PORT of vancouver | Vancouver Fraser Port Authority

February 14, 2022

Carmen Wu
Advisian
Suite 200, 2390 Virtual Way
Vancouver, BC V5M 0A5

Dear Carmen Wu:

Re: **Vancouver Fraser Port Authority Project Permit No. 20-012**
Request for Construction Outside of Regular Work Hours – March 1 to May 31, 2022 and August 16, 2022 to February 28, 2023
Shell Canada Products Ltd. – Shellburn Berthing Dolphin Replacement

The Vancouver Fraser Port Authority (the "Port Authority") has received a request from Advisian working on behalf of Shell Canada Products Ltd. (the "Permit Holder") for an amendment to Condition 23 of Project Permit No. 20-012 to allow works 24 hours a day, five days a week, Monday to Friday. Project components proposed to be conducted outside of regular work hours consist of:

- Formwork removal
- Fender panel installation
- Works to support installation of in-water piles such as splicing or welding pile sections together, above and below the high water level
- Deck reinstatement activities
- Placement of pre-cast concrete and associated formwork

Pile driving activities (installation and removal) will only be conducted during regular construction hours Monday to Saturday between the hours of 7:00 a.m. to 8:00 p.m. No construction and physical activities shall take place on Sundays or holidays.

The Port Authority understands that this request is to allow for safe, efficient and timely completion of Project activities that are tidally dependent. We further understand that these works are not anticipated to generate significant noise and that the Permit Holder is committed to concentrating any activities likely to generate noise during daytime hours, minimizing potential disturbances on surrounding residents, and addressing complaints promptly should they arise.

To meet requirements of the *Impact Assessment Act*, the Port Authority considered the factors set out in section 84. We concluded that the requested extended work hours are not likely to cause significant adverse environmental effects.

The Port Authority will allow construction outside regular hours of work during the above noted time period provided the following conditions are met:

1. The Permit Holder shall ensure the scope of works undertaken during extended hours is limited to the five types of activities outlined above.

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2. The Permit Holder shall circulate two construction notices to surrounding residents. The notices shall be consistent with the draft provided on January 19, 2022 and, once approved by the Port Authority, shall be distributed to residents a minimum of (10) ten business days in advance of the commencement of each period of works: March 1 to May 31, 2022 and August 16, 2022 to February 28, 2023.
3. An updated Navigational Warning (NAVWARN) (Condition 16) and notice to the BC Coast Pilots and Pacific Pilotage Authority (Condition 19) informing them of the change in work hours for a limited scope of activities shall be issued.
4. Lights shall be directed down and away from residential areas, both in Burnaby and on the North Shore, and welding shields shall be used.
5. All Project Permit No. 20-012 conditions shall continue to apply during extended work hours.

The Port Authority reserves the right to cancel or revoke authorization for extended work hours should noise levels exceed reasonable levels or should disturbances to surrounding residents persist.

This Amendment is valid until **February 28, 2023**. Should you have any questions, please contact Kim Keskinen at 778-229-4563 or kim.keskinen@portvancouver.com.

Yours truly,

VANCOUVER FRASER PORT AUTHORITY

ORIGINAL COPY SIGNED

Chris Bishop
Manager, Project and Environmental Review

cc Andrea Kwasnicki, Public Engagement
Scarlett Chen, Real Estate

Encl Project Permit No. 20-012
Amendment No. 20-012-01
Amendment No. 20-012-02
Amendment No. 20-012-03

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PORT of vancouver | Vancouver Fraser Port Authority

July 14, 2021

Victoria Burdett-Coutts
Advisian
Suite 200, 2390 Virtual Way
Vancouver, BC V5M 0A5

Dear Victoria Burdett-Coutts:

Re: **Vancouver Fraser Port Authority Project Permit No. 20-012**
Request for Construction Outside of Regular Work Hours – August 2021 to February 2022
Shell Canada Products Ltd. – Shellburn Berthing Dolphin Replacement

The Vancouver Fraser Port Authority (the "Port Authority") has received a request from Advisian working on behalf of Shell Canada Products Ltd. (the "Permit Holder") for an amendment to Condition 23 of Project Permit No. 20-012 to allow works 24 hours a day, five days a week, Monday to Friday. Project components proposed to be conducted outside of regular work hours consist of:

- formwork removal
- fender panel installation
- works to support installation of in-water piles such as splicing or welding pile sections together, above and below the high water level
- deck re-instatement activities

Pile driving activities (installation and removal) will only be conducted during regular construction hours Monday to Saturday between the hours of 7:00 a.m. to 8:00 p.m. No construction and physical activities shall take place on Sundays or holidays.

The Port Authority understands that this request is to allow for safe, efficient and timely completion of Project activities that are tidally dependent. We further understand that these works are not anticipated to generate significant noise and that the Permit Holder is committed to concentrating any activities likely to generate noise during daytime hours, minimizing potential disturbances on surrounding residents, and addressing complaints promptly should they arise.

To meet requirements of the *Impact Assessment Act*, the Port Authority considered the factors set out in section 84. We concluded that the requested extended work hours are not likely to cause significant adverse environmental effects.

The Port Authority will allow construction outside regular hours of work during the above noted time period provided the following conditions are met:

1. The Permit Holder shall ensure the scope of works undertaken during extended hours is limited to the four types of activities outlined above.
2. The Permit Holder shall circulate a construction notice to surrounding residents. The notice shall be consistent with the draft provided on June 23, 2021 and, once approved by the Port Authority, shall be distributed to residents a minimum of (10) ten business days in advance of the commencement of works.

…/2

3. An updated Navigational Warning (NAVWARN) (Condition 16) and notice to the BC Coast Pilots and Pacific Pilotage Authority (Condition 19) informing them of the change in work hours for a limited scope of activities shall be issued.
4. Lights shall be directed down and away from residential areas, both in Burnaby and on the North Shore, and welding shields shall be used.
5. All Project Permit No. 20-012 conditions shall continue to apply during extended work hours.

The Port Authority reserves the right to cancel or revoke authorization for extended work hours should noise levels exceed reasonable levels or should disturbances to surrounding residents persist.

This Amendment is valid until **February 28, 2022**. Should you have any questions, please contact Kim Keskinen at 604-665-9121 or kim.keskinen@portvancouver.com.

Yours truly,

VANCOUVER FRASER PORT AUTHORITY

ORIGINAL COPY SIGNED

Lisa McCuaig
Manager, Environmental Programs

cc Kate Grossman, Public Engagement
Catherine MacInnis, Real Estate

Encl Project Permit No. 20-012
Amendment No. 20-012-01
Amendment No. 20-012-02

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PORT of vancouver | Vancouver Fraser Port Authority

March 8, 2021

Victoria Burdett-Coutts
Advisian
Suite 200, 2390 Virtual Way
Vancouver, BC V5M 0A5

Dear Victoria Burdett-Coutts:

Re: Vancouver Fraser Port Authority Project Permit No. 20-012-02 - Extension
Shell Canada Products Ltd. – Shellburn Berthing Dolphin Replacement

On behalf of the Vancouver Fraser Port Authority ("the Port Authority"), I am pleased to advise that the Project Permit for the above-noted work has been extended. This permit is now valid until June 30, 2023. Failure to complete the works by this date may result in the need to apply for a new Project Permit.

As a requirement of this Permit Extension, the following conditions shall be met:

1. An updated Navigational Warning (NAVWARN) (Condition 16) and notice to the BC Coast Pilots and Pacific Pilotage Authority (Condition 19) shall be issued prior to phase 3 (2022-2023) of the proposed construction timeline.
2. The Permit Holder shall distribute an approved construction notice to residents and businesses to an area to the Port Authority's satisfaction (Condition 15) 10 business days prior to phase 3 (2022-2023) of the proposed construction timeline.
3. All Project Permit No. 20-012 conditions shall continue to apply during the extension.

Advisian working on behalf of Shell Canada Products Ltd. is responsible for carrying out the works according to the subject conditions contained in the Permit. Please ensure that those involved in undertaking the approved works are aware of these conditions and that a copy of the Permit is maintained on site during the Project.

Please submit all documents required to satisfy the conditions listed in the Project Permit to per@portvancouver.com.

Should you have any questions regarding this approval, please contact me at Kim.Keskinen@portvancouver.com.

Yours truly,

ORIGINAL COPY SIGNED

Kim Keskinen
Supervisor, Environmental Programs

cc: Scarlett Chen, Real Estate
encl (1) Project Permit No. 20-012
Amendment No. 20-012-01

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PORT of vancouver | Vancouver Fraser Port Authority

January 12, 2021

Victoria Burdett-Coutts
Advisian
Suite 200, 2390 Virtual Way
Vancouver, BC V5M0A5

Dear Victoria Burdett-Coutts:

Re: **Vancouver Fraser Port Authority Project Permit No. 20-012**
Request for Construction Outside of Regular Work Hours – January to June 2021
Shell Canada Products Ltd. – Shellburn Berthing Dolphin Replacement

The Vancouver Fraser Port Authority (the "Port Authority") has received a request from Advisian working on behalf of Shell Canada Products Ltd. (the "Permit Holder") for an amendment to Condition 23 of Project Permit No. 20-012 to allow works 24 hours a day, five days a week. Project components proposed to be conducted outside of regular work hours consist of:

- formwork removal
- fender panel installation
- works to support installation of in-water piles such as splicing or welding pile sections together, above and below the high water level
- deck re-instatement activities

Pile driving activities (installation and removal) will only be conducted during regular construction hours Monday to Sunday between the hours of 7:00 a.m. to 8:00 p.m. No construction and physical activities shall take place on holidays.

The Port Authority understands that this request is to allow for safe, efficient and timely completion of Project activities that are tidally dependent. We further understand that these works are not anticipated to generate significant noise and that the Permit Holder is committed to concentrating any activities likely to generate noise during daytime hours, minimizing potential disturbances on surrounding residents, and addressing complaints promptly should they arise.

To meet requirements of the *Impact Assessment Act*, the Port Authority posted a description of the requested extended work hours and notice of public participation to the Canadian Impact Assessment Registry and considered the factors set out in section 84. We concluded that the requested extended work hours are not likely to cause significant adverse environmental effects.

The Port Authority will allow construction outside regular hours of work during the above noted time period provided the following conditions are met:

1. The Permit Holder shall ensure the scope of works undertaken during extended hours is limited to the four types of activities outlined above.
2. The Permit Holder shall circulate a construction notice to surrounding residents. The notice shall be consistent with the draft provided on December 4, 2020 and, once approved by the Port Authority, shall be distributed to residents a minimum of (10) ten business days in advance of the commencement of works.

…/2

3. An updated Navigational Warning (NAVWARN) (Condition 16) and notice to the BC Coast Pilots and Pacific Pilotage Authority (Condition 19) informing them of the change in work hours for a limited scope of activities shall be issued.
4. Lights shall be directed down and away from residential areas, both in Burnaby and on the North Shore, and welding shields shall be used.
5. All Project Permit No. 20-012 conditions shall continue to apply during extended work hours.

The Port Authority reserves the right to cancel or revoke authorization for extended work hours should noise levels exceed reasonable levels or should disturbances to surrounding residents persist.

This Amendment is valid until **June 30, 2021**. Should you have any questions, please contact Kim Keskinen at 604-665-9121 or kim.keskinen@portvancouver.com.

Yours truly,

VANCOUVER FRASER PORT AUTHORITY

ORIGINAL COPY SIGNED

Lisa McCuaig
Manager, Environmental Programs

cc Kate Grossman, Public Engagement Advisor

Encl Project Permit No. 20-012

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PORT of vancouver	VANCOUVER FRASER PORT AUTHORITY PROJECT AND ENVIRONMENTAL REVIEW REPORT AND PERMIT
PER No.:	**20-012**
Tenant:	**Shell Canada Products Ltd.**
Project:	**Shellburn Berthing Dolphin Replacement**
Project Location:	**201 Kensington Ave, Burnaby**
Vancouver Fraser Port Authority SID No.:	**BBY091-04085F-006**
Land Use Designation:	**Port Terminal**
Applicant/Permit Holder:	**Shell Canada Products Ltd.**
Category of Review:	**B**
Date of Approval:	**June 25, 2020**
Date of Expiry:	**June 30, 2022**

1 INTRODUCTION

The Vancouver Fraser Port Authority (the port authority), a federal port authority, manages lands under the purview of the *Canada Marine Act*, which imparts responsibilities for environmental protection. The port authority accordingly conducts project and environmental reviews of works and activities undertaken on these lands to ensure that the works and activities will not likely cause significant adverse environmental effects. This project and environmental review report and project permit (the Permit) documents the port authority's project and environmental review of PER No. 20-012: Shellburn Berthing Dolphin Replacement (the Project) proposed by Shell Canada Products Ltd. (the Applicant).

This project and environmental review was carried out to address the port authority's responsibilities under the *Canada Marine Act*, and to meet the requirements of the *Impact Assessment Act*, as applicable. The proposed Project is not considered a "designated project" under the *Impact Assessment Act* and an impact assessment as described in the *Impact Assessment Act* is not required. However, the port authority authorization is required for the proposed Project to proceed and in such circumstances, where applicable, Section 82 of *Impact Assessment Act* requires federal authorities to assure themselves that projects will not likely cause significant adverse environmental effects. This review provides that assurance. In addition, the port authority considers other interests, impacts and mitigations through the project and environmental review.

The project and environmental review considered the application along with supporting studies, assessments and consultations carried out or commissioned by the Applicant, as well as other information provided by the Applicant. In addition, this project and environmental review considered other information available to the port authority and other consultations carried out by the port authority. A full list of information sources germane to the review is provided in the following pages of this report.

This Permit is the authorizing document allowing the Applicant to proceed with the Project subject to the listed project and environmental conditions.

2 PROJECT DESCRIPTION

Shell Canada Products Ltd. is proposing to replace four existing berthing dolphins and install a fifth berthing dolphin as part of repair and maintenance of the existing wharf structure at the Shellburn facility in Burnaby, BC. The project consists of the removal of 185 creosote-treated timber piles and the installation of 65 creosote-treated timber, and 25 concrete-filled steel pipe piles. Eight temporary 457 mm timber fender piles will be installed to secure construction-related support vessels, these temporary piles will be removed once construction is complete. All waste materials will be collected within the immediate project area, and transported to an appropriate facility for recycling or disposal.

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Pile installation and removal will be carried out from a floating barge using a spud barge, materials barge, vibratory pile driving hammer, and impact pile driving hammer. Existing decking will be removed where necessary to facilitate the replacement of each new dolphin. Staged removal of sections of the existing decking will be performed with marine based equipment and the decking components will be removed, placed on a barge, and subsequently taken from site for disposal at an approved facility. Once construction of each dolphin is complete, the corresponding section of deconstructed decking will be reconstructed using new materials. The proposed deck removal and replacement work will be carried out either from a floating barge or from the top of the wharf. Marine vessel traffic would include a barge-mounted crane for pile installation, and tugs to assist in barge movement.

Works will be conducted in two phases focusing on each of the dolphin structures from east to west in sequence, with each phase occurring during the Fisheries and Oceans Canada (DFO) least-risk window during the 2020–2021 and 2021–2022 seasons (Area 28 – Burrard Inlet: August 16 to February 28). Phase 1 consists of the works associated with the eastern section of the berthing facility and the fifth new dolphin installation with in-water works conducted in the 2020-2021 least risk window. Phase 2 consists of the demolition and installation works associated with the western section of the berthing facility, with in-water works conducted in the 2021-2022 least risk windows.

In this project permit, the Project means the physical activities authorized by the port authority to be carried out pursuant to **PER No. 20-012**, as described below.

2.1 Proposed Works

Proposed works include:

- Sectioned removal and replacement of existing decking to facilitate new dolphin construction
- Removal of 185 creosote-treated timber 356 millimetre (mm) piles
- Installation of 65 creosote-treated timber 356 mm piles (vertical and batter)
- Installation of 21 concrete-filled 914 mm steel pipe piles (vertical)
- Installation of 4 concrete-filled 1,067 mm steel pipe piles (vertical)
- Installation and removal of 8 temporary 457 mm steel pipe fender piles installed to secure construction-related support vessels.
- Staging of marine support vessels including a floating barge using a spud barge, materials barge, and supporting tug vessels
- Use of vibratory pile driving hammer and impact pile driving hammer to install timber and steel pipe piles
- Expansion of the berth footprint by extending the berth seaward by 1.8 m to increase dock length to 120.8 m

Construction activity is anticipated to be scheduled between 7:00 a.m. and 8:00 p.m. on weekdays and 9:00 a.m. and 8:00 p.m. on Saturdays, conforming to the Port Authority's standard work hours.

Estimated project cost is $5,000,000 and the anticipated construction timeline is July 2020 to February 2022.

3 VANCOUVER FRASER PORT AUTHORITY INTERNAL REVIEWS

The following port authority departments have undertaken and completed a review of these works and confirm that the proposal meets their requirements, subject to the listed project and environmental conditions.

☒ Planning	☒ Environmental Programs	☒ Engineering
☒ Marine Operations	☒ Public Engagement	☐ Transportation
☒ Indigenous Consultation		

Noise will be generated during pile driving activities, however, pile driving activities are proposed to occur during regular working hours to reduce impact to adjacent communities. Pile driving will also focus on individual dolphin structures to be replaced in sequence, these works will be staged intermittently between operation of the berth.

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Therefore noise will be minimized by completing the replacement of one dolphin structure at a time rather than having multiple structures under construction at the same time. A Project schedule detailing construction sequencing for all phases is a condition of the permit and must be submitted prior to construction commencing.

4 INDIGENOUS CONSULTATION

The port authority has reviewed the proposed works and determined that the project may have the potential to adversely impact Aboriginal rights.

The following Indigenous groups were consulted:

a) Musqueam Indian Band;
b) Squamish Nation;
c) Tsleil-Waututh Nation; and,
d) Sto:lo Nations, through the People of the River Referrals.

The following consultation activities were conducted:

- On March 18, 2020, project application referral letters and supporting documents were sent to the Indigenous groups listed above, informing them of the proposed project.
- The port authority provided participation funding to the respective First Nations to facilitate their participation in the project and environmental review process. Comments for the proposed project were requested by April 28, 2020.
- The port authority extended the consultation period and requested comments by May 19, 2020, and June 19, 2020, respectively.

Below is a table summarizing key concerns and comments received by the port authority and how they were considered as part of the project and environmental review.

Issue	Port Authority Consideration	Mitigation and Permit Conditions
Requests that all piles be fully removed rather than cut at below mud line, where possible.	The port authority requires the complete removal of piles by extracting the entire length of pile from the seabed. If physical conditions result in the breakage of timber piles, the port authority requires that all reasonable effort is made to remove the remaining pile stubs with the least amount of disturbance of the seabed as possible. If pile stubs are not able to be removed, the port authority requires a survey of the work area with location coordinates and a report to the port authority including a rationale demonstrating why the pile was cut below the mud line.	This requirement is reflected in condition no. 30 of the Project Permit.

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Issue	Port Authority Consideration	Mitigation and Permit Conditions
Requests an environmental impact assessment on increased traffic and site use on the site's rockfish conservation designation. Concerned about the cumulative effects of marine traffic, as increased wave activity is causing erosion, in addition to potential introduction of marine invasive species following marine shipping.	The proposed works and activities support the maintenance and repair of an existing facility to maintain its functionality, and no additional marine traffic volumes are proposed.	None required.
Concern regarding harmful alteration, destruction or disruption of fish habitat. Given that the Project proposes the installation of creosote-treated timber piles, toxicity levels at the site are likely to exceed allowable levels and cause long-term environmental damage to fish habitat. Requests all works be completed within the Fisheries Window.	The port authority requires that all in-water activities to be conducted during the fisheries least risk window for the Project. The Project is scheduled to occur over two seasons, both to accommodate the fisheries least risk windows and functionality of the site. DFO has issued a Letter of Advice to the permit holder. A condition is included in the permit requiring the Permit Holder to follow DFO's Letter of Advice.	Condition No. 35 requires the Permit Holder to implement the mitigation measures listed in DFO Letter of Advice (20-HPAC-00140) for the duration of the Project.
Concern regarding use of uncured or partially uncured cement in and around waterways and sensitive environmental sites. If dewatering is required of the site that contains uncured cement, recommend dewatering all contact water into a catch basin for further analysis for pH, temperature, TSS and turbidity by a Qualified Environmental Professional or Environmental Monitor.	The Project design requires the installation of cast-in-place concrete for portions of physical works. This is a result of adding to existing elements, as well as to accommodate areas where pre-casting technology or alternate materials is not feasible. Concrete pre-casting will be used to the extent feasible.	Condition No. 21 requires the Permit Holder to submit an updated construction environmental management plan. The Permit Holder must carry out the Project in accordance with the construction environmental management plan, and any subsequent updates made to VFPA's satisfaction.
Requests environmental monitors, and Indigenous environmental monitors, be onsite during project works.	The permit holder is required to have a qualified environmental monitor onsite during in water works. Additionally, the port authority will require the Applicant to provide opportunities for interested Indigenous groups to monitor and be present on the Project site during in water works.	This requirement is reflected in condition no. 27 of the Project Permit.

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Issue	Port Authority Consideration	Mitigation and Permit Conditions
Requests for notification of any spills of deleterious substances, as well as any death of fish within the vicinity of the project.	The Permit Holder has updated their CEMP to include notification to Indigenous groups.	Condition No. 21 requires the Permit Holder to submit an updated construction environmental management plan. The Permit Holder must carry out the Project in accordance with the construction environmental management plan, and any subsequent updates made to VFPA's satisfaction.

Based on the record of consultation, the port authority is of the view that the duty to consult has been met.

5 EXISTING POLICIES OR GUIDELINES

The Project conforms to the land use designation of "Terminal" in the port authority's Land Use Plan and supports the primary use under this designation.

6 NOTIFICATIONS

6.1 Municipal Notification

The proposed Project was assessed by the port authority to have potential impacts to municipal interests. A notification letter was sent to the City of Burnaby on March 31, 2020. The City of Burnaby had no comments.

6.2 Adjacent Tenant Notification

The proposed Project was assessed by the port authority to have potential impacts to adjacent tenant interests. A notification letter was sent to Westridge Marine Terminal (WMT) on March 31, 2020, notifying them of the proposed Project.

A conference call was held on April 9, 2020 between WMT and Advisian, on behalf of the Applicant, to discuss WMT's concerns and a copy of Advisian's meeting minutes was shared with the port authority on April 22nd, 2020. The following table summarizes WMT's comments and how they were considered as part of the project and environmental review.

Issue	Mitigations and Permit Conditions	Rationale
Impact on WMT's floating safety boom and potential limits to access.	Condition No. 20 of the Permit requires the Permit Holder to submit a Marine Construction and Staging Plan.	The Applicant indicated that a Marine Construction and Staging Plan will be provided to the port authority once a contractor is hired. The Applicant confirmed that there will be no limits to access during the project and that construction will occur within the Applicant's lease boundary.
Interferences to WMT's existing *Fisheries Act* Authorization for acoustic monitoring from the project.	Condition No. 22 of the Permit requires the Permit Holder to submit a Project Schedule.	The Applicant indicated that interferences with acoustic noise are not likely. Hydroacoustic monitors will be required as per Condition No. 33.
Interference to WMT's existing 15-hour average noise monitoring threshold.		The port authority will require the Applicant to carry out the Project in accordance with the noise management measures described in the updated construction environmental management plan.

Canada

Issue	Mitigations and Permit Conditions	Rationale
Community feedback and potential impacts on the public.	Condition No. 15 of the Permit requires the Permit Holder to distribute an approved construction notice to nearby businesses and residents at least 10 days in advance of both phases of construction.	The Applicant will continue to communicate with WMT to minimize interference and potential cumulative impacts.

6.3 Public Engagement

To meet requirements of section 86 of the *Impact Assessment Act*, the port authority posted a description of the Project and notice of public participation to the Canadian Impact Assessment Registry to provide the public 30 calendar days to comment on the project and provide community knowledge. No comments were received.

The proposed Project was assessed by the port authority to have potential impacts to community interests during construction. These include potential impacts such as noise from proposed construction activities such as pile driving activities.

As a result, the Permit Holder is required to send a construction notice to adjacent residents and businesses as indicated on the map below in Burnaby. The notification area is within approximately 500 m from the project site. The construction notice shall be distributed by the Permit Holder at least 10 business days prior to the start of the works. This is set out in conditions No. 14 and 15 in the permit.

The Permit Holder is required to send an additional construction notice to the same community members prior to phase two of the project beginning in July 2021 to March 2022.

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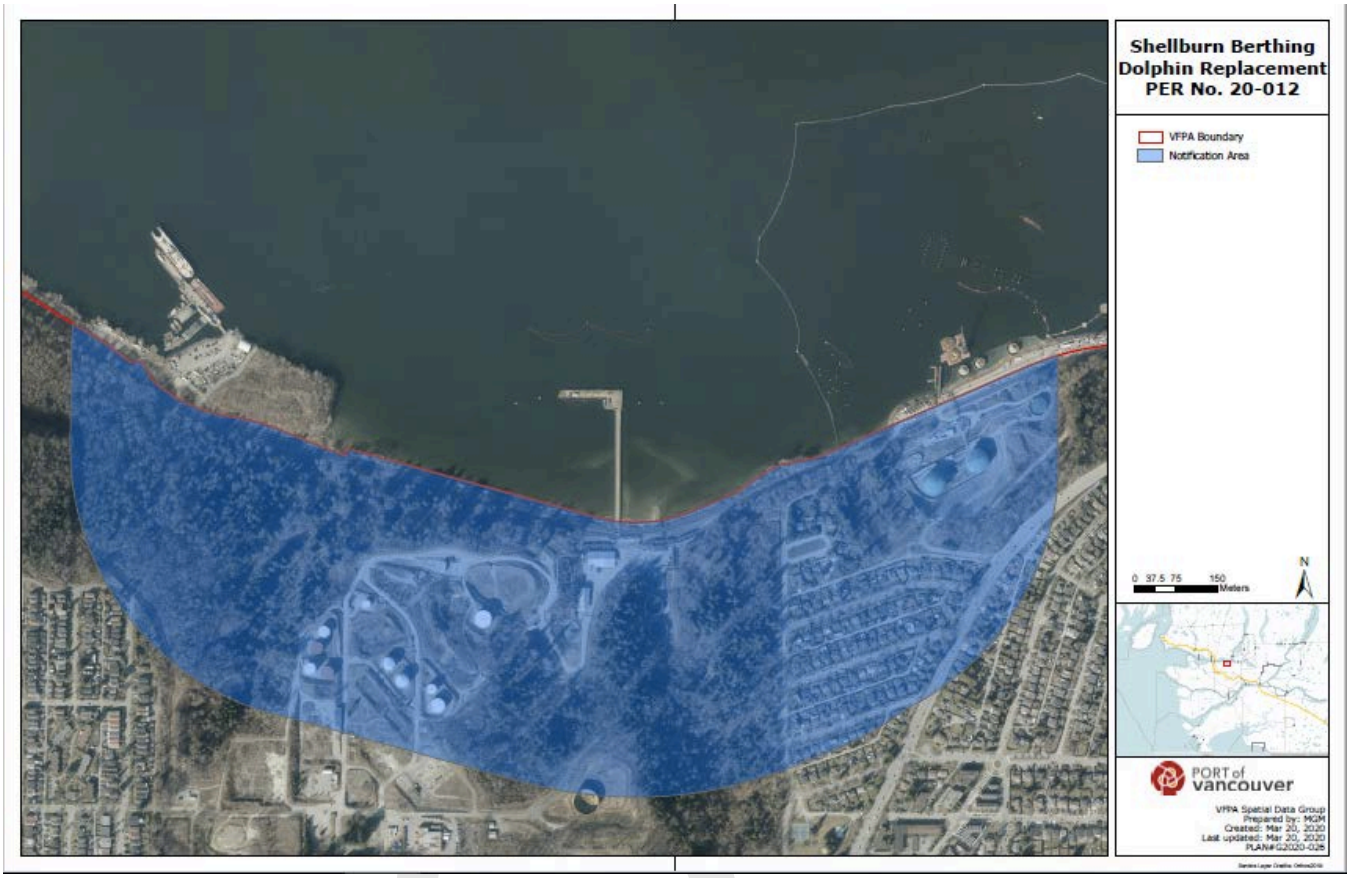
Map of notification area



7 INFORMATION SOURCES

The port authority has relied upon the following sources of information in its review of the Project.

- Application form and materials submitted by the Applicant on behalf of the tenant on January 24, 2020.
- All Project correspondence from January 24, 2020 to June 19, 2020
- All plans and drawings labelled PER No.20-012-A to PER No. 20-012-N
- Construction Summary Table, January 20, 2020, prepared by Advisian
- Fisheries and Oceans Canada Request for Review, February 10, 2020, prepared by Advisian
- Shellburn Dolphin Replacement Project Construction Environmental Management Plan, February 10, 2020, prepared by Advisian for Shell Canada Products Ltd.
- Letter titled “Shellburn Dolphin Replacement Project – Pile Driving Discussion”, April 15, 2020, Advisian
- Key correspondence:
    - Email dated 2020-03-20, from Burdett-Coutts, Victoria (Advisian) to Darcy Paslawski (VFPA) and Anthony Pederson (Advisian), “RE: Project and Environmental Review No. 20-012 Shellburn Berthing Dolphin Replacement – Creosote Discussion”

8 ENVIRONMENTAL REVIEW DECISION

In completing the project and environmental review, the port authority has reviewed and taken into account relevant information available on the proposed project and has considered any adverse impact that the project may have on the rights of the Indigenous peoples, Indigenous knowledge, community knowledge, comments received from the public, and measures that would mitigate any significant adverse environmental effects of the project. We conclude that with the implementation of proposed mitigation measures and conditions described in

the project and environmental conditions section below, the Project is not likely to cause significant adverse environmental effects.

ORIGINAL COPY SIGNED

ANDREA MACLEOD
MANAGER, ENVIRONMENTAL PROGRAMS

June 25, 2020
DATE OF DECISION

9 CONCLUSION

In completing the project and environmental review, the port authority concludes that with the implementation of proposed mitigation measures and conditions described in the project and environmental conditions section below, the Project has appropriately addressed all identified concerns.

PROJECT AND ENVIRONMENTAL REVIEW DECISION

Project Permit PER No. 20-012 is approved by:

ORIGINAL COPY SIGNED

ANDREA MACLEOD
MANAGER, ENVIRONMENTAL PROGRAMS

June 25, 2020
DATE OF APPROVAL

10 PROJECT AND ENVIRONMENTAL CONDITIONS

The port authority has undertaken and completed a review of the Project in accordance with the *Canada Marine Act* and Section 5 of the Port Authorities Operations Regulations and, as applicable, Section 82 of the *Impact Assessment Act*.

If at any time the Shell Canada Products Ltd. (the Permit Holder), fails to comply with any of the project and environmental conditions set out in the project permit (the Permit) below, or if the port authority determines that the Permit Holder has provided any incomplete, incorrect or misleading information in relation to the Project, the port authority may, in its sole and absolute discretion, cancel its authorization for the Project or change the project and environmental conditions to which such authorization is subject.

Pursuant to Section 29 of the *Port Authorities Operations Regulations*, the port authority may also cancel its authorization for the Project, or change the project and environmental conditions to which such authorization is subject, if new information is made available to the port authority at any time in relation to the potential adverse environmental and other effects of the Project.

The following are the minimum conditions that must be followed by the Permit Holder to mitigate potential or foreseeable adverse environmental and other effects.

All port authority Guidelines and Record Drawing Standards referenced in this document can be located at: https://www.portvancouver.com/development-and-permits/project-and-environmental-reviews/technical-guidelines/.

No.	GENERAL CONDITIONS
1.	The Permit Holder must have a valid lease, licence, or access agreement for the Project site prior to accessing the Project site or commencing construction or any other physical activities on the Project site. This Permit shall in no way limit any of the Permit Holder's obligations, or the port authority's rights, under such lease, licence, or access agreement.

Canada

2.	The Permit Holder shall at all times and in all respects, comply with and abide by all applicable statutes, laws, regulations and orders from time to time in force and effect, including all applicable environmental, labour and safety laws and regulations.	
3.	This Permit in no way endorses or warrants the design, engineering, or construction of the Project and no person may rely upon this Permit for any purpose other than the fact that the port authority has permitted the construction of the Project, in accordance with the terms and conditions of this Permit.	
4.	The Permit Holder shall indemnify and save harmless the port authority in respect of all claims, losses, costs, fines, penalties or other liabilities, including legal fees, arising out of: (a) any bodily injury or death, property damage or any loss or damage arising out of or in any way connected with the Project; and (b) any breach by the Permit Holder of its obligations under this Permit.	
5.	The Permit Holder shall undertake and deliver the Project to total completion in a professional, timely and diligent manner in accordance with applicable standards and specifications set out in the sections above entitled Project Description and Information Sources, including the attached plans and drawings numbered **PER No. 20-012-A to 20-012-N**. The Permit Holder shall not carry out any other physical activities unless expressly authorized by the port authority.	
6.	The Permit Holder shall cooperate fully with the port authority in respect of any review by the port authority of the Permit Holder's compliance with this Permit, including providing information and documentation in a timely manner, as required by the port authority. The Permit Holder is solely responsible for demonstrating the Permit Holder's compliance with this Permit.	
7.	The Permit Holder shall review the Permit with all employees, agents, contractors, licensees and invitees working on the Project site, prior to such parties participating in any construction or other physical activities on the Project site. The Permit Holder shall be solely responsible for ensuring that all such employees, agents, contractors, licensees and invitees comply with this Permit.	
8.	The Permit Holder shall make available upon request by any regulatory authority (such as a Fishery Officer) a copy of this Permit.	
9.	Unless otherwise specified, the Permit Holder shall provide all plans, documents, and notices required under this Permit to the following email address: **per@portvancouver.com** and referencing **PER No. 20-012**.	
10.	Unless otherwise specified, all plans, schedules, and other Project-related documentation that the Permit Holder is required to provide under this Permit must be to the port authority's satisfaction.	
11.	The port authority shall have unfettered access to environmental compliance documentation and the Project site at all times during construction without notice.	
12.	The Permit Holder must maintain and retain any records associated with, or produced by, actions or activities undertaken to achieve compliance or that indicate non-compliance with project permit conditions. These records must be made available at the request of the port authority.	
	CONDITIONS – PRIOR TO COMMENCING CONSTRUCTION OR ANY PHYSICAL ACTIVITIES	**SUBMISSION TIMING (business days)**
13.	The Permit Holder shall submit signed and sealed drawings for proposed works approved for construction by a professional engineer licensed to practice in the Province of British Columbia.	5 business days before commencing construction or any physical activities

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14.	The Permit Holder shall provide a draft construction notice to the port authority's satisfaction in accordance with the port authority's Public Consultation Guidelines for both phases of construction.	20 business days before commencing construction or any physical activities
15.	The Permit Holder shall distribute an approved construction notice to residents and businesses to an area to the port authority's satisfaction. The Permit Holder shall notify the port authority when such distribution has been completed. This condition applies to phase 1 and phase 2 of the proposed construction timeline.	10 business days before commencing construction or any physical activities
16.	Prior to the commencement of any vessel-related activities, the Permit Holder shall contact Canadian Coast Guard (CCG) Marine Communications and Traffic Services (MCTS), (email: NAVWARN.MCTSPrinceRupert@innav.gc.ca; Phone: 250-627-3070) regarding the issuance of a Navigational Warning (NAVWARN) to advise the marine community of potential hazards associated with the Project.	As per Coast Guard requirements
17.	At least two days prior to commencing any physical activities, the Permit Holder shall notify the Harbour Master and VFPA Environmental Programs, email: Harbour_Master@portvancouver.com and EnvironmentalPrograms@portvancouver.com.	2 days prior to commencing and physical activities
18.	The Permit Holder shall submit a marine construction and staging plan to VFPA's satisfaction, which includes: a) identification of navigation related hazards and risk mitigation measures; b) staging and construction areas; c) dates and hours of operations; d) description of activities taking place; e) participating equipment and vessels (dimensions must be included); f) method of preferred communication with marine users; g) method of communicating updates to relevant marine users; and h) special requests and/or additional information. The Permit Holder shall carry out the Project in accordance with the marine construction and staging plan, including any subsequent updates made to VFPA's satisfaction.	20 business days prior to commencing any vessel-related activities
19.	The Permit Holder shall inform the BC Coast Pilots (bccp@bcpilots.com) and the Pacific Pilotage Authority (marineops@ppa.gc.ca) of their Marine Construction Staging area, as well as inform them of any changes in the capacity of the new dolphins prior to commencing any construction, or vessel-related activities. Any concerns raised by the BC Coast Pilots or Pacific Pilotage Authority must be addressed prior to commencing in vessel-related activities works.	Prior to commencing construction or any vessel-related activities
20.	The Permit Holder shall provide a Project schedule to the port authority showing the anticipated start dates for all major phases of the Project as identified by the port authority. The Permit Holder shall notify the port authority of any material changes to the Project schedule and, upon request, shall provide an updated Project schedule.	20 business days prior to commencing construction or any physical activities
21.	The Permit Holder shall submit an updated construction environmental management plan to VFPA's satisfaction. The Permit Holder shall carry out the Project in accordance with the construction environmental management plan, and any subsequent updates made to VFPA's satisfaction.	20 business days prior to commencing construction or any physical activities

COPY

	CONDITIONS – DURING CONSTRUCTION OR ANY PHYSICAL ACTIVITIES
22.	The Permit Holder shall notify the port authority upon commencement of construction, or any physical activities (e.g., mobilization to the Project site).
23.	All general construction and physical activities related to the Project shall be conducted from Monday to Saturday between the hours of 7:00 am and 8:00 pm. No construction and physical activities shall take place on Sundays or holidays. These hours shall not be modified without prior approval of VFPA. To request permission to conduct activities outside these hours, the Permit Holder must submit a written request no less than 30 business days prior to the desired start date.
24.	The Permit Holder shall notify the port authority within two business days of any complaints received from the community and stakeholders during construction and indicate how the Permit Holder has responded to such complaints.
25.	The Permit Holder shall remove all abandoned utilities from the project site, both underground and aboveground. At locations of connection to municipal work (i.e., at property lines), the abandoned utilities shall be capped.
26.	The Permit Holder shall provide opportunities for interested Indigenous groups to monitor and be present on the Project site at all times during ground disturbing activities with the potential to impact fish and fish habitat.
27.	If the Permit Holder encounters, expects to encounter, or should expect to encounter an actual or potential archaeological resource, the Permit Holder shall: a) Immediately stop any activities that may disturb the archaeological resource or the site in which it is contained (Site); b) Not move or otherwise disturb the archaeological resource or other remains present at the Site; c) Stake or flag the Site to prevent additional disturbances; and, d) Immediately notify the port authority by email and phone.
28.	During any vessel-related activities, the Permit Holder shall: a) Position vessels and equipment associated with the Project in such a manner so as not to obstruct line of sight to navigational aids or markers; b) Exhibit the appropriate lights and day shapes at all times; c) Monitor the VHF channel used for MCTS communications in the respective area at all times and participate as necessary; d) Be familiar with vessel movements in areas affected by the Project. e) Plan and execute the Project in a manner that will not impede navigation or interfere with vessel operations; and, f) During night hours, unless working 24 hours per day, ensure that the rig and associated equipment is moored outside the navigation channel and lit in accordance with all applicable regulations.
29.	The Permit Holder shall remove piles completely by extracting the entire length of pile from the seabed. If physical conditions result in the breakage of piles, the Permit Holder shall remove the remaining pile stubs with the least amount of disturbance of the seabed as possible. Should it be impossible to remove the remaining pile stubs, they are to be cut as close as possible to the nominal bed elevation in the immediate area of each pile. Upon successful completion of the pile extraction work, the location shall be surveyed and the location coordinates provided to VFPA within five days of Project completion.

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30.	Piles shall be driven with a vibratory hammer to the extent practical. The Permit Holder shall conduct hydroacoustic monitoring during any pile installation by diesel, hydraulic, or other impact hammer or other technology and implement underwater sound attenuation measures, such as bubble curtains to maintain underwater sound levels below 206 dB, as described in the Construction Environmental Management Plan.	
31.	The Permit Holder, or their contractor, shall engage a qualified environmental professional to monitor the Project in order to ensure that the works are carried out in compliance with this Permit. Monitoring events shall take place as required by the environmental monitor, the Construction Environmental Management Plan, or the port authority, provided that monitoring will be full time when works are underway that have the potential to adversely affect fish or fish habitat.	
32.	The Permit Holder shall provide environmental monitoring reports to the port authority as specified in the Construction Environmental Management Plan or more frequently if the port authority requires. In addition, a summary report for the whole monitoring period shall be forwarded to the port authority within 30 days of the conclusion of the monitoring period.	
33.	There shall be no in-water works during the fisheries sensitive period from March 1 to August 15, inclusive, unless otherwise approved in writing by Fisheries and Oceans Canada (DFO) or VFPA. VFPA shall be notified of any DFO exemptions allowing works within the fisheries sensitive period.	
34.	The Permit Holder shall implement the mitigation measures listed in DFO Letter of Advice (20-HPAC-00140) for the duration of the Project. VFPA shall be consulted during the development of any contingency plans or mitigation measures with respect to activities listed by the DFO Letter of Advice that fall within VFPA jurisdiction.	
35.	The Permit Holder shall immediately cease work and notify VFPA if the Permit Holder has reasonable grounds to believe that the Project has harmed fish or fish habitat, including observation of distressed, injured, or dead fish. The Permit Holder shall not resume work until authorized by VFPA.	
36.	The Permit Holder shall cap any exposed hollow pipe piles to prevent wildlife entrapment.	
37.	Sediments contained within piles after driving shall be left in place. If it is determined that they must be removed for engineering reasons, the Permit Holder shall consult VFPA for review and authorization prior to initiating the proposed physical activities.	
38.	The Permit Holder shall not disturb the seabed outside the Project site.	
39.	The Permit Holder shall repair and/or remediate any damage or erosion resulting from disturbance to the intertidal foreshore during the Project.	
40.	No dredging shall be conducted as part of the Project. Any proposals to dredge shall be the subject of a separate application to VFPA.	
41.	Without limiting the generality of permit condition #2, the Permit Holder shall not, directly or indirectly: (a) deposit or permit the deposit of a deleterious substance of any type in water frequented by fish in a manner contrary to Section 36(3) of the *Fisheries Act*; or (b) adversely affect fish or fish habitat in a manner contrary to Section 35(1) of the *Fisheries Act*.	
	CONDITIONS – UPON COMPLETION	**SUBMISSION TIMING (Business Days)**
42.	The Permit Holder shall notify the port authority upon completion of the Project.	Upon substantial completion

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43.	The Permit Holder shall provide record drawings in accordance with the port authority's Record Drawing Standards (available at: http://www.portvancouver.com/development-and-permits/project-and-environmental-reviews/technical-guidelines/), in both AutoCAD and Adobe (PDF) format to the port authority, including a Project site plan that clearly identifies the location of works.	Within 40 business days of completion
44.	The Permit Holder must send record drawings of all newly constructed and/or demolished marine works to the Database Information Office of the Canadian Hydrographic Service (250-363-6360 or chsdatacentre@dfo-mpo.gc.ca) to arrange for the relevant Canadian Hydrographic Service charts to be updated. VFPA's Marine Operations department must be carbon copied into the request (navigation.review@portvancouver.com).	Within 40 business days of completion

The port authority reserves the right to rescind or revise these conditions at any time that new information warranting this action is made available to the port authority.

LENGTH OF PERMIT VALIDITY

The Project must be completed no later than **June 30, 2022** (the Expiry Date).

AMENDMENTS

- Details of any material proposed changes to the Project, including days and hours when construction and any physical activities will be conducted, must be submitted to the port authority for consideration of an amendment to this Permit.
- For an extension to the Expiry Date, the Permit Holder must apply in writing to the port authority no later than 40 business prior to that date.

Failure to apply for an extension as required may, at the sole discretion of the port authority, result in termination of this Permit.

CONTACT INFORMATION

Vancouver Fraser Port Authority
100 The Pointe, 999 Canada Place
Vancouver BC V6C 3T4 Canada

Project & Environmental Review
Tel.: 604-665-9047
Fax: 1-866-284-4271
Email: PER@portvancouver.com
Website: www.portvancouver.com

After normal business hours:

In the event of any land or marine construction incidents or concerns related to works carried out on-site under this permit, please contact the 24/7 Port Operations Centre 604-665-9086. In the event of an emergency requiring 'First Responders', please call 911 first.

COPY

APPENDIX A PROJECT AND ENVIRONMENTAL DRAWINGS

COPY

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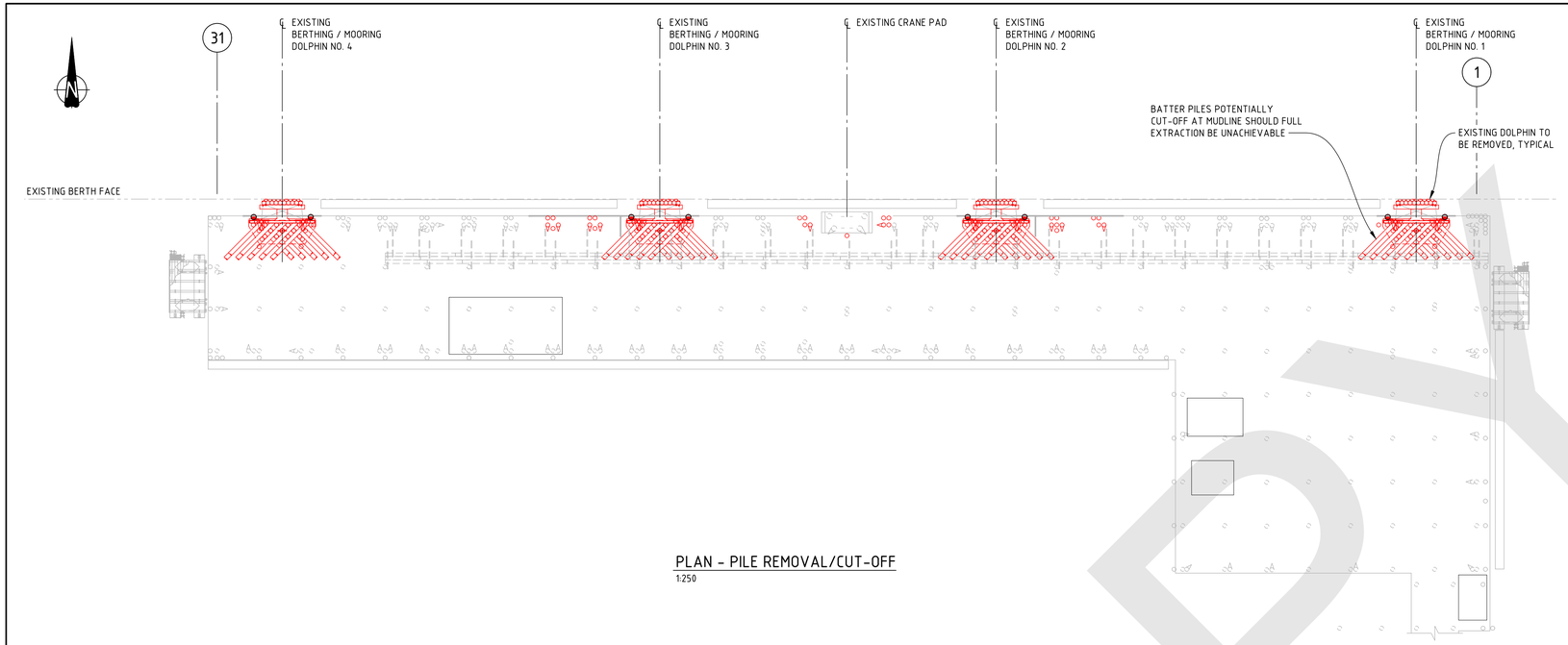
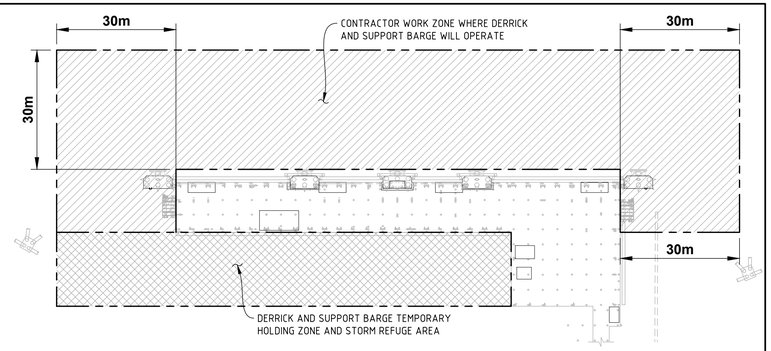
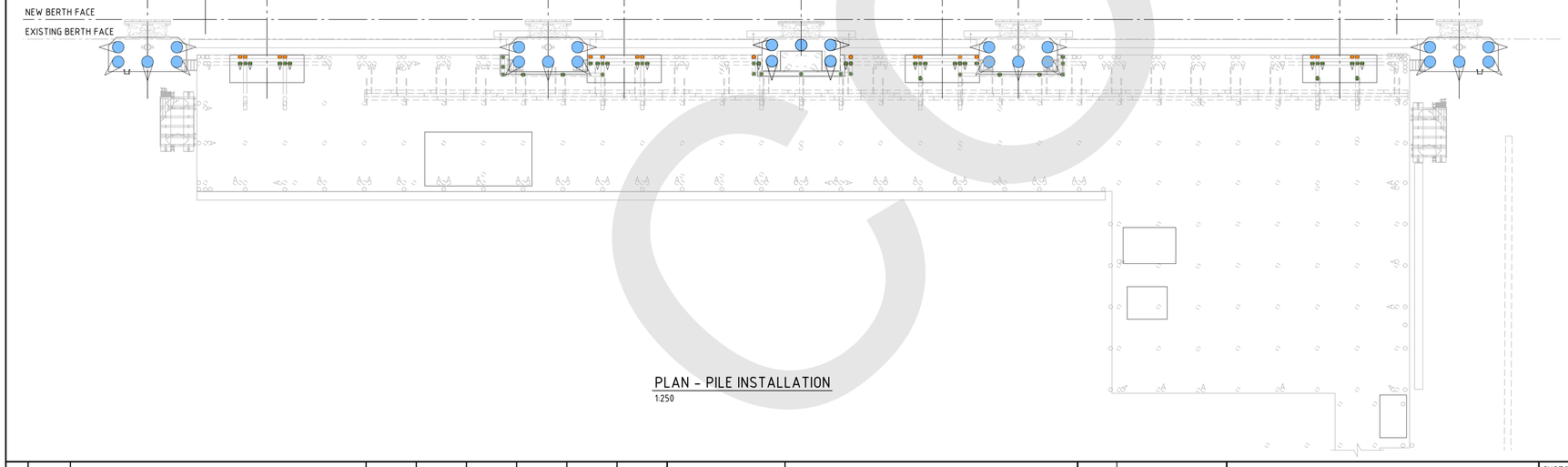


PLAN - PILE REMOVAL/CUT-OFF
1:250



PLAN - WORK AREA
1:750



PLAN - PILE INSTALLATION
1:250

m 0 5 10 15 m
1:250

LEGEND:
- STEEL PIPE PILE
- TIMBER PILE
- TIMBER FENDER PILE
- TEMPORARY STEEL PIPE FENDER PILE
- PILES TO BE REMOVED

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
A	13-FEB-20	ISSUED FOR PERMIT	BJM	-	AJP	-	AJP	-		

D SHEET | SCALE | SHOWN

OneWay to zero harm

WORLEYPARSONS PROJECT No
407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Feb. 13/20 2:58pm

CUSTOMER

Shell Canada Products

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Advisian Worley Group

SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
PILE REMOVAL / PILE INSTALLATION

DRG No 407071-00182-00-EN-DGA-0001

REV A

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PLOT DATE & TIME: 13/2/2020 2:58:11 PM
SAVE DATE & TIME: 13/2/2020 2:58:02 PM

COPY

Shell Canada Products

BERTHING DOLPHIN REPLACEMENT

DRAWING NUMBER	DRAWING TITLE
407071-00182-00-MA-DGA-1500	COVER SHEET AND DRAWING LIST
407071-00182-00-MA-DGA-1501	DESIGN CRITERIA
407071-00182-00-MA-DGA-1502	GENERAL NOTES
407071-00182-00-MA-DGA-1503	EXISTING SITE PLAN
407071-00182-00-MA-DGA-1504	GENERAL ARRANGEMENT
407071-00182-00-MA-DGA-1505	CONSTRUCTION SEQUENCING
407071-00182-00-MA-DGA-1506	DEMOLITION PLAN AND DETAILS
407071-00182-00-MA-DGA-1507	SPARE
407071-00182-00-MA-DGA-1508	DECK REINSTATEMENT PLAN
407071-00182-00-MA-DGA-1509	DECK REINSTATEMENT SECTION AND DETAILS
407071-00182-00-MA-DGA-1510	PILE PLAN AND DETAILS
407071-00182-00-MA-DGA-1511	PILE LIST
407071-00182-00-MA-DGA-1512	DOLPHIN NOS. 1A, 2A, 3A AND 4A - PLANS AND SECTIONS
407071-00182-00-MA-DGA-1513	DOLPHIN NO. 2.5 - PLANS AND SECTIONS
407071-00182-00-MA-DGA-1514	SPARE
407071-00182-00-MA-DGA-1515	FENDERS AND BOLLARDS
407071-00182-00-MA-DGA-1516	MISCELLANEOUS DETAILS - SHEET 1
407071-00182-00-MA-DGA-1517	SPARE
407071-00182-00-MA-DGA-1518	SPARE

COPY

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	BJM	AJP	SPER	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	BJM	-	AJP	SPER	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1500)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE NONE

OneWay to zero harm

WORLEYPARSONS PROJECT No
407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Dec. 04/19 3:07pm

CUSTOMER

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Worley Group

SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
COVER SHEET AND DRAWING LIST

DRG No 407071-00182-00-MA-DGA-1500 | REV C

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USER NAME: brian.massullo
PLOT DATE & TIME: 4/12/2019 5:05:37 PM
SAVE DATE & TIME: 4/12/2019 3:07:51 PM

DESIGN CRITERIA:

1.0 DESIGN, MATERIAL AND TESTING STANDARDS

1.1 THE STRUCTURES HAVE BEEN DESIGNED IN ACCORDANCE WITH THE RELEVANT COMPONENTS OF THE FOLLOWING CODES AND STANDARDS AS OF SEPTEMBER 1, 2019:

- OIL COMPANIES INTERNATIONAL MARINE FORUM MOORING EQUIPMENT GUIDELINES (4TH EDITION) (OCIMF MEG4)
- CAN/CSA S6 DESIGN OF HIGHWAY BRIDGES
- BRITISH STANDARD BS 6349 : MARITIME WORKS

2.0 ENVIRONMENTAL LOADS AND EFFECTS

2.1 IN ACCORDANCE WITH S6 FOR BURNABY, BC, UNLESS NOTED OTHERWISE.

3.0 SEISMIC

3.1 IN ACCORDANCE WITH S6 FOR BURNABY, BC, UNLESS NOTED OTHERWISE.
- NO COLLAPSE IN 1:2475 SEISMIC EVENT

3.2 SEISMIC RESPONSE SPECTRA AND DESIGN PARAMETERS, BASED ON GEOTECHNICAL INVESTIGATION PERFORMED JUNE/JULY 2019, AND AS INCLUDED IN ADVISIAN DOCUMENT NO. 407071-00172-00-SS-REP-0001 REV. 0, DATED (TO COME).

3.3 SITE CLASS E RESPONSE SPECTRUM

SITE RESPONSE SPECTRUM FOR 1:2475 EVENTS						
SITE CLASS E	**Sa(0.2)**	**Sa(0.5)**	**Sa(1.0)**	**Sa(2.0)**	**Sa(5.0)**	**Sa(10)**
S(g)	0.97	0.97	0.65	0.44	0.16	0.05
T(S)	0.20	0.50	1.00	2.00	5.00	10.00

4.0 DESIGN LIFE

4.1 DESIGN SERVICE LIFE FOR NEW STRUCTURES IS 50 YEARS (EXCEPT FOR RUBBER FENDER UNITS, WITH A 20 YEAR SERVICE LIFE UNDER NORMAL OPERATING CONDITIONS) PROVIDED THE FOLLOWING INSPECTION AND MAINTENANCE IS IMPLEMENTED:
- ROUTINE MAINTENANCE FOR DETERIORATION AND DAMAGE.
- REPAIRS OF DETERIORATED AND DAMAGED AREAS.

5.0 CORROSION

5.1 THE RATE OF CORROSION FOR EXPOSED STEEL SHALL BE 0.1mm PER YEAR.

5.2 COATING SERVICE LIFE ASSUMED TO BE 15 YEARS.

6.0 MARINE CRITERIA

6.1 ALL ELEVATIONS ARE REFERENCED TO HYDROGRAPHIC (TIDE AND CHART) DATUM.

6.2 TIDE ELEVATIONS AT THE SITE ARE AS FOLLOWS:

EXTREME HIGH WATER LEVEL (EXTREME TIDE)	EHWL	+5.6m
HIGHER HIGH WATER LEVEL (LARGE TIDE)	HHWL	+5.0m
MEAN WATER LEVEL	MWL	+3.1m
LOWER LOW WATER LEVEL (LARGE TIDE)	LLWL	-0.1m
EXTREME LOW WATER LEVEL (EXTREME TIDE)	ELWL	-0.3m

6.3 WIND AND CURRENT
PER THE STANDARD ENVIRONMENTAL CRITERIA RECOMMENDED BY OCIMF:

- 60 KNOT WINDS FROM ANY DIRECTION SIMULTANEOUSLY WITH 3 KNOT CURRENTS AT 0 DEG. OR 180 DEG.
- 60 KNOT WINDS FROM ANY DIRECTION SIMULTANEOUSLY WITH 2 KNOT CURRENTS AT 10 DEG. OR 170 DEG.
- 60 KNOT WINDS FROM ANY DIRECTION SIMULTANEOUSLY WITH 0.75 KNOT CURRENTS FROM THE DIRECTION OF MAXIMUM BEAM CURRENT LOADING.

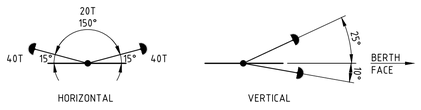
7.0 DESIGN VESSELS AND BERTHING CRITERIA

7.1 FOR DESIGN VESSEL PARAMETERS, SEE TABLE 1.

7.2 FOR DESIGN VESSEL BERTHING ENERGY CRITERIA, SEE TABLE 2.

8.0 MOORING LOADS

8.1 NEW DOLPHIN NO'S 1A, 2A, 3A AND 4A HAVE A SAFE WORKING LOAD THROUGH THE RANGE OF DIRECTIONS NOTED BELOW:



1T = 1 TONNE = 1000 kg

9.0 DECK LOADS

9.1 NEW BERTHING AND MOORING DOLPHIN:

- UNIFORM DISTRIBUTED LOAD: 2.4 kPa

9.2 DOLPHIN 2.5 - EXISTING CRANE

- MAXIMUM MOMENT ✶ 435 kNm
- MAXIMUM THRUST ✶ 217 kN
- MAXIMUM ROTATIONAL TORQUE ✶ 58 kNm

✶ UNFACTORED LOAD AT BASE OF CRANE (TOP OF STEEL CRANE PEDESTAL)

9.3 REINSTATEMENT OF EXISTING TIMBER WHARF STRUCTURES SHALL MATCH THE EXISTING STRUCTURE.

10.0 LOAD COMBINATIONS

10.1 TABLE 3.1 FROM S6-14 PRESENTS THE LOAD FACTORS AND LOAD COMBINATIONS THAT SHALL BE USED FOR DESIGN SUPPLEMENTED BY BS 6349 FOR WIND AND CURRENT LOAD FACTORS AS FOLLOWS:

- WIND LOAD FACTOR (BS 6349):
  - PRIMARY LOAD: 1.4
  - COMPANION LOAD: 0.6
- CURRENT LOAD FACTOR (BS 6349):
  - PRIMARY LOAD: 1.4
  - COMPANION LOAD: 0.6
- MOORING LOAD FACTOR (BS 6349):
  - PRIMARY LOAD: 1.4
  - COMPANION LOAD: 0.6
- BERTHING LOAD FACTOR (BS 6349):
  - PRIMARY LOAD: 1.2 (CONSIDERING DESIGN ENERGY)
  - COMPANION LOAD: 0.6

11.0 FUNCTIONAL REQUIREMENTS

11.1 GENERAL
- DOLPHIN DESIGN LATERAL DISPLACEMENT 50mm

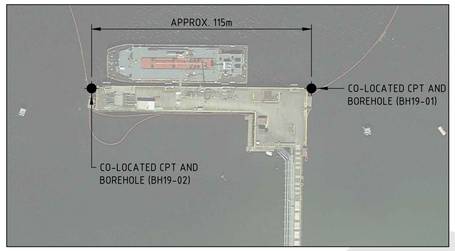
11.2 SEISMIC
- DOLPHIN DESIGN LATERAL DISPLACEMENT 125mm

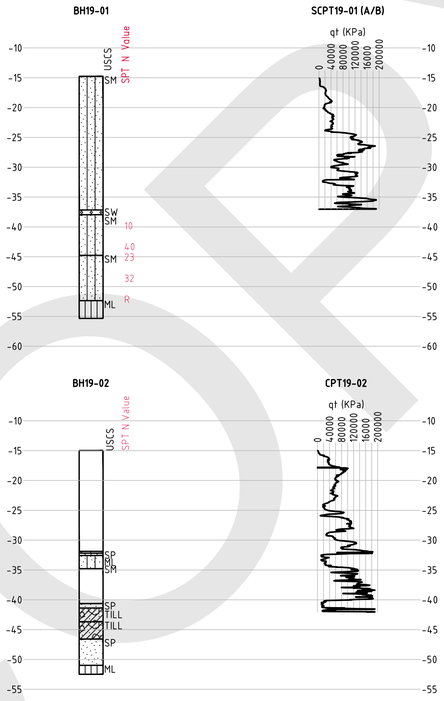
12.0 GEOTECHNICAL CONDITIONS

12.1 GEOTECHNICAL PROFILE

GEOTECHNICAL INVESTIGATION PERFORMED IN JUNE/JULY 2019.

SHELLBURN - BOREHOLE LOCATIONS





12.2 STEEL PILE GEOTECHNICAL (ULS) RESISTANCE

STEEL PIPE PILE SIZE	AXIAL COMPRESSION (kN)		AXIAL TENSION (kN)	
	STATIC	SEISMIC	STATIC	SEISMIC
1067mm DIA. x 19.1mm THK.	TO COME	TO COME	TO COME	TO COME

TABLE 1 - DESIGN VESSEL PARAMETERS

CATEGORY	VESSEL				
	BARGE	TANKER KIRKEHOLMEN	TANKER FULLY LADEN	TANKER PARTIALLY LADEN	TANKER ✶ HELLAS AVATAR
DEADWEIGHT TONNAGE (DWT) (T)	-	17,000	40,000	-	51,449
DISPLACEMENT TONNAGE (T)	-	-	52,000	52,000	66,884
LENGTH OVERALL (LOA) (m)	94.8	144.2	189.0	217.9	183.1
BEAM (m)	18.3	23.0	30.5	32.0	32.0
MOULDED DEPTH (m)	5.5	-	16.2	17.1	19.1
DRAFT LOADED (m)	4.6	6.1	12.2	12.2	13.6
DRAFT BALLASTED (m)	1.2	-	5.2	5.2	7.2

✶ NOTE: THE HELLAS AVATAR REQUIRES AN INCREASE IN BERTH DEPTH TO BE ACCOMMODATED AT THE FACILITY OVER ALL TIDAL RANGES. THE BERTH IS NOT BEING DEEPENED AS PART OF THIS CONTRACT.

TABLE 2 - DESIGN VESSEL BERTHING ENERGY CRITERIA

VESSEL / PROPERTIES	VESSEL					DATA SOURCE
	BARGE	TANKER KIRKEHOLMEN	TANKER FULLY LADEN	TANKER PARTIALLY LADEN	TANKER HELLAS AVATAR	
BERTHING VELOCITY (m/s)	-	-	0.11 (0.36 ft/s)	0.11 (0.36 ft/s)	0.10 (0.33 ft/s)	BS 6349 - EASY BERTHING CONDITIONS (SHELTERED)
ANGLE OF APPROACH	6 DEGREES					BS 6349
BLOCK COEFFICIENT (C_b)	-	-	0.77	0.64	0.86	BS 6349
VIRTUAL MASS COEFFICIENT (C_m)	1.8 (UNDER KEEL CLEARANCE < 10% DRAFT)					BS 6349
ECCENTRICITY COEFFICIENT (C_e)	-	-	0.58	0.53	0.61	BS 6349
SOFTNESS COEFFICIENT (C_s)	1.0					BS 6349 - SOFT FENDER
BERTH CONFIGURATION COEFFICIENT (C_c)	1.0					BS 6349 - OPEN
COMBINED COEFFICIENT (C)	-	-	1.037	0.946	1.095	$C = C_m C_e C_c C_s$
HULL FENDER CONTACT	QUARTER POINT BERTHING					BS 6349
ABNORMAL ENERGY FACTOR	1.5					BS 6349

NOTES:
1. MAXIMUM ALLOWABLE HULL PRESSURE 20 TONNES / m^2.
2. RESTRAINT CHAINS (SHEAR, TENSION, AND WEIGHT) ARE REQUIRED AND SHALL BE PROVIDED AND DESIGNED TO ACCOMMODATE A 0.3 FRICTION COEFFICIENT.

LEGEND - BOREHOLE STRATIGRAPHY

- HIGH PLASTICITY CLAY
- LOW PLASTICITY CLAY
- LOW PLASTICITY SILTY CLAY
- SILT
- SANDY SILT
- SILTY SAND
- WELL-GRADED SAND
- POORLY-GRADED GRAVELLY SAND
- GLACIAL TILL
- CORE LOSS
- FAULT BRECCIA
- DIABASE
- SCHIST
- GNEISS

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	AJP	SPER	AJP	-		
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A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1501)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE NONE

OneWay to zero harm

WORLEYPARSONS PROJECT No 407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

PRELIMINARY
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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
DESIGN CRITERIA

DRG No 407071-00182-00-MA-DGA-1501 | REV C

PLOT DATE & TIME: 4/12/2019 5:06:43 PM
SAVE DATE & TIME: 4/12/2019 3:22:46 PM
USER NAME: brian.massullo
LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\11_DRAWINGS\15_I_AND_E\02_MARINE\407071-00182-00-MA-DGA-1501_1502.DWG

GENERAL NOTES:

1.0 GENERAL

1.1 DETAILED REQUIREMENTS FOR MATERIALS, FABRICATION AND INSTALLATION PROCEDURES ARE DEFINED IN THE SPECIFICATIONS. FOR CONVENIENCE, CERTAIN EXTRACTS ARE REPRODUCED BELOW. IN THE EVENT OF CONFLICT, THE CONFLICT SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE FOR RESOLUTION.

1.2 UNDERTAKE WORK IN ACCORDANCE WITH ALL APPLICABLE STATUTORY AND ENVIRONMENTAL REQUIREMENTS. REFER TO SPECIFICATION DOCUMENT NOS. 01 00 00, 01 35 43 AND 01 41 00.

1.3 MATERIALS AND TESTING HAVE BEEN SPECIFIED TO CONFORM TO THE EDITIONS OF RELEVANT STANDARDS PUBLISHED BY THE FOLLOWING ORGANIZATIONS AS OF SEPTEMBER 1, 2019:
- CANADIAN STANDARDS ASSOCIATION (CSA)
- AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1.4 LOCATIONS AND ELEVATIONS OF EXISTING ELEMENTS AS SHOWN ON THE DRAWINGS ARE APPROXIMATE VALUES ONLY, AND ARE SUBJECT TO CONSTRUCTION VARIATIONS. THE CONTRACTOR SHALL VISIT THE SITE OF THE WORK, TAKE OWN MEASUREMENTS OF ALL EXISTING STRUCTURES, GROUND AND OTHER WORK. ALL DIMENSIONS AND DETAILS SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO FABRICATION AND CONSTRUCTION. DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE.

1.5 ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

1.6 ABBREVIATIONS:

C/W	COMPLETE WITH
CL.	CLEAR
CONT.	CONTINUOUS
CP	COMPLETE PENETRATION
DEG.	DEGREES
DFT	DRY FILM THICKNESS
DIA.	DIAMETER
DWG.	DRAWING
DWT	DEADWEIGHT TONNAGE
EL.	ELEVATION
EMB.	EMBEDMENT
I.D.	INSIDE DIAMETER
m	METRE
m/s	METRES PER SECOND
mm	MILLIMETRE
MIL	ONE THOUSANDTH OF AN INCH
N/A	NOT APPLICABLE
NO.	NUMBER
O.D.	OUTSIDE DIAMETER
OPP.	OPPOSITE
PL	PLATE
REF.	REFERENCE
SEC.	SECOND
SIM.	SIMILAR
SS	STAINLESS STEEL
STD.	STANDARD
SWL	SAFE WORKING LOAD
T	TONNES
T.O.	TOP OF
U/S	UNDERSIDE
UHMW	ULTRA HIGH MOLECULAR WEIGHT
UNO	UNLESS NOTED OTHERWISE
WP	WORK POINT

2.0 CONCRETE REINFORCEMENT

2.1 FOR COMPLETE SPECIFICATIONS REFER TO SPECIFICATION DOCUMENT NO. 03 20 00.

2.2 REINFORCEMENT STEEL SHALL BE HOT ROLLED DEFORMED BILLET BARS TO CAN/CSA-G30.18, GRADE 400W.

2.3 PROVIDE CORNER BARS, WITH TENSION LAP SPLICES, TO MATCH ALL REINFORCEMENT AT ALL CORNERS.

2.4 REINFORCEMENT ABBREVIATIONS:

H2E:	HOOK 2 ENDS, STANDARD HOOK
H1E:	HOOK 1 END, STANDARD HOOK
1H2E900:	HOOK 2 ENDS, 900 LONG HOOK
120M2000:	20M STRAIGHT BAR, 2000 LONG
20M6000 H1E	20M BAR 6000 LONG WITH A STANDARD 90° HOOK AT 1 END, THE LENGTH SPECIFIED IS THE CUT LENGTH BEFORE BENDING

2.5 NO MORE THAN 25% OF THE LONGITUDINAL REINFORCEMENT IN THE PILE CAPS SHALL BE SPLICED AT THE SAME LOCATION. ADJACENT BARS SHALL NOT BE SPLICED AT THE SAME LOCATION.

2.6 MINIMUM LAP LENGTH FOR ANY REINFORCEMENT SPLICES SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE:

BAR SIZE	BARS OTHER THAN TOP BARS	TOP BARS
10M	400	500
15M	500	650
20M	600	800
25M	1000	1300
30M	1200	1600
35M	1500	2000

TOP BARS ARE HORIZONTAL REINFORCEMENT BARS SUCH THAT MORE THAN 300mm OF CONCRETE IS CAST IN THE MEMBER BELOW THE REINFORCEMENT.

2.7 DOWELS MUST BE SECURELY TIED INTO POSITION PRIOR TO PLACING CONCRETE. WET DOWELLING IS NOT PERMITTED.

3.0 CAST-IN-PLACE CONCRETE AND PRECAST CONCRETE

3.1 FOR COMPLETE SPECIFICATIONS REFER TO SPECIFICATION DOCUMENT NOS. 03 30 00 AND 03 40 00.

3.2 CONCRETE MATERIALS AND METHODS OF CONSTRUCTION SHALL CONFORM TO CSA A23.1, CSA A23.4 AND S6.

3.3 CONCRETE SHALL BE EXPOSURE CLASS C-1 AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF:

- CAST-IN-PLACE CONCRETE AND TOPPING: 40 MPa
- PRECAST CONCRETE: 50 MPa

AT 28 DAYS UNLESS OTHERWISE NOTED. FOR ADDITIONAL DESIGN PROPERTIES, SEE SPECIFICATIONS.

3.4 CAST IN PLACE CONCRETE AND PRECAST CONCRETE CLEAR COVER TO THE REINFORCEMENT STEEL SHALL BE AS FOLLOWS, UNLESS NOTED OTHERWISE,

LOCATION	CAST-IN-PLACE	PRECAST
BOTTOM SURFACES	100mm	75mm
SIDE SURFACES	75mm	50mm
TOP SURFACES	75mm	50mm

3.5 PREPARATION OF HARDENED CONCRETE SURFACES TO RECEIVE ADDITIONAL CAST-IN-PLACE CONCRETE

- REMOVE ALL LAITANCE USING HYDROMILLING WITH MINIMUM 70,000 kPa (10,000 psi) PRESSURE, OR AN ALTERNATE APPROVED METHOD TO EXPOSE COARSE AGGREGATE TO A MINIMUM 6mm AMPLITUDE

3.6 PROVIDE 25mm CHAMFERS ALONG ALL EXPOSED EDGES AND 25mm FILLETS AT RE-ENTRANT CORNERS UNLESS NOTED OTHERWISE.

3.7 CURING OF CAST-IN-PLACE CONCRETE AND PRECAST CONCRETE SHALL BE WET CURE AS PER CSA A23.1-09 AND A23.4, RESPECTIVELY.

3.8 GROUT SHALL BE CEMENTITIOUS GROUT WITH MINIMUM COMPRESSIVE STRENGTH OF 55 MPa AT 7 DAYS. SUBMIT PROPOSED PRODUCT SPECIFICATIONS FOR APPROVAL BY THE OWNER'S REPRESENTATIVE.

3.9 BROOM FINISH ALL CONCRETE TOP SURFACES.

4.0 STEEL PIPE PILING

4.1 FOR COMPLETE SPECIFICATIONS, REFER TO SPECIFICATION DOCUMENT NOS. 31 62 00 AND 31 62 16.

4.2 DOLPHIN PILES

- 1067 O.D. x 19.1mm THICK
- STEEL PIPE PILES SHALL CONFORM TO CSA Z245 CATEGORY 1 WITH A MINIMUM YIELD STRENGTH OF 355 MPa

4.3 THE STEEL PIPE PILE COATING SHALL BE IN ACCORDANCE WITH SPECIFICATION DOCUMENT NO. 31 62 16 AND SHELL DEP 30.42.00.31

THE PILE COATING SYSTEM SHALL BE "IMMERSION GRADE SOLVENT FREE HIGH-BUILD EPOXY" WITH MINIMUM NDFT OF 20 MILS AND MINIMUM OF 3 COATING LAYERS.

4.4 PILES SHALL BE DRIVEN TO THE MINIMUM EMBEDMENT INDICATED AND THE FINAL SET SPECIFIED BY THE OWNER'S REPRESENTATIVE. ENSURE PILES ARE NOT OVERDRIVEN CAUSING DAMAGE TO THE PILE ENDS. CUT OFF PILES NEATLY AND HORIZONTALLY AT ELEVATION INDICATED.

4.5 THE INTEGRITY OF THE PILES DURING CONSTRUCTION SHALL REMAIN THE RESPONSIBILITY OF THE CONTRACTOR.

4.6 INSTALL PILES TO THE FOLLOWING HORIZONTAL TOLERANCES:

STEEL PIPE PILES:

- AT GROUND LINE OR WATER LINE 75mm
- DEVIATION FROM AXIAL ALIGNMENT BELOW WATER OR GROUND LINE NOT GREATER THAN 1:150

4.7 CLEARLY MARK EACH PILE AT INTERVALS OF 1 FOOT ALONG ITS FULL LENGTH PRIOR TO DRIVING. MAINTAIN ACCURATE RECORDS OF BLOW COUNTS FOR EACH 1 FOOT OF PENETRATION FOR EACH LENGTH OF PILE. IF VIBRATORY DRIVING METHODS ARE USED IN ACCORDANCE WITH THE SPECIFICATIONS, MAINTAIN ACCURATE RECORDS OF DEPTH DRIVEN OVER 30 SEC. INTERVALS.

5.0 METAL FABRICATIONS

5.1 FOR COMPLETE SPECIFICATIONS, REFER TO SPECIFICATION DOCUMENT NO. 05 50 00.

5.2 THE MISCELLANEOUS STEEL PAINTING SHALL BE IN ACCORDANCE WITH SPECIFICATION DOCUMENT NO. 09 97 19.

5.3 STRUCTURAL STEEL TO CAN/CSA-G40.21 TO THE FOLLOWING GRADES:

ROLLED SECTIONS AND PLATES:	300W
HOLLOW STRUCTURAL SECTIONS:	350W, CLASS C
STRUCTURAL BOLTS, NUTS AND WASHERS:	ASTM F 3125 – A325M TYPE 1
ANCHOR RODS:	ASTM A193, GRADE B7
STAINLESS STEEL PLATES:	TYPE 316, MIN. YIELD STRENGTH 290 MPa
HANDRAIL:	ASTM A53-07 GRADE B
BULLRAIL PIPE:	ASTM A53-07 GRADE B

5.4 FASTENERS INSTALLED IN HARDENED CONCRETE SHALL BE WITH HILTI HIT-RE 500 ADHESIVE AND STANDARD EMBEDMENT TYPE 316 STAINLESS STEEL ANCHORS, UNLESS NOTED OTHERWISE.

5.5 TRAINED APPLICATORS OF HILTI ADHESIVE PRODUCTS SHALL BE USED. VERIFICATION TECHNIQUES FOR DETERMINING PROPER APPLICATION OF ADHESIVE SHALL BE USED. CONTRACTOR SHALL NOTE, HILTI PROVIDES NO COST TRAINING FOR USE OF ITS PRODUCTS.

5.6 WELDING PRACTICE SHALL CONFORM TO CSA W59 AND BE MADE BY CWB QUALIFIED WELDERS. FULL STRENGTH WELDED SPLICES AND CONNECTIONS SHALL BE TESTED IN ACCORDANCE WITH CSA W59 BY A CWB CERTIFIED WELDING INSPECTION AGENCY RETAINED AND PAID FOR BY THE CONTRACTOR.

5.7 ALL METAL FABRICATIONS, BOLTS AND NUTS SHALL BE HOT DIP GALVANIZED, UNLESS NOTED OTHERWISE, TO ASTM A123/A123M.

6.0 TIMBER PILING AND CAMEL LOGS

6.1 FOR COMPLETE SPECIFICATIONS, REFER TO SPECIFICATION DOCUMENT NO. 06 10 20.

6.2 ALL TIMBER WORK SHALL CONFORM TO CSA S6, CSA-056, CSA -080 AND WWPI-BMP'S.

6.3 ALL TIMBER PILES AND CAMEL LOGS SHALL BE PER THE FOLLOWING:

ROUND WOOD PILES
- COAST DOUGLAS FIR TO CSA 056 CLEAN PEELED PILES WITH MINIMUM 25mm SAP WOOD. MINIMUM SIZE 36 (#14) WITH TIP DIAMETER RELATED TO LENGTH AS INDICATED IN TABLE A1 OF CSA 056.

- PILE PRESERVATIVE TREATMENT CREOSOTE TREATMENT, INSPECTION AND RETREATMENT SHALL BE IN ACCORDANCE WITH CSA 080 FOR SALTWATER MARINE EXPOSURE USE CATEGORY 5A AND THE WWPI-BMPs.

ROUND WOOD CAMEL LOGS
- SPRUCE TO CSA 056 CLEAN PEELED MINIMUM TIP 600mm, MAXIMUM BUTT 900mm, LENGTH AS INDICATED ON DRAWINGS. CAMEL LOGS NEED NOT BE TREATED.

6.4 ALL TIMBER PILES SHALL BE CUT TO REQUIRED LENGTH PRIOR TO TREATMENT, FIELD CUT TIMBER PILES WILL BE REJECTED AND REPLACED AT CONTRACTORS EXPENSE UNLESS FIELD CUTS HAVE BEEN PRE-APPROVED BY THE OWNER'S REPRESENTATIVE. TREAT FIELD CUTS IN ACCORDANCE WITH THE SPECIFICATIONS.

6.5 TREAT ALL NEW BOLT HOLES WITH TWO SEPARATE COATS OF CHROMATED COPPER ARSENATE (CCA) AND DIP BOLTS AND PLUGS IN CCA PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.

6.6 PLATE WASHERS SHALL BE USED UNDER THE HEADS AND NUTS OF ALL BOLTS BEARING ON TIMBER. UNLESS NOTED OTHERWISE, THE SIZE OF WASHER SHALL BE AS FOLLOWS:

BOLT DIAMETER	WASHER SIZE
M20 (19.1mm) [3/4"]	100 x 100 x 9.5 CURVED TO 165mm RADIUS
M24 (25.4mm) [1"]	125 x 125 x 12.7 CURVED TO 165mm RADIUS
M30 (31.7mm) [1 1/4"]	150 x 150 x 12.7 CURVED TO 165mm RADIUS

BOLTS TO BE ASTM A307-07b. ALL STEEL CONNECTION HARDWARE TO BE HOT DIP GALVANIZED TO ASTM A123/A123M-09.

7.0 HEAVY TIMBER

7.1 FOR COMPLETE SPECIFICATIONS, REFER TO SPECIFICATION DOCUMENT NO. 06 10 20.

7.2 ALL TIMBER WORK SHALL CONFORM TO CSA S6, CSA-056, CSA-080 AND WWPI-BMP'S.

7.3 ALL SAWN TIMBER SHALL BE COAST DOUGLAS FIR, NO. 1 STRUCTURAL GRADE OR BETTER AND SHALL BE GIVEN TREATMENT AS FOLLOWS:

- DECK PLANKS, GUARDRAILS, STAIRS AND RISERS AT DECK LEVEL AND ABOVE SHALL BE GIVEN AN ACZA SALT CONCENTRATE TREATMENT FOR USE CATEGORY 4.2

- PILE CAPS ANDS STRINGERS ABOVE HIGHER HIGH WATER SHALL BE GIVEN ACZA SALT CONCENTRATE TREATMENT OR CREOSOTE TREATMENT FOR USE CATEGORY 4.2

- SAWN TIMBER MEMBERS WITH ANY PART WHICH EXTENDS BELOW HIGHER HIGH WATER SHALL BE GIVEN ACZA SALT CONCENTRATE TREATMENT OR CREOSOTE TREATMENT FOR USE CATEGORY 5A.

7.4 ALL TIMBER SHALL BE CUT TO REQUIRED LENGTH PRIOR TO TREATMENT. FIELD CUT TIMBERS WILL BE REJECTED AND REPLACED AT CONTRACTORS EXPENSE UNLESS FIELD CUTS HAVE BEEN PRE-APPROVED BY THE OWNER'S REPRESENTATIVE. TREAT FIELD CUTS IN ACCORDANCE WITH THE SPECIFICATIONS.

7.5 TREAT ALL NEW BOLT HOLES WITH TWO SEPARATE COATS OF CHROMATED COPPER ARSENATE (CCA) AND DIP BOLTS AND PLUGS IN CCA PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.

7.6 PLATE WASHERS SHALL BE USED UNDER THE HEADS AND NUTS OF ALL BOLTS BEARING ON TIMBER. UNLESS NOTED OTHERWISE, THE SIZE OF WASHER SHALL BE AS FOLLOWS:

BOLT DIAMETER	WASHER SIZE
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M30 (31.7mm) [1 1/4"]	150 x 150 x 12.7

BOLTS TO BE ASTM A307-07b. ALL STEEL CONNECTION HARDWARE TO BE HOT DIP GALVANIZED TO ASTM A123/A123M-09.

8.0 MOORING BOLLARDS

8.1 FOR COMPLETE SPECIFICATIONS REGARDING MOORING BOLLARDS, REFER TO SPECIFICATION DOCUMENT NO. 35 59 29 AND DRAWING 407071-00182-00-MA-DGA-1515.

8.2 MOORING BOLLARD STEEL TO THE FOLLOWING GRADES.

- BOLLARD PIPE	CSA Z245, GRADE 359 OR G41.26/G41.21 CLASS C HSS SECTIONS, MIN. YIELD STRENGTH OF 350 W
- BOLLARD SOLID BAR	CAN/CSA-40.21 300W

8.3 MOORING BOLLARDS SHALL BE PAINTED IN ACCORDANCE WITH SPECIFICATION DOCUMENT NO. 09 97 19.

9.0 MARINE FENDERS

9.1 FOR COMPLETE SPECIFICATIONS, REFER TO SPECIFICATION DOCUMENT NO. 35 59 13 AND DRAWING 407071-00182-00-MA-DGA-1515.

9.2 MARINE FENDERS ENERGY ABSORBING ELEMENTS RATED PERFORMANCE CRITERIA SHALL BE AS FOLLOWS:

PERMANENT ENERGY ABSORBING FENDERS
- RUBBER CONE FENDER SHALL BE TRELLEBORG SCN 1100, RUBBER GR. F1.5 OR APPROVED EQUIVALENT
- E = 562 kNm (MIN.)
- R = 1140 kN (MAX.)

TEMPORARY FOAM FILLED FENDERS
- FOAM FILLED RUBBER FENDER SHALL BE MARINE FENDERS INTERNATIONAL INC., OCEAN GUARD STANDARD CAPACITY 1800x3700 FOAM-FILLED FENDER OR APPROVED EQUIVALENT
- E = 40 kNm (MIN.)
- R = 150 kN (MAX.)

10.0 DEMOLITION

10.1 FOR COMPLETE SPECIFICATIONS, REFER TO SPECIFICATION DOCUMENT NO. 24 41 00.

10.2 OBTAIN WRITTEN APPROVAL FROM THE OWNER'S REPRESENTATIVE PRIOR TO REMOVING ANY EXISTING UTILITIES IN THE AREA OF DEMOLITION.

10.3 WHERE TIMBER PILES ARE TO BE REMOVED, EVERY REASONABLE EFFORT SHALL BE MADE TO EXTRACT THE PILES IN THEIR ENTIRETY WITHOUT BREAKING.

10.4 TAKE ALL NECESSARY PRECAUTIONS TO CONTAIN THE DEMOLITION WITHIN THE LIMITS DESIGNATED. THE CONTRACTOR SHALL BE LIABLE FOR ANY DAMAGE TO EXISTING STRUCTURES AND UTILITIES NOT INTENDED FOR REMOVAL.

10.5 ANY DAMAGE INCURRED IN THE EXECUTION OF THIS WORK TO ANY PART OF THE PROPERTY OR STRUCTURE NOT SPECIFICALLY DESIGNED FOR DEMOLITION SHALL BE REPAIRED, REPLACED AND/OR RECONSTRUCTED AT THE EXPENSE OF THE CONTRACTOR, TO ITS ORIGINAL CONDITION.

10.6 REMOVE AND DISPOSE OF ALL DEMOLISHED MATERIAL OFF SITE IN ACCORDANCE WITH ALL MUNICIPAL, PROVINCIAL AND FEDERAL REQUIREMENTS.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
B	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	AJP	CNM	AJP	-		
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D SHEET | SCALE NONE

OneWay to zero harm

WORLEYPARSONS PROJECT No 407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
GENERAL NOTES

DRG No 407071-00182-00-MA-DGA-1502

REV B

PLOT DATE & TIME: 4/12/2019 5:05:45 PM
SAVE DATE & TIME: 4/12/2019 3:22:46 PM
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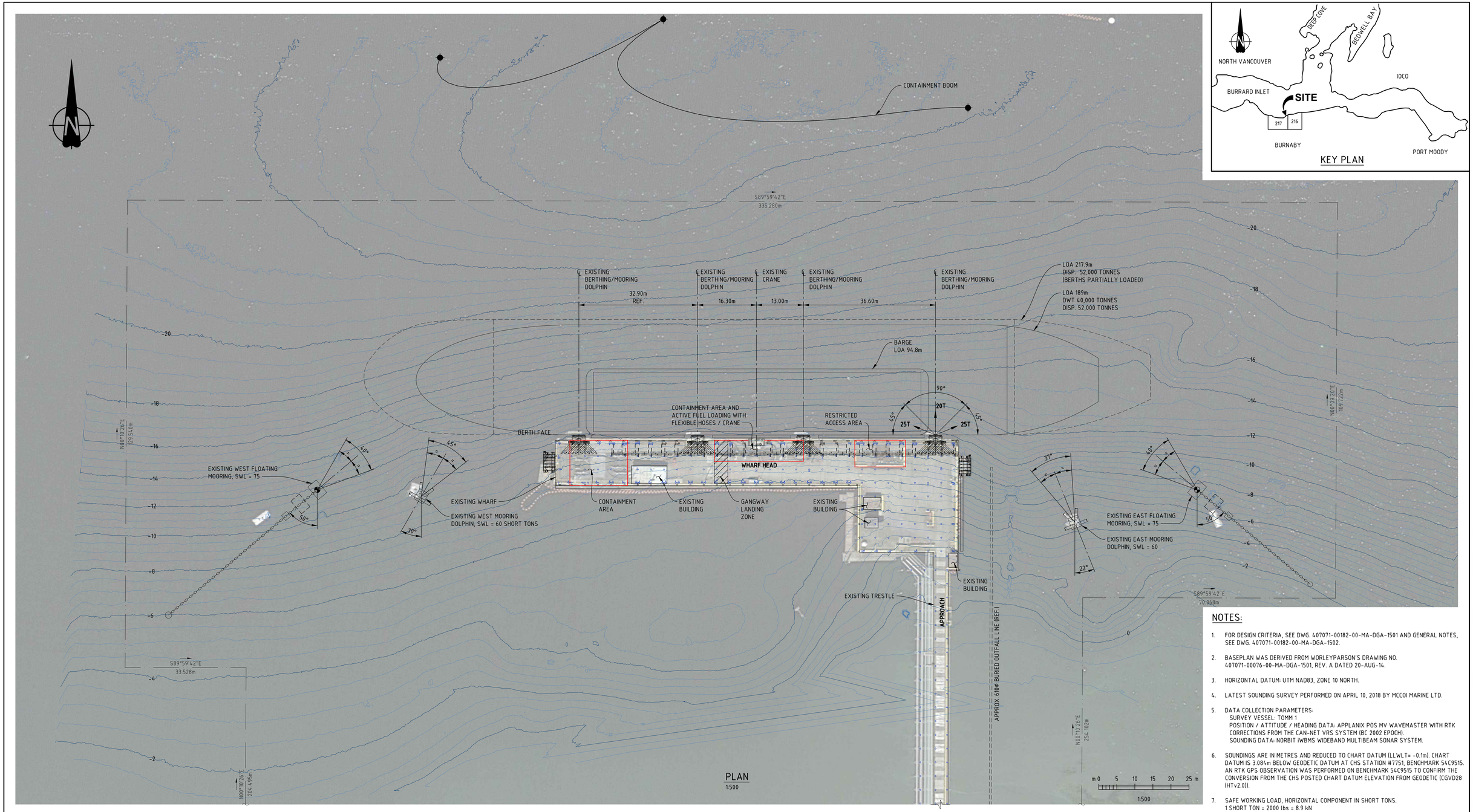
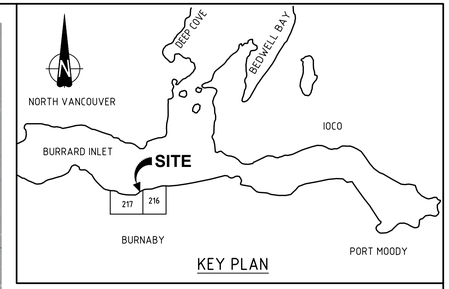
LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\11_DRAWINGS\15_I_AND_E\02_MARINE\407071-00182-00-MA-DGA-1501_1502.DWG



PLAN
1:500



KEY PLAN

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.
2. BASEPLAN WAS DERIVED FROM WORLEYPARSON'S DRAWING NO. 407071-00076-00-MA-DGA-1501, REV. A DATED 20-AUG-14.
3. HORIZONTAL DATUM: UTM NAD83, ZONE 10 NORTH.
4. LATEST SOUNDING SURVEY PERFORMED ON APRIL 10, 2018 BY MCCOI MARINE LTD.
5. DATA COLLECTION PARAMETERS:
   SURVEY VESSEL: TOMM 1
   POSITION / ATTITUDE / HEADING DATA: APPLANIX POS MV WAVEMASTER WITH RTK CORRECTIONS FROM THE CAN-NET VRS SYSTEM (BC 2002 EPOCH).
   SOUNDING DATA: NORBIT iWBMS WIDEBAND MULTIBEAM SONAR SYSTEM.
6. SOUNDINGS ARE IN METRES AND REDUCED TO CHART DATUM (LLWLT= -0.1m). CHART DATUM IS 3.084m BELOW GEODETIC DATUM AT CHS STATION #7751, BENCHMARK 54C9515. AN RTK GPS OBSERVATION WAS PERFORMED ON BENCHMARK 54C9515 TO CONFIRM THE CONVERSION FROM THE CHS POSTED CHART DATUM ELEVATION FROM GEODETIC (CGVD28 (HTv2.0)).
7. SAFE WORKING LOAD, HORIZONTAL COMPONENT IN SHORT TONS.
   1 SHORT TON = 2000 lbs = 8.9 kN

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D SHEET | SCALE | SHOWN

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WORLEYPARSONS PROJECT No
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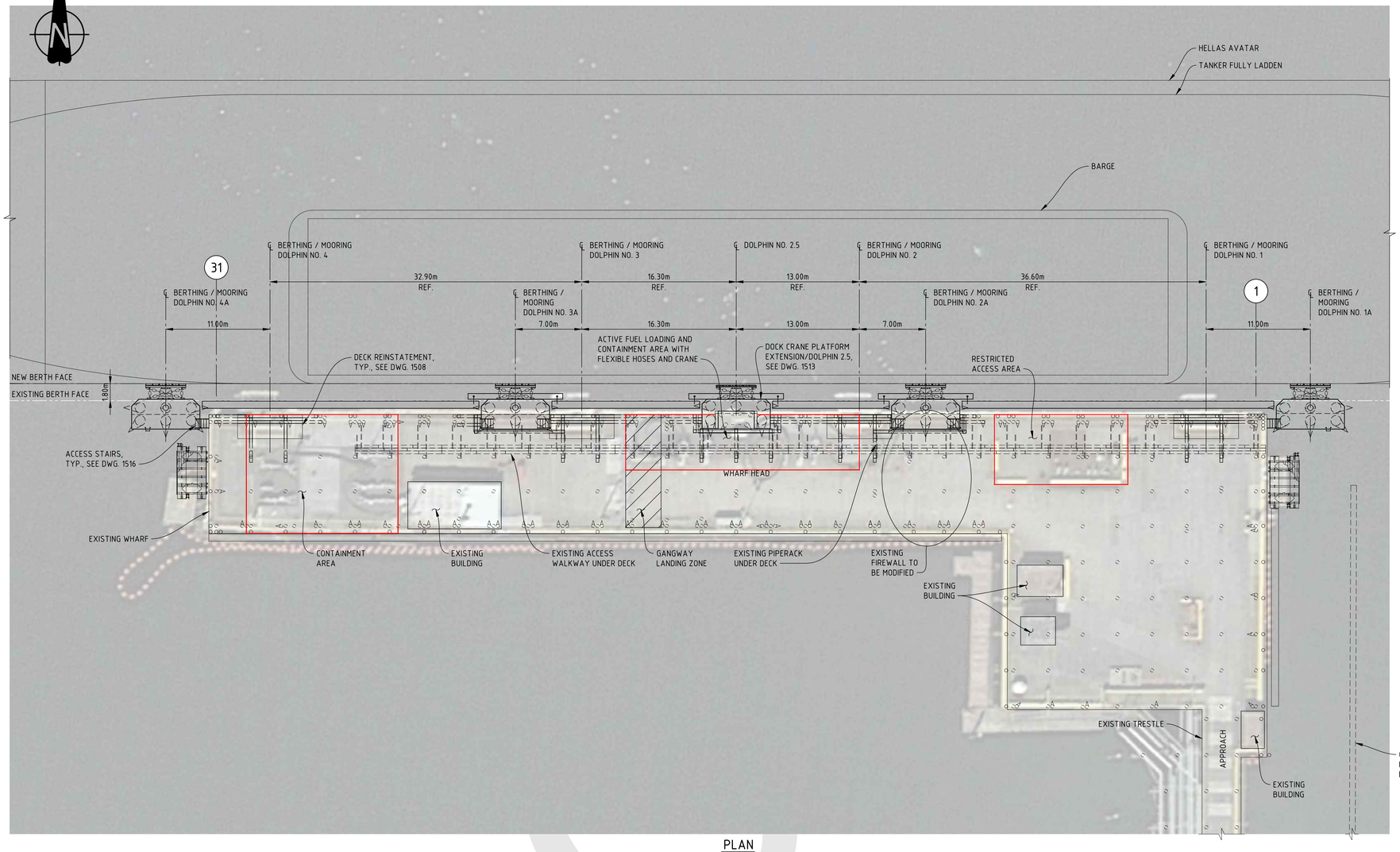
SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
EXISTING SITE PLAN

DRG No 407071-00182-00-MA-DGA-1503

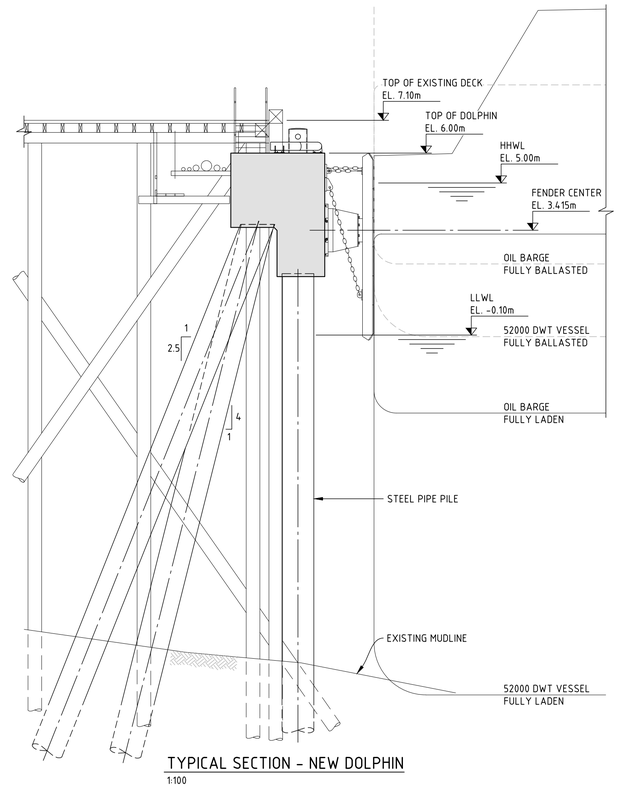
REV C

LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\1T_DRAWINGS\15_1_AND_E\02_MARINE\407071-00182-00-MA-DGA-1503.DWG
USER NAME: brian.massullo
PLOT DATE & TIME: 4/12/2019 5:05:53 PM
SAVE DATE & TIME: 4/12/2019 3:29:05 PM



PLAN
1:250

NOTES:
1. SOME EXISTING DOCK ELEMENTS HAVE BEEN OMITTED FOR CLARITY.
2. CONTRACTOR SHALL REVIEW PROPOSED WORKS WITH OWNER'S REPRESENTATIVE PRIOR TO STARTING WORKS DUE TO THE WHARF REMAINING IN OPERATION AND SENSITIVE PIPING AND EQUIPMENT PRESENT ABOVE AND BELOW DECK.



TYPICAL SECTION - NEW DOLPHIN
1:100

NOTES:
1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.

m 0 5 10 15 m
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D SHEET | SCALE SHOWN

OneWay to zero harm

WORLEYPARSONS PROJECT No
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ENGINEERING AND PERMIT STAMPS (As Required)

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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
GENERAL ARRANGMENT

DRG No 407071-00182-00-MA-DGA-1504
REV C

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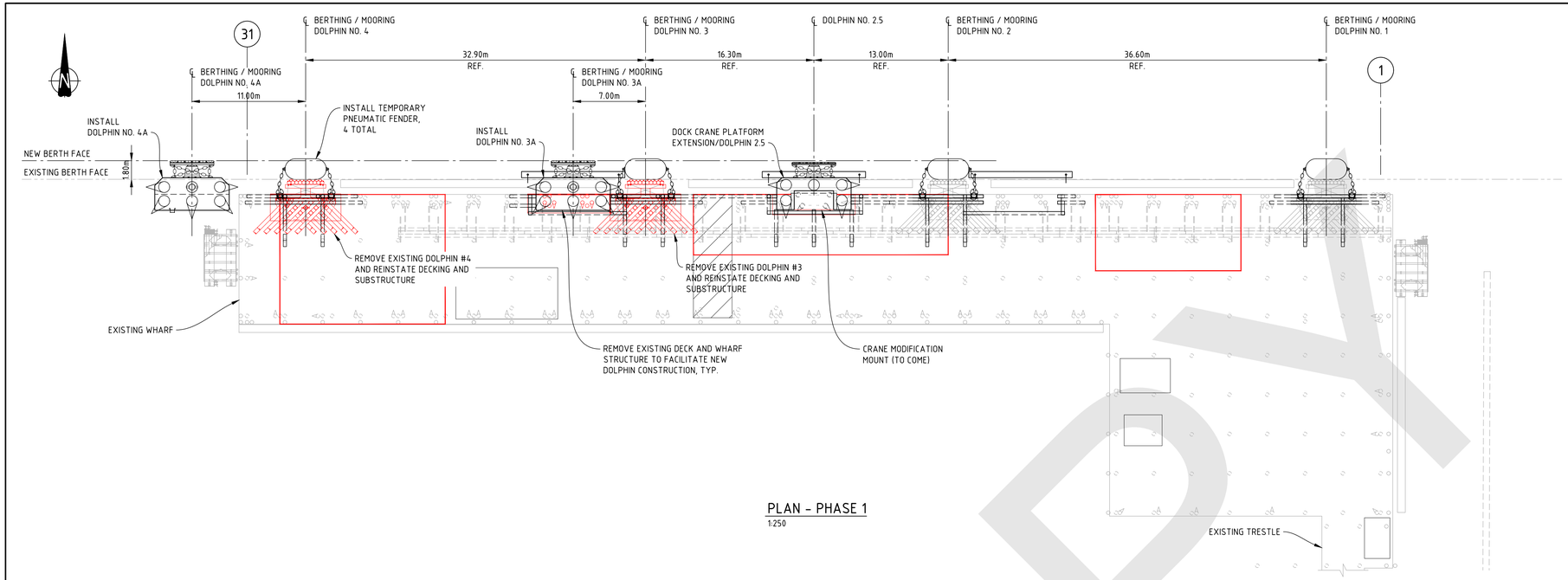
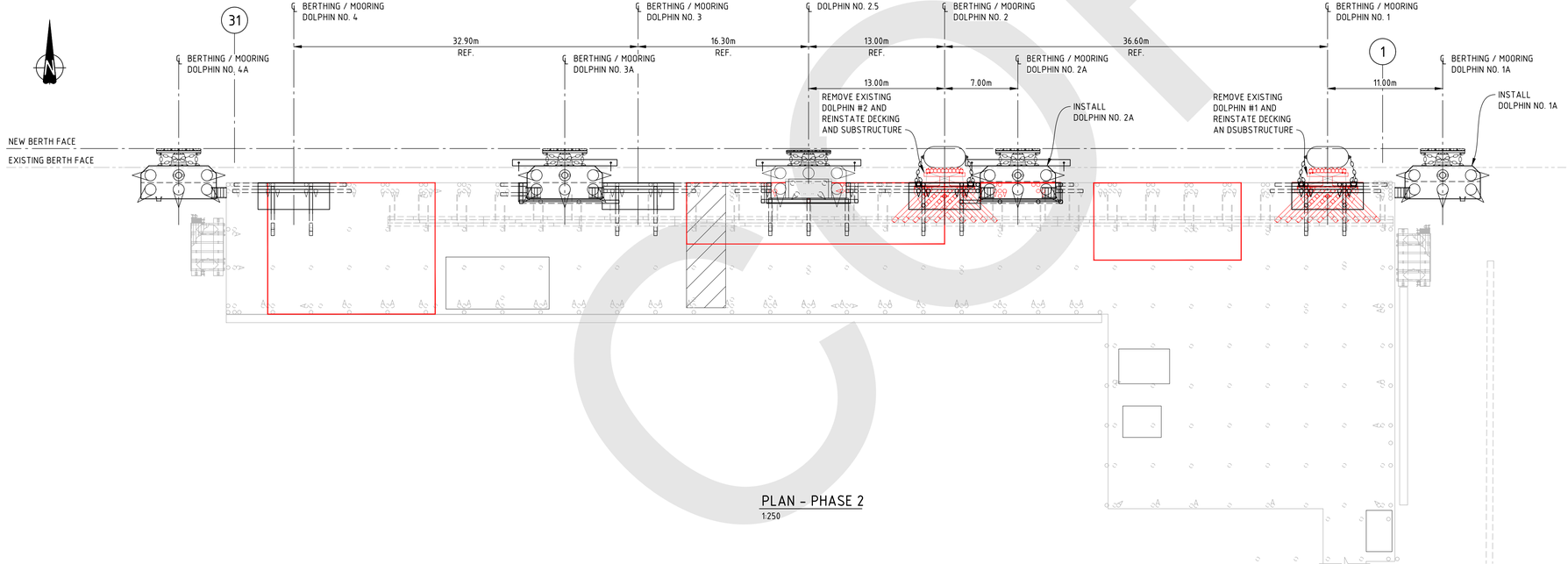
SAVE DATE & TIME: 4/12/2019 3:46:44 PM



PLAN - PHASE 1
1:250

HIGH-LEVEL ANTICIPATED CONSTRUCTION SEQUENCE

PHASE	ORDER OF WORK	INSTRUCTION
1	1	MOBILIZE
	2	RELOCATE/MODIFY EXISTING CRANE MOUNT/CRANE (BY OTHERS)
	3	INSTALL TEMPORARY FENDERS AT EXISTING DOLPHINS 1, 2, 3 AND 4
	4	DEMOLISH WHARF DECKING AND SUBSTRUCTURE FOR DOLPHINS 2.5 AND 3A
	5	INSTALL DOLPHINS 2.5, 3A AND 4A
	6	REMOVE TEMPORARY FENDERS AT EXISTING DOLPHINS 3 AND 4
	7	DEMOLISH EXISTING DOLPHINS 3 AND 4
	8	REINSTATE WHARF DECKING AND SUBSTRUCTURE AT EXISTING DOLPHIN LOCATIONS 3 AND 4
	9	REINSTATE FUEL SPILL BARRIER
	10	DEMOBILIZE
2	1	MOBILIZE
	2	DEMOLISH WHARF DECKING AND SUBSTRUCTURE FOR DOLPHIN 2A
	3	INSTALL DOLPHINS 1A AND 2A
	4	REMOVE TEMPORARY FENDERS AT DOLPHINS 1 AND 2
	5	DEMOLISH EXISTING DOLPHINS 1 AND 2
	6	REINSTATE WHARF DECKING AND SUBSTRUCTURE AT EXISTING DOLPHIN LOCATIONS 1 AND 2
	7	REINSTATE FUEL SPILL BARRIER
	8	DEMOBILIZE



PLAN - PHASE 2
1:250

m 0 5 10 15 m
1:250

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.
2. FOR DEMOLITION LAYOUT, SEE DWG. 407071-00182-00-MA-DGA-1506.
3. FOR REINSTATEMENT LAYOUT, SEE DWG. 407071-00182-00-MA-DGA-1508.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	AJP	SPER	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	BJM	-	AJP	SPER	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1505)	BJM	-	SPER	-	AJP	-		

D SHEET SCALE SHOWN

OneWay to zero harm

WORLEYPARSONS PROJECT No
407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
Last Saved: Dec. 04/19 4:03pm

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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
CONSTRUCTION SEQUENCING

DRG No 407071-00182-00-MA-DGA-1505
REV C

LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\11_DRAWINGS\15_I_AND_E\02_MARINE\407071-00182-00-MA-DGA-1505.DWG
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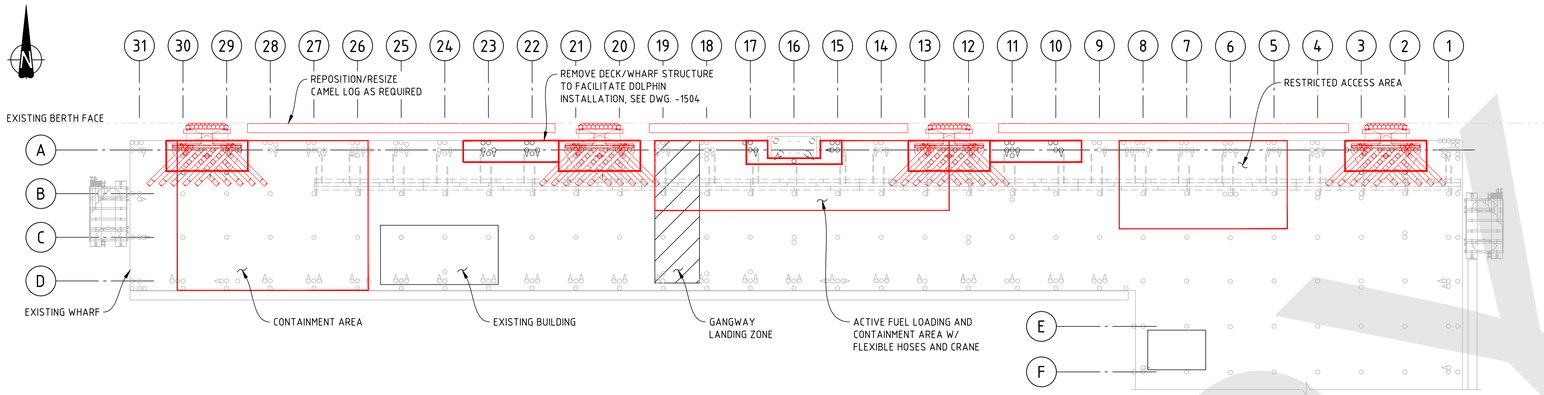
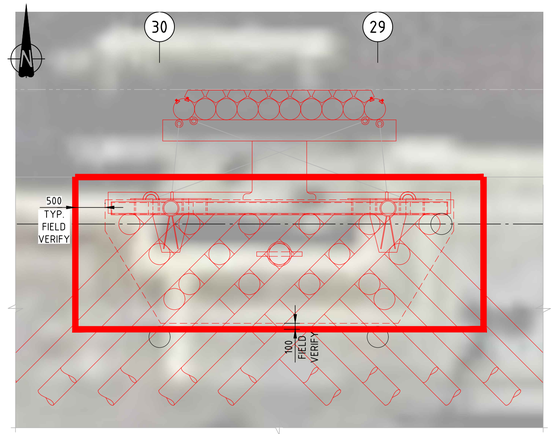
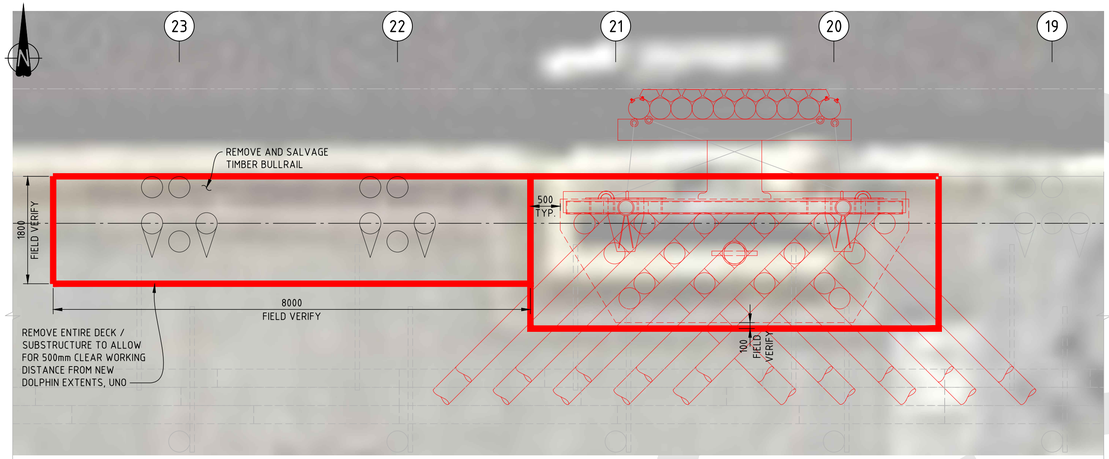


PLAN
1:250



PLAN - DECK AND FENDER DEMOLITION FOR EXISTING DOLPHINS
1:50

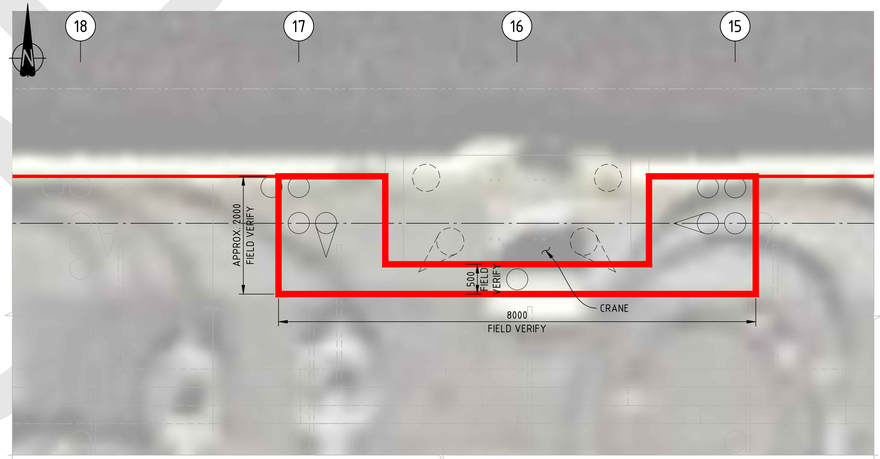
NOTES:
1. CONTRACTOR TO WORK WITH OWNER'S REPRESENTATIVE TO FIELD VERIFY EXTENTS AND LIMITS OF DEMOLITION.
2. CONTRACTOR SHALL SUPPORT EXISTING WHARF/DECK STRUCTURE AS REQUIRED DURING DEMOLITION. AT THE CONTRACTORS DISCRETION THE SUPPORT MAY BE TEMPORARY DURING DEMOLITION ONLY OR IT MAY BE A PERMANENT PART OF THE REINSTATEMENT.



PLAN - DECK AND FENDER DEMOLITION FOR EXISTING AND NEW DOLPHINS
1:50

NOTES:
1. CONTRACTOR TO WORK WITH OWNER'S REPRESENTATIVE TO FIELD VERIFY EXTENTS AND LIMITS OF DEMOLITION.
2. CONTRACTOR SHALL SUPPORT EXISTING WHARF/DECK STRUCTURE AS REQUIRED DURING DEMOLITION. AT THE CONTRACTOR'S DISCRETION THE SUPPORT MAY BE TEMPORARY DURING DEMOLITION ONLY OR IT MAY BE A PERMANENT PART OF THE REINSTATEMENT.

CONTRACTOR SHALL THOROUGHLY REVIEW THE UNDERSIDE OF DECK WALKWAYS AND PIPE RACKS TO ENSURE ITS DEMOLITION PLANS DO NOT DAMAGE STRUCTURES NOT TO BE REMOVED. CONTRACTOR TO REVIEW DEMOLITION PLAN AND PERCEIVED CONFLICTS WITH OWNER AND OWNER'S REPRESENTATIVE PRIOR TO ANY DEMOLITION WORKS.



PLAN - DEMOLITION AT EXISTING CRANE
1:50

NOTES:
1. CONTRACTOR TO WORK WITH OWNER'S REPRESENTATIVE TO FIELD VERIFY EXTENTS AND LIMITS OF DEMOLITION.
2. CONTRACTOR SHALL SUPPORT EXISTING WHARF/DECK STRUCTURE AS REQUIRED DURING DEMOLITION. AT THE CONTRACTORS DISCRETION THE SUPPORT MAY BE TEMPORARY DURING DEMOLITION ONLY OR IT MAY BE A PERMANENT PART OF THE REINSTATEMENT.
3. CONTRACTOR SHALL NOTE THE PRESENCE OF OPERATING AND CHARGED EQUIPMENT, FUEL LINES, ELECTRICAL SERVICES AND SHALL WORK WITH THE OWNER AND OWNER'S REPRESENTATIVE DURING CONSTRUCTION FOR EFFECTIVE AND SAFE "SHUT-DOWNS" AND DE-ENERGIZING/UN-CHARGING.

m 0 5 10 15 m
1:250

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	AJP	SPER	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	JLC	-	AJP	SPER	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1506)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE | SHOWN

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WORLEYPARSONS PROJECT No
407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

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Worley Group

SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
DEMOLITION
PLAN AND DETAILS

DRG No 407071-00182-00-MA-DGA-1506
REV C

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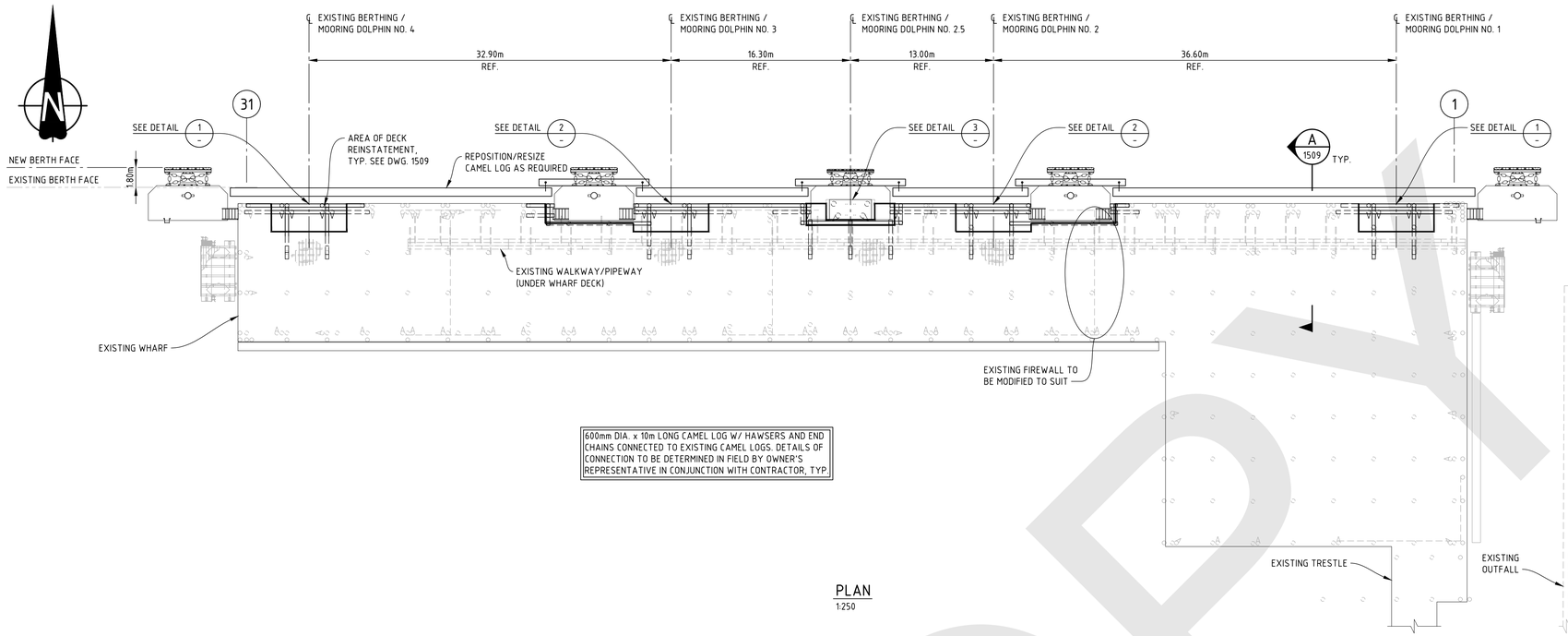
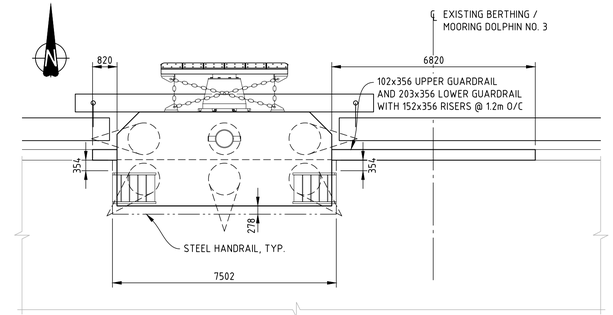


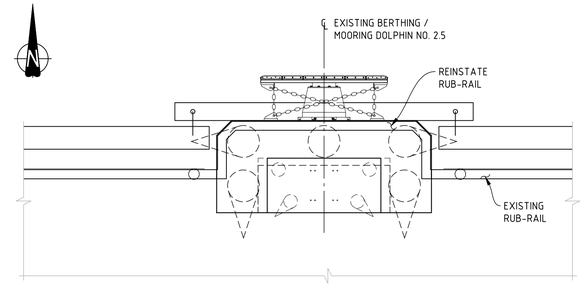
600mm DIA. x 10m LONG CAMEL LOG W/ HAWSERS AND END CHAINS CONNECTED TO EXISTING CAMEL LOGS. DETAILS OF CONNECTION TO BE DETERMINED IN FIELD BY OWNER'S REPRESENTATIVE IN CONJUNCTION WITH CONTRACTOR, TYP.

PLAN
1:250

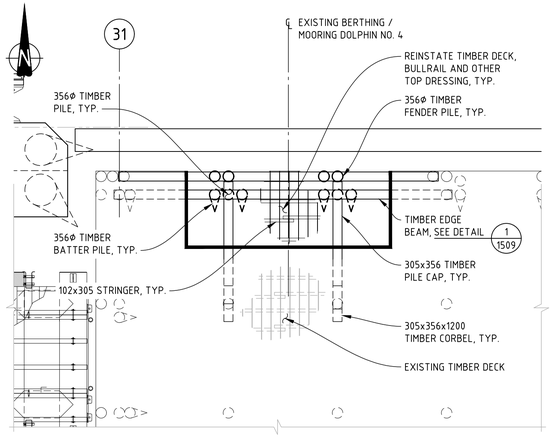


DOLPHIN - DECK AND TOP DRESSING PLAN
1:100

NOTE: DOLPHIN 2 SIMILAR, OPPOSITE HAND.

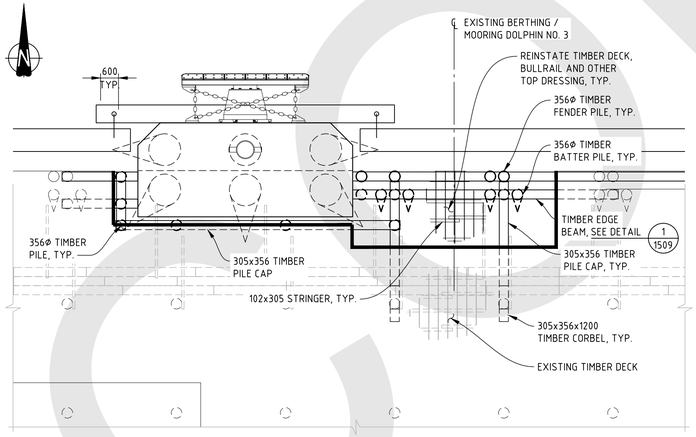


DOLPHIN 2.5 - DECK AND TOP DRESSING PLAN
1:100



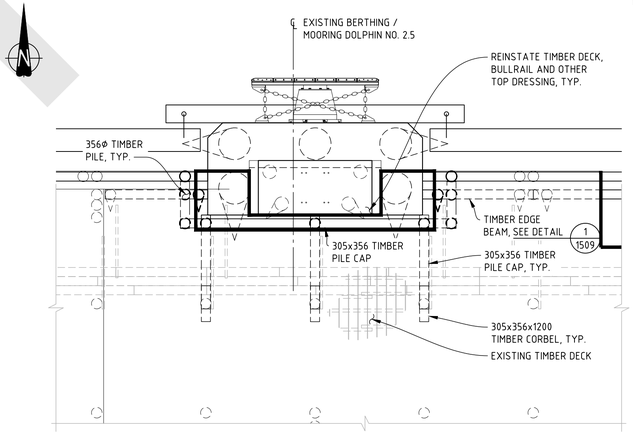
DETAIL 1
1:100

NOTES:
1. DOLPHIN 1 AND 4 SIMILAR.
2. CONTRACTOR SHALL NOTE THE PRESENCE OF OPERATING AND CHARGED EQUIPMENT, FUELED LINES, ELECTRICAL SERVICES AND SHALL WORK WITH THE OWNER AND OWNER'S REPRESENTATIVE DURING CONSTRUCTION FOR EFFECTIVE AND SAFE "SHUT-DOWNS" AND DE-ENERGIZING/UN-CHARGING.
3. REINSTATE IMPERVIOUS DECK BARRIER IN ACCORDANCE WITH OWNER REQUIREMENTS.
4. FOR NEW TIMBER PILES, SEE DWGS. 1510 AND 1511.



DETAIL 2
1:100

NOTES:
1. DOLPHIN 2 AND 3 SIMILAR.
2. CONTRACTOR SHALL NOTE THE PRESENCE OF OPERATING AND CHARGED EQUIPMENT, FUELED LINES, ELECTRICAL SERVICES AND SHALL WORK WITH THE OWNER AND OWNER'S REPRESENTATIVE DURING CONSTRUCTION FOR EFFECTIVE AND SAFE "SHUT-DOWNS" AND DE-ENERGIZING/UN-CHARGING.
3. REINSTATE IMPERVIOUS DECK BARRIER IN ACCORDANCE WITH OWNER REQUIREMENTS.
4. FOR NEW TIMBER PILES, SEE DWGS. 1510 AND 1511.



DETAIL 3
1:100

NOTES:
1. CONTRACTOR SHALL NOTE THE PRESENCE OF OPERATING AND CHARGED EQUIPMENT, FUELED LINES, ELECTRICAL SERVICES AND SHALL WORK WITH THE OWNER AND OWNER'S REPRESENTATIVE DURING CONSTRUCTION FOR EFFECTIVE AND SAFE "SHUT-DOWNS" AND DE-ENERGIZING/UN-CHARGING.
2. REINSTATE IMPERVIOUS DECK BARRIER IN ACCORDANCE WITH OWNER REQUIREMENTS.
3. FOR NEW TIMBER PILES, SEE DWGS. 1510 AND 1511.

m 0 1 2 3 4 5 m
1:100

m 0 5 10 15 m
1:250

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.
2. CONTRACTOR SHALL REINSTATE DECK COMPONENTS INCLUDING BULLRAILS, AND OTHER TOP DRESSING TO TOP OF WHARF AS REQUIRED AND IN ACCORDANCE WITH EXISTING CONSTRUCTION.
3. EXISTING PIPEWAY AND WALKWAY BENEATH WHARF SURFACE SHALL BE MODIFIED IN FIELD TO FACILITATE WORKS. OWNER'S REPRESENTATIVE SHALL PROVIDE DETAILS/CLARIFICATIONS FOR SAID WORKS DURING CONSTRUCTION.
4. ALL TIMBER FOR DECK AND SUBSTRUCTURE REINSTATEMENT SHALL BE DRESSED TO MATCH EXISTING TIMBERS.
5. CAMEL LOGS ALONG BERTH FACE SHALL BE MODIFIED IN FIELD AND SUPPLEMENTED AS REQUIRED.
6. CONTRACTOR SHALL NOTE, THAT ALTHOUGH ALL EFFORTS HAVE BEEN MADE TO ACCURATELY REFLECT THE WORKS, AS THIS IS AN EXISTING STRUCTURE OVER 60 YEARS OLD, IT IS ANTICIPATED THE IN-FIELD CONDITIONS WILL DIFFER FROM AVAILABLE REFERENCE INFORMATION. CONTRACTOR SHALL INFORM OWNER AND OWNER'S REPRESENTATIVE OF DISCREPANCIES.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	AJP	CID	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	JLC	-	AJP	CID	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1508)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE | SHOWN

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WORLEYPARSONS PROJECT No
407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
EXISTING DECK REINSTATEMENT
PLAN

DRG No 407071-00182-00-MA-DGA-1508

REV C

COPY

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SAVE DATE & TIME: 4/12/2019 4:18:25 PM
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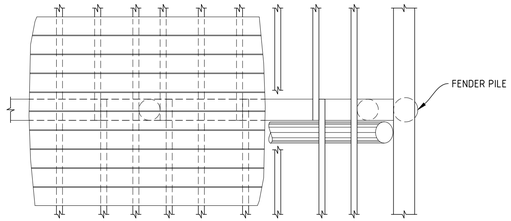
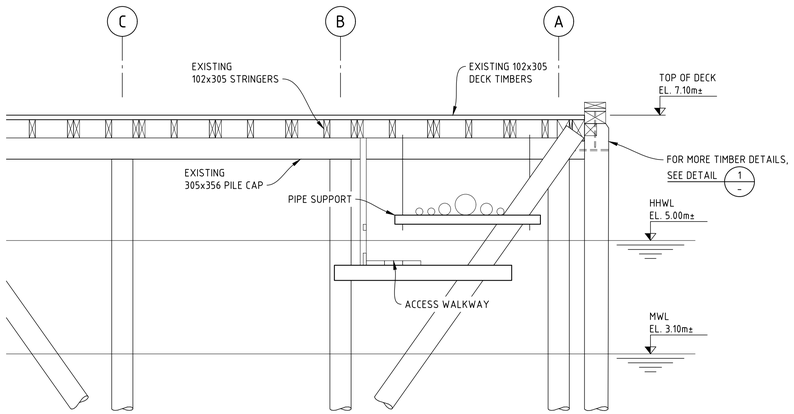
LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\11_DRAWINGS\15_1_AND_E\02_MARINE\407071-00182-00-MA-DGA-1508.DWG

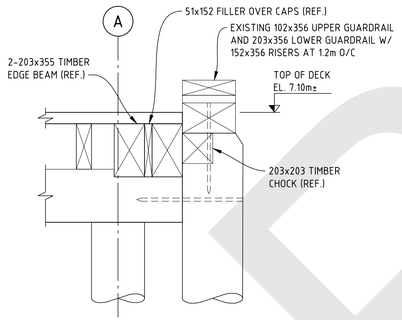


SHOWING DECKING DECKING REMOVED

TYPICAL FRAMING PLAN
1:50

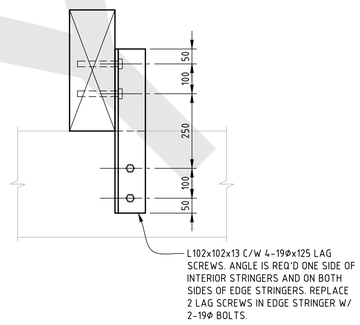


SECTION A
1:50 1508

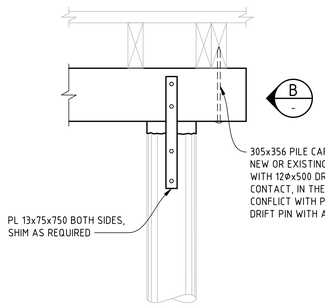


DETAIL 1
1:20 -

NOTE: BATTER PILE NOT SHOWN FOR CLARITY

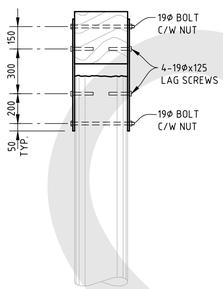


DETAIL 2 TYPICAL STRINGER TO PILE CAP CONNECTION
1:10 -

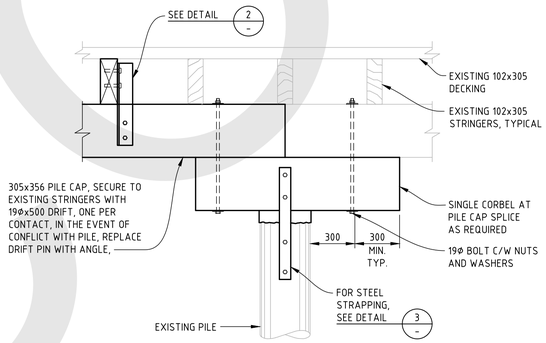


DETAIL 3 EXISTING PILE TO NEW WHARFHEAD CAP AND EXISTING CAP TO NEW PILE CONNECTION
1:20 -

NOTE: DECK AND STRINGERS NOT SHOWN FOR CLARITY.



VIEW B
1:20 -



DETAIL 4 WHARFHEAD PILE CAP REPLACEMENT AT SPLICE OR NEW BUILD
1:20 -

PHOTO 1 - DECK, PIPEWAY AND DOLPHIN INTERACTION

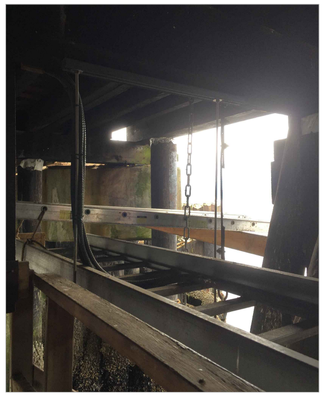


PHOTO 2 - DECK AND DOLPHIN INTERACTION

PHOTO 3 - DECK, PIPEWAY AND WALKWAY

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.
2. CONTRACTOR SHALL REINSTATE DECK COMPONENTS INCLUDING BULLRAILS, AND OTHER TOP DRESSING TO TOP OF WHARF AS REQUIRED AND IN ACCORDANCE WITH EXISTING CONSTRUCTION.
3. ALL DIMENSIONS RELATING TO THE EXISTING STRUCTURE ARE REFERENCE. CONTRACTOR SHALL FIELD VERIFY.
4. EXISTING PIPEWAY AND WALKWAY BENEATH WHARF SURFACE SHALL BE MODIFIED IN FIELD TO FACILITATE WORKS. OWNER'S REPRESENTATIVE SHALL PROVIDE DETAILS/CLARIFICATIONS FOR SAID WORKS DURING CONSTRUCTION.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	CUSTOMER	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	AJP	CID	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	JLC	-	AJP	CID	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1509)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE | SHOWN

OneWay to zero harm

WORLEYPARSONS PROJECT No
407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

PRELIMINARY
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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
EXISTING DECK REINSTATEMENT
SECTIONS AND DETAILS

DRG No 407071-00182-00-MA-DGA-1509 REV C

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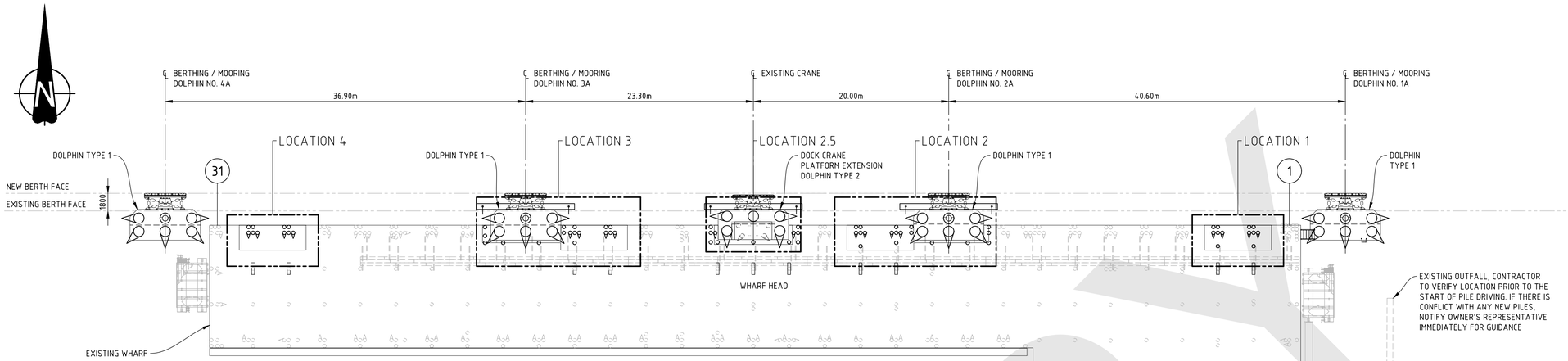
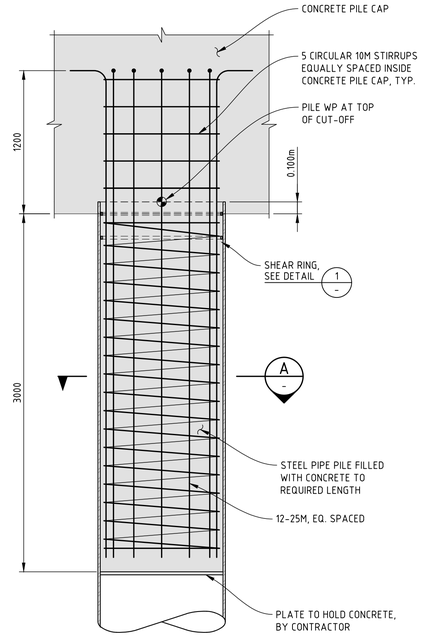
SAVE DATE & TIME: 4/12/2019 4:18:53 PM

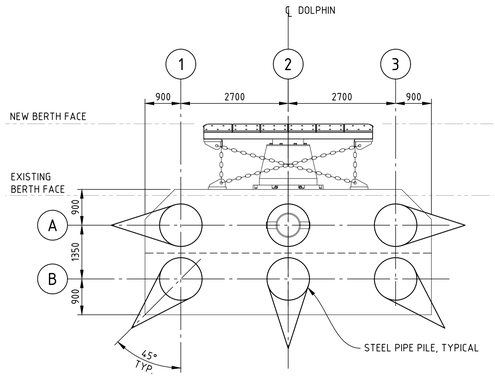


ONCE DECK DEMOLITION IS COMPLETE AND DECK REINSTATEMENT DIMENSIONS ARE CONFIRMED, NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY CONFLICTS BETWEEN NEW AND/OR EXISTING PILES.

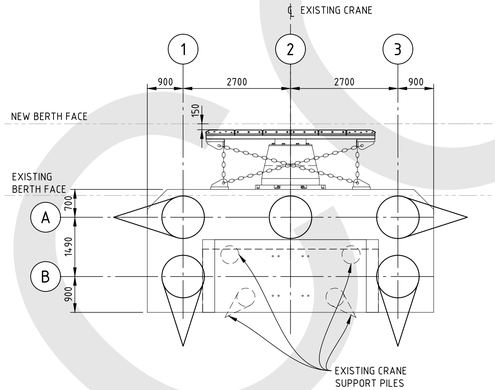
PLAN
1:250
NOTE: FOR ALL LOCATIONS IDENTIFIED, SEE DWG. -1511.



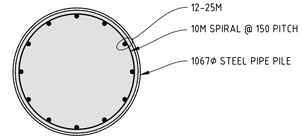
PILE PLUG
1:25



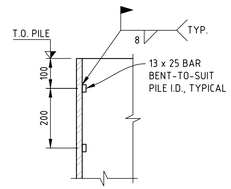
PLAN - DOLPHIN NO. 1A, 2A, 3A AND 4A
1:75 (4 REQ'D THUS)



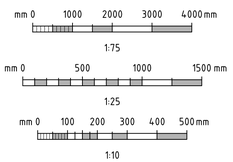
PLAN - DOLPHIN NO. 2.5
1:75



SECTION A/-
1:25



DETAIL 1/- SHEAR RING
1:10



NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	SPER	ELIU	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	BJM	-	SPER	ELIU	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1510)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE | SHOWN

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WORLEYPARSONS PROJECT No
407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
PILE PLAN AND DETAILS

DRG No 407071-00182-00-MA-DGA-1510

REV C

COPY

LOCATION: U:\YVR\407071\00182_SCP_SHIB2020PDR\11_DRAWINGS\15_1_AND_E\02_MARINE\407071-00182-00-MA-DGA-1510.DWG
USER NAME: brian.massullo
PLOT DATE & TIME: 4/12/2019 5:12:14 PM
SAVE DATE & TIME: 4/12/2019 5:11:52 PM

WHARF TIMBER PILE LIST – DECK REINSTATEMENT

LOCATION	DESCRIPTION	PILE TYPE	QUANTITY	NORTHING	EASTING	PILE O.D. (mm)	BATTER	ESTIMATED MUDLINE EL. (m)	ESTIMATED PILE TIP EL. (m)	CUT-OFF EL. (m)	ADDITIONAL ALLOWANCE (m)	ESTIMATED TOTAL LENGTH (m)	INSTALLED NORTHING	INSTALLED EASTING	SURVEYED MUDLINE EL. (m)	SURVEYED PILE TIP EL. (m)	INSTALLED CUT-OFF EL. (m)
1	EXISTING DOLPHIN NO. 1 DECK REINSTATEMENT	V	2	–	–	356	VERTICAL	-9.0	-22.5	6.5	0.5	29.0	–	–	–	–	–
		B	4	–	–	356	8.5:12	-9.0	-17.2	6.5	0.5	29.0	–	–	–	–	–
		F	4	–	–	356	VERTICAL	-9.0	-20.7	6.8	0.5	27.5	–	–	–	–	–
2	EXISTING DOLPHIN NO. 2 DECK REINSTATEMENT AND REINSTATEMENT WORKS ASSOCIATED WITH DOLPHIN NO. 2A	V	7	–	–	356	VERTICAL	-9.0	-22.5	6.5	0.5	29.0	–	–	–	–	–
		B	4	–	–	356	8.5:12	-9.0	-17.2	6.5	0.5	29.0	–	–	–	–	–
		F	5	–	–	356	VERTICAL	-9.0	-20.7	6.8	0.5	27.5	–	–	–	–	–
2.5	REINSTATEMENT WORKS ASSOCIATED WITH DOLPHIN NO. 2.5	V	7	–	–	356	VERTICAL	-9.0	-22.5	6.5	0.5	29.0	–	–	–	–	–
		B	2	–	–	356	8.5:12	-9.0	-17.2	6.5	0.5	29.0	–	–	–	–	–
		F	2	–	–	356	VERTICAL	-9.0	-20.7	6.8	0.5	27.5	–	–	–	–	–
3	EXISTING DOLPHIN NO. 3 DECK REINSTATEMENT AND REINSTATEMENT WORKS ASSOCIATED WITH DOLPHIN NO. 3A	V	9	–	–	356	VERTICAL	-9.0	-22.5	6.5	0.5	29.0	–	–	–	–	–
		B	4	–	–	356	8.5:12	-9.0	-17.2	6.5	0.5	29.0	–	–	–	–	–
		F	5	–	–	356	VERTICAL	-9.0	-20.7	6.8	0.5	27.5	–	–	–	–	–
4	EXISTING DOLPHIN NO. 4 DECK REINSTATEMENT	V	2	–	–	356	VERTICAL	-9.0	-22.5	6.5	0.5	29.0	–	–	–	–	–
		B	4	–	–	356	8.5:12	-9.0	-17.2	6.5	0.5	29.0	–	–	–	–	–
		F	4	–	–	356	VERTICAL	-9.0	-22.5	6.8	0.5	27.5	–	–	–	–	–

NOTE: FIELD FIT REQUIRED POST-DOLPHIN INSTALLATION.

LEGEND:

V TIMBER PILE – VERTICAL

B TIMBER BATTER PILE

F TIMBER FENDER PILE – VERTICAL

TEMPORARY PILE LIST – FOAM-FILLED FENDER LOCATIONS

LOCATION (EXISTING DOLPHIN NO.)	QUANTITY	NORTHING	EASTING	PILE O.D. (mm)	WALL THICKNESS (mm)	BATTER	ESTIMATED MUDLINE EL. (m)	ESTIMATED PILE TIP EL. (m)	CUT-OFF EL. (m)	ADDITIONAL ALLOWANCE (m)	MINIMUM COATED LENGTH (m)	ESTIMATED TOTAL LENGTH (m)
1	2			457	12.7	VERTICAL	-9.5	-20.0	6.0	0.5	UNCOATED	26.5
2	2			457	12.7	VERTICAL	-9.5	-20.0	6.0	0.5	UNCOATED	26.5
3	2			457	12.7	VERTICAL	-9.5	-20.0	6.0	0.5	UNCOATED	26.5
4	2			457	12.7	VERTICAL	-9.5	-20.0	6.0	0.5	UNCOATED	26.5

PILE LIST – DOLPHIN NO'S. 1A, 2A, 3A, AND 4A

DOLPHIN	PILE LOCATION	NORTHING	EASTING	PILE O.D. (mm)	WALL THICKNESS (mm)	BATTER	ESTIMATED MUDLINE EL. (m)	ESTIMATED PILE TIP EL. (m)	CUT-OFF EL. (m)	ADDITIONAL ALLOWANCE (m)	MINIMUM COATED LENGTH (m)	ESTIMATED TOTAL LENGTH (m)	INSTALLED NORTHING	INSTALLED EASTING	SURVEYED MUDLINE EL. (m)	SURVEYED PILE TIP EL. (m)	INSTALLED CUT-OFF EL. (m)
1A	A1			1067	19.1	1:4	-9.8	-34.3	1.96	0.6	*	38	–	–	–	–	–
	A2			1067	19.1	VERTICAL	-10.5	-33.5	1.96	0.6	*	36	–	–	–	–	–
	A3			1067	19.1	1:4	-11.4	-34.4	1.96	0.6	*	38	–	–	–	–	–
	B1			1067	19.1	1:2.5	-8.7	-32.9	3.61	0.6	*	40	–	–	–	–	–
	B2			1067	19.1	1:4	-9.4	-32.6	3.61	0.6	*	38	–	–	–	–	–
	B3			1067	19.1	1:2.5	-10.2	-32.9	3.61	0.6	*	40	–	–	–	–	–
2A	A1			1067	19.1	1:4	-9.3	-32.4	1.96	0.6	*	36	–	–	–	–	–
	A2			1067	19.1	VERTICAL	-9.5	-33.4	1.96	0.6	*	36	–	–	–	–	–
	A3			1067	19.1	1:4	-9.6	-32.4	1.96	0.6	*	36	–	–	–	–	–
	B1			1067	19.1	1:2.5	-7.9	-31.1	3.61	0.6	*	38	–	–	–	–	–
	B2			1067	19.1	1:4	-8.1	-31.7	3.61	0.6	*	37	–	–	–	–	–
	B3			1067	19.1	1:2.5	-8.0	-31.1	3.61	0.6	*	38	–	–	–	–	–
3A	A1			1067	19.1	1:4	-9.9	-33.3	1.96	0.6	*	37	–	–	–	–	–
	A2			1067	19.1	VERTICAL	-9.7	-33.5	1.96	0.6	*	36	–	–	–	–	–
	A3			1067	19.1	1:4	-9.5	-33.3	1.96	0.6	*	37	–	–	–	–	–
	B1			1067	19.1	1:2.5	-8.3	-32.9	3.61	0.6	*	40	–	–	–	–	–
	B2			1067	19.1	1:4	-8.3	-31.7	3.61	0.6	*	37	–	–	–	–	–
	B3			1067	19.1	1:2.5	-8.1	-32.9	3.61	0.6	*	40	–	–	–	–	–
4A	A1			1067	19.1	1:4	-11.3	-34.3	1.96	0.6	*	38	–	–	–	–	–
	A2			1067	19.1	VERTICAL	-10.9	-35.4	1.96	0.6	*	38	–	–	–	–	–
	A3			1067	19.1	1:4	-10.2	-34.3	1.96	0.6	*	38	–	–	–	–	–
	B1			1067	19.1	1:2.5	-9.7	-32.9	3.61	0.6	*	40	–	–	–	–	–
	B2			1067	19.1	1:4	-9.4	-32.6	3.61	0.6	*	38	–	–	–	–	–
	B3			1067	19.1	1:2.5	-8.9	-32.9	3.61	0.6	*	40	–	–	–	–	–

* NOTE: MINIMUM COATED LENGTH SHALL BE TO 3.0m BELOW ACTUAL MUDLINE ELEVATION

PILE LIST – DOLPHIN NO. 2.5 (DOCK CRANE EXTENSION)

DOLPHIN	PILE LOCATION	NORTHING	EASTING	PILE O.D. (mm)	WALL THICKNESS (mm)	BATTER	ESTIMATED MUDLINE EL. (m)	ESTIMATED PILE TIP EL. (m)	CUT-OFF EL. (m)	ADDITIONAL ALLOWANCE (m)	MINIMUM COATED LENGTH (m)	ESTIMATED TOTAL LENGTH (m)	INSTALLED NORTHING	INSTALLED EASTING	SURVEYED MUDLINE EL. (m)	SURVEYED PILE TIP EL. (m)	INSTALLED CUT-OFF EL. (m)
2.5	A1			1067	19.1	1:4	-9.8	-33.4	1.96	0.5	*	37	–	–	–	–	–
	A2			1067	19.1	VERTICAL	-9.8	-33.5	1.96	0.5	*	36	–	–	–	–	–
	A3			1067	19.1	1:4	-9.7	-33.4	1.96	0.5	*	37	–	–	–	–	–
	B1			1067	19.1	1:2.5	-7.7	-31.2	3.61	0.5	*	38	–	–	–	–	–
	B3			1067	19.1	1:2.5	-7.4	-31.2	3.61	0.5	*	38	–	–	–	–	–

* NOTE: MINIMUM COATED LENGTH SHALL BE TO 3.0m BELOW ACTUAL MUDLINE ELEVATION

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.

CONFORMED

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	–	SPER/AJP	ELIU/CID	AJP	–		
B	25-NOV-19	ISSUED FOR PRICING	BJM	–	SPER/AJP	ELIU/CID	AJP	–		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY 407071-00182-00-MA-DGA-1511)	BJM	–	SPER	–	AJP	–		

D SHEET | SCALE | SHOWN

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WORLEYPARSONS PROJECT No 407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
PILE LIST

DRG No 407071-00182-00-MA-DGA-1511 | REV C

PLOT DATE & TIME: 4/12/2019 5:06:45 PM
SAVE DATE & TIME: 4/12/2019 4:35:33 PM
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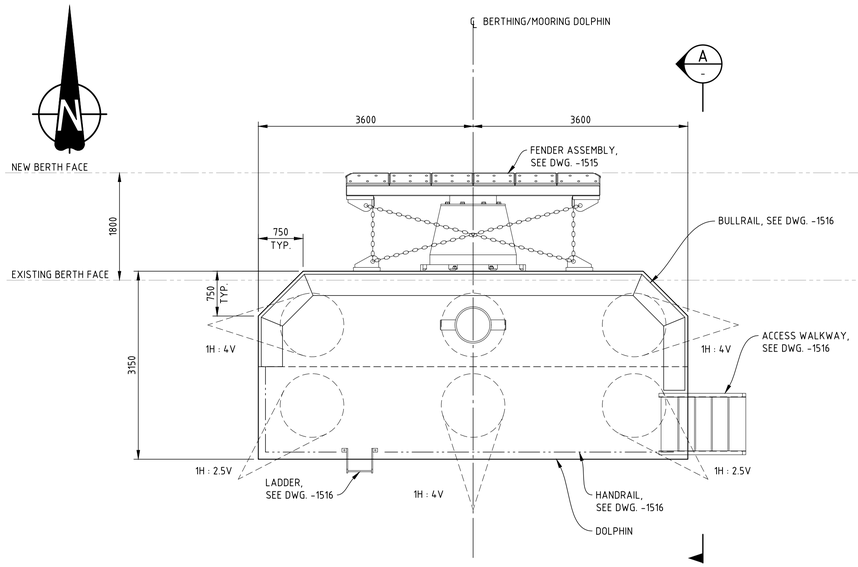
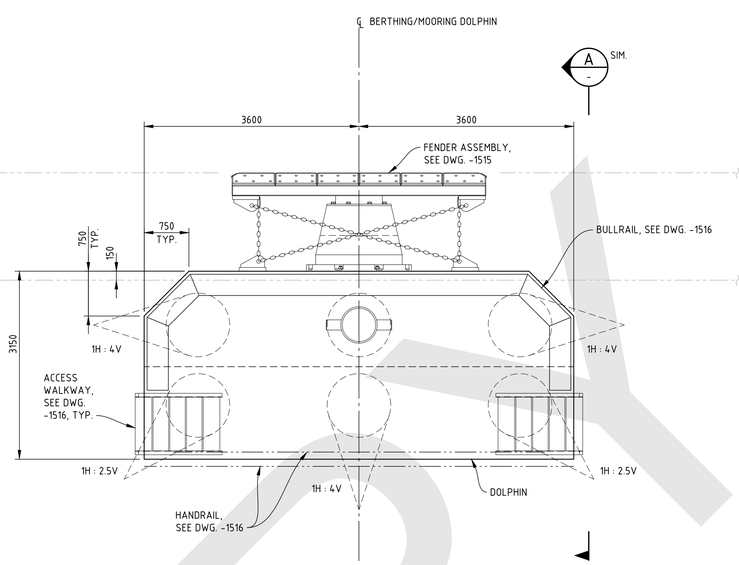
LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\1I_DRAWINGS\15_I_AND_E\02_MARINE\407071-00182-00-MA-DGA-1511.DWG



PLAN - DOLPHIN 1A AND 4A

1:50

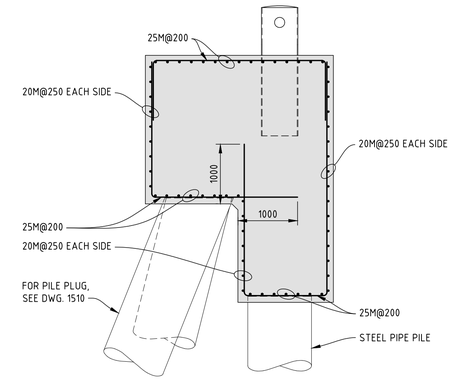
NOTES:
1. DOLPHIN 4A SHOWN, DOLPHIN 1A IS OPPOSITE HAND.
2. EXISTING DECK ELEMENTS NOT SHOWN FOR CLARITY.



PLAN - DOLPHIN 2A AND 3A

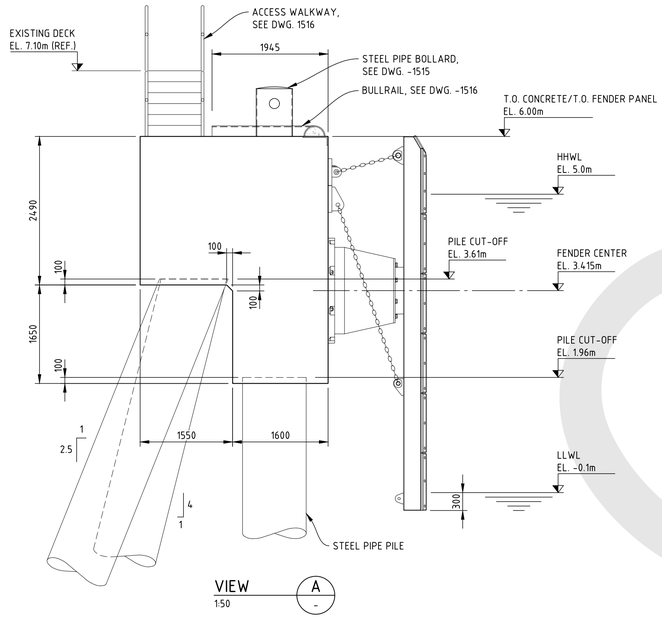
1:50

NOTE: FOR INFORMATION NOT SHOWN, SEE PLAN - DOLPHIN 1A AND 4A



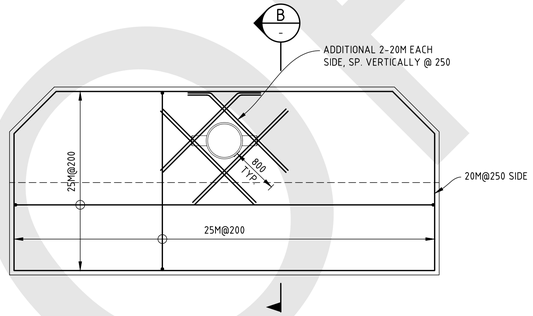
SECTION

1:50



VIEW

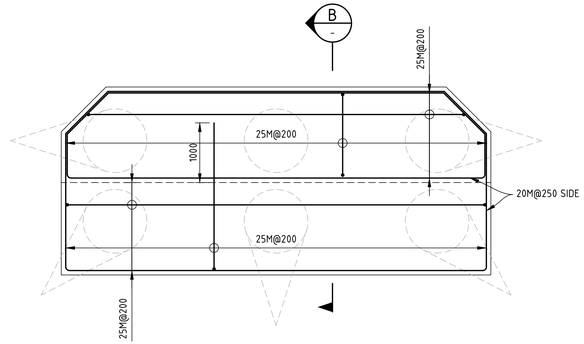
1:50



DOLPHIN 1A, 2A, 3A AND 4A - TOP REINFORCEMENT

1:50

NOTE: LOCALIZE ADJUSTMENT OF REINFORCEMENT AT BOLLARD LOCATIONS REQUIRED.



DOLPHIN 1A, 2A, 3A AND 4A - BOTTOM REINFORCEMENT

1:50

PRECASTING PORTIONS OF PILE CAPS FOR DOLPHINS 1A, 2A, 3A AND 4A CAN BE CONSIDERED SHOULD THE CONTRACTOR INDICATE THIS IS PREFERRED. OWNER'S REPRESENTATIVE WILL PROVIDE UPDATED DESIGN DETAILS IN THIS EVENT.

mm 0 500 1000 2500 mm

1:50

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	SPER	ELIU	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	BJM	-	SPER	ELIU	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-DGA-1512)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE 1:50

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ENGINEERING AND PERMIT STAMPS (As Required)

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SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
DOLPHIN NOS. 1A, 2A, 3A AND 4A
PLANS AND SECTIONS

DRG No 407071-00182-00-MA-DGA-1512 | REV C

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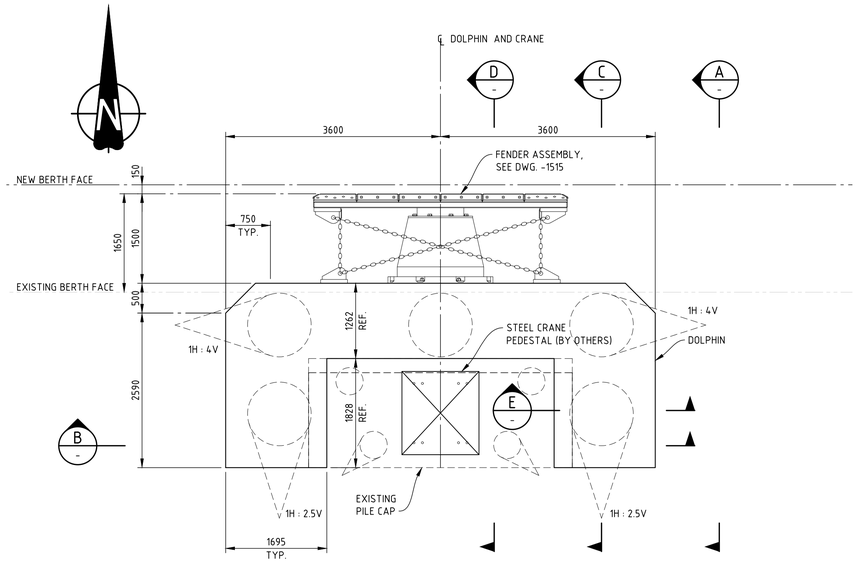
USER NAME: brian.massullo
PLOT DATE & TIME: 4/12/2019 5:06:52 PM
SAVE DATE & TIME: 4/12/2019 4:50:50 PM

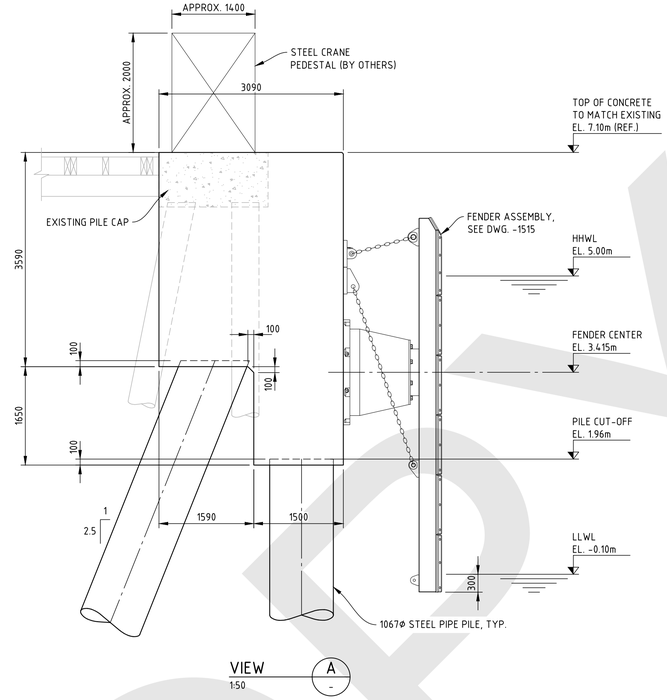


PLAN - DOLPHIN NO. 2.5

1:50

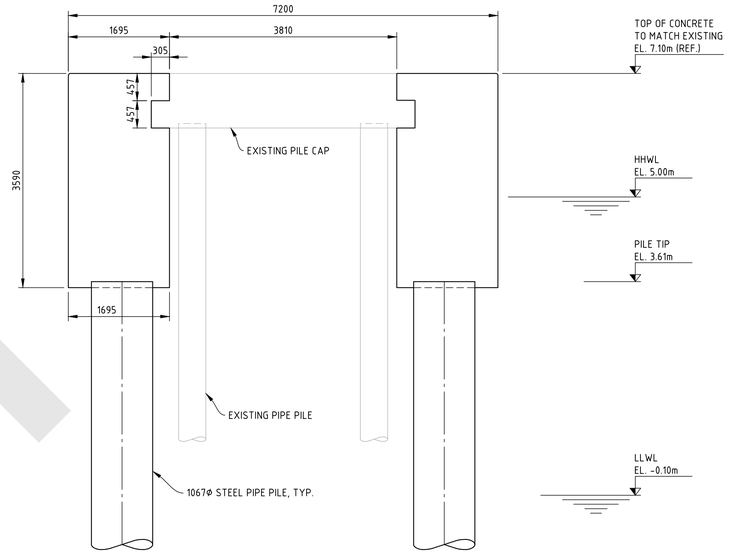
NOTES:

1. CRANE PAD NOT SHOWN FOR CLARITY.
2. EXISTING HARDWARE / BULLRAIL / RUB-RAILS SHALL BE REESTABLISHED. OWNER'S REPRESENTATIVE TO PROVIDE DETAILS BASED ON IN-SITU CONDITIONS.
3. REINSTATE EXISTING RUB-RAIL (NOT SHOWN).



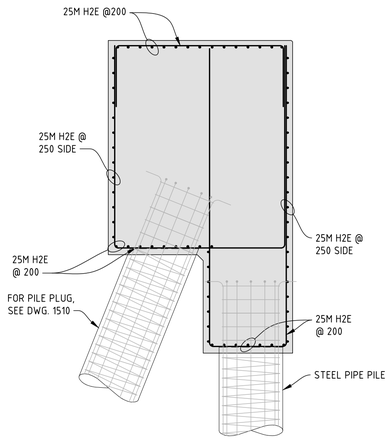
VIEW A

1:50



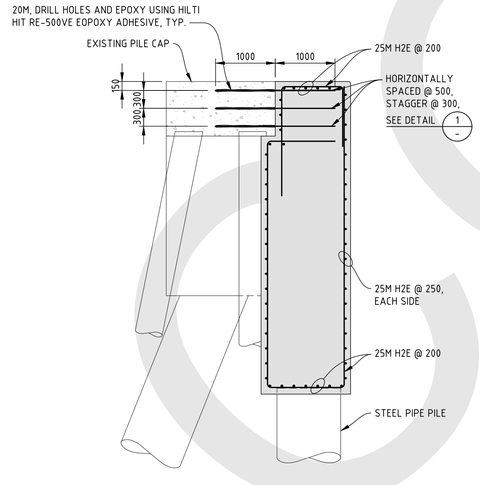
SECTION B

1:50



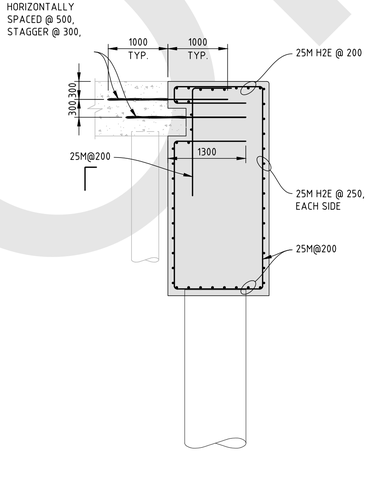
SECTION C

1:50



SECTION D

1:50



SECTION E

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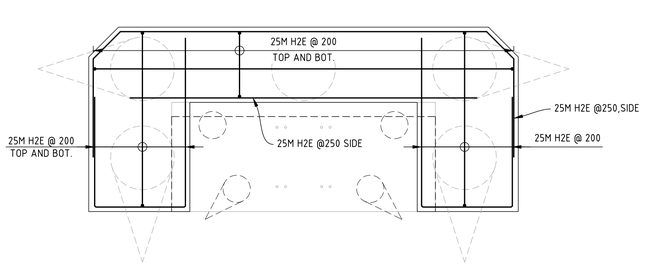
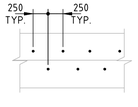


DOLPHIN NO. 2.5 - REINFORCEMENT

1:50



DETAIL 1

1:50

mm 0 500 1000 2500 mm

1:50

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	SPER	ELIU	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	BJM	-	SPER	ELIU	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1513)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE 1:50

OneWay to zero harm

WORLEYPARSONS PROJECT No 407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

PRELIMINARY
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Last Saved: Dec. 04/19 5:00pm

CUSTOMER

Shell Canada Products

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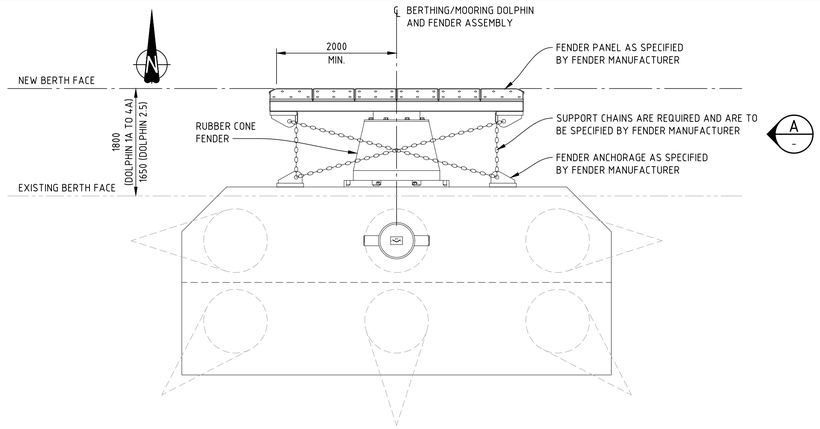
Advisian Worley Group

SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
DOLPHIN NO. 2.5
PLANS AND SECTIONS

DRG No 407071-00182-00-MA-DGA-1513 | REV C

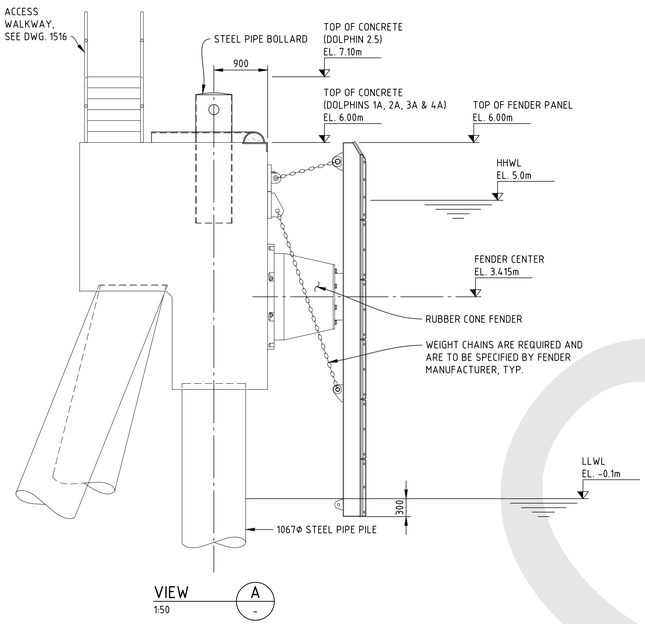
LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\11_DRAWINGS\15_I_AND_E\02_MARINE\407071-00182-00-MA-DGA-1513.DWG
USER NAME: brian.massullo
PLOT DATE & TIME: 4/12/2019 5:06:59 PM
SAVE DATE & TIME: 4/12/2019 5:00:36 PM



PLAN - FENDER ASSEMBLY (PERMANENT)

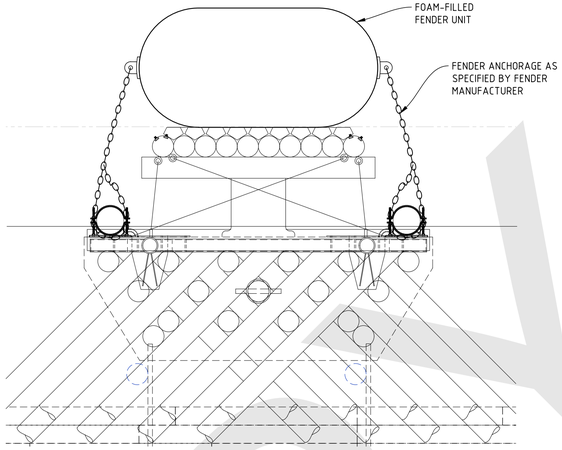
1:50 (5 REQ'D THUS)

NOTES:
1. RUBBER CONE FENDER SHALL BE TRELLEBORG SCN 1100, RUBBER GR. F1.5 OR APPROVED EQUIVALENT.
2. DOLPHIN NO. 2.5 PILE CAP NOT SHOWN FOR CLARITY.
3. DOLPHIN HANDRAILS, BULLRAILS AND STAIRS NOT SHOWN FOR CLARITY.



VIEW A

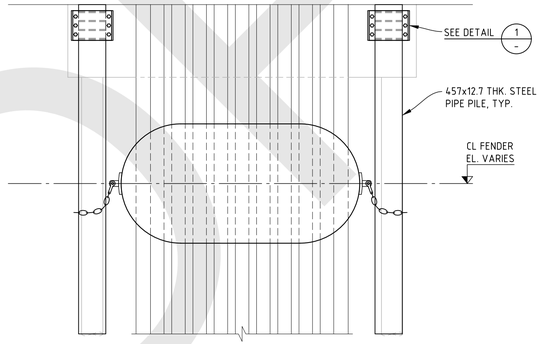
1:50



PLAN - FENDER ASSEMBLY (TEMPORARY)

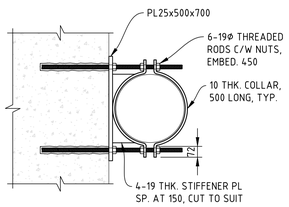
1:50 (4 REQ'D THUS)

NOTES:
1. FOAM FILLED RUBBER FENDER SHALL BE MARINE FENDERS INTERNATIONAL INC., OCEAN GUARD STANDARD CAPACITY 1800x3700 FOAM-FILLED FENDER OR APPROVED EQUIVALENT.
2. FENDER SCHEMATIC SHOWN FOR REFERENCE AND SUBJECT TO CHANGE.



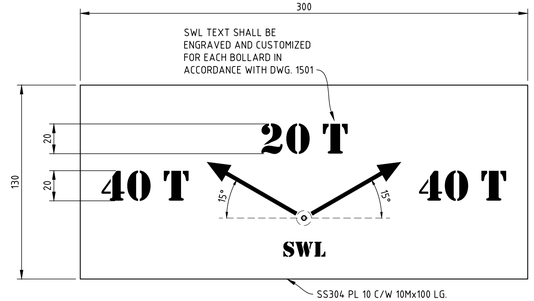
ELEVATION - FENDER SYSTEM

1:50



DETAIL 1

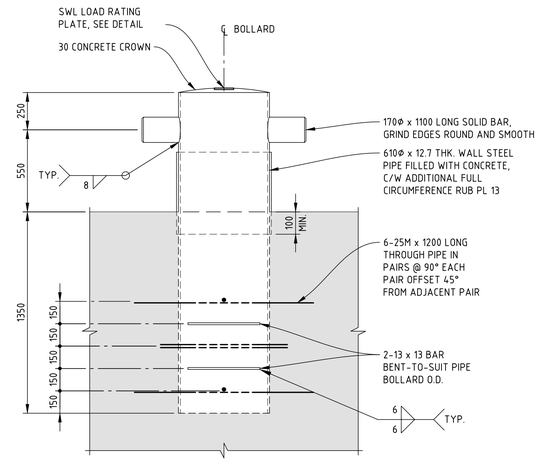
1:20



SWL LOAD RATING PLATE

1:2

NOTE: EMBED SWL PLATE ON TOP OF EACH BOLLARD. PLATE SHALL SHOW THE SWL AND ANGLE LIMITS OF OPERATION IN ACCORDANCE WITH DWG. 1501.



STEEL PIPE BOLLARD

1:20

NOTE: EXPOSED BOLLARD ASSEMBLY SHALL BE PAINTED TO 300 BELOW CONCRETE SURFACE.

NOTES:

1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.

m 0 5 10 15 m

1:250

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	SPER/AJP	ELIU	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	JLC	-	SPER/AJP	ELIU	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1515)	BJM	-	SPER	-	AJP	-		

D SHEET SCALE SHOWN

OneWay to zero harm

WORLEYPARSONS PROJECT No 407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

PRELIMINARY
DO NOT USE FOR CONSTRUCTION
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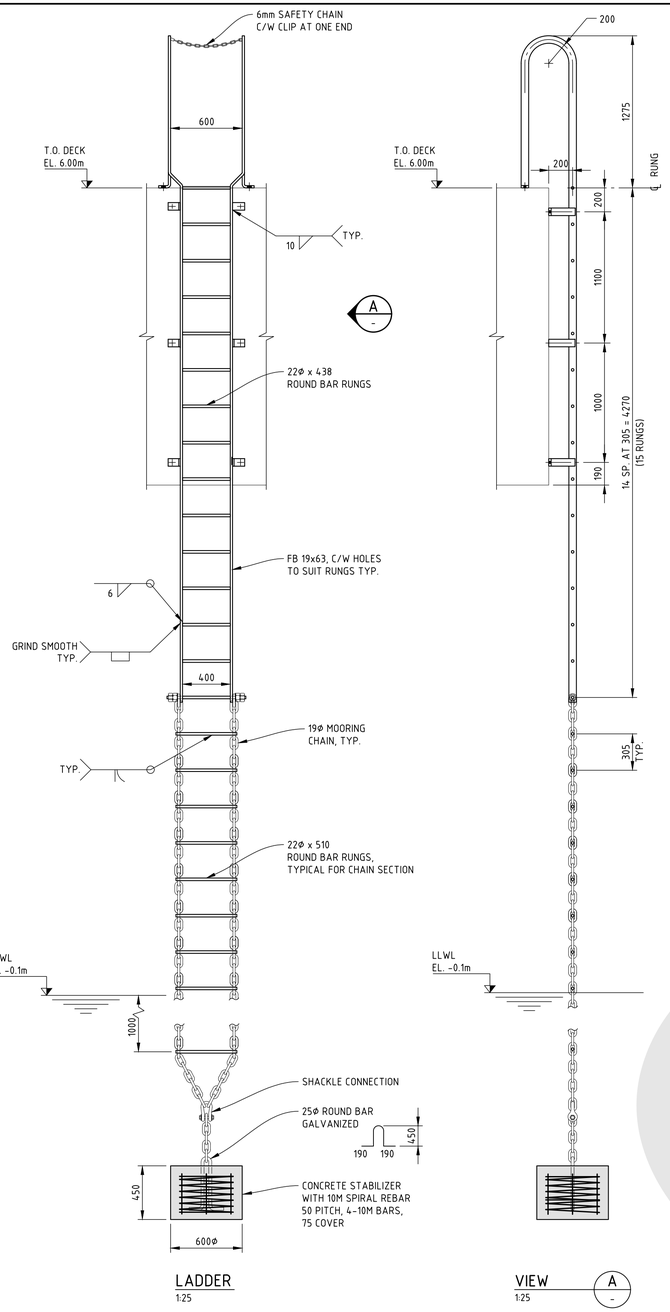
SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
FENDERS AND BOLLARDS

DRG No 407071-00182-00-MA-DGA-1515 REV C

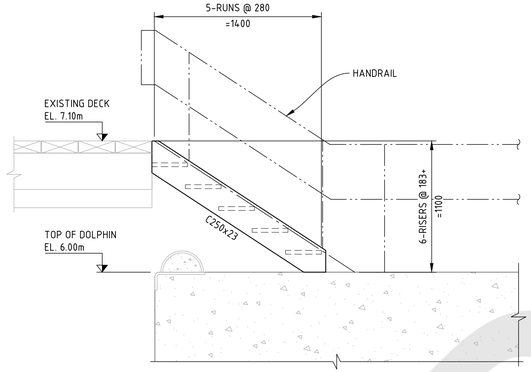
LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\11_DRAWINGS\15_I_AND_E\02_MARINE\407071-00182-00-MA-DGA-1515.DWG
USER NAME: brian.massullo
PLOT DATE & TIME: 4/12/2019 5:07:05 PM
SAVE DATE & TIME: 4/12/2019 5:01:43 PM



LADDER
1:25

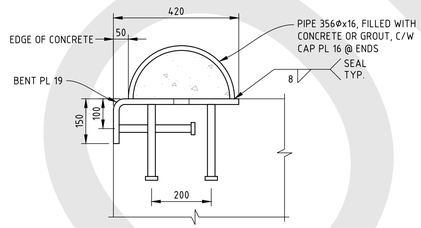
NOTES:
1. ENTIRE ASSEMBLY TO BE HOT DIP GALVANIZED.
2. GRIND SMOOTH ALL BURRS AND PROTRUSIONS.

VIEW A
1:25



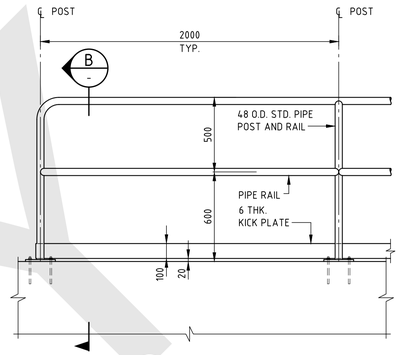
ACCESS WALKWAY - FIELD VERIFY
1:25

NOTES:
1. ACCESS WALKWAY CONNECTIONS TO BE DETERMINED IN-FIELD. CONTRACTOR AND OWNER'S REPRESENTATIVE TO REVIEW EXISTING CONDITIONS TO DETERMINE DESIGN PATH FORWARD. OWNER'S REPRESENTATIVE SHALL PROVIDE A DETAILED DESIGN FOR CONNECTIONS.
2. 1000 CLEAR WIDTH.



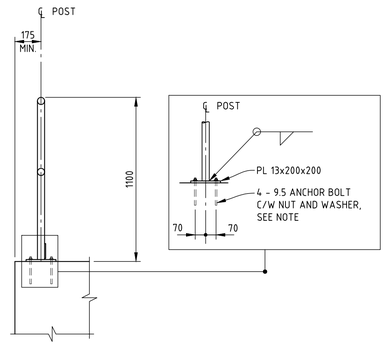
TYPICAL BULLRAIL
1:10

ENTIRE ASSEMBLY TO BE HOT DIP GALVANIZED



DETAIL 1 TYPICAL HANDRAIL
1:20 (1530)

NOTE: ALL HANDRAIL PIPES TO BE 48Ø STD. AND ALL POSTS SHALL BE 2000 MAX. C/C



SECTION B
1:20

NOTE: EMBEDMENTS OF ANCHOR BOLTS

CONCRETE (AS SHOWN) - 130 LG. SS ANCHOR BOLTS INSTALLED WITH HILTI RE-500 EPOXY
TIMBER (NOT SHOWN) - 200 LG COURSE THREAD LAG BOLTS

mm 0 500 1000 1500 mm
1:25

mm 0 100 200 300 400 500 mm
1:10

NOTES:
1. FOR DESIGN CRITERIA, SEE DWG. 407071-00182-00-MA-DGA-1501 AND GENERAL NOTES, SEE DWG. 407071-00182-00-MA-DGA-1502.

REV	DATE (DD-MMM-YY)	REVISION DESCRIPTION	DRAWN	DRAFT CHK	DESIGNED	ENG CHK	APPROVED	QAR	REF DRAWING No	REFERENCE DRAWING TITLE
C	04-DEC-19	ISSUED FOR CLIENT REVIEW	JLC	-	SPER/AJP	ELIU/CID	AJP	-		
B	25-NOV-19	ISSUED FOR PRICING	JLC	-	SPER/AJP	ELIU/CID	AJP	-		
A	05-APR-19	ISSUED FOR CLIENT REVIEW (FORMERLY DWG. 407071-00172-00-MA-DGA-1516)	BJM	-	SPER	-	AJP	-		

D SHEET | SCALE | SHOWN

OneWay to zero harm

WORLEYPARSONS PROJECT No
407071-00182

ENGINEERING AND PERMIT STAMPS (As Required)

PRELIMINARY
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Advisian Worley Group

SHELLBURN MARINE FACILITY
BERTHING DOLPHIN REPLACEMENT
MISCELLANEOUS DETAILS
SHEET 1

DRG No 407071-00182-00-MA-DGA-1516 | REV C

LOCATION: U:\YVR\407071\00182_SCP_SHB2020PDR\11_DRAWINGS\15_I_AND_E\02_MARINE\407071-00182-00-MA-DGA-1516.DWG
USER NAME: brian.massullo
PLOT DATE & TIME: 4/12/2019 5:07:06 PM
SAVE DATE & TIME: 4/12/2019 5:03:34 PM

COPY

APPENDIX B DEPARTMENT OF FISHERIES AND OCEANS CANADA RESPONSE 20-HPAC-00140

COPY

Canada

Fisheries and Oceans Canada
Pêches et Océans Canada

Pacific Region
Suite 200 - 401 Burrard St
Vancouver, BC
V6C 3S4

Région du Pacifique
Pièce 200 - 401 rue Burrard
Vancouver (C.-B.)
V6C 3S4

April 23, 2020

Your file *Votre référence*

Our file *Notre référence*

20-HPAC-00140

Shell Canada Products Inc.
ATTN: Todd McMahon
201 Kensington Avenue
Burnaby, BC
V5B 4B2

Via Email: todd.mcmahon@shell.com

Subject: Dolphin Replacement, Burrard Inlet, Burnaby – Implementation of Measures to Avoid and Mitigate the Potential for Prohibited Effects to Fish and Fish Habitat

Dear Mr. McMahon:

The Fish and Fish Habitat Protection Program (the Program) of Fisheries and Oceans Canada (DFO) received your proposal on February 11, 2020. We understand that the in-water works you propose to undertake consist of:

- Installation and removal of eight (8) temporary steel pipe fender piles (457 mm diameter);
- Removal of 96 timber (vertical, fender) piles (356 mm diameter) (full removal planned);
- Removal of 89 timber (batter) piles (356 mm diameter) (cut below the mud line (sea bed));
- Installation of 65 timber piles with 356 mm diameter (vertical, batter, fender), predominantly using vibratory pile driving methods; and
- Installation of 25 steel pipe piles with the following size breakdown;
    - 21 steel pipe piles (914 mm diameter)
    - Four (4) steel pipe piles (1,067 mm diameter)

Furthermore, we understand that you propose to complete this project in two separate phases, which are required for the continued use of the terminal.

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- Phase 1 works will focus on the eastern section of the wharf (removal of dolphins 3, 4; installation of dolphins 3A, 4A, and 2.5), with in-water works occurring during the 2020-2021 recommended least-risk windows.
- Phase 2 works will focus on the western section of the wharf (removal of dolphin 1, 2; installation of dolphin 1A, 2A), with in-water work occurring during the 2021-2022 recommended least-risk window.

We understand the following aquatic species listed under the *Species at Risk Act* may use the area in the vicinity of where your proposal is to be located:

- Leatherback Sea Turtle, Basking shark, and Northern Abalone which are currently listed as Endangered;
- Northeast Pacific Transient Killer Whales which are currently listed as Threatened; and,
- Yelloweye Rockfish, Bluntnose sixgill shark, Longnose thornyhead,
- Rougheye rockfish (Types 1 and 2), Tope, Grey and Humpback Whale, Harbour porpoise, and Steller Sea Lion which are currently listed as Special Concern.

Our review considered the following information:

- The Request for Review form with supporting documentation (Construction Environmental Management Plan (CEMP), environmental assessment, and design drawings attached) received from Victoria Burdett-Coutts of Advisian via email on February 11, 2020;
- An additional design drawing showing the location of pile removal and installation, provided via email by Victoria Burdett-Coutts of Advisian on March 5, 2020; and
- Revision 1 of the letter originally sent on March 31, 2020 from Advisian to Darcy Paslawski (VFPA), initially provided to DFO on April 7, 2020, with revisions provided via email to DFO from Victoria Burdett-Coutts on April 22, 2020.

Your proposal has been reviewed to determine whether it is likely to result in:

- the death of fish by means other than fishing and the harmful alteration, disruption or destruction of fish habitat which are prohibited under subsections 34.4(1) and 35(1) of the *Fisheries Act*; and
- effects to listed aquatic species at risk, any part of their critical habitat or the residences of their individuals in a manner which is prohibited under sections 32, 33 and subsection 58(1) of the *Species at Risk Act*.

The aforementioned outcomes are prohibited unless authorized under their respective legislation and regulations.

To avoid and mitigate the potential for prohibited effects to fish and fish habitat (as listed above), we recommend following all avoidance and mitigation measures as provided within VFPA Permit No. 20-012, in addition to implementing the measures listed below:

.../3

- Plan in-water works, undertakings and activities to respect timing windows to protect fish, including their eggs, juveniles, spawning adults, and/or the organisms on which they feed and migrate;
    - Burrard Inlet (inland from Point Grey to Point Atkinson): August 16 - February 28.

- Ensure a Qualified Environmental Professional (QEP) is on site for all sensitive and higher risk works (e.g., pile driving). The QEP is required to monitor for compliance with regulations and to ensure appropriate implementation of environmental best management practices.

- Water-based equipment shall not ground upon the seabed except for the use of anchors or spuds needed to keep the water-based equipment in place;
    - Conduct work during high tide to ensure there is enough clearance between seabed and the vessels to avoid/minimize propeller wash and/or grounding of vessels; and
    - Minimize re-positioning of spuds and avoid placement of spuds on sensitive aquatic vegetation or habitat (e.g., kelp).

- All pile driving activities are to be conducted during daylight hours in good weather conditions that permit visual observations by a qualified marine mammal observer(s) (MMO) on-site.

- DFO acknowledges that the majority of the pile driving will be with a vibratory hammer and it is not expected to result in sound pressure levels that are harmful to fish. However, DFO recommends that the following acoustic noise thresholds for fish presented below should be applied:
    - A fish exclusion zone (i.e., at least 10 m from the noise source) should be established around the vibratory pile driving site (i.e., noise source) to delineate where sound levels are not to exceed 206 dB re 1 µPa and a SELcum of 186 dB re 1 µPa2s;
    - Continuous hydroacoustic monitoring should be conducted during all pile driving activities to monitor sound levels; and
    - If monitoring indicates sound levels in excess of the above-mentioned thresholds, the activity will cease and will only resume after additional mitigation measures (e.g., bubble curtain) have been implemented to reduce sound levels to below the threshold.

- Vibratory pile driving, rather than impact pile driving is preferred to reduce the potential impacts on fish and marine mammals. If impact pile driving is to occur, the following additional mitigation measures are should be implemented:
    - A sound attenuation device (e.g., encased bubble curtain or double walled casing) around the full wetted length of the pile should be installed to reduce sound levels to below 206 dB re 1 µPa and a SELcum of 186 dB re $\mu Pa^2 \cdot s$, outside of the bubble curtain;

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  - If a bubble curtain is applied, daily inspection of the bubble curtain should confirm that it is fully connected and functioning prior to pile driving works;
  - All impact pile driving will require an increased bubble curtain run time prior to the start of piling activities. The bubble curtain is to be activated sequentially one ring at a time starting from the top ring, and the curtain must be run at full power for three (3) minutes prior to the first hammer strike;
  - For all in-water, impact pile driving of cylindrical steel piles, a two-hydrophone configuration should be used. One hydrophone will be positioned at the mid-point of the water column (i.e., equal distance between the surface and the seafloor) and the other hydrophone will be positioned within 2 meters of the seafloor;
  - In addition to acoustic monitoring to ensure compliance with sound level thresholds for fish, the QEP will establish a marine mammal exclusion zone where sound levels do not exceed 160 dB_{RMS} re 1 µPa. The exclusion zone should be confirmed with on site monitoring data;
  - If monitoring indicates sound levels in excess of 160 dB_{RMS} re 1 µPa at the boundary of the marine mammal exclusion zone, the work must be halted. The work will only resume after additional measures are implemented to reduce sound levels below the threshold level;
  - A 30 minute visual assessment will be conducted prior to initiation of impact pile driving activities, to ensure that no marine mammals are in the exclusion zone. Impact pile driving activities will be ceased if any marine mammal is observed within the exclusion zone and will only resume once the animal has left the exclusion zone or has not been re-sighted for 30 minutes; and
  - The use of a timed slow-start (ramp-up) procedure should be implemented for impact pile driving installations.

- If there is a risk to a marine mammal from direct contact, temporarily suspend works until the individual has left the area or has not been sighted for 30 minutes.

- Implement a Sediment Control Plan to minimize sedimentation of the aquatic environment during all phases of the work, undertaking or activity. Monitor for signs of sedimentation during all phases of the project and take appropriate corrective actions.

- Implement a response plan to avoid a spill of deleterious substances.

Provided that you incorporate these measures into your plans, the Program is of the view that your proposal is not likely to result in the contravention of the above mentioned prohibitions and requirements.

Should your plans change or if you have omitted some information in your proposal, further review by the Program may be required. Consult our website (http://www.dfo-

COPY

mpo.gc.ca/pnw-ppe/index-eng.html) or consult with a qualified environmental consultant to determine if further review may be necessary. It remains your responsibility to remain in compliance with the *Fisheries Act* and the *Species at Risk Act*.

It is also your *Duty to Notify* DFO if you have caused, or are about to cause, the death of fish by means other than fishing and/or the harmful alteration, disruption or destruction of fish habitat. Such notifications should be directed to (http://www.dfo-mpo.gc.ca/pnw-ppe/contact-eng.html), or to the DFO-Pacific Observe, Record and Report phone line.

We recommend that you notify this office at least 10 days before starting your project and that a copy of this letter be kept on site while the work is in progress. It remains your responsibility to meet all other federal, territorial, provincial and municipal requirements that apply to your proposal.

If you have any questions with the content of this letter, please contact Rebecca Barrick at our Vancouver office by email at Rebecca.Barrick@dfo-mpo.gc.ca. Please refer to the file number referenced above when corresponding with the Program.

Yours sincerely,

Vance Mercer
Senior Biologist
Fish and Fish Habitat Protection Program

CC:
Victoria Burdett-Coutts, Marine Scientist, Advisian.
victoria.coutts@Advisian.com
Darcy Paslawski, Environmental Specialist, Vancouver Fraser Port Authority,
Darcy.Paslawski@portvancouver.com

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