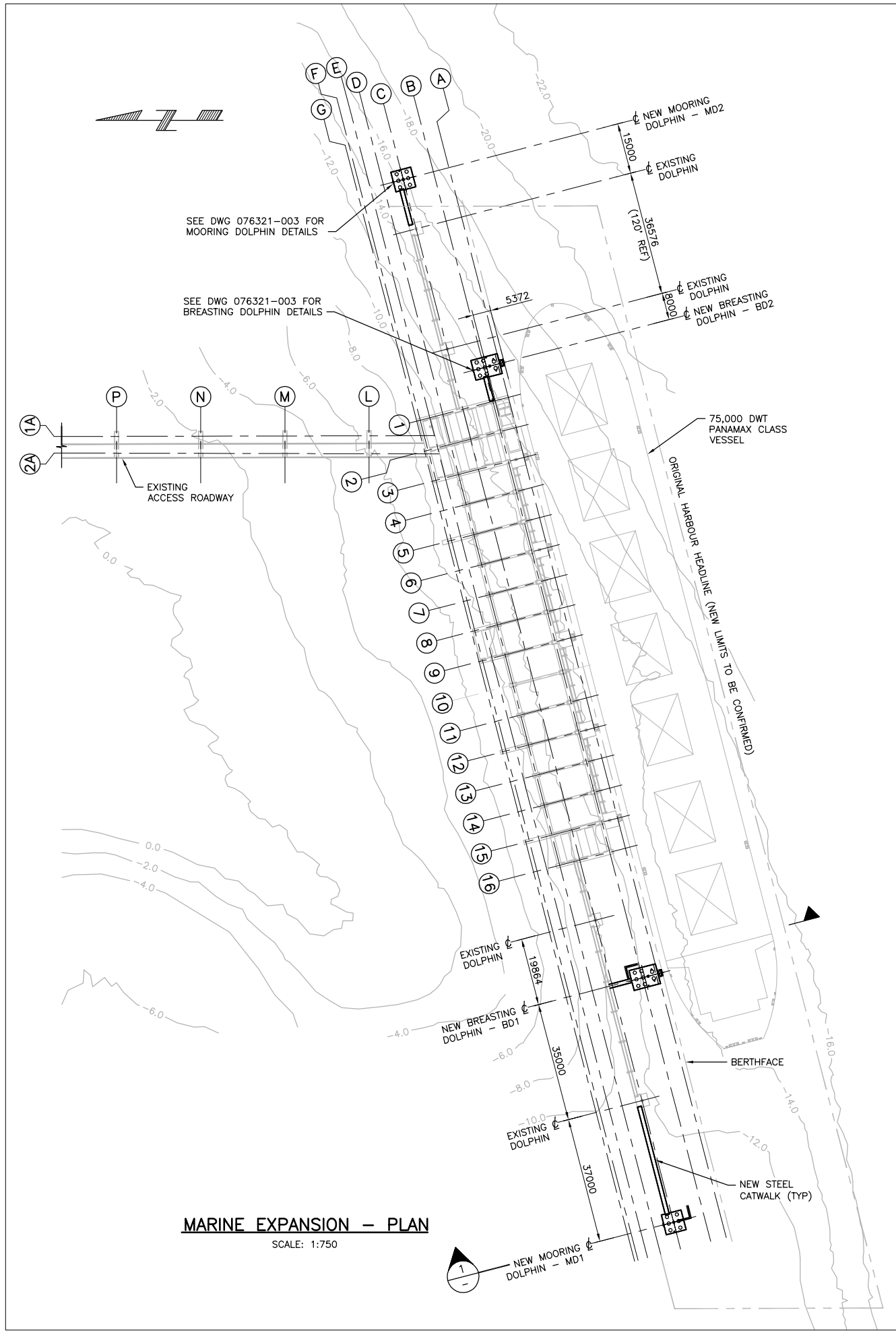
APPENDIX F-C

Marine Structure Drawings (R2)

FIBRECO

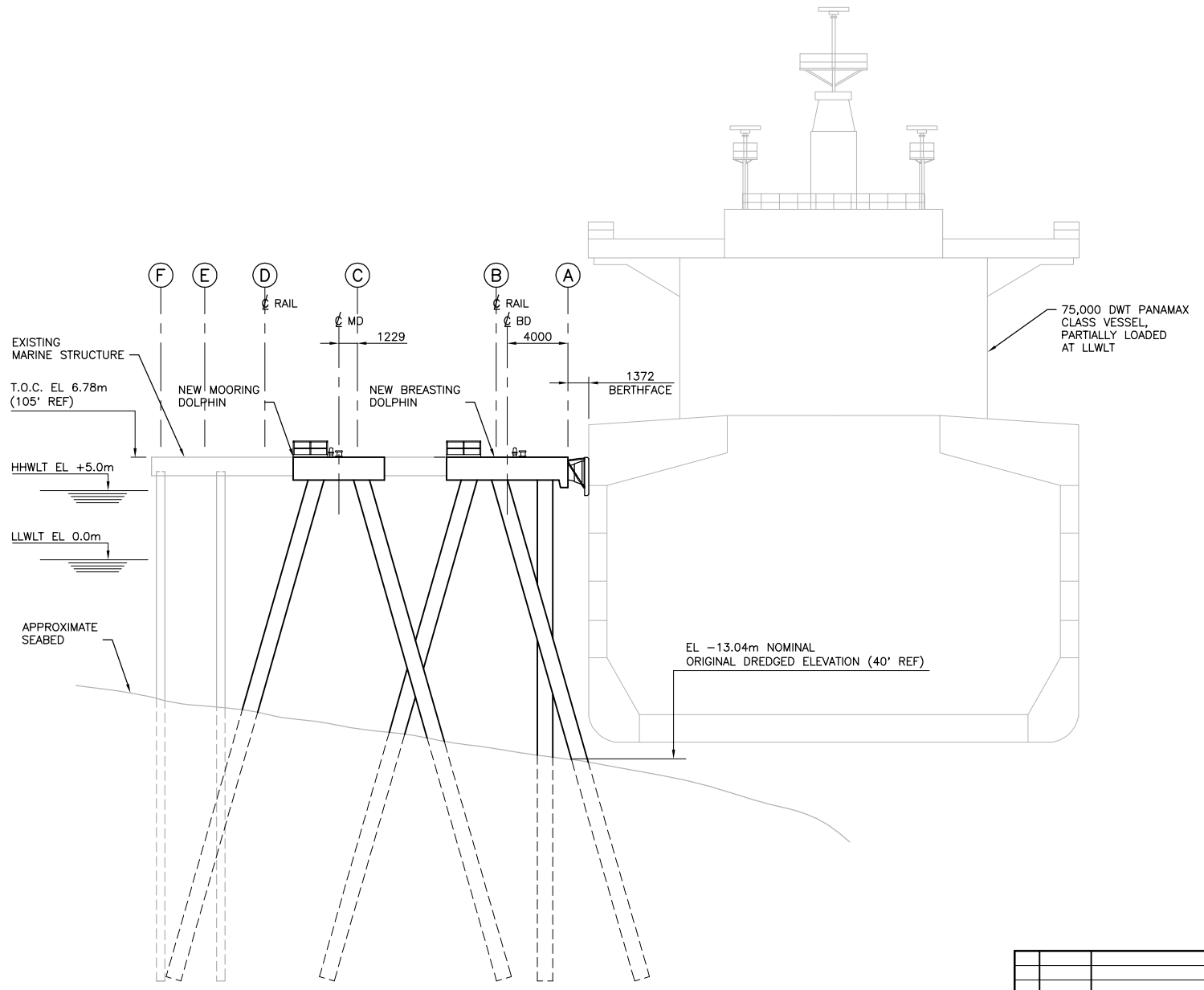
For Vancouver Fraser Port Authority Review Only

Fibreco Export Terminal Enhancement
Permit Application Document



MARINE EXPANSION – PLAN

SCALE: 1:750



SECTION 1/– 1:200

REFERENCE DRAWINGS

H.A. SIMONS (INTERNATIONAL) LTD DWGS:
D–4379–019–922 DOCK AND APPROACH F.R.P.D PILE NUMBERING
D–4379–031–001 DOCK & APPROACH GENERAL ARRANGEMENT
D–4379–031–005 DOCK LAYOUT
D–4379–031–006 DOCK SECTIONS & DETAILS SH#1
D–4379–031–007 DOCK SECTIONS & DETAILS SH#2
D–4379–031–009 DOCK FENDER DETAILS
D–4379–031–010 DOCK SECTIONS & DETAILS SH#4
D–4379–031–012 DOCK ACCESS WALKWAYS
D–4379–031–013 APPROACH LAYOUT AND SECTIONS
D–4379–031–017 DOLPHINS/WALKWAYS LAYOUT AND SECTIONS
D–4379–031–018 DOLPHINS – DETAILS

SKS ENGINEERING DWG:
96083 C–03 SHIP UNLOADING FACILITY 60" INBOUND CHIP CONVEYOR–SECTION 2 PILE CAP AT HOPPER DETAILS

NOTES:

1. BATHYMETRIC CONTOURS ARE IN METRES AND REDUCED TO CHART DATUM OBTAINED FROM VANPILE'S DWG 80–01–007–P1 DATED APRIL 17, 2015.
2. ELEVATIONS IN METRES TO CHART DATUM. (WHERE NOTED, REF ELEVATIONS IN FEET REFER TO N.H.B. DATUM, WHICH IS 82.77' BELOW ZERO TIDE).

0 8m 16m
SCALE: 1:200

0 30m 60m
SCALE: 1:750

REV	DATE	DESCRIPTION	BY	CHK
A02	08/05/2016	ISSUED FOR REVIEW	PNCN	JLCJ
A01	07/26/2016	ISSUED FOR CLIENT REVIEW	PNCN	JLCJ

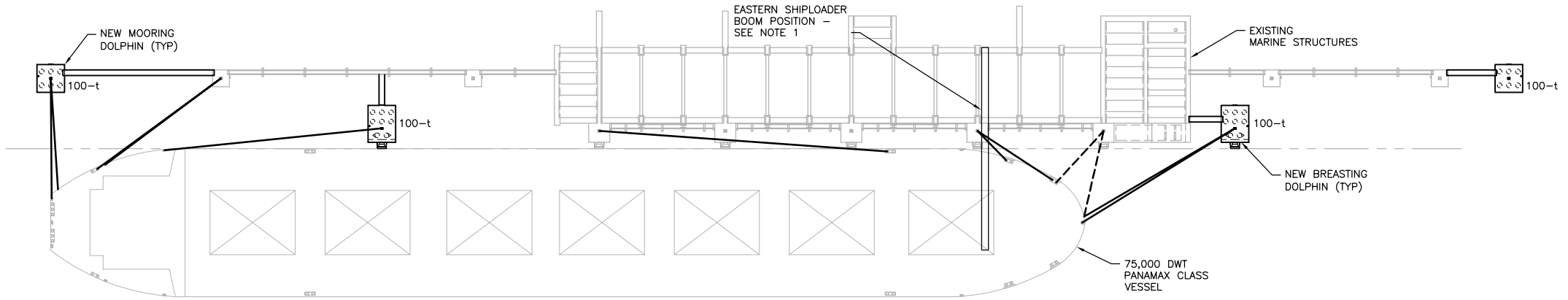
CLIENT
FIBRECO
FIBRECO EXPORT INC.
1239 McKeen Ave,
North Vancouver, B.C.
V7P 3H9
TEL: (604) 980–8543
FAX: (604) 984–2583

CONSULTANT
COWI

PROJECT TITLE
TERMINAL ENHANCEMENT PROJECT

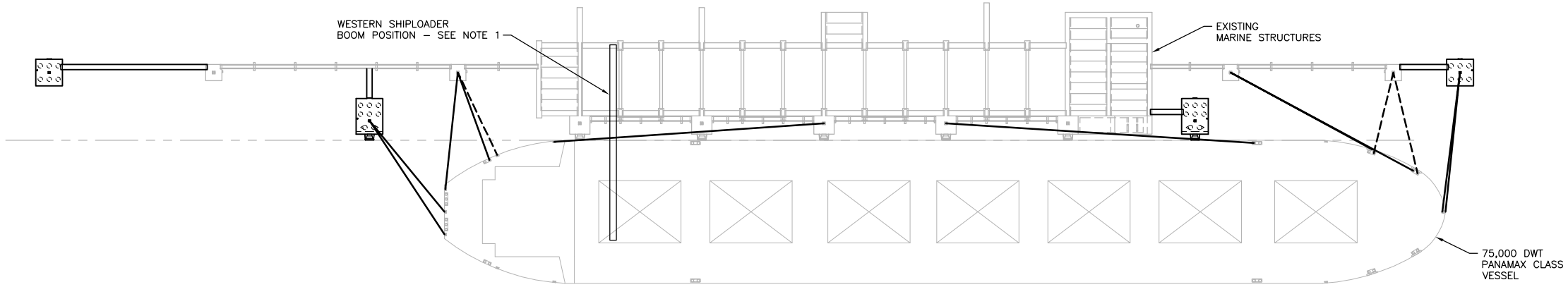
DRAWING TITLE
PROPOSED MARINE STRUCTURES - PLAN AND SECTION

SCALE	DESIGNED	APPROVED
AS SHOWN	JLCJ	
DRAWN	CHECKED	DATE
PNCN		
JOB NO.	DRAWING NO.	REV.
A076321	076321-001	A02



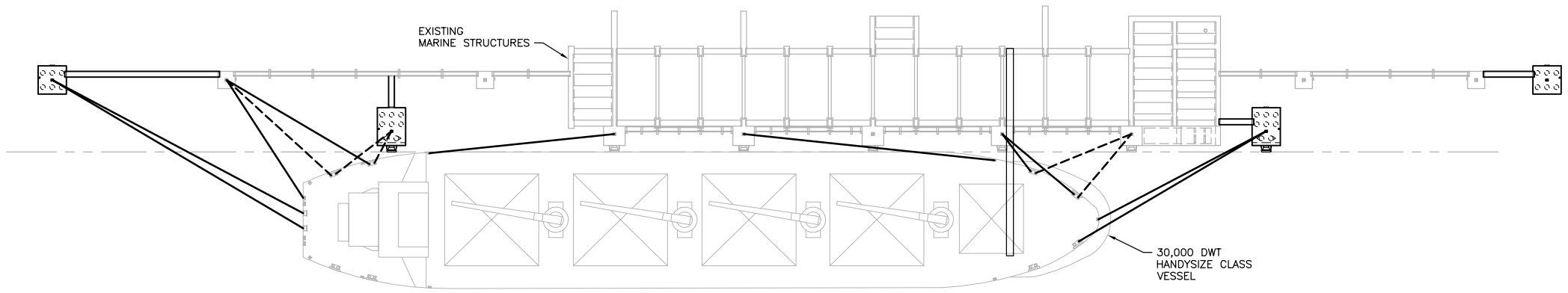
PANAMAX MOORING LAYOUT – EXTREME WARPING AFT

1:600



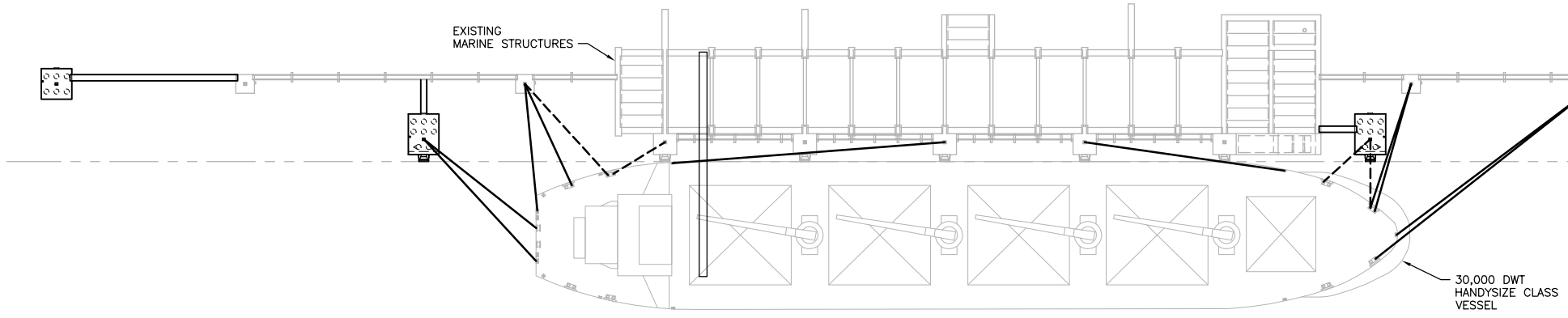
PANAMAX MOORING LAYOUT – EXTREME WARPING FWD

1:600



HANDYSIZE MOORING LAYOUT – WARPING AFT

1:600



HANDYSIZE MOORING LAYOUT – WARPING FWD

1:600

NOTES:

1. SHIPLOADER EXTREME OPERATING POSITIONS OBTAINED FROM CWA DWG 15006–500–SK–008_P2 AND REFLECT A 79m SHIPLOADER TRAVEL RANGE. POSITIONS TO BE CONFIRMED.
2. MOORING ARRANGEMENTS ARE INDICATIVE ONLY. FINAL ARRANGEMENTS DETERMINED BY THE SHIPS MASTER AND THE TERMINAL.

0 24m 48m

SCALE: 1:600

REV	DATE	DESCRIPTION	BY	CHK
A02	08/05/2016	ISSUED FOR REVIEW	PNCN	JLCJ
A01	07/26/2016	ISSUED FOR CLIENT REVIEW	PNCN	JLCJ

CLIENT

FIBRECO

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FAX: (604) 984-2583

CONSULTANT

COWI

PROJECT TITLE

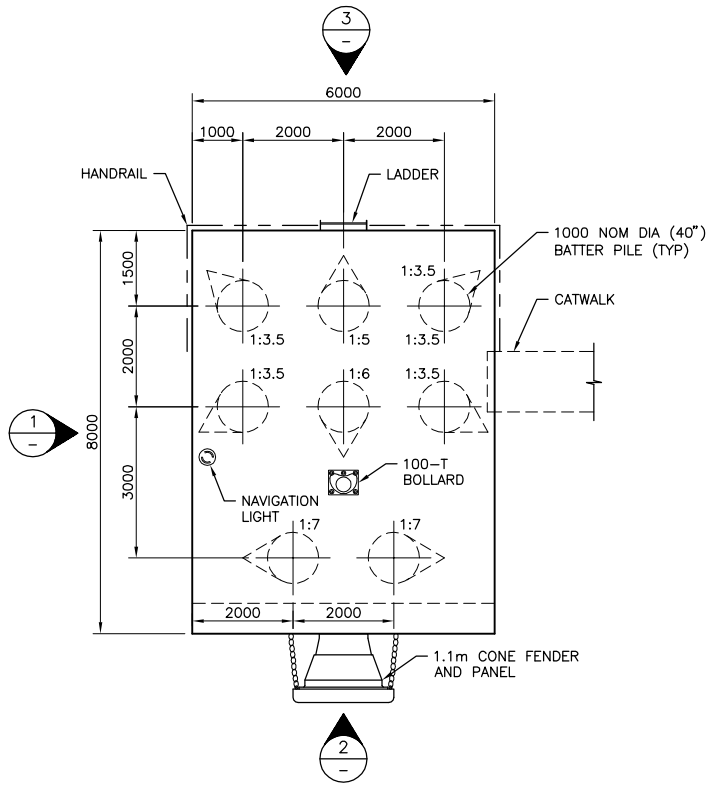
TERMINAL ENHANCEMENT PROJECT

DRAWING TITLE

MOORING LAYOUTS
PANAMAX AND HANDYSIZE CLASS

SCALE	DESIGNED	APPROVED
1:600	JLCJ	
DRAWN	CHECKED	DATE
PNCN		

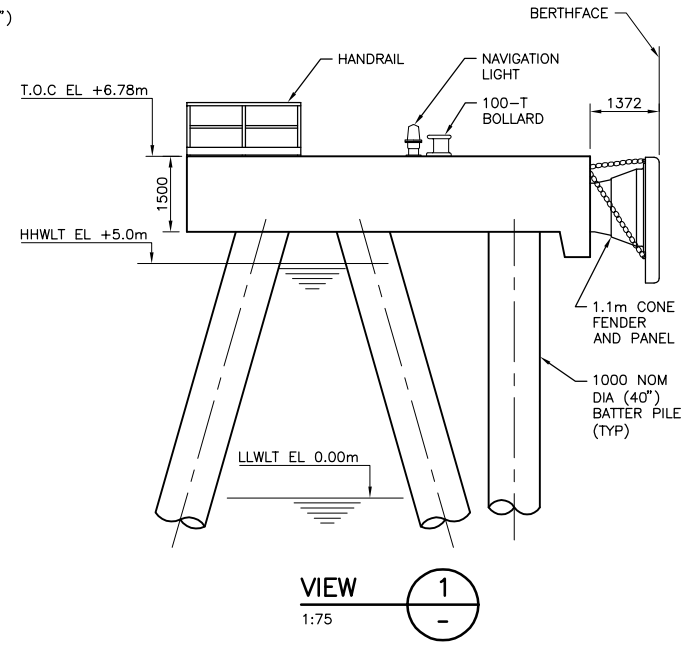
JOB NO.	DRAWING NO.	REV.
A076321	076321-002	A02



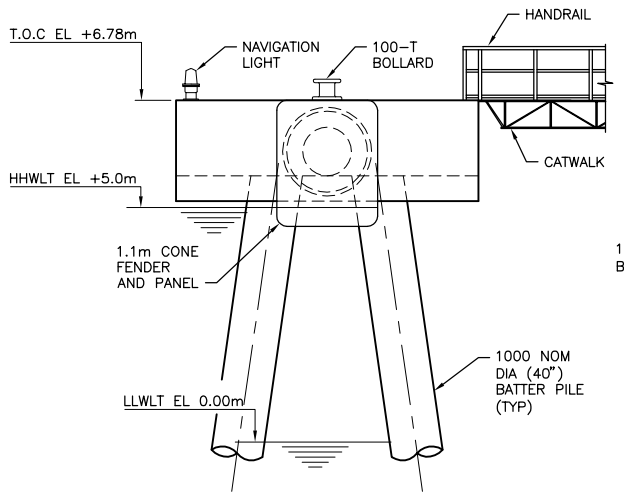
TYPICAL BREASTING DOLPHIN – PLAN

SCALE: 1:75

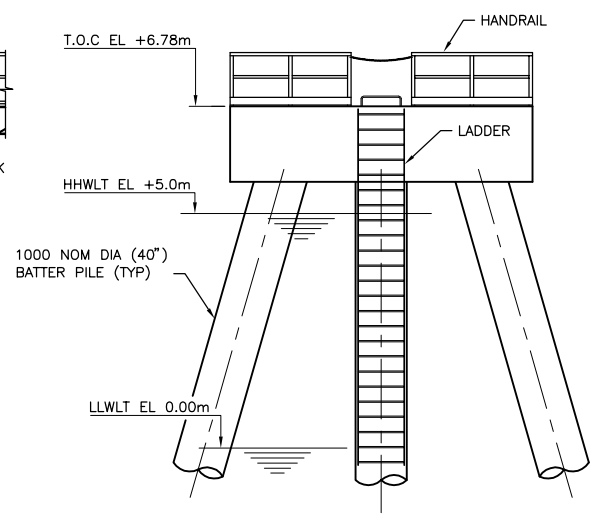
(CATWALK AND LADDER LOCATIONS MAY VARY)



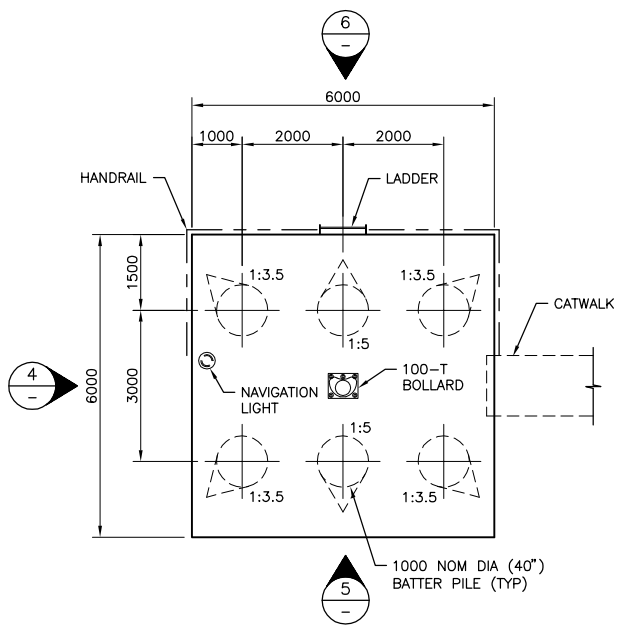
VIEW 1 – 1:75



VIEW 2 – 1:75



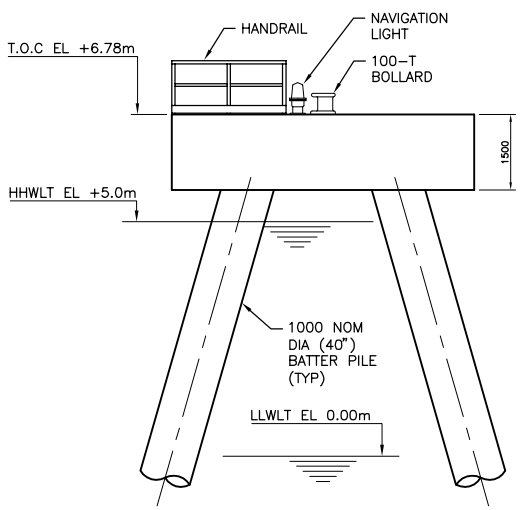
VIEW 3 – 1:75



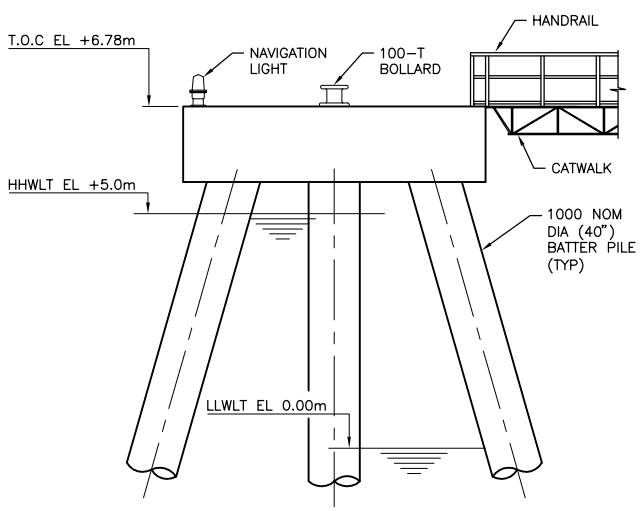
TYPICAL MOORING DOLPHIN – PLAN

SCALE: 1:75

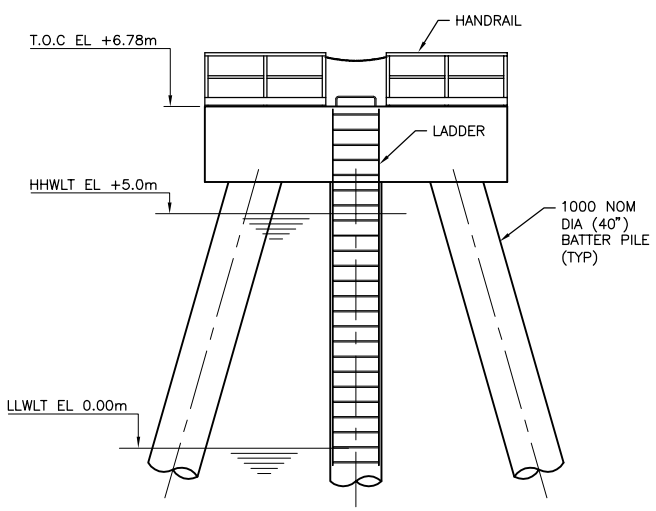
(MD1 SHOWN. MD2 OPPOSITE HAND)



VIEW 4 – 1:75



VIEW 5 – 1:75



VIEW 6 – 1:75

NOTES:

1. ELEVATIONS IN METRES TO CHART DATUM. (WHERE NOTED, REF ELEVATIONS IN FEET REFER TO N.H.B. DATUM, WHICH IS 82.77' BELOW ZERO TIDE).

0 3m 6m

SCALE: 1:75

REV	DATE	DESCRIPTION	BY	CHK
A02	08/05/2016	ISSUED FOR REVIEW	PNCN	JLCJ
A01	07/26/2016	ISSUED FOR CLIENT REVIEW	PNCN	JLCJ

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CONSULTANT

COWI

PROJECT TITLE

TERMINAL ENHANCEMENT PROJECT

DRAWING TITLE

MOORING AND BREASTING STRUCTURES
PLAN, ELEVATIONS AND DETAILS

SCALE	DESIGNED	APPROVED
1:75	JLCJ	
DRAWN	CHECKED	DATE
PNCN		
JOB NO.	DRAWING NO.	REV.
A076321	076321-003	A02

Evergreen Engineering
PO Box 21530
Eugene, OR 97402-0409
Ph: (541) 484-4771
Fax: (541) 484-6759

Eugene S. Cochrane
Job #3219.1
3/9/2016

Fibreco Ship Loader Loading -

The structure will be located at the Fibreco site in VAncouver BC
The platform is a Risk Category II structure - In order to maintain the use of service level wind speeds, the structure will be designed with ASCE 7-05, Allowable Stress Design.

Wind Loading - ASCE 7-05; Sec 6.5.15 Design Wind Load on Other Structures

Basic wind speed (3sec gust at 33ft) $v := 35$ Design wind speed in operation $H := 136ft$

Use exposure D

$K_{zt} := 1.0$ no topographic effects -

$G := 1.09$ gust effect factor - ASCE 7-05 6.5.8.2

$K_d := .85$ wind directionality factor - ASCE 7-05 Table 6-4

velocity pressure coefficient - ASCE 7-05 sec. Table 6-3 $K_z :=$

$$\begin{pmatrix} 1.03 \\ 1.08 \\ 1.12 \\ 1.16 \\ 1.22 \\ 1.27 \\ 1.31 \\ 1.34 \\ 1.38 \\ 1.40 \\ 1.43 \\ 1.48 \\ 1.52 \\ 1.55 \\ 1.58 \\ 1.61 \end{pmatrix}$$

$q_z := .00256psf \cdot K_z \cdot K_{zt} \cdot K_d \cdot v^2$ velocity pressure - ASCE 7-10 sec. 6.5.10

$\varepsilon := .1$ $C'_f := 4 \cdot \varepsilon^2 - 5.9 \cdot \varepsilon + 4 = 3.45$ Note that Cf is intended to represent the wind on the entire tower applied to a single face, for RISA, divide Cf by 2 and apply wind to both faces equally.

$C_f := \frac{C'_f}{2} = 1.725$ Use this value for loader gantry. Boom will be treated as a solid - cladded building.

$L := 192ft$ $B := 12ft$ For wind normal to narrow face $\kappa_n := \frac{L}{B}$

$C_{fn} := if\left(\kappa_n < 1.5, \frac{1}{4} \cdot \kappa_n^2 + 1.4, \frac{2}{3} \cdot \kappa_n + .9\right) = 11.567$ normal to wide face $\kappa_w := \frac{B}{L}$

$C_{fw} := if\left(\kappa_w < 1.5, \frac{1}{4} \cdot \kappa_w^2 + 1.4, \frac{2}{3} \cdot \kappa_w + .9\right) = 1.401$

Wind on narrow face -

Wind on gantry -

$F_n := q_z \cdot G \cdot C_f =$

5.162
5.413
5.613
5.814
6.115
6.365
6.566
6.716
6.917
7.017
7.167
7.418
7.618
7.769
7.919
8.069

$\cdot$ psf

Wind on Side face of Boom/Counter Boom -

MId height of boom is 80 feet, therefore use the kz at 80 feet

$F_{fw} := q_{z_8} C_{fw} \cdot G = 5.617 \cdot psf$

Use a 10'-6" boom height and get load at top on bottom chords -

$w_{fw} := \frac{F_{fw} \cdot 10.5ft}{4} = 14.746 \cdot plf$ wind line load on each chord

Wind on End of Boom -

$F_{fn} := q_{z_8} \cdot C_{fn} \cdot G = 46.378 \cdot psf$

Distribute end of boom loads along the length of the top and bottom chords -

$w_{fn} := \frac{F_{fn} \cdot 10.5ft \cdot 20ft}{4 \cdot 177.5ft} = 13.717 \cdot plf$

For wind on the boom in the Up position -

$L_u := 15ft$ $B_u := 10.5ft$ For wind normal to narrow face $\kappa_{nu} := \frac{L_u}{B_u}$

$C_{fnu} := if\left(\kappa_{nu} < 1.5, \frac{1}{4}\cdot \kappa_{nu}^{2} + 1.4, \frac{2}{3}\cdot \kappa_{nu} + .9\right) = 1.91$ normal to wide face $\kappa_{wu} := \frac{B_u}{L_u}$

$C_{fw} := if\left(\kappa_w < 1.5, \frac{1}{4}\cdot \kappa_w^{2} + 1.4, \frac{2}{3}\cdot \kappa_w + .9\right) = 1.401$

$v := 95$

$q_z := .00256psf \cdot K_z \cdot K_{zt} \cdot K_d \cdot v^2$

$G := .99$

$w_{nu} := q_z \cdot G \cdot C_{fnu} \cdot \frac{10.5}{4} =$

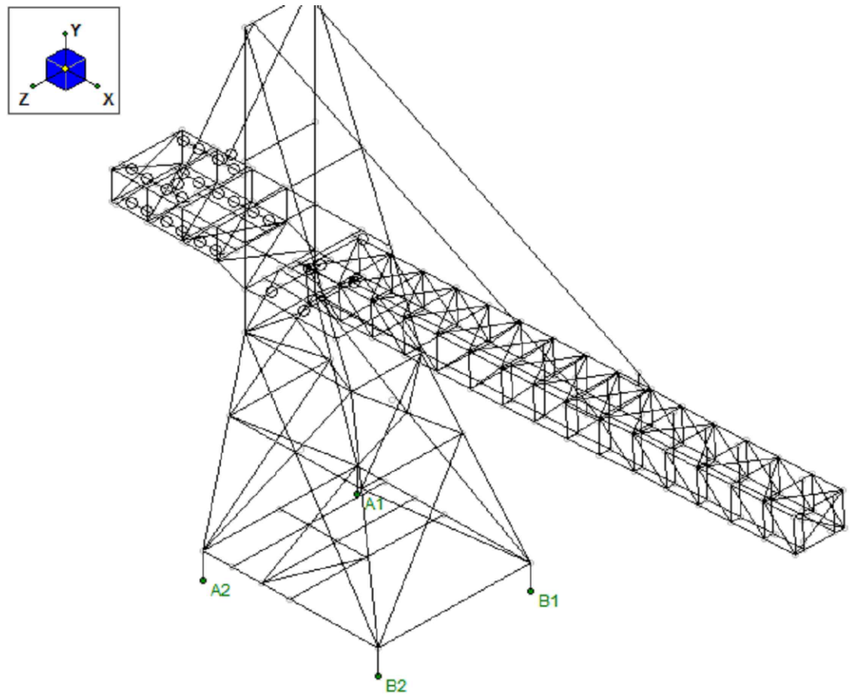
	0
0	100.412
1	105.287
2	109.186
3	113.086
4	118.935
5	123.81
6	127.709
7	130.634
8	134.533
9	136.483
10	139.408
11	144.282
12	148.181
13	151.106
14	154.031
15	156.955

$\cdot psf$

	Operating Loads - Shuttle Back									
		Dead	Material	Snow	Plugged Chute	Wind X	Wind Z	Seis X	Seis Y	Seis Z
	A1	136.993	-6.441	14.304	-14.029	-10.185	-45.242	-41.597	17.809	-124.145
	A2	123.954	-5.817	14.227	-14.057	-10.204	45.244	-41.694	16.114	124.156
	B1	125.644	14.796	108.245	31.529	10.185	10.678	41.597	16.334	19.788
	B2	125.903	14.887	108.285	31.557	10.204	-10.68	41.694	16.367	-19.799
Total Vert. Load		512.494	17.425	245.061	35				66.624	
Total Horiz. Reaction						-15.9	-22.2	-77		-77

	Operating Loads - Shuttle Out									
		Dead	Material	Snow	Plugged Chute	Wind X	Wind Z	Seis X	Seis Y	Seis Z
	A1	97.269	-7.836	-2.633	-45.401	-8.752	-40.893	-35.238	12.645	-124.958
	A2	128.981	-1.117	29.385	-25.116	-11.666	40.983	-48.481	16.767	125.211
	B1	165.246	20.843	125.178	62.901	8.752	6.327	35.238	21.482	20.214
	B2	121.96	14.124	93.13	42.616	11.666	-6.416	48.481	15.855	-20.467
Total Vert. Load		513.456	26.014	245.06	35				66.749	
Total Horiz. Reaction						-15.9	-22.2	-77		-77

	Operating Loads - Boom Up								Storm Wind	
		Dead	Snow	Wind X	Wind Z	Seis X	Seis Y	Seis Z	X	Z
	A1	183.951	58.798	-37.493	-61.172	-48.651	23.616	-99.71	-280.77	-449.153
	A2	187.551	70.96	-38.641	61.236	-57.114	24.052	99.662	-289.367	449.78
	B1	78.479	63.751	37.493	-9.41	48.651	10.069	-29.855	280.77	-79.396
	B2	63.327	51.551	38.641	9.345	57.114	8.124	29.903	289.367	78.769
Total Vert. Load		513.308	245.06				65.861			
Total Horiz. Reaction				-33.3	-29.5	-75		-76	-249.3	-221



Estimated Vertical Loads for Fibreco Ship Loader.
Loads given are PRELIMINARY and not for design purposes.
Vertical loads are positive down
Design Conditions:
2000 US TPH (at belt speed equal to 11 ft/s)
Operating wind speed - 35MPH
Max. wind speed (parked and tied down) - 95MPH
Wind loads are given for ASCE 7-05 Exposure category 'D'
Snow Load (60psf)
Seismic Coefficient - Cs=0.15
All loads are SERVICE level loads
Wind and seismic loads are reversible

UNLESS NOTED OTHERWISE
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING

WEIGHT (ONE ASSEMBLY)
N/A

UNLESS NOTED OTHERWISE
THIRD ANGLE PROJECTION

TOLERANCES
FRAC +/- 1/16
.XX +/- .020
.XXX +/- .005
ANGLES +/- 1 DEG

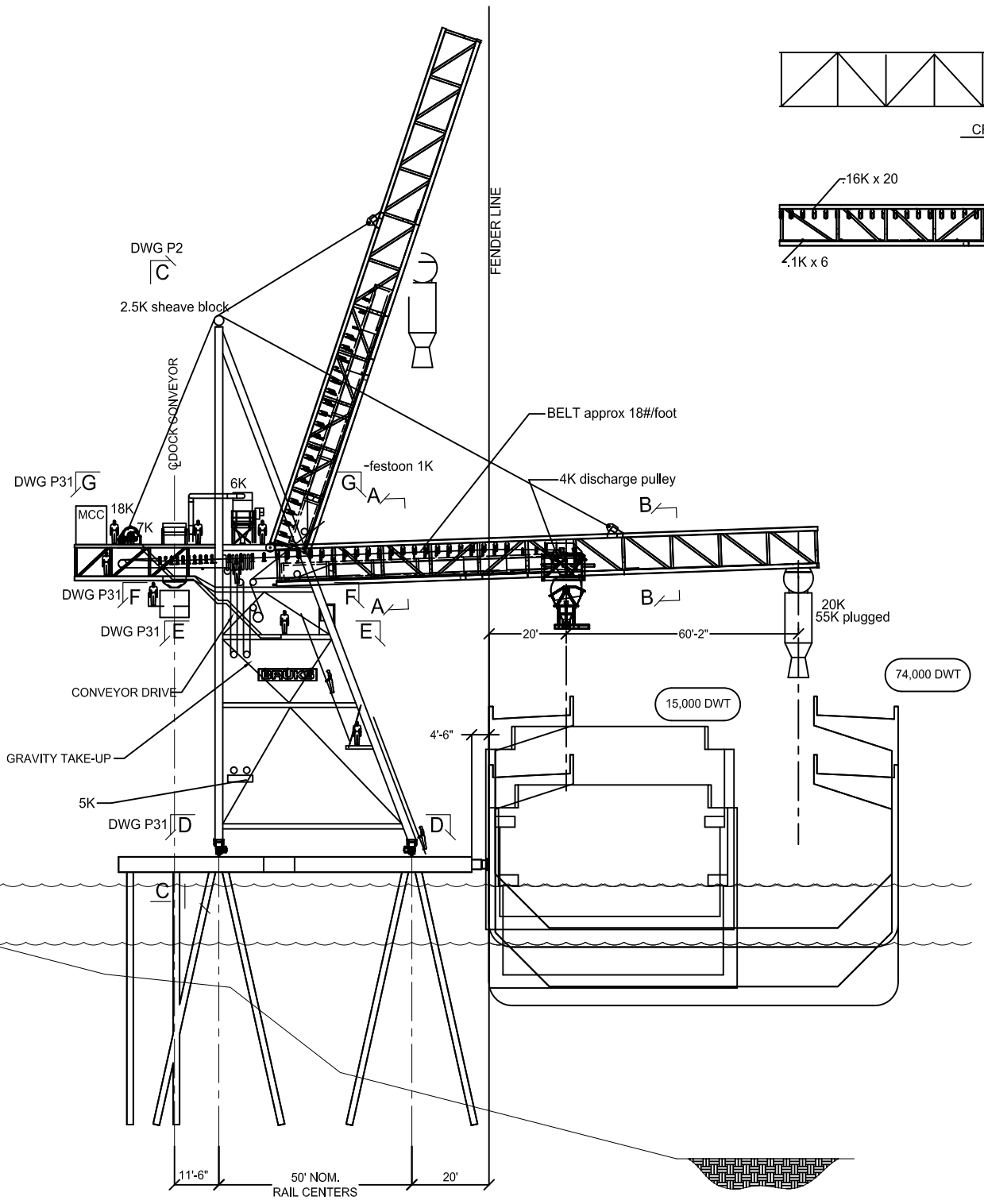
REV.	DATE	BY	DESCRIPTION
P1	2/1916	GSC	REVISED PROPOSAL
P	1/29/16	KH	PROPOSAL

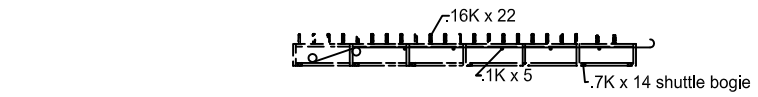
RAIL LOADS
SHIP LOADER

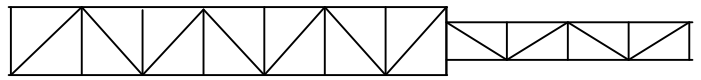
BRUKS Rockwood

SHEET SIZE: B

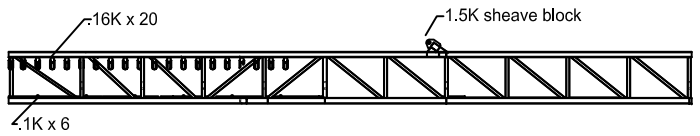
SCALE:
DATE: 1/29/16
DRAWN BY:
APPROVED BY:
DESIGNED BY: KH
CHECKED BY:
REPLACES:
SHEET: 1 of 1
PROJECT: 14-005234
DRAWING NO.: P5
REV NO.: P1

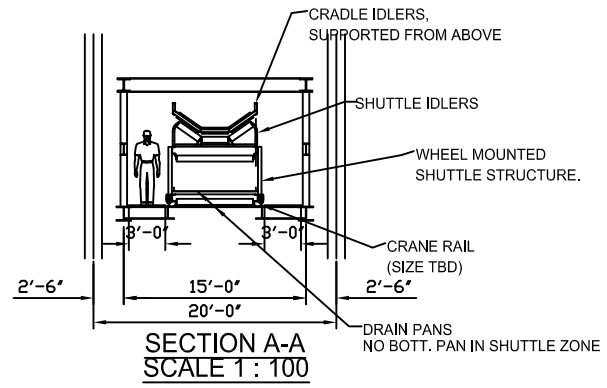




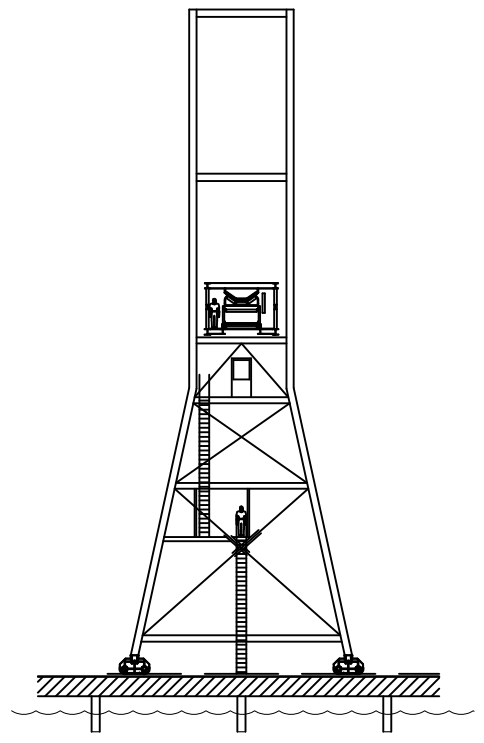


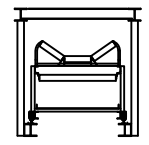
CRADLE PLAN





SECTION A-A
SCALE 1 : 100





SECTION B-B
SCALE 1 : 100

VESSEL NOTE:

1. LAYOUT ASSUMES A MINIMUM BALLASTED VESSAL DRAFT OF 16'-5" [5.00m] AT M.H.H.W. TIDAL CONDITION.
2. CLIENT TO CONFIRM VESSEL DIMENSIONS ARE ACCURATE AT GIVEN TIDAL CONDITIONS.

UNLESS NOTED OTHERWISE
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING

WEIGHT (ONE ASSEMBLY)
N/A

UNLESS NOTED OTHERWISE
THIRD ANGLE PROJECTION

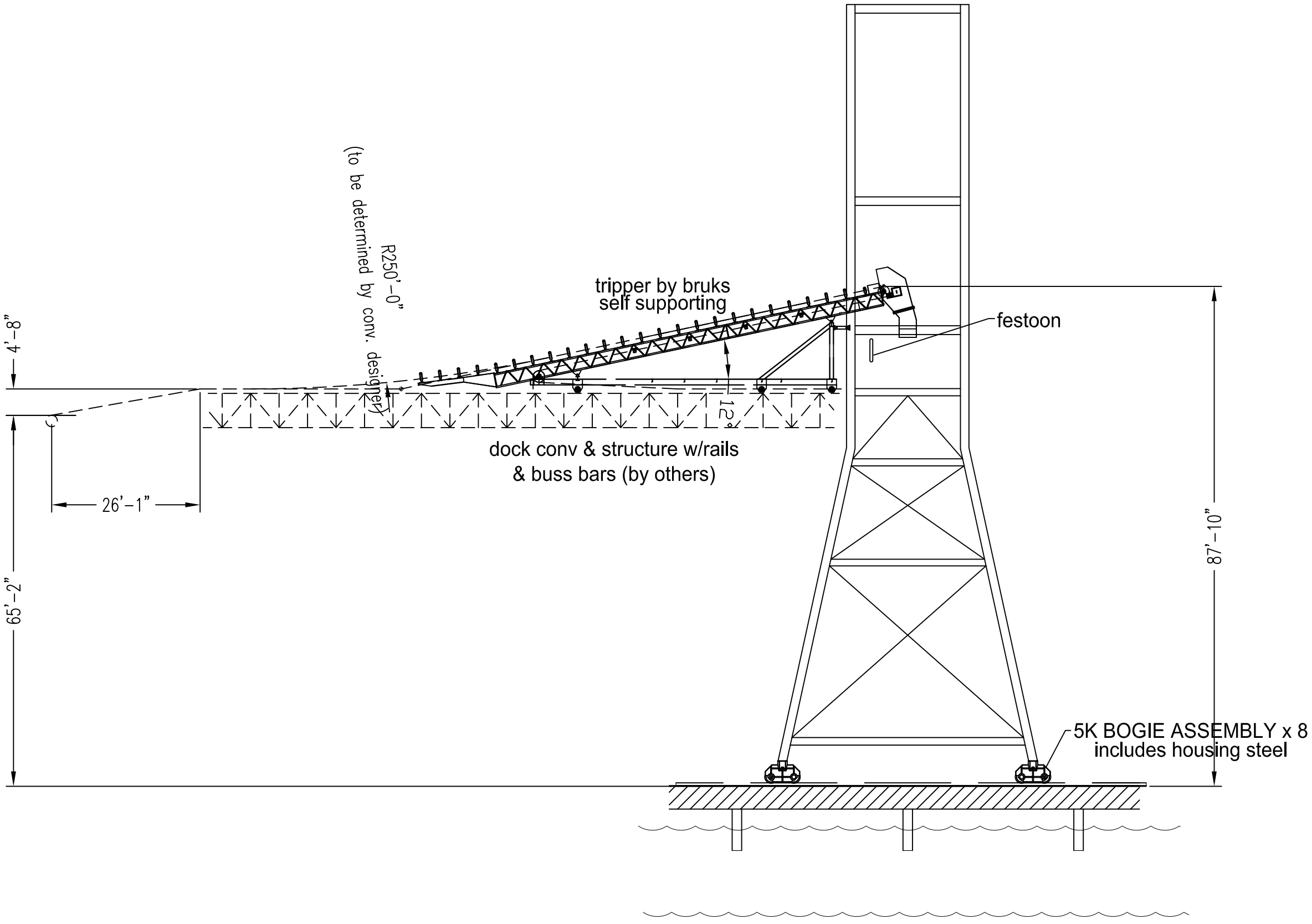
TOLERANCES
FRAC +/- 1/16
.XX +/- .020
.XXX +/- .005
ANGLES +/- 1 DEG

REV.	DATE	BY	DESCRIPTION
P	1/27/16	KH	PROPOSAL

ELEVATION
SHIP LOADER

BRUKS Rockwood

SCALE	DATE 1/27/16
DRAWN BY	APPROVED BY
DESIGNED BY KH	CHECKED BY
REPLACES	SHEET 1 of 1
PROJECT 14-005234	
SHEET SIZE B	DRAWING NO. P1
	REV NO. P



UNLESS NOTED OTHERWISE
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING

WEIGHT (ONE ASSEMBLY)
N/A

UNLESS NOTED OTHERWISE
THIRD ANGLE PROJECTION

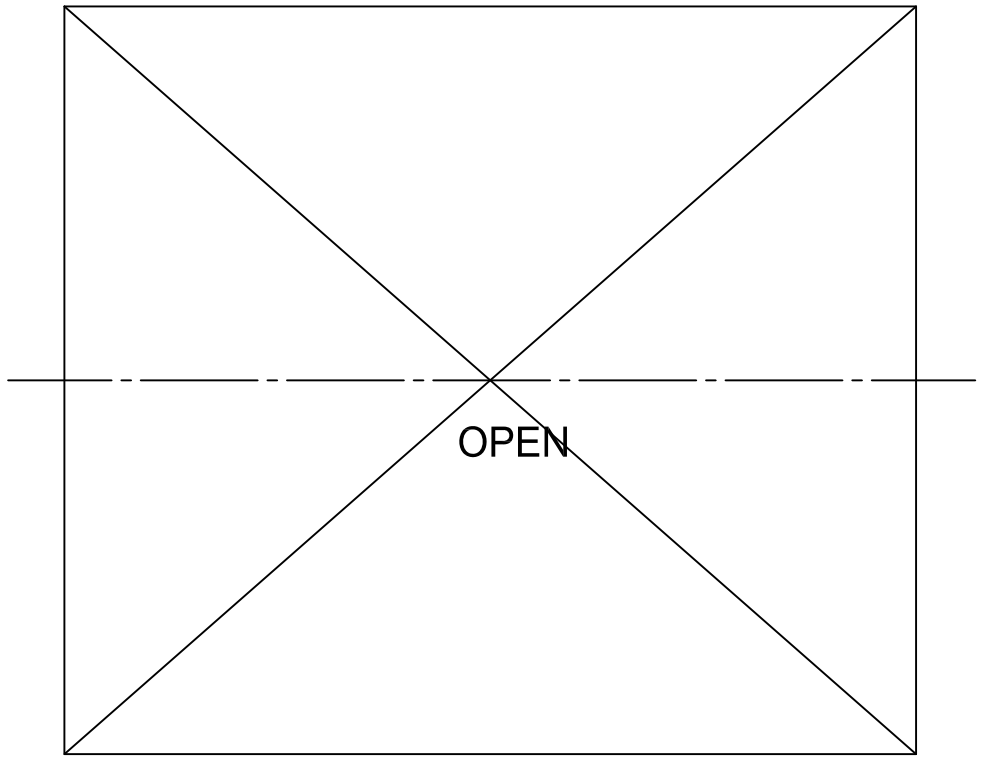
TOLERANCES
FRAC +/- 1/16
.XX +/- .020
.XXX +/- .005
ANGLES +/- 1 DEG

REV.	DATE	BY	DESCRIPTION
P1	2/29/16	KH	GENERAL REVISION
P	1/25/16	KH	PROPOSAL

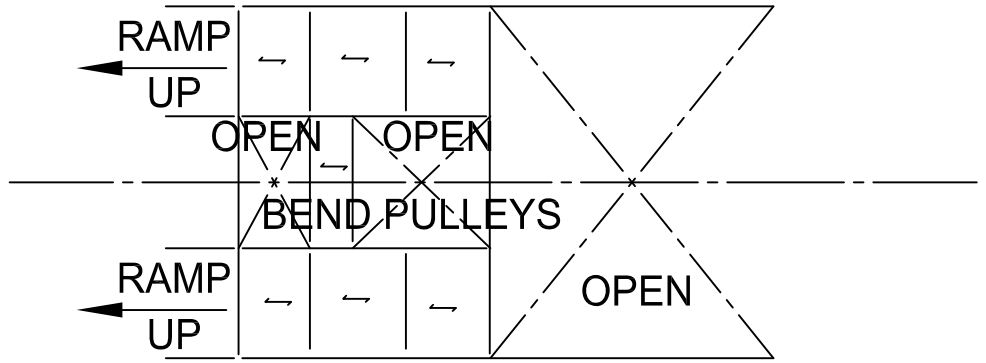
GENERAL ARRANGEMENT
TRIPPER

BRUKS Rockwood

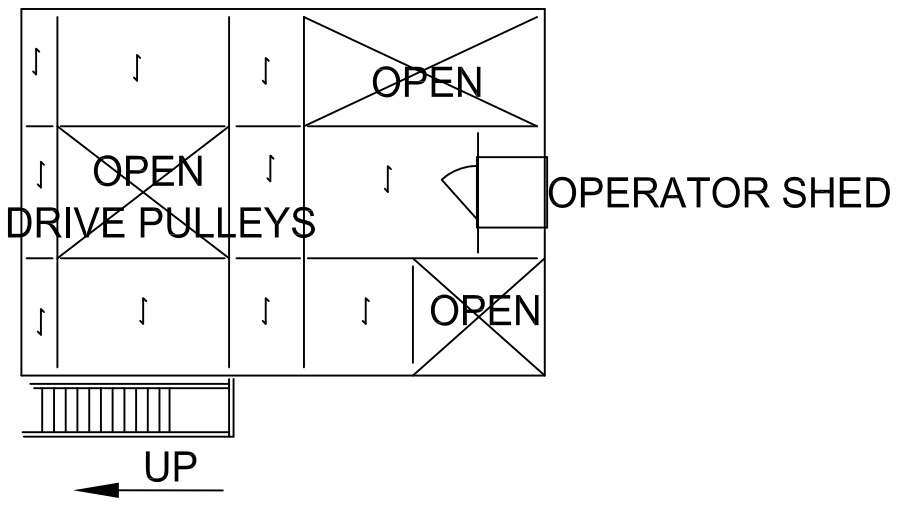
SCALE	DATE 1/25/16
DRAWN BY	APPROVED BY
DESIGNED BY KH	CHECKED BY
REPLACES	SHEET 1 of 1
PROJECT 14-005234	
SHEET SIZE B	DRAWING NO. P21
	REV NO. P1



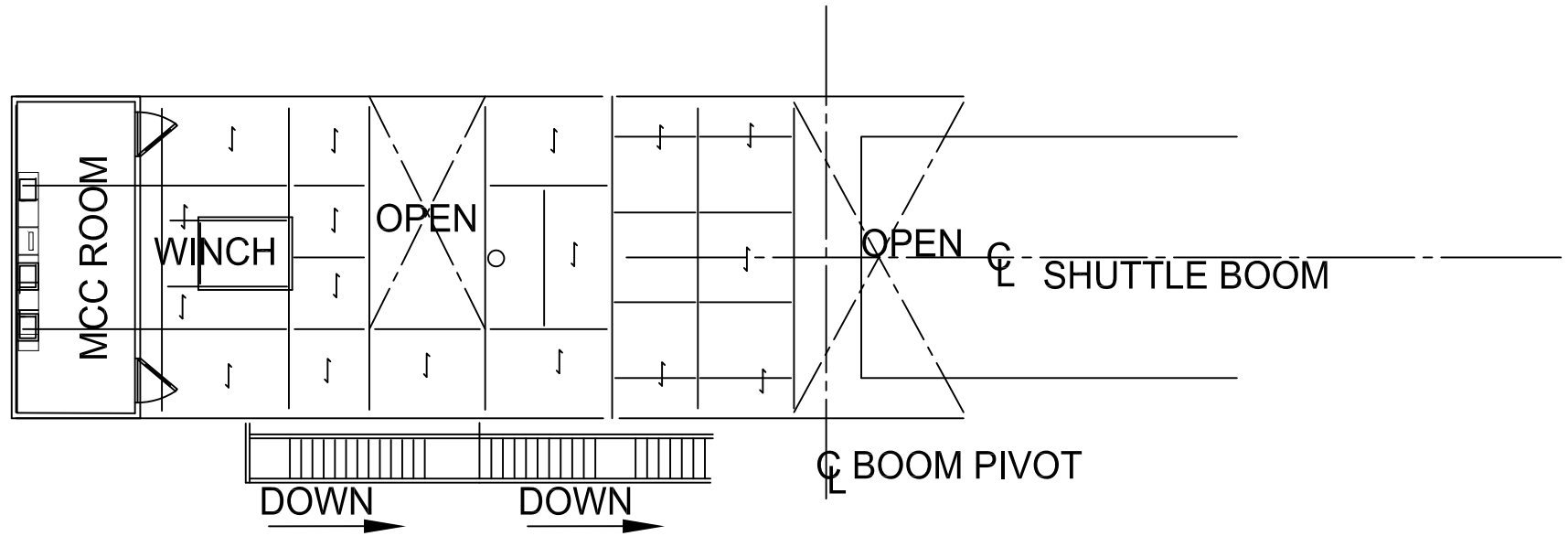
SECTION D-D
(DWG P11)



SECTION F-F
(DWG P11)



SECTION E-E
(DWG P11)



SECTION G-G
(DWG P11)

UNLESS NOTED OTHERWISE
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING

WEIGHT (ONE ASSEMBLY)
N/A

UNLESS NOTED OTHERWISE
THIRD ANGLE PROJECTION

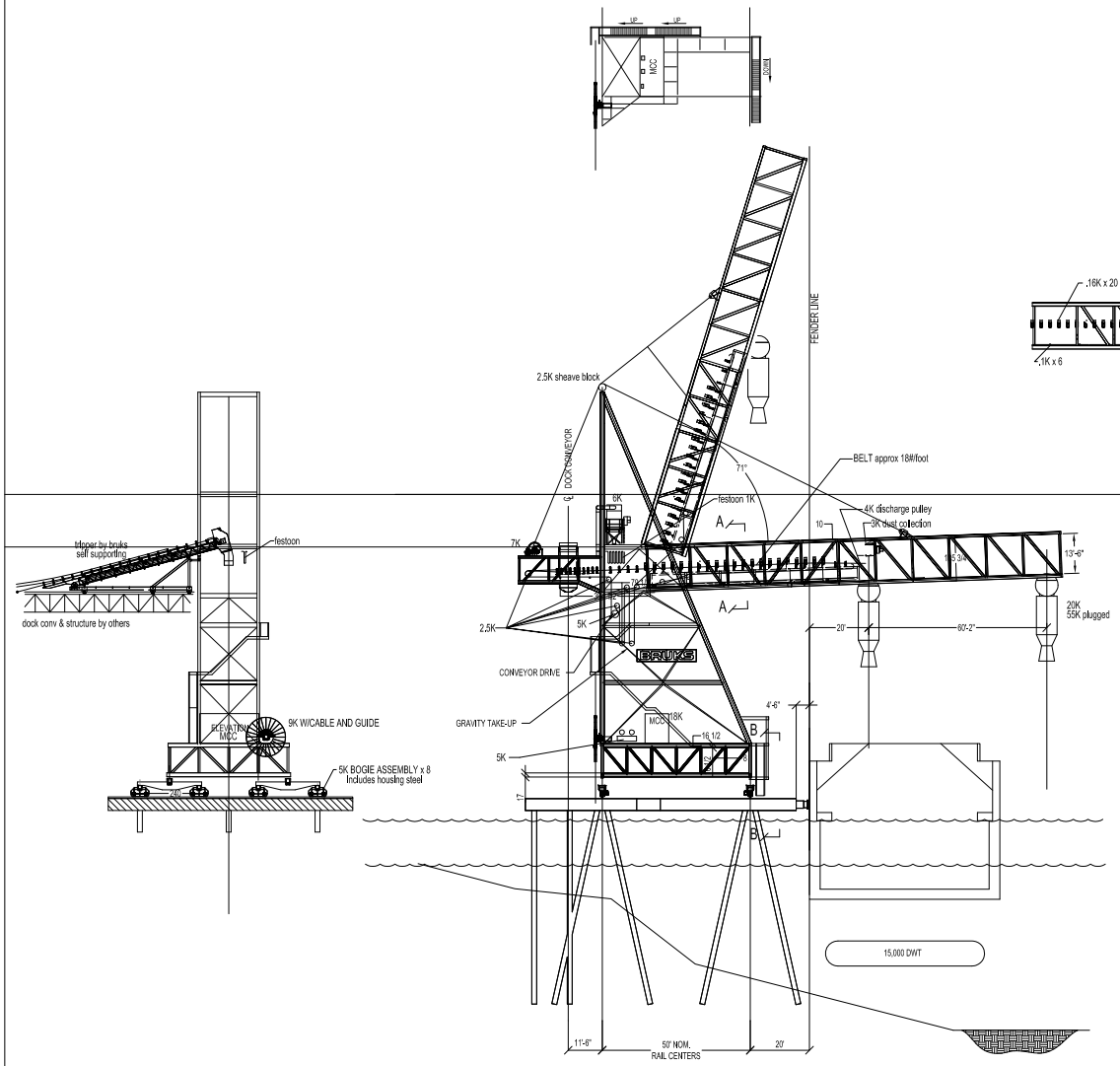
TOLERANCES
FRAC +/- 1/16
.XX +/- .020
.XXX +/- .005
ANGLES +/- 1 DEG

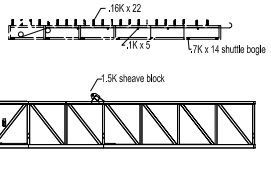
REV.	DATE	BY	DESCRIPTION
P1	2/27/16	KH	GENERAL REVISION
P	1/25/16	KH	PROPOSAL

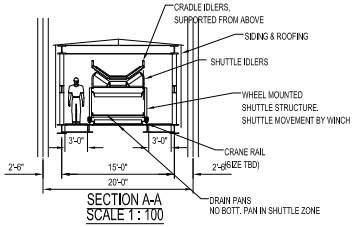
PLAN VIEWS
SHIP LOADER GANTRY

BRUKS Rockwood

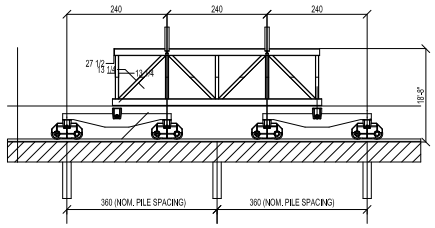
SCALE	DATE 1/25/16
DRAWN BY	APPROVED BY
DESIGNED BY KH	CHECKED BY
REPLACES	SHEET 1 of 1
PROJECT 14-005234	
SHEET SIZE B	DRAWING NO. P31
	REV NO. P1







SECTION A-A
SCALE 1 : 100



SECTION B-B
SCALE 1 : 150

DRAWING NOTE:

1. THIS DRAWING IS FOR ILLUSTRATIVE PURPOSES ONLY, FOR ESTABLISHING ELEVATIONS, INTERFACE POINTS, CLEARANCES, AND STRUCTURAL LOADS.
2. ONLY DIMENSIONS GIVEN ON DRAWING HAVE BEEN APPROVED BY BRUKS.
3. DO NOT SCALE ADDITIONAL DIMENSIONS FROM DRAWING.
4. DOCKS, TOWERS, RAILS, AND OTHER STRUCTURES ARE NOT WITHIN THE SCOPE OF BRUKS ROCKWOOD AND ARE SHOWN AT DESIGN LOCATIONS FROM ORIGINAL DESIGN DOCUMNETS, ACTUAL AS-BUILT CONDITIONS MAY VARY. CLIENT TO VERIFY DIMENSIONS WHICH WILL AFFECT THE POSITION AND OPERATION OF THE SHIP LOADER

VERTICAL DATUM:

ALL ELEVATIONS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM, NAVD1988 AND ARE SHOWN IN FEET,

MEAN HIGH HIGH WATER (M.H.H.W.) = +98.02"

MEAN LOW LOW WATER (M.L.L.W) = +82.87'

VESSEL NOTE:

1. LAYOUT ASSUMES A MINIMUM BALLASTED VESSAL DRAFT OF 16'-5" [5.00m] AT M.H.H.W. TIDAL CONDITION.
2. CLIENT TO CONFIRM VESSEL DIMENSIONS ARE ACCURATE AT GIVEN TIDAL CONDITIONS.

PRELIMINARY
NOT FOR CONSTRUCTION

VESSEL EMPTY ELEVATION VIEW

LOOKING APPROXIMATELY EAST

UNLESS NOTED OTHERWISE
DIMENSIONS ARE IN INCHES
DO NOT SCALE DRAWING
VERSAT (CAD ASSEMBLY)
N/A

UNLESS NOTED OTHERWISE	
THIRD ANGLE PROJECTION	TOLERANCES
	FRAC +/- 1/16
	.XX +/- .020
	.XXX +/- .005
	ANGLES +/- 1 DEG

REV.	DATE	BY	DESCRIPTION
P	1/13/2016	KH	PRELIMINARY

GENERAL ARRANGEMENT / VESSEL LOADING
SHIP LOADER
NORTH VANCOUVER, BC - CWA / FIBRECO

BRUKS Rockwood

DRAWN BY:	KH
CHECKED BY:	AMB
DATE:	1/13/2016
SHEET:	1 OF 1
PROJECT:	14-005234
SHEET SIZE:	D
DRAWING NO.:	kh1
REV. NO.:	P