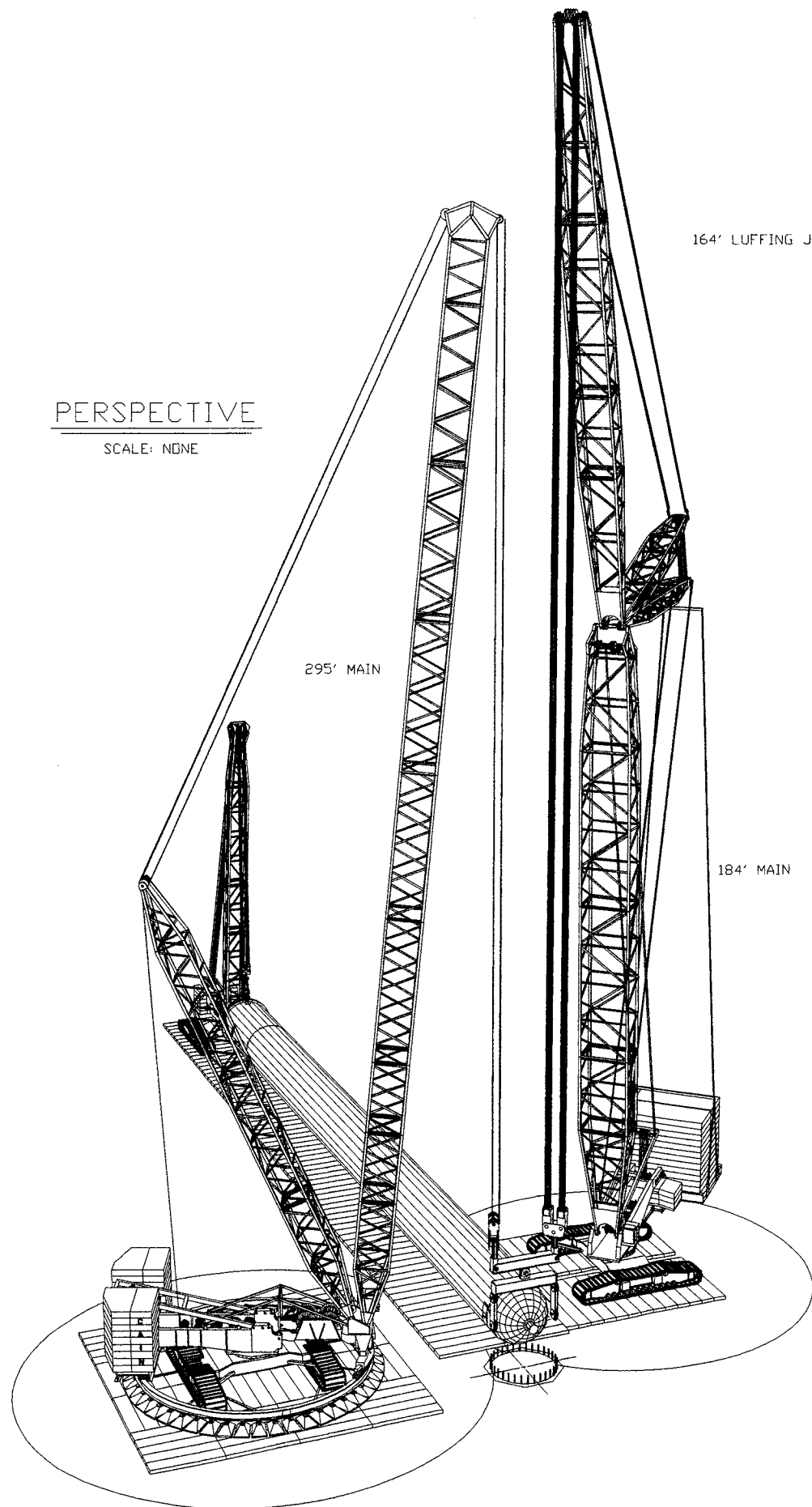
LiftMovie is a three-dimensional crane and rigging lift simulation system that works in tandem with LiftPlanner. This option is used for client presentation and to rehearse the crew prior to a lift. It includes software for rendering and animation.

Meehan says the program is not just for use in big rental houses. "LiftPlanner is a good vehicle for the smaller rental house to compete," he says. "The cost of the program is incidental when you compare it to the safety aspects and competitiveness you're gaining. It shows that your company has a greater engineering perspective."

**For information on LiftPlanner:
Write in 895 on inquiry card**

PERSPECTIVE

SCALE: NONE



LR1600 DEDUCTIONS

C2 SPLITTER (50%)	888,500
BLOCK	31,000
RIGGING	14,000
TOTAL	933,500

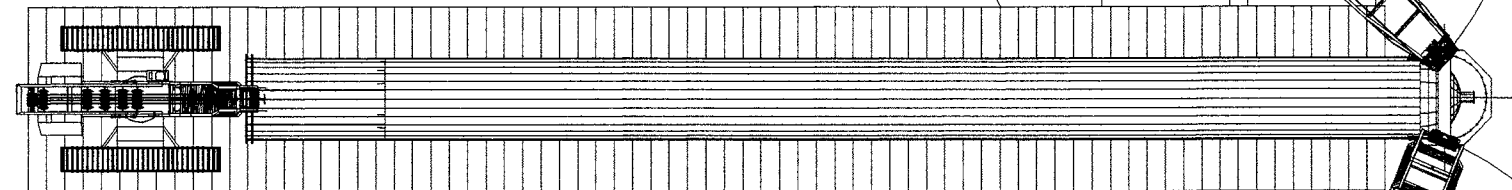
$$\frac{933,500}{1,168,128} = 79.9\% \text{ CAPACITY}$$

LIEBHERR LR1600		
56m (183.7') MAIN BOOM		
50m (164') LUFF. JIB DERRICK		
360° LIFT CAPACITY CHART		
METRIC TONNES		
RAD.(m)	RAD.(ft)	CAPACITY
20	65.6'	530
25	82.0'	500
30	98.4'	470
32	105.0'	450
35	114.8'	440
40	131.2'	410
42	137.6'	400
45	147.6'	396
49	160.7'	365
50	164.0'	360

PLAN VIEW

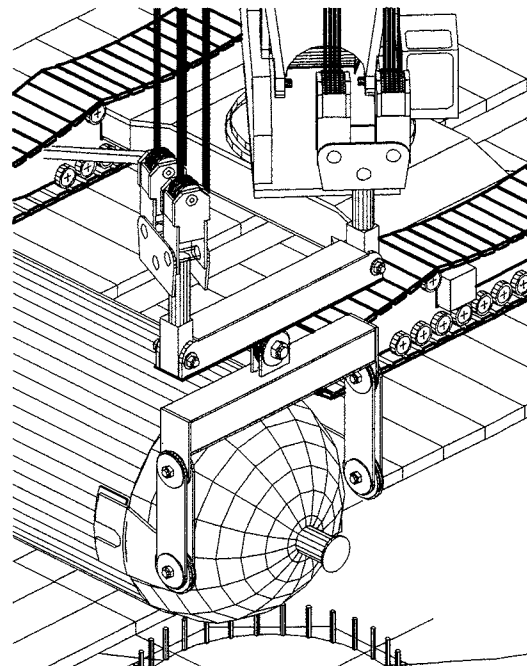
SCALE: 1"= 20'-0"

DEMAG
CC 2000



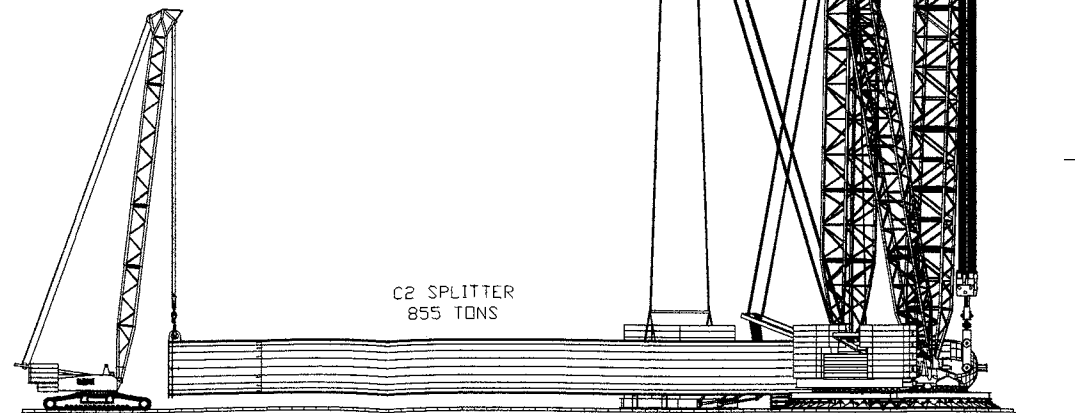
RIGGING DETAIL

SCALE: NONE



ELEVATION

SCALE: 1"= 30'-0"



LIEBHERR
LR 1600

DEMAG
CC 4000RL

CC4000 DEDUCTIONS

C2 SPLITTER (50%)	888,500
BLOCK	31,000
RIGGING	14,000
TOTAL	933,500

$$\frac{933,500}{1,102,000} = 84.7\% \text{ CAPACITY}$$

DEMAG CC4000		
RING LIFT		
295' MAIN BOOM		
360° LIFT CAP.		
SHORT TONS		
RAD.(ft)	CAPACITY	
66'	500	
82'	500	
98'	491	
115'	469	
131'	419	
148'	392	
164'	301	
188'	262	
197'	230	
213'	204	
230'	182	
246'	164	
262'	144	
279'	125	

LIFTPLANNER

105 GENEVA BLVD. TEL.: (952) 435-6126
BURNSVILLE, MN. 55306 FAX.: (952) 435-6126
WWW.LIFTPLANNER.NET

DESCRIPTION	AS SHOWN	REV. NO.
C2 SPLITTER 855 TON LIFT	DRAWN BY JM	REV. BY
JOB NO.	DATE 11/14/96	DATE
DWG. NO. BDP-X-C2	SHEET 1 of 1	APPD. BY

Current library of LiftPlanner cranes:

American

7260, 7530, 8460, 8470, 9270, 9299, 9310, 9310 Skyhorse, 9320, 9510, A 1500-HC, 11250, 11250 Skyhorse, 11320, 11320 Skyhorse

Broderson

IC-35-2B, IC-80-F, IC-180, IC-200-3F

Clark-Lima

7700, 7707

Demag

AC35, AC35L, AC40-1, AC50, AC80-1, AC80-2, AC120, AC125, AC155, AC200-1, AC205, AC265, AC300-1, AC335, AC350/SL, AC395, AC395/1, AC400-1/SL, AC435, AC500-1/SL, AC615, AC615S, AC1200/SL, AC1300, AC1600/SL, CC1200/SL, CC1800/SL, CC2000/SL, CC2500/SL, CC2500-1/VSL, CC2600/SL, CC2800/SL, CC4000, CC4000/Ring, CC4800, CC6800, CC8800-1, HC810, HC920, HC1010, TC1200, TC2000, TC3000/SL, TC3200/SL, TC4000

Galion

150FA

Gantries

J&R 700-28, J&R 903-34LD, J&R T1402-39, Lift Systems 44A, Lift Systems 24PT500LT, Lift Systems 34PT500WT, Riggers EZ-400

Grove

AT422, AT750B, AT1100, AT1300, GMK3055, GMK3050, GMK4070, GMK4115, GMK5120B, GMK5130L, GMK5150B, GMK5165, GMK5175, GMK5210, GMK5240, GMK6220, GMK6250L, GMK6300, GMK6300B, GMK6350, GMK7550-Megalift, RT58D, RT78S, RT522B, RT530E, RT630B, RT635C, RT740B, RT745, RT750, RT755, RT760, RT760E, RT855B, RT860, RT865, RT870, RT880, RT880E, RT890, RT890E, RT990, RT9100, RT9130E, RT9150E, TM875, TM1275, TM1300, TM2500, TMS300, TMS475/LP, TMS500E, TMS865, TMS875c, TMS800E, TMS900E, TMS9000E, TMS890, TM9120, GTK1100

Kobelco

SL6000, CKE 4000, CK2500, CK2000-II, CKE 1350, CK1000-III

Krupp

2025, 70GMT AT, 100GMT, 140GMT AT, 180GMT, 4070, 4080, 4085, 5090,

5110, 6140, 6275, 7250, 8350

Liebherr

LR11350, LR1750, LR1600/1, LR1600/2, LR1400/1, LR1400/2, LR1300, LR1280, LR1200, LR1160, HS 853HD, LG 1200, LG-1550, LHM500. LHM320, LTF1045-4.1, LTM1045-3.1, LTM1050/1, LTM1055-3.1, LTM1055-3.2, LTM1070/1, LTM1070-4.1, LTM1080/1, LTM1090/2, LTM1095-5.1, LTM1100, LTM1100/2, LTM1100-4.1, LTM1100-5.2, LTM1120/1, LTM1130-5.1, LTM1140, LTM1160, LTM1160/2, LTM1160-5.1, LTM1200, LTM1200/1, LTM1220-5.1, LTM1220-5.2, LTM1225-5.1, LTM1250-6.1, LTM1300, LTM1300/1, LTM1300-6.1, LTM1400, LTM1400-7.1, LTM1500, LTM1500-8.1, LTM1800, LTM11200-9.1

LinkBelt

ATC-3130, HC-138H, 138HSL, HC-218, HC-218A, 218HSL, 218H5, HC-228H, HC-238A, 238HSL, HC-248H, 248 Hylab 5, HC-258, HC-268, HC278H, 348 Hylab 5, HSP-8022, HSP-8035S, HSP-8040, HSP-8055, HTC-830, HTC-1170, HTC-8665, HTC-8640, HTC-8650, HTC-8670, HTC-8675, HTC-8690, HTC-86100, HTC-11100, HTC-3140LB, LS-138H, LS-218, LS-308H5, LS-518, LS-718, LS718/Ring, LS-818, LS-818/Ring, LS-918, LS-918/Ring, LS-1018, RTC-8050S2, RTC-8060, RTC-8064, RTC-8065, RTC-8075, RTC-8090, RTC-80100, TCC-750

Lorain

MC8150

Manitowoc

111, 3900W, 3900T, 4000W, 4100-S1, 4100-S2, 4100-Tower, 4100S3 Ring, 555, M-250, M-250 w/400 Maxer, M-250T, 2250, 2250 w/ 2000 Maxer, 777, 777T, 4600 S-4, 4600 S-4 Ring, 4600 S-4 Twr, 4600 S-5, 888, 888 Ring, M-1200 Ring, 999, 12000, 14000, 16000, 16000 w/Maxer, 18000, 18000 w/Maxer, 21000, 21000 w/Maxer

Mantis

10010

Misc

AmClyde LSB18, Sliding Systems, Strand Jack Lifting frames, Goldhofer & Scheuerle platform trailers, Goliath, Kroll 10000 (tower crane), SPMT's, Scheuerle Super Vario, Mi-Jack MJ110 Travelift

P & H

5150R, 5250, 5300R, 790B-TC, 9125TC, CN165, Alpha, T750

Riggers Manufacturing

TL150BW Trilifter, EZ-400

Tadano

ATF50-3, ATF65G-5, ATF160G-5, ATF220G-5, GR-300EX, GR-550EX, GR-700EX, GR-800XL-1, GR-1000XL-2, TR-160M, TR-280XL, TR-300XL, TR-350XL, TR-350XL-3, TR-450XL, TR500XL-3, TR-500E, TR-500M, TR-600XL, TR-600XL-3, TR-650XXL-3

Terex

5120, RT130, RT160, RT175, RT190, RT230, RT335, RT450, RT555-1, RT780, T340, T340-1L, T560, T750

Tower Cranes

Favelle Favco M1280D, Favelle Favco M760D, Kroll 10000, Wolff 355B (on rails)

Specify any crane and we will build it. Many fixed, luffing and attachments are available for the above cranes.

List current as of 6/2013 – see www.liftplanner.com for latest update

