Executive Summary

The Vancouver Fraser Port Authority (VFPA) proposes to consolidate Wallenius Wilhelmsen Solutions (WWS) vehicle import operations in Greater Vancouver at WWS's Annacis Auto Terminal (AAT) facility on Annacis Island. Proposed improvements are expected to modernize processing operations at AAT and increase processing throughput from 352,000 to 480,000 vehicles annually.

The proposed improvements at AAT consist of three primary elements:

- Enhancement of the existing rail capacity through the extension of existing track sidings and the addition of new track sidings to increase the rate of vehicle imports
- Installation of electric vehicle charging stations and the infrastructure needed for future expansion to suit future consumer demand and government climate action policies
- Demolition, replacement and refurbishment of existing terminal buildings and other vehicle processing and handling facilities in order to optimize terminal operations.

Rail Capacity Expansion

There are two rail yards at AAT where cars are loaded onto trains, the primary means by which vehicles imported through the facility are transported to the marketplace. Both of these yards are slated for expansion. The overall number of rail spots will increase from the current 83 to 144 following the expansion.

Rail Side 1 along the northern edge of terminal consists of four tangent tracks serviced by the Southern Railway of BC (SRY); three of the tracks will be extended to the same length as the current fourth track, to increase the number of railcar spots by 12 spots per track, and the overall number of railcar spots from 53 to 89. The expanded Rail Side 1 will feature two loading pad areas, one at the mid-point of the tracks, and one at the northeastern end of the new tracks.

Rail Side 2 at the western end of the terminal consists of four tracks also serviced by SRY. Four additional tracks will be added to the south of the existing, with six spots each for tracks 10, 11 and 12 and seven spots for track 9, with a total increase in the number of railcar spots from 30 to 55. The existing loading pad area at the east end of the tracks will be expanded to accommodate all eight tracks.

Electric Vehicle Charging Infrastructure

To accommodate emerging market demand and government climate action policies, additional Electric Vehicle (EV) Charging stations are being provided. The project allows for infrastructure to accommodate eight additional charging stations at the southeast corner of the Parts Warehouse and four level 2 EV chargers. The remaining infrastructure is provided for future expansion including for additional EV chargers.

To service the EV Charging facilities and other new infrastructure, electrical service will be provided from the existing electrical enclosure at the northwest corner of the Paint and Body Shop. This service will also power the new Processing Building.

Existing Building Demolition

A new Processing Building is proposed for AAT to upgrade and modernize processing facilities at AAT. The new building will occupy the space between the Accessory Shop #1 and the Parts Warehouse, and requires the demolition of Accessory Shop #2, Mechanical Shop #1 and the

Canopy on the west side of the Parts Warehouse; various other small outbuildings or equipment will also need to be relocated.

The Paint and Body Shop is also designated for demolition; however, it will be used for temporary storage for the contents of the other buildings for most of the construction period and would be demolished as a final stage to the overall project. The building would be demolished down to the slab level and the electrical enclosure at the northwest corner of the building would remain.

A Preliminary Hazardous Materials Assessment was completed as a part of this work and the assessment provides an outline of the hazardous materials identified in each of the buildings to be demolished and the means by which they can be disposed.

New Processing Building

The new Processing Building is a single storey, 7.23 m high pre-engineered building that consists of a 3051 m^2 processing area (on-line processing lines and off-line processing bays) and 134 m^2 of ancillary spaces. The ancillary area includes a mechanical room, tool room, electrical room, storage room and accessible washrooms for men and women.

The building site is underlain by soft soils that are susceptible to liquefaction and lateral spreading for design seismic events and in order to meet National Building Code of Canada (NBCC) requirements, ground improvements are to be undertaken. The design assumes installation of stone columns beneath the majority of the building footprint but cannot be extended to the full building footprint due to the proximity of neighboring buildings. The remainder of the ground improvements will incorporate seismic drains.

The building foundation will consist of shallow spread footings and tied together by a perimeter grade beam and a slab-on-grade diaphragm as per the geotechnical recommendations.

The main superstructure consists of a portal frame with an interior column, side girts, wall cladding, roof purlins, and a standing seam roof. The bay spacing and interior columns were selected to minimize the loading to the foundations.

Fire suppression for the new building is required as per the BC Fire Code and NFPA 13; due to the proximity of the building to other neighboring facilities, upgrades to the walls of the existing structures facing the Processing Building also need to be implemented.

Parts Warehouse Floor Replacement

The floor of the existing Parts Warehouse is to be replaced, this includes the demolition and removal of the existing asphalt floor while taking care not to damage the building foundation slabs and ties and replacing the floor with a suitable sub-grade as per geotechnical recommendations and a new finished concrete slab-on-grade.

Construction Staging and Construction Traffic Management Plan

In consideration of Terminal Operations, project elements are to be delivered in sequence, commencing with the rail capacity expansion, the EV charging infrastructure, existing building demolition and construction of the new Processing Building and upgrade of the Parts Warehouse floor.

A preliminary construction traffic management plan (TMP) has been developed and is intended as a template for the ultimate contractor who would develop his traffic management plan to align with terminal operations requirements and his particular equipment and approach to the delivery of the project. Incorporated into the TMP are proposed contractor laydown and staging areas and access routes to the various construction sites on the terminal.

Air Emissions Assessment

This report includes a Level 1 Air Emissions Assessment, as specified in the PER Air Guidelines, to evaluate the potential effects that the proposed Project could have on ambient air quality. A Level 1 assessment considers changes to emissions only – it does not predict how changes in emissions would affect air quality using dispersion modelling

Archaeological Overview Assessment

An Archaeological Overview Assessment (AOA) was completed as a part of the Project Definition Report, the AOA does not recommend that a further Archaeological Impact Assessment (AIA) be undertaken.

1. Introduction

The Vancouver Fraser Port Authority (VFPA) owns two properties on the Main Arm of the Fraser River that are currently leased to Wallenius Wilhelmsen Solutions (WWS) and which are utilized for the import of automobiles that are manufactured overseas. These terminals are the Annacis Auto Terminal (AAT) located on the north bank of the Fraser River at the upstream end of Annacis Island, and the Richmond Terminal (RT) located on the north bank of the Fraser River upstream of the George Massey Tunnel.

The VFPA proposes to utilize the Richmond facility for other port-related purposes and in turn optimize the AAT facility to be able to handle the combined throughput of WWS operations.

This project is expected to increase the annual terminal capacity of AAT from approximately 352,000 vehicles to 480,000 vehicles.

1.1 Project Overview

The AAT Optimization project consists of three elements that together provide additional infrastructure within the terminal footprint to realize the overall increase in terminal throughput capacity and provide modern facilities for improved operating practices and alignment with WWS supply chain partners. The following improvements are proposed:

- Enhancement of the existing rail capacity through the extension of existing track sidings and the addition of new track sidings to increase the rate of vehicle imports
- Installation of electric vehicle charging stations and the infrastructure needed for future expansion to suit future consumer demand and government climate action policies
- Demolition, replacement and refurbishment of existing terminal buildings and other vehicle processing and handling facilities in order to optimize terminal operations.

2. Rail Capacity Expansion

Rail transport capacity at the Annacis Auto Terminal is achieved through the extension of existing tracks at Rail Side 1 along the northern edge of the terminal alongside Annacis Parkway, and the addition of track sidings to the south of the existing tracks at Rail Side 2 on the western edge of the site. The additional rail capacity increases the total number of rail spots at the terminal by 61 to a total of 144 spots.

2.1 Rail Side 1

Rail Side 1 describes the proposed extension of three existing unloading tracks located at the north end of the site. The extensions will add an additional 12 cars per track, for a total addition of 36 cars. In addition, the extensions will allow for an unloading pad located at mid-way and at the north east end of the tracks.

Each track extension is to follow the general configuration of the existing yard. Each extension is to be accessible by an adjacent asphalt roadway (termed a “shag road”, meant to describe a roadway for allowing crew entry/egress from the area), and specialized metal racks to allow the unloading of the Autorack cars. Shag roads will run outside of track 1, and between tracks 2 and 3. The gaps between the rest of the tracks are to be filled with walking ballast.

Rail Side 1 preliminary design is an extension of the existing tracks, adding vertical curves to raise and flatten the track grades. The tracks and roadways were considered as one excavated area, with the subsurface structures to be constructed at the same time.

Existing electrical boxes adjacent to the proposed loading area at the end of track 1 on Rail Side 1 interfere with planned future operations and are to be moved to the extreme northeast corner of property within the fence line at the corner of Annacis Parkway and Dock Road.

2.2 Rail Side 2

Rail Side 2 describes the proposed creation of four additional unloading tracks adjacent to an existing set of unloading tracks at the south west end of the site. These new tracks require a connection to the SRY lead that enters the site, and the relocation of the existing fence line and gate. From the SRY lead, a ladder extends into the site, branching into four new unloading tracks.

Rail Side 2 will create capacity for an additional six cars per track for tracks 10, 11 and 12 and seven additional cars for track 9, for a total of 25 cars.

Similar to Rail Side 1, the tracks are to have road access and nearby metal racks for unloading. A “shag road” will run between the existing track 8 and proposed track 9, and between tracks 10 and 11 as well.

2.3 Preliminary Rail Design

All new tracks are to match the existing track standards (115# RE rails, timber ties) and the new design is to conform to SRY requirements and AREMA guidelines for new track construction. Basic rail design criteria are provided in the table below:

Table 2.1 Basic Rail Design Criteria

Rail weight	115 RE
Turnouts	No 7
Ties	7”x9”x8.5’ timber
Ballast	9” minimum
Sub-ballast	12” minimum
Max grade	0.10%
Typical grade	0.00%

Rail specifications are largely developed from CN Rail specifications for Industrial Tracks and are supplemented where needed. The choice of No 7 turnouts was proposed by the client to aid with the lack of available space and was pre-approved by SRY.

2.4 Rail Operations

There is no current formal agreement with SRY for the operation of the tracks. Generally, railcars are spotted each workday prior to 7:30am and are removed after the WWS workday has completed usually after 3:30pm. Depending on demand, additional railcars are brought in mid-day (usually completed between 9:00am and 10:00am). This is most common during busier times of the year from March to August.

With the present configuration of the Terminal rail compound, a minimum of 83 railcars are typically processed in a given workday, and with mid-day spots that number could reach up to 110 railcars per workday. With the expanded rail compound, the number of railcars processed would increase to 144 railcars per workday, and with that the need for mid-day spots would be reduced.

SRY services the WWS terminal, but the shunting of individual railcars and the assembly or disassembly of trains is done in the SRY yard adjacent to the WWS terminal and is done at slow speeds. CN and CP supply SRY with empty railcars mixed with other types of railcars, and SRY typically breaks up the trains at their Annacis Island yard prior to delivery.

When spotting railcars, SRY will typically work one track at a time, and will enter the yard in order to spot the required number of railcars for each track. Access to site is slow and careful. The cars are backed up to the first spot, the brakes are set and then each subsequent car is carefully positioned as required before setting each brake. For Side 1, each track is spotted to the end of the track and a gap for the mid-position loading area is left open. This process is followed for each track.

Similarly, when removing full railcars at the end of the workday, tracks are emptied one at a time, and trains are assembled in the SRY yard. Railcars destined for delivery to CP and to CN are delivered at different times of the day, and as such SRY will assemble two separate trains for delivery for each of the Class 1 rail carriers. CN and CP aggregate full trains in their respective yards for ultimate delivery to customers elsewhere in the country.

The existing yard has the following railcar spot capacity:

- Side 1 – 53 Railcars
- Side 2 – 30 Railcars
- Current total – 83 Railcars

The expanded tracks would increase the railcar spot capacity:

- Side 1 – 89 Railcars
- Side 2 – 55 Railcars (using 1 extra car space on track 9)
- Post Expansion Total - 144 Railcars

A ten-year forecast of rail traffic volume is provided in Table 2.2 below. The forecast is listed by total forecasted Volume arriving at the terminal and the volumes leaving the terminal via railcar. The number of railcars required to meet the projected volumes is based on an average of 10 vehicles per railcar.

Table 2.2 10-year Rail Volume Forecast

Year	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Vehicle Forecast	410,452	416,609	422,858	429,201	435,639	442,174	448,806	455,539	462,372	469,307	476,347
Vehicles Outbound by Rail	299,630	304,125	308,686	313,317	318,016	322,787	327,628	332,543	337,532	342,594	347,733
Outbound Railcars	29,963	30,412	30,869	31,332	31,802	32,279	32,763	33,254	33,753	34,259	34,773

3. Electrical Vehicle Charging

3.1 Background

As part of the upgrades to the Annacis Auto Terminal, WWS and VFPA are increasing the electrical vehicle charging capacity throughout the Terminal. To support the implementation of this initiative AECOM has reviewed the electrical power capacity on site for accommodating the infrastructure to support eight EV charging stations to be arranged along the east wall of the existing Parts Warehouse. Included in the scope of this project is the installation of four of the eight identified Level 2 EV charging stations.

Outside of the scope of this current project, WWS has engaged Mott Electric for installation of two - Dual Port Level 2 charger and one DC Fast Charge Level 3. As part of the installation of the three EV chargers by Mott Electric, WWS commissioned power capacity studies at both the Warehouse Building and Body Shop which are relied upon in this report to assess available power capacity.

There are currently two main services on the site. The main incoming service to the Warehouse building is 200A-600V 3-phase service which is currently loaded to a peak load of 115kW. The second incoming services is at the Body Shop is fed from 800A-600V H Frame mounted Transformer which is currently to loaded to average 87kW.

3.2 EV Charging Criteria

The new proposed electric vehicle charging stations are Charge Point CT4000 Dual Port bollard mounts. The dual port EV chargers have an electrical output of 14.4kW. The input voltage for the chargers is 208V dual pole 40A non GFCI breaker.

3.3 EV Charging Recommendations

Based on the above analysis it is found there is no capacity within the Existing Warehouse Facility, and it is recommended a new larger service be provided from the Electrical Room at the Body Shop to accommodate the following loads:

- Eight new Level 2 chargers: 120kW
- Capacity for Processing Building (based on memo 200504-MEMO-01-R0-A)* : 290kW
  *includes capacity for six future Level 2 chargers and two future Level 3 chargers
  Total Proposed Load = *New Level 2 chargers + capacity for Processing Building*
  410kW = 120kW + 290kW

We recommend providing a new 3-phase, 500A fused disconnect switch in the Electrical Room to feed the total proposed 410kW load.

3.3 EV Charging Service Plan

The new 500A is proposed to surface run in a 6in rigid galvanized steel conduit along the west face of the Body Shop building transitioning to 6in directionally drilled rigid PVC conduit across pavement to the existing warehouse building where the distribution for the proposed loads is to be located.

The proposed distribution is composed of a 600V distribution panel, 600V/208V 3-phase transformer sizing to be confirmed once the Processing Building Loads are finalized, 600V/480V 3-phase transformer, 208V Distribution Panel and 480V distribution panel. The details of the

proposed distribution are included in Site Servicing, Proposed Single Line Drawing and Equipment Elevation.

4. Existing Building Demolition

In advance of the construction of the new Processing Building, a number of existing buildings and facilities are to be demolished or relocated. After the new Processing Building is complete and the Parts Warehouse floor has been replaced, the Paint and Body Shop is to be demolished down to floor level to provide additional parking slots for terminal operations.

4.1 Hazardous Materials Assessment Report

A Hazardous Materials Assessment of each of the buildings slated for demolition was carried out and the report detailing the findings is provided and should be used to determine the procedures and requirements for the removal of material containing hazardous materials during demolition. Refer to building demolition specifications provided for quality assurance and site condition requirements prior to the demolition of the buildings.

4.2 Demolition of Mechanical Shop #1, Accessory Shop #2 and Parts Warehouse Canopy

The Mechanical Shop #1, Accessory Shop #1, the Parts Warehouse Canopy and a variety of smaller outbuildings are to be demolished in preparation for ground improvements and the construction of the new Processing Building. Additionally, the existing Paint and Body shop is also required to be demolished.

Some other ancillary facilities such as the trash compactor, the site first-aid trailer and other small items are to be re-located prior to the commencement of demolition works.

4.3 Demolition of Paint and Body Shop

The Paint and Body Shop is also ultimately expected to be demolished; however, during construction of the new Processing Building and the replacement of the floor of the Parts Warehouse, the Paint and Body Shop will serve as temporary storage space for material and equipment that will be re-used in the new Processing shop and the parts normally stored in the Parts Warehouse.

The electrical enclosure at the northwest corner of the Paint and Body shop will remain.

5. New Processing Building Design

The new Processing Building design is outlined by discipline within this section. The various elements include:

- Ground improvements after the pre-existing buildings have been demolished and removed in order to prepare the ground for the construction of the new Processing Building
- Foundation design of the new building
- Conceptual structural design to accommodate the building usage with the intent of using a pre-engineered steel structure
- Civil design to establish site grading around the new building and to make the necessary alterations for utilities and services
- Architectural design for the building envelope and accommodation for its intended use
- Mechanical design for building services
- Electrical design for power services

Ground improvements and foundation design recommendations are based on a Geotechnical Report by Thurber Engineering, commissioned by WWS during an earlier conceptual phase of design, which are relied upon to develop preliminary designs.

5.1 Structural and Geotechnical Design

The structural and geotechnical design involves the design of the ground improvement, foundations, and building superstructure. The main preliminary design concept is presented in Sections 5.1.1, 5.1.2, and 5.1.3. As a comparison exercise, alternative foundation and ground improvement options are presented in Section 5.1.4.

5.1.1 Ground Improvements

The soil conditions encountered on site have prompted a recommendation for ground improvements which is outlined in the geotechnical report by Thurber Engineering, dated December 21, 2020. The proposed building location is in an area susceptible to liquefaction, which can result in loss of foundation support, excessive settlement, and lateral spreading. By densifying the soil, the consequences of liquefaction are mitigated.

The preliminary assumptions for ground improvement include stone columns spaced at 3 m and seismic drains spaced at 1 m when near the existing structures. The layout presented is a preliminary estimate based on the geotechnical report from Thurber Engineering, and is subject to refinement pending detailed design.

5.1.2 Foundation Design

The new Processing Building involves a pre-engineered metal building that sits on top of cast-in-place concrete pedestals that connect to spread footings. The preliminary foundation design was carried out using the National Building Code of Canada 2015 and CSA A23.3-19: Design of Concrete Structures. The foundation loading assumptions were based on the assumed reactions from the Processing Building. The final reactions for the foundations will be verified once the detailed design is complete for the pre-engineered metal building superstructure.

The geotechnical report by Thurber Engineering, dated December 21, 2020, recommended maximum soil pressures under the foundations which was a major component for sizing the

foundations. The design is preliminary and will require coordination with a pre-engineered metal building supplier.

Due to the seismic loads and liquefaction potential on site, the spread footings will be tied together with perimeter grade beams and a structural slab on grade that acts as a floor diaphragm. By providing a robust interconnected foundation system, the effects of any post-seismic lateral spreading will be reduced to ensure the structural integrity of the building.

5.1.3 Structural Design

The main superstructure consists of a portal frame with an interior column, side girts, wall cladding, roof purlins, and a standing seam roof. The bay spacing and interior columns were selected to minimize the loading to the exterior foundations.

The structural design for the superstructure will be carried out by a pre-engineered building supplier using proprietary software for full optimization of structural members. The superstructure concept is subject to change depending on the vendor selected for design. The depths of the columns and beams will later be optimized by the pre-engineered designer, and what has been shown for the preliminary design is a conservative assumption.

5.2 Civil Design

The Processing Building elevation is set to address storm event flooding issues that have been experienced with the existing facilities. A drainage system of catch basins and piping will capture surface runoff, roof rain leaders and trench drains from inside the building that have been cleaned through an oil water separator to acceptable water quality and all will be connected to the existing site drainage system. The extension of the building has no substantial impact on runoff flow/volume since all areas, including asphalt pavement and the building roof were within hard surface with the same runoff coefficient. Connections for site services are included in the civil design package.

An investigation of site water services was undertaken with the Corporation of Delta, and it was confirmed that the site is presently serviced by a single connection at the Derwent Way traffic circle at the west end of the terminal site.

5.3 Architectural Design

5.3.1 Introduction

The new Processing Building will be located at the current location of Mechanical Shop #1 and Accessory Shop #2, between Accessory Shop #1 and Parts Warehouse.

The main purpose of the new building is to optimize the facility operations and improve the operational flows. Therefore, a flow-through layout is one of the critical principles for the new Processing Building.

The new Processing Building is a single storey, 7.23 m high pre-engineered building that consist of a 3051 m^2 processing area (on-line processing lines and off-line processing bays) and 134 m^2 of ancillary spaces. The ancillary area includes a mechanical room, tool room, electrical room, storage room and accessible washrooms for men and women.

The purpose of this section is to summarize:

- The Architectural design assumptions and criteria that have been considered for the preliminary design of the new Processing Building;

- National Building Code (2015) requirements that affects the overall Processing Building layout, its proximity to the existing buildings and the fire protection and occupant safety requirements; and
- ASHRAE 90.1-2019 requirements for the thermal performance requirements of the building assemblies and proposed assemblies.

5.3.2 Building Design & Existing Buildings Improvement

Due to the occupancy classification of the new Processing Building, the proximity of the existing Accessory Shop #1 and Parts Warehouse to this building and the unique operational requirements of the facility, several factors have been considered in the design of the new Processing Building, to determine the processing area layout, building height and the final building footprint:

a. The layout of the on-line processing lines and off-line processing bays have been driven by the operational requirements and the expected capacity of the new Processing Building. In addition, all doorway dimensions and door types follow the project requirements to ensure the operational efficiency of the Processing Building.

b. Minimum 4572mm (15 feet) clear height has been provided throughout the Processing Building as per the project requirement. All mechanical equipment is located on the roof to meet this requirement and access from the interior space to the roof has been provided for mechanical equipment maintenance and service purposes.

c. Throughout the design process, the goal has been to maximize the building footprint and decrease the distance between the new Processing Building and existing buildings, without compromising the operational efficiency of the facility. This will increase the capacity of the new Processing Building, provide additional space and facilitate the entire operations. Structural constraints have also been considered for this purpose.

The length of the building is determined by aligning the building with the existing adjacent buildings. To determine the width of the building, a thorough National Building Code (2015) study has been conducted to investigate various options, including potential required upgrades to the existing Accessory Shop and Parts Warehouse in order to decrease the limiting distance required by the Code for the existing buildings and to be able to locate the Processing Building in close proximity to these existing buildings. For this purpose, both existing buildings have been classified as F-2, medium hazard occupancies.

Table 5.1 Parts Warehouse Improvement Options

Options	Result	Approved Approach
Existing building (unsprinklered)	Limiting Distance for the exposing building face approx. 22 m	
Existing building (unsprinklered) + sprinkler system	Limiting Distance for the exposing building face approx. 13.33 m	
Existing building (unsprinklered) + 2hr fire-rated exterior wall where exposed to Processing Building	Limiting Distance for the exposing building face approx. 1.2 m Note: maximum individual unprotected opening area to be 0.35 sq. m. Thus, both doors on the exposing building face should be replaced with 90min fire-rated doors.	Minimum Limiting Distance equal to 3 m has been considered for the Parts Warehouse In this case, only the OH door needs to be replaced with a 90min fire-rated door.

Existing building (unsprinklered) + sprinkler system + 2hr rated exterior wall where exposed to Processing Building	Limiting distance for the exposing building face approx. 0.6 m Note: unprotected opening is not allowed in the exposing building face.	

Table 5.2 Accessory Shop Improvement Options

Options	Result	Approved Approach
Existing building (unsprinklered)	Limiting Distance for the exposing building face approx. 22 m	
Existing building (unsprinklered) + sprinkler system	Limiting Distance for the exposing building face approx.14 m	
Existing building (unsprinklered) + 2hr rated exterior wall where exposed to Processing Building	Limiting Distance for the exposing building face approx. 4.85 m Note: maximum individual unprotected opening area to be 17.34 sq. m. (OK for both doors on the exposing building face) However, the horizontal distance between two unprotected openings can not be less than 2m, so the man door needs to be replaced with a new 90min fire-rated door.	Minimum Limiting Distance equal to 4.85 m has been considered for the Accessory Shop. The man door needs to be replaced with a new 90min fire-rated door.
Existing building (unsprinklered) + sprinkler system + 2hr rated exterior wall where exposed to Processing Building	Limiting Distance 1.2 m However, individual unprotected opening more than 0.35 sq. m. is not allowed. Thus, both doors need to be replaced with 90min fire-rated doors.	

As summarized in Table 5.1 and Table 5.2, the final width of the building has been determined based on the approved improvements approach for the existing buildings and some structural design considerations.

5.3.3 National Building Code (2015) Data Matrix

Table 5.3 NBCC (2015) Matrix

Item	National Building Code Data Matrix	
1	**Project Description:**	New Processing Building
2	**Major Occupancy:**	Group F, Division 2, Medium Hazard Industrial Occupancy
3	**Building Area:**	3185 m^2
4	**Gross Area:**	3185 m^2
5	**Number of Storeys:**	1 Storey
6	**Building Height:**	7.23 m (Above Grade)
7	**Number of Streets/ Access Routes:**	2
8	**Building Classification:**	F, Division 2, up to 2 Storeys
9	**Sprinkler System Proposed:**	Required
10	**Standpipe Required:**	No
11	**Fire Alarm Required:**	Yes
12	**Water Service/ Supply is Adequate:**	Yes
13	**High Building:**	No

14	**Permitted Construction:** **Actual Construction:**		Combustible & Non-combustible Non-combustible				
15	**Mezzanine Area**		134 m^2				
16	**Occupant Load Based On:**		46 m^2/person, 70 persons				
17	**Barrier Free Design (Accessibility):**		No				
18	**Hazardous Substances:**		No				
19	**Required Fire Resistance Rating (FRR)**		**Floor Assemblies:** shall be fire separations and, if of combustible construction, shall have a fire-resistance rating not less than 45 min **Supporting Members:** loadbearing walls, columns and arches supporting an assembly required to have a fire-resistance rating not less than 45 min or be of non-combustible construction.				
			Repair Garage Separation: A repair garage and any ancillary spaces serving it shall be separated from other occupancies by a fire separation having a fire-resistance rating not less than 2 h.				
			FRR Between Service Rooms: 1 h				
20	**Spatial Separation – Construction of Exterior Walls**						
	Wall	**EBF (m^2)**	**L.D. (m)**	**Opening**	**FRR**	**Type of Construction**	**Type of Cladding**
	Project North	>200	>15	100%	N/A	Combustible or Non-C	Combustible or Non-C
	Project South	>200	>15	100%	N/A	Combustible or Non-C	Combustible or Non-C
	Project East	>200	0 (assumed)	0%	2 h	Non-combustible	Non-combustible
	Project West	>200	0 (assumed)	0%	2 h	Non-combustible	Non-combustible
21	**Fire Protection Rating of Closures**:		45 min for 1 h FRR of Fire Separation 90 min for 2 h FRR of Fire Separation				
22	**Minimum Number of Exits:**		At Least 2 Exits				
23	**Distance Between Exits:**		The least distance between 2 exits to be one half the maximum diagonal dimension of the floor area = approximately 41 m				
24	**Travel Distance:**		45m from at least one exit				
25	**Minimum Width of Exits:**		Doorway: 800 mm Stairs: 900 mm Corridors & Passageway: 1100 mm				
26	**Doors Width:**		No door leaf less than 610mm				
27	**Direction of Door Swing:**		Open into the direction of exit travel				

5.3.4 Access and Circulation

Doors and Circulation

Based on the conducted Building Code studies, the processing area needs to have at least two exit doors. Less than 45m travel distance from any point in the floor area to at least one exit door has been provided to ensure the occupant's safe circulation and exit as per the Code requirements. All the exit doors are more than 800mm in width and open in the direction of exit travel.

Roof Access Ladder

Interior roof access caged ladder has been provided for the Processing Building to provide safe rooftop access for occasional service and maintenance of mechanical equipment.

5.3.5 Assemblies

ASHRAE 90.1-2019 Requirements

Other than the Code requirements regarding the construction and cladding type (combustible or non-combustible), fire separation and fire resistance rating of the assemblies, ASHRAE 90.1-2019 building envelope requirements have been considered to determine the minimum thickness of the insulation required and the overall thermal resistance of the assemblies.

The Processing Building has been categorized as a semi-heated building under Zone 4 as per the building site climate zone, for the purpose of ASHRAE 90.1-2019 envelope requirements.

Wall Assembly

As per the classification of the new Processing Building and the building site climate zone, ASHRAE 90.1-2019 requires minimum RSI-2.3 (R-13.1) for the above-grade wall assemblies.

Prefinished insulated metal panels with a tongue-and-groove joint system have been proposed for the exterior cladding of the new Processing Building. Insulated metal panels deliver both attractiveness and energy efficiency to the design. These high-quality non-combustible insulated metal panels can be easily adapted to the proposed pre-engineered metal building and are particularly advantageous in achieving sustainable design. These panels are easily washable and utilize concealed clips and eliminated thermal short circuits. The installation process of these panels is easy and fast, and this will eventually reduce the construction labour costs.

As the insulated metal panels are only available only in specific thicknesses, the minimum insulation R-value and the fire resistance rating requirements have been considered to choose the most appropriate panel thickness for the exterior walls. Where the exterior walls are adjacent to the existing building, 2-hour rated panels have been proposed (refer to the Code studies).

Concrete masonry unit walls and steel stud walls have been used for the interior partitions of the building. Fire resistance rating requirement to follow the code studies.

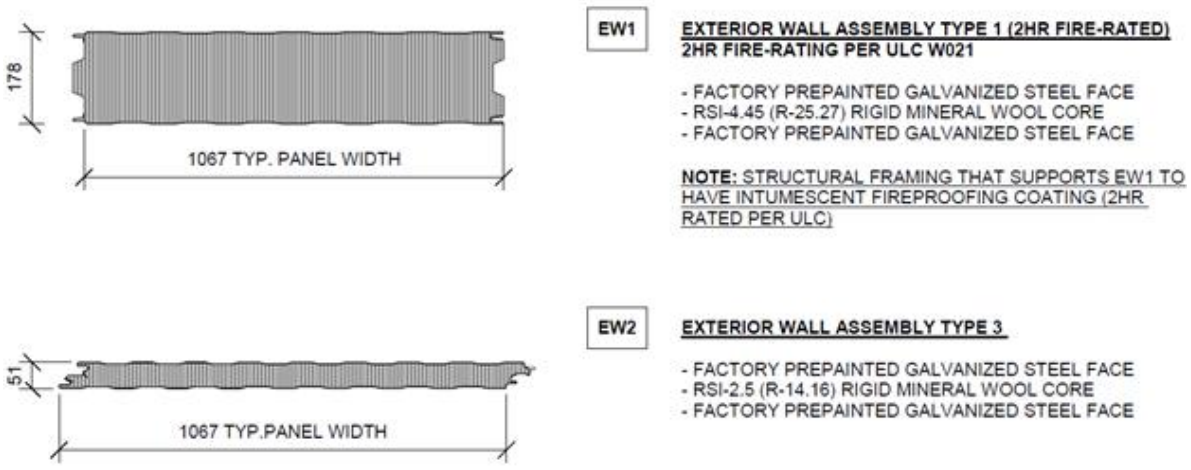

Figure 5.1 Exterior Wall Assemblies

Floor Assembly

ASHRAE 90.1-2019 requires no thermal resistance for unheated slabs-on-grade, for semi-heated buildings in Zone 4. Thus, a 150mm reinforced slab with no under-slab insulation has been provided for the Processing Building. Generally, the slab does not have a slope, but does have a minimum 1% slope toward the trench drains in their immediate vicinity.

Figure 5.2 Floor/Slab-on-Grade Assembly

A composite metal floor deck has been used for the ancillary area roof. Fire resistance rating requirement to follow the code studies.

Roof Assembly:

As per the classification of the new Processing Building and the building site climate zone, ASHRAE 90.1-2019 requires minimum RSI-3.3 (R-18.7) for the roof assembly.

A standing seam metal roof with blanket-type insulation has been proposed for the new Processing Building. The proposed roof assembly is one of the most common roof assemblies that is being used for industrial occupancies and has been assessed to be appropriate for this application.

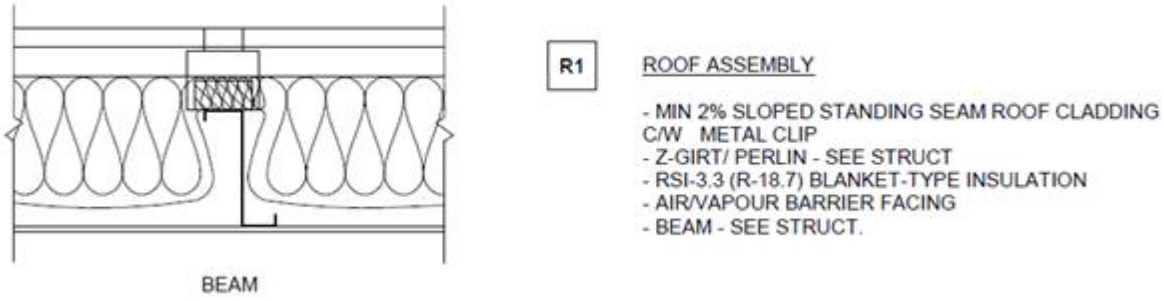

Figure 5.3 Roof Assembly

option in the architectural specifications. These panels provide an all-in-one composite roof panel design, with a polyurethane core. These metal roof panels provide a standing seam exterior face for unsurpassed weathertight performance. Panels are installed completely from the top side with concealed clips and fasteners placed in the side joint. Factory-cut panel ends, factory notching, and factory-swaged ends eliminate critical and extensive field reworking. Factory-installed backer plates at the end laps also eliminate pre-drilling for special fasteners and tools.

5.4 Sustainability Features

In order to reduce the environmental impact throughout the lifecycle of the building, various factors have been considered. The energy efficiency of the building, water efficiency, indoor environmental quality, usage of environmentally friendly and sustainable materials are the main factors that are intended to contribute to the sustainability of this project.

- **Materials:** Materials with the lowest negative environmental impact are specified to be used for this project where possible. The following criteria and considerations have been

considered in the selection of materials for the building and should be further implemented in the detailed design phase:

  - Longer lifespan;
  - Less life-cycle cost;
  - Enhanced indoor environmental quality;
  - Less waste; and
  - less energy and non-renewable resource consumption.

- **Waste:** Construction waste management planning and implementation for diversion and reduction of waste materials (reduce, reuse, and recycle) is to be implemented during construction. The sizing of cladding, panels and other materials during the detailed design is to be in such a way that reduces material waste and negative environmental impact.
- **Indoor environmental quality:** The building is adequately insulated and is airtight to the extent possible in order to provide a controlled temperature and to enhance the indoor environmental quality. This also reduces the load on the ventilation systems and energy use of the building.
- **Energy:** Strategies for reducing the energy consumption of the building and metering energy. ASHRAE 90.1 and NECB 2017 – National Energy Code for Buildings requirements have been considered for energy performance:
  - Main Process Area HVAC system uses high-efficient natural gas pre-heat (92%) for the outdoor air.
  - Heat Recovery Ventilator is provided for support areas.
  - 96% efficient tankless NG water heater is provided.
  - Variable speed drives provided on all air handling equipment.
  - Opportunity to receive Fortis BC rebates for the tankless water heater and efficient air compressor.
  - Energy efficient, low power consumption, and long-lasting LED light fixtures used throughout the facility.
  - Eight electric vehicle charging stations have been added to support sustainable energy transportation alternatives.
  - Power distribution system electrical capacity has been designed to accommodate additional EV charging stations in the future.

- **Water:** Strategies to protect natural water resources and reduce potable water consumption, reduce the load on sewage treatment system and the overall reduction of energy use of the building by reducing the load on water heating and plumbing systems have been considered by specifying Energy Star and Water Sense certified appliances and plumbing fixtures. These strategies are to be further explored in the detailed design phase.

5.5 Mechanical Design

5.5.1 Abbreviations

ACGIH – American Conference of Governmental Industrial Hygienists
ASHRAE – American Society of Heating, Ventilating and Air Conditioning Engineers
ACH – Air Changes per hour
AHU – Air Handling Unit
CFM – Cubic Feet per Minute

EF – Exhaust Fan
NFPA – National Fire Protection Association
OSHA – Occupational Safety and Health Administration
VFD – Variable Frequency Drive

5.5.2 General

The New Processing Building will be provided with mechanical systems including:

- Mechanical ventilation with 92% efficient natural gas pre-heat of the outdoor air
- Space heating via multiple infrared natural gas-fired ceiling heaters
- Domestic hot water for washrooms and emergency eye wash via 96% efficient NG heater
- Domestic cold water for potable and utility use
- Sanitary and indoor area drainage
- Compressed air generation and distribution around the facility
- Fire Suppression throughout and Fire Department Siamese external connections

5.5.3 Mechanical Ventilation

The mechanical ventilation is provided by eight roof top air handling units (MUA-1 to MUA-8) and six roof top upblast exhaust fans. The air handling units have direct natural gas pre-heat of the outside air with 92% efficiency. During the regular operation air handling units run in constant speed while the exhaust fans run in low speed. Upon detection of the elevated levels of Carbon Monoxide, the building is purged via six roof exhaust fans (EF-1 to EF-6) in high speed which provide interlock signals for the garage doors to be fully opened. The regular operation is when Carbon Monoxide (CO) and Nitrogen Oxides (NOx) concentration levels are below 25 ppm for CO.

Carbon Monoxide (CO), one of the most toxic components of vehicle exhaust as well as a significant safety concern in automotive facilities. Gas-powered vehicles make use of these facilities on a regular basis and emit CO during regular movements or idling. When concentrations of CO approach unsafe levels, the ventilation purging must be activated to normalize the area. Due to energy and environment concerns, many jurisdictions across Northern America have mandated CO sensing control systems for new automotive facilities and garages.

The mechanical ventilation is controlled by multi-point analog detection system. The detection system will monitor 5-6 gas sensors and control multiple relays for MUAs and EFs. All sensor wiring is home run to multi-point controller located in the Mechanical Room. The controller will be capable to provide multiple relay outputs for fan cycling and door interlocks as well as multiple analog outputs to control Variable Frequency Drives (VFDs) of the MUAs and EFs.

The minimum ventilation provided is 5.6 L/s per sq.m (1.1 cfm/sq.ft) while maximum ventilation is 11.2 L/s per sq.m (2.2 cfm/sq.ft). The minimum ventilation rate equals to 3 Air Changes Per Hour (ACH), while maximum rate is 6 ACH. The leaving air temperature setpoint from the air handlers is set at 12°C on the coldest day of the year (adjustable).

The 3 ACH (17,000 L/s; 36,000 cfm) is provided via eight 100% O/A air handlers located on the roof. The vertical discharge with the long throw diffusers provides air splashing of the areas. Upon detection of elevated CO ppm concentration in the particular zone, the gas detection controller will send a command to cycle specific exhaust fan(s) and open the garage door(s) closest to that area where detection happened.

The 6 ACH (34,000 L/s; 72,000 cfm) is provided via eight air handlers located on the roof, open rolling doors and six exhaust fans. With all six exhaust fans running in high speed and doors opened, the building achieves the max ventilation rate.

The energy savings will be achieved via analog control of airflow and air exchange based on the CO concentration as well as on free cooling setpoint in the summer. No mechanical cooling is provided. Destratification of the stagnant air will be provided by four (4) ceiling fans. The controls logic will include “first worker on site" and “last worker on site” which represent ventilation purging in the early morning upon start of first shift and ventilation shutdown when last worker left the building.

The support areas corner which includes washrooms, tool room, storage, electrical and mechanical rooms will be ventilated via standalone heat recovery ventilator (HRV-1).

Table 5.4 contains ventilation controls summary.

Table 5.4 New Processing Building Ventilation Control

CO Level in Air	Alarm Level	Ventilation Rate (ACH)	Ventilation Rate (L/s)
< 25 ppm	No alarm	3.0 ACH	17,000 L/s
>=25 ppm	Low-Low Alarm Level Trip/Setpoint	3.5 ACH	19,835 L/s
>=35 ppm	Low Alarm Level Trip/Setpoint	4.0 ACH	22,665 L/s
>=50 ppm	Mid Alarm Level Trip/Setpoint	4.5 ACH	25,500 L/s
>=75 ppm	High Alarm Level Trip/Setpoint	5.0 ACH	28,335 L/s
>=100 ppm	**High-High Alarm Level Trip/Setpoint Strobe and Visual Beacon Activated**	**6.0 ACH**	**34,000 L/s**

Ventilation design meets the requirements of AHRAE and NECB for energy savings, as well as ACGIH, and OSHA for allowable CO concentrations.

Please refer to drawings 365-039-M-001, 365-039-M-002, 365-039-M-100, 365-039-M-101.

5.5.4 Space Heating

The space heating will be provided by sixteen (16) Infrared Natural Gas Radiant Heaters distributed around the facility. They will maintain comfortable indoor temperatures with adjustable setpoint from 15°C to 20°C on the coldest day of the year. Combustion and exhaust flues will be directed via the roof outside.

The Electric Fan Forced wall-mounted heaters (5) of small capacity (0.5 kW) will be installed in the supporting areas like Mechanical Room 102, Tools Room 103, Storage Room 104, Men’s Washroom, and Women’s Washroom 107.

Please refer to drawings 365-039-M-001, 365-039-M-002, 365-039-M-100, 365-039-M-101.

5.5.5 Domestic Water Heating

The high-efficient tankless NG water heater located in the Mechanical Room 102 will provide domestic hot water to the washroom fixtures as well as to the emergency eyewash located outside the Tools Room 103.

Please refer to drawings 365-039-M-002, 365-039-M-300.

5.5.6 Domestic Cold-Water Potable and Utility

The domestic cold water will be used on the facility for potable needs and for utility needs. The network will provide backflow prevention with pressure reducing valve as per National Plumbing Code of Canada requirements.

The washroom fixtures will include flush valve toilets and urinals both meeting low-flow requirements. The lavatories will be in washrooms.

The drinking fountains will be located along the wall of the support areas.

The hose bibs at working stations where service water drop is required will be provided. Two outdoor non-freeze bib types will be provided on the south and north exterior walls.

Please refer to drawings 365-039-M-002, 365-039-M-200, 365-039-M-300.

5.5.7 Sanitary and Indoor Area Drainage

The indoor area drainage will be provided via trench drains strategically located at the garage doors entries/exists and parts delivery corridor. The floor slopes are coordinated with architect for the correct drainage flow.

The oil interceptors will be provided at catchment points prior the discharge to city sewer as per National Plumbing Code of Canada.

Localized floor drains will be provided in the Mechanical Room 102, Men’s Washroom, and Women’s Washroom 107.

Please refer to drawings 365-039-M-002, 365-039-M-200, 365-039-M-300.

5.5.8 Compressed Air Generation and Distribution

The compressed air system will consist of air compressor package (provided by Owner) and distribution piping around the facility to multiple service drops.

The Owner’s provided air compressor package was included in the submission package and main branch piping was sized in accordance with unit’s capacity.

The compressed air distribution detailed design will be finalized once operating parameters at service drops will be provided by the Owner.

Please refer to drawings 365-039-M-003, 365-039-M-300.

5.5.9 Fire Suppression

The fire suppression requirements for the New Processing Facility are defined by National Fire Code of Canada and NFPA 13 - Standard for the Installation of Sprinkler Systems.

The New Processing Facility is defined as an Extra Hazard Group 1 due to the presence of automotive plastics, tires, fuels, and nature of operation.

The fire suppression system for such hazard group shall meet required density of 0.28 gpm/sq.ft. for 3000 sq.ft of suppression area. With the hose allowance of 500 gpm, total fire water flow demand is 1340 gpm. Taking into consideration the most remote sprinkler area location in the building from the point of fire piping entry and elevation pressure drop, the pressure at the base of the riser required is 70 psi.

Please refer to drawings 365-039-M-300, 365-039-M-301.

5.6 Electrical Design

5.6.1 Abbreviations

CEC – Canadian Electrical Code
CSA – Canadian Safety Association
IESNA – Illuminating Engineering Society of North America
NBCC – National Building Code of Canada

5.6.2 Electrical Distribution

The new Processing Building and EV chargers along the east wall of the warehouse building will be serviced by a new 500A metered feed from the existing Electrical Room located adjacent to the Body Shop Building.

All equipment, conduit supports, accessories and their connections to structures shall be designed to resist seismic forces and to accommodate building seismic deflection in accordance with NBCC.

In general, loads are fed from power panels and power distribution centres. Multiple loads are circuited such that these loads on different phases are uniformly distributed and balanced. These loads will include normal building, lighting, convenience receptacles, process loads and HVAC systems.

Main distribution for the building is supplied at 600/347V, 3 Phase, 4 Wire, 60Hz. Transformers for stepping down from 600V will be Type ANN air-cooled natural circulation type, copper windings, Class 'H' insulation, and kVA rating (at 80°C temperature rise) 25 percent greater than maximum calculated demand load (not connected load). All transformers will be encapsulated and housed in a ventilated metal case to CSA and EEMAC standards.

Panel boards will be surface mounted as required, complete with hinged locking door and flush catch and finished in enamel over corrosion resistant primer. Panel boards will be full capacity solid neutral design with sequence style bussing, composed of an assembly of bolt-in-place moulded case circuit breakers with thermal and magnetic trips and trip-free position separate from either the "ON" or “OFF" positions. Multi-pole circuit breakers will have common simultaneous trip.

All conductors will be copper at voltage levels below 1000 V. All conductors larger than No. 10 AWG will be stranded. Conductors will conform to CSA standards and will have a minimum insulation temperature rating of 90°C when the conductors are used for lighting, power supply and distribution.

Receptacles located in wet areas or outdoors shall be protected by a ground fault circuit interrupter (GFCI) or shall be GFCI type receptacle complete with weather-proof cover plates Rated as required for intended use.

5.6.3 Lighting

The new Processing Building will be illuminated to average of 30 foot-candles and uniformity of 5:1 in accordance with IESNA standards. The normal lighting will be composed of all LED lighting which will be repurposed from existing building on site. The emergency lighting will be battery backed LED lighting providing average of 1 foot-candle. “Running Man” style Exit signage will be provided at emergency egress.

Exterior lighting around the building and at the building entrance will be exterior LED fixtures.

The lighting control system for the Processing Building will be standalone low voltage relay panel with a timeclock and photocell for the exterior lighting. A local switch and occupancy sensors will be provided for washrooms other service rooms.

5.6.4 Fire Alarm

There is currently no provision for a fire alarm system at any of the buildings. WWS currently has an evacuation plan in place for dealing with emergency on site, this will be applied to the new Processing Building. The need for a fire alarm will be further assessed in the following stages of the project and will be considered for inclusion in the further development of the processing building design.

5.6.5 Information Technology System

In order to support IT services a conduit riser from the IT panel located in the Electrical Room will be provided. The active IT equipment, wiring and connections to the individual workstation outlets will be provided by WWS.

5.6.6 Closed Circuit Television

There is currently no provision for supporting CCTV systems.

5.6.7 Public Address

There is currently no provision for supporting Public Address System.

6. Parts Warehouse Floor Replacement

The existing Parts Warehouse sits adjacent to the new Processing Building. For its location on the plan view, refer to the new Processing Building drawings. The Parts Warehouse is a pre-engineered metal building sitting on cast-in-place concrete footings with perimeter foundation walls and transverse tie beams. The floor surface consists of a layer of asphalt pavement in between each transverse tie beam.

6.1 Removal of Existing Asphalt Floor

The Parts Warehouse floor level will have the asphalt surface removed to allow for a more robust concrete slab on grade to be installed. The removal will be limited to the locations in between transverse tie beams, which will be maintained because they are required for an interconnected foundation system. Any damage to the existing structure during asphalt removal should be repaired.

6.2 Installation of New Concrete Floor

The new concrete floor will consist of a standard 150 mm thick reinforced concrete slab on grade that is placed in between the existing reinforced concrete tie beams. The slab on grade should be underlain by a minimum of 150 mm thick base course of clean, well-graded crushed gravel fill compacted to 100% Standard Proctor Maximum Dry Density (SPMDD) as recommended in the geotechnical report by Thurber Engineering dated December 21, 2020. The joint between each section of slab on grade and the existing transverse tie beams will consist of a compressible joint filler and sealant materials to ensure proper service life of the new slab.

7. Traffic Management and Construction Staging

7.1 Construction Traffic Management Plan

The Construction Traffic Management and Staging Plan was developed to act as a guideline for the selected Contractor to consider during construction at the three designated construction zones within the Terminal. The daily business operation within the Terminal requires movement and staging of new passenger vehicles within the Terminal area before it can be exported. As a result, the area within the Terminal is critical and construction must be mitigated to reduce the impact to the Terminal's business operations. The purpose of the Construction Traffic Management and Staging Plan is to present a series of suggested construction zones with a description of the work and suggested traffic management measures to mitigate impact to the road network and within the Terminal area.

Construction traffic will be expected to use a combination of public and private roadways to access the three designated construction zones at the Annacis Auto Terminal. Construction traffic will need to access Annacis Island either from the north via Derwent Way (City of New Westminster jurisdiction) or via Highway 91 (BCMOTI jurisdiction). Derwent Way, at Annacis Island (City of Delta), would be the direct roadway to access the Terminal entrance where a security booth will permit authorized access into the Terminal. Annacis Parkway and Dock Road are the only private access routes within the Terminal and traffic flow must be maintained at all time since both access routes are used for access to the Terminal buildings and other tenants within the Terminal area.

Up to 15 construction trucks per hour was estimated for construction traffic during the construction scope of work within the Terminal. A high-level assessment shows that Derwent Way (New Westminster and Delta jurisdiction) would have sufficient capacity to accommodate the additional estimated construction traffic. However, the existing traffic capacity on Highway 91 is already operating at capacity near Annacis Island during peak morning and evening rush hours, but the existing traffic on Highway 91 would decrease after the rush hour periods. The estimate construction traffic wouldn't be significant on Highway 91 since it is already operating over capacity, but it could cause delays for construction traffic to access Annacis Island. Construction traffic would not be an issue on Annacis Parkway since the access route is private where Terminal employees and other tenants will be using Annacis Parkway in the morning and evening for work. The construction traffic will only use Annacis Parkway to access the designated construction zone and will not occupy the access route.

There will be three designated construction zones (Rail Side 1, Rail Side 2, and the Processing Building) within the Terminal and each construction zones will not be active concurrently. Each construction zone has a designated area that includes the work area and the laydown area for materials and workspace. The selected Contractor will only be permitted to be within each designated construction zone and not permitted to go beyond the limits of each construction zone in order to mitigate impacts to the Terminal's daily operations.

Construction traffic will need to use Annacis Parkway as the primary access route to access the construction zone at Rail Side 1. There is an existing fence along the south edge of Annacis Parkway with openings where construction traffic can use to access into the construction zone. Access within the construction zone includes an allowance for construction vehicles to maneuver within the area and to exit on to Annacis Parkway. The Terminal will have minimal impact during Rail Side 1 construction since construction traffic will be using Annacis Parkway

and will be within the designated construction zone that will be marked off in advanced so there will not be any construction traffic interfering with any of the Terminal's daily operations.

Rail Side 2 will require access outside of the Terminal to minimize impact to the Terminal's daily operations. Construction traffic will be required to access the construction zone at Rail Side 2 via Aldford Ave (City of Delta roadway). There is a secured gate at the Terminal entrance via Aldford Ave which the Contractor must have some security measure in place to permit access. A designated area will be marked off in advanced for the construction zone where construction traffic is not permitted to infringe. Construction traffic is also expected to exit the construction zone using Aldford Ave.

The construction access to the Processing Building will require a different method of access. Construction traffic will need to enter the Terminal via Derwent Way and Annacis Parkway, but access to the construction zone will require an escorted access (provided by the Terminal) to travel from Annacis Parkway to the Processing Building construction zone using an internal access road inside the Terminal area. Construction traffic exiting the construction zone will also need an escorted access from the construction zone back to Annacis Parkway.

7.2 Traffic Impact

At the completion of the project, the AAT is expected to increase the number of vehicles processed annually. Although the number of vehicles leaving the terminal by truck carrier will increase, the ratio of vehicles leaving by train and by truck carrier will remain unchanged. As a result, the number of car carriers used to ship processed vehicles out of the AAT is expected to increase by approximately 10 car carriers per day. The increase in car carriers from the Terminal will add additional traffic volumes to the adjacent road network. Table 7.1 below shows the comparison and estimated car carrier volumes.

Table 7.1 Car Carrier Volume Comparison

Car Carrier Volume Comparison

	Current	Future (post construction)
AAT Terminal Capacity (number of vehicles processed annually)	352,000	480,000
Percentage Shipped by Car Carriers (based on current conditions)	20%	20%
Number of Vehicles Shipped by Car Carriers	70,400	96,000
Assumed Number of Workdays Per Year (six working days per week)	300	300
Number of Cars Shipped by Car Carriers Per Workday	235	320
Terminal Work Hours Per Day	8	8
Car Carrier Capacity (number of units/vehicles)	9	9
Number of Car Carriers Per Hour Per Workday	3.26	4.44
Difference in Number of Car Carriers Per Hour (Future - Current)	-	1.19

The table above compares the current and future car carrier volumes leaving the AAT. The estimate assumes that 20% of the vehicles processed within the AAT will be shipped off by car carriers. It was estimated that there will be an increase of approximately two car carriers per hour per workday that can be expected to use the adjacent roadway in the future.

Since the roadway capacity and volumes are measured in passenger vehicle units, a high-level passenger vehicle equivalent factor (typically three vehicle units for heavy vehicles) should be applied to convert the car carrier to an equivalent passenger vehicle unit to be consistent for measuring capacity and volume impacts. It can be estimated that the two additional car carriers

per hour is equivalent to six passenger vehicle equivalent units that will be using the adjacent public roadways (Derwent Way or Belgrave Way) in the future.

The theoretical interrupted flow capacity along the Derwent Way and Belgrave Way corridors was estimated to be 520 passenger vehicles per hour per lane (refer to the Construction Traffic Management and Staging Plan for more details). The extrapolated AM and PM peak hour traffic volumes (year 2021) along Derwent Way and Belgrave (between Audley Blvd and Caldew St) indicate that the expected volumes would be approximately 300 passenger vehicles per hour and appears to be currently operating under the theoretical capacity.

The additional six passenger vehicle equivalent units per hour which will be added to a future road network where the roadway is expected to be operating about 306 passenger vehicles per hour, approximately 40% below the optimal capacity. Therefore, the adjacent public roadways will still be operating under the optimal roadway capacity even with the post construction increase of six passenger equivalent vehicles per hour (two car carriers).

With respect to the haulway plaza adjacent to the lead in tracks to Side 1, the current 17 bays at the plaza are underutilized and accordingly, the plaza is expected to be sufficient for anticipated future volumes, and no changes to the haulway plaza are anticipated. Further, no changes are anticipated at the terminal entrance and the guardhouse.

The majority of railcar spotting is done prior to 7:00am and pulled out after 3:30pm, with limited mid-day spotting. Mid-day spots usually occur between 9:00am and 10:00am, and this activity can delay access for truck carriers. With the increase in railcar capacity, the number and frequency of mid-day spots are expected to be reduced and accordingly a reduction in delays for truck carriers entering or leaving the site.

With the terminal expansion, WWS anticipates approximately 40 additional employees working on the site over four different shifts, the capacity of the employee parking lot is expected to be sufficient for the number of additional staff. Other minor truck traffic is expected to increase marginally as parts that had previously been delivered to the Richmond Terminal would now be delivered to the Annacis Auto Terminal and is expected to be in the order of ten trucks per week.

Site access is not anticipated to be changed, and no changes to the width of drive aisles within the terminal are anticipated. Major drive aisles remain about 24-30ft in width, and most other drive aisles are 20 feet in width.

8. Air Emissions Study

The air emission assessment methodology consisted of a Level 1 Assessment, as specified in the PER Air Guidelines, to evaluate the potential effects that the proposed Project could have on ambient air quality. A Level 1 assessment considers changes to emissions only – it does not predict how changes in emissions would affect air quality using dispersion modelling. The assessment considers Baseline emissions – those resulting from current operations at the Richmond Auto Terminal (RT) and the AAT – as well as Project emissions which include the expanded operations at AAT as well as a small increase in overall capacity. The assessment considers the case if the Project does not go ahead, which is not a viable option in the current situation given VFPRA's need for land at the RT. The assessment also considers the potential for application of best available technology and procedures to reduce emissions of the Project. The assessment considers emissions from operations only – it does not consider emissions from demolition or construction activities on site.

Emission factors were largely taken from U.S. EPA data sources and in particular the MOVES model for mobile sources. Activities causing emissions were determined by discussion with client and contractors.

The assessment found that Project emissions would generally increase relative to Baseline emissions. The reasons are:

- The vehicle throughput capacity in the expanded AAT is larger than current actual Baseline throughput
- Moving all operations to AAT increases the distance travelled by ocean going vessels to deliver vehicles to the facility. Marine emissions are the largest component of the Project, which also considers shipping vehicles by rail and truck after processing as well as emissions from activities on site.

Countering the tendency to increase were:

- Planned regulatory decreases in emissions from vehicles which vary by pollutant and vehicle type. These anticipated changes are capture in MOVES model emission factors.
- Consolidation of activities on a single site

Emissions from activities on site are negligible to small compared to transportation emissions, and the assessment considered that only emissions on site where within the control of the facility. Therefore, opportunities to apply best available technologies or procedures on site have little effect on emissions.

9. Archaeological Overview Assessment

An Archaeological Overview Assessment (AOA) was completed. The AOA does not recommend that a further Archaeological Impact Assessment (AIA) be undertaken.