



Canal Greenway Phase II

Coordinated Open Space Development Plan

Prepared For:



Project No: 051232



CBCL LIMITED

Consulting Engineers

in association with



Final Report
May 2006

Contents

Chapter 1	Project Purpose	1
Chapter 2	Site Overview	2
2.1	Existing Site Conditions.....	2
2.1.1	Historical Significance.....	2
2.1.2	Physical Context/Surroundings.....	3
2.1.3	Topography, Surface Drainage, and Soils (Former Starr Manufacturing Property).....	4
2.1.4	Archaeology	4
2.1.5	Underground Infrastructure	6
2.2	Potential Uses.....	6
2.2.1	Public Input.....	6
2.2.2	Opportunities and Constraints.....	7
Chapter 3	Master Plan Update	10
3.1	General Layout.....	10
3.1.1	Alderney Centre to Alderney Drive / Portland Street	11
3.1.2	Alderney/Portland Intersection	12
3.1.3	The Pine Street Extension Area	13
3.1.4	Inclined Plane Site, Turbine Chamber Interpretive Feature, and Starr Manufacturing	15
3.1.5	Prince Albert Road from the Pine Street Extension to Ochterloney	19
3.1.6	Esso Station/Ochterloney Street	19
3.1.7	Sobeys Property on the Pine Street Extension	20
3.2	Interpretive Program.....	20
3.3	Intersection Re-alignments.....	21
3.3.1	The Pine Street Extension.....	21
3.3.2	Alderney/Portland/Prince Albert	22
3.3.3	Prince Albert/Ochterloney	22
3.3.4	Ochterloney/Crichton.....	23
Chapter 4	Implementation	24
4.1	Conceptual Grading.....	24
4.2	Scheduling of Works	24
4.3	Opinion of Probable Costs	25

Appendices

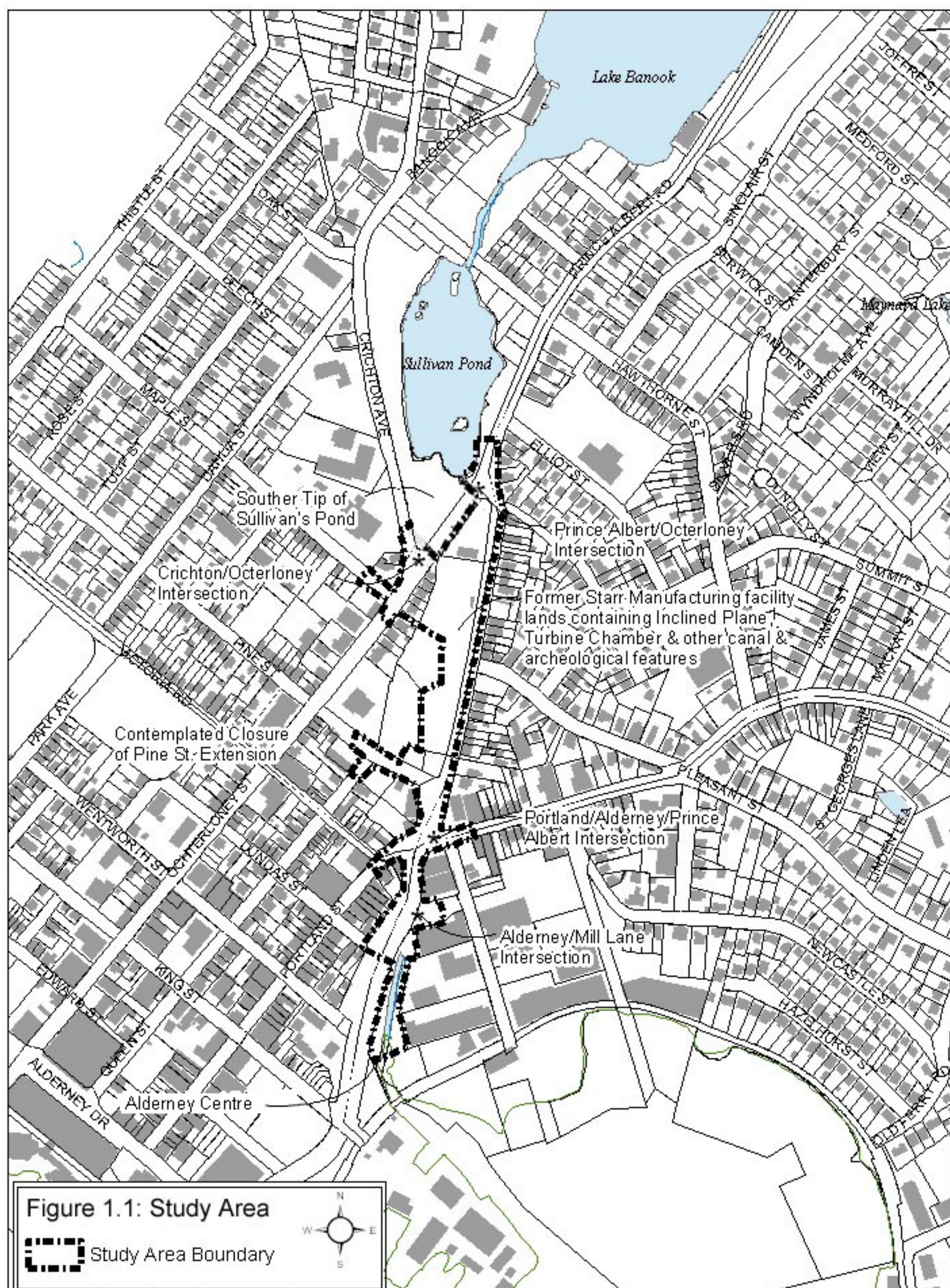
A Traffic Report

Chapter 1 Project Purpose

This project builds upon an earlier report by Ekistics Planning and Design, which was commissioned by HRM and the Shubenacadie Canal Commission 2002 in an effort to determine the best possible greenway alignment solution to link Dartmouth Cove to the Lake Banook trail system. That report was a vision document that outlined a possible design for the former Starr Manufacturing property with open space and trail connections to Sullivan's Pond and to the Dartmouth waterfront.

Figure 1.1 defines the study area for this project. The study has three major components:

1. an update of the Ekistics master plan to reflect changes in site conditions, specifically the development of the Lock 4 condominium on the western side of the property, as well as public opinion which was not solicited for the early report;
2. the provision of detailed design drawings for intersections that require reconfiguration to accommodate the proposed trail and park development; and
3. the provision of detailed design and tender documents for the Trans Canada Trail through the Former Starr Manufacturing property and an interpretive facility related to the historic turbine chamber found in-site.



Chapter 2 Site Overview

2.1 Existing Site Conditions

The site operates on a number of levels: as a neighbourhood open space; as a regionally significant park; as part of the larger Shubenacadie Canal system; as a watercourse draining a watershed from north Dartmouth to the waterfront; as a location containing a sanitary sewer draining much of Dartmouth; and as part of a national trail system. Each of these perspectives bring various points of view related to site development, some of which are complementary, others of which are competitive.

The site is also complex from an archaeological point of view, with many historical uses layered on top of each other and with different eras having adaptively re-used and altered the previous eras' installations.

However, a unifying theme of the site is water, whether it be as a First Nation canoe route, the development of the Shubenacadie Canal, the development of the water powered turbine for use on the inclined plane and adapted for powering a manufacturing plant, storm drainage, fish passage, or as an amenity beside recreational pathways and trails.

2.1.1 Historical Significance

The site area lies along the historic alignment of the stream that flows from Lake Banook to Halifax Harbour. Historic accounts and oral tradition indicate that, prior to the founding of Halifax and Dartmouth in 1749, this stream was an important part of a natural waterway used by the Mi'kmaq and their ancestors to travel between the Atlantic coast and the Minas Basin.

Beginning in 1749, the flow of the stream was used to power a succession of mills built south of the property, near Halifax Harbour, and north of the property, near Lake Banook. These mills generated lumber, flour and other products vital to the development of the harbour settlements.

With the commencement of Shubenacadie Canal construction in 1826, the site became the location of Locks 1 to 5 of a six-lock canal system designed to enable barges to transport goods from Halifax Harbour to Lake Banook en route via other canal elements to the Minas Basin.

Financial difficulties resulted in a period of abandonment for the canal. In 1860, Locks 1 to 5 were replaced by a sloped railway designed to improve efficiency by hauling vessels in cradles from Halifax Harbour to Sullivan's Pond. This marine railway, known as an "inclined plane" also passed through the Starr Manufacturing property, west of the old canal works. Like the old mills, the new marine railway drew its power from the flow of the local stream.

In 1861, Halifax businessman John Starr opened a small nail factory adjacent to the powerhouse. This business, which utilized surplus power generated by the railway turbine, was the origin of Starr Manufacturing Limited. The factory expanded rapidly on the property, incorporating the powerhouse and covering over the canal. Ultimately, it produced a variety of metal products ranging from skates to bridges.

Use of the marine railway ceased in 1870 and the configuration of the Starr building complex underwent frequent changes in the late 19th and 20th centuries. The last of the Starr buildings was destroyed by fire in 1998.

The use of the Canal corridor as a portion of the Trans-Canada Trail and the regional trail system adds another dimension to this historic route. Certainly the use of this corridor for a greenway is consistent with the earliest cultural history of Nova Scotia.

2.1.2 Physical Context/Surroundings

The site is the northern terminus of the mixed commercial/residential development of downtown Dartmouth. The area north of the site and along its eastern and western sides is primarily residential. Downtown Dartmouth is in the process of redevelopment with a number of new condominium buildings having been constructed, other buildings under renovation, and the opening of new businesses.

With the removal of the Starr Manufacturing buildings, the site has become a major open space in the area. The development of the area as urban open space will benefit the community as it has previously separated neighbourhoods in the vicinity. Now, there is an opportunity for it to act as a connector and an important transition point between the various land uses.

The site offers the opportunity to complete a missing link in the Trans Canada Trail and regional trail system. The existing trail ends at Sullivan's Pond and picks up again at the Alderney Centre with slightly less than a kilometre gap in the middle. The gap is considered a pivotal link in the regional trail system from Lake Banook to the waterfront trail currently under development connecting the downtown Dartmouth ferry terminal to the Woodside ferry terminal.

Following the demolition of the Starr Manufacturing buildings, a variety of development proposals for the site were entertained, some of which would have seen the bulk of the area turned over to residential development. A portion of the site was sold for the development of the Lock 4 condominium building. Construction of this building has altered the western edge of the site and necessitates the revision of the Ekistics master plan to accommodate the new development.

The site is mostly grassed with its southern portion gravelled. It contains no structured use and is primarily utilized as a dog-walking area for local residents and a pedestrian shortcut between the Pleasant/Prince/Albert intersection and the Queen/Pine intersection. It also receives occasional use as a parking area and location camp for filmmaking.

The removal of the Starr Manufacturing buildings allowed an informal pedestrian and bicycle connection to develop between the Pleasant/Prince/Albert intersection and the Maple/Ochterloney intersection, using the trail connection provided as part of the Lock 4 development. This connection has been acknowledged with the gravelling of the un-surfaced path that had formed.

2.1.3 Topography, Surface Drainage, and Soils (Former Starr Manufacturing Property)

The site generally slopes from north to south with the extreme southern end of the site being a low point with an elevation below the surrounding street and parking area. Interestingly, the area does not contain any surface water, even after considerable precipitation events.

Based on existing grades on the site surface, it appears that the top of the turbine chamber is somewhat higher than the surrounding ground and the adjacent Prince Albert Road. This could present some challenges in final grading of the site as the area will not be able to be lowered.

New fill was added on the north end of the site adjacent to the Imperial Oil property during the summer. The fill was material left over from the replacement of a portion of the 2.7 m diameter stormwater drainage pipe on the Lock 4 property. However, HRM hired part of the design team for this project to ensure that the fill was placed with the future development of the Canal Greenway site in mind.

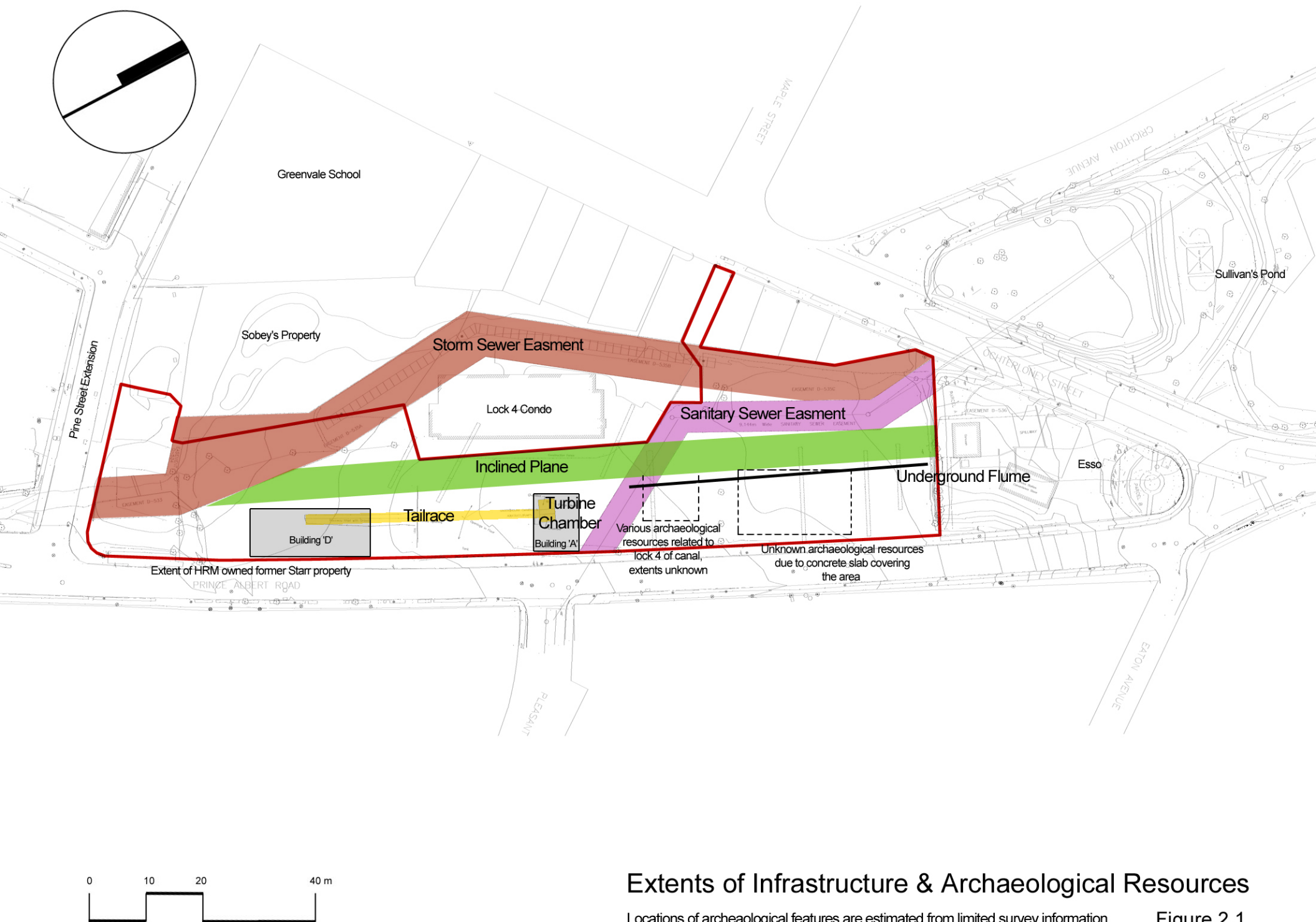
As the location of a former metal manufacturing plant, the site is contaminated with polycyclic aromatic hydrocarbons (PAHs) and metals. The risk assessment completed by Jacques Whitford in 2002 showed unacceptable risk to future residents (adults and children) with respect to dermal contact or ingestion of soil. Upon the recommendation of this risk assessment, the metal impacted soils were removed and the site was capped leaving the site in safe condition.

However, construction of the Canal Greenway will re-disturb the site and the following conditions should be considered:

- No building should be located in the central portion of the site next to Prince Albert Road;
- Any areas on site in which the existing cap is disturbed will require re-capping;
- Sampling and analysis of soils and the implementation of appropriate measures should be required during excavation on site.
- Metal contaminated soils that are excavated on site may possibly be disposed at a landfill, if a leachate test comes back allowing this. However, it would be preferable if the soils could remain on site. It is important to try not to mix the contaminants, i.e., move PAH or petroleum contaminated soil to other areas where it may cause remediation or disposal concerns in the future.
- It will be difficult to dispose of any petroleum or PAH contaminated material off-site due to the presence of elevated metal concentrations. This issue should be dealt with by careful site design balancing cut and fill and the provision of appropriate cover to minimize the costs of hauling the material off site.
- Given that the soils on the area will be disturbed by construction of the Canal Greenway, it is highly recommended that a risk assessment scenario for a construction worker be obtained prior to construction.
- Due to the presence of a dry cleaning shop across the Pine Street extension and the ground elevations in the area, it is recommended that testing for chlorinated solvents (VOCs) be undertaken on the southern portion of the site prior to construction.

2.1.4 Archaeology

The site contains a complex layering of archaeological features, based on a relatively long period of occupation and the adaptive re-use of elements by succeeding users. **Figure 2.1** shows the general



Extents of Infrastructure & Archaeological Resources

Locations of archaeological features are estimated from limited survey information

Figure 2.1

location of the archaeological features found on site. All buildings and most other above ground features have been removed. In-ground archaeological resources have been covered for protection.

Archaeological resources known to exist on the Canal Greenway property are as follows:

- *Shubenacadie Canal Locks 3 and 4*: Inspection beneath the floor of Starr Manufacturing Building A in 1998 and archaeological testing conducted by CRM Group in 2002 revealed masonry remains identified as wall segments from Shubenacadie Canal Locks 3 and 4;
- *Inclined Plane*: Archaeological testing by CRM Group in 2002 revealed a surviving segment of the inclined plane, built circa. 1860. The bed consists of a broad surface of compacted ironstone fragments set in a matrix of reddish brown sandy silt. Although the rails are no longer present, the rail footings are, consisting of two low stone walls lying parallel to one another, 6.1 m apart. Each of the footings is about 1.0 m wide and 750 mm high;
- *Powerhouse Turbine Chamber*: Inspection beneath the floor of Starr Manufacturing Building “A” in 1998 documented the existence of the powerhouse turbine chamber. This subterranean cavity lies within the confines of Lock 3. It is framed by four masonry walls, consisting of the east and west walls of the lock (6.7 m [22 ft] apart and built ca. 1830) and two perpendicular walls spanning the width of the lock (4.85 m [15.9 ft] apart and built ca. 1860). This chamber is capped by a masonry arch that has a central opening to accommodate the turbine shaft; and
- *Tailrace*: Inspection beneath the floor of Starr Manufacturing Building “D” in 1998 identified a surviving segment of the underground masonry spillway that carried the outflow water southward from the turbine chamber. Built ca. 1860, this feature is 1.5 m wide and 1.2 m deep.

Given that significant archaeological resources have been encountered throughout much of the Canal Greenway property, it is recommended that development related ground impacts be avoided wherever possible. Plans for any unavoidable ground impacts should be reviewed with an archaeologist during the planning stage, to allow for timely adjustments minimizing the potential for impact upon archaeological resources. This early review would identify any requirements for further archaeological assessment, advance mitigative archaeological excavation or archaeological monitoring during construction.

While the buildings and the turbine chamber were relatively well documented by Industrial Heritage Nova Scotia Society, no geo-referenced information has been found to locate the features accurately in 3-dimensional space. Even though cross sections have been excavated through the site, exact locations and lengths of elements such as the inclined plane and tailrace have not been completely recorded. This situation creates some uncertainty in the master planning process, in that some adjustments to locations and elevations of plan elements may be required as the archaeological resources are uncovered and accurate grades and locations are obtained.

Archaeological monitoring of construction excavation on the Imperial Oil property at Prince Albert and Ochterloney in 2002 identified significant archaeological resources within the footprint proposed for a new convenience store. The archaeological resources included the eastern earthen embankment for Lock 5 of the Shubenacadie Canal, and a combination of stone, wood and clay features that is believed to be part of the gate structure for the head pond and head race of the marine railway’s power plant. Those resources were fully documented and left undisturbed and in situ. An amendment to the design of the

proposed store foundation allowed the new building to be erected over the archaeological features, without further risk of archaeological impact.

Archaeological monitoring during construction of the new condominium complex by Innovative Properties at the corner of Prince Albert and Portland in 2003 revealed evidence of one or two stone foundations within 30 to 60 cm of the front of the building, one of which was previously severely damaged. In Situ, the firm responsible for the monitoring, believes that these may have been the footings for a bridge that spanned the canal in the area. The site of the building had been previously highly disturbed and no other archaeological remains were found during construction.

2.1.5 Underground Infrastructure

In addition to the variety of buried historical infrastructure, the site contains existing piped systems that had been installed during the 1900s and are presently in use (see Figure 2.1).

Following Hurricane Beth in 1973, a 2.7 m diameter corrugated steel pipe was installed in the existing stream (Sawmill River) located on the western portion of the site. The pipe was installed to help prevent the widespread flooding and damage that had occurred as a result of the heavy rains. Results of recent studies of the condition of the pipe have included recommendations to replace or repair portions of the existing stormwater pipe due to corrosion that jeopardizes the structural integrity of the pipe. In the summer of 2005, approximately 125 m of the corrugated metal pipe was replaced with a 2.5 m diameter concrete pipe. The replacement section is located on the western side of the recently constructed Lock 4 Condominium building.

An existing 1.2 m diameter concrete sanitary trunk sewer diagonally crosses the northern portion of the site from Ochterloney Street to Prince Albert Road at Pleasant Street. The sanitary sewer is the primary collection pipe for the Dartmouth Cove/Lake Banook-Lake Charles sanitary sewershed. A 300 mm diameter watermain was recently installed adjacent to a portion of the sanitary pipe to provide water service to the Lock 4 Condominium. The water service is connected to the existing 400 mm diameter watermain located along Prince Albert Road.

The sanitary sewer pipeline was installed in a trench excavated across land in the area of the inclined plane, canal locks and elevated sluiceway. There is an opportunity to install piping in the same trench to provide servicing to planned facilities, thereby minimizing disruption of buried historical features. An example would be the installation of a water supply main to provide a simulated stream flow to the Powerhouse exhibit or through the exposed tailrace.

2.2 Potential Uses

2.2.1 Public Input

A public workshop attended by over 100 participants was held on 15 September 2005. After a brief presentation outlining the history of the site, people were asked to split into groups of approximately eight and develop a layout plan for the site. Each group presented the results of their work to the whole

audience. The workshop demonstrated a fairly consistent agreement amongst members of the public on the elements that the site should contain and their general location.

All groups saw the site being developed as passive open space and generally supported day-lighting (exposing) the maximum possible portion of the stream through the site. All groups considered tree planting and the provision of benches to be important elements of any park design. People viewed the turbine chamber as an important feature for exposure and interpretation. There was fairly high support for the development of a play area, with many groups placing that at the northern end of the site near the Imperial Oil property

Trail linkages through the site were considered important. Most people saw the development of the major north-south trail through the site occurring on top of the inclined plane. Many people wanted to see connections at the northwestern end of the site at the corner of the Imperial Oil site on Ochterloney. Many people wanted the visual connection from Sullivan's Pond to the waterfront preserved or enhanced.

Generally, people did not support the development of a building or a skating rink on site. Many groups suggested that if a building or skating area was to be developed that those elements would be best sited on the Sobeys property (formerly Beazley's Bowling Lanes), if that was acquired at some point by HRM.

Many people agreed that the acquisition of the Imperial Oil site would improve open space connectivity through downtown Dartmouth.

Additional interesting ideas that were presented at the meeting included:

- the use of periscopes to see into the turbine chamber;
- the provision of interpretive elements along the trail telling the story of different parts of the site; and
- a reminder to ensure the provision of lighting along the trails.

2.2.2 Opportunities and Constraints

With removal of the Starr Manufacturing buildings, the opportunity to create a regionally, if not nationally significant open space in the heart of downtown Dartmouth has been created. This site can fill a missing link in the Trans-Canada and regional trail system, provide the chance to interpret what some consider one of the most important engineering and transportation artefacts in Canada, and potentially act as a catalyst to spark further redevelopment of Portland Street and downtown Dartmouth.

The number and variety of archaeological resources found on site provide an opportunity to tell an interesting story of the history of the area. As part of the Trans Canada Trail, a regional active transportation link from the Dartmouth waterfront to the New Minas Basin, and also a link in a major urban open space connection and pathway network, the site should attract high levels of traffic. From the site, it is less than 600 m to the waterfront and less than 1 km to the ferry terminal. A compelling feature could attract tourists to the area through downtown, increasing traffic in that area and providing additional retail opportunities. The visibility of the site and anticipated high levels of use will allow the history of the area to be expressed to a wide and varied audience.

The trail surface needs to be paved, preferably in asphalt and a 4.0 m width is preferred (3.0 m. minimum). The trail needs to be continuous and the surface material should not change. Where the trail runs adjacent to a road in a manner similar to a sidewalk, the surface and markings should make it obvious that it is a multi-use trail. HRM will need to designate the length of the trail including “sidewalk” areas officially as trails to permit cycling under the Motor Vehicle Act.

The turbine chamber is a very interesting feature (see **Figure 2.1**). However, it was not well documented before being filled in with gravels for archaeological preservation purposes. Therefore, it is not possible to design an appropriate structure that would allow it to be opened and exposed while preserving its archaeological integrity without considerable prior investigation. It is therefore recommended that any structure related to this feature be built without disturbing the existing archaeological resource.

The variety of sewer easements across the site impose some restrictions on grading and the area available for building construction.

Many archaeological and infrastructural features cover much of the site. The installation of a building or other major infrastructure is not possible without impacting a number of these features. The use of the site for a building and associated parking is not appropriate, due to the negative impact it would have on the exposure, reconstruction, and interpretation of the extant historical features. The installation of a building would destroy the open space character of the site and limit the creation of visual and open space linkages between Sullivans Pond and the harbour. Public opinion also does not support the construction of a building on site. A building would be better placed on the Sobeys property on the Pine Street extension, if acquired by HRM or elsewhere.

The invert elevation of the existing storm sewer pipe and the depth that imposes on the bottom of the stream means that major excavations and grading will be required to day-light any portion of the Sawmill River through the site.

While the site could accommodate a skating area, the general public was not very supportive of building such a feature on the property. Such a facility would require a building to house refrigeration and other ice preparation equipment. If it was successful, it would also likely require parking. A number of people supported the idea that such a facility would be more suitably located on the Sobeys property, if it was acquired by HRM. It is HRM’s intention to clear and flood ice on Lake Banook as an outdoor skating area when weather and ice thicknesses allow it. Therefore, it is not recommended that a refrigerated skating surface be provided within the existing site. However, a large flat area located north of the turbine chamber could accommodate a community skating rink operated by volunteers.

In terms of the overall development of downtown Dartmouth, it is suggested that the acquisition of the Imperial Oil property at the corner of Ochterloney and Prince Albert is more important than the purchase of the Sobeys property at the other end of the site. The Imperial Oil site contains important archaeological elements including evidence of a lock structure, and what is believed to be part of the gate structure for the head pond and head race of the marine railway’s power plant. The property would allow a more cohesive open space linkage from the waterfront to Lake Banook and beyond. Therefore it is recommended that HRM negotiate a right of first refusal should Imperial Oil ever decide to sell their

property. HRM should only purchase the Sobeys property, if it can be acquired at a reasonable price, if its purchase does not interfere with the purchase of the Imperial Oil property, and if HRM has a specific use in mind for the site.

As recognized in the 2002 Ekistics report, HRM has the opportunity on the Canal Greenway site to create an urban park of the highest quality; infused with history and brimming with social relevance. The park is certainly regionally, if not nationally significant, and a high quality development would demonstrate respect for the predecessor uses which once occupied this property and gave rise to the social fabric and physical form of Dartmouth. Such quality of development and interpretation of the fascinating history of the site would also provide an interior destination in Dartmouth drawing people through the downtown and up into the Dartmouth chain of lakes.

Chapter 3 Master Plan Update

Figure 3.1 is an illustration of the proposed master plan. While the plan is similar to the 2002 Ekistics plan, changes were necessitated by the development of the Lock 4 condominiums.

3.1 General Layout

This master plan does not reflect a wholesale change from the previous plan created by Ekistics. Upon review, that plan represents a solid concept for the redevelopment for the site. This project seeks to build upon the earlier plan, fine-tuning elements to reflect current conditions and to make improvements that have become apparent upon reflection. On this basis, this report repeats the descriptions from the earlier report, making changes to reflect alterations in the plan.

The alignment of the former inclined plane is used as a route to connect the Alderney Centre on the Dartmouth Waterfront to Sullivans Pond. The connecting theme for the site is the water and the



opportunities it presents as a medium of transportation, a power source and an amenity. The proposed site development is analogous to a “string of pearls”, where various features provide points of interest along a linear route through the site. The area will act as a connector, creating an open space link from the waterfront to the Dartmouth lakes system and providing connections between and a potential focus for downtown Dartmouth neighbourhoods around the site.

Figure 3.2: View North Along Site

The approach would see the revival of the inclined plane alignment as the central spine of the Greenway, the day-lighting of a portion of the former river system through the site, and the reconstruction of select areas and the introduction of new elements to emphasize the area’s unique industrial history.

Twelve features mark progress along the Greenway, telling the history of the site and should be the focus of an extensive interpretive program (see Section 3.1.7):

1. the Alderney Centre;
2. a water sculpture and interpretive feature marking the point where a natural spring existed;
3. the Stonemasons Plaza at the Portland / Alderney / Prince Albert intersection;
4. the proposed timber recreation of the cradle;
5. the reproduction of the inclined plane and the rails;
6. the day-lighted stream;
7. the tail race;
8. the turbine chamber interpretive pavilion;

Note: Numbers refer to list of items in Section 3.1 of report text.

9. the head race markers;
10. Fairbanks Grove;
11. the canal boat themed adventure playground at the top of the incline plane and trailhead on Ochterloney Street; and
12. the revealed bridge under Ochterloney at the north end of the Esso property.

This is a visionary plan, which, to be successfully realized, will require significant investments to reconfigure the Alderney/Prince Albert/Portland intersection, close the Pine Street extension to Prince Albert Road and replace it with a pedestrian bridge, open the rock cut and introduce water near the Alderney/Prince Albert/Portland intersection, remove a portion of the 2.7 m diameter stormwater pipe and day-light the watercourse in the Pine Street extension area, and reconstruct/interpret key features of the Canal/marine railway and other historic features. The site also will act as a major link in the Trans Canada Trail completing the connection of the trail from Sullivans Pond to the harbour.

Any further re-construction of the 2.7 m diameter storm sewer through the site should be undertaken with fish passage in mind. It is recommended that a study be undertaken to determine if it is feasible to create fish passage along the river and if so, to design the required elements such as pool and riffle structures, fish ladders, and light wells in the pipe to encourage the use of the watercourse (open and piped portions) by fish. The plan should be comprehensive and provide a solution for fish passage from the harbour to Lake Charles. This type of study is not within HRM's mandate and outside funding will have to be sought.

The site development can be subdivided into six parts as described below. More detailed discussion and illustrations of recommended intersection reconfigurations are found in Section 3.3.

3.1.1 Alderney Centre to Alderney Drive / Portland Street

The Alderney Centre is the southern gateway for this section of the Greenway. It is also the gateway for interpretation of the Shubenacadie Canal. The basin created at the Alderney Centre is the first contact with the harbour as the start of the Canal and is an objective milestone on the Trans Canada Trail.

The proposal is to create a new trail along the western edge of the Canal and to reconstruct the stone bank of the Canal to properly retain the trail edge. The new trail should include seating. A water feature, marking the spot where a natural spring existed, will be the central component of a small interpretive area along this section of the Greenway. The spring was heavily used as a potable water source for most of the ships stationed in the harbour during the 1800s.

It is important that the Trans Canada Trail provide a sense of visual prominence when crossing Mill Lane and the road markings should be developed to appropriately demarcate the 3.0 m wide trail crossing on the roadway surface.

By reconfiguring the Alderney/Prince Albert/Portland intersection (as shown on **Figure 3.15** and more fully described in Section 3.3.2), an area varying from 3.5 to 6 m wide has been provided on the eastern side of Alderney Drive for the development of the multi-use trail. An additional 1.5 to 2 m wide strip has been provided on the western side of Alderney Drive for the future development of a sidewalk.

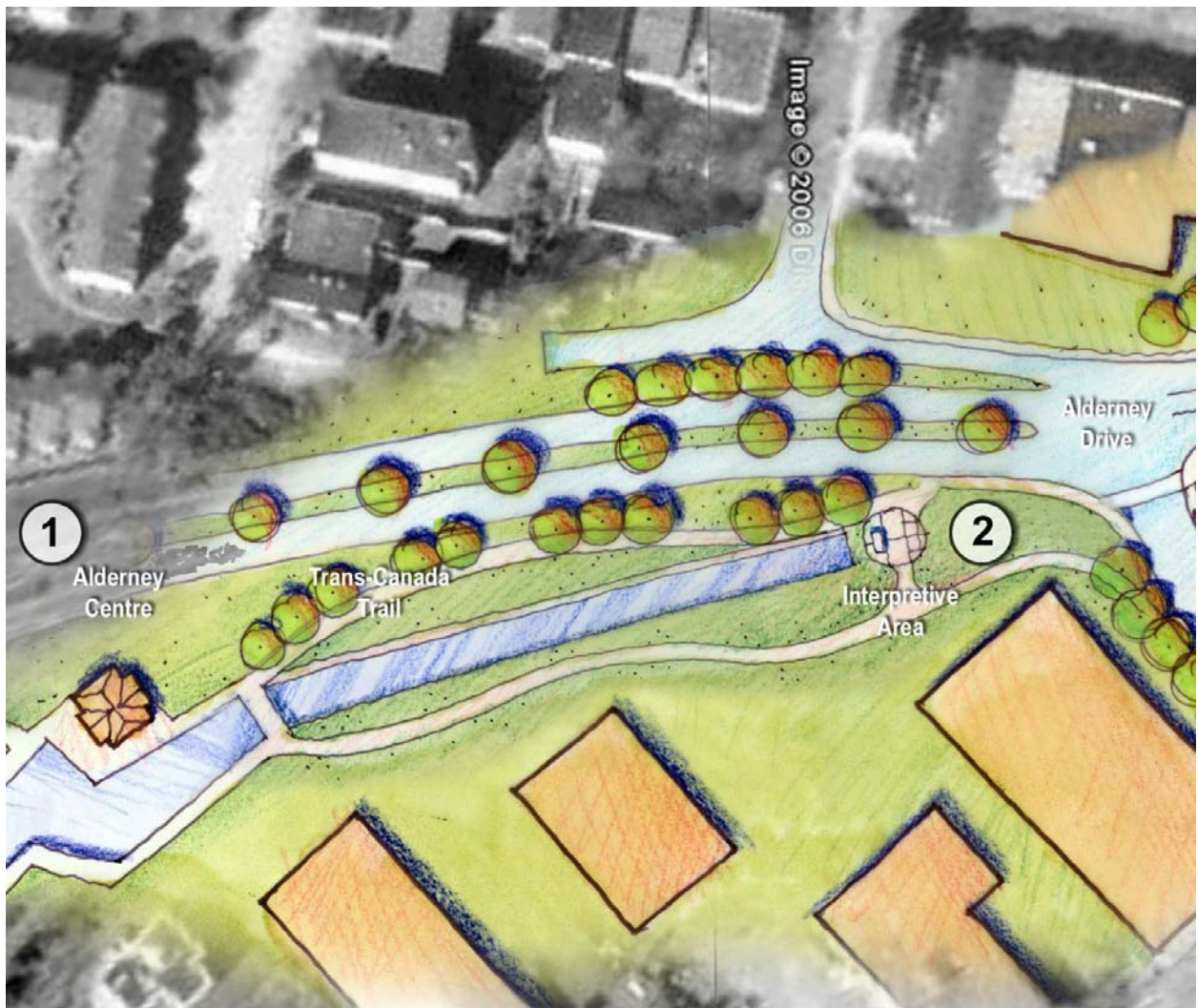


Figure 3.3: Site Area from Alderney Centre to Mill Lane

3.1.2 Alderney/Portland Intersection

The best route to cross this intersection is a question that has been studied before. Ekistics proposed similar layouts in their 2000 Portland Streetscape Study and 2002 Shubenacadie Canal Greenway Study. In 2002, SGE Ltd. offered three possible new configurations for this intersection. A technical drawing showing this project's preferred solution is illustrated in Figure 3.15.

As per Ekistics 2002 proposal, two roadway lanes on Prince Albert Road are removed to create space for the Trans Canada Trail and the day-lighting of the channel in the area. The additional area also provides space for the development of an urban plaza and a feature that will 'take-up the grade' required to make the day-lighted stream work north of this area. The day-lighted stream will fall approximately 5.0 m below the existing intersection elevation. This allows enough room for the culvert plus services, base course and asphalt. The final design of the culvert should be based on requirements that may be outlined in a fish passage study (see Section 3.1). The outfall should be granite-faced to ensure the congruency of materials along the Greenway and provide a pleasant appearance for users with a direct view of the structure.

The Stonemasons' plaza at the corner of Portland and Prince Albert is critical to the successful realization of the plan. It provides a destination and a visual linkage through the intersection from the trail along Alderney Drive beside Marine House. It will be apparent to first time users and tourists coming up from the waterfront that something interesting is happening across the road and it will lead them on to where they can see the boat cradle and extension of the trail along the inclined plane.

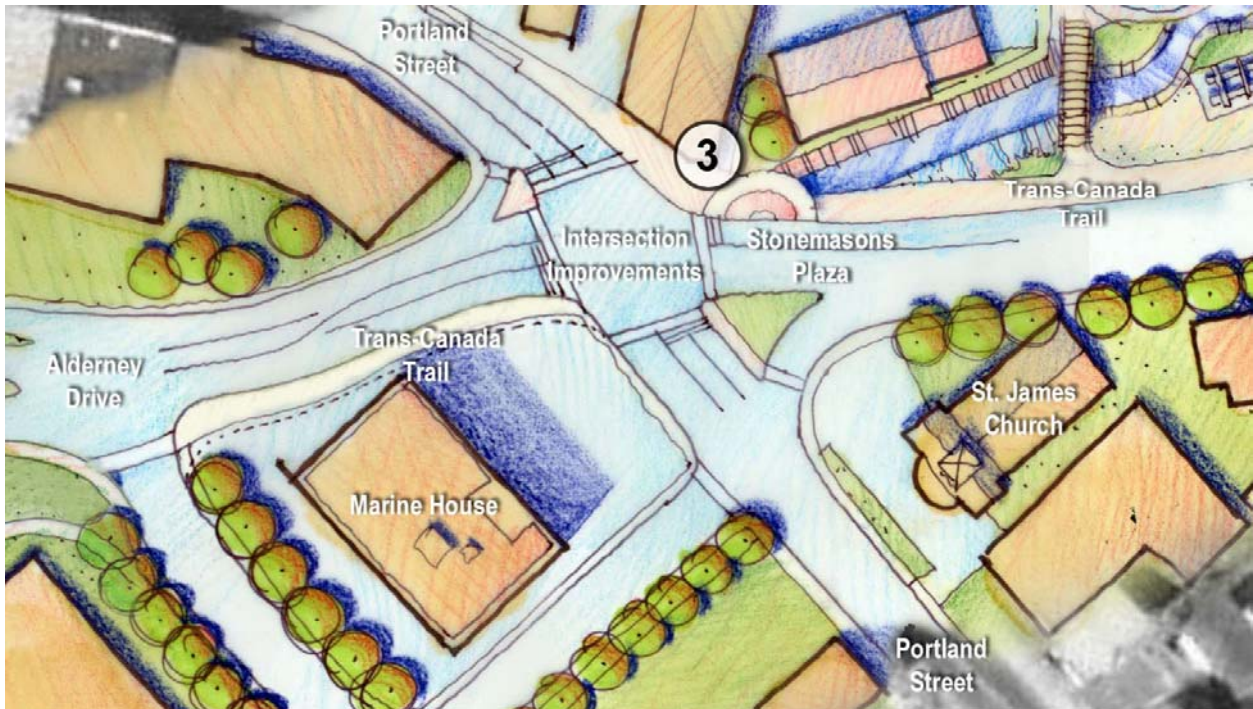


Figure 3.4: Site Area at Alderney/Portland/Prince Albert Intersection

In this plaza, a monument to the Irish and Scottish stonemasons could be developed using old canal blocks placed on end at roughly seating height. The names of the stonemasons (which are on record) could be sandblasted into the blocks around the plaza. A large bronze casting could be cast into the sidewalk overlaying the old canal route. This casting could include showing a full map of the 1856 canal across the province. One or two interpretive panels should be placed in the plaza looking north up the inclined plane.

3.1.3 The Pine Street Extension Area

Results of a preliminary hydraulic analysis of the stormwater flows indicate that portions of the 2.7 m. diameter stormwater pipe from Sullivan's Pond to the outfall into Dartmouth Cove can be day-lighted and a portion of the original Sawmill River restored. The plan proposes removal of the pipe from the Sobeys / Canal Greenway property boundary to the Alderney / Prince Albert / Portland intersection. Day-lighting the stream will provide a link to the history of the site, may be beneficial in terms of fish passage, will provide a significant open space amenity, and will re-establish views from the greenway through the channel and pipe to the waters at Dartmouth Cove. The exposure of the stream channel will remind users that the theme of the Greenway is water and that this is a waterside trail extending from the harbour up into the city.

During extreme storm events portions of the park may be inundated, but it is possible to create a channel of sufficient capacity to handle 100 year storm events. The stream channel geometry should be designed using natural channel design principles. While it will be necessary to create a retaining wall to accommodate the Pine Street extension cul-de-sac and to replicate a rock cut in narrower areas nearer the Alderney/Prince Albert/Portland intersection, the remainder of the channel should be engineered to look like an undisturbed stream as much as possible by incorporating sloping banks with a variety of planting. There remain some significant trees in this area that should be retained if possible during the detailed design stage. More detailed drawings of this area are provided in Figures 4.1 and 4.2. Given the restrictions on the remainder of the site, no other day-lighting of the culverted watercourse is proposed.

The concept as illustrated in **Figure 3.5** is to uncover the water (i.e. remove the storm pipe and day-light the stream) in this area. It is anticipated that a rock cut still exists between the Pine Street extension and the Alderney/Prince Albert/Portland intersection and that this could be exposed to be used as a channel through the area. Archaeological investigations of this manmade feature will be required to locate the cut and determine the best manner in which to reveal it. The reconfiguration and reduction of lanes on Prince Albert Road will provide room for the exposure of the cut.

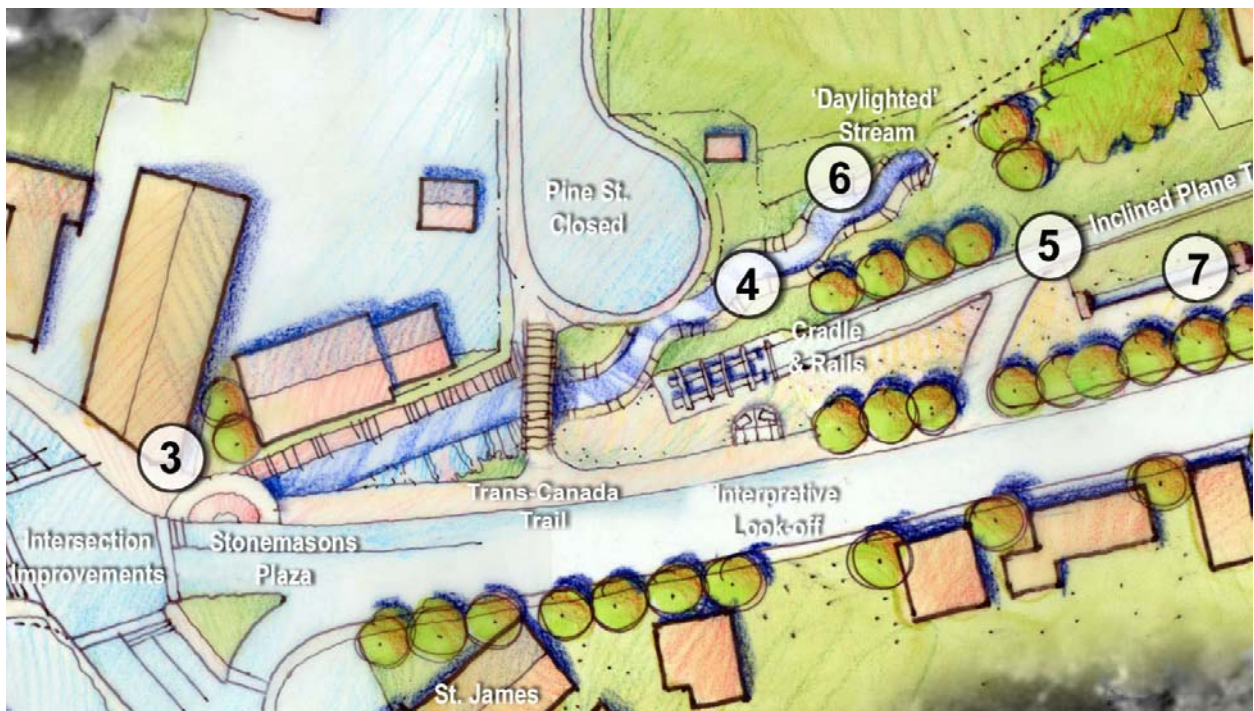


Figure 3.5: Site Area at Pine Street

Preliminary investigations indicate that it should be possible to adjust flows from Lake Charles to create constant flows down the Sawmill River. However, this will require further detailed investigation, perhaps as part of the fish passage study, to ensure that drainage to the Shubenacadie River north out of Lake Charles is not adversely affected. If it is not possible to ensure year round water flows through the channel, it is still appropriate to day-light the stream, however, the watercourse should be designed to still provide amenity without water in it during the dry summer months.

The section of the Pine Street extension that meets Prince Albert Road would be eliminated and replaced with a pedestrian bridge over the day-lighted stream. All properties in the area can be accessed off the cul-de-sac created in the area. The pedestrian bridge will provide significant views of the entire park and down Canal Street to McNabs Island. Interpretive viewstations should be located on the bridge. An existing water line under Pine Street will require relocation under the new pedestrian bridge. This is an urban site of the utmost importance and a high quality feature will create the required anchor for this end of Portland Street.

A recreated boat cradle is located on the southern end of the inclined plane trail near the Pine Street extension pedestrian bridge. Since the inclined plane trail is to approximately follow the slopes of the original plane, this cradle will be placed in a low area associated with the bottom of the inclined plane and the day-lighted stream below street level. Photos of the types of cradles used on the site are available and should be used as reference material during detailed design of the feature.

A look-off is located above the cradle to allow interpretation of the inclined plane and the cradle as integrated elements. Stairs lead from the lower level to street level allowing direct access back onto the Trans Canada Trail for people who have taken the lower route to look at the cradle.

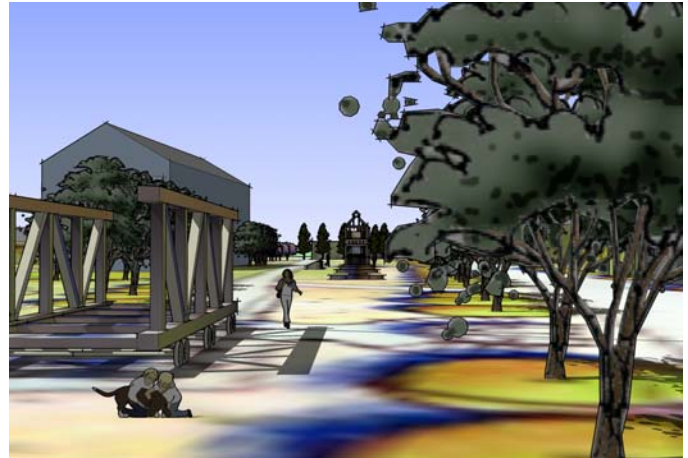


Figure 3.6: View from Pine Street Pedestrian Bridge Upstream to the North

3.1.4 Inclined Plane Site, Turbine Chamber Interpretive Feature, and Starr Manufacturing

Figure 3.7 shows the layout of this area. In addition to the Starr Manufacturing buildings that were demolished in the late 1990's, this portion of the site contains two major features which have been unapparent for years: the inclined plane, and the turbine chamber. The plan is to reveal and use the incline plane as the main trail alignment through the site. The surface of the incline will be paved to allow it, as a pathway, to act as the main linking feature through the site. The location of the rails, upon which the cradle used to run, are proposed to be marked in the path with a contrasting material like concrete pavers. This linear element will allow further interpretation of the function of the plane and will also act as a visual cue linking elements along the inclined plane. The trail will follow the elevation of the incline from Ochterloney Street down to the day-lighted portion of the river near the Pine Street extension. The trail will be quite low at this point providing views along the waterway through the culvert towards the harbour.



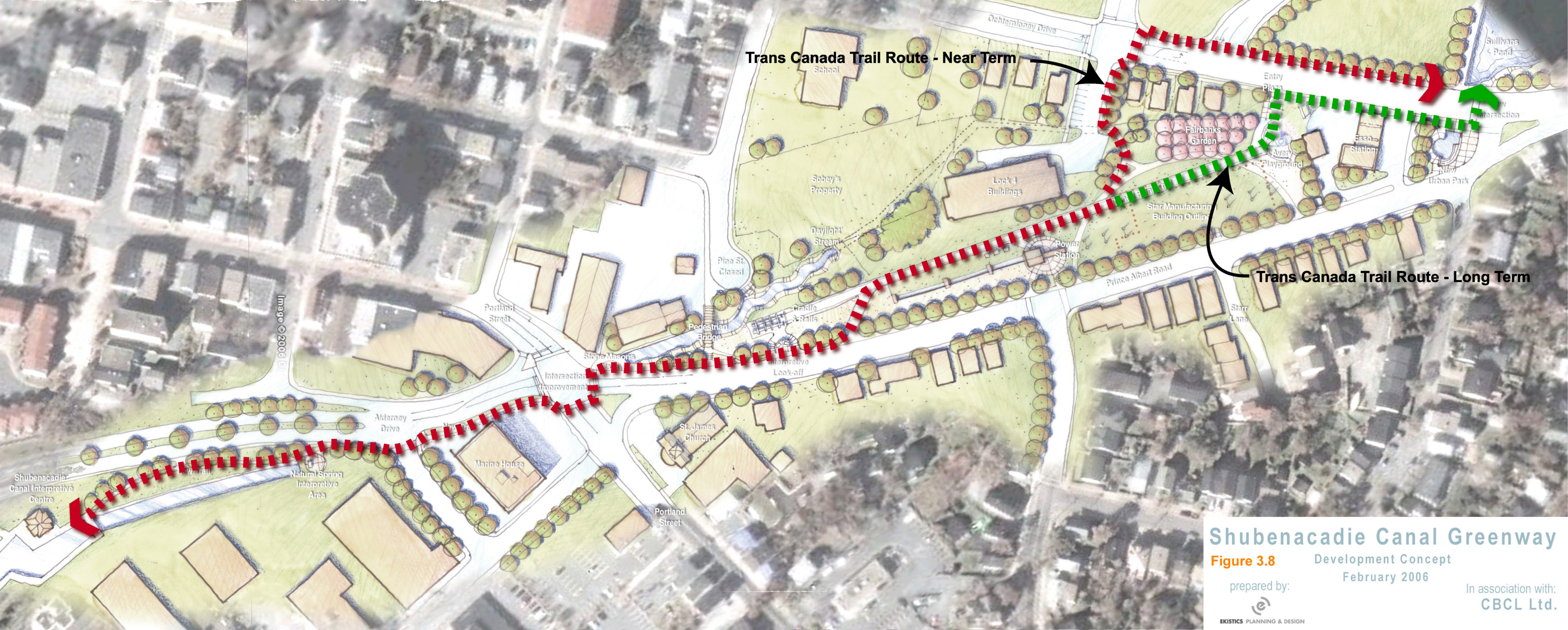
Figure 3.7: Central Site Area

The aboveground portion of the turbine chamber is proposed to be interpreted and associated infrastructure will be exposed or have interpretive features constructed to allow interpretation of how water power had been used on site to haul boats up the inclined plane and for other early manufacturing activities at the Starr factory. Some of the actual archaeological resources will remain buried for protection and preservation for possible study by future generations.

While the inclined plane will act as the main trail feature through the site, the Trans Canada Trail will only use a portion of it. In the short term, the Trans Canada Trail will enter the site from Maple Street on the west through the Lock 4 property (see **Figure 3.8**). From an intersection near the turbine chamber, the Trans Canada Trail then proceeds south down along the slope of the inclined plane until it veers eastwards at the end of the tail race so it can stay more level with Prince Albert Road making a more direct connection through for the Trail through the site.

The visual and physical opening of a connection between the end of Pleasant and Maple Streets has created a strong desire line between the two roads. This route should be formalized with the development of a hard surfaced path through the site connecting to the trail section through the Lock 4 property.

The turbine chamber site is at the fortunate location on axis with the visual extension of Maple Street and Pleasant Street. These streets do not cross the site, however pedestrian and cyclists should and will cross the site, passing this proposed interpretive feature. The frame of the turbine chamber powerhouse, whose overhead flume from Sullivan's Pond provided the power to lift boats up the inclined plane, is proposed



Trans Canada Trail Route - Near Term

Trans Canada Trail Route - Long Term

Shubenacadie Canal Greenway

Figure 3.8 Development Concept
February 2006

prepared by:
EKISTICS PLANNING & DESIGN

In association with:
CBCL Ltd.

to be interpreted through the construction of a pavilion as a central icon for the new urban park. A conceptual sketch of this feature is presented in **Figures 3.9 and 3.10**. The sketch shows the reconstruction of the powerhouse frame (which is well documented). Keeping the structure open framed will showcase some of the interesting joinery used in the past.

The overhead flume would be reconstructed with a simulated waterfall that would empty from the flume overhead into the turbine chamber, demonstrating the height of

the fall of water that powered the winch that pulled the boats up the inclined plane. The exact nature of the simulated waterfall will be determined in stage two of this project. The interpretation of this key

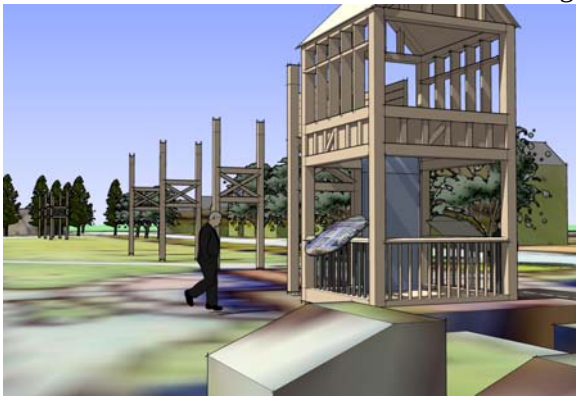


Figure 3.10: Perspective of Powerhouse Looking North

feature would provide a pivotal understanding of the workings of the marine railway. Because the Powerhouse was integrated into the frame of the Starr Manufacturing facility, the feature is the ideal link between these two important historic uses of the site and can be used to host interpretive panels for both.

While it is very desirable to expose the turbine chamber to allow interpretation, detailed information on the exact location and condition of the feature is not available at this time. It is therefore proposed that the chamber remain undisturbed and that the powerhouse frame be built upon floating cast in place interlocking concrete slabs that will not require underground disturbance. This type of structure will also allow the powerhouse frame and the slabs to be easily moved out of the way should opening of the turbine chamber be required. Should it be desirable to expose and interpret the turbine chamber in the future, detailed archaeological investigations should be undertaken first to provide detailed location information and instructions for preservation.

During demolition, timbers from an adjacent building were salvaged. However, these timbers are contaminated and their re-use on site is not considered appropriate. Nevertheless, they should be used to ensure the accuracy of the re-created structure.

The tailrace exiting the turbine chamber is currently buried in place and is in good condition. It is proposed to expose the tailrace along with some of the stone arches found along its length. Archaeological investigations should be completed to determine methods for preservation and if water

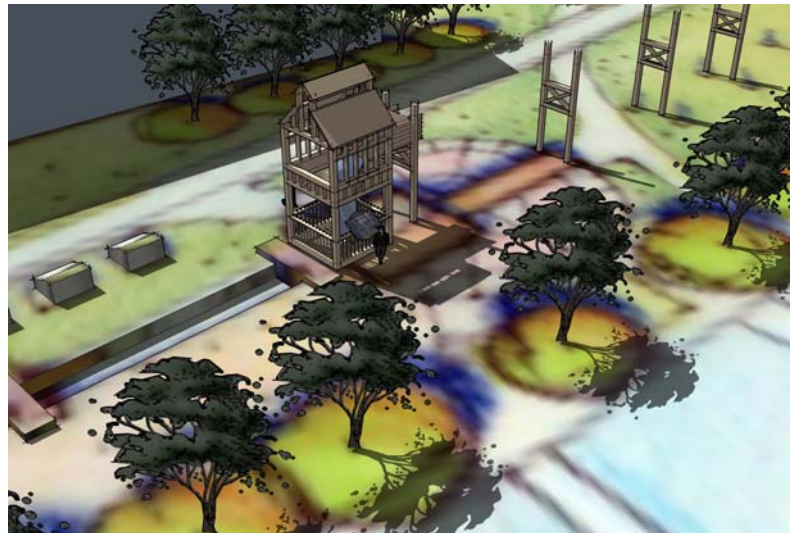


Figure 3.9: Aerial perspective of Power House

can be placed in the channel. This area would also be a good place to interpret some of the Starr Manufacturing artefacts using exterior displays. The displays could use drawings and historic photos to show the buildings and activities that used to be on site. They could also discuss the re-use of the turbine chamber as a power source for the manufacturing activities. This might also be an appropriate area to discuss the history of manufacturing on the site including the production of skates, nails, railway scabbards or sheath joints, nuts and bolts, pipes, etc. The description of these various activities would emphasize the layering of history and the adaptive re-use of the canal infrastructure.



Figure 3.11: Perspective of Powerhouse Looking South

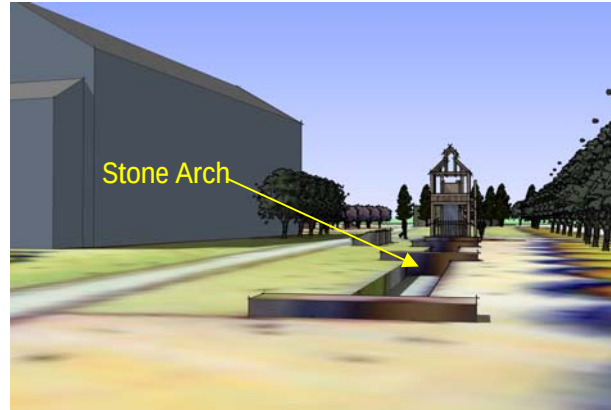


Figure 3.12: Looking North Along Tailrace to Powerhouse

At the northern end of the site, a boat themed adventure play structure, named after one of the canal boats, the Avery, is proposed. To allow the structure to operate as an interpretive feature as well as a playground, it should be in proportion to the simulated rails in the trail surface, about the same size as the original canal boat, and placed on axis with the inclined plane trail.

A small park entranceway should be constructed on Ochterloney as a trailhead to the inclined plane trail. The gateway will be adjacent to the adventure playground at the top of the incline plane. It is important to provide the park with a direct access to Ochterloney Street to give it a presence within the downtown Dartmouth area and to offer a visual connection between Sullivans pond and the Canal Greenway site. The proposed layout does not require adjustment to the Esso gas station signs. Any features installed in the gateway should be removable to allow for repair or replacement of the 2.7 metre storm water sewer underneath the area.

One of the Starr Manufacturing buildings is proposed to be marked on the ground by a series of low concrete markers that just jut out of the ground creating a dashed outline on the ground. The demarcation of a Starr building will allow the interpretation of the manufacturing history of the site, especially as the location of the Starr skate factory. The area enclosed by the building outline should be graded flat to accommodate to allow the possibility of an un-refrigerated community skating rink, operated by volunteers. A hosebib for flooding the area should be provided in the area to allow this facility to be developed, should the community come together to do so.

Fairbanks Grove, shown on the plan, would be a collection of 35 trees, with each tree representing a year it took to complete the Shubenacadie Canal. This grove of trees is named after Charles Fairbanks, an

engineer, who was hired to revise the original plans for the canal. He was directly responsible for the replacement of the locks on site with the inclined plane. Selection of smaller trees with spreading roots and placement in relation to the storm sewer pipe in the area will be required during detailed design to ensure that the tree roots do not negatively impact the performance of the pipe.

3.1.5 Prince Albert Road from the Pine Street Extension to Ochterloney

The eastern edge of the site is proposed to be redeveloped with a new curb, sidewalk and tree planting. The existing road width of 9.5 m. is sufficient to accommodate two lanes of traffic and one row of parallel parking on the park side of the street. The existing brick wall across from the Pleasant Street intersection should be retained as an artefact of the history of the place and should be redeveloped as a seating wall along the edge of the sidewalk, which will run at street level between the wall and the curb. On-street parking in the area should be sufficient to accommodate users visiting the park by car. No parking should be developed within the site.

3.1.6 Esso Station/Ochterloney Street

The tip of the Esso property at the intersection of Ochterloney and Prince Albert is proposed as another point of interest and link in the overall Greenway system. This intersection should be re-aligned to provide better visibility in both directions and to reduce the crossing width for the street (see Figure 3.16, more fully described in Section 3.3.3). The existing crosswalk in the area should remain to allow a convenient pedestrian/cyclist crossing.

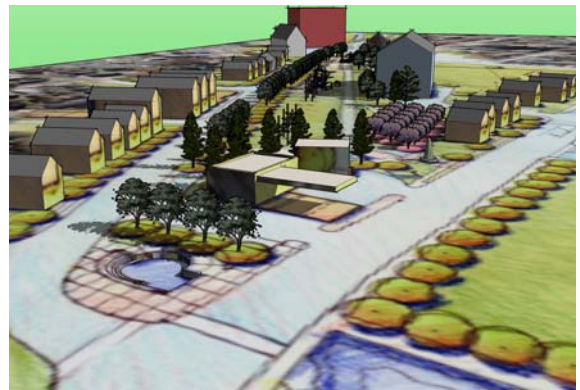


Figure 3.13: Aerial Perspective Looking South at Ochterloney/Prince Albert Intersection

Figure 3.14 shows a possible layout of this site. The old stone bridge built in the 1800s is still under the existing intersection. A portion of this historic structure could be revealed in the fashion of the Roman ruins of Paris. A hole could reveal parts of the bridge. The hole could be covered, or as in Paris, left open with simple interpretive signs. In fact, a portion of Sullivan's pond could be excavated to create a water feature in this new park triangle. This

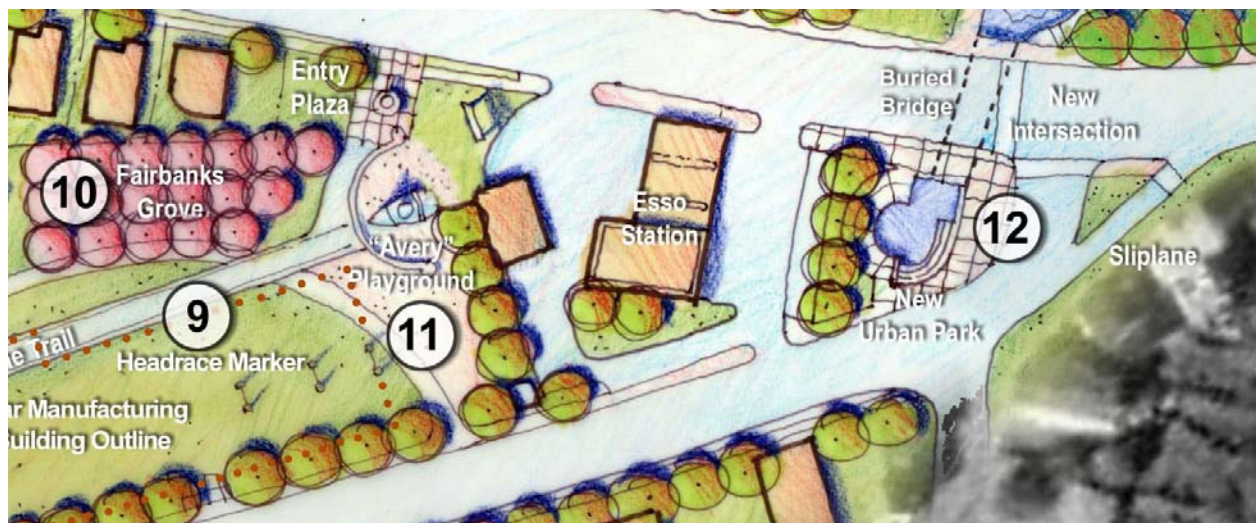


Figure 3.14: Site Area at Ochterloney/Prince Albert

would give some meaning to the bridge. It may be possible to include steps down into the water feature for a better view of the bridge structure.

The re-alignment of the intersection should not be done without archaeological investigations and detailed surveys to examine the quality of the buried bridge and locate it spatially. The final re-design of the intersection should be based on the investigation and survey.

The Imperial Oil property on which the Esso gas station is located is an important piece of property for the development of not only the Canal Greenway site, but also an integrated open space connection through Dartmouth from the harbourfront out to Shubie Park and beyond. The acquisition of this property, if it becomes available in the future, would allow for the creation of an uninterrupted open space link from the harbour through the developed urban core to the outskirts of the city. It is highly recommended that HRM seek to obtain this property.

3.1.7 Sobeys Property on the Pine Street Extension

While the acquisition of this property (the former Beazley Bowling Lanes) has been discussed in a number of meetings, it is not considered critical to the development of the site or as a part of an overall regional trail link. The development of a mixed use or multi-unit residential building that takes advantage of views and is of a quality to complement the park would be appropriate on the site. Such a privately developed building would be an asset to downtown Dartmouth and could assist the park by providing casual surveillance of the site. The site requires a development agreement to allow it to be developed. Any development agreement negotiated for the site should consider issues such as extensions to the day-lighted stream, making open space connections to the Greenvale School site and Ochterloney Street providing possible ground floor commercial opportunities to bring daytime activity to the site. The site development should allow continuation of the day-lighted stream and a pathway connection through the site to the Greenvale School site. As with the Lock 4 Condominium building, surface parking should be minimized.

As noted in Section 2.2.2, HRM should only purchase the Sobeys property, if it can be acquired at a reasonable price, if its purchase does not interfere with the purchase of the Imperial Oil property, and if HRM has a specific use in mind for the site. If HRM acquires the property, it would be an appropriate location for a building that could house an interpretation centre/museum or other related heritage function and/or an outdoor skating area. However, it is important to note that the Alderney Centre already exists near the harbour and that the Fairbanks Centre is located in Shubie Park. Both these centres are currently underutilized and careful consideration should be given before creating a third such building. Both these assets should be considered before any new structure is built.

3.2 Interpretive Program

Given the variety of events and activities that occurred here, this site is an ideal candidate for the development of an interpretive program that will explain the layers of history found on site using the many existing structures and artefacts and the new structures installed as part of the re-development of the site. It is recommended that an overall interpretive program be developed based on the use of water as the connecting theme. There are many stories that can be told including:

- the original watercourse in the area and its use by First Nations for transportation and fishing;
- the collection of water from the small spring in the area below Portland St. by ships stationed in the harbour in the 1800s;
- the Shubenacadie Canal including the locks, the inclined plane, the stonemasons and engineers involved in the design and building of the canal, the re-created cradle, the Avery canal boat re-created as a play structure, the turbine chamber;
- the manufacturing history of the site and the adaptive re-use of the turbine chamber;
- the development of the Starr skate;
- the site was the location of the first electrical generating plant in Dartmouth; and
- the alterations of the landscape as a result of transportation requirements and stormwater management techniques as demonstrated by the buried bridge under Ochterloney, the covered rock cut, the installation of the large stormwater sewer and its subsequent day-lighting.

It is the interweaving of these stories that makes the site especially significant and powerful as a special location in HRM.

3.3 Intersection Re-alignments

The layout drawings provided in this report are conceptual only. Preliminary design drawings of all selected intersection designs will be provided in stage 2 of this project. Appendix A provides additional information related to traffic and concept designs for the intersections.

3.3.1 The Pine Street Extension

It is deemed desirable to close the intersection of the Pine Street extension and Prince Albert Road to enhance the overall connectivity of the trail system.

While this intersection is not critical to the traffic patterns in the area, it does serve to draw traffic from other intersections in the area. The Pine Street extension currently serves as a route for vehicles to proceed to the Macdonald Bridge via Victoria Road. Closing the Pine Street extension will create higher turning movements at the Alderney/Portland/Prince Albert and Portland/Victoria intersections, as many of the vehicles that would turn on the Pine Street extension will now turn right on Portland Street from Prince Albert Road and then turn right on Victoria Road.

In order to determine the effects of closing the Pine Street extension, existing traffic count numbers were used to transfer the Pine Street extension traffic to the Alderney/Portland/Prince Albert intersection. It was assumed that all vehicles currently using the Pine Street extension would proceed to Portland Street via Prince Albert Road. Refer to the intersection sketches found in Appendix A for the morning and afternoon peak hours, with the Pine Street extension open and with the Pine Street extension closed.

Analysis of the intersection shows that the approach Levels of Service (LOS) are not changed for the Alderney/Portland/Prince Albert intersection in the morning peak or the afternoon peak. However, the overall intersection LOS does decline in the afternoon peak from a “B” to a “C”.

3.3.2 Alderney/Portland/Prince Albert

This intersection is a key node in downtown Dartmouth. Much of the traffic traveling to the downtown core or to the Macdonald Bridge passes through this intersection. With the small building set-back in the area, there is currently very little available space in which to accommodate the Trans Canada Trail. The primary focus of the investigation at this intersection involved the elimination of existing lanes in order to create spaces for the trail and associated spaces, such as the Stonemasons' Plaza and enlarged traffic islands that act as refuges for pedestrians and cyclists crossing the road.

The challenges that are encountered at this intersection are predominantly geometric in nature. Prince Albert Road currently intersects with Portland Street at a skewed angle (approximately 55 degrees) and is not aligned directly opposite Alderney Drive. With the objective of getting the trail on the east side of Alderney Drive, creating this space does not help to improve the alignment of the intersection.

In order to create the necessary space on the Prince Albert Road approach, eliminating the right turn lane was analyzed. The analysis demonstrated that the approach will operate at acceptable levels with a one-lane approach, even with the closure of the Pine Street extension (level of service 'B' in the AM peak). In order to analyze conservatively, it was assumed that all vehicles at the Pine/Prince Albert intersection would now utilize the Alderney/Portland/Prince Albert intersection.

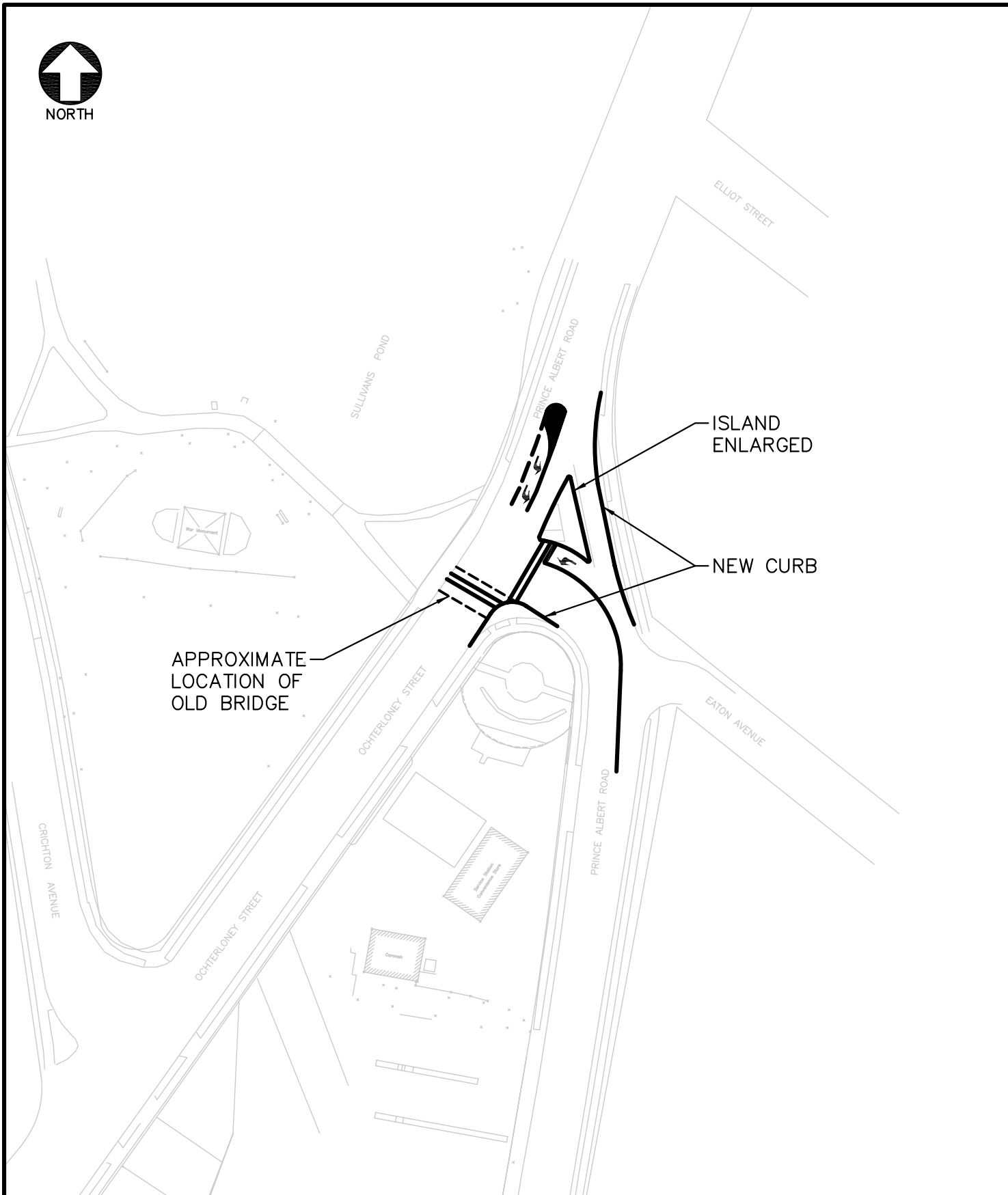
To create the required space on the Alderney Drive approach, the cross section at the intersection must be reduced. Currently, the approach is comprised of a four-lane cross section (plus a center median). The intersection can operate at a high level of service with a three-lane cross section at the intersection. It is important to maintain separate lanes for the northbound traffic (right turning and through/left turning), as well as the left turn bay on Alderney Drive to access Mill Lane. Trucks must be accommodated in the intersection in most directions; therefore curb radii must be kept to their maximum.

The Marine Slips located just south of the study area are under application for the development of approximately 1,100 units. It is anticipated that most of the vehicular traffic generated by this development at peak times will leave or access the site from the south along Alderney or due west through downtown Dartmouth to access downtown Halifax or the Burnside Industrial Park. Off peak traffic is likely to head north along Prince Albert or through downtown to Victoria and Woodland to access the Dartmouth Crossing development and Micmac Mall at the Circumferential Highway / Highway 118 area. With the relocation of Wal-Mart and Home Depot from the Circumferential Highway/ Portland Street area to Dartmouth Crossing, little traffic is anticipated to head west out along Portland.

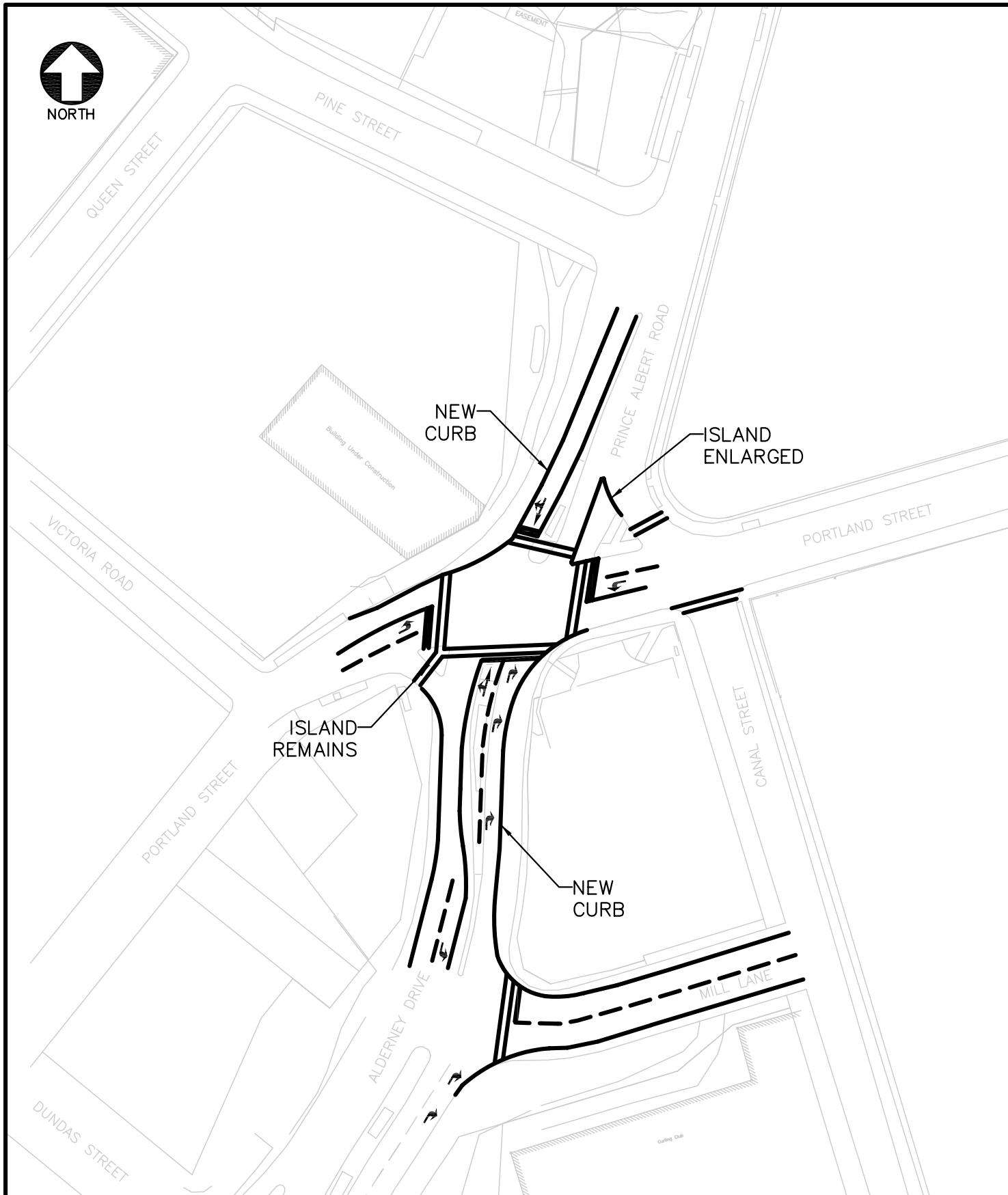
Figure 3.15 illustrates the preferred option for the reconfiguration of the intersection. Other alternatives that were investigated are shown in Appendix A. It provides a wide space on the eastern side of Alderney Drive for the development of a multi-use trail and also allows for the creation of a sidewalk along the western side of the road.

3.3.3 Prince Albert/Ochterloney

Figure 3.16 illustrates the proposed layout of the Prince Albert/Ochterloney intersection. The intention is to attempt to "tighten up" this intersection by reducing the width of Prince Albert Road at the intersection.



Date 06-04-25	Scale 1:1000	Designed MSM	Drawn MJM	Checked DNB	Approved GS	Contract 051232
CBCL CBCL LIMITED Consulting Engineers ISO 9001 CERTIFIED		HALIFAX REGIONAL MUNICIPALITY		CANAL GREENWAY STUDY		Figure 3.16
				INTERSECTION MODIFICATIONS PRINCE ALBERT RD/OCHTERLONEY ST		



Date 06-04-25	Scale 1:1000	Designed MSM	Drawn MJM	Checked DNB	Approved GS	Contract 051232
CBCL CBCL LIMITED Consulting Engineers ISO 9001 CERTIFIED		HALIFAX REGIONAL MUNICIPALITY		CANAL GREENWAY STUDY		Figure 3.15
				INTERSECTION MODIFICATIONS ALDERNEY DR/PRINCE ALBERT RD/PORTLAND ST PREFERRED SOLUTION		

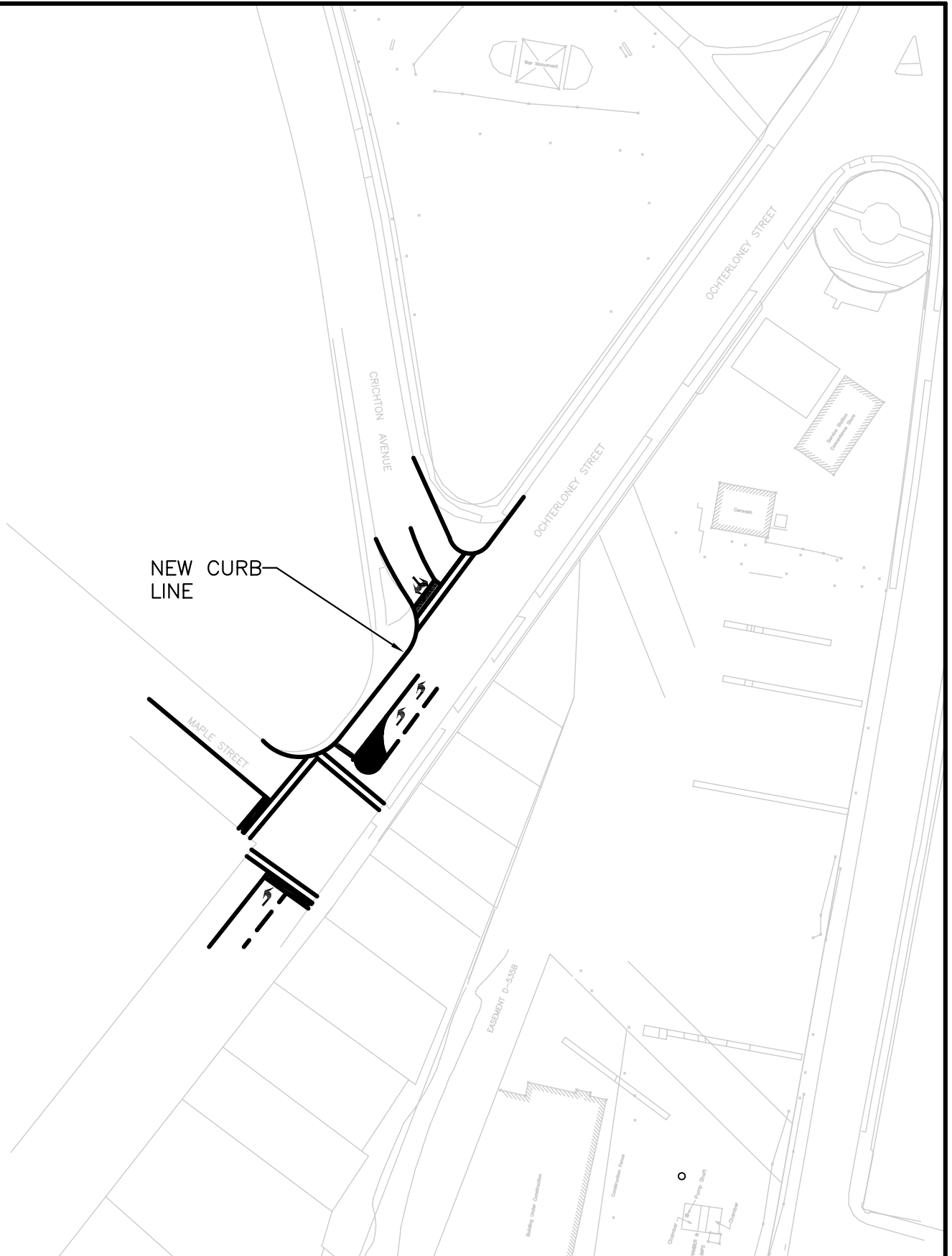
Currently, there are two, two-way approaches on Prince Albert Road, one to/from the north and one to/from the south. The creation of a more “conventional”, tee intersection would create a safer environment for vehicles and pedestrians. The intersection needs to accommodate truck traffic because trucks can legally access any intersection when in local service. With the traffic volumes that exist at this intersection in the peak hours, dedicated left and right turning lanes should remain. The changes should not significantly affect the level of service at the intersection.

3.3.4 Ochterloney/Crichton

Similar to the Prince Albert/Ochterloney intersection, the opportunity to tighten up this intersection is the primary goal. The throat width of Crichton is quite wide (approximately 19 m), primarily to accommodate Metro Transit vehicles. Being a skewed intersection, it is necessary to have wider approach lane on Crichton, but there is opportunity to reduce the crossing length on Crichton by creating larger pedestrian landings at both corners.

Figure 3.17 illustrates a proposed reconfiguration of this intersection. The throat width may be reduced to approximately 15 m and still provide comfortable turning space for transit vehicles. The traffic level of service will not be significantly impacted by the changes at the intersection.

Consideration was given to the closure of this intersection, however, its importance as a transit route, and the presence of various residential and other properties, did not make closure a reasonable option at this time.



Date 06-04-25	Scale 1:1000	Designed MSM	Drawn MJM	Checked DNB	Approved GS	Contract 051232
CBCL CBCL LIMITED Consulting Engineers ISO 9001 CERTIFIED		HALIFAX REGIONAL MUNICIPALITY		CANAL GREENWAY STUDY		Figure 3.17
				INTERSECTION MODIFICATIONS CRICHTON AVE/OCHTERLONEY ST		

Chapter 4 Implementation

4.1 Conceptual Grading

Major changes to the existing grades on site will be required to recreate the slope of the inclined plane and day-light a portion of the Sawmill River and the tail race. A conceptual grading plan was prepared for the site to determine how much potentially contaminated material could be retained on site (see **Figures 4.1** and **4.2**). The excavation of the marine railway basin upstream of the proposed pedestrian bridge at Pine Street as per the master plan will generate approximately 3,000 cubic metres of contaminated soil assuming that all soils are polluted to the proposed excavated depths beneath the areas outlined in Jacques Whitford *RBCA Tier III Risk Assessment Former Starr Manufacturing Works Ltd. (Project No. 14930)* report.

Section CC on Figure 4.2 is a cross section that illustrates the grading of the northern end of the site up from the sidewalk at a 3h:1v slope to raise the soil in the area by 0.6 metres, and extending the elevation of the inclined plane across the site to the western property boundary where it drops down to meet grade. Allowing for the re-utilization of the top half of the existing cap in the area, this section will allow for the utilization of approximately 1,300 cubic metres of material. Building a small mound immediately north of the storm sewer outlet and the Lock 4 Condominiums could accommodate approximately 500 cubic metres of contaminated fill.

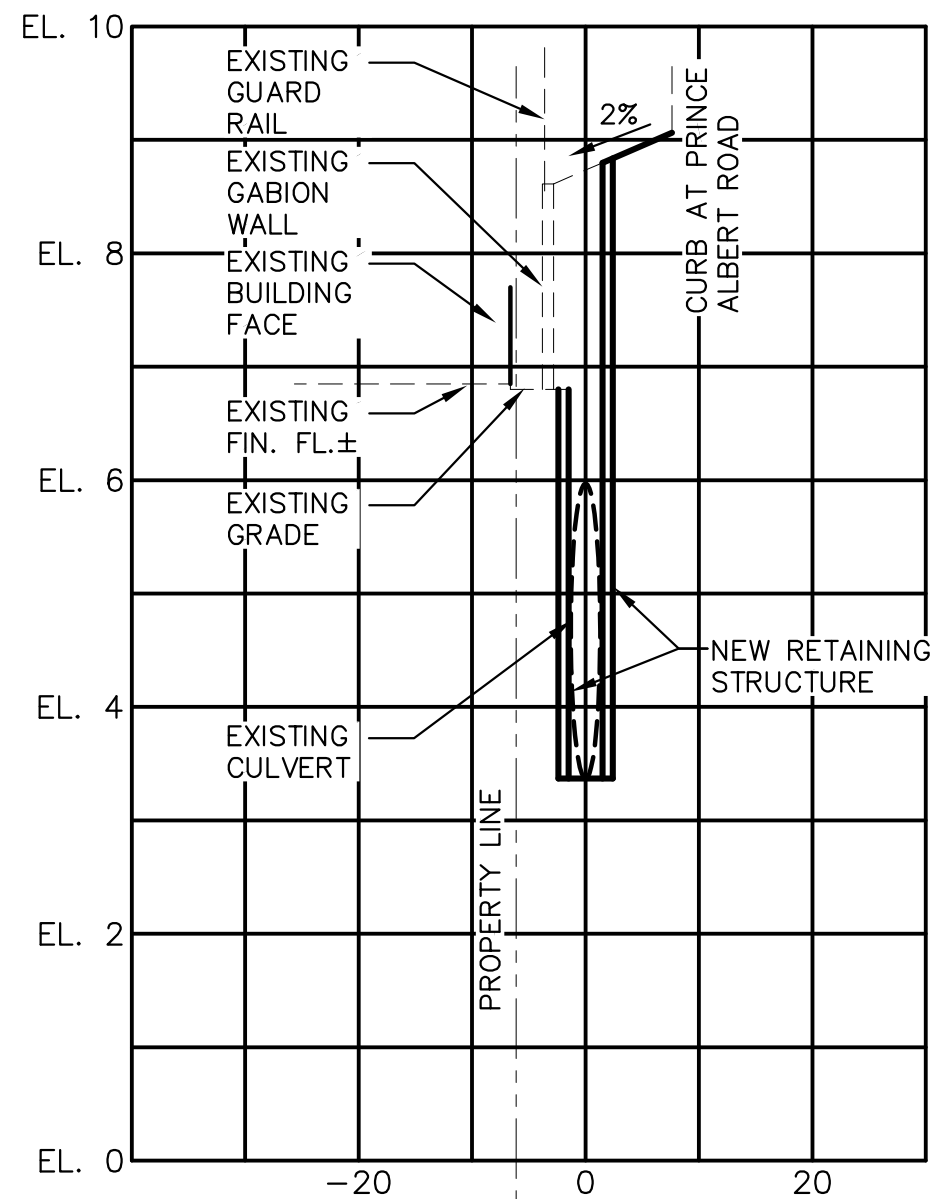
The required grading to accommodate the day-lighted stream and marine railway basin will require the removal of approximately 1,200 cubic metres ($3,000 \text{ m}^3 - 1,300 \text{ m}^3 - 500 \text{ m}^3$) of contaminated soil off site. These soils may cost from \$200.00 to \$600.00 per cubic metre to dispose of off site depending on the types and levels of contamination. Therefore, prior to detailed design, comprehensive investigations to determine the exact three dimensional extents of the contamination should be undertaken. Detailed grading of the site should be carefully done to minimize cut amounts and maximize fill quantities while still creating the desired effect of the inclined plane crossing through the site. The detail design might also consider moving less contaminated soils, which can be disposed of less expensively, off site to create areas on site where more contaminated soils can be placed. Removal of highly contaminated soils off site will increase the cost of development and could make day-lighting of the stream more difficult to achieve.

The excavation of the channel downstream of the pedestrian bridge at Pine Street will produce about 342 cubic metres of material, which is assumed to be clean imported fill over the storm sewer pipe.

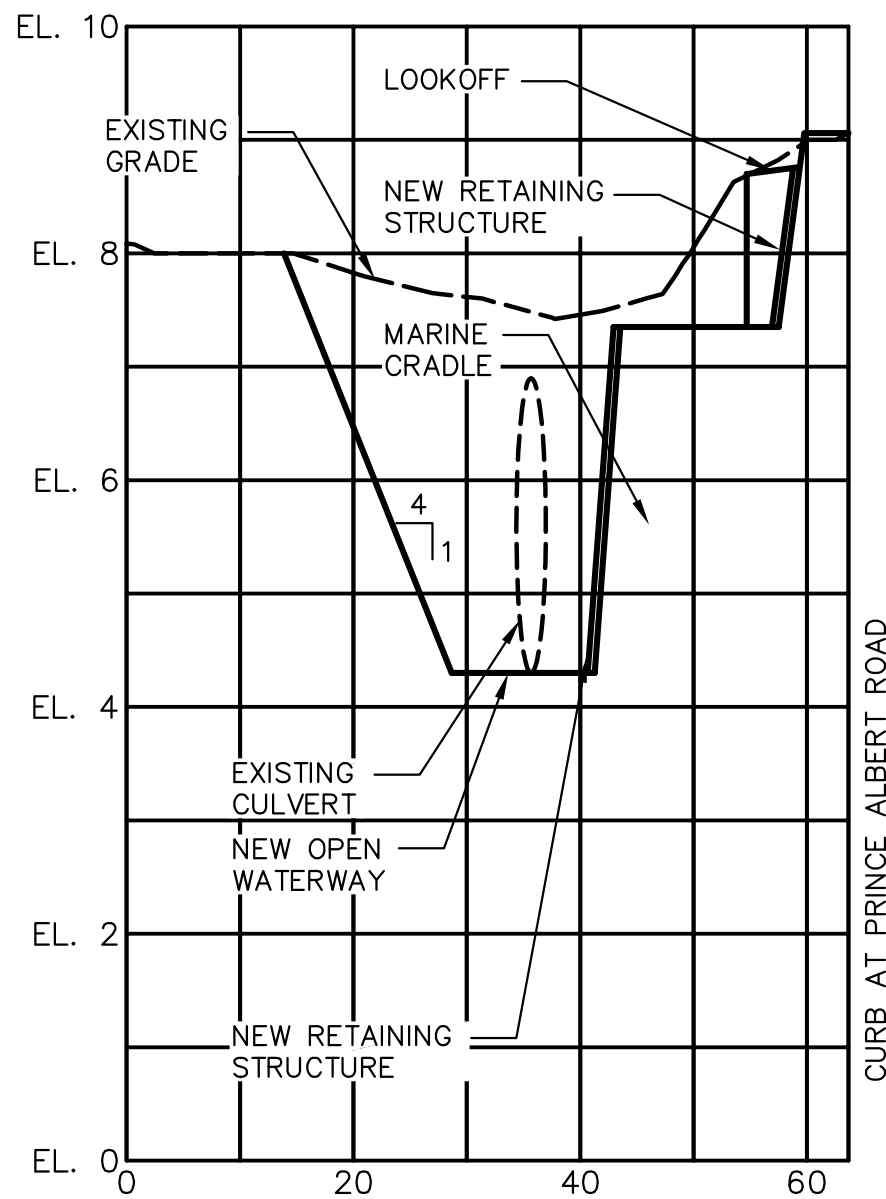
4.2 Scheduling of Works

Many departments within HRM will be responsible for the variety of work required to create a linear heritage park in the area. The attached dependency chart (see **Figure 4.3**) illustrates the required work elements laid out sequentially within an optimal program, showing which elements must be undertaken first so that others may follow without disturbance of previous works. The redline represents the critical path denoting the items, which cannot be delayed without affecting the completion of the project. Each work element has an estimate of time required for completion and a budget attached. The numbers

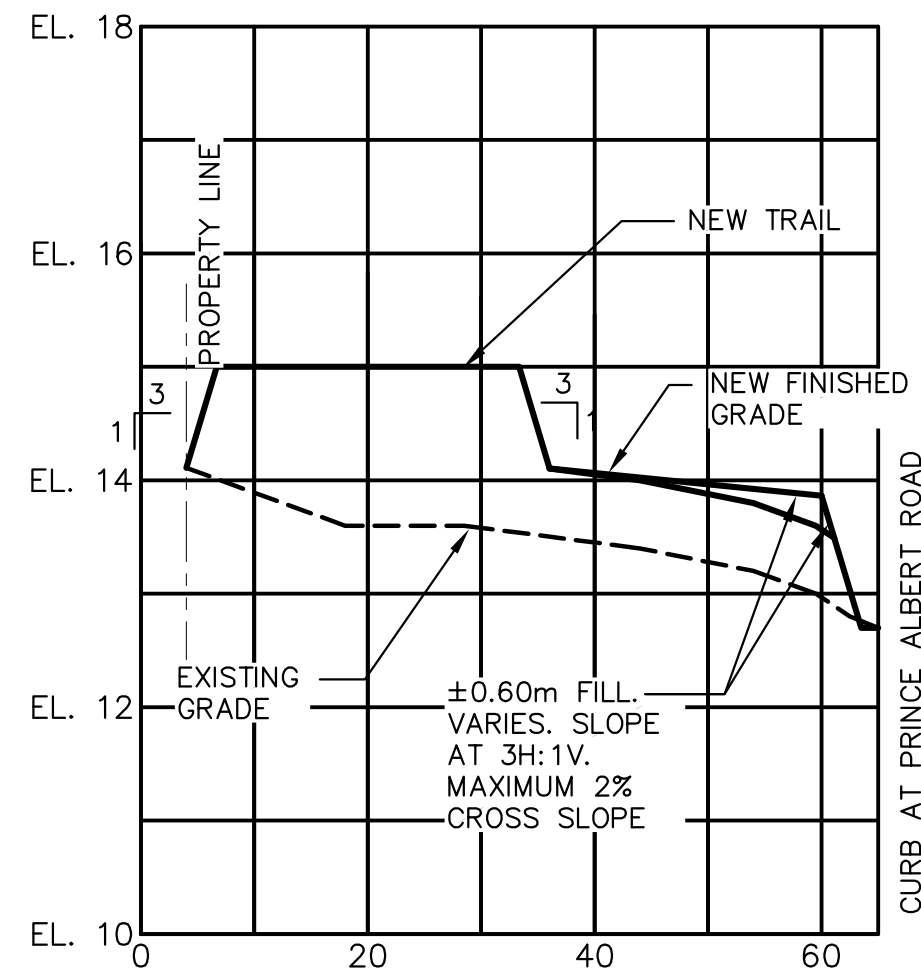
DRAWING FILENAME: 051232_50.dwg LAYOUT NAME: 4.2PDF DATE: May 25, 2006 9:14am CAD OPERATOR: jasonm



AA
4.1 **SECTION—** CANAL WAY AT CONDOS
SCALE H=1:750 V=1:75

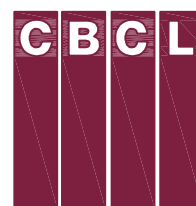


BB
4.1 **SECTION—** INCLINE PLANE AT 0+000
SCALE H=1:750 V=1:75



CC
4.1 **SECTION—** INCLINE PLANE AT 0+230
SCALE H=1:750 V=1:75

CONCEPTUAL ONLY
NOT FOR CONSTRUCTION



CBCL LIMITED
Consulting Engineers
ISO 9001 CERTIFIED

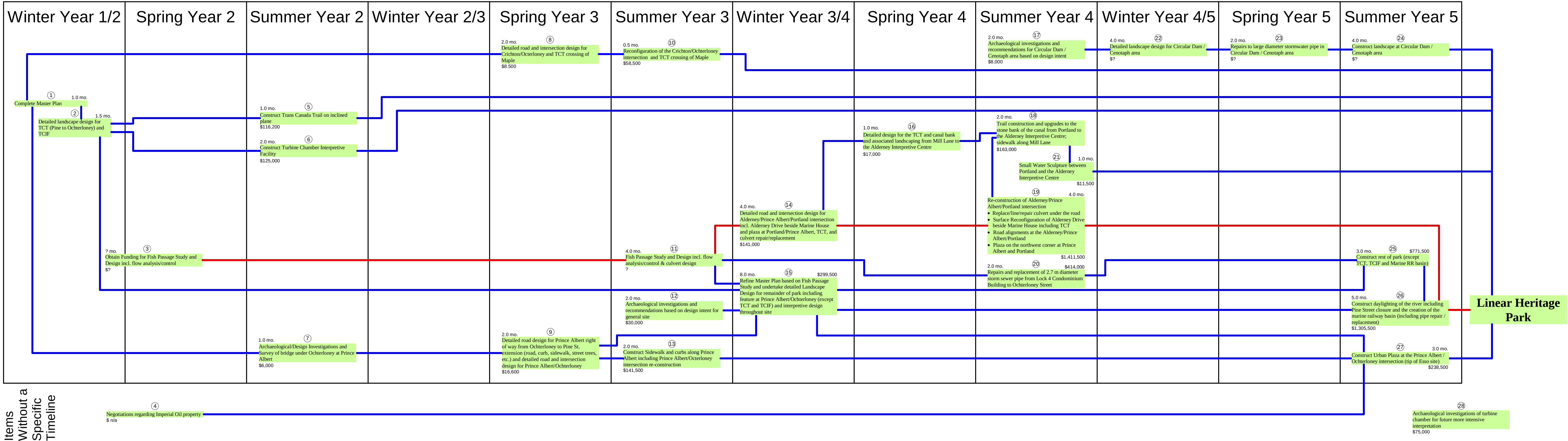
Date 06/03/06	Scale H 1:500 V 1:50	Designed C.K.	Drawn J.R.M.	Contract 051232
------------------	-------------------------	------------------	-----------------	--------------------

CANAL GREENWAY STUDY

CONCEPTUAL
CROSS SECTIONS

FIGURE

4.2



associated with the work elements allow reference to the opinion of probable costs and the assignment of primary and secondary responsibilities for implementation.

The chart illustrates the shortest time in which the project could realistically be completed if budget amounts are fully available when needed to complete the work items. Unfortunately, the budgets for some items are outside the control of HRM. In addition, financial realities within HRM may mean that money must be acquired over a longer period delaying completion of certain work items and their dependent items.

Figure 4.4 shows the phasing of development based on the dependency chart. This chart and the related opinion of probable costs are tools that HRM can use to program budgets and construction works to ensure the smoothest possible implementation of the project.

The dependency chart includes some timings for work at the circular dam / Cenotaph area at Sullivans Pond (items 17, 22, 23, and 24). This work should be the subject of future studies.

4.3 Opinion of Probable Costs

Figure 4.5 provides a detailed opinion of probable costs for the development of the site and denotes the departments within HRM that are primarily responsible and which other departments should be consulted for implementation of individual work items. These are preliminary estimates only, and are quoted in 2006 dollars. All work items should be fully scoped and have more accurate estimates prepared prior to submission for budgetary purposes or construction.

Development Concept
December 2005

prepared by

In association with
CBCL Ltd.

Construction Items 6,7,8
Dependent Items 1,2,3,4,5

Construction Items 12,15
Dependent Items 9,10,11

Construction Items 20,21,23
Dependent Items 13,16,18

Construction Items 26,27,28,29
Dependent Items 14,17,19,22,24,25

Canal Greenway
Opinion of Probable Costs

Figure 4.5

CBCL Project No. 051232

Date: 24 May 2006

Dependency Chart No.	Item	Amount	Unit	Cost/Unit	Subtotal	Extension	Const. & Contingency	Fees	Primary Responsibility	In Consultation with
1	Complete Master Plan							n/a		
2	Detailed Design for Trans Canada Trail and Turbine Chamber Interpretive Feature							n/a		
3	Obtain Funding for Fish Passage Study							n/a	EMS? Sawmill Riv?	Cap Dist
4	Negotiations Regarding Imperial Oil Property							n/a	RPAM	Cap Dist
5	Construct Trans Canada Trail Development Through Site								Cap Dist	
	Fill and Grading to Recreate Inclined Plane	1,800	cubic metre	15	27,000					
	Asphalt Paving	900	square metre	55	49,500					
	Partial Pedestrian Lighting	7	each	3,500	24,500					
					Subtotal	101,000				
					Contingency	15%				
						15,150				
						Item Total	116,150			
6	Construct Turbine Chamber Interpretive Pavillion								Cap Dist	
	Floating Concrete Slab	1	lump sum	25,000	25,000					
	New Wooden Structure	1	lump sum	15,000	15,000					
	Interpretive Panels	5	each	3,000	15,000					
	Lighting inside Chamber	1	lump sum	5,000	5,000					
	General Lighting	1	lump sum	5,000	5,000					
	Electrical Panels/Enclosure	1	lump sum	4,000	4,000					
	Associated Paved Paths	150	linear metres	158	23,625					
	Planting, incl. Topsoil and Fine Grading	200	square metre	80	16,000					
						108,625				
					Contingency	15%				
						16,294				
						Item Total	124,919			
7	Bridge at Prince Albert/Ochterloney								Canal Comm	Cap Dist?
	Archaeological/Design Investigations and Survey							6,000		
8	Redesign of Crichton / Ochterloney Intersection and TCT Crossing of Maple (see Item 10)								Des Serv	Cap Dist
	Design					5,849				
	Additional Survey					2,500				
						Item Total		8,349		
9	Design of Prince Albert Redevelopment Including Intersection at Ochterloney (see Item 13)								Des Serv	Cap Dist
	Design and Survey					14,134				
	Additional Survey					2,500				
						Item Total		16,634		

Dependency Chart No.	Item	Amount	Unit	Cost/Unit	Subtotal	Extension	Const. & Contingency	Fees	Primary Responsibility	In Consultation with
10	Redevelopment of Ochterloney / Crichton Intersection and Crossing of Maple								Des Serv	Park Plan, Traff Trans, Cap Dist
	Demolition of Existing Road, Curb, etc.	1	lump sum	3,000	3,000					
	Traffic Re-Routing and Control	1	lump sum	2,500	2,500					
	Reinstatement of Curb	90	linear metre	80	7,200					
	Reinstatement of Pavement	100	square metre	50	5,000					
	Reinstatement of Catchbasins	2	each	2,500	5,000					
	Reinstatement of Traffic Signs	1	lump sum	2,500	2,500					
	Concrete Sidewalk	80	linear metre	80	6,400					
	Painting Trans Canada Trail Crossing of Road	510	square metre	30	15,300					
	Painting of Lanes and Pedestrian Crossings	200	linear metre	15	3,000					
	Reinstatement of Turf	120	square metre	8	960					
						50,860				
				Contingency	15%	7,629				
						Item Total	58,489			
11	Fish Passage Study including Flow Control							?	Sawmill Riv? EMS?	
12	General Archaeological Investigations					20,000			Canal Comm	
	South of Lock 4 Condominiums					10,000				
	North of Lock 4 Condominiums (based on concept of showing layout of walls on surface)					Item Total		30,000		
13	Redevelopment of Prince Albert including Interseccion at Ochterloney								Cap dist	Des Serv, Traff Trans
	Demolition of Existing Road, Curb, etc.	1	lump sum	5,000	5,000					
	Traffic Re-Routing and Control	1	lump sum	2,500	2,500					
	Redevelopment of Curb along Prince Albert	340	linear metre	80	27,200					
	Sidewalk along Prince Albert	510	square metre	80	40,800					
	Reinstatement of Curb	80	linear metre	80	6,400					
	Reinstatement of Pavement	100	square metre	50	5,000					
	Reinstatement of Catchbasins	2	each	2,500	5,000					
	Reinstatement of Traffic Signs	1	lump sum	3,000	3,000					
	Concrete Sidewalk	60	linear metre	80	4,800					
	Catchbasins	4	each	2,500	10,000					
	Painting of Lanes and Pesestrian Crossings	80	linear metre	15	1,200					
	Reinstatement of Turf/additional Planting	300	square metre	40	12,000					
						122,900				
				Contingency	15%	18,435				
						Item Total	141,335			
14	Redesign of Alderney/Portland/Prince Albert Intersection (see Item 19)							140,657	Traff Trans (AT Plan)	Park Plan, Cap Dist
15	Refine Master Plan and Undertake Detailed landscape design for remainder of park (except TCT and TCIF) including interpretive design								Cap Dist	All Steering Committee
	Daylighting of Stream (see Item 26a)					56,852				
	Closure of Pine Street Extension (see Item 26b)					18,101				
	Better Determine Quantity of Contaminated Soil and Disposal Options incl. Completion of Risk Assessment for Construction Worker					62,000				
	Development of Marine Railroad Basin (see Item 26c)					46,890				
	Exposure of Tail Race (including Survey) (see Item 26d)					9,797				
	Entry Plaza at Ochterloney and Esso Property (see Item 25b)					6,078				
	New Urban Plaza at Prince Albert / Ochterloney (see Item 27)					23,440				
	Other Park Elements (see Item 25a)					59,076				
	Interpretive Design of Park (see Item 25c)					17,250				
						Item Total		299,483		Heritage
16	Design of Interpretive Centre to Mill Lane								Cap Dist	Park Plan
	Trail and Related Items (see Item 18)					15,706				
	Small Water Sculpture between Portland and the Alderney Interpretive Centre (see Item 21)					1,150				
						Item Total		16,856		
17	Archaeologcial Investigations and Monitoring of Circular Dam at Sullivan's Pond							8,000	Canal Comm	

Dependency Chart No.	Item	Amount	Unit	Cost/Unit	Subtotal	Extension	Const. & Contingency	Fees	Primary Responsibility	In Consultation with
18	Interpretive Centre to Mill Lane								Cap Dist	Park Plan
	Trans Canada Trail	510	square metre	105	53,550					
	Reconstruction of Canal Bank	200	linear metre	150	30,000					
	Grading	1,020	cubic metres	15	15,300					
	Removal of Guard Rail	1	lump sum	500	500					
	Concrete Sidewalk along Mill Lane	70	linear metre	80	5,600					
	Painting for Trans Canada Trail Crossing of Mill Lane	54	square metre	30	1,620					
	Demolitions and Reinstatements	1	lump sum	30,000	30,000					
						136,570				
						Design and Contingency	15%	20,486		
						Archaeological Assessment and Monitoring		6,000		
						Item Total	163,056			
19	Redevelopment of Alderney/Portland/Prince Albert Intersection								Traff Trans	Cap Dist, Park Plan
	Installation of new culvert (worst case)	185	linear metre	4,000	740,000				EMS	
	Development of Stone Face for Inlet and Outfall	1	lump sum	5,000	5,000					
	Demolition of Existing Road, Curb, etc.	1	lump sum	2,000	2,000					
	Traffic Re-Routing and Control	1	lump sum	10,000	10,000					
	Reinstatement of Curb	350	linear metre	80	28,000					
	Reinstatement of Pavement	2,250	square metre	50	112,500					
	Reinstatement of Catchbasins	8	item	2,500	20,000					
	Replacement of Traffic Lights	1	lump sum	150,000	150,000					
	Painting Trans Canada Trail Crossing of Road	120	square metre	30	3,600					
	Pavement Markings	75	linear metre	20	1,500					
	Brick Paving for Plaza	100	square metre	105	10,500					
	Allowance for Art in Plaza	1	lump sum	100,000	100,000					
	Benches	8	each	1,200	9,600					
	Bins	3	each	800	2,400					
	Special Street/Pedestrian Lighting	8	each	3,500	28,000					
						1,223,100				
						Contingency	15%	183,465		
						Subtotal		1,406,565		
						Archaeological Monitoring		5,000		
						Item Total	1,411,565			
20	Repair / Replacement of Pipe at north end of Site (worst case)								EMS	Cap Dist, Park Plan
		90	linear metre	4,000	360,000					
						360,000				
						Contingency	15%	54,000		
						Item Total	414,000			
21	Small Water Sculpture between Portland and the Alderney Interpretive Centre								Cap Dist	
	Construction	1	lumpsum	10,000	10,000					
						10,000				
						Design and Contingency	15%	1,500		
						Item Total	11,500			
22	Redesign of Circular Dam / Cenotaph Area at Sullivan's Pond (see Item 24)								? Cap Dist or Park Plan	
23	Repairs to large diameter stormwater pipe in Circular Dam / Cenotaph area								? EMS	
24	Redevelopment of Circular Dam / Cenotaph Area at Sullivan's Pond								? Cap Dist or Park Plan	

Dependency Chart No.	Item	Amount	Unit	Cost/Unit	Subtotal	Extension	Const. & Contingency	Fees	Primary Responsibility	In Consultation with
25	Construct Other Park Elements									
	a OtherPark Elements								Park Plan	
	Boat Themed Playground	1	lump sum	50,000	50,000					
	Head Race Markers	6	each	5,000	30,000					
	Grove Planting in Fairbanks Garden (35 trees)	35	each	500	17,500					
	Marking of Starr Manufacturing Building	1	lump sum	25,000	25,000					
	Lighting of Inclined Plane and Trans Canada Trail	20	each	3,500	70,000					
	Other Paths (incl. lighting)	160	linear metre	158	25,201					
	Benches	20	each	1,200	24,000					
	Bins	10	each	800	8,000					
	Turf	11,250	square metre	8	90,000					
	Tree and Shrub Planting	2,900	square metre	60	174,000					
						513,701				
						5,000				
						Contingency 15%				
						Subtotal				
						595,756				
	b Entry Plaza at Ochterloney and Esso Property								Cap Dist	Canal Comm
	Cut and Fill	50	cubic metre	15	750					
	Paving	120	square metre	105	12,600					
	Benches	4	each	1,200	4,800					
	Bins	2	each	800	1,600					
	Water Feature	1	lump sum	25,000	25,000					
	Reinstatement of Turf	100	square metre	9	900					
	Planting, incl. Topsoil and Fine Grading	120	square metre	60	7,200					
						52,850				
						Contingency 15%				
						Subtotal				
						60,778				
	c Interpretive Program	1	lump sum			100,000				
						Contingency 15%				
						Subtotal				
						15,000				
						115,000				
						Item Total	771,533			
26	Construct Daylighting of the River including Pine Street Closure and the Creation of the Marine Railway Basin									
	a Daylighting of Stream								EMS	Sawmill Riv, Cap Dist, Park Plan
	Cut and Fill / Rough Grading	3,825	cubic metres	25	95,625					
	Off-Site Disposal of Contaminated Soil	900	cubic metres	200	180,000 *					
	Rock Excavation	100	cubic metres	200	20,000					
	Control Chamber	1	lump sum	75,000	75,000					
	Channel Lining	1	lump sum	20,000	20,000					
	Planting, incl. Topsoil and Fine Grading	1,700	square metre	60	102,000					
						492,625				
						2,000				
						Contingency 15%				
						Subtotal				
						73,894				
						568,519				
	b Closure of Pine Street Extension								Traff Tran	Cap Dist
	Demolition of Existing Road, Curb, etc.	1	lump sum	5,000	5,000					
	New Curb	100	linear metre	80	8,000					
	New Pavement	600	square metre	80	48,000					
	New Storm Drainage	1	lump sum	5,000	5,000					
	Pedestrian Bridge	1	lump sum	50,000	50,000					
	Re-Routing of Services (i.e. waterline)	1	lump sum	25,000	25,000					
	Signage	1	lump sum	2,000	2,000					
	Planting, incl. Topsoil and Fine Grading	240	square metre	60	14,400					
						157,400				
						Contingency 15%				
						Subtotal				
						23,610				
						181,010				

Note:

* The unit cost of \$200 per cubic metre assumes that the soil can be disposed of locally. If the material must be shipped out of province for disposal, this cost could escalate to \$600 per cubic meter.

Dependency Chart No.	Item	Amount	Unit	Cost/Unit	Subtotal	Extension	Const. & Contingency	Fees	Primary Responsibility	In Consultation with
	c Development of Marine Railroad Basin								Cap Dist	Canal Comm, Park Plan
	Cut and Fill / Rough Grading	1,000	cubic metres	30	30,000					
	Off-Site Disposal of Contaminated Soil	300	cubic metres	200	60,000 *					
	Retaining Wall for Trans Canada Trail	30	linear metre	750	22,500					
	Exposure of Rock Cut	1	lump sum	50,000	50,000					
	Steps at Marine Railway Basin	1	lump sum	50,000	50,000					
	Retaining Wall	375	square metre	300	112,500					
	Planting, incl. Topsoil and Fine Grading	1,350	square metre	60	81,000					
						406,000				
						2,000				
						Contingency	15%			
						Subtotal				
						468,900				
	d Exposure of Tail Race								Cap Dist	Canal Comm
	Excavation to Expose Structure	1,200	cubic metre	30	36,000					
	Grading	40	cubic metre	20	800					
	Channel Lining	1	lump sum	4,000	4,000					
	Interpretive Signage	1	each	3,000	3,000					
	Planting, incl. Topsoil and Fine Grading	400	square metre	60	24,000					
						67,800				
						Contingency	15%			
						10,170				
						Site Monitoring for Soil Contamination				
						1,000				
						Archaeological Monitoring				
						8,000				
						Subtotal				
						86,970				
						Item Total				
						1,305,399				
27	New Urban Plaza at Prince Albert / Ochterloney								Cap Dist	Canal Comm
	Cut to Expose Bridge	390	cubic metres	30	11,700					
	Opening of Water Supply from Sullivan's Pond	1	lump sum	10,000	10,000					
	Grading	130	cubic metres	15	1,950					
	Paving	175	square metres	105	18,375					
	Tree Planting	4	each	1,000	4,000					
	Shrub and Ground Cover Planting	150	square metres	60	9,000					
	Steps	1	lump sum	30,000	30,000					
	Retaining Wall around Basin	150	linear metre	500	75,000					
	Concrete Base	1	lump sum	20,000	20,000					
	Facing of Bridge Opening	1	lump sum	10,000	10,000					
	Railing on Ochterloney	15	linear metre	200	3,000					
	Railing around Rest of Basin	20	linear metre	100	2,000					
	Benches	6	each	1,200	7,200					
	Bins	2	each	800	1,600					
						203,825				
						Contingency	15%			
						30,574				
						Archaeological Monitoring				
						4,000				
						Item Total				
						238,399				
28	Archaeological Investigations of Turbine Chamber area for future development								Canal Comm	Cap Dist
	Excavation of Turbine Chamber	1	lump sum		25,000					
	Excavation of canal & industrial features in vicinity & Locks 3 & 4	1	lump sum		50,000					
						Item Total		75,000		

Note:

* The unit cost of \$200 per cubic metre assumes that the soil can be disposed of locally. If the material must be shipped out of province for disposal, this cost could escalate to \$600 per cubic meter.

Legend

Cap Dist	Capital District
Park Plan	Parkland Planning
Traff Tran	Traffic and Transportation (Active Transportation)
Des Serv	Design Services
RPAM	Real Property and Asset Management
Canal Comm	Shubenacadie Canal Commission
EMS	Environmental Management Services
Sawmill Riv	Sawmill River Daylighting Committee
Heritage	Culture and Heritage Division

Appendix A

Traffic Report



CBCL LIMITED

Consulting Engineers

24 May 2006

Hanita Koblents, Planner I
Planning and Development Services
Halifax Regional Municipality
PO Box 1749
Halifax NS
B3J 3A5

Dear Ms. Koblents:

RE: Traffic Analysis for Canal Greenway Phase II

Estimated Traffic Impacts Due to Closure of the Pine Street Extension

It is deemed desirable to close the intersection of Pine Street and Prince Albert Road to enhance to overall connectivity of the Trans Canada Trail system in the area.

1489 Hollis Street

PO Box 606

Halifax, Nova Scotia

Canada B3J 2R7

Telephone: 902 421 7241

Fax: 902 423 3938

E-mail: info@cbcl.ca

www.cbcl.ca

**Solving
today's
problems
with
tomorrow
in mind**

ISO 9001
Registered Company

While this intersection is not critical to the traffic patterns in the area, it does serve to draw traffic from other intersections in the area. Pine Street currently serves as a route for vehicles to proceed to the Macdonald Bridge via Victoria Road. Closing the Pine Street extension will create higher turning movements at the Alderney/Portland/Prince Albert and Portland/Victoria intersections, as many of the vehicles that would turn on Pine Street will now turn right on Portland Street from Prince Albert Road and then turn right on Victoria Road.

In order to determine the effects of closing the Pine Street extension, existing traffic count numbers were used to transfer the Pine Street extension traffic to the Alderney/Portland/Prince Albert intersection. It was assumed that all vehicles currently using the Pine Street extension would proceed to Portland Street via Prince Albert Road.

Figure A shows the existing AM peak traffic counts in the area. For inbound traffic at the AM peak, it is estimated that, with the closure of the Pine Street extension. Natural volume balancing may result in as many as 100 vehicles that currently travel down Portland to the Alderney / Portland / Prince Albert intersection will take the Pleasant / Prince Albert route proceeding onto Alderney Drive. This volume reallocation is deemed appropriate due to the number of left turning vehicles on Portland Street (537) versus the volume of through traffic on Prince Albert Road (122). Even with the physically longer route, there will be some volume transfer from Portland to Prince Albert. All vehicles that currently turn right onto the Pine Street extension from Prince Albert Road will proceed to the Alderney / Portland / Prince Albert intersection. It is estimated that 85% of the vehicles that currently turn off Prince Albert onto the Pine Street extension will proceed to the Alderney / Portland / Prince Albert intersection and then turn right. The remaining 15% will proceed straight through the intersection to Alderney Drive.

For outbound traffic at the AM peak, it is estimated that 72% of the vehicles that use the Pine Street extension / Prince Albert intersection will move to the Alderney Drive



CBCL LIMITED

Consulting Engineers

with 10% proceeding straight through the intersection and 90% turning right onto Portland. The remaining 28% of the vehicles that use the Pine Street extension / Prince Albert intersection would travel along Portland with 35% turning left onto Prince Albert and 60% continuing straight along Portland and 5% turning right onto Alderney.

Figure A shows that, at the AM peak at the Alderney / Portland / Prince Albert intersection, there are no changes to the overall or approach LOS with adjusted existing turning movement counts when the Pine Street extension is closed.

Figure B shows the existing PM peak traffic counts in the area. It is estimated that, with the closure of the Pine Street extension, there will be no change for vehicles that currently travel along Prince Albert towards the Alderney / Portland / Prince Albert intersection. Similarly to the morning traffic flows, it is estimated that 85% of these vehicles will turn right on Portland to get onto Victoria and that 15% of the vehicles will proceed through on Alderney Drive.

For outbound traffic at the PM peak (again similarly to the AM peak situation), it is estimated that it is estimated that 72% of the vehicles that use the Pine Street extension / Prince Albert intersection will move to the Alderney Drive with 10% proceeding straight through the intersection and 90% turning right onto Portland. The remaining 28% of the vehicles that use the Pine Street extension / Prince Albert intersection will travel along Portland with 40% turning left onto Prince Albert and 60% continuing straight along Portland.

Figure B shows that, at the Alderney / Portland / Prince Albert intersection at the PM peak with the Pine Street extension closed, the approach Levels of Service (LOS) are not changed, however, the overall intersection LOS does decline in the afternoon peak from a "B" to a "C".

The Marine Slips located just south of the study area are under application for the development of approximately 1,100 units. It is anticipated that most of the vehicular traffic generated by this development will travel to the two main employment nodes in HRM, that is peninsular Halifax or the Burnside Industrial Park. There will be little reason for major portions of the traffic to travel eastwards along Portland. At peak times, traffic to peninsular Halifax will leave or access the site from the south along Alderney Drive or due west through downtown Dartmouth to access the Macdonald Bridge. Traffic to and from Burnside will use Alderney Drive, filter through downtown Dartmouth, and travel north along Alderney Drive and Prince Albert Road. The traffic to Burnside through the Alderney/Portland/Prince Albert intersection at peak times will be travelling in the opposite direction to the bulk of the rush hour traffic. It will be proceeding north along Alderney and continuing north along Prince Albert. The bulk of the rush hour traffic is travelling south on Alderney.

Off peak traffic from the Marine Slips is likely to head north along Alderney and Prince Albert or through downtown to Victoria and Woodland to access the Dartmouth Crossing development and Micmac Mall at the Circumferential Highway / Highway 118 area. With the relocation of Wal-Mart and Home Depot from the Circumferential Highway/ Portland St. area to Dartmouth Crossing, little traffic is anticipated to head east along Portland.

Reconfiguration of the Alderney/Portland/Prince Albert Intersection

This intersection is a key node in downtown Dartmouth. Much of the traffic travelling to the downtown core or to the Macdonald Bridge, passes through this intersection. With the small building set-back in the area, there is currently very little available space in which to accommodate the Trans Canada Trail. The primary focus of the investigation at this intersection involved the elimination of existing lanes in order to create spaces for the trail and associated spaces.

To create additional space at the intersection, the reconfiguration of Alderney Drive and Prince Albert Road including elimination of centre medians and the elimination of lanes were considered.

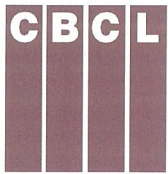
The challenges that are encountered at this intersection are predominantly geometric in nature. Prince Albert Road currently intersects with Portland Street at a skewed angle (approximately 55 degrees) and is not aligned directly opposite Alderney Drive. With the objective of getting the trail on the east side of Alderney Drive, creating this space does not help to improve the alignment of the intersection.

In order to create the necessary space on the Prince Albert Road approach, eliminating the right turn lane was analyzed. The analysis demonstrated that the approach will operate at acceptable levels with a one-lane approach, even with the closure of Pine Street (level of service 'B' in the AM peak). In order to analyze conservatively, it was assumed that all vehicles at the Pine/Prince Albert intersection would now utilize the Alderney/Portland/Prince Albert intersection.

To create the required space on the Alderney Drive approach, the cross section at the intersection must be reduced. Currently, the approach is comprised of a four-lane cross section (plus a centre median). The intersection can operate at a high level of service with a three-lane cross section at the intersection. It is important to maintain separate lanes for the northbound traffic (right turning and through/left turning), as well as the left turn bay on Alderney Drive to access Mill Lane. Trucks must be accommodated in the intersection in most directions, therefore curb radii must be designed to accommodate these vehicles.

An investigation was carried out to alter the cross section of Alderney Drive from a four lane cross section to a two lane cross-section, from Portland Street (near Alderney Gate) to Prince Albert Road. Considering the traffic volumes on the approach to the road, it appear that Alderney Drive could operate as a two-lane street in this section. Year 2004 volumes show afternoon peak volumes of 809 northbound and 463 southbound. A single lane in each direction would handle these volumes at acceptable levels, however, there would be a significant reduction in level of service from the predominant free flow conditions on Alderney Drive observed today.

Figures C, D and E illustrate various options for the reconfiguration of the intersection. **Figures G and J** are predicated on having Alderney Drive remain a four-lane road. **Figure H** is based on Alderney Drive becoming a two-lane road. Given that there is only limited advantage to trail development in the area, this project does not recommend the reconfiguration of Alderney Drive to a two-lane cross section. Since it provides the widest space on the eastern side of the road in the area, the layout illustrated in **Figure E** is preferred.



CBCL LIMITED

Consulting Engineers

Reconfiguration of the Prince Albert/Ochterloney Intersection

Figure F illustrates the proposed layout of the Prince Albert/Ochterloney intersection. The intention is to attempt to “tighten up” this intersection by reducing the width of Prince Albert Road at the intersection. Currently, there are two, two-way approaches on Prince Albert Road, one to/from the north and one to/from the south. The creation of a more “conventional”, tee intersection would create a safer environment for vehicles and pedestrians. With the traffic volumes that exist at this intersection in the peak hours, dedicated left and right turning lanes should remain and a northbound slip lane is provided from Prince Albert onto Ochterloney. The changes should not significantly affect the level of service at the intersection.

Reconfiguration of the Ochterloney/Crichton Intersection

Similar to the Prince Albert/Ochterloney intersection, the opportunity to tighten up this intersection is the primary goal. The throat width of Crichton is quite wide (approximately 19 m), primarily to accommodate Metro Transit vehicles. Being a skewed intersection, it is necessary to have wider approach lane on Crichton, but there is opportunity to reduce the crossing length on Crichton by creating larger pedestrian landings at both corners.

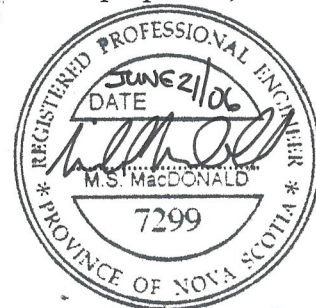
Figure G illustrates a proposed reconfiguration of this intersection. The throat width may be reduced to approximately 15 m and still provide comfortable turning space for transit vehicles. The traffic level of service will not be significantly impacted by the changes at the intersection.

Consideration was given to the closure of this intersection, however, its importance as a transit route, and the presence of various residential and other properties, did not make closure a reasonable option at this time.

Yours very truly,

CBCL Limited

Gordon Smith, CSLA
Direct: 421-7241, ext 2488
E-Mail: gordons@cbcl.ca



Michael S. MacDonald, P.Eng
Direct: 421-7241, ext 2317
E-Mail: mikemac@cbcl.ca

cc: Alan Taylor, Transportation Planner, HRM Transportation and Public Works Services

Turning Movement Counts - AM Peak Calculations

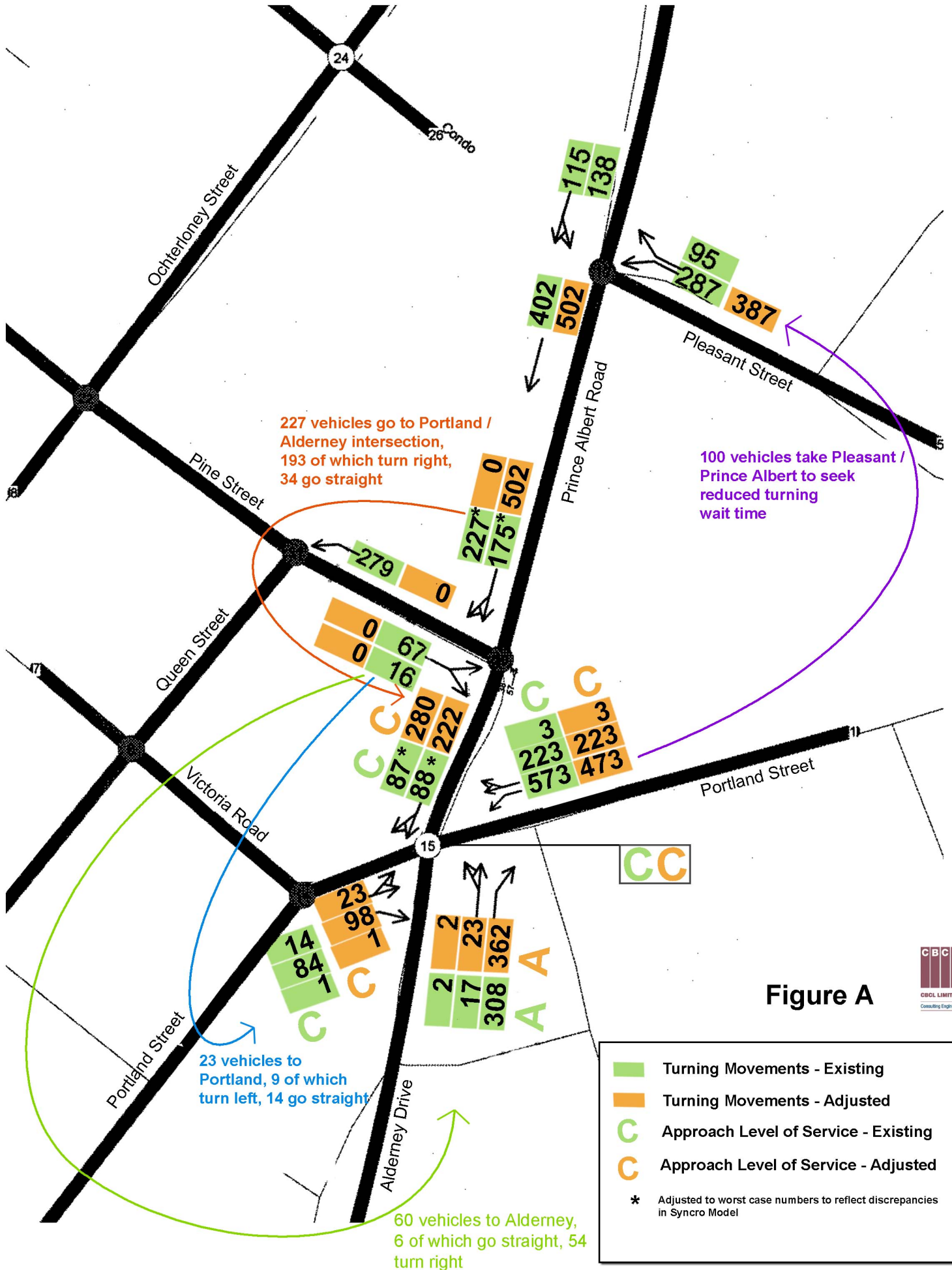


Figure A

Turning Movement Counts - PM Peak Calculations

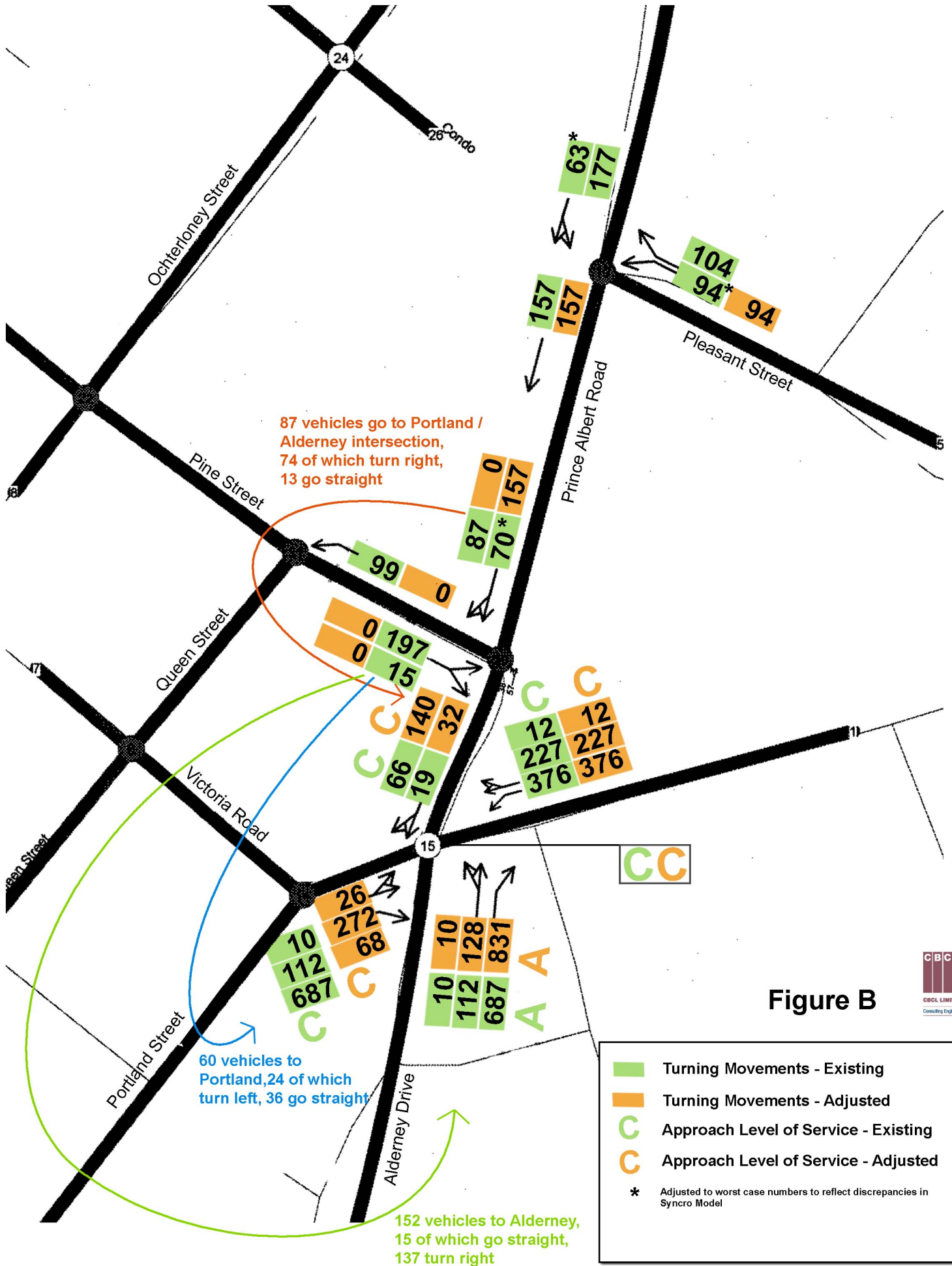
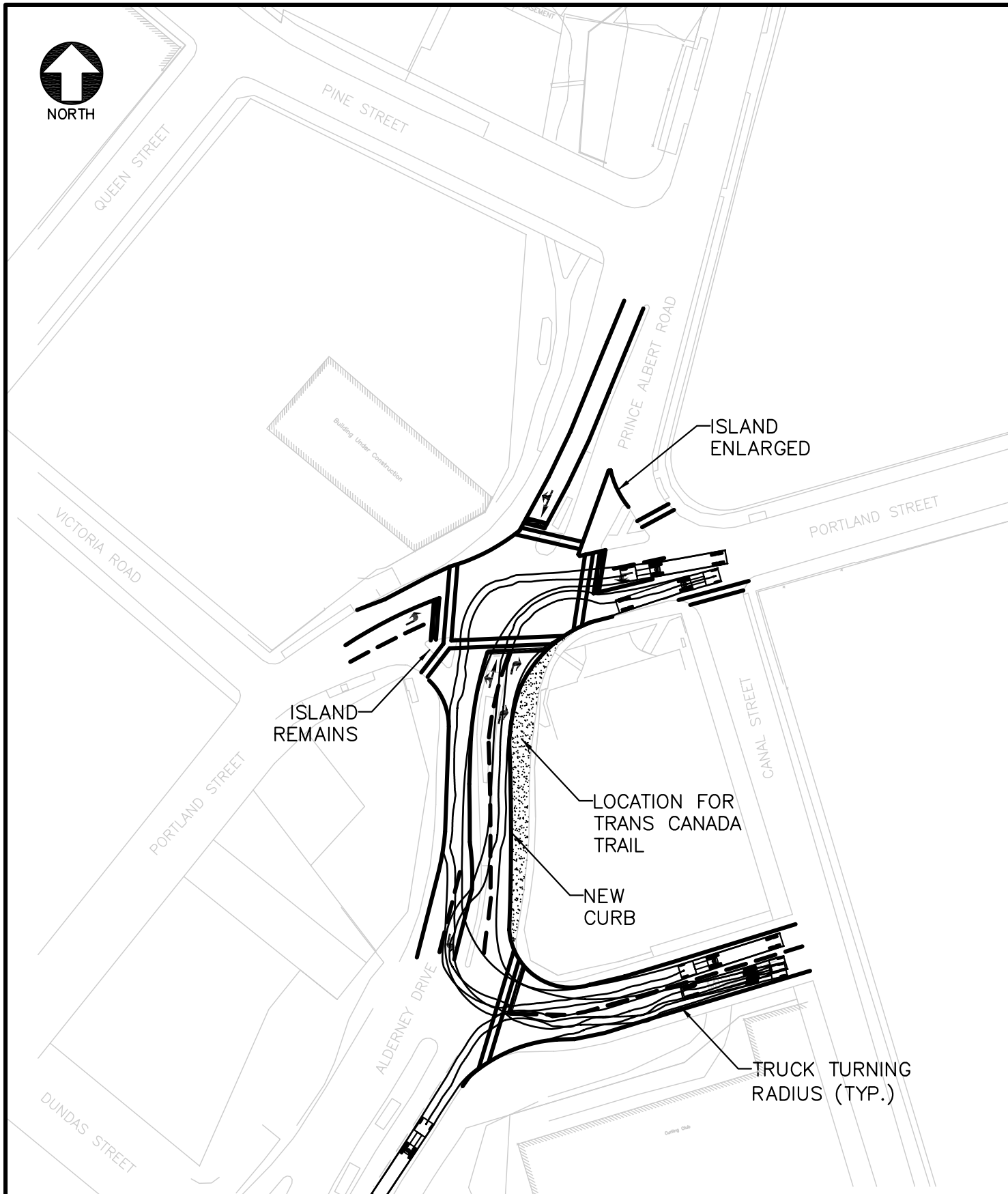
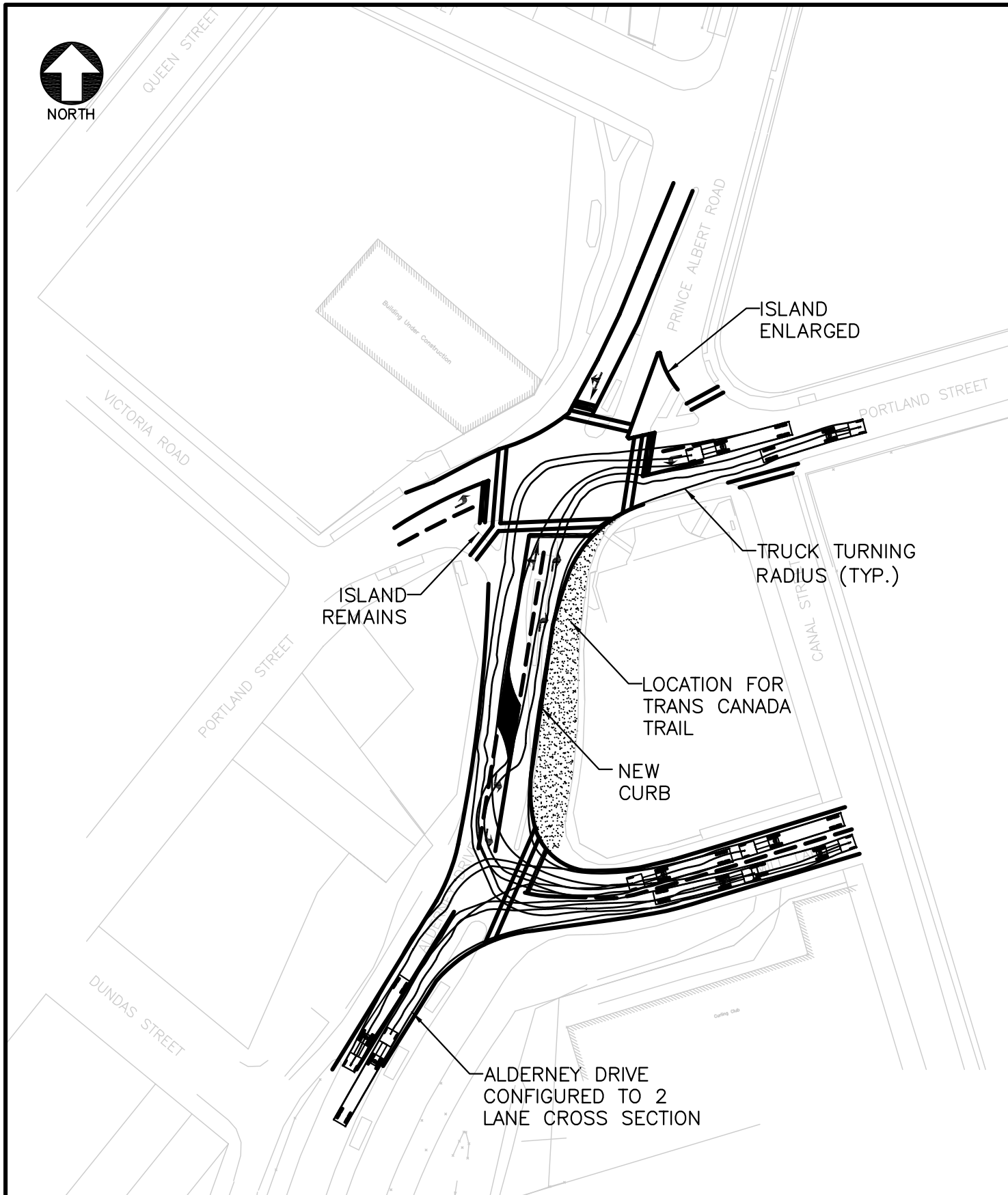


Figure B



Date 06-04-25	Scale 1:1000	Designed MSM	Drawn MJM	Checked DNB	Approved GS	Contract 051232
CBCL CBCL LIMITED Consulting Engineers ISO 9001 CERTIFIED		HALIFAX REGIONAL MUNICIPALITY	CANAL GREENWAY STUDY			Figure C
			INTERSECTION MODIFICATIONS ALDERNEY DR/PRINCE ALBERT RD/PORTLAND ST			



Date 06-04-25	Scale 1:1000	Designed MSM	Drawn MJM	Checked DNB	Approved GS	Contract 051232
------------------	-----------------	-----------------	--------------	----------------	----------------	--------------------



CBCL LIMITED
Consulting Engineers
ISO 9001 CERTIFIED

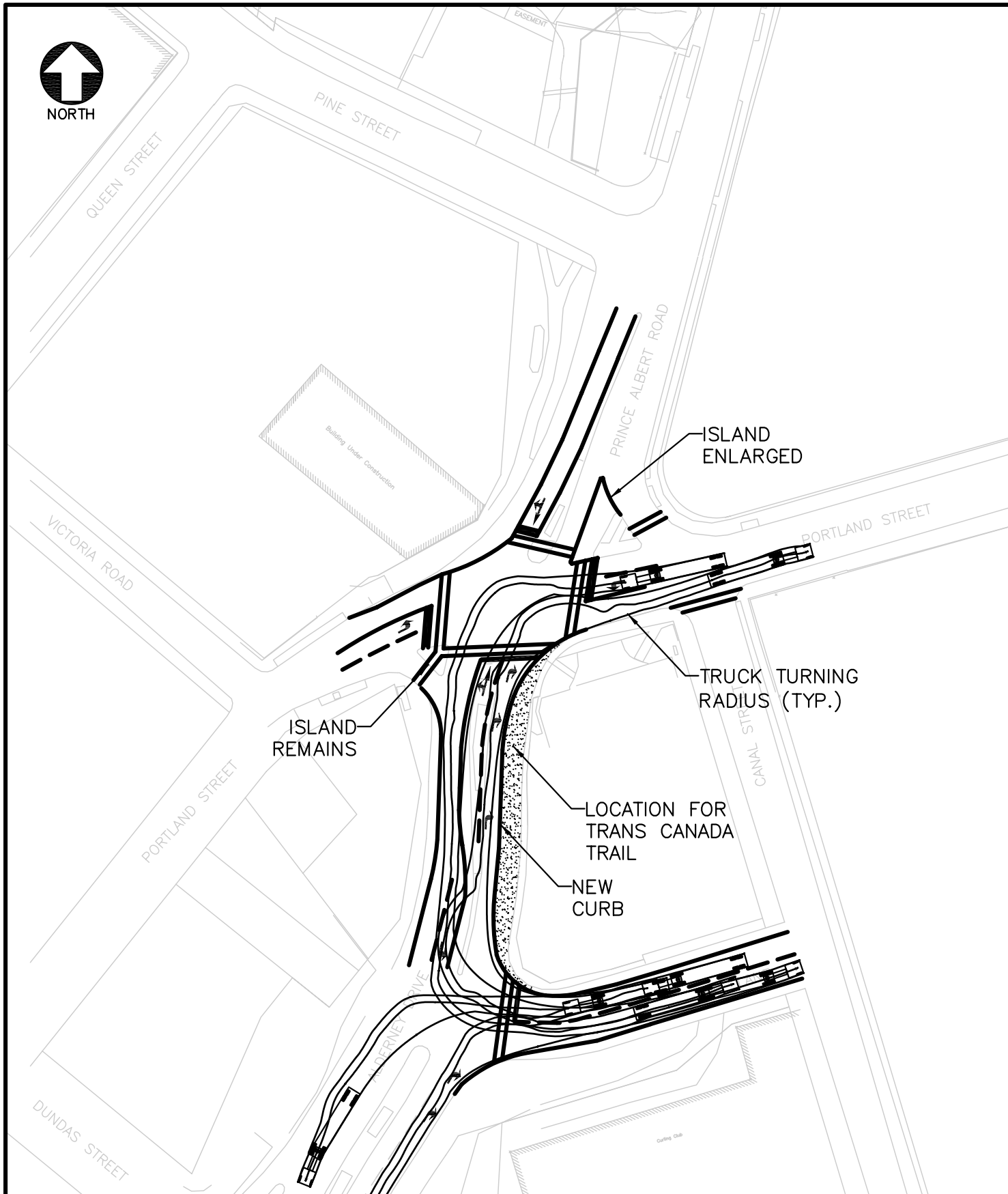
HALIFAX
REGIONAL MUNICIPALITY

CANAL GREENWAY STUDY

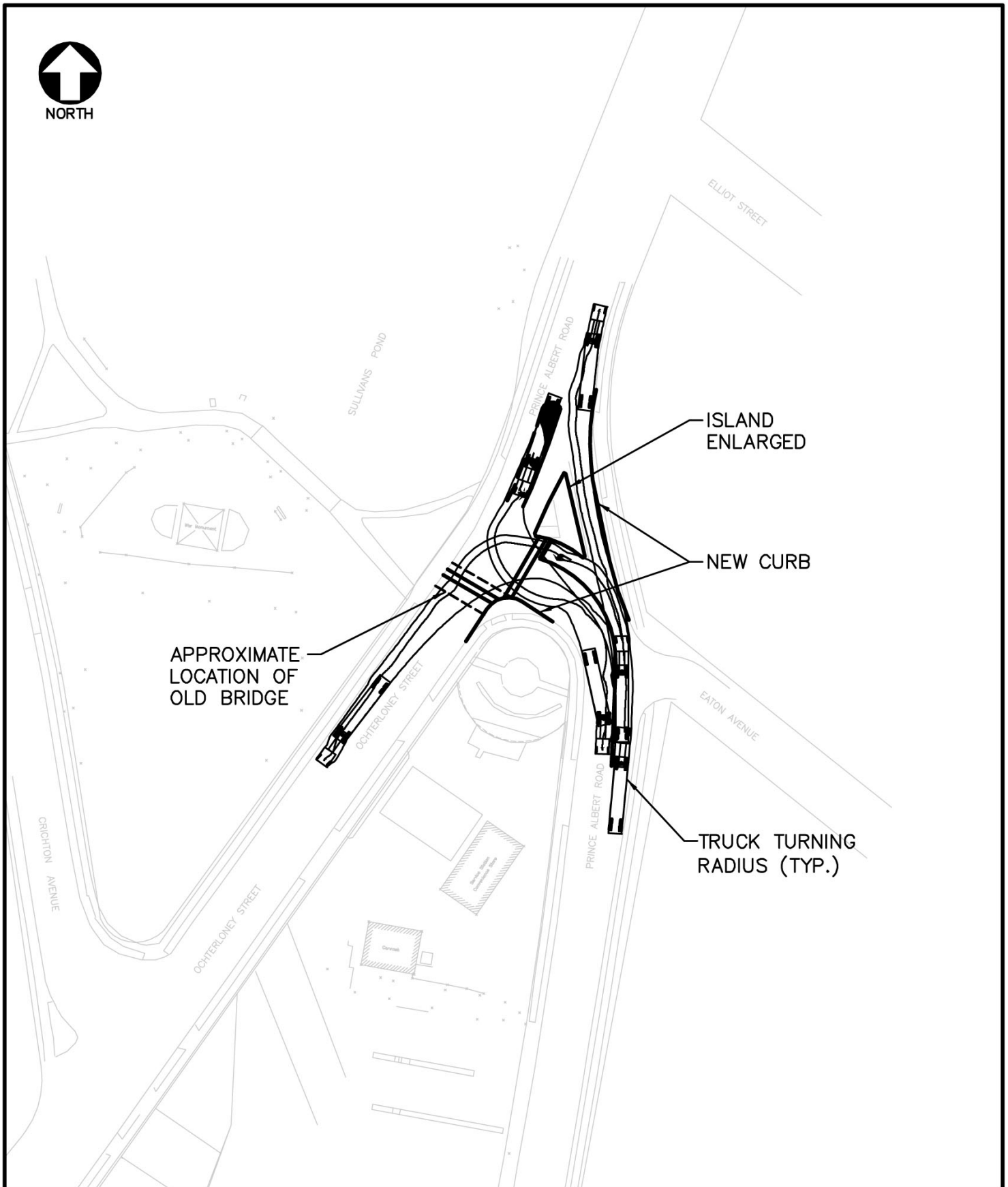
INTERSECTION MODIFICATIONS
ALDERNEY DR/PRINCE ALBERT RD/PORTLAND ST

Figure

D



Date 06-04-25	Scale 1:1000	Designed MSM	Drawn MJM	Checked DNB	Approved GS	Contract 051232
CBCL CBCL LIMITED Consulting Engineers ISO 9001 CERTIFIED		HALIFAX REGIONAL MUNICIPALITY	CANAL GREENWAY STUDY			Figure E
			INTERSECTION MODIFICATIONS ALDERNEY DR/PRINCE ALBERT RD/PORTLAND ST			



Date 06-04-25	Scale 1:1000	Designed MSM	Drawn MJM	Checked DNB	Approved GS	Contract 051232
------------------	-----------------	-----------------	--------------	----------------	----------------	--------------------

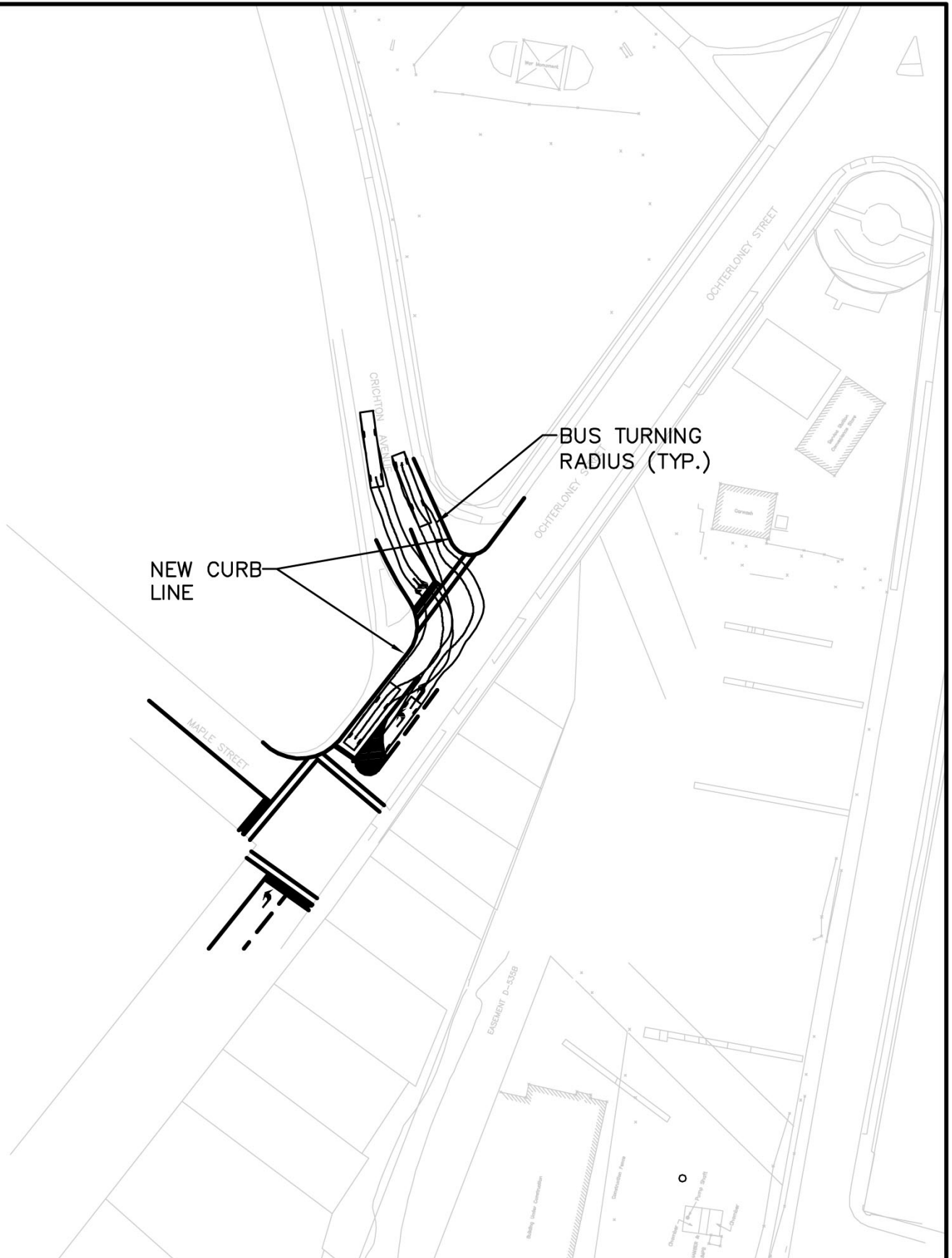


CANAL GREENWAY STUDY

INTERSECTION MODIFICATIONS
PRINCE ALBERT RD/OCHTERLONEY ST

Figure

F



Date 06-04-25	Scale 1:1000	Designed MSM	Drawn MJM	Checked DNB	Approved GS	Contract 051232
------------------	-----------------	-----------------	--------------	----------------	----------------	--------------------



CANAL GREENWAY STUDY

INTERSECTION MODIFICATIONS
CRICHTON AVE/OCHTERLONEY ST

Figure

G