Port Hardy CCG SAR – Float Replacement
Addendum #2

The following changes / clarifications in the tender documents are effective immediately. This Addendum will form part of the Contract Documents.

Response to Bidders' Inquiries:

Please find below a response to bidder's inquiries received to date.

1. **Does the new timber pile need to be treated with creosote?**

   Yes, the timber piles shall be supplied creosote treated to CAN/CSA –080 full cell creosote treatment to a minimum net retention of 225 kg/cu meter (14 lb/ft3).

2. **Can you please provide the procedure for the installation of the owner supplied anodes?**

   See Amendment #1 below for reference drawing "Anode Installation Instruction". Note that anodes will come with Crosby clamps, and mounting plate to be welded to pile; the cable loop as identified in detail 2 will not be required.

3. **Can you please confirm the weight of the existing gangway that is to be relocated?**

   See Amendment #2 below for reference drawing "New Aluminum Ramp and Apron Sections & Details".

4. **The 75kVA 1PH 600-120/240V epoxy potted transformer is not available according to the manufacturer. The largest available in this configuration is only 50kVA. Please provide further clarification.**

   After consulting several manufacturers, a 75kVA 1ph 600-120/240V transformer is not available. As a substitute, the contractor shall install a 75kVA 1ph 600-120/240V dry-type transformer in the existing electrical room and provide increased cable size from the transformer to a new receptacle cabinet on the trestle. See Amendment #3 and #4 for revised drawings.

5. **Please refer to the following sent by one of the kiosk / TRC manufacturers and provide response:**

   We shipped a few of these cabinets for a small craft harbours project last year that were based on some further detailed drawings (which can be supplied if required). It looks like the Port Hardy project drawings were based off of the same design but some changes have been made. Unfortunately, the updated equipment won't work in the structure as shown as per the following details:

   1. Last year the largest panel in these kiosks was 225A 42 circuit main lug panel. The 400A 30 circuit main breaker panel shown is 12" taller. Allowing for bending space for wires we don't have that extra 12" available in this size of kiosk.
   2. To accommodate a 100A 1P breaker rated to 22kA we would need even more space to accommodate a sub-feed kit.
   3. Only the 20A receptacles are shown as GFCI protected on the drawings. In order to accommodate for GFI protection for the 100A 1P circuit, we would need to install a GFI relay (max 1 pole GFCI breaker is 30A) requiring even more space. In order to

accommodate these changes, we would need to add as least 24" to the height (currently 119" tall) or width (currently 43" wide) or a bit of both.

Please confirm if dimension changes are acceptable as noted.

Applies to all three questions*: dimensions are acceptable as noted. Please coordinate the final location and sizes with the float contractor once final dimensions are available. Although both height and width can be added to the cabinets as required to fit the new equipment, an increase in height would be preferable where possible, provided all receptacles are still at an accessible height.

6. **Please confirm that you guys have obtained the necessary permits for all marine works?**

   DFO-RPSS will be responsible for coordinating with ROEC.

7. **We would like to request for a Geotechnical Report, for more information on the bedrock material.**

   A Geotechnical Report for the work site is not available, however for reference, contractor can review Amendment #5, a Geotechnical Evaluation report for a site across Hardy Bay off Jensen Cove Rd.

8. **Please confirm the value of the owner supplied material (3 ea – Float safety ladder w/ mounting hardware, 6 ea – Zinc Pile Anodes) for insurance purposes.**

   The approximate value of the owner supplied materials are as follows,
   - $1,800.00 total for the three (3) units of Float safety ladder w/ mounting hardware, and
   - $ 600.00 total for the six (6) units of Zinc Pile Anodes.

9. **Refer to electrical specification 26 05 29 PART 3.1.10 - please confirm requirement for seismic documentation and reports as noted as typically seismic is not required for float applications. Should we substitute this requirement for wind sheer resistance reports / design?**

   New equipment in the electrical room shall be seismically secured as required, including the transformer referenced in Response to Bidders' Inquiry #4. There is no requirement for seismic restraint on wharf equipment.

10. **Refer to Addendum No 1, item / response #8 dated Aug. 10, 2020 - Please provide specification as noted in response "See attached supplementary specification for further information".**

    Please see Amendment #6 below.

Amendments:

Please find attached amendments to the drawings.

1. **The following reference drawing set is added: Anode Installation Instructions.**

2. **The following reference drawing set is added: New Aluminum Ramp and Apron Sections & Details (DWG # S01).**

Port Hardy CCG SAR – Float Replacement
Addendum #2

3. **The following drawing is revised DWG 201-01545-00-E004 R3**

4. **The following drawing is revised DWG 201-01545-00-E005 R3**

Please find amendments to the following specifications.

5. **The following reference document is added: Geotechnical Evaluation by Lewkowich Engineering Associates Ltd. (File No. F6903.02).**

6. **The specifications shall be revised to include Section 26 05 31 – Splitters, Junction, Pull Boxes and Cabinets, where the section is read as per below,**

SECTION 26 05 31 – SPLITTERS, JUNCTION, PULL BOXES, AND CABINETS

Part 1 General
1.1 REFERENCE STANDARDS
.1 CSA Group (CSA)
.1 CSA C22.1, Latest Adopted Edition, Canadian Electrical Code, Part 1
1.2 ACTION AND SUBMITTALS
.1 Product Data:
.1 Provide manufacturer s printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Provide shop drawings:

Part 2 Products
2.1 SPLITTERS
.1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
.2 Terminations: main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.
.3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 400 A.
2.2 JUNCTION AND PULL BOXES
.1 Construction: 5052-H32 aluminum or 304/304L stainless steel.
.2 NEMA 4X rated for marine applications.
.3 Covers Flush Mounted: 25 mm minimum extension all around.
.4 Covers Surface Mounted: screw-on turned edge covers.
2.3 CABINETS
.1 Construction: as indicated.

Part 3 Execution
3.1 SPLITTER INSTALLATION
.1 Mount plumb, true and square to building lines.
.2 Extend splitters full length of equipment arrangement except where indicated otherwise.
3.2 JUNCTION, PULL BOXES AND CABINETS INSTALLATION
.1 Install pull boxes in inconspicuous but accessible locations.
.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.
.3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.
3.3 IDENTIFICATION
.1 Provide equipment identification in accordance with Section 26 05 01.

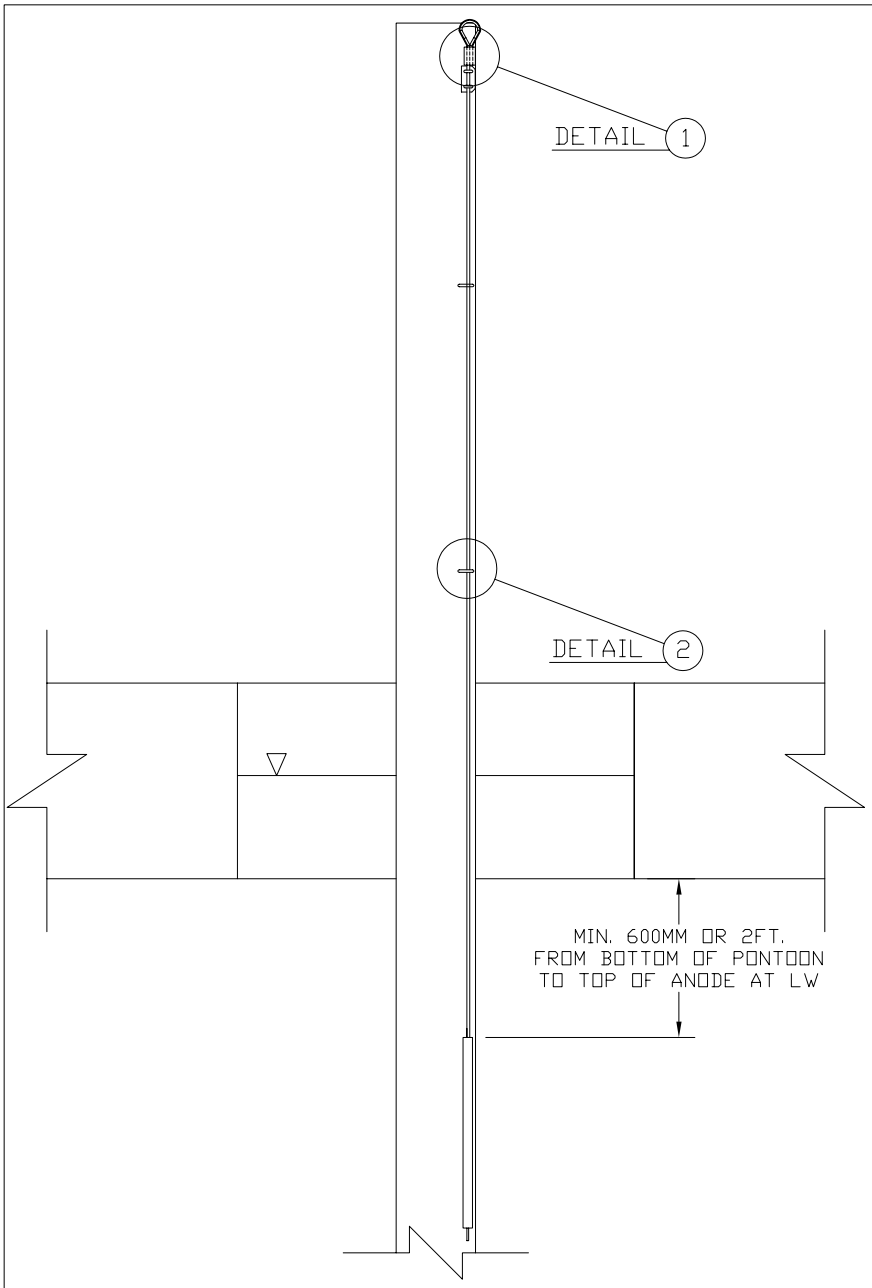
.2 Identification Labels: size 2 indicating system name or as indicated.

END OF SECTION

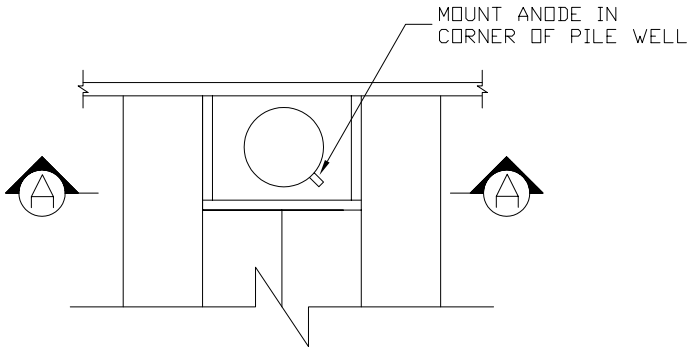
Attachments:

- **Anode Installation Instructions**
- **New Aluminum Ramp and Apron Sections & Details (DWG # S01)**
- **DWG 201-01545-00-E004 R3**
- **DWG 201-01545-00-E005 R3**
- **Geotechnical Evaluation by Lewkowich Engineering Associates Ltd. (File No. F6903.02)**

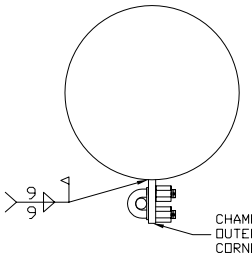
END OF ADDENDUM

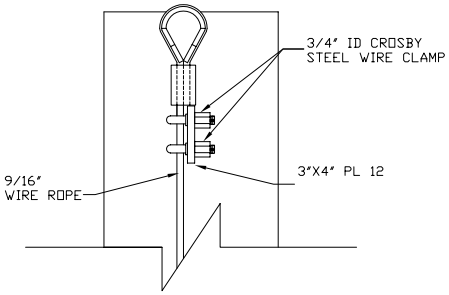


ELEVATION VIEW

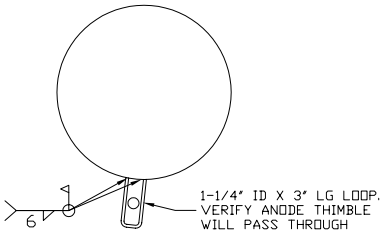


PLAN VIEW





DETAIL 1



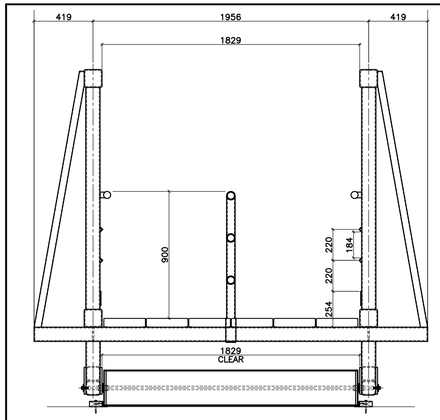
DETAIL 2

Fisheries and Oceans / Pêches et Océans
Small Craft Harbours Branch

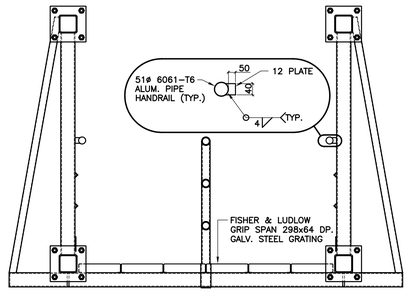
Tel: (604) 666-2226 Fax: (604) 666-7056 MORGAN.MEENTS@DFO-MPO.GC.CA

Title: ANODE INSTALLATION INSTRUCTIONS

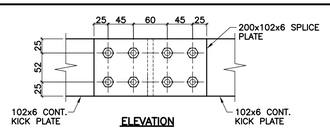
Scale: Not to Scale	Checked By:	Drawn By: MM
Drawn: MAY 23, 2008	Drawing No.: –	



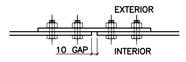
DETAIL (RAMP TO DOCK END)
SCALE 1:20



SECTION (ø SPLICE)
SCALE 1:20

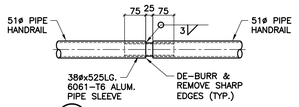


ELEVATION

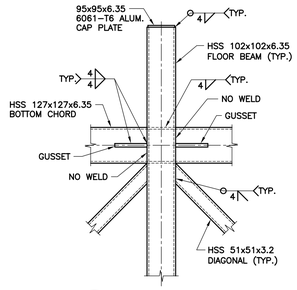


PLAN

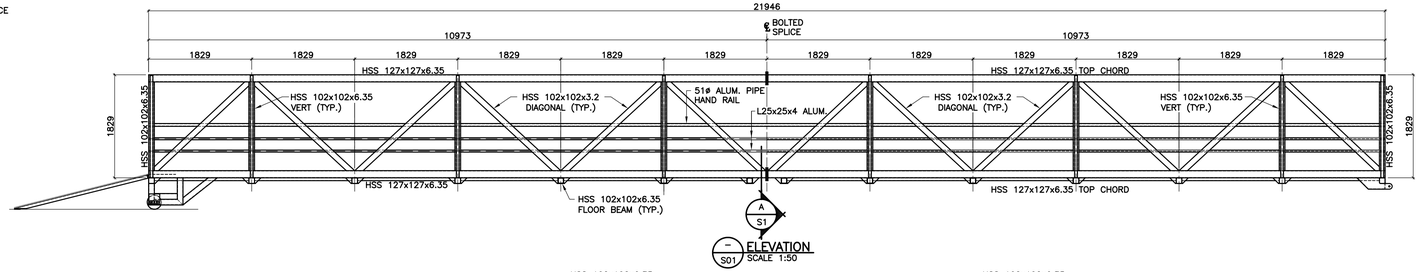
DETAIL (KICK PLATE ø SPLICE)
SCALE 1:10



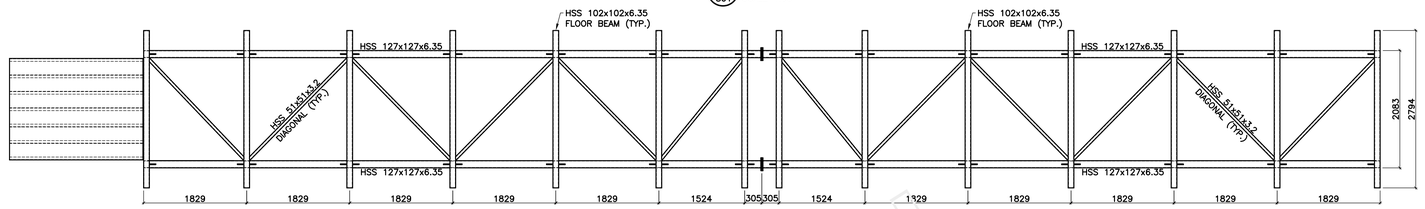
DETAIL (HANDRAIL ø SPLICE)
SCALE 1:10



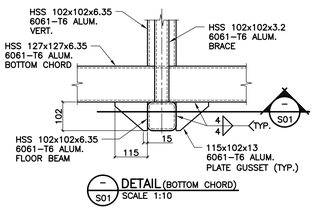
DETAIL (LOOKING UPWARD)
SCALE 1:10



ELEVATION
SCALE 1:50

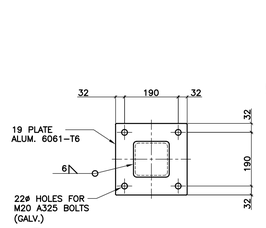


PLAN (LOOKING UPWARD)
SCALE 1:50

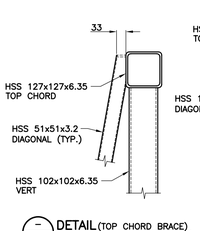


DETAIL (BOTTOM CHORD)
SCALE 1:10

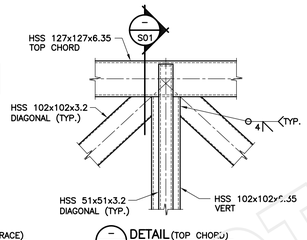
DETAIL (DOCK APRON & TRUSS ROLLER)
SCALE 1:10



DETAIL (TYP. TOP & BOTT. SPLICE PLATE)
SCALE 1:10



DETAIL (TOP CHORD BRACE)
SCALE 1:10



DETAIL (TOP CHORD)
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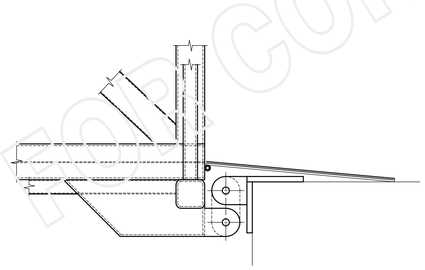
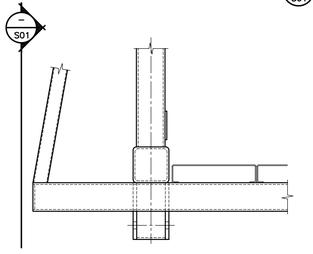


DETAIL (RAMP – WHARF CONNECTION)
SCALE 1:10



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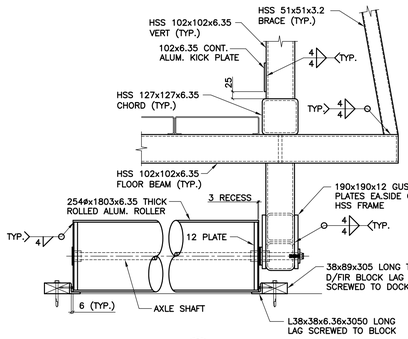
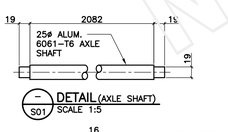
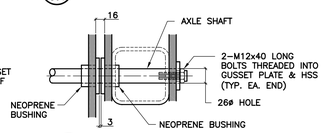


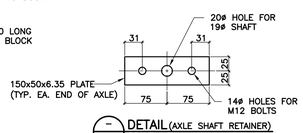
DETAIL (TRUSS ROLLER)
SCALE 1:10



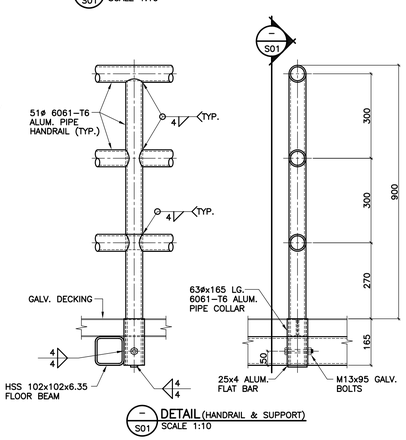
DETAIL (AXLE SHAFT)
SCALE 1:5



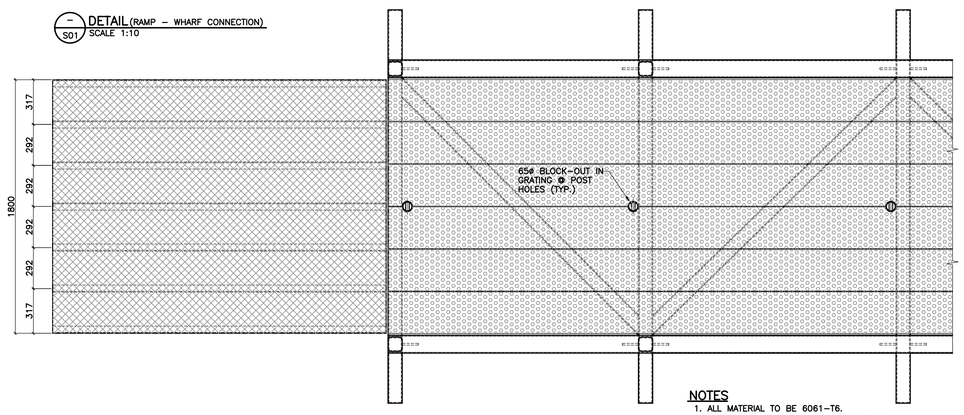
DETAIL (AXLE SHAFT ASSEMBLY)
SCALE 1:5



DETAIL (AXLE SHAFT RETAINER)
SCALE 1:5



DETAIL (HANDRAIL & SUPPORT)
SCALE 1:10



PART PLAN (RAMP – DOCK APRON)
SCALE 1:20

NOTES
1. ALL MATERIAL TO BE 6061–T6.
2. FABRICATION TO BE TO CAN3–S157–M83.
3. ALL WELDING TO BE DONE TO REQUIREMENTS OF CSA S 244.
4. WELDING OPERATORS AND PROCEDURES SHALL BE TO CSA W47.2
5. ALL GALVANIZED COMPONENTS SHALL CONFORM TO CSA G164–M.
6. ALL SHARP EDGES TO BE GROUND SMOOTH.
7. DESIGN LIVE LOAD : 4.8 kPa (100 psf).

NO.	DATE:	REVISION:

HEROLD ENGINEERING LIMITED
Consulting Engineers
#202 – 572 Stewart Avenue, Nanaimo, BC V9S 5T5
Telephone: 250–741–8551 Facsimile: 250–741–8553
Email: mail@heroldengineering.com

DISTRICT OF PORT HARDY
7360 Columbia Street Box 68 Port Hardy BC Canada V0N 2P0
Telephone (250)949-6688 Fax (250)949-7433 Email general@porthardy.ca

DISTRICT OF PORT HARDY
SEAGATE WHARF RAMP
PORT HARDY
BRITISH COLUMBIA

NEW ALUMINUM RAMP AND APRON SECTIONS & DETAILS

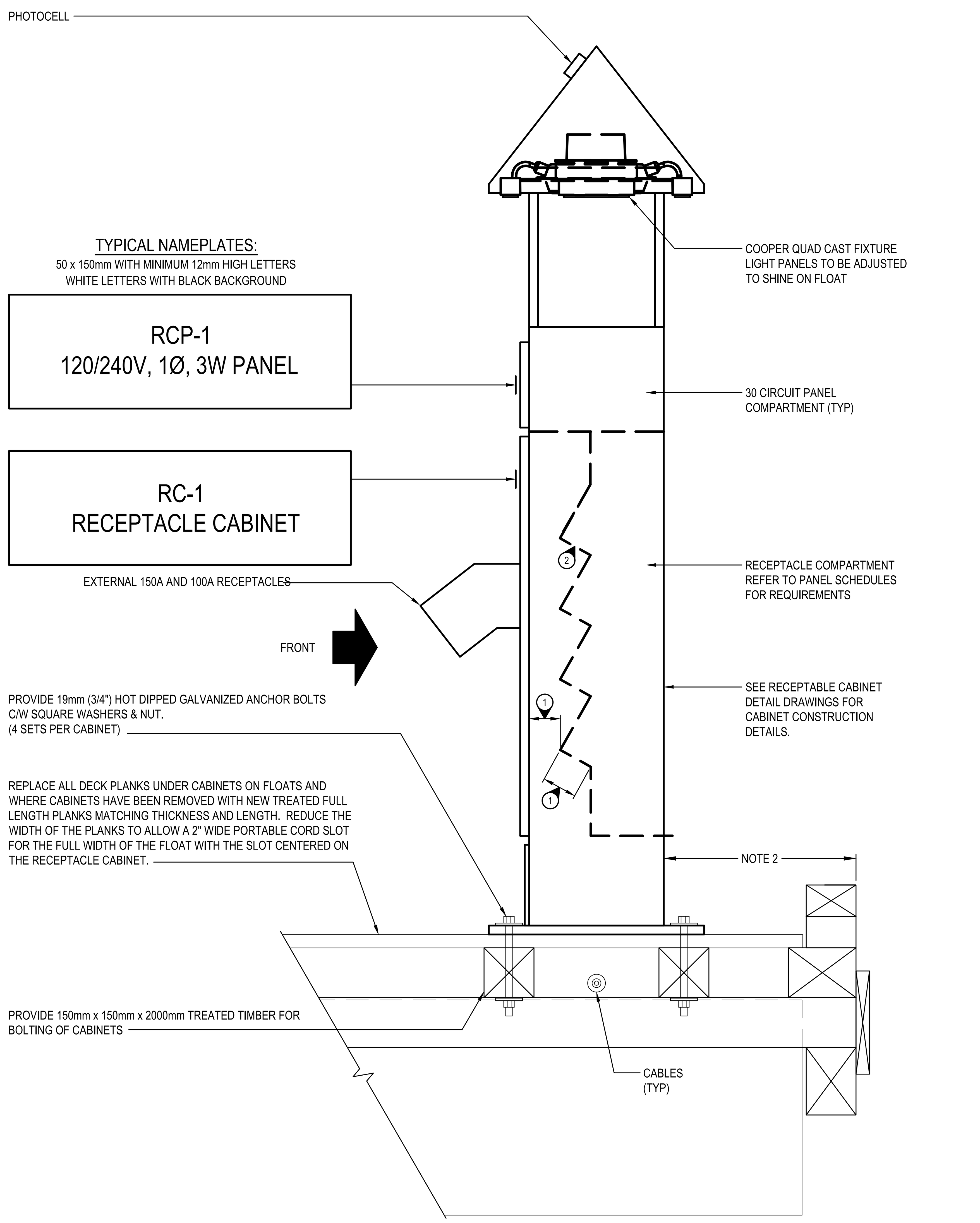
SCALE: AS SHOWN	ENGINEER'S STAMP
DATE: 20OCT03	
DESIGNED BY: BRB	
REVIEWED BY: BRB	
DRAWN BY: SL	DWG NO. S01
CHECKED BY: BRB	
JOB NO. 1175–001	DWG NO. 1 OF 1
	REVISION NO.

NOTES:

1. CONTRACTOR SHALL SIZE KIOSK DIMENSIONS AS REQUIRED TO FIT EQUIPMENT.

KEYNOTES:

1. MODIFY RECEPTACLE MOUNTING PLATE LOCATION AND DIMENSIONS TO ACCOMMODATE ALL RECEPTACLES AND THEIR CORRESPONDING PLUG AND CABLE ASSEMBLIES.
2. RECEPTACLE SHALL BE SINGLE, TWIST LOCK MARINE GRADE, WITH MELAMINE BODY AND NYLON FACE, UNLESS OTHERWISE NOTED WITHIN THE PROJECT DOCUMENTS



1 / E004 DETAIL - TRANSFORMER AND RECEPTACLE CABINET (TRC) ON FLOAT - FRONT VIEW

SCALE: NTS

FISHERIES AND OCEANS CANADA

REAL PROPERTY AND SAFETY AND SECURITY

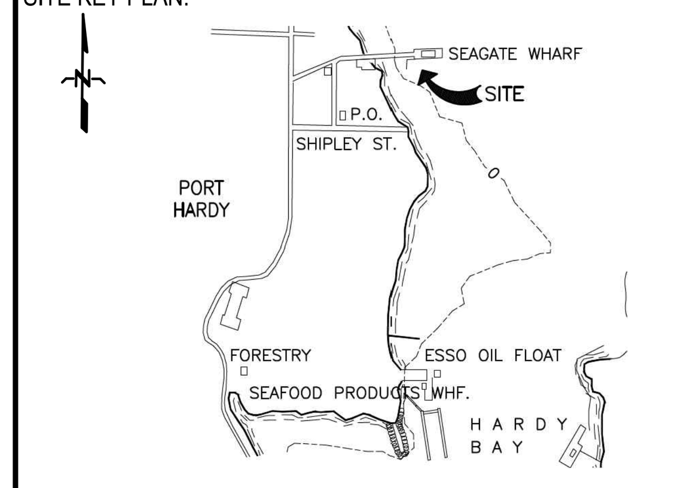
wsp

301-3600 Uptown Blvd
Victoria BC, Canada
V8Z 0B9
T+1 250-384-5510
F+1 250-386-2844
wsp.com

PRELIMINARY

NOT FOR CONSTRUCTION

SITE KEY PLAN:



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. RITCHIE
46836

2020-08-12

DO NOT SCALE DRAWINGS

Revision/Revision	Description/Description	Date/Date
5		
4		
3	RE-ISSUED FOR TENDER	2020/08/12
2	ISSUED FOR TENDER	2020/05/27
1	ISSUED FOR CLIENT REVIEW	2020/04/30
0	ISSUED FOR INTERNAL REVIEW	2020/04/16

Client/client

FISHERIES AND OCEANS CANADA

401 BURRARD STREET, SUITE 200
VANCOUVER, BC

Project title/Titre du projet

Canadian Coast Guard Station
Port Hardy, B.C.

PORT HARDY CCG SAR
Float Electrical Equipment Consolidation

Approved by/Approuve par
WYATT RITCHIE

Designed by/Concept par
SHIVA AHMADI

Drawn by/Dessine par
S.A.

PWGSC Project Manager/Administrateur de Projets TPSGC

PWGSC, Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSGC

Client/client
DFO

Drawing title/Titre du dessin

ELECTRICAL TRANSFORMER RECEPTACLE CABINET DETAILS

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
201-01545-00	E004 5 OF 6	3

PWGSC – A1 – 841X594

0 10 20 30 40 50 60 70 80 90 100mm

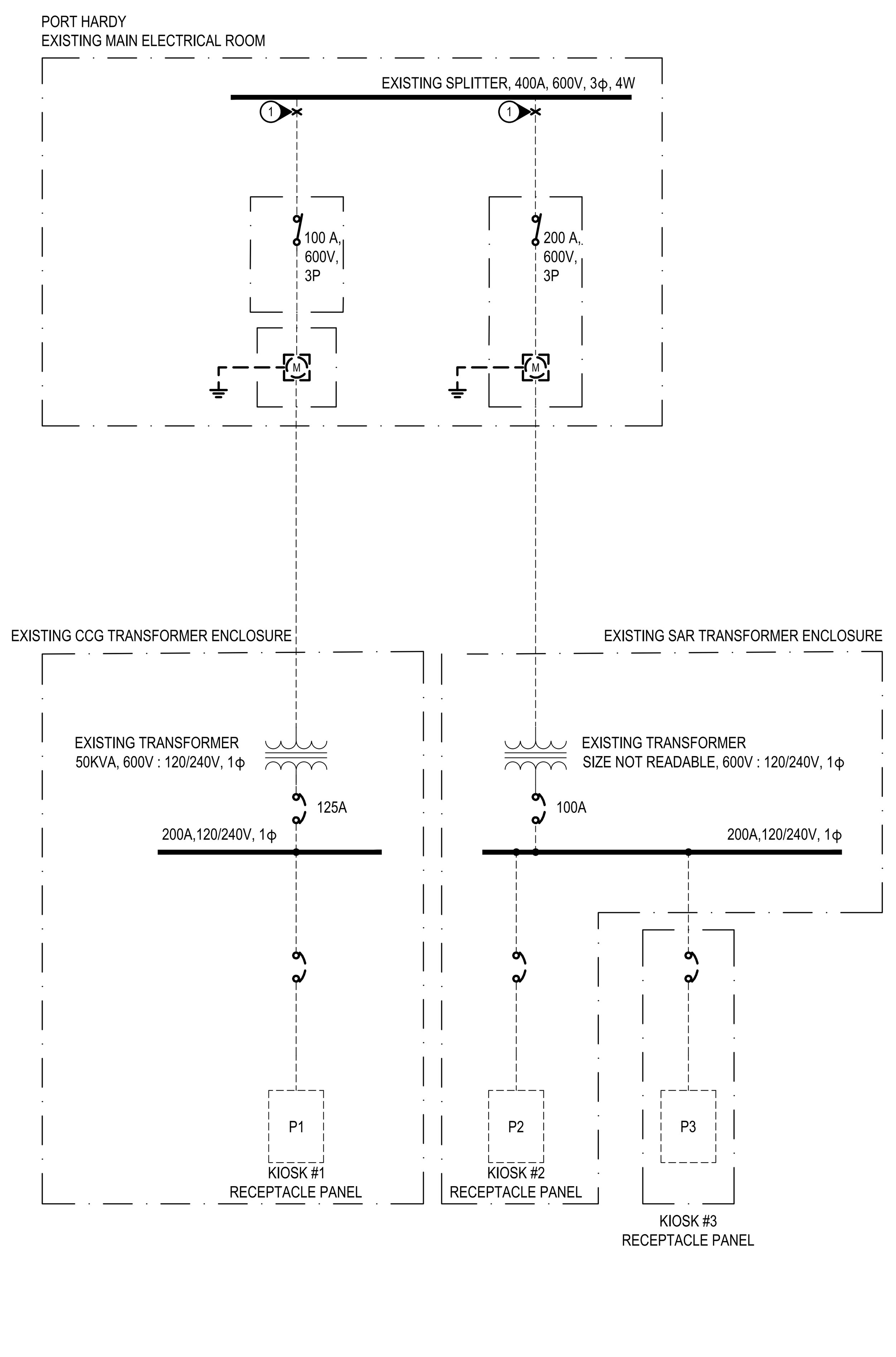
XT-PWGSCA1

SLD - KEYNOTES:

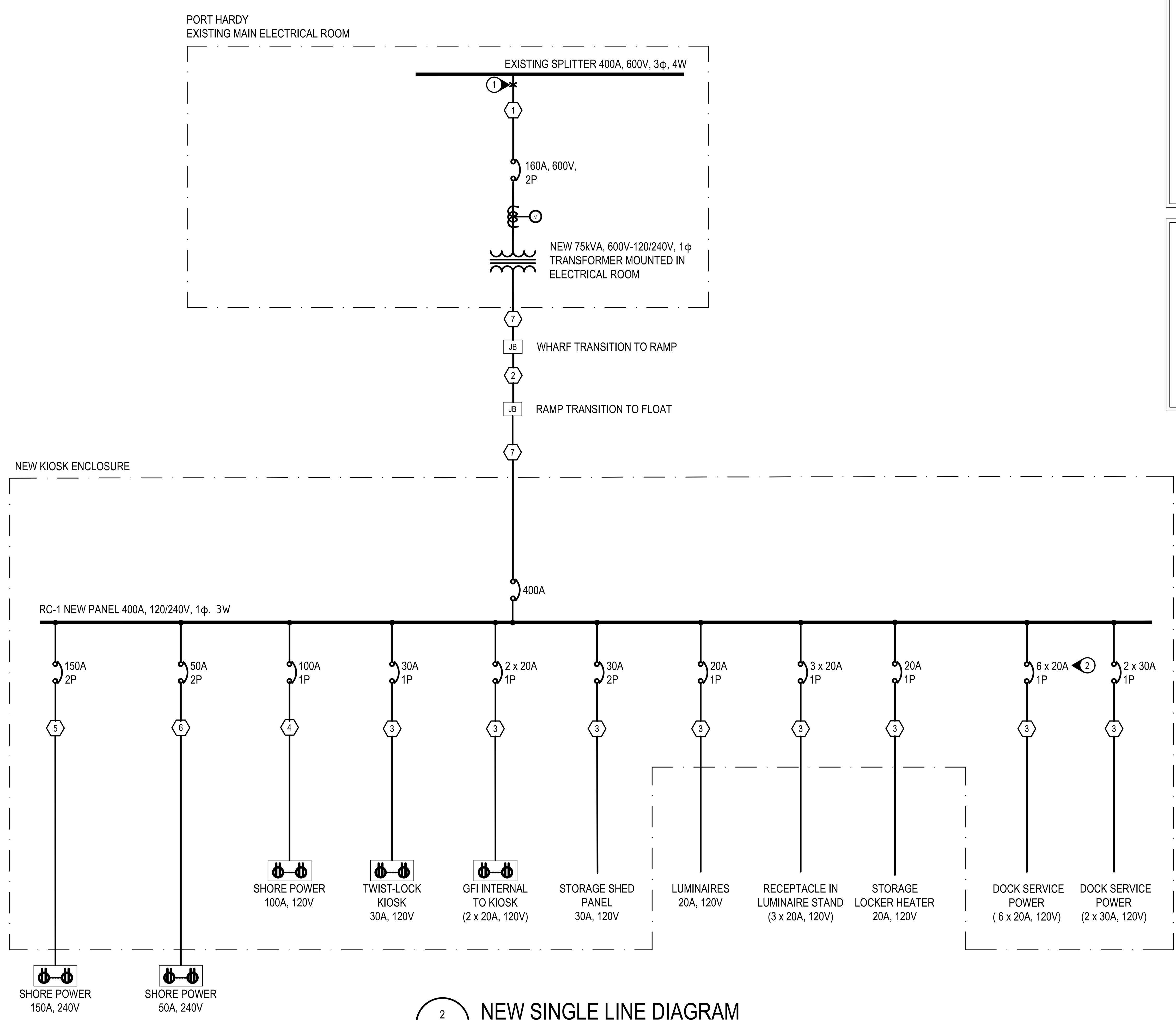
1. CONTRACTOR SHALL COORDINATE DISCONNECT WITH HARBOUR MASTER TO ENSURE IMPACT OF POWER OUTAGE IS MINIMIZED.
2. "# x XXA" INDICATES MULTIPLE BREAKERS AND FEEDERS CORRESPONDING TO '#', SIZED AS PER 'XX'.
3. LOAD CALCULATIONS TAKE INTO ACCOUNT THAT ONLY TWO VESSELS CAN BE PHYSICALLY DOCKED AT ONCE.
4. EXISTING SINGLE LINE DIAGRAM IS APPROXIMATE ONLY. CONTRACTORS SHALL VERIFY EXISTING ALL SINGLE LINE DIAGRAM COMPONENTS AND CONNECTIONS BEFORE DISCONNECTING AND DEMOLISHING EQUIPMENT.

FEEDER SCHEDULE:

1. 3C #2/0 TECK CABLE
2. 2 X 3C #3/0 TYPE G IN RPVC CONDUIT
3. 3C #10 AWG TECK
4. 3C #3 AWG CU
5. 3C #1/0 AWG CU
6. 3C #8 AWG CU
7. 2 x 3C 3/0 AWG CU



1 E005 EXSITING SINGLE LINE DIAGRAM
SCALE: N.T.S.



2 E005 NEW SINGLE LINE DIAGRAM
SCALE: N.T.S.

New PANEL: RC-1

Location:	WHARF KIOSK	VOLTAGE	120/240 V
Supply From:	MAIN ELECTRICAL ROOM	PHASES	1 Ø
Mounting :		WIRE	3
Enclosure:	NEMA 3X	CIRCUITS	30
BUS RATING:	400A	MAIN BRKR:	400A

CCT No	Load Description	Type	BRK SIZE	A	B	BRK SIZE	Type	Load Description	CCT No
1	SHORE POWER	REC.	150			20	REC.	DOCK SERVICE POWER	2
3						20	REC.	DOCK SERVICE POWER	4
5	SHORE POWER	REC.	50			20	REC.	DOCK SERVICE POWER	6
7						20	REC.	DOCK SERVICE POWER	8
9	TWIST LOCK KIOSK	REC.	30			20	REC.	DOCK SERVICE POWER	10
11	GFI INTERNAL KIOSK	REC.	20			20	REC.	DOCK SERVICE POWER	12
13	GFI INTERNAL KIOSK	REC.	20			30	REC.	DOCK SERVICE POWER	14
15	STORAGE SHED PANEL	PNL	30			30	REC.	DOCK SERVICE POWER	16
17						100	REC.	SHORE POWER	18
19	LUMINAIRES	LTG.	20						20
21	SPARE LUMINAIRES CIRCUIT	SPR	20						22
23	SPARE LUMINAIRES CIRCUIT	SPR	20						24
25	SPARE LUMINAIRES CIRCUIT	SPR	20						26
27	STORAGE LOCKER HEATER	HTR.	20						28
29									30

3 E005 PANEL SCHEDULES
SCALE: N.T.S.

Load Calculations:

Receptacle count	rec'pt	qty	amps	volts	ph	kW	mult	Total kW
1st 4 highest rated		1	150	240	1	36.0	1.00	36.0
		1	50	240	1	12.0	1.00	12.0
		2	30	120	1	7.2	1.00	7.2
Next 4 highest rated		1	30	120	1	3.6	0.65	2.3
		3	20	120	1	7.2	0.65	4.7
Next 5 highest rated		5	20	120	1	12.0	0.50	6.0
Next 16 highest rated		2	20	120	1	4.8	0.25	1.2
		0	0	0	1	0.0	0.25	0.0
Next 20 highest rated							0.20	
Next 20 highest rated							0.15	
Remaining receptacles							0.10	
Total plug/receptacles		**15**						69.4
LED Lighting Fixture	55W	3	20	120	1	0.1	1.00	0.3
Storage Shed Panel		1	30	240	1	7.2	0.60	4.3
Estimated load								**74.0**
Load at Service Entrance		**240** volts		**1** ph		**309** amps		

FISHERIES AND OCEANS CANADA
REAL PROPERTY AND SAFETY AND SECURITY

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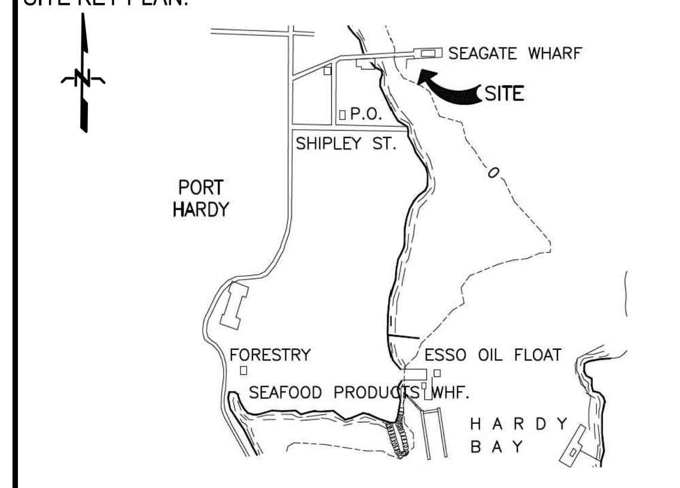
Victoria BC, Canada
V8Z 0B9
T+1 250-384-5510
F+1 250-386-2844
wsp.com

PRELIMINARY
NOT FOR CONSTRUCTION

SITE KEY PLAN:



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
W. L. RITCHIE
46836
2020-08-12

DO NOT SCALE DRAWINGS

Revision/Révision	Description/Description	Date/Date
5		
4		
3	RE-ISSUED FOR TENDER	2020/08/12
2	ISSUED FOR TENDER	2020/05/27
1	ISSUED FOR CLIENT REVIEW	2020/04/30
0	ISSUED FOR INTERNAL REVIEW	2020/04/16

Client/client
FISHERIES AND OCEANS CANADA
401 BURRARD STREET, SUITE 200
VANCOUVER, BC

Project title/Titre du projet
Canadian Coast Guard Station
Port Hardy, B.C.

PORT HARDY CCG SAR
Float Electrical Equipment Consolidation

Approved by/Approuvé par
WYATT RITCHIE

Designed by/Concept par
SHIVA AHMADI

Drawn by/Dessiné par
S.A.

PWGSC Project Manager/Administrateur de Projets TPSGC

PWGSC, Architectural and Engineering Resources Manager/Ressources Architectural et de Directeur d'ingénierie, TPSGC

Client/client
DFO

Drawing title/Titre du dessin
SINGLE LINE DIAGRAMS AND SCHEDULES

Project No./No. du projet	Sheet/Feuille	Revision no./La Révision no.
201-01545-00	E005	3
	6 OF 6	

PWGSC – A1 – 841X594
XT-PWGSCA1

GEOTECHNICAL EVALUATION

for
CANADIAN COAST GUARD
DEPARTMENT OF FISHERIES AND OCEANS
OCEAN PROTECTION PLAN DEPOT

JENSEN COVE ROAD, PORT HARDY, BC

Prepared for:

MR. DON STORRY
DFO, SUPERVISOR REPONSE
RICHMOND, BC

Prepared by:

Mr. John Hessels, AScT, and Mr. Louis Chapdelaine, P.Geo

Reviewed by:

Mr. Chris Hudec, M.A.Sc.,P.Eng

of

Lewkowich Engineering Associates Ltd.

File No. F6903.02

Table of Contents

1. INTRODUCTION

As requested, Lewkowich Engineering Associates Ltd. (LEA) evaluated the subsurface conditions relating to the proposed ramp abutment and dock pile support structures. The purpose of this work was to provide information to allow for the detailed design of the waterside infrastructure. A previous report no. F6903.01 was completed by LEA for the landside works entitled "Geotechnical Assessment – Landside" Dated September 3, 2019.

This report was prepared in general accordance to the LEA proposal P3740 and subsequent email revisions to date. Written authorization to proceed with the work was received on July 22, 2019 from Mr. Don Storry, P.Eng. Senior Project Engineer, Real Property and Technical Support Division, Fisheries and Oceans Canada, Pacific Region, PO # F1802-180075.

2. ASSESSMENT OBJECTIVES

Our assessment, as summarized within this report, is intended to meet the following objectives:

i. Determine the subsurface characteristics through a subsurface drilling program for use in the design of the waterside infrastructure. We understand SNC Lavalin has been retained to provide the water side dock and ramp design for the facility.

ii. Identify any geotechnical deficiency that might impact the design and construction of the development, and prescribe the geotechnical works and any changes in the standards of the design and construction of the development that are required to ensure the land buildings, and works and services are developed and maintained safely for the use intended, and;

iii. Acknowledge that the Approving and/or Building Inspection Officers may rely on this report when making a decision on application for the development of the land.

3. ASSESSMENT METHODOLOGY

a. A preliminary site review was completed in concert with SLR Contracting on June 20, 2019. This review included hand core drilling in the foreshore area to determine depth of bedrock weathering and also to gather underwater information from the divers with respect to depth to bedrock and thickness of surficial soils over the proposed dock area.

b. Resonant sonic drilling with a 150 diameter casing and 75mm core size was conducted on August 19th to the 21st, 2019 to further characterize the sub surface soils and bedrock stratigraphy at depth. A Borehole Site Plan drawing F6903-03 shows the borehole locations. Two continuous rock core samples reaching to a depth of 14.2m (BH01-19) and 11.1m (BH01-20) were recovered.

c. The samples were then analyzed to determine details for the attached Rock Core logs BH01-19 and BH02-19 which include Core Recovery %, Core Condition, Discontinuity Spacing, RQD, Intact Rock Strength and Weathering.

d. Samples were also sent to Golder and Associates on September 12th, 2019 for Compressive/Poissons (2 samples per hole) and Brazilian Tests (2 samples per hole) to provide further strength data of the rock.

4. SITE CONDITIONS

4.1. General

a. The subject site consists of an industrial lot off Jensen Cove Road in Port Hardy, BC. The water side portion of the site is currently developed with significant fills and older ramp and dock structure that is partially deconstructed.

b. The natural topography of the foreshore area consists of moderately undulating igneous bedrock on a 4:1 inclination rising out of the Bay. Outside of the natural foreshore, the existing dock abutment includes up to a 6.5m thickness of sand and gravel protected with

100 to 250 kg class rock rubble infill into the bay. The proposed piling area shows a moderately sloped igneous bedrock ocean bottom with approximately a 0.6m thickness of rock rubble with some sediments on top. See attached Drawing F6903-03 showing estimated depths from LLWL to bedrock along the dock extent.

b. Overall, the lower portion of the site has been filled substantially over the bedrock to provide a flat area that is gently inclined down toward the ocean.

4.2. Soil Conditions and Bedrock

a. The soil strata observed in the two boreholes consisted of a 6.5m thickness of compact sand and gravel/ rock rubble fill over bedrock. Bedrock borehole samples were recovered and placed in core boxes to be reviewed by the Geologist at our office in Nanaimo, BC. Soils beyond the abutment fills and under the proposed dock consisted of a thin layer (0.6m) of 75mm minus rock rubble (Geyserite) likely spilled from barge loading operations.

b. Bedrock was cored at depth in two locations as shown on the appended Borehole Site Plan F6903-01. Rock Core Logs are appended at the end of this report. The rock is primarily characterized as amygdaloidal basalt from the Upper Karmutsen Formation formed during the Upper Triassic period. Basalt: medium to Dark grey-green, aphantic to plagioclase-phyric basalt flows, commonly amygdaloidal and locally exhibiting laminar flow features (vesicle trains) and pipe vesicles.

c. The Rock Core logs can be summarized as:

    i. Medium strong (25 - 50 mpa), very poor to excellent quality (RQD values ranged from 0 -92%). From the borehole logs, RQD values, core condition and discontinuity spacing the rock exhibits numerous discontinuities suggesting that the rock quality is relatively poor to fair

    ii. Based on the recovered core samples, the rock types can be described as a dark-grey

to light-green, amygdaloidal, plagioclase-phyric BASALT. Weathering characteristics ranged from fresh to completely weathered.

iii. From the examination of the core samples, a short section of "very broken" core, with evidence of clay gouge was identified. This suggests that a short possibly weak clay infilled layer may be present at this depth, that was subject to minor, localized faulting.

4.3 Groundwater Conditions

Groundwater levels in the boreholes were consistent with tidal influence of the adjacent ocean. Other groundwater flows from upland areas would likely flow or be perched atop of the original bedrock surface.

4.4 Shoreline Erosion

The natural foreshore is made up of igneous bedrock with a gentle to moderate inclination. Shoreline erosion is considered low to very low with very little recession of the bedrock expected over the 100 year life of the proposed structure. The developed portions of the shoreline show igneous rock rubble of varying sizes with some migration of materials seaward over time. We understand that the proposed works will include a revetment design provided by others that would be suitable for the intended use.

5. Acknowledgements

Lewkowich Engineering Associates Ltd. acknowledges that this report has been prepared for and at the expense of the Owner of the subject land. Lewkowich Engineering Associates Ltd. has not acted for or as an agent of the Governing Authority in the preparation of this report.

6. Closure

Lewkowich Engineering Associates Ltd. appreciates the opportunity to be of service on this project. If you have any comments, or if we can be of further service, please contact us at your convenience.

Respectfully Submitted,
Lewkowich Engineering Associates Ltd.

John Hessels, AscT
Senior Technologist

Louis Chapdelaine, P.Geo
Project Geoscientist

Reviewed by:

Chris Hudec, M.A.Sc., P.Eng
Senior Project Engineer

7. ATTACHMENTS

a. LEA Drawing F6503-03 Borehole Site Plan

b. LEA Rock Core Logs, BH19-01 and BH19-02

c. LEA Drawing F6503-04, Subsurface Profile – Dock and Abutment

8. REFERENCES

a. Lewkowich Engineering Associates Ltd., "*Geotechnical Assessment – Landside"*, September 3rd, 2019, File 6903.02

b. SNC Lavalin, "*General Arrangment",* July18, 2019, Project No. 666024, Sheet 001, Rev. PA.


BH19-01
BH19-02
TP19-01
TP19-02
TP19-07
TP19-03
TP19-06
TP19-05
TP19-04

ROCK CORE LOG

TEST HOLE No. SH19-01

Lewkowich Engineering Associates Ltd.

Job Number: F6903

Project: JENSEN COVE ROAD, PORT HARDY, BC		Elevation: N/A
Driller: DRILLWELL	Method: SONIC	Dates: 2019-08-20
Hole Orientation: N/A	Logged By: LC	Date: 2019-09-08

Drilling Details (▼ Water Table)	Depth (m)	Core Recovery %	Core Condition	Discontinuity Spacing	R.Q.D.	Intact Rock Strength	Weathering	Structural Discontinuity Description	Rock Symbol	Rock Mass Description	Tests
	6.8										
		95	V.BROKEN	20	29%	R3	SW - MW	Rough, with Rust Stained infill		plagioclase-phyric BASALT dark-grey with hematitic staining aphanitic with porphyritic texture	N/A
	7.5		SOLID - BROKEN	06	92%						
	8.0		BROKEN - V. BROKEN	14	33%	R2 - R3					
	9.5		SOLID - BROKEN	03	75%		SW				
	10.7	80	BROKEN	13	37%	R4	F - SW	Rough, with joints and veins infilled with Calcite and/or Quartz		amygdaloidal BASALT grey-green vesicular to amygdaloidal aphanitic with epidote filled veins	N/A
	12.6	90		09	55%	R3	F	Rough to smooth, with joints infilled with Calcite and/or Quartz and Epidote		plagioclase-phyric BASALT dark-grey with hematitic staining aphanitic with porphyritic texture	
	13.7	60	SHATTERED	26	0%						
	14.2									14.2m END OF HOLE	

CORE RECOVERY

Length of core run / core run x 100

R.Q.D.

Sum core lengths >100mm / length of core run x 100

DISCONTINUITY SPACING
No. of fractures/m

ROCK STRENGTH (MPa)	
R0 Extremely weak	<1
R1 Very weak	1-5
R2 Weak	5-25
R3 Medium weak	25-50
R4 Strong	50-100
R5 Very Strong	100-250
R6 Extremely strong	>250

WEATHERING	
F	F
SW	Slightly
MW	Moderately
HW	Highly
CW	Completely
RS	Residual Soil

File No. F6903

Drawn By: LC

Sheet 1 of 1

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V9S 5Y2
Phone: (250) 756-0355
Fax: (250) 756-3831
geotech@lewkowich.com

ROCK CORE LOG

TEST HOLE No. SH19-02

Lewkowich Engineering Associates Ltd.

Job Number: F6903

Project: JENSEN COVE ROAD, PORT HARDY, BC		Elevation: N/A
Driller: DRILLWELL	Method: SONIC	Dates: 2019-08-20
Hole Orientation: N/A	Logged By: LC	Date: 2019-09-08

Drilling Details (Water Table)	Depth (m)	Core Recovery %	Core Condition	Discontinuity Spacing	R.Q.D.	Intact Rock Strength	Weathering	Structural Discontinuity Description	Rock Symbol	Rock Mass Description	Tests
	6.6	90	V.BROKEN	25	0%	R3	SW	Rough to Smooth, with Rust Staining, joints and veins infilled with Calcite and/or Quartz		plagioclase-phyric BASALT dark-grey with hematitic staining aphanitic with porphyritic texture and chloritic alteration	N/A
	7.6	80	SOLID - BROKEN	03	89%	R4	F	Rough, joints and veins infilled with Calcite and/or Quartz and Epidote		amygdaloidal BASALT grey-green vesicular to amygdaloidal aphanitic with epidote filled veins	N/A
	8.5		V.BROKEN	16	25%	R3	SW	Rough, Clay Gouge, joints and veins infilled with Epidote			
	9.6	95		07	18%	R0 - R1	HW - CW				
	10.6	100	BROKEN	18	90%	R3	F	Rough, joints and veins infilled with Calcite and/or Quartz and Epidote			
	11.1									11.1m END OF HOLE	

CORE RECOVERY

Length of core run / core run x 100

R.Q.D.

Sum core lengths >100mm / length of core run x 100

DISCONTINUITY SPACING
No. of fractures/m

ROCK STRENGTH (MPa)	
R0 Extremely weak	<1
R1 Very weak	1-5
R2 Weak	5-25
R3 Medium weak	25-50
R4 Strong	50-100
R5 Very Strong	100-250
R6 Extremely strong	>250

WEATHERING	
F	F
SW	Slightly
MW	Moderately
HW	Highly
CW	Completely
RS	Residual Soil

File No. F6903

Drawn By: LC

Sheet 1 of 1

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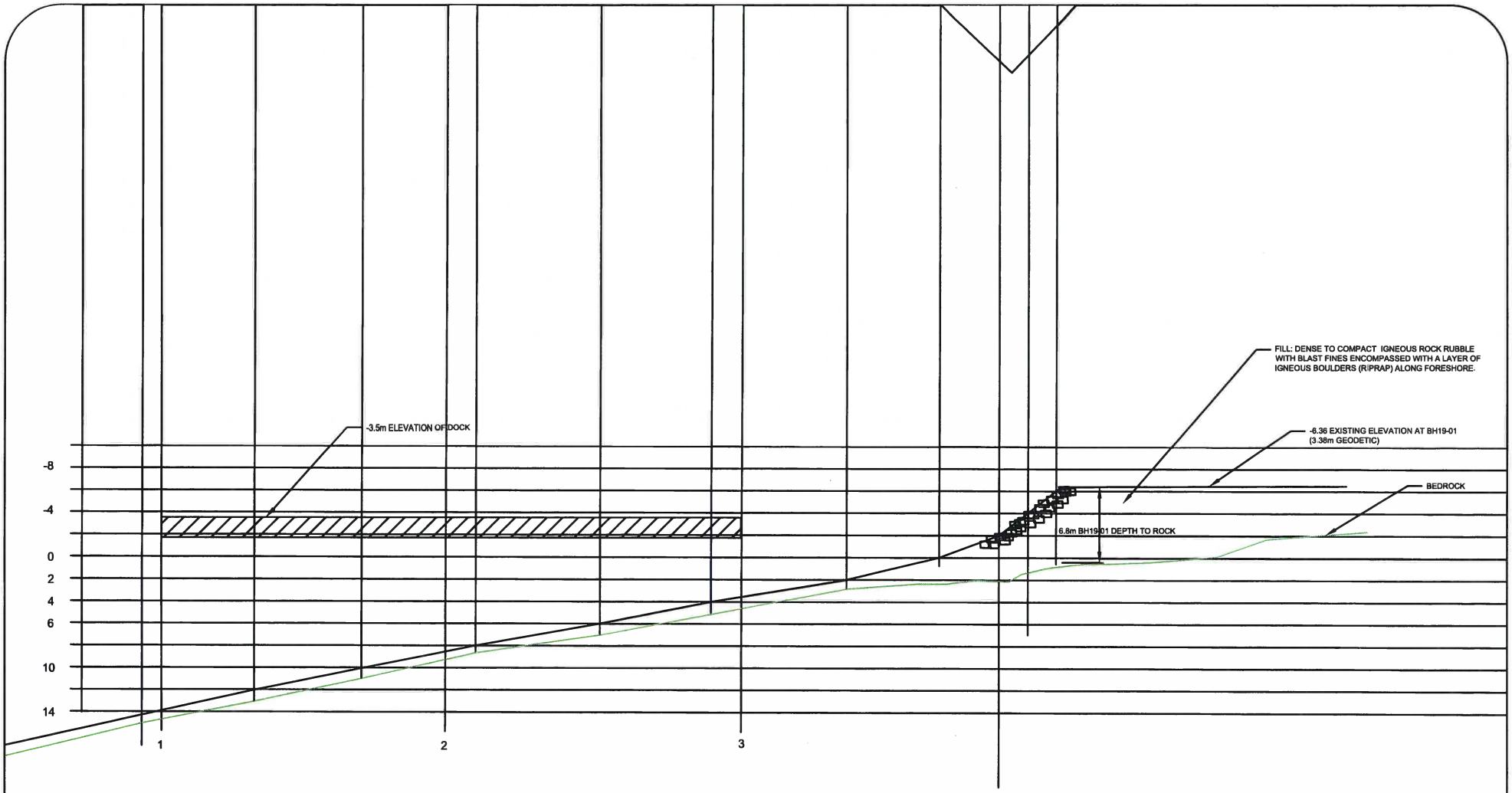
geotech@lewkowich.com



DRAFT

REV No.	DATE	BY	P.Eng.	REVISION DESCRIPTION

DRAWING TITLE
DOCK PROFILE ALONG GRIDLINE B

PROJECT NAME
CCG - OCEAN PROTECTION FACILITY
JENSEN COVE ROAD, PORT HARDY, BC

LEGAL DESCRIPTION

ENGINEER'S SEAL

PLOT DATE	DRAWN BY
SEPT.24-19	JH
REVIEWED BY	SCALE
P.Eng.	1:500
PROJECT No.	DRAWING No.
F6903	F6903-03

LEA
Lewkowich Engineering Associates Ltd.