Technical Memo

McElhanney

TO	FROM
Steve Rosell, Project Manager	Matthew Friderichs, P.Eng. Fraser Peterson, EIT
COMPANY	**MCSL BRANCH**
Summit Earthworks	2211 - Courtenay
RE	**DATE**
Derwent Way Barge Facility Marine Terminal Operations	July 24, 2018
	FILE NUMBER
	2211-70549-00

1. Introduction

McElhanney Consulting Services Ltd. (McElhanney) has been retained by Tetra Tech Ltd. to complete the design of a new barge loading facility at the Derwent Way Transfer Facility, in New Westminster, BC.

As requested by Port Metro Vancouver (PMV), McElhanney has prepared a brief memo describing the typical marine terminal operations. Specifically, this includes the barge loading and the design considerations to prevent spillage of the contaminated soil materials into the Fraser River. This memo is to be read in conjunction with the relevant permit drawings prepared by McElhanney / Tetra Tech Ltd.

2. Conveyor Operations

2.1 General Description

Figure A provides a general concept view of the conveyor layout. Appendix A presents an operational drawing.

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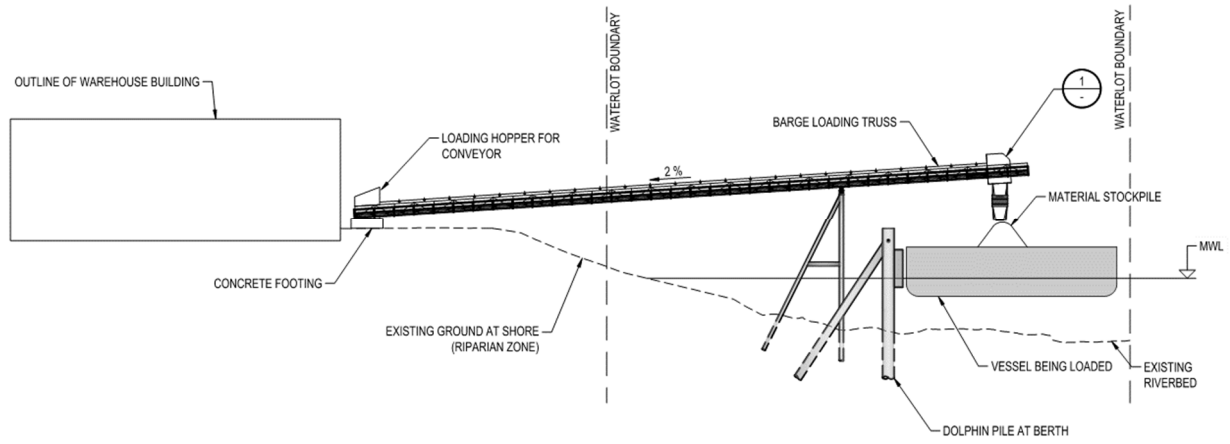

Figure 1 - Concept Profile View of Loading Conveyor

The structure consists of a steel truss supporting approximately 50 m of conveyor, which is used to transport contaminated soil materials from an inshore loading hopper to a telescoping loading spout at the offshore end. The conveyor consists of a variable speed, 48” wide belt conveyor that can handle a variety of soil products ranging from dry gravel/sand to clays/silts. The conveyor will have a maximum design loading capacity of approximately 800 tons per hour, however it is anticipated that the conveyor will typically load at approximately 400 tons/hr to 500 tons/hr.

2.2 Hopper Loading

The loading hopper will be located at the inshore end to receive buckets of soils from a wheel loader (or similar heavy equipment), which will be deposited onto the conveyor. The hopper will have sufficient side and backwalls to prevent spillage from the loader bucket. The hopper will be located on an asphalt pad, which is graded for any run-off water to be contained and stored.

2.3 Conveyor Spillage Management

Figure 2 provides a general section view of the proposed conveyor elements. The conveyor belt will be covered with a light gauge stainless steel cover to prevent wind and rain exposure of the product while on the belt. The cover will be hinged at one end to allow the cover to be opened for inspection and maintenance access.

The spill tray, located beneath the return conveyor belt, will be installed to contain any product spillage. Periodically, these spill trays will require cleaning which can be completed by vacuuming or incorporated water cleaning jets at the head end to washdown the spill trays. A collection tank would be installed at the inshore end to contain the spillage and associated cleaning water.

Access walkways will be located on both sides and at the head end of the conveyor to allow for regular maintenance and cleaning.

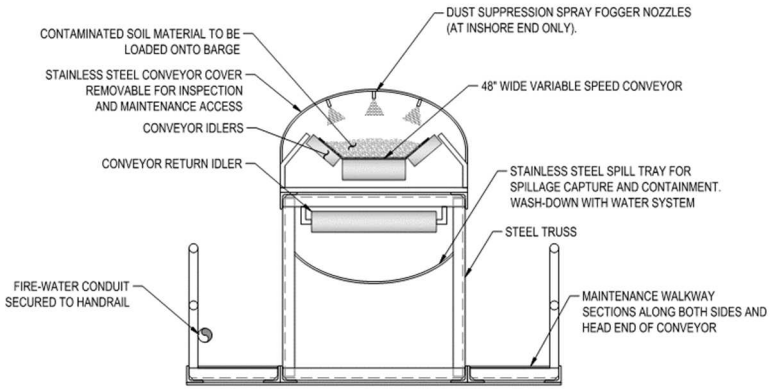

Figure 2 - Conveyor Spill Management Components

2.4 Barge Loading

At the head end of the conveyor, there will be a stainless head chute which will divert soil material from the conveyor to the telescopic loading spout for product placement on the barge (see Appendix A). The temporary stockpile will not be greater than 5 m. As there are water level fluctuations in the Fraser River of approximately 3.6 m, and significant height differences between an unloaded and loaded barge, the telescopic loading spout will reduce the free fall drop height and minimize dispersion of the material on the deck. This would prevent potential spillage of material and reduce any dust creation on the barge deck.

2.5 Dust Management

Dust management is critical for the conveyor operations and the following design controls will be in place to manage dust accumulation as described below:

- Under most conditions, the soil material being loaded onto the barge will be slightly moist and dust accumulation is not anticipated.
- A 48” wide conveyor belt will be used to ensure even and shallow product height on the belt.
- The conveyor will have variable speed capability, so the loading flow rates can be reduced if necessary.
- The conveyor will be entirely contained by a cover and spill tray, to protect the soil material from wind forces that could generate wind.
- A dust suppression spray fogger system (Martin Engineering M3 or similar equivalent) will be employed at the inshore hopper area. If the soil being loaded is overly dry and could potentially generate dust, the spray fogger system will provide a very light water mist to suppress dust. The extent of water from the fogger system will not be enough to generate leachate water on the barge.
- If required after commissioning, additional spray fogger locations can be added to the conveyor system.

3. Marine Operations

3.1 Regulatory Requirements

All barges accessing the proposed Derwent Way Facility, will be crewed by local, licensed tug haulers in accordance with all Transport Canada rules and regulations. Barges will be loaded and trimmed to allowable limits as determined by qualified individuals, such as Naval Architects. Published barge capacities will be followed to ensure the hull stability of the barges is maintained and prevent accidental overturning.

3.2 Typical Barge Vessels

The vessels accessing the facility will be typical small flat-deck barges and material scows that are rectangular and flat-bottomed hulled, which have excellent stability characteristics. In addition, the barge vessels will not have high centre-of-gravity loading which can impact hull stability.

Based on the zoned water lot extents, bathymetric under-hull clearances, and proposed terminal operations, the maximum barge vessel characteristics are as follows:

- Max Barge Dwt. = 3 100 tons
- Hull Length = 67 m
- Hull Width = 17 m
- Maximum Hull Draft = 1.62 m
- Barge Frequency = 4 per month
- Barge Loading Duration = 10 – 12 hours

Figure 3 present a general arrangement of a typical proposed barge vessel.

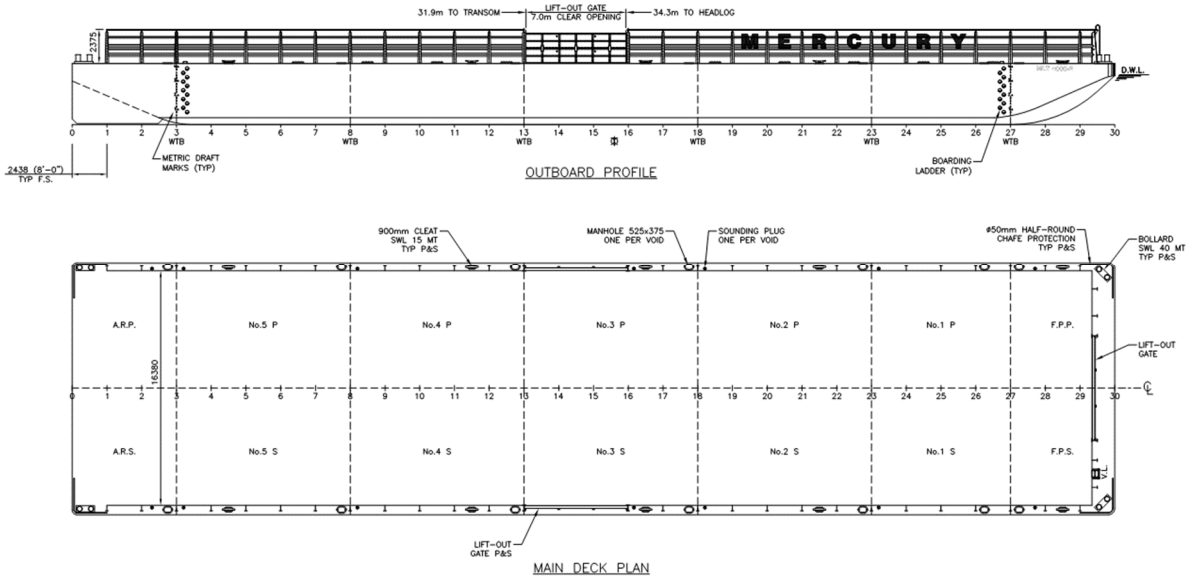

Figure 3 - Typical Barge Vessel General Arrangement

3.3 Leachate Water Management

Barge vessels will have solid hull construction and will be side sealed for containment of soil and any run-off or leachate water. Typical side sealing will consist of either incorporating bin walls on the barge or using concrete block perimeters with a geo-membrane liner along all sides. Soils loaded on the barge, will be loaded dry from the covered waste storage area. Due to the short barge loading durations, there is minimal water accumulation anticipated.

In the instance of any water accumulation, a sump pump will be available on the barge to remove and discharge the leachate to the onshore facility for onsite treatment. The discharged leachate would be transported from the barge deck via hoses located along the conveyor truss walkways to the onshore facility.

3.4 Barge Trimming

As the conveyor structure is not designed to pivot (upstream-downstream) or shuttle (inshore-offshore), the barge will be loaded at a single point from the loading spout. There will be a wheel loader on the barge which will stockpile the soil material on the barge deck. The barge vessels will not undergo strong side or end loading during operations has the hull trim is controlled by the wheel loader. Two primary stockpiles, located at the forward and aft section of the barge are anticipated. Based on preliminary calculations, the total height of the stockpile is not anticipated to be over 5.5 m. The drawing in Appendix A provides a schematic of the barge loading.

3.5 Berthing Dolphin Design

A summary of the berthing dolphin design criteria is as follows:

- The berthing dolphin structures will be designed to relevant and commonly used marine design codes including
    - WorkSafe BC Occupational Health and Safety Standards
    - Canadian Highway Bridge Design Code (CHBDC) S6-14
    - British Standard 6349-4
    - Unified Facilities Criteria 4-152-01
    - PIANC (World Association for Waterborne Transport Infrastructure).
- Four steel mooring dolphins are proposed which can support a variety of barge vessel sizes. The mooring dolphins will consist of a single large diameter steel pile with additional lateral restraint provided by two steel batter piles.
- Vessel berthing energy absorption will be provided by rubber fendering elements (super-arch fenders) which have sufficient height to operate a variety of barge heights and water levels.
- Barges will be moored to the berthing dolphins utilized steel pipe morning horns at the top of the vertical steel pile.
- As there is an existing right-of way at the foreshore area, no shore based mooring winches will be considered. The barges will be moored directly to the berthing dolphin.
- Barges with available deck winches can utilize the berthing dolphins to warp the barge vessel (upstream-downstream) to vary the loading point of the conveyor on the barge deck.

Barges will not access the berth during extreme storms or water current events such as the annual spring freshet in the Fraser River. As such, the barges will typically not access or moor at the terminal for greater than 48 hours.

4. Closure

This document is for the sole use and reliance of the Summit Earthworks, Port Metro Vancouver and McElhanney Consulting Services Ltd. The material in this report reflects McElhanney's best judgment based of the information available at the time of preparation. Any use of this report by a third party or any reliance on or decisions made based on it are the responsibility of such third parties. McElhanney accepts no responsibility for damages suffered by any third party as a result of decisions made or actions based on this report.

Sincerely,

McElhanney Consulting Services Ltd.

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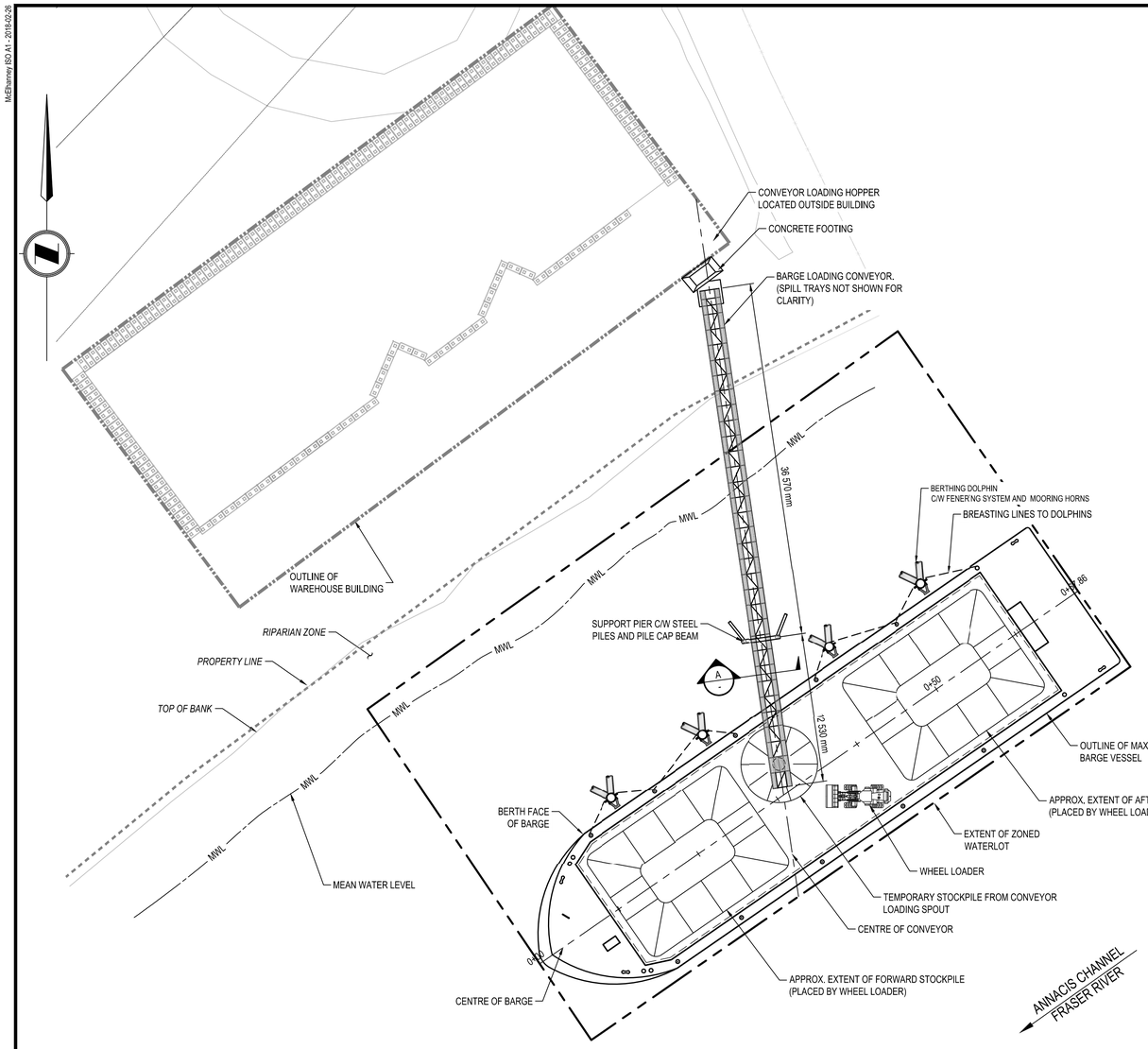
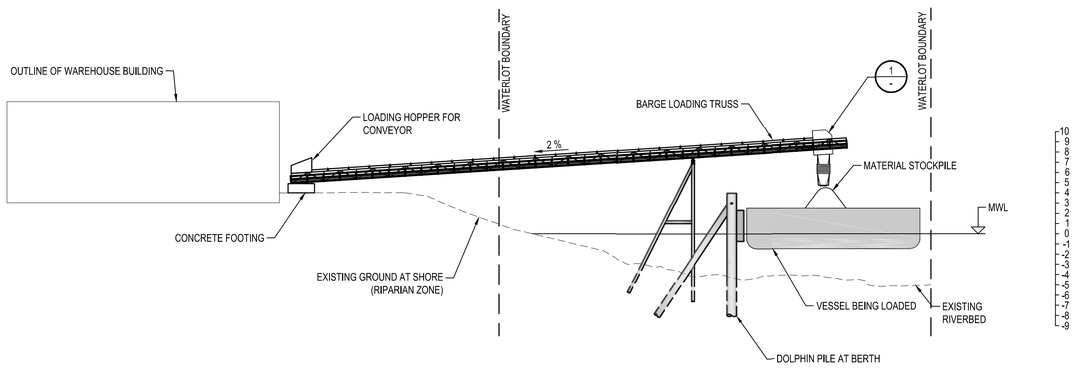
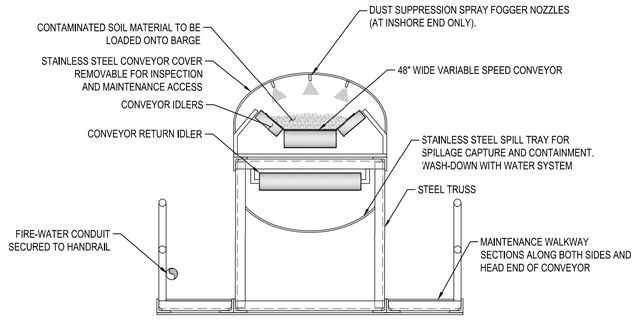
APPENDIX A – OPERATIONAL DRAWING



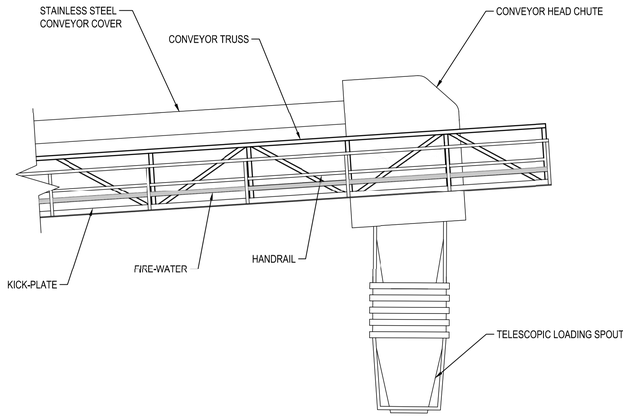
PLAN VIEW - LOADED BARGE AT MWL
SCALE 1: 300

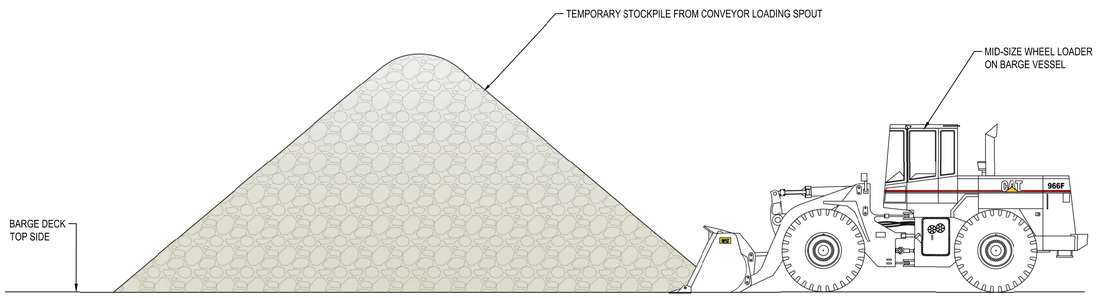


PROFILE AT CENTRE OF CONVEYOR - LOADED BARGE AT MWL
SCALE 1: 300



A SECTION
SCALE H 1:20
V 1:20





1 DETAIL
SCALE H 1:50

NOTES:

1. DRAWING IS TO BE READ IN CONJUNCTION WITH THE REPORT TITLED "DERWENT WAY BARGE FACILITY, MARINE TERMINAL OPERATIONS", DATED JULY 24th, 2018.

Rev	Date	Description	Drawn	Design	App'd
PA	2018-07-24	ISSUED FOR INFORMATION	GC	MF	MF

SCALE AS NOTED

ORIGINAL DWG SIZE: A1 (594 x 841mm)

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Approved Sealed

TETRA TECH

DERWENT WAY BARGE LOADING MARINE FACILITY

OPERATIONAL LOADING - GENERAL ARRANGEMENT

91484 DERWENT WAY
DELTA, BC

Drawing No. 000

Project Number 2211-70549-00

Rev. PA

DESTROY ALL PRINTS BEARING PREVIOUS REVISION

DATE: 2018-07-24 12:06 FILE: \\cy-fs2\vol1\VOL1\2211 Engineering\70500-76999\70549 Tetra Tech Derwent Way Barge\10.0 Drawings\10.1 Engineering\10.2.1 Sheets\70549-SS-000.dwg