

D E S I G N B R I E F

SEYMOUR STREET ENVIRONMENTAL ASSESSMENT AND PRELIMINARY DESIGN

STATION ROAD TO WALLACE ROAD

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Prepared for:

THE CITY OF NORTH BAY

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DESIGN BRIEF (DRAFT)

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AND PRELIMINARY DESIGN**

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DESIGN BRIEF

SEYMOUR STREET
ENVIRONMENTAL ASSESSMENT
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1.0 INTRODUCTION

This document describes design criteria utilized to support preliminary design of Seymour Street within the construction limits identified. These limits can be described as full surface reconstruction of Seymour Street from Station Road eastward for approximately 800 metres to Wallace Road. Surface reconstruction will also include provision of a concrete sidewalk on the north side of Seymour Street between Highway 11 and Commerce Crescent. It should be noted that although the sidewalk west of Station Road is outside the construction limits identified, preliminary design of a concrete sidewalk has been included in the scope of work for this assignment.

Seymour Street will be widened to three lanes consisting of eastbound, westbound, and a centre two-way left turn lane. The eastbound and westbound lanes will be expanded to a width of 3.75m to better serve industrial and commercial vehicles. The new two-way left turn lane will be 3.25m in width. The centre lane will be a common left turn lane for both eastbound and westbound traffic. All lane widths will be increased to 4.0m wide at the approaches to the Seymour/Commerce/Venture intersection to accommodate turning movements of truck traffic.

Two options for operation improvements to the Seymour/Commerce/Venture intersection have been reviewed. Option 1 utilizes traffic signals and will be supported by transition of the two-way left turn lane to a dedicated left turn lane on each approach to the Seymour/Commerce/Venture intersection. The second option, which utilizes a roundabout at the intersection, is not presented at the preliminary design stage because of the negative comments received from stakeholders. It was generally felt by Seymour Street business stakeholders that a roundabout would not allow over-length and over-width loads to effectively travel through the intersection.

A new 600mm diameter transmission watermain is proposed on the north side of Seymour Street. One fire hydrant will be connected to the new 600 mm watermain as requested by the City of North Bay (CNB) and will be located at the east end of the main to serve as an end of line “blow-off” valve.

The 600mm watermain will be connected to the existing mains feeding into Seymour Street and will be capped at Wallace Road. This includes two “T” connections joining the proposed main to the existing system at the intersection of Seymour/Commerce/Venture.

This proposed watermain will be fed from the 600mm diameter watermain that crosses Highway 11 at Cholette Street. A preliminary plan has been provided for the section of

watermain that is not within the Seymour Street right-of-way, however detailing of the profile will not be provided within the scope of this assignment as geotechnical information is not available at this time.

A retaining wall will also be required to provide sufficient width of the road platform and to provide erosion improvement for the north bank of Seymour Street where the slope is steep and prone to erosion. Rock outcrops that occur on the southern shoulder of Seymour Street will require controlled rock removal to provide the necessary horizontal clearance for the expansion of the Seymour Street platform.

A new concrete sidewalk will be located along the north side of Seymour Street from Highway 11 to the Seymour/Commerce/Venture intersection. Preliminary design for storm drainage systems have been provided where required. These systems include a combination surface ditch/pipe storm drain system west of Commerce Crescent and an open ditch system from Commerce Crescent eastward to Wallace Road.

Several design constraints within the construction limits have required additional consideration and stakeholder input during the preliminary design phase of the project. These constraints include existing surface infrastructure, property entrances, construction staging, and traffic control.

An important planning requirement is to minimize disturbance to local business and residents during construction with respect to service disconnection and access disruptions. Coordination between City staff, the public, and affected stakeholders will be required in an effort to minimize the impact resulting from the construction process.

2.0 EXISTING CONDITIONS

Seymour Street is currently a two lane collector road that experiences a high volume of traffic between 7 am and 6 pm as a result of its use by commercial and industrial operations. This includes a large proportion of heavy traffic such as construction and commercial vehicles. This high volume of traffic causes major delays and/or unsafe conditions at intersections where local roads feed into Seymour Street. The most notable of these feeder roads are Commerce Crescent and Venture Crescent. The posted speed limit for Seymour Street and all intersecting roads is 50 km/hr.

Currently there are no formalized sidewalks on Seymour Street. Paved and gravel shoulders on both sides of the road are used regularly by pedestrians. Pedestrian traffic walking between Highway 11 and Commerce Crescent related to the college campus on Commerce is particularly heavy at various times during the day.

The topography on the north side of Seymour Street immediately west of the Commerce Crescent intersection drops off steeply toward the north. This steep slope will become unstable when the road platform is widened and will require a grade reinforcing in the form of a retaining wall over a length of approximately 120 metres. Rock slopes on the south side of Seymour Street in the same area may require controlled blasting in order to widen the road for the proposed third lane.

3.0 DESIGN ELEMENTS

3.1 Seymour Street Third Lane Expansion

The Seymour Street improvement design will be undertaken to the requirements of the City of North Bay's "Technical Standards and Specifications for Roads" (draft 2009). Full depth reconstruction is proposed throughout the corridor as recommended in the Geotechnical Investigation prepared by Paterson Group Inc. In addition to 140mm of hot mix asphalt on 150mm Granular A base and 450mm Granular B Type II subbase, replacement of any soft subgrade areas with Granular B Type II material is also recommended in the Geotechnical Investigation.

Seymour Street will be expanded from two lanes to a three lanes (eastbound, centre two-way left turn, and westbound) commencing at the east end of the Seymour Streets four lane section (approximately 100m east of Station Road) and terminating at Wallace Road.

The width of the eastbound and westbound lanes will be increased to 3.75m wide to better serve commercial and industrial vehicles. The central turning lane will be 3.25m wide and will serve to reduce stacking and delays of traffic on Seymour Street due to vehicles waiting to turn left. In addition to the improved function and safety for traffic turning left, provision of the two-way left turn lane will improve the level of service experienced by through traffic on Seymour Street. All lanes will be increased to 4.0m wide at the approaches to the Seymour/Commerce/Venture intersection to accommodate turning movements of truck traffic.

The proposed two-way left turn lane will transition into a dedicated eastbound left turning lane approximately 40m west of Commerce/Venture and a dedicated westbound left turning lane approximately 40m east of Commerce/Venture. These dedicated left turn lanes will provide storage for left turning vehicles approaching the intersection.

Property acquisition will be required at each of the quadrants of the intersection in order to provide clearance for traffic signals and drainage features.

Although only minimal profile grade adjustments are contemplated, any reduction to existing grades will be monitored for the impact to existing buried infrastructure to ensure a minimum cover of 2.2m will be maintained on all watermains, sewers, and service connections within the improvement limits.

The expansion of Seymour Street from two to three lanes will require many pre-construction preparations. Controlled blasting of the existing rock outcrop on south side of the road in the area of Apple Auto Glass and Vested Interest (formerly Schutz Garden Center) will be required to provide adequate road platform width to support the additional lane and sidewalk proposed. Removal of rock will also provide for increased site distances when entering Seymour Street from the Trout Creek Auto Mall roadway.

The north side of Seymour Street will require the construction of a 120m long retaining wall to support the road and sidewalk platform between Station 0+601 and Station 0+722. This wall will also serve to stabilize the steep bank and prevent erosion currently being experienced. The expansion of Seymour Street will require realigning of the surface ditches and improvements to some of the storm water management systems located in the corridor.

3.2 Sidewalk Improvements

A concrete sidewalk on the north side of Seymour Street is proposed to link Highway 11/17 with Commerce Crescent. This is a relatively high volume pedestrian route for students attending Canadore College located on Commerce Crescent.

Within the primary project limits between Station Road and Commerce Court, the sidewalk will be 1.5m wide and will be offset from the curb by a 1.5m wide asphalt boulevard. This boulevard will provide a safety buffer zone between pedestrians and motor vehicles as well as providing room for snow storage.

The sidewalk will continue west of the project limits as well, extending to the intersection of Seymour Street and Highway 11/17. Throughout this section the sidewalk will remain at a width of 1.5m. An asphalt boulevard will also be provided where there is sufficient distance between the existing curb and right-of-way property limits.

3.3 Drainage System Improvements

The proposed drainage system will be designed to the requirements of the City of North Bay's "Technical Standards and Specifications for Storm Water Management (draft 2009)", the Ministry of the Environment's "Storm Water Management Planning and Design Manual (2008)" and the Municipal Engineers Association's "Municipal Works Design Manual".

The expansion of Seymour Street to three lanes will require full reconstruction of the existing drainage system in some areas and only a partial improvement of the system in other areas. The existing drainage system mainly consists of open ditches and entrance

culverts. Wherever possible the existing storm water system will be rehabilitated or maintained. Throughout the corridor the new drainage system will consist of ditches and culverts, underground storm sewer systems, or a combination of the two.

Improvements to the drainage system will be designed with consideration of maintaining the existing stormwater discharge characteristics of the corridor. These discharge points include the following:

- a) Station 0+265 Left - Discharge northward via pipe.
- b) Station 0+350 Right – Discharge into wetland south of road via pipe.
- c) Station 0+780 Left – Discharge into ditch on east side of Commerce via pipe.
- d) Station 0+895 Left - Discharge into drainage course on north side of road.
- e) Station 0+915 Right – Discharge into drainage course on south side of road.

Perforated drainage pipe will be installed under the locations of curbs and edge of pavement where gravel shoulders exist. This drainage pipe will remove ground water from the sub-base of the road. Perforated drainage pipe have proven to provide reduction of long term cracking and rutting of asphalt and to reduce premature road degradation resulting from the effects of freeze/thaw cycling. Perforated drainage pipe will discharge in either catch basins or roadside ditches.

3.4 Transmission Watermain

The proposed 600mm transmission watermain design will be undertaken to the requirements of the City of North Bay’s “Technical Standards and Specifications for Water Distribution Systems (draft 2009)”, the Ministry of the Environment’s “Design Guidelines for Drinking-Water Systems (2008)” and the Municipal Engineers Association’s “Municipal Works Design Manual”.

The proposed watermain will be connected to the existing 600mm watermain on Cholette Street immediately east of Highway 11/17 and will terminate and be capped at Wallace Road. There will be two “T” connections at the Seymour/Commerce/Venture intersection to connect the proposed watermain to the existing system.

The “T” connection will require three valves as per the CNB’s “Technical Standards and Specifications for Water Distribution Systems”. A fire hydrant will be connected directly into the newly 600mm transmission main as per CNB’s request to function as a “blow-off” valve .

Valves will be located no further apart then 600m as to minimize inconvenience and contamination during repairs. The valves located along the proposed trunk watermain will be resilient seat gate style valves and will be placed in valve chambers. An air release

valves will also be located within valve chambers. This air release valve will be located at the high point of the proposed transmission main system.

All valves will be resilient seat gate valves conforming to AWWA C509, and will open counter clockwise with a 50mm operating nut as per the City of North Bay's "Technical Standards and Specifications for Water Distribution Systems".

The new 600mm transmission watermain shall be designed to withstand the maximum internal operating pressure plus the transient pressure, as well as external loads imposed by trench backfill and superimposed loads (both static and dynamic).

Minimum cover on all watermains and service connections shall be 2.2m below final grade. Watermains shall have a minimum horizontal clearance to sewer pipe and manholes of 2.5m and shall be placed at least 0.5m above sewer pipes as per MOE requirements.

Installation of new watermain shall meet the requirements of the following Ontario Provincial Standards and Specifications:

- OPSD 806.060 PVC Height of Fill Table
- OPSD 1104.020 Water Service Connection – Large Diameter
- OPSD 1105.010 Hydrant Installation
- OPSD 1109.011 Cathodic Protection for PVC Watermain Systems

3.5 Traffic Control at Seymour/Commerce/Venture Intersection

Two traffic control options have been proposed for improving the level of service provided at the Seymour/Commerce/Venture intersection. Option 1 is a standard traffic signal designed to meet the requirements of the MTO's "Ontario Traffic Manual" and City of North Bay specifications. The second option is a roundabout.

Results of the traffic operations study undertaken by HDR Corp. show that traffic signals are expected to improve the over all level of service at this intersection from a D to an A. Traffic signals are also expected to provide an A or B level of service in the future when traffic volume projections over the 5, 10, 15, and 20 year time horizons are considered. Level of service calculations and volume projects are described in the "Seymour Street Traffic Operations Report" prepared by HDR Corp. for this assignment.

Improvements to the level of service at the subject intersection provided by a roundabout is also outlined in HDR's "Seymour Street Traffic Operations Report". An advantage of roundabout traffic control is that maintenance costs are lower than a signalized intersection. One disadvantage of a roundabout is that more property acquisition is required compared to a standard signalized intersection. Ultimately, comments from stakeholders in support of a signalized intersection resulted in it being selected as the preferred solution.

3.6 Retaining Wall (North Side - Station 0+601 to Station 0+722)

A retaining wall will be required to provide a suitable platform width for the road section improvements proposed and to re-stabilize and reinforce against erosion the north bank of Seymour Street against erosion where the slope is excessively steep (greater than 3 to 1).

This retaining wall will serve a dual purpose, the first of which is to allow for necessary backfilling to take place to establish the required platform width for the additional lane and newly proposed sidewalk along the north side of Seymour Street. The second purpose is to prevent erosion along the steepest part of the north bank and as a result reduce maintenance costs as well as preventing potentially damaging washout of the road granular layers. Two types of retaining walls have been considered at this point, a cast in place (CIP) concrete retaining wall, and a segmental concrete block wall.

The CIP concrete retaining wall has been identified as the preferred option because it can be designed and constructed in simple and practical manner. The proposed wall can be supported directly on the shallow bedrock that is observed at the site. As a result, cost reduction for footings and engineered fill required by other wall systems will be experienced.

The construction process typically includes:

- a) Excavate to bedrock along the length of the retaining wall site,
- b) Drill and insert rock anchors into bedrock,
- c) Build forms,
- d) Pour concrete,
- e) Remove forms after cure-time, and
- f) Backfill with suitable structural material.

A CIP concrete wall is expected to have a lower material and construction costs than the segmental block. An estimate of probable construction cost of the CIP concrete retaining wall is \$255,000 (HST not included).

4.0 ESTIMATE OF PROBABLE CONSTRUCTION COST

An estimate of probable construction cost has been prepared for the Seymour Street improvements described. The unit prices utilized to determine the estimates of probable construction cost are based on recent tender records and projects of a similar size, scope and complexity to the subject project.

These estimates are based on 2012 unit prices estimates and include a 10% engineering allowance and a 30% contingency allowance. Harmonized Sales Tax (HST) is not included.

The improvements have been classified as Road Widening With Full Depth Reconstruction and 600mm Diameter Transmission Watermain installation. Unit price sheets for the cost estimates are provided in Appendix A.

-Road Widening and Full Depth Reconstruction	\$4,371,850.00
-600mm Dia. Transmission Watermain	<u>\$2,543,940.00</u>
TOTAL	\$6,915,790.00

Actual construction costs may differ

Respectfully Submitted,

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APPENDIX A

CONSTRUCTION COST ESTIMATES