DRAINAGE REPORT
FOR THE LOWER PORTION OF THE

LENNON DRAIN

TOWN OF LASALLE & CITY OF WINDSOR

DILLON
CONSULTING

N. J. Peralta Engineering Ltd.
Consulting Engineers

FINAL REPORT
25 MAY 2021

FILE NO. 12-6578-1600

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PREAMBLE

Original Instructions

On February 17, 2012 the Ministry of Transportation Ontario (MTO) filed a petition with the Town of LaSalle, in accordance with Section 4 of the Drainage Act. The purpose of the petition was for an engineer to be appointed by Council to examine and report on the municipal drains that provide a drainage outlet for the Rt. Hon. Herb Gray Parkway (formerly known as the Windsor Essex Parkway).

A subsequent letter from the MTO was submitted on January 11, 2013 requesting the original appointment be in accordance with Section 78 of the Drainage Act and further defined eight (8) downstream Municipal Drains that are to be reported on as follows:

3rd Concession Drain
Howard Ave Drain
Burke Drain
Cahill Drain
Lennon Drain
Grand Marais Drain
Basin Drain
West Branch of the Cahill Drain (only if required based on analysis of Cahill Drain)

The West Branch of the Cahill Drain though not physically connected to the Cahill Drain still remains interconnected in terms of flood plain and provides an outlet for the spillover of flows when the Cahill Drain experiences greater than full bank flow conditions. A report on the West Branch of the Cahill Drain is provisional only and is dependent on the findings from the hydraulic analysis performed on the Cahill Drain. If it is determined that the spillover will not impact the West Branch of the Cahill Drain, a report on the said drain will not be required.

Additional Instructions

While the preparation of the report for the Lennon Drain was in progress, the City of Windsor requested that the report on the Lennon Drain be extended upstream to include the portion of drain that crosses the Herb Gray Parkway and continues along the north limit of the new highway corridor within the City of Windsor. The City of Windsor's letter dated April 22, 2016 formally requested of the Town of LaSalle that the scope of services for the drainage reports be expanded, as described above, and was mutually agreed upon by the City of Windsor, Town of LaSalle and the Ministry of Transportation.

Joint Appointment of Engineer

On January 22, 2013, Council for the Town of LaSalle reconfirmed a joint appointment of Dillon Consulting Limited (Dillon) and Stantec Consulting Ltd. (Stantec), to prepare all necessary drainage reports in accordance with Section 78 of the Drainage Act, for all drains serving as an outlet for the Rt. Hon. Herb Gray Parkway. Subsequently, there was a change made by Council for the Town of LaSalle to appoint N.J. Peralta Engineering Ltd (Peralta) to assume the responsibilities of Stantec Consulting Ltd.

Engineer's Role (Dillon Consulting Limited)

Dillon's responsibilities are limited to on-site meetings, survey work, hydraulic analysis and design, detailed watershed determination, and to report thereon the recommended improvements necessary to each of the above mentioned municipal drains outlined herein. These reports shall contain all plans, profiles and details accompanying the recommended drainage works, together with an estimate of costs, determination of any land or damage allowances and the provision of specifications associated with the work.

The content, as noted above, is contained within this report under **PART A – TECHNICAL CONSIDERATIONS.**

Engineer's Role (N.J. Peralta Engineering Ltd.)

Peralta's responsibilities are limited to determination of assessments and provision of rationale for the distribution of costs against all lands, roads and public utilities affected by the improvements to the drainage works as outlined by Dillon within each of the above mentioned municipal drain reports. These assessments shall be prepared for both the construction and future maintenance of each drain and presented in the form of assessment schedules.

The content, as noted above, is contained within this report under **PART B – ASSESSMENT CONSIDERATIONS.**

File No. 12-6578-1600

Mayor and Council
Corporation of the Town of LaSalle
5950 Malden Road
LaSalle, Ontario
N9H 1S4

Drainage Report for the
Lower Portion of the
LENNON DRAIN
Town of LaSalle & City of Windsor

Mayor and Council:

PART A – TECHNICAL CONSIDERATIONS

Watershed Description

The Lennon Drain lower portion comprises approximately 1,713 metres of open drain starting from its outlet into the Cahill Drain located within the Town of LaSalle and continuing upstream across the Rt. Hon. Herb Gray Parkway into the City of Windsor. The upper drain portion represents approximately 3,210 metres of open drain within the City of Windsor north of the Parkway. The Lennon Drain commences on the west side of Howard Avenue and continues downstream in a westerly direction to the Herb Gray Parkway where it then flows parallel to the highway before crossing to the south side and extending in a south-westerly direction across Normandy Street to its outlet into the Cahill Drain.

The overall watershed area is approximately 639 Ha (1,579 acres) with approximately 1,284 acres (81%) in the City of Windsor and approximately 295 acres (19%) in the Town of LaSalle. The Lennon Drain provides outlet for several storm sewer drainage systems within the City of Windsor and the Town of LaSalle as well as outlet for the Nantais Drain in the Town of LaSalle. The Lennon Drain is the most significant tributary of the Cahill Drain representing approximately 35% of the area being serviced by the Cahill Drain.

The lands within the Lennon Drain watershed are predominately urban and fully developed residential areas with some smaller areas of commercial and institutional uses as well as some green space, the most significant being the Roseland golf course. There is little topographic relief. Fair to poorly draining Berrien Sand soil type encompasses the majority of the watershed.

In determining the present watershed boundary limits, we obtained drainage maps available from each municipality. The mapping depicted existing storm sewer systems and their routing to the point of outlet into the Lennon Drain and its respective tributaries. In some areas, we also carried out field reconnaissance and survey to confirm the limits.

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Changes to the Lennon Drain Watershed

Within the City of Windsor, previous hydrology studies on the Lennon Drain watershed from the early 1990's included lands in the northeast quadrant to the east of the Sixth Concession Road between Provincial Road and Dougall Parkway. The said lands are now being drained through the Sixth Concession Drain and are no longer within the Lennon Drain watershed. The northern limit of the Lennon Drain watershed within the City of Windsor was historically bounded by Cabana Road West from the King's Highway No. 401 east to the Sixth Concession Road. However, there are some additional developed areas north of Cabana Road and Provincial Road that were previously part of the Grand Marais Drain watershed and are now part of the Lennon Drain watershed. We have accounted for these changes as part of our hydraulic analysis for the lower portion of the Lennon Drain continuing downstream from the north limit of the Herb Gray parkway corridor to its outlet into the Cahill Drain within the Town of LaSalle.

Previous Drainage Reports

We found the following previous drainage reports for the Lennon Drain:

- 22 September 2016, Rood Engineering Inc. (Lennon Drain improvements within City of Windsor): Recommended work included the brushing and cleanout of the existing Lennon Drain for approximately 500 m length starting from the upstream side of the Herb Gray Parkway and continuing east to St. Clair College campus. In addition, the report includes all the recommended work set out in the AECOM 2012 Hydrologic and Hydraulic Study implementing stormwater management facilities for the Lennon Drain to account for the future Cabana Road improvements and associated Class EA recommendations. The extent of this work being to the west of Dougall Avenue continuing downstream to St. Clair College and entails the widening of the drain, flow control structures and a new conveyance channel across the Roseland Golf Course complete with five (5) storm water management facilities on the said property. The widening of the Lennon Drain channel downstream of the Roseland Golf Course was also to provide on-line stormwater detention storage capturing the 1 on 100 year storm flows. The widened drain spanning from Casgrain Drive to Longfellow Avenue to Mount Royal Drive to Mount Carmel Drive to Avon Drive and to Geraedts Drive at St. Clair College. Flow control consisting of 1500 mm diameter concrete pipe replacement culverts were constructed at each of the above noted road crossings. This was to ensure that the 1 in 100 year storm flows within the Lennon Drain that outlet downstream of the St. Clair College property will not overwhelm the 1650 mm concrete pipe outlet flow control structure that was previously designed as part of the 1993 LCBA Functional Design report.
- 15 June 1907 by J. Newman, C.E. (Sandwich West By-Law 404): Recommended work included the cleanout of the entire portion of the Lennon Drain from its outlet into the Cahill Drain, within the Town of LaSalle, upstream to its top end at Howard Avenue, within the City of Windsor. This report appears to be the most recent improvements performed on the entire length of this drain, initiated through the provisions of the Drainage Act.

- 28 July 1899 by W. Newman C.E. (Sandwich West By-Law 316):

  The Lennon Drain was originally constructed under the Ditches and Watercourses Act in 1899. The owners the landowners petitioned for the drain to be cleaned, enlarged and improved. The recommended works extended from the drain's outlet into the Cahill Drain within the Town of LaSalle (formerly Sandwich West Township) upstream for its entire length to Howard Avenue within the City of Windsor and formerly the boundary between Sandwich West Township and the City of Windsor until the 1960's when the municipal boundary changed from Howard Avenue to the King's Highway No. 401 corridor.

Previous Hydrology Studies/ Storm Water Management Plans

Our research yielded the following previous hydrology studies and stormwater management plans for the Lennon Drain.

- May 2015 – Parkway Infrastructure Engineers Hatch Mott MacDonald – Dillon Consulting Limited, Lennon Drain Stormwater Management Report specific to the new Herb Gray Parkway corridor. This report references the modifications made to the Lennon Drain upstream and downstream of the Herb Gray Parkway as part of its design and construction in 2013 & 2014. A portion of the Lennon Drain (upstream of Station 1+125) was relocated further north to cross the new highway in a new location measuring approximately 230 metres from its original crossing. The original Lennon Drain alignment was filled in to the east of Huron Church Line leaving the remaining portion to the west as a tributary of the Lennon Drain measuring approximately 275 m in length.
- March 1993 – Lafontaine, Cowie, Buratto & Associates Limited (LCBA), Functional Design Report for Lennon Drain within City of Windsor (Highway No. 3 to Avon Drive). This report recommended an orifice flow control structure on the Lennon Drain within the City of Windsor. The purpose being to control upstream storage within the Lennon Drain north of Highway No. 3 and to further control the water level and flow rate beyond continuing downstream into the Town of LaSalle. This was accomplished with a 1650 mm diameter concrete culvert being placed in the Lennon Drain approximately 75 metres upstream of the Highway No. 3 bridge as the flow control structure such that flows through the existing Highway No. 3 bridge would not increase beyond existing conditions despite additional development and potential higher flows in the future. In conjunction with this culvert there was the recommended widening of the Lennon drain channel north of Highway No. 3 upstream continuing across the St. Clair College lands including berming adjacent thereto to provide stormwater management.
- December 1990 – MacLaren Engineers, Master Drainage Plan for the Cahill and Lennon Drains in the City of Windsor. This report evaluated stormwater management alternatives for both the Cahill Drain and Lennon Drain catchment areas within the City of Windsor. The objective of the proposed drainage plan was to obtain zero increase in runoff across the municipal boundary into the Town of LaSalle (formerly Township of Sandwich West). The plan was to also

ensure that, in the future, the hydraulic capacity of the Lennon and Cahill Drains will not be exceeded. Hydraulic deficiencies were identified in the Cahill & Lennon Drains as well as the lower reach of Turkey Creek within the Town of LaSalle. Subsequently, there were some downstream improvements undertaken on the Cahill Drain as per the recommendations set out in the 1993 Lafontaine drainage report previously identified herein.

- April 1973 – Lafontaine, Cowie, Buratto & Associates Limited (LCBA), Design Report for the Lennon Drain in the City of Windsor. A functional planning report for the improvement of the Lennon Drain within the City of Windsor and Town of LaSalle to its outlet into the Cahill Drain. This report proposed that improvements to the drain be undertaken in successive stages in step with the future development of the area due to the very high costs to improve the Lennon Drain capacity. This report further recommended that part of the Lennon Drainage area north of Cabana Road, as well as areas east and west of Howard Avenue, be redirected to the Grand Marais Drain, and that the Lennon Drain be constructed with adequate capacity to serve only the area west of Howard Avenue and to also provide relief for the Roselawn Drive area north of Cabana Road. Two alternative drainage schemes were presented. Based on the drainage infrastructure that exists today, only partial work has been carried out and to a lesser extent than what was originally recommended. Most the lands north of Cabana Road still continue to remain outside of the Lennon Drain watershed therefore little drainage relief for Cabana Road was provided. The covered Lennon Drain portion across the Roseland Golf Course had been constructed however to a smaller size than had been originally recommended. These deficiencies were subsequently addressed as part of the 2016 Rood Engineering Inc. report for the Lennon Drain.

On-Site Meeting

We conducted an on-site meeting on July 5, 2013 at the Macedonian Community Centre, in the Town of LaSalle. An overview of the Parkway project was introduced to those landowners who attended this meeting. It was explained that the Town of LaSalle accepted a request from the MTO to have an engineer appointed under Section 78 of the Drainage Act to examine the Lennon Drain and assess its condition and adequacy to provide a sufficient outlet for the lands and roads being serviced, including the Rt. Hon. Herb Gray Parkway. Furthermore, the site meeting audience was told that if the Engineer determines that improvements are required to obtain a sufficient outlet, the recommendations will be detailed within the engineer's report that will be presented to Town of LaSalle Council for their consideration and adoption thereof prior to undertaking the necessary works. Also, they were informed that the MTO has agreed in principle that costs associated with the preparation of this report for the Lennon Drain will be paid for by the Parkway project.

All landowners were invited to submit their questions, provide comment or concerns as to their present drainage condition. The feedback was recorded and compiled for consideration in the preparation of this report. Where more information or clarification was required by the engineer, there was subsequent follow up with the respective landowner to better understand the issues.

Survey and Findings

Our survey and examination of the lower portion of the Lennon Drain portion within the Town of LaSalle was completed in late January 2013. The survey comprised the recording of topographic data and examining the drain for available depth and capacity necessary to provide a sufficient drainage outlet for the lands and roads within the watershed. We resumed our survey and examination of the Lennon Drain in the Spring of 2016, including the re-aligned portion within the City of Windsor across and along the Herb Gray Parkway to the northerly limit of the highway corridor.

For purposes of this report, the Lennon Drain has been stationed on the drawings starting from Station 0+000 at its outlet into the Cahill Drain within the Town of LaSalle and continuing upstream to Station 1+713 on the north side of the Herb Gray Parkway in the City of Windsor. Upstream drainage flows from the Lennon Drain just north of the Parkway are controlled by design through an existing 1650 mm diameter concrete pipe previously recommended in the 1993 LCBA Functional Design Report for the Lennon Drain. Further elaboration on this flow control culvert, denoted herein as Bridge No. 4, is referenced under the Existing Bridges sub-section below. Throughout its length, the cross section of the Lennon Drain is trapezoidal with a bottom width ranging between 1.5 to 5 metres and side slopes varying from 1.5:1 to 2.4:1 (horizontal to vertical).

We discovered that the lower portion of the Lennon Drain contains heavy brush occupying the banks of the drain from Station 0+000 to Station 0+655. Despite the heavy brush along its banks, we observed that the bottom of the drain is mostly clear of vegetation enabling better conveyance of flows. The only exception being, where some localized partial drain blockages have resulted from trees falling across the bottom of the channel. The fallen trees continue to trap woody debris and impede flows just enough to cause the formation of sediment bars and if not maintained, there is the potential for the spillage of drainage flows beyond the channel into the surrounding forested area on both north and south sides of Normandy Street.

Downstream of Normandy Street (Station 0+550 approximately) the Lennon Drain traverses an environmentally significant area known as the LaSalle Woodlot ESA. Within this section, there is an existing grassed pedestrian trail established on the west side of the drain from Station 0+075 to Station 0+235 and it forms part of the Brunet Park trail system. The area is accessible from Normandy Street for equipment to enter and complete drain improvement works from the west side and thereby preserves existing trees on the east side of the drain. Selective tree cutting on the west side of the drain is recommended only where necessary to remove existing blockages and for excavation purposes to remove localized sediment build up and to reshape the west drain bank for improved capacity and stability.

The higher amount of sediment is attributed to the existing debris restricting flows, a minimal drain gradient, dense tree cover which shades the banks leaving little to no vegetation or grasses on the drain banks to protect the drain from erosion during higher flows. The sediment levels vary throughout the drain with the heavier areas containing up to approximately 0.4 metres depth of sediment which reduces the drain's capacity. There is also evidence of sediment intrusion from agricultural lands. Surface water runoff is being artificially collected by field swales and directed into the Lennon Drain with little to no erosion protection at these spillway points. The lighter sandy soil type is

highly erodible. The drain banks in some locations have experienced undercutting, sloughing and scouring likely caused during higher flows. The amount of sediment build up within in the Lennon Drain decreases as you proceed upstream of Normandy Street along an existing greenbelt that aligns the drain as it traverses the existing residential areas of Brooklyn Avenue, Bridgeway Boulevard and the Chartwell Oak Park retirement home. Accessibility to both the west and east sides of the drain is available through this reach from these neighbouring streets. Selective tree cutting on the east side of the drain is recommended only where necessary for excavation purposes to remove debris blockages and to remove localized sediment build up.

Existing Bridges

For the lower portion of the Lennon Drain being reported on from Station 0+000 to Station 1+713, there are presently three (3) road bridges and one (1) flow control bridge as described below:

Bridge No. 1 (Normandy Street crossing @ Station 0+575) consists of an 1800 mm diameter concrete pipe 35 m long with concrete jute bag headwalls that remains in good condition.

Bridge No. 2 (Brooklyn Avenue crossing @ Station 0+670) consists of an 1800 mm diameter concrete pipe, 30 m long, with sloping stone endwalls that remain in good condition.

Bridge No. 3 (Herb Gray Parkway crossing @ Station 1+350) is an inverted siphon system consisting of three (3) submerged 2400 mm diameter concrete culverts including two (2) low barrel culverts and one (1) high barrel culvert. The difference in elevation between the low barrel and high barrel submerged culverts is approximately 2 metres with the low barrel culverts being fully submerged and high barrel culvert just partially submerged below the Lennon Drain profile. All three culverts at each end are contained within an inlet and outlet concrete chamber with the openings covered with steel grated screens to prevent large debris from entering the submerged culverts. There is also a 1.5 m deep sediment trap contained within the inlet structure and located upstream of the culverts. The sediment trap will capture approximately 100 m^3 of sediment. The inlet opening measures approximately 8 m wide by 4 m high, with a sloped screen and surveyed inlet sill elevation of 178.79 m. The outlet opening measures approximately 13 m wide x 4 m high with vertical screen and surveyed outlet sill elevation of 178.51 m.

One of the low barrel submerged culverts and the high barrel culvert are located behind a 1 m high weir intended to convey the higher flows resulting from larger storm events beyond the 1 in 5 year frequency. The other low barrel culvert conveys low flows during smaller storm events. The intent of this design is to have the new highway culverts act hydraulically similar to the original Highway No. 3 bridge over the Lennon Drain which has since been removed. The said bridge had an opening measuring 2.65 m wide x 1.2 m high and flows through this bridge would have been no less than the new submerged culverts, therefore no adverse impact on peak flows in the reach of the Lennon Drain downstream of the Parkway. The one low barrel culvert is redundant except for during large storm events when it works with the other barrel culvert and high barrel culvert. It also serves an emergency purpose should the other low barrel culvert become obstructed from debris or ice blockage. The submerged culverts are new as part of the Herb Gray

Parkway construction in 2013 & 2014 and are in excellent condition. A review of and further information pertaining to the design and operation of the inverted siphon system under the Parkway is provided later in this report.

Bridge No. 4 (Flow control crossing @ Station 1+708) consists of a 1650 mm diameter concrete pipe 10 m long with vertical concrete headwalls designed to have a top elevation to match headwater elevation of the 100 year storm event. The bridge's intended purpose was to act as a flow control structure and was originally constructed in 1993. The purpose of the flow control was to limit peak flows through the pipe to the 5 year storm as determined from the 1993 LCBA study to be 4.33 cms, and to manage headwaters such that they not build up within the upstream reach to go above full bank condition.

The same study also recommended raising drain banks in order to store the backwater volume from larger storm events. For the 100 year storm peak flow (6.50 cms - 1993 LCBA study) the lands which are adjacent to the drain would be protected from flooding. Without this flow control structure, the 1993 study determined that the Highway No. 3 culvert at the time was undersized and the headwaters resulting from a 1 in 100 year storm would have flooded much of the land adjacent to the highway.

In reference to the 2015 Lennon Drain Stormwater management report prepared for the Herb Gray Parkway project, this same flow control structure was identified. The hydraulic design for both the realigned Lennon Drain and new highway crossing took into account its function, that being to restrict upstream flows originating from within the City of Windsor.

Modifications to Bridge No. 4 during Herb Gray Parkway Construction

In 2013, Bridge No. 4 was altered during the Parkway construction to accommodate the re-alignment of the Lennon Drain. The bridge was temporarily removed by the Parkway's contractor in order to redirect drainage flows through the highway construction site. In 2014, the said bridge was subsequently re-instated once the new Lennon Drain alignment and new highway crossing (denoted herein as Bridge No. 3) was completed.

In comparison of previous drain surveys from 2010 and 2016 that used the same datum, we discovered from the 2010 survey that both the culvert and headwall elevations for Bridge No. 4 closely matched the 1993 LCBA Functional Design Report. However, in our 2016 survey, we found the reconstructed culvert to be approximately 0.70 m lower than the original culvert and the headwalls were approximately 0.40 m lower than the original headwalls.

The flow control structure (Bridge No. 4) now has the pipe culvert significantly embedded by approximately 40% of its diameter situated below the drain bottom profile. From our hydraulic analysis of the present culvert, we have determined that this will restrict flows through the culvert by approximately 30% and further increases the backwater effects. The increased backwater volume combined with a reduced headwall elevation for the flow control structure would ultimately lead to increased flows surpassing the flow control structure and adversely impacting the Lennon Drain downstream within the Town of LaSalle.

We recommend that the existing flow control structure (Bridge No. 4) including the culvert and the concrete headwalls be restored to its original 1993 functional design report and to compliment the 2015 stormwater management report. It is our considered opinion that the necessary reconstruction of Bridge No. 4 is the responsibility of the road authority having jurisdiction of the Herb Gray Parkway.

Design Considerations

A Guide for Engineers working under the Drainage Act in Ontario, 2018, as published by OMAFRA, is the current reference document used by engineers carrying out work on municipal drains under the Act. The 2 year return period design storm is the recommended design standard applied to municipal drains within rural Ontario specific to open drain channels and low hazard agricultural field access crossings. For residential and commercial properties where flooding could wash out an access culvert, a higher 5 to 10 year return period design storm is the recommended design criteria.

Considering the Lennon Drain watershed is predominantly urban for the upper part of the drain within the City of Windsor starting at Howard Avenue and proceeding downstream to the Herb Gray Parkway, the existing drainage outlet provided at the City of Windsor municipal boundary is limited to a 1 in 5 year storm conveyance via the existing flow control structure (denoted as Bridge No. 4 herein). Detention storage is available within the upstream Lennon Drain channel and its multiple stormwater management facilities adjacent thereto and to be located within the Roseland Golf Course. Recent improvements that were recommended to the upper part of the Lennon Drain, as outlined within the 2016 Rood report, were designed to provide flood protection to adjacent lands along the Lennon Drain within the City of Windsor during larger storms up to and including the 1 in 100 year storm event. The design took into account that flows are still being limited by the flow control structure that was designed as part of the 1993 Functional Design study.

Inside the Herb Gray Parkway corridor from Station 1+713 downstream to Station 1+125 the Lennon Drain was realigned and widened and included the new highway crossing (Bridge No. 3 denoted herein) as part of the highway development. The drainage works were designed to provide the capacity required for a 1 in 100 year design storm, while at the same time not increasing the peak flows or water levels within the Lennon Drain downstream of the Parkway corridor. This was achieved by means of storm water detention ponds that were constructed on the Parkway lands to receive and store the 100 year storm drainage flows originating from the new highway. From the ponds, these flows are released slowly back into the Lennon Drain at a controlled rate that would not exceed pre-development flow conditions or increase the backwater effects within the Lennon Drain upstream of the Parkway corridor. There is however, an increase in runoff volume by approximately 8.6% above pre-development conditions that is attributed to the increased impervious area within the Herb Gray Parkway corridor.

Proceeding downstream through the existing residential area within the Town of LaSalle to Normandy Street, the Lennon Drain is capable on conveying a 5 year return period storm within the channel following some minor drain bottom deepening improvements of approximately 0.25 metres for the downstream portion of drain between Station 0+550 and Station 1+125. This segment of drain picks up drainage from the lands east of the drain including existing residential areas on Bridgeway Boulevard, Brooklyn Avenue,

Thirteenth Street and Normandy Street. The area identified as Blocks 'B' and 'C' on page 2 of the drawings included within this report.

The existing residential lands to the west side of the drain have their drainage directed to the Nantais Drain and form part of the Block 'A' lands identified on page 2 of the drawings included within this report. Continuing downstream of Normandy Street to the Lennon Drain outlet into the Cahill Drain, the 1 in 5 year design storm capacity is obtained with some minor deepening and widening improvements as we have recommended herein. These improvements are required to reduce the tail water conditions within the downstream part of the Lennon Drain for the Normandy Street culvert (Bridge No. 1).

The 10 year return period storm is the recommended design criteria applied to municipal drain crossings of local municipal roads such as Normandy Street (Bridge No. 1) and Brooklyn Avenue (Bridge No. 2). Following the improvements to the lower portion of the Lennon Drain as outlined above, the existing 1800 mm diameter culverts at each of these respective crossings are capable of conveying the 10 year design peak flows without experiencing a headwater condition.

Hydrologic and hydraulic analysis using computer aided simulations were applied to check the upstream and downstream impacts on the Lennon Drain from the improvements undertaken with the Herb Gray Parkway construction. Stormwater management ponds were designed and constructed as part the Parkway project to capture all drainage from the new highway corridor with controlled release of flows to pre-development conditions. Our findings from this analysis indicate that there are no adverse impacts in terms of higher flows or elevated water levels. However, there is an increased volume of runoff coming from the Herb Gray Parkway development compared to the previous Highway No. 3 condition.

With the exception of the existing flow control structure (Bridge No. 4) all other existing bridges have adequate capacity to meet the design standards, as noted above, taking also into account the improvements recommended under this report. To convey peak flows from the 5 year storm event without surcharging, Bridge No. 4 requires the existing 1650 mm diameter concrete culvert to be raised up, as specified herein. Furthermore, the headwalls require to be raised up, as specified herein, to make full use of upstream available on-line storage while attenuating the peak flows from the 100 year storm event as originally designed as part of the 1993 LCBA Functional Design Report

We have recommended the widening of the Lennon Drain from its outlet upstream for a distance of approximately 550 metres to Normandy Street. It is at this downstream portion of drain where an increased tail water condition exists for the Normandy Street culvert (Bridge No. 1). The drain widening reduces the tail water elevation to permit conveyance of the 5 year storm flows both upstream and downstream of Normandy Street. Downstream of the Lennon Drain outlet into the Cahill Drain our survey revealed that the lower portion of the Cahill Drain extending to its outlet into Turkey Creek has accumulated very little sediment with the exception of two localized areas just upstream near Dunkirk Avenue. This is being addressed under the Cahill Drain improvements and detailed under a separate report.

Lennon Drain Submerged culverts (Bridge No. 3) crossing Herb Gray Parkway

Submerged culverts or as they are more widely known as inverted siphons are typically used where piping is required to go under an obstruction. In this case, the obstruction being the tunneled highway segment of the Herb Gray Parkway. An inverted siphon can be designed to achieve the same hydraulic performance as a non-submerged culvert. They operate under gravity and pressurized flow. They have been designed such that there is no increase in peak flows downstream or increase in headwater elevation upstream. They are rarely used in municipal drain applications due to concerns over increased maintenance costs and potential blockages from ice and debris. However, some measures were incorporated into the design and construction of the submerged culverts to reduce the potential for any such issues, as follows:

- The trash screen on the inlet structure is sloped to allow for ice and debris to float at the surface away from the main channel flow and less likely to obstruct.
- Should the inlet structure screen become obstructed, an emergency flow route located along the north side of the inlet structure allows flows to enter from the opposite side of the inlet structure through a separate inlet screen.
- There are additional openings on the north wall of the inlet structure to facilitate weir flow into the submerged culverts during higher storm flows. During the 100 year storm event, the submerged culverts will continue to convey the flows with only two barrels in use, in the event that one of the three existing barrels become obstructed or removed from operation for maintenance.
- In order to address the potential of water freezing at the opening of the low flow barrel culvert, one of the high flow barrels is elevated such that the pipe opening is not fully submerged and therefore maintaining an outlet. Having the other two low barrel culverts fully submerged eliminates the possibility of air being trapped in the descending pipes and reducing conveyance of flows without air release venting.
- A sediment trap of significant size and depth within the inlet structure captures the majority of the sediment that can also be readily removed mechanically using sewer cleaning equipment with access through the removable grating on top of structure. For the lower segment of the low flow submerged culvert where sediment would end up should it by pass the sediment trap, the pipes are designed such that during a 5 year storm flow the water velocity within the pipe exceeds the minimum 0.9 m/s required to transport and flush sediment from the pipes. Provided there is routine inspection and maintenance of the inlet structure's sediment trap, the submerged culverts should not be prone to appreciable sediment accumulation.
- The upstream catchment area is predominantly developed with either hard or grassed surfaces contributing minimal sediment load expected from surface water runoff. The upstream portion of the Lennon Drain channel which runs parallel to the Parkway has been realigned and reconstructed to a much broader fully grassed lined channel complete with a meandering low flow channel. As a result, there is less potential for scour and sediment transport downstream during higher flows. Provided there is routine inspection and maintenance to remove

accumulated sediment from the low flow channel, transported sediment reaching the inlet structure for the submerged culverts at the Lennon Drain crossing of the Parkway should be minimal.

Incorporation of the Lennon Drain Re-alignment (Station 1+125 to Station 1+713)

The original Lennon Drain portion within the Town of LaSalle that had crossed the former King's Highway No. 3 and Huron Church Line Road has now been realigned and extended further to the north into and across the Herb Gray Parkway corridor before rejoining the original alignment of the Lennon Drain within the City of Windsor. The new drain segment defined from Station 1+125 to Station 1+713 was completed as part of the Herb Gray Parkway project in 2014 including the new highway crossing denoted herein as Bridge No. 3 (Station 1+350) and the flow control structure denoted herein as Bridge No. 4 (Station 1+708).

On the upstream side of Bridge No. 3, the new drain alignment from Station 1+430 to Station 1+713 runs parallel with the highway and receives drainage directly from the adjacent residential lands on the north side. On the downstream side of Bridge No. 3, the new drain alignment from Station 1+125 to Station 1+266 receives drainage directly from the Herb Gray Parkway lands and its associated storm water management pond only. We have recommended the incorporation of these drainage works to become a part of the new Lennon Drain alignment.

We find that no further improvements are required to the drain channel or Bridge No. 3 within this new alignment, however improvements to Bridge No. 4 are recommended as per the details provided within this report. The new drain alignment eliminates the three 90 degree bends that existed in the Lennon Drain immediately downstream of Huron Church Line Road that were in close proximity to each other. These drains bends had reduced the drain's performance and increased the likelihood of flooding affecting the downstream lands between Huron Church Line Road and Bridgeway Boulevard. With the straighter drain alignment associated with the realigned Lennon Drain constructed through the Herb Gray Parkway construction, the drain's performance has improved.

Lennon Drain Branch

For the remnant portion of the original Lennon Drain, it was previously filled in starting upstream of Huron Church Line Road and across the Herb Gray Parkway lands. Some of the upstream drainage within the highway corridor was redirected to the new drain alignment, while the remaining storm drainage from Huron Church Line Road and the adjacent properties starting north of Normandy Street continues to outlet into the original Lennon Drain at Huron Church Line Road. Measuring approximately 265 m in length, we recommend the said portion of drain maintain its municipal drain status and be hereby be renamed the Lennon Drain Branch. The watershed area for the Lennon Drain Branch is approximately 12.69 hectares and is represented by Block 'C' identified on page 2 of the drawings contained within this report.

We find that no hydraulic improvements or maintenance is necessary at this time for the Lennon Drain Branch. Sediment buildup is minimal and the channel section, having a bottom width of 1.5 m and 3:1 side slopes, is substantially adequate to convey the 1 in 5 year storm. Access for future maintenance of the drain shall be from Thirteenth Street to access the south side of the drain from Station 0+000A to Station 0+120A and from

Station 0+180A to Station 0+265A; and from Huron Church Line Road and through private property Roll No. 240-08400 to the east side of the drain between Station 0+120A and Station 0+180A.

Recommendations

Based on our review of the history, the information obtained during the site meeting and our examination and analysis of the survey data, hydrologic and hydraulic analysis, we have recommended the following improvements to the Lennon Drain:

- Brushing and drain bottom cleanout including minor widening of west bank to establish minimum 1.5 m design bottom width and 2:1 side slope on west bank from Station 0+000 to Station 0+550. Selective tree and stump removal within the drain channel and/or trimming of trees on west side of the drain only where necessary to gain access for equipment to complete work. The excavated sediment and debris is to be trucked and hauled away to an approved dumping site. For this purpose, a temporary access culvert would be required across the Nantais Drain to access the lower portion of the Lennon Drain. The minimum culvert size for the temporary culvert shall be 1050 mm diameter concrete pipe or 1200 mm diameter corrugated steel pipe. Access to the drain shall be from Normandy Street along the west side of the drain.

- Brushing and drain bottom cleanout to establish minimum 1.5 m design bottom width from Station 0+590 to Station 1+125. Selective tree removal and/or trimming of trees on east side of the drain only where necessary to gain access for equipment to complete work. The excavated sediment and debris is to be trucked and hauled away to an approved dumping site. Access to the drain shall be from Brooklyn Avenue situated on the west side of the Lennon Drain and continuing across Bridge No. 2 and along the east side of the drain. The contractor shall be required to open a section of the chain link fence located on the east side of the drain. Access between the fence and the drain extends for a distance of approximately 90 metres. The fence and grassed access corridor to be fully restored thereafter as part of the work.

- Flush and clean existing 1800 mm diameter concrete pipe culverts including disposal of sediment off site, Bridge No. 1 – 35 m long, Bridge No. 2 – 30 m long.

- Excavation of drain bottom including the widening of west bank (2:1 side slopes) and trucking of excavated materials off site, Station 0+000 to Station 0+550, totalling approximately 550 lineal metres of drain and approximately 1,650 m^3 of material (1.5 m wide bottom). The work shall include the supply and installation of a temporary access culvert across the Nantais Drain outlet (1050 mm diameter concrete or 1200 mm diameter CSP) including its removal and full restoration of drain banks thereafter.

- Excavation of drain bottom including trucking of excavated materials off site, Station 0+590 to Station 1+125, totalling approximately 535 lineal metres of drain and approximately 150 m^3 of material (1.5 m wide bottom). The Contractor shall prevent damage to the existing asphalt pedestrian path and to the steel chain link fence along the east side of the drain for a distance of approximately 90 metres. The work shall include dismantling the fence to gain access on east side of drain from

Station 0+782 to Station 0+872 and full reassembly following completion of the drain cleanout. The existing grassed corridor on east side of drain where damaged shall be fully restored as part of the work.

- Hydraulic seeding of west drain bank from Station 0+000 to Station 0+550.
- Supply and install stone erosion protection on outlet of Lennon Drain into the Cahill Drain Station 0+003 to 0+013 including new filter fabric underlay (approximately 150 m^2).
- Supply and install stone erosion protection for surface water inlet on east drain bank into the Lennon Drain Station 0+085 including new filter fabric underlay (approximately 20 m^2).
- Supply and install stone erosion protection on outlet of Nantais Drain into the Lennon Drain Station 0+243 including new filter fabric underlay (approximately 40 m^2).
- Bridge No. 4 – Station 1+708 (Flow control bridge) – Salvage and raise up existing 10 m long, 1650 mm diameter concrete pipe and reconstruct vertical concrete headwalls including disposal of existing materials off site. Work to also include clear stone bedding materials for pipe, Granular 'B' backfill, and Granular 'A' for driveway surface. The new concrete headwalls are to be poured in place or precast conforming to OPSD 804.02. Access to work site shall be from Northway Avenue and along the existing asphalt roadway. Contractor to take necessary precautions to avoid damage to asphalt surface.
- Construct sediment trap complete with rock check dam and spillway starting from Station 0+003 to Station 0+013 (10 m long x 2 m wide x 0.5 m deep rock lined sediment trap & 5 m long x 3.5 m wide x 0.5 m high rock check dam). Work to include excavation of drain materials, trucking and disposal off site (approx. 10 m^3) and 150-250 mm size gabion stone (approx. 50 tonnes).

Allowances (Lennon Drain)

In accordance with Sections 29 and 30 of the Drainage Act, we have made a determination of the amount to be paid for damages to the lands and for land used and taken in the improvements to the Lennon Drain.

Schedule 'A-1' shows the distribution of these allowances for the Lennon Drain in the total amount of $3,600.00.

Allowances (Lennon Drain Branch)

In accordance with Sections 29 and 30 of the Drainage Act, we have made a determination of the amount to be paid for land used in the improvements to the Lennon Drain Branch.

Schedule 'A-2' shows the distribution of these allowances for the Lennon Drain Branch in the total amount of $3,300.00.

Cost Estimate

We estimate the costs of the Lennon Drain repairs and improvements as described below:

Item	Description	Amount
	LENNON DRAIN	
1.	Brushing of the drain and selective tree cutting as required to permit construction equipment access to complete excavation works including trucking and removal of brush, trees including stumps and other debris located within drain channel and the disposal off-site as follows:	
	a) Station 0+000 to Station 0+550 (west side access)	$35,000.00
	b) Station 0+590 to Station 1+125 (east side access)	$15,000.00
2.	Excavation of drain bottom including the widening of west bank (2:1 side slopes) and trucking of excavated materials off site, as follows:	
	a) Station 0+000 to Station 0+550, totalling approximately 550 lineal metres of drain and approximately 1,650 m^3 of material (1.5 m wide bottom). The work shall include the supply and installation of a temporary access culvert across the Nantais Drain outlet (1050 mm diameter concrete or 1200 mm diameter CSP) including its removal and full restoration of drain banks thereafter.	$40,000.00
	b) In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.	$60,000.00
3.	Excavation of drain bottom including trucking of excavated materials off site, as follows:	

Item	Description	Amount
	a) Station 0+590 to Station 1+125, totalling approximately 535 lineal metres of drain and approximately 150 m^3 of material (1.5 m wide bottom). The Contractor shall prevent damage to the existing asphalt pedestrian path and steel chain link fence along the east side of the drain. The work shall include dismantling the fence to gain access on east side of drain from Station 0+782 to Station 0+872 and full reassembly following completion of the drain cleanout. The existing grassed corridor on east side of drain where damaged shall be fully restored as part of the work.	$25,000.00
	b) In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.	$15,000.00
4.	Flush and clean existing 1800 mm diameter concrete pipe culverts including disposal of sediments off site.	
	a) Station 0+575 Normandy Street - 35 m long	$5,000.00
	b) Station 0+670 Brooklyn Ave - 30 m long.	$5,000.00
5.	Hydraulic seeding of west drain bank from Station 0+000 to Station 0+550 (approximately 3,000 m^2).	$12,000.00
6.	Stone Erosion protection works as follows:	
	a) Station 0+003 to 0+013 – Supply and installation of stone erosion protection (SEP) at Lennon Drain outlet including new filter fabric underlay (approximately 150 m^2).	$9,000.00

Item	Description	Amount
	b) Station 0+085 – Supply and installation of stone erosion protection (SEP) at existing surface water inlet on east bank including new filter fabric underlay (approximately 20 m^2).	$1,200.00
	c) Station 0+243 – Supply and installation of stone erosion protection (SEP) at Nantais Drain outlet on west drain bank including new filter fabric underlay (approximately 40 m^2).	$2,400.00
7.	Bridge No. 4 – Station 1+708 (Flow control bridge) – Salvage and raise up existing 10 m long, 1650 mm diameter concrete pipe and reconstruct vertical concrete headwalls including disposal of existing materials off site. Work to also include clear stone bedding materials for pipe, Granular 'B' backfill, and Granular 'A' for driveway surface. The new concrete headwalls are to be poured in place or precast conforming to OPSD 804.02. Access to work site shall be from Northway Avenue cul-de-sac within the City of Windsor and along the existing asphalt roadway leading into the Herb Gray Parkway corridor. Contractor to take necessary precautions to avoid damage to the asphalt surface.	$45,000.00
8.	Construct sediment trap complete with rock check dam and spillway starting from Station 0+003 to Station 0+013 (10 m long x 2 m wide x 0.5 m deep rock lined sediment trap & 5 m long x 3.5 m wide x 0.5 m high rock check dam). Work to include excavation of drain materials, trucking and disposal off site (approx. 10 m^3) and 150-250 mm size gabion stone (approx. 50 tonnes).	$6,000.00
	SUB-TOTAL	**$275,600.00**
9.	Allowances under Sections 29 and 30	$3,600.00
10.	Drain Survey, Design, Report, attend Council meetings including expenses and incidentals.	$110,500.00
11.	Drain Assessment Rationale & Assessment Schedules, Report, attend Council meetings including expenses and incidentals as per N.J. Peralta Engineering.	$34,400.00
12.	Contract administration and part time construction inspection.	$15,000.00
13.	ERCA review and permit application fee	$800.00
	TOTAL ESTIMATE – LENNON DRAIN	**$439,900.00**

Item	Description	Amount
	LENNON DRAIN BRANCH	
14.	Allowances under Sections 29 and 30	$3,300.00
15.	Drain Survey, Design, Report, attend Council meetings including expenses and incidentals.	$8,500.00
16.	Drain Assessment Rationale & Assessment Schedules, Report, attend Council meetings including expenses and incidentals as per N.J. Peralta Engineering.	$3,000.00
	TOTAL ESTIMATE – LENNON DRAIN BRANCH	**$14,800.00**
	OVERALL TOTAL – LENNON DRAIN & BRANCH	**$454,700.00**

The estimate provided in this report was prepared according to current materials and installation prices as of the date of this report. In the event of delays from the time of filing of the report by the Engineer to the time of tendering the work, it is understood that the estimate of cost is subject to inflation. The rate of inflation shall be calculated using the Consumer Price Index applied to the cost of construction from the date of the report to the date of tendering.

Assessments

The foregoing capital costs as well as future costs of maintenance have been assessed to the affected landowners, roads and other parties as shown in the appended schedules of assessment (**see Part 'B' – Assessment Considerations**) as prepared by N.J. Peralta Engineering Ltd. A rationale for the assessments is also provided.

Future Maintenance of the Lennon Drain downstream of the Herb Gray Parkway Corridor

We recommend that future work of repair and maintenance of the lower portion of the Lennon Drain downstream of the Herb Gray Parkway from Station 0+000 to Station 1+150 be carried out by the Municipality (Town of LaSalle). The assessment of future maintenance costs are provided under the appended assessment considerations, Part B of this report prepared by N.J. Peralta Engineering.

Future Maintenance of the Lennon Drain across the Herb Gray Parkway Corridor

We recommend that future work of repair and maintenance of the lower portion of the Lennon Drain across the Herb Gray Parkway from Station 1+150 to Station 1+713 including all lateral drains be carried by the operating road authority as per the existing maintenance agreements with the Town of LaSalle and City of Windsor. Should the road authority neglect to properly maintain the drain, the affected municipality which has the responsibility and liability to ensure it is maintained and kept in good repair, has the rights and powers under the Drainage Act legislation to proceed accordingly. The assessment of future maintenance costs are provided under the appended assessment considerations, Part B of this report prepared by N.J. Peralta Engineering.

Future Maintenance of the Lennon Drain Branch

We recommend that future work of repair and maintenance of the Lennon Branch Drain from Station 0+000A to Station 0+265A be carried out by the Municipality (Town of LaSalle). The assessment of future maintenance costs are provided under the appended assessment considerations, Part B of this report prepared by N.J. Peralta Engineering.

Drawings and Specifications

Attached to this report is "Schedule B", which are Specification setting out the details of the recommended works, and "Schedule C", which represents the following drawings that are also attached to this report:

Page 1 of 8:	**Overall Plan**
Page 2 of 8:	**Plan Enlargement**
Page 3 of 8:	**Lennon Drain Profile Sta. 0+000 to Sta. 0+800**
Page 4 of 8:	**Lennon Drain Profile Sta. 0+800 to Sta. 1+713**
Page 5 of 8:	**Lennon Drain Branch Profile Sta. 0+000A to Sta. 0+265A**
Page 6 of 8:	**Cross Sections**
Page 7 of 8:	**Bridge No. 4 Details**
Page 8 of 8:	**Details**

Fisheries Issues

The Lennon Drain has been classified as a "Type C" drain by the Department of Fisheries and Oceans from its outlet into Cahill Drain to upstream of the Herb Gray Parkway (Station 1+713). Standard practices to be followed to minimize disruption to fish habitat include embedment of culverts a minimum 10% below drain bottom, maintaining existing grass buffer strips, repairing drain bank erosion and preserving all healthy trees that are outside of the drain channel unless they are physically obstructing and preventing access to clean the drain and require trimming or removal.

In addition, to alleviate potentially harmful impacts and avoid disruption to fish habitat, the following is recommended:

- In order to protect local fish populations during their spawning and nursery periods no **'in-water'** work should be conducted from March 15 – June 30 (DFO/MNRF) timing window without prior authorization from DFO (Department of Fisheries and Oceans) for emergency situations. Prior to undertaking any of these works, a DFO review and authorization in accordance with Fisheries Act may be required.
- All in-stream work should be completed in **'the dry'**.
- Sediment and erosion control measures should be implemented prior to work and regularly inspected and maintained during the work phase, to prevent entry of sediment into the water.
- All materials and equipment used for the purpose of site preparation and project completion should be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum products, silt, etc.) from entering the water.

- All disturbed areas should be stabilized immediately, and upon completion of work returned to a pre-disturbed state or better as soon as conditions allow.

Grants

In accordance with the provisions of Sections 85, 86 and 87 of the Drainage Act, a grant in the amount of 33–1/3 percent of the assessment eligible for a grant may be made in respect to the assessment made under this report upon privately owned lands used for agricultural purposes. The assessments levied against privately owned agricultural land must also satisfy all other eligibility criteria set out in the Agricultural Drainage Infrastructure Program policies. We recommend that application be made to the Ministry of Agriculture, Food and Rural Affairs in accordance with Section 88 of the Drainage Act, for this grant, as well as for all other grants for which this work may be eligible.

Respectfully submitted,

DILLON CONSULTING LIMITED

Tim R. Oliver, P.Eng.
TRO:wlb

SCHEDULE 'A-1'

SCHEDULE OF ALLOWANCES

LENNON DRAIN

TOWN OF LASALLE

Roll No.	Con.	Description	Owner	Section 30 Damages	Section 29 Land	Total Allowances
190-00190	2	Pt. Lot 34 RP 12R13916 Pts 1,2 & 3	Town of LaSalle	$0.00	$1.00	$1.00
240-08770	2	Pt. Lot 39 RP 12R21108 Part 1	Town of LaSalle	$0.00	$1.00	$1.00
240-10300	2	Pt. Lot 38 Plan 1279 Lots 349 to 351	Town of LaSalle	$0.00	$1.00	$1.00
240-10500	2	Pt. Lot 38 Plan 1279 Lots 304 & 305	Town of LaSalle	$0.00	$1.00	$1.00
240-10600	2	Pt. Lot 38 Plan 1279 Lot 354	Town of LaSalle	$0.00	$1.00	$1.00
240-10750	2	Pt. Lot 38 Plan 1279 Lots 301, 302 & 303	Town of LaSalle	$0.00	$1.00	$1.00
240-13700	2	Pt. Lot 38 Plan 1279 Lots 215 & 216	Town of LaSalle	$0.00	$1.00	$1.00
240-13800	2	Pt. Lot 38 Plan 1279 Lot 214	South Windsor Properties Inc.	$0.00	$460.00	$460.00
240-17200	2	Pt. Lot 38 Plan 1279 Lots 131, 132 & 133	Town of LaSalle	$0.00	$1.00	$1.00
240-17600	2	Pt. Lot 38 Plan 1279 Lots 215 to 216	Town of LaSalle	$0.00	$1.00	$1.00
240-17600	2	Pt. Lot 37 Plan 1279 Lots 48 to 53	Town of LaSalle	$0.00	$1.00	$1.00
240-17710	2	Pt. Lot 37 Plan 1279 Lots 44 to 47	Town of LaSalle	$0.00	$1.00	$1.00
250-04100	2	Pt. Lot 36	Hydro One Networks Inc.	$0.00	$1,050.00	$1,050.00
250-04600	2	Pt. Lot 36 Plan 963 Lots 260-263	Alyssa A. Elliott	$0.00	$1,210.00	$1,210.00
250-17400	2	Pt Lot 36 Plan 963 Lot 407 & 408	Town of LaSalle	$0.00	$1.00	$1.00
250-17500	2	Pt. Lot 36 Plan 963 Lot 406	South Windsor Properties Inc.	$0.00	$370.00	$370.00
250-17700	2	Pt. Lot 36 Plan 963 Lot 406	Town of LaSalle	$0.00	$1.00	$1.00
250-18500	2	Pt. Lot 36 Plan 963 Lots 586 to 588	Town of LaSalle	$0.00	$1.00	$1.00
250-18700	2	Pt. Lot 36 Plan 963 Lot 585	Town of LaSalle	$0.00	$1.00	$1.00
250-28200	2	Pt. Lot 37 Plan 1000 Lots 16 to 30	Town of LaSalle	$0.00	$1.00	$1.00
250-29000	2	Pt. Lot 37 Plan 1001 Lots 165 & 166	Town of LaSalle	$0.00	$1.00	$1.00

Roll No.	Con.	Description	Owner	Section 30 Damages	Section 29 Land	Total Allowances
250-34000	2	Pt. Lot 37 Plan 1001 Lots 225 & 239	Town of LaSalle	$0.00	$1.00	$1.00
250-35300	2	Pt. Lot 37 Plan 1001 Lots 348 & 349	Town of LaSalle	$0.00	$1.00	$1.00
250-35400	2	Pt. Lot 37 Plan 1001 Lot 347	Domenico Iannetta	$0.00	$490.00	$490.00
250-35500	2	Pt. Lot 37 Plan 1001 Lots 345 & 346	Town of LaSalle	$0.00	$1.00	$1.00
TOTAL ALLOWANCES				**$0.00**	**$3,600.00**	**$3,600.00**

SCHEDULE 'A-2'

SCHEDULE OF ALLOWANCES

LENNON DRAIN BRANCH

TOWN OF LASALLE

Roll No.	Con.	Description	Owner	Section 30 Damages	Section 29 Land	Total Allowances
240-08770	2	Pt. Lot 39 RP 12R21108 Part 1	Town of LaSalle	$0.00	$1.00	$1.00
240-08760	2	Pt. Lot 39 RP 12R21108 Part 3	Town of LaSalle	$0.00	$1.00	$1.00
240-08600	2	Pt. Lot 39 RP 12R5226 Part 1	Lawrence A. & Deborah S. Serran	$0.00	$950.00	$950.00
240-08400	2	Pt. Lot 39 RP 12R20390	Donald J. & Colleen M. Serran	$0.00	$2,348.00	$2,348.00
TOTAL ALLOWANCES				**$0.00**	**$3,300.00**	**$3,300.00**

"SCHEDULE B"
DRAINAGE REPORT FOR THE
LOWER PORTION OF THE
LENNON DRAIN
TOWN OF LASALLE AND THE CITY OF WINDSOR
SPECIAL PROVISIONS - GENERAL

1.0 GENERAL SPECIFICATIONS

The General Specifications attached hereto is part of "Schedule B" It also forms part of this specification and is to be read with it, but where there is a difference between the requirements of the General Specifications and those of the Special Provisions which follow, the Special Provisions will take precedence.

2.0 DESCRIPTION OF WORK

The work to be carried out under this Contract includes, but is not limited to, the supply of all **labour, equipment and materials** to complete the following items:

- Brushing of the drain on west side only as required to permit construction equipment access for drain cleanout including trucking and removal of debris off-site as follows:.
  - Station 0+000 to Station 0+550 (west side only)
  - Station 0+590 to Station 1+125 (east side only)
- Excavation of drain bottom including minor widening of west bank and trucking of excavated materials off site, as follows:
  - Station 0+000 to Station 0+550, totalling approximately 550 lineal metres of drain and approximately 1,650 m^3 of material (1.5 m wide bottom). The Contractor shall prevent damage to the existing asphalt pedestrian path along south side of Normandy Road using wood mats.
  - In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.
  - Supply and placement of temporary access culvert across Nantais Drain (1050 mm concrete or 1200 mm CSP) including removal and restoration of drain banks where disturbed.
- Excavation of drain bottom including trucking and levelling excavated materials off-site, as follows:
  - Station 0+590 to Station 1+125, totalling approximately 535 lineal metres of drain and approximately 150 m^3 of material (1.5 m wide bottom). The Contractor shall

prevent damage to the existing asphalt pedestrian path and steel chain link fence along the east side of the drain.The work shall include dismantling the fence to gain access on east side of drain from Station 0+782 to Station 0+872 and full reassembly following completion of the drain cleanout. The existing grassed corridor on east side of drain where damaged shall be fully restored as part of the work.

- In advance of the excavation of the drain, the contractor to coordinate and implement a soil sampling program in order to further characterize the nature of the soil material projected to be excavated from the drain bottom. The soil sampling program shall be developed and undertaken by a qualified certified firm. The proposed sampling program will be developed on the basis of satisfying both Municipal and Ministry of the Environment Climate Change and Parks (MECP) requirements to confirm that the nature of the excavated material is suitable for land disposal. The Contractor shall not proceed with the excavation of the drain until such approval has been received. In the event that the soil is deemed not suitable for land disposal, the Contractor is obligated to dispose of the material at an approved alternate location in compliance with Ont. Reg. 406/19 for On-Site and Excess Soil Management.

- Hydraulic seeding of west drain bank from Station 0+000 to Station 0+550 (approximately 3,000 m^2).
- Flush and clean existing 1800 mm diameter concrete pipe culverts including disposal of sediments off-site.
  - Station 0+575 Normandy Street - 35 m long.
  - Station 0+670 Brooklyn Ave - 30 m long.
- Stone Erosion protection works as follows:
  - Station 0+003 to 0+013 – Supply and installation of stone erosion protection (SEP) at Lennon Drain outlet including new filter fabric underlay (approx. 150 m^2).
  - Station 0+085 – Supply and installation of stone erosion protection (SEP) at existing surface water inlet on east bank including new filter fabric underlay (approx. 20 m^2).
  - Station 0+243 – Supply and installation of stone erosion protection (SEP) at Nantais Drain outlet on west drain bank including new filter fabric underlay (approx. 40 m^2).
- Bridge No. 4 – Station 1+708 (Flow control bridge) –Salvage and raise up existing 10 m long, 1650 mm diameter concrete pipe and reconstruct vertical concrete headwalls including disposal of existing materials off site. Work to also include clear stone bedding materials for pipe, Granular 'B' backfill, and Granular 'A' for driveway surface. The new concrete headwalls are to be poured in place or precast conforming to OPSD 804.02. Access to work site shall be from Northway Avenue cul-de-sac within the City of Windsor and along the existing asphalt roadway leading into the Herb Gray Parkway corridor. Contractor to take necessary precautions to avoid damage to asphalt surface.
- Construct sediment trap with rock check dam on downstream side starting from Station 0+003 to Station 0+013 (10 m long x 2 m wide x 0.5 m deep sediment trap & 5 m long x 3.5 m wide x 1.0 m high rock check dam). Work to include excavation of drain materials, trucking and disposal off site (approx. 10 m^3) and 150-250 mm size gabion stone (approx. 50 tonnes).

3.0 CONSTRUCTION ACCESS

Lennon Drain

Access to the drain from Station 0+000 to Station 0+590 shall be from Normandy Road. Access from

Station 0+590 to Station 0+872 shall be from Brooklyn Avenue on the west side of the drain and crossing Bridge No. 2 to the east side of the drain. Access from Station 0+872 to Station 1+150 shall be from Bridgeway Boulevard on the east side of the drain. Access from Station 1+150 to Station 1+266 shall be from Herb Gray Parkway lands and Huron Church Line Road cul-de-sac within the Town of LaSalle. Access from Station 1+430 to Station 1+713 shall be from Herb Gray Parkway lands and Northway Avenue within the City of Windsor. The Contractor shall make his/her own arrangements for any additional access for his/her convenience. All road areas and grass lawn areas disturbed shall be restored to original conditions at the Contractor's expense.

Lennon Drain Branch

Access to the drain from Station 0+000A to Station 0+120A shall be from Thirteenth Street. Access from Station 0+120A to Station 0+180A shall be from property Roll No. 240-08400 through a 6 m wide access through the existing driveway access and extending westward to the drain. Access from Station 0+180A to 0+265A shall be from Huron Church Line Road.

4.0 WORKING CORRIDORS

The Contractor shall restrict his equipment to the working corridors as specified in this Section. Any damage resulting from non-compliance with this Section shall be borne by the Contractor. The working corridor shall be measured from the top of the drain bank and shall be as follows:

FROM STA.	TO STA.	PRIMARY (See Note 1 below)	SECONDARY (See Note 2 below)
		LENNON DRAIN	
0+000	0+550	6.0 m wide on west side of drain	N/A
0+550	0+590	Normandy Street	N/A
0+590	0+655	6.0 m wide on east side of drain	N/A
0+655	1+150	6.0 m wide on east side of drain	3.0 m wide on west side of drain
1+150	1+713	Herb Gray Parkway	N/A
		LENNON DRAIN BRANCH	
0+000A	0+120A	6.0 m wide on south side of drain	3.0 m wide on north side of drain
0+120A	0+180A	6.0 m wide on east side of drain	3.0 m wide on west side of drain
0+180A	0+265A	3.0 m wide on south side of drain	N/A

Note 1: *Primary working corridor* indicates the access corridor along the side of the drain where excavation and levelling is recommended (unless noted otherwise below and/or in the Specifications, as well as all purposes listed for Secondary Working Corridors).

Note 2: *Secondary working corridor* indicates the access corridor along side the drain where construction equipment may travel for the purpose of drain bank repairs, tile inlet repairs, surface water inlet repairs, grassed areas and other miscellaneous works. **No disposal of fill or levelling of materials shall be permitted within a secondary working corridor. As**

further specified, use of this secondary working corridor may be further restricted due to site condition. Read all Specifications, Drawings and/or notes before completing works.

5.0 BRUSHING

Brushing shall be carried out on the entire drain within the above identified sections of the drain where required and as specified herein. **All** brush and trees located within the drain side slopes shall be cut parallel to the side slopes, as close to the ground as practicable. Tree branches that overhang the drain shall be trimmed. Small branches and limbs are to be disposed of by the Contractor along with the other brush off site. The Contractor may elect to use a wood chipper machine provided the wood chips are collected by truck and disposed of off-site. The Contractor shall make every effort to preserve mature trees which are beyond the drain side slopes and are within the working corridors that can be avoided by excavator equipment and permit truck access.

Tree stumps within the west drain bank where to be widened from Station 0+000 to Station 0+550 shall be removed and disposed of off-site. All brush, timber, logs, stumps, large stones or other obstructions and deleterious materials that interfere with the cleanout of the drain, as encountered along the course of the drain are to be removed from the drain by the Contractor. Large stones and other similar material shall be disposed of by the Contractor off the site.

Following completion of the work, the Contractor is to trim up any broken or damaged limbs on trees which remain standing, disposing of the branches cut off along with other brush and leaving the trees in a neat and tidy condition.

6.0 EXCAVATION AND TRUCKING OF EXCAVATED MATERIALS

6.1 Excavation of Existing Drain Channel

In all cases, the Contractor shall use the benchmarks to establish the proposed grade. However, for convenience, the drawings provide the approximate depth from the surface of the ground and from the existing drain bottom to the proposed grades. **THE CONTRACTOR SHALL NOT EXCAVATE DEEPER THAN THE GRADELINES SHOWN ON THE DRAWINGS**. Should over-excavation of the drain bank occur, the Contractor will **not** be permitted to repair with native material packed into place by the excavator and reshaped. Should over-excavation occur, the Contractor will be required to have a bank repair detail engineered by a Professional Engineer (hired by the Contractor), to ensure long term stability of the bank is maintained. Such repairs shall be subject to approval by the Engineer and will be at no extra cost to the item.

All excavated material shall be handled as specified in Section 6.2. Hydraulic seeding of the disturbed drain banks shall be completed immediately following drain construction and as specified in Section 8. All excavation work shall be done in such a manner as to not harm any vegetation or trees, not identified in this report or by the Drainage Superintendent for clearing. Any damages to trees or vegetation caused by the Contractors work shall be rectified to the satisfaction of the Drainage Superintendent. The Contractor shall exercise caution around existing tile inlets and shall confirm with the property owners that all tiles have been located and tile ends repaired as specified.

6.2 Trucking of Excavated Materials

Excavated materials are the property of the Contractor and trucking of excavated materials to off-site disposal site to be arranged by Contractor for all non-agricultural properties identified in Section 4.0.

Where applicable, the Contractor shall be solely responsible for acquiring any and all permits and approvals required prior to hauling and disposal of materials off-site. Ontario Regulation 406/19 for On-Site and Excess Soil Management must be adhered to when considering a re-use site for disposal other than a waste management landfill. Soils to be tested to determine soil

classification (Soils Characterization Program) and to confirm Class 2 soils exist to permit the temporary soil storage sites for volumes under 10,000 m^3. Where the soils do not meet the above requirements, a contingency allowance would be used for the increased disposal costs to a local waste facility. The Contractor shall be solely responsible for acquiring any and all permits and approvals required prior to hauling and disposal of materials off-site.

The Contractor shall restore any such areas which are damaged by his operations, to original or better condition. The Contractor will be held liable for damages to roads, sodded areas and gardens, resulting from his non-compliance with these Specifications.

7.0 STONE EROSION PROTECTION (SEP)

The Contractor shall supply and install the required quantities of graded stone rip-rap erosion protection materials where specified herein and detailed on the drawings appended hereto. All stone to be used for erosion protection shall be 125 - 250 mm clear **quarried rock** or OPSS 1001 placed over a non-woven filter fabric Terrafix 270R or approved equivalent. **Concrete rip-rap will not be permitted.**

The minimum thickness requirement of the erosion stone layer is 300 mm with no portion of the filter fabric to be exposed. Stone erosion protection is required where private surface water inlets and tributary municipal drains enter the Lennon Drain as well as for drain bank protection and the construction of rock check dams. The sediment trap shall be constructed in conformance with OPSD 219.22.

8.0 HYDRAULIC SEEDING OF DRAIN BANKS

All existing grassed areas disturbed by construction shall be hydraulic mulch seeded as specified herein. The existing ground surface to be seeded shall be loosened to a depth of 25 mm and shall be rendered uniformly loose for that 25 mm depth. The surface shall be predominantly fine and free from weeds and other unwanted vegetation. All other loose surface litter shall be removed and disposed of.

Hydraulic mulch shall consist of finely ground cellulose pulp derived from recycled newsprint and shall be dyed green. Its fiber consistency shall be approximately 60% fine fiber with the balance being paper particles, 40% of which shall be a diameter of 3 mm minimum and 6 mm maximum. Hydraulic mulch shall be applied at 2,000 kg per 10,000 m^2. Clean water shall be applied at 42,700 liters per 10,000 m^2.

Seeding and mulching shall be a one step process in which the seed, fertilizer and hydraulic mulch are applied simultaneously in a water slurry via the hydraulic seeder/mulcher. The materials shall be added to the supply tank while it is being loaded with water. The materials shall be thoroughly mixed into a homogeneous water slurry and shall be distributed uniformly over the prepared surface. The materials shall be measured by mass or by a mass-calibrated volume measurement, acceptable to the Drainage Superintendent.

The hydraulic seeder/mulcher shall be equipped with mechanical agitation equipment capable of mixing the materials into a homogenous state until applied. The discharge pumps and gun nozzles shall be capable of applying the material uniformly.

Grass seed shall be Canada No. 1 grass seed mixture meeting the requirements of a Waterway Slough Mixture as supplied by Growmark or approved equal, as follows:

Creeping Red Fescue	*20%*
Meadow Fescue	*30%*
Tall Fescue	*30%*
Timothy	*10%*
White Clover	*10%*

Bags shall bear the label of the supplier indicating the content by species, grade and mass. Seed shall be applied at a rate of 200 kg per 10,000 m². Fertilizer shall be 8-32-16 applied at 350 kg per 10,000 m². It shall be in granular form, dry, free from lumps and in bags bearing the label of the manufacturer, indicating mass and analysis.

The hydraulic seeding shall be deemed "Completed by the Contractor" when the seed has established in all areas to the satisfaction of the Engineer. Re-seeding and/or other methods required to establish the grass will be given consideration to achieve the end result and the costs shall be incidental to the works.

9.0 FLOW CONTROL BRIDGE No. 4

9.1 Construction of New Access Bridge

The new culvert shall be installed as shown on the drawings attached hereto. The centerline of the new culverts shall be located to align with the existing laneways.

9.2 Removal of Existing Access Bridge

The Contractor shall exercise caution when removing these materials as to minimize damage to the drain banks. Any damage the drain shall be restored to original conditions at the expense of the Contractor. The removed 1650 mm diameter concrete sewer pipe culvert shall be salvaged for reuse. Other materials (existing concrete head walls) shall be hauled away off-site and disposed of at an approved site.

9.3 Culvert Materials

Culvert Pipe	**Bridge No. 4- Station 1+713:** *Salvaged 10.0 m long, 1650 mm diameter CSA A-257.2 Class 100-D reinforced circular concrete pipe .*
Pipe Bedding Below Pipe	*20-25 mm clear stone conforming to OPSS Division 10.*
Backfill of Pipe Culvert	*Granular 'B' conforming to OPSS Division 10.*
Driveway Surface	*Granular 'A' made from crushed limestone conforming to OPSS Division 10. Minimum 200 mm thickness.*
Erosion Stone	*All stone to be used for erosion protection shall be 125 - 250 mm clear quarried rock or OPSS 1004, minimum 300 mm thickness.*
Filter Fabric	*"Non-Woven" geotextile filter fabric with a minimum strength equal to or greater than Terrafix 270R, Amoco 4546, Mirafi 140NC or approved equivalent.*

9.4 Culvert Installation

Suitable dykes shall be constructed in the drain so that the installation of the pipe can be accomplished in the dry. The drain bottom shall be cleaned, prepared, shaped and compacted to suit the new culvert configuration, as shown on the drawings. Granular materials shall be compacted to at least 98% of their maximum dry density; clean native materials shall be supplied, placed and compacted to at least 95% of their maximum dry density.

9.5 Vertical Concrete Headwalls

The Contractor shall remove and dispose of the existing concrete headwalls off site. The new concrete headwalls shall conform to OPSD 804.02 and constructed to the dimensions and elevations depicted on the drawings appended hereto.

9.6 Granular 'A' Driveway

The Contractor shall construct the driveway to an elevation matching the top of the vertical concrete headwalls. This work includes the installation of a minimum 200 mm thickness of compacted Granular 'A' (crushed limestone) driveway surface. The minimum top width of the driveway shall be as shown on the drawings.

9.7 Imported Native Materials

Clean native materials suitable for fill placement shall be used to raise the elevation of the lands beyond the driveway and headwalls to match same as depicted on the drawings appended hereto. The fill materials shall be compacted and fine graded to suit.

10.0 SITE CLEANUP AND RESTORATION

As part of the work and upon completion, the Contractor shall remove and dispose of, off-site any loose timber, logs, stumps, large stones, rubber tires, cinder blocks or other debris from the drain bottom and from the side slopes. Where the construction works cross a lawn, the Contractor shall take extreme care to avoid damaging the lawn, shrubs and trees encountered. Upon completion of the work, the Contractor shall completely restore the area by the placement and fine grading of topsoil and seeding or sodding the area as specified by the Engineer or Drainage Superintendent.

GENERAL SPECIFICATIONS

1.0 AGREEMENT AND GENERAL CONDITIONS

The part of the Specifications headed "Special Provisions" which is attached hereto forms part of this Specification and is to be read with it. Where there is any difference between the requirements of this General Specification and those of the Special Provisions, the Special Provisions shall govern.

Where the word "Drainage Superintendent" is used in this specification, it shall mean the person or persons appointed by the Council of the Municipality having jurisdiction to superintend the work.

Tenders will be received and contracts awarded only in the form of a lump sum contract for the completion of the whole work or of specified sections thereof. The Tenderer agrees to enter into a formal contract with the Municipality upon acceptance of the tender. The General Conditions of the contract and Form of Agreement shall be those of the Stipulated Price Contract CCDC2-Engineers, 1994 or the most recent revision of this document.

2.0 EXAMINATION OF SITE, PLANS AND SPECIFICATIONS

Each tenderer must visit the site and review the plans and specifications before submitting his/her tender and must satisfy himself/herself as to the extent of the work and local conditions to be met during the construction. Claims made at any time after submission of his/her tender that there was any misunderstanding of the terms and conditions of the contract relating to site conditions, will not be allowed. The Contractor will be at liberty, before bidding to examine any data in the possession of the Municipality or of the Engineer.

The quantities shown or indicated on the drawings or in the report are estimates only and are for the sole purpose of indicating to the tenderers the general magnitude of the work. The tenderer is responsible for checking the quantities for accuracy prior to submitting his/her tender.

3.0 MAINTENANCE PERIOD

The successful Tenderer shall guarantee the work for a period of one (1) year from the date of acceptance thereof from deficiencies that, in the opinion of the Engineer, were caused by faulty workmanship or materials. The successful Tenderer shall, at his/her own expense, make good and repair deficiencies and every part thereof, all to the satisfaction of the Engineer. Should the successful Tenderer for any cause, fail to do so, then the Municipality may do so and employ such other person or persons as the Engineer may deem proper to make such repairs or do such work, and the whole costs, charges and expense so incurred may be deducted from any amount due to the Tenderer or may be collected otherwise by the Municipality from the Tenderer.

4.0 GENERAL CO-ORDINATION

The Contractor shall be responsible for the coordination between the working forces of other organizations and utility companies in connection with this work. The Contractor shall have no cause of action against the Municipality or the Engineer for delays based on the allegation that the site of the work was not made available to him by the Municipality or the Engineer by reason of the acts, omissions, misfeasance or non-feasance of other organizations or utility companies engaged in other work.

5.0 RESPONSIBILITY FOR DAMAGES TO UTILITIES

The Contractor shall note that overhead and underground utilities such as hydro, gas, telephone and water are not necessarily shown on the drawings. It is the Contractor's responsibility to contact utility companies for information regarding utilities, to exercise the necessary care in construction operations and to take other precautions to safeguard the utilities from damage. All work on or adjacent to any utility, pipeline, railway, etc., is to be carried out in accordance with the requirements of the utility, pipeline, railway, or other, as the case may be, and its specifications for such work are to be followed as if they were part of this specification. The Contractor will be liable for any damage to utilities.

6.0 CONTRACTOR'S LIABILITY

The Contractor, his/her agents and all workmen or persons under his/her control including sub-contractors, shall use due care that no person or property is injured and that no rights are infringed in the prosecution of the work. The Contractor shall be solely responsible for all damages, by whomsoever claimable, in respect to any injury to persons or property of whatever description and in respect of any infringement of any right, privilege or easement whatever, occasioned in the carrying on of the work, or by any neglect on the Contractor's part.

The Contractor, shall indemnify and hold harmless the Municipality and the Engineer, their agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceedings arising out of or attributable to the Contractor's performance of the contract.

7.0 PROPERTY BARS AND SURVEY MONUMENTS

The Contractor shall be responsible for marking and protecting all property bars and survey monuments during construction. All missing, disturbed or damaged property bars and survey monuments shall be replaced at the Contractor's expense, by an Ontario Land Surveyor.

8.0 MAINTENANCE OF FLOW

The Contractor shall, at his/her own cost and expense, permanently provide for and maintain the flow of all drains, ditches and water courses that may be encountered during the progress of the work.

9.0 ONTARIO PROVINCIAL STANDARDS

Ontario Provincial Standard Specifications (OPSS) and Ontario Provincial Standard Drawings (OPSD) shall apply and govern at all times unless otherwise amended or extended in these Specifications or on the Drawing. Access to the electronic version of the Ontario Provincial Standards is available online through the MTO website, free of charge to all users. To access the electronic standards on the Web go to http://www.mto.gov.on.ca/english/transrd/. Under the title Technical Manuals is a link to the Ontario Provincial Standards. Users require Adobe Acrobat to view all pdf files.

10.0 APPROVALS, PERMITS AND NOTICES

The construction of the works and all operations connected therewith are subject to the approval, inspection, by-laws and regulations of all Municipal, Provincial, Federal and other authorities having jurisdiction in respect to any matters embraced in this Contract. The Contractor shall obtain all approvals and permits and notify the affected authorities when carrying out work in the vicinity of any public utility, power, underground cables, railways, etc.

11.0 SUBLETTING

The Contractor shall keep the work under his/her personal control, and shall not assign, transfer, or sublet any portion without first obtaining the written consent of the Municipality.

12.0 TIME OF COMPLETION

The Contractor shall complete all work on or before the date fixed at the time of tendering. The Contractor will be held liable for any damages or expenses occasioned by his/her failure to complete the work on time and for any expenses of inspection, superintending, re-tendering or re-surveying, due to their neglect or failure to carry out the work in a timely manner.

13.0 TRAFFIC CONTROL

The Contractor will be required to control vehicular and pedestrian traffic along roads at all times and shall, at his/her own expense, provide for placing and maintaining such barricades, signs, flags, lights and flag persons as may be required to ensure public safety. The Contractor will be solely responsible for controlling traffic and shall appoint a representative to maintain the signs and warning lights at night, on weekends and holidays and at all other times that work is not in progress. All traffic control during construction shall be strictly in accordance with the **Occupational Health and Safety Act** and the current version of the **Ontario Traffic Manuals**. Access to the electronic version of the **Ontario Traffic Manual** is available online through the MTO website, free of charge to all users. To access the electronic standards on the Web go to http://www.mto.gov.on.ca/english/transrd/, click on "Library Catalogue," under the "Title," enter "Ontario Traffic Manual" as the search. Open the applicable "Manual(s)" by choosing the "Access Key," once open look for the "Attachment," click the pdf file. Users require Adobe Acrobat to view all pdf files.

Contractors are reminded of the requirements of the Occupational Health and Safety Act pertaining to Traffic Protection Plans for workers and Traffic Control Plan for Public Safety.

14.0 SITE CLEANUP AND RESTORATION

As part of the work and upon completion, the Contractor shall remove and dispose of, off-site any loose timber, logs, stumps, large stones, rubber tires, cinder blocks or other debris from the drain bottom and from the side slopes. Where the construction works cross a lawn, the Contractor shall take extreme care to avoid damaging the lawn, shrubs and trees encountered. Upon completion of the work, the Contractor shall completely restore the area by the placement and fine grading of topsoil and seeding or sodding the area as specified by the Engineer or Drainage Superintendent.

15.0 UTILITY RELOCATION WORKS

In accordance with Section 26 of the Drainage Act, if utilities are encountered during the installation of the drainage works that conflict with the placement of the new culvert, the operating utility company shall relocate the utility at their own costs. The Contractor however will be responsible to co-ordinate these required relocations (if any) and their co-ordination work shall be considered incidental to the drainage works.

16.0 FINAL INSPECTION

All work shall be carried out to the satisfaction of the Drainage Superintendent for the Municipality, in compliance with the specifications, drawings and the Drainage Act. Upon completion of the project, the work will be inspected by the Engineer and the Drainage Superintendent. Any deficiencies noted during the final inspection shall be immediately rectified by the Contractor.

Final inspection will be made by the Engineer within 20 days after the Drainage Superintendent has received notice in writing from the Contractor that the work is completed, or as soon thereafter as weather conditions permit.

17.0 FISHERIES CONCERNS

Standard practices to be followed to minimize disruption to fish habitat include embedment of the culvert a minimum 10% below grade, constructing the work 'in the dry' and cutting only trees necessary to do the work (no clear-cutting). No in-water work is to occur during the timing window unless otherwise approved by the appropriate authorities.

DRAINAGE REPORT

LOWER PORTION OF THE LENNON DRAIN

PART B – ASSESSMENT CONSIDERATIONS

TOWN OF LASALLE & CITY OF WINDSOR

N. J. Peralta Engineering Ltd.

Consulting Engineers

45 Division St. N., Kingsville, Ontario N9Y 1E1
Tel. (519) 733-6587

Project No. D-14-034

May 25th, 2021

May 25th, 2021

Mayor and Council
Corporation of the Town of LaSalle
5950 Malden Road
LaSalle, Ontario
N9H 1S4

PROJECT: LOWER PORTION OF THE LENNON DRAIN
Town of LaSalle & City of Windsor, County of Essex
Project No. D-14-034 (Dillon File No. 12-6578-1600)

PART B – ASSESSMENT CONSIDERATIONS

I. INSTRUCTIONS

As referred to in the preamble portion of this report, this drainage project is proceeding under a joint appointment of Dillon Consulting Limited (Dillon) and N.J. Peralta Engineering Ltd., with each having a distinct role for the preparation of this drainage report in accordance with Section 78 of the Drainage Act.

N.J. Peralta Engineering Ltd.'s role with respect to this drainage project shall be limited to the determination of assessments and provision of the rationale for the distribution of costs against all lands, roads, and public utilities affected by alterations necessary to the Lower Portion of the Lennon Drain as outlined in **PART A – TECHNICAL CONSIDERATIONS** portion of this Drainage Report prepared by Dillon. Our assessments are intended to be prepared for both the construction and for the future maintenance of the Lower Portion of the Lennon Drain, in the form of Assessment Schedules. Our confirmation of appointment for this Section 78 Engineer's Report for the Lower Portion of the Lennon Drain was provided to us through an email from Peter Marra, P.Eng., (LaSalle Director of Public Works) on January 23rd, 2015.

Our appointment as described above, and all of the work related to the Lower Portion of the Lennon Drain under our portion of this report, are in accordance with Section 78 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended in 2020". We have carried out all of the necessary examinations, investigations, and review of Dillon's **PART A – TECHNICAL CONSIDERATIONS** portion of this report, as well as their design drawings. We also discussed all the details with Mr. Tim Oliver, P.Eng., where necessary, to gain a clearer understanding of the technical findings and determinations, to assist us with establishing both the Construction Assessment Rationale and the Future Maintenance Assessment Rationale related to these drainage works.

II. INTRODUCTION

Our responsibilities with respect to this drainage project are to be limited to the determinations of assessments and the provision of the assessment rationale for the distribution of costs against all lands, roads, and public utilities affected by the proposed improvements to the Lower Portion of the Lennon Drain, as described within the design drawings included with the **PART A - TECHNICAL CONSIDERATIONS** by Dillon. The assessment considerations to be provided by us shall be prepared for not only the construction works being recommended by Dillon within this report, but also for the future maintenance provisions for this drainage system.

In order for us to establish our construction and future maintenance assessments, we worked closely with Mr. Tim Oliver, P.Eng., to obtain all relevant and necessary detailed technical information related to their design of this drainage system.

III. DRAINAGE HISTORY AND WATERSHED CHARACTERISTICS

A review of the Town of LaSalle's drainage records indicates that the Lennon Drain is an existing and generally open Municipal Drain that has been repaired and maintained through provisions of the Drainage Act and the Sandwich West Act. As outlined within **PART A - TECHNICAL CONSIDERATIONS**, this Municipal Drain is a tributary of the Turkey Creek watershed, which has Municipal by-laws dating back to the late 1800s. Subsequent Engineer's Reports have been prepared for the Lennon Drain. However, for works conducted in the Town of LaSalle, it is our understanding that following the passing of the Sandwich West Act in 1949, this drain was subsequently maintained with work being carried out without the benefit of any new by-laws. The following are relevant Engineer's Reports prepared through the provisions of the Drainage Act for the Lennon Drain within the Town of LaSalle and City of Windsor:

a) **July 28th, 1899** Engineer's Report for the "Lennon Drain", prepared by W. Newman, C.E., was filed through the Township of Sandwich West By-Law No. 316. This report provided for the necessary improvements and cleanout for the entire length of the Lennon Drain from its outlet into the Cahill Drain, within the Town of LaSalle, upstream to its top-end at Howard Avenue, within the City of Windsor. These improvements were petitioned for through the provisions of the Drainage Act. Prior to this report, this drain was originally created through the Ditches and Watercourses Act.

b) **June 15th, 1907** Engineer's Report for the "Lennon Drain", prepared J. Newman, C.E., was filed through the Township of Sandwich West By-Law No. 404. This report provided for the necessary improvements and cleanout for the entire length of the Lennon Drain from its outlet into the Cahill Drain, within the Town of LaSalle, upstream to its top-end at Howard Avenue, within the City of Windsor. This report appears to

be the most recent improvements performed on the entire length of this drain, initiated through the provisions of the Drainage Act.

c) **September 22nd, 2016** Engineer's Report for the "Lennon Drain", prepared by G. Rood, P.Eng., was filed through the City of Windsor By-Law. This report included a hydrological and hydraulic study and provided for the improvements to a portion of the Lennon Drain, upstream of the Herb Gray Parkway lands and within the City of Windsor, including Stormwater Management facilities with intentions to store runoff up to the 1:100-year storm flows. These improvements are intended to address the increased runoff created by development within the City of Windsor and to ensure that the existing flow control structure installed per the 1993 Functional Design Report is not overwhelmed.

In March of 1993, a Functional Design Report was prepared by LaFontaine, Cowie, Buratto & Associates Limited (L.C.B.A.) for the Lennon Drain (Talbot Road to Avon Drive), within the City of Windsor. This report was not prepared through the provisions of the Drainage Act. However, it is of major importance to the overall hydraulics within the drainage system. This report included a hydrological and hydraulic study to evaluate the effects of existing and future developments within the City of Windsor. The recommendations included in this report provided for the installation of a flow control structure and alterations to the open drain, upstream of the flow control structure. These improvements were required to protect the lands within the Town of LaSalle by collecting, storing and controlling the increased stormwater runoff created by development within the City of Windsor. The previously identified 2016 Engineer's Report provided for subsequent improvements to the open drain, upstream of the flow control structure, while preserving the existing flow structure, to accommodate for further on-going development in the City of Windsor.

The Lower Portion of the Lennon Drain, as outlined within this report, commences within the City of Windsor at the north side of the Rt. Hon. Herb Gray Parkway (Parkway), immediately east of the intersection of the Parkway and Huron Church Line. The drain then extends northwesterly and parallel to the Parkway for approximately 360.00 metres before crossing southwesterly across the Parkway and into the Town of LaSalle. From this point, this Municipal Drain continues in a southwesterly direction through private lands and crosses Brooklyn Avenue and Normandy Street, to its outlet into the Cahill Drain.

The overall Lennon Drain is the primary drainage outlet for various tributary Municipal Drains. This drain has an irregular-shaped watershed and encompasses approximately 639 hectares (1,579 acres). Most of which are developed lands, within the Town of LaSalle and the City of Windsor. These lands are generally located within relatively flat terrain with very little topographic relief. Furthermore, the watershed is predominately

urban and mostly developed as residential with smaller areas of commercial, institutional, industrial lands. The downstream reach of the Lennon Drain resides within the LaSalle Woodlot E.S.A. (Brunet Park). The soil types and Hydrologic Soil Groups are as follows:

Berrien Sand soils - Classified as Hydrologic Soil Group C; which is described as a low infiltration rate when thoroughly wetted and consists chiefly of soils with a layer that impedes downward movement of water with moderately fine to fine soil structure. As a result, these soils typically require effective artificial sub-surface drainage to be productive.

Brookston Clay soils - Classified as Hydrologic Soil Group D; which is described as a very low infiltration rate when thoroughly wetted and consists chiefly of clay soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material. As a result, these soils require effective artificial sub-surface drainage to be productive.

Overall, there are a total of three (3) road crossings and one (1) flow control structure within the Lower Portion of the Lennon Drain. The road crossing structures are utilized to access the lands and roads along the course of this drain. Each of these structures has been identified within this report.

IV. RT. HON. HERB GRAY PARKWAY (WINDSOR-ESSEX PARKWAY) IMPROVEMENTS

From our review and detailed discussions with Mr. Tim Oliver, P.Eng., of Dillon, the Ministry of Transportation Ontario (M.T.O.), as part of the Parkway Development carried out significant changes to the drainage patterns and the outlet location of the watershed area along the Rt. Hon. Herb Gray Parkway corridor.

As previously identified, the M.T.O. had initiated a request to investigate the functionality of the receiving Municipal Drains, as a direct result of the development of the Rt. Hon. Herb Gray Parkway construction. The Parkway construction commenced in 2012. The improvements and development works associated with the construction of the Parkway include the new roadway realignment of King's Highway No.3 and the widening of King's Highway No. 401. Portions of the Parkway drainage flows are controlled by the new construction of the M.T.O. Stormwater Management Ponds within the Parkway corridor. However, there are additional contributing areas and an increase of runoff resulting from the Parkway construction that is uncontrolled and attributed to a higher impervious area. This development has created increased post-development runoff that outlet directly into the existing drainage infrastructure and overall affects the Lower Portion of the Lennon Drain, as the receiving drain downstream.

V. DESIGN CONSIDERATIONS AND FINDINGS

Dillon, in their **PART A – TECHNICAL CONSIDERATIONS** portion of this report, has referenced "A Guide for Engineers Working Under the Drainage Act in Ontario" - O.M.A.F.R.A. Publication 852 (2018), as the current reference documentation used by Engineer's carrying out work on Municipal Drains through provisions of the Drainage Act. They have confirmed that the design criteria to be utilized for this project are as follows:

- The two (2) year return period design storm is the recommended design standard applied to Municipal Drains within rural Ontario specific to open drain channels and low hazard agricultural access crossings. The exception being for residential, industrial and commercial properties where flooding could wash out an access culvert, where a higher five (5) to ten (10) year return period design storm could be the design criteria. The lands adjacent to the Lower Portion of the Lennon Drain, from its outlet into the Cahill Drain at Station 0+000 to the south limit of the Parkway lands at Station 1+125, has a mixture of residential developments and a natural wood lot alongside the course of the drain. As such, a minimum five (5) year return period storm design shall be utilized for this section of the Lower Portion of the Lennon Drain.

- Continuing upstream through the Parkway lands, from Station 1+125 to the top end of the Lower Part of the Lennon Drain at Station 1+713, the existing drain cross-section has the carrying capacity to convey the one-hundred (100) year return period. For freeway arterial roads, such as the Parkway, the recommended design criteria shall be the one-hundred (100) year return period storm design.

- The ten (10) year return period design storm is the recommended design criteria applied to culverts on Municipal Drains crossing municipal roads such as Brooklyn Avenue and Normandy Street.

Through Dillon's analysis, and our discussions with Mr. Tim Oliver, P.Eng., we understand that the Lower Portion of the Lennon Drain has some areas of heavy brush along the drain banks and within the bottom of the drain. Furthermore, there is a varying degree of sedimentation within the entire length of the open drain and existing culverts. As a result, the Lower Portion of the Lennon Drain will require brushing and cleaning throughout its entire length. Dillon's analysis further outlines that some minor drain widening is recommended, specifically at the lower reaches of the drain between Station 0+000 to Station 0+550, in order to improve channel hydraulics. Dillon further recommends the placement of stone erosion protection at drain bends, surface inlets and at the confluence of tributary drains, in order to protect against future erosion and sedimentation.

It was also established that road crossings under this project have been sized using the rational method. The peak flows determined by the rational method should freely pass through these culverts without experiencing any backwater effects. Furthermore, hydrologic and hydraulic analysis using computer-aided modelling was also applied by Dillon to check the downstream impacts caused by the Lower Portion of the Lennon Drain improvements. This model accounted for the land-use changes within the overall affected watershed, and the effect they may have on the receiving drainage outlets, such as the existing open Municipal Drain.

Based on Dillon's analysis of all of the existing drainage structures within the Lower Portion of the Lennon Drain, the following determinations within said reach have been established as follows:

a) The existing Bridge No.1 at Station 0+575.0, serving as the road crossing structure across Normandy Street, is under the jurisdiction of the Town of LaSalle. This road crossing culvert has never been identified within any Engineer's Report for the Lower Portion of the Lennon Drain. The existing crossing consists of 35.00 metres of 1800mm diameter concrete pipe with concrete jute bag headwalls and is found to be in good physical condition. From Dillon's analysis, the structure has been found to have sufficient capacity to handle the required pre-Parkway and post-Parkway Development design flows for the ten (10) year storm event. Based on Dillon's evaluation, no improvements are required for this structure as part of the technical considerations. However, as part of **PART B - ASSESSMENT CONSIDERATIONS**, provisions have been made to address future maintenance of this structure.

b) The existing Bridge No.2 at Station 0+670.0, serving as the road crossing structure across Brooklyn Avenue, is under the jurisdiction of the Town of LaSalle. This road crossing culvert has never been identified within any Engineer's Report for the Lower Portion of the Lennon Drain. The existing crossing consists of 30.00 metres of 1800mm diameter concrete pipe with sloped stone end walls and is found to be in good physical condition. From Dillon's analysis, the structure has been found to have sufficient capacity to handle the required pre-Parkway and post-Parkway Development design flows for the ten (10) year storm event. Based on Dillon's evaluation, no improvements are required for this structure as part of the technical considerations. However, as part of **PART B - ASSESSMENT CONSIDERATIONS**, provisions have been made to address future maintenance of this structure.

c) The existing Bridge No.3 at Station 1+350.0, serving as the road crossing structure across the Rt. Hon. Herb Gray Parkway and was installed as part of the Parkway construction in 2013 and 2014. This road crossing structure has never been identified within any Engineer's Report for the Lower Portion

of the Lennon Drain. The existing crossing consists of three (3) submerged 2400mm diameter concrete inverted siphons and is found to be in excellent physical condition. From Dillon's analysis, the structure has been found to have sufficient capacity to handle the required pre-Parkway and post-Parkway Development design flows for the one-hundred (100) year storm event. Based on Dillon's evaluation, no improvements are required for this structure as part of the technical considerations. However, as part of **PART B - ASSESSMENT CONSIDERATIONS**, provisions have been made to address future maintenance of this structure.

d) The existing Bridge No.4 (Flow Control Structure) at Station 1+708.0, serves as a flow control structure to limit the peak flows from the developed lands within the City of Windsor. This structure was installed as part of the Functional Design Report prepared by LaFontaine, Cowie, Buratto & Associates Limited (L.C.B.A.), dated March 1993. The original structure consists of 10.00 metres of 1650mm diameter concrete pipe with vertical concrete headwalls and is currently found to be in good condition. However, it was found that the original structure was removed and replaced as part of the Parkway construction. In reviewing the pre versus post-construction survey data, it was found that the replacement of the culvert was installed approximately 0.700 metres lower than the original and the headwalls were installed approximately 0.400 metres lower than the original. Based on Dillon's evaluation, they have recommended that this flow control structure, in its entirety, be removed and restored to its original 1993 Functional Design Report elevations to match the intended flow characteristics and as set out in this report and as further outlined within Dillon's **PART A - TECHNICAL CONSIDERATIONS** portion of this report. We recommend that all costs associated with the replacement of this structure be assessed entirely to the Ministry of Transportation Ontario (M.T.O.), as further outlined within **PART B - ASSESSMENT CONSIDERATIONS**. Furthermore, future maintenance provisions for this structure have also been outlined as part of this report.

VI. RATIONALE FOR CONSTRUCTION ASSESSMENTS

From a comprehensive review of the contents within **PART A - TECHNICAL CONSIDERATIONS** portion of this report and the design drawings related thereto prepared by Dillon, our considerable discussions with Mr. Tim Oliver, P.Eng., together with our review of all past Engineer's Reports on the Lennon Drain and all other Municipal Drains located in the general area, we have established our construction assessment rationale and determinations relative to the improvements being carried out to the Lower Portion of the Lennon Drain. They are as follows:

1. **Brushing and Mowing (Station 0+000 to Station 0+550 and Station 0+590 to Station 1+125)**

A key component of the improvements being provided on the Lower Portion of the Lennon Drain generally consists of the brushing and mowing of the open drain to facilitate the drain improvements recommended under this report. The brushing includes the removal of all brush and trees within the drain banks, and along the length of the open drain which reduces the carrying capacity and contributes to the accumulation of sedimentation within the open drain.

Brushing and mowing of the open drain forms part of the general maintenance works of Municipal Drains. Furthermore, the cutting and removal of vegetative overgrowth are necessary to conduct the various improvements to the open drain and enhance the hydraulic carrying capacity of the channel. As a result, we recommend that all of the costs associated with the brushing and mowing (***Construction Item 1, inclusive***) within the Lower Portion of the Lennon Drain, be levied against all lands and roads within the drain's watershed, which utilize the Lower Portion of the Lennon Drain as a drainage outlet, and to those lands who reside adjacent to the drain that benefits from these works. All of which have been outlined within Section "**VII. CONSTRUCTION ASSESSMENTS**" and further levied within the Construction Schedule of Assessment.

2. **Drain Excavation and Widening (Station 0+000 to Station 0+550)**

Further to the brushing and mowing of the open drain, together with the drain bottom excavation required, Dillon's analysis identified that the section of the open drain between Station 0+000 and Station 0+550 requires channel widening to improve the carrying capacity of the Lower Portion of the Lennon Drain. Through our discussions with Mr. Tim Oliver, P.Eng., we understand that the drain widening is a result of the following factors:

a) From Dillon's hydraulic analysis, they found that the majority of the open drain can sufficiently convey runoff from the upstream lands and roads at a minimum five (5) year return period. However, the outlet portion of the drain, between Station 0+000 and Station 0+550, did not meet the minimum five (5) year return period pre-Parkway runoff requirement and requires deepening and widening to safely convey these flows.

b) As part of Dillon's analysis, they evaluated the drain's capacity relative to the five (5) year pre-Parkway runoff versus the post-Parkway Development. They found that this analysis yielded no adverse impact or an increase in peak flows. Nonetheless, post-Parkway Development yields an 8.6% increase in total runoff volume. Therefore, further

excavations and widening are required to account for the increase in total runoff volume to meet the five (5) year post-Parkway development storm event flows. As a result, the proposed drainage improvements to this section of the open drain also account for the effects of the post-Parkway construction.

We find that the works outlined above include the widening of the Lower Portion of the Lennon Drain (***Construction Items 2, inclusive***), together with the seeding of the newly excavated drain bank (***Construction Item 5***), is required to restore the drain's hydraulic capacity to the minimum design requirements, together with the necessary improvements to accommodate the increased runoff volume created by the development of the Parkway. Based on the above information, we have determined that these construction costs, together with the associated incidental costs, shall be levied **25% to the Ministry of Transportation Ontario (M.T.O.)**, as a **Section 26 Special Assessment**, and 75% to all affected land and roads adjacent to this section of the open drain and within the drain's watershed. All of which have been outlined within Section "**VII. CONSTRUCTION ASSESSMENTS**" and further levied within the Construction Schedule of Assessment.

3. **General Drain Excavation and Trucking (Station 0+590 to Station 1+125)**

Further to the brushing and mowing of the open drain, the drain profile indicates that there are pockets of sediment accumulated within the bottom of the Lower Portion of the Lennon Drain that impedes the conveyance of runoff. The drain excavation to remove the accumulation of sediment within the open drain is intended to restore the drain to its optimal design and provide peak performance, together with providing a sufficient outlet for the drainage system. These works also provide sufficient depth for all sub-surface drainage tiles. The spoil materials removed from the drain are intended to be trucked off-site as set out within the Specifications.

With the construction of the Parkway development, a considerable amount of sedimentation was deposited within the Lower Portion of the Lennon Drain, throughout the construction process. The Lower Portion of the Lennon Drain is a tributary of the Lower Portion of the Cahill Drain and the deposition of sediment has travelled downstream into the receiving drain.

The specified drain cleanout and culvert flushing form part of the general drain maintenance of Municipal Drains and is intended to enhance the hydraulic capacity for the betterment of the overall drainage system. However, we find that in addition to the natural deposition of sedimentation from the adjacent lands within the Lower Portion of the Lennon Drain, the construction works

conducted on the Parkway have contributed to the total volume of material that is slated for removal as part of this project.

We find that the works outlined above include the open drain excavation and trucking of spoil material ***(Construction Items 3, inclusive)***, are required to maintain the drain's hydraulic capacity to the minimum design requirements. Based on the above information and the construction estimates provided by Dillon, we have determined that the M.T.O., together with the affected lands and roads within the overall watershed, shall share the responsibility for the necessary works outline above. We would therefore recommend that the cost of these construction works, plus all related incidental expenses, shall be assessed 25% to the **Ministry of Transportation Ontario (M.T.O.)**, as a **Section 26 Special Assessment**, and 75% to all affected land and roads within the drain's watershed. All of which have been outlined within Section "**VII. CONSTRUCTION ASSESSMENTS**" and further levied within the Construction Schedule of Assessment.

4. Flushing of Road Crossings

As part of the works outlined within this report, the road crossing culverts were reviewed and analyzed for their condition and hydraulic capacity. As previously identified, all of the road crossing culverts carry sufficient capacity to handle the required pre-Parkway and post-Parkway development design flows for the ten (10) year storm event. All road crossing culverts that require flushing and cleaning, such as Bridge No.1 for Normandy Street and Bridge No.2 for Brooklyn Avenue, are subject to flushing and cleaning as part of general maintenance works of Municipal Drains, as previously identified in Item 3 of this section. However, as outlined under Section 26 of the Drainage Act, all works caused by the existence of the road authorities, shall be assessed to the appropriate road authorities for all of the increased costs caused by their existence.

We find the works associated with the flushing and cleaning of Bridge No.1 for Normandy Street and Bridge No.2 for Brooklyn Avenue crossing culverts (***Construction Item 4, inclusive***), together with the associated incidental costs, be levied against the **Town of LaSalle Road Authority.** All of which shall be assessed as a **Section 26 Special Assessment.** All of which have been outlined within Section "**VII. CONSTRUCTION ASSESSMENTS**" and further levied within the Construction Schedule of Assessment.

5. Erosion Protection, Sediment Trap and Flow Check Dam

As part of the works outlined within this report, erosion protection has been recommended at various locations along the course of the open drain to help reduce erosion and sedimentation caused by the flows entering and within the open channel. The stone erosion protection shall be placed along the drain banks at bends and at locations where lateral private ditches enter the Lower Portion of the Lennon Drain. The erosion protection will help reduce the sedimentation and deposition within the open drain, while also providing ecological benefits.

A permanent check dam and sediment trap have been recommended within the Lower Portion of the Lennon Drain to assist with the reduction of velocities, prevent erosion, and collect accumulated sediment within the drain. All of which are being provided without affecting the hydraulic capacity of the drainage system. This feature has been placed in a strategic location to maximize the collection of sedimentation towards its removal through the drain maintenance process. These open drain improvements are necessary to help reduce the frequency of maintenance and to protect the drain from bank failures and excess sedimentation. These improvements will also enhance the hydraulic carrying capacity of the channel. Overall, these works are being incorporated as part of the Municipal Drain for the betterment of the entire drainage system.

We find the works outlined above, include the installation of erosion protection (***Construction Item 6, inclusive***) and the construction of the permanent rock flow check dam and sediment trap (***Construction Item 8***). Based on the above information, and the construction estimates provided by Dillon, we have determined that all of these construction costs together with the associated incidental costs, be levied against all affected lands and roads within the drain's watershed, which utilize the Lower Portion of the Lennon Drain as a drainage outlet, and to those lands who reside adjacent to the drain that benefits from these works. All of which have been outlined within Section "**VII. CONSTRUCTION ASSESSMENTS**" and further levied within the Construction Schedule of Assessment.

6. Bridge No.4 (Flow Control Bridge) Replacement

As part of the works outlined within this report, the flow control bridge culvert was reviewed and analyzed for its condition and hydraulic capacity. As previously identified, all of the drain crossing culverts carry sufficient capacity to handle the required pre-Parkway and post-Parkway development design flows for the ten (10) year storm event. However, the existing flow control structure, identified as Bridge No.4, was reconstructed as part of the Parkway construction and was not installed to its original

elevations. The improper installation of this structure has significant implications for the entire drainage system. Although the structure is in good condition, it is recommended that this structure be removed and restored to the elevations as outlined within the 1993 Function Design Report.

We find the works associated with the replacement of Bridge No.4 (***Construction Item*** 7), together with the associated incidental costs, be levied against the **Ministry of Transportation Ontario (M.T.O.)**, as a **Section 26 Special Assessment.** All of which have been outlined within Section "**VII. CONSTRUCTION ASSESSMENTS**" and further levied within the Construction Schedule of Assessment. Furthermore, future maintenance provisions for this structure have also been outlined as part of this report.

7. Lennon Drain Branch

The original alignment of the Lower Portion of the Lennon Drain crossed the Parkway lands, from Station 1+125 to Station 1+713, at approximately 190.00 metres to the east of the current road crossing location. As part of the Parkway construction, a portion of the original alignment was filled in and redirected to the new crossing location. However, the remnant portion of the Lower Portion of the Lennon Drain remains as a primary outlet for the lands along Huron Church Line and within Block 'C'. Therefore, as part of the works outlined within this report, the remnant portion of the Lower Portion of the Lennon Drain, from Station 0+000A to Station 0+265A is still required as the primary outlet for the land contributing to this section of the drain. This remnant portion shall remain as a Municipal Drain and be renamed to the "Lennon Drain Branch". As part of Dillon's analysis, they evaluated the drain's capacity relative to the five (5) year storm event flows and found that no hydraulic improvement or maintenance is required.

With the need to re-establish the remnant portion of the original Lower Portion of the Lennon Drain as a Municipal Drain, created by the Parkway construction, all incidental costs associated with the creation of the Lennon Drain Branch, together with all associated allowances, shall be levied against the **Ministry of Transportation Ontario (M.T.O.)**, as a **Section 26 Special Assessment.** All of which have been outlined within Section "**VII. CONSTRUCTION ASSESSMENTS**" and further levied within the Construction Schedule of Assessment. Furthermore, future maintenance provisions for Lennon Drain Branch have also been outlined as part of this report.

8. Lower Portion of the Lennon Drain Allowances and Compensation

As part of this report, allowances under Section 29 and 30 of the Drainage Act have been determined for the Lower Portion of the Lennon Drain and shall be distributed to affected property owners. These allowances are to be paid to specific property owners for damages to lands and/or for land taken to perform the necessary improvements to the Lower Portion of the Lennon Drain. These allowances are necessary to compensate individual landowners for the damages caused to lands adjacent to the open drain, as a result of the construction works outlined within this report. Furthermore, the working corridors that form part of this Municipal Drain form a right of entry and use of the established easement to conduct the necessary works on the drain. Therefore, the adjacent landowners, in which the lands are being used, have been issued compensation for these lands and shall be used for both construction and future maintenance of the Lower Portion of the Lennon Drain.

We find that these one-time costs are being incorporated as part of this report are required, as outlined within Section 29 and 30 of the Drainage Act, and are issued for the right of use and betterment of the entire drainage system. Based on the information outlined above, we recommend that all of these allowances and compensation be levied against all lands and roads within the drain's watershed, which utilizes the Lower Portion of the Lennon Drain. All of which have been outlined within Section **"VII. CONSTRUCTION ASSESSMENTS"** and further levied within the Construction Schedule of Assessment.

VII. CONSTRUCTION ASSESSMENTS

We would recommend that all of the costs associated with the improvements to the Lower Portion of the Lennon Drain, including all related incidental expenses, be charged against the lands and roads affected per the attached **Construction Schedule of Assessment**.

It should be noted that the attached Construction Schedule of Assessment shall be utilized only for the sharing of all of the costs associated with the work being provided for under this report and said Construction Schedule of Assessment should not be utilized, under any circumstance, for the sharing of any future maintenance works conducted to any portion of the Municipal Drainage System established herein.

Assessment Components

The total individual assessments, within the Construction Schedule of Assessments, are comprised of four (4) separate assessment components, including:

i) **Benefit** is *defined as advantages to any lands, roads, buildings or other structures from the construction, improvement, repair or maintenance of a drainage works such as will result in a higher market value or increased crop production or improved appearance or better control of surface or subsurface water, or any other advantages relating to the betterment of lands, roads, buildings or other structures, as it relates to Section 22 of the Drainage Act.*

ii) **Outlet Liability** is *defined as part of the cost of the construction, improvement or maintenance of a drainage works that is required to provide such outlet or improved outlet, as it relates to Section 23 of the Drainage Act.*

iii) **Special Benefit** *defined as any additional work or feature included in the construction, repair or improvement of a drainage works that has no effect on the functioning of the drainage works, as it relates to Section 24 of the Drainage Act.*

iv) **Special Non-Proratable Assessments**

a. **Non-Proratable Assessment** - Described as *a special assessment levied to one or multiple landowners for drainage works conducted for the sole benefit or purpose of the subject properties. The affected properties shall be assessed the net increase in cost to the project caused by the above special improvements and these assessments shall not form part of the shared proratable costs.*

b. **Section 26 Assessment** - Defined as; *in addition to all other sums lawfully assessed against the property of a public utility or road authority under this Act, and despite the fact that the public utility or road authority is not otherwise assessable under the Act, the public utility or road authority shall be assessed for and shall pay all the increase of cost of such drainage works caused by the existence of the works of the public utility or road authority.*

Assessments to be Shared with the Watershed

As outlined within Section "**VI. RATIONALE FOR CONSTRUCTION ASSESSMENTS**", we have determined that specific components of this project shall be assessed to the lands and roads within the Lower Portion of the Lennon Drain watershed. These components include the following:

a) All of the construction costs, together with the applicable incidental costs associated with the brushing and mowing of the Lower Portion of the Lennon Drain (***Construction Item 1***), the installation of erosion protection (***Construction Item 6, inclusive***) and the construction of the permanent rock flow check dam and sediment trap (***Construction Item 8***). These total estimated costs amount to **$108,600.00.**

b) 75% of the construction costs, together with the applicable incidental costs, associated with excavation and widening of the Lower Portion of the Lennon Drain (***Construction Items 2, inclusive***), the cleaning of the drain bottom and trucking spoil material (***Construction Items 3, inclusive***), together with the associated seeding of the newly excavated drain bank (***Construction Items 5***). These total estimated costs amount to **$180,472.00.**

c) All allowances and compensation outlined within this report related to the Lower Portion of the Lennon Drain are to be distributed to individual property owners for the damages and land taken to facilitate the necessary improvements to the Lower Portion of the Lennon Drain. The total amount of payment to these affected lands is **$3,600.00.** These costs shall be assessed to all lands and roads adjacent to the entire length of the Lower Portion of the Lennon Drain, together with and all upstream lands and roads that contribute their runoff to this Municipal Drain.

As a result of the above, the total cost to be assessed to the lands and roads within the Lower Portion of the Lennon Drain watershed is estimated value of **$292,672.00.** Generally speaking, these costs have been distributed within the attached Construction Schedule of Assessment, based on the following principles:

Benefit Assessment - The removal of trees, brush and debris, along with the excavation of accumulated sediment within the open channel will drastically improve the flow of water through the drainage system. The improvements to the drain will enhance the hydraulic capacity of the channel and provides a sufficient outlet for the drainage system. As a result, the properties located adjacent to the Lower Portion of the Lennon Drain benefit from the improvements to the open drain. Therefore, the Benefit Assessment shown within the Construction Schedule of Assessment is levied against those properties that reside in close proximity to the drain, based on the definition provided above.

Special Benefit Assessment - Any special feature requested or required for the sole betterment of a single property, that does not affect the functionality of the drainage system shall be assessed a Special Benefit Assessment. This Special Benefit Assessment would also include any special features to enhance a property or an access bridge structure (such as decorative headwalls, surface pavement, etc.).

Outlet Assessment - According to the parameters set within Section 23 of the Drainage Act, all lands which utilize the Municipal Drain as a drainage outlet may be assessed for Outlet Liability. As further outlined within Section 23(3) of the Drainage Act, the Outlet Assessment is ***"...based on the volume and rate of flow of the water artificially caused to flow..."***. Based on the characteristics of the lands that contribute flow to the Lower Portion of the Lennon Drain, runoff factors have been applied based on the land use of each property to reflect the actual amount of water that is artificially collected and discharged into this Municipal Drain. Therefore, developed lands (residential, industrial lots and roads) have an increased run-off factor applied to their assessment. Contrarily, lands that have surface (or subsurface) runoff that exits the watershed, or contains woodlots would have a decrease run-off factor applied to their assessment. Furthermore, additional factors have been included in these outlet assessments that relate to soil types and the location of where each property's runoff enters the Lower Portion of the Lennon Drain.

Special Non-Proratable Assessments

The Special Assessments outlined below are to provide additional clarification and summarize the assessments listed under Section 6 of the Construction Schedule of Assessment, based on the Assessment Rational determined in the preceding paragraphs:

A. We determined that a Special Assessment shall be assessed to the **Ministry of Transportation Ontario (M.T.O.)** for the extra costs for the increased sedimentation deposited within the drainage system and the necessary drain widening that is directly attributed to the improvements carried out by the Rt. Hon. Herb Gray Parkway, in accordance with Section 26 of the Drainage Act. This extra **non-proratable** cost, pursuant to Section 26 is related to their share of the construction works within the Lower Portion of the Lennon Drain consisting of **25%** of all works associated with *Construction Items 2 inclusive, Items 3 inclusive and Item 5*, within this report. The estimated net increase in cost to the project caused by these works, together with all related incidental expenses is **$60,157.00**.

The above estimated Special Assessment to the Ministry of Transportation Ontario (M.T.O) for the works outlined above, pursuant to Section 26 of the Drainage Act, is listed under Section 6 of the Construction Schedule of Assessment and is to be **non-proratable.** The incidental costs portion associated with the above net cost consists of an estimated amount of **$22,157.00**.

Once the construction of this work is completed, the M.T.O. shall be assessed 25% of the **actual construction costs** for *Construction Items 2 inclusive, Items 3 inclusive and Item 5*, together with its share of the project incidental costs associated with same, in the amount of **$22,157.00**. This

amount represents the actual Section 26 Special Assessment amount to be assessed to the M.T.O. for their share of this work and this actual amount shall replace the estimated amount for same in Section 6 of the Construction Schedule of Assessment when charging out the works to the affected landowners and roads.

B. We determined that a Special Assessment shall be assessed to the **Ministry of Transportation Ontario (M.T.O.)** for the increase of cost to the project related to the removal and replacement of Bridge No.4 (Flow Control Structure) at Station 1+708.0, to the proper elevation as established within the 1993 Functional Design Report. This extra **non-proratable** cost to the project consists of all construction works associated with Construction Item 7, within this report. The estimated net increase in cost to the project caused by the above special improvements in the Lower Portion of the Lennon Drain, together with all related incidental expenses is **$71,239.00**.

The above estimated Special Assessment to the Ministry of Transportation Ontario (M.T.O.)pursuant to Section 26 of the Drainage Act, is listed under Section 6 of the Construction Schedule of Assessment and is to be **non-proratable**. The incidental cost portion associated with the above net cost consists of an estimated amount of **$26,239.00**.

Once the construction of this work is completed, the M.T.O. shall be assessed for the **actual construction costs** for Construction Item 7, together with its share of the project incidental costs associated with these works, in the estimated amount of **$26,239.00**. This combined total represents the actual Section 26 Special Assessment amount to be assessed to the Town of LaSalle Public Works Department for this work and this actual amount shall replace the estimated amount outlined in Section 6 of the Construction Schedule of Assessment when charging out the works to the affected lands and roads.

C. We determined that a Special Assessment is to be assessed to the **Town of LaSalle Road Authority** for the increase of cost to the project related to the flushing and cleaning of Bridge No.1 at Station 0+575.0 and Bridge No.2 at Station 0+670.0 which serves the existing road crossing culverts across Normandy Street and Brooklyn Avenue, respectively. This extra **non-proratable** cost to the project consists of all construction works associated with Construction Item 4a and 4b within this report. The estimated net increase in cost to the project caused by the above special improvements in the Lower Portion of the Lennon Drain, together with all related incidental expenses is **$15,832.00**.

The above estimated Special Assessment to the Town of LaSalle Road Authority pursuant to Section 26 of the Drainage Act, is listed under Section 6 of the Construction Schedule of Assessment and is to be **non-proratable**. The incidental cost portion associated with the above net cost consists of an estimated amount of **$5,832.00**.

Once the construction of this work is completed, the Town of LaSalle Road Authority shall be assessed for the **actual construction costs** for Construction Item 4a and 4b, together with its share of the project incidental costs associated with same, in the amount of **$5,832.00**. This amount represents the actual Section 26 Special Assessment amount to be assessed to the Town of LaSalle Road Authority for this work and this actual amount shall replace the estimated amount for same in Section 6 of the Construction Schedule of Assessment when charging out the works to the affected landowners and roads.

D. We determined that a Special Assessment shall be assessed to the **Ministry of Transportation Ontario (M.T.O.)** for the increase of cost to the project related to the creation of the "Lennon Drain Branch" as a remnant of the original Lower Portion of the Lennon Drain alignment, created by the Parkway construction. This extra **non-proratable** assessment consists of all incidental costs associated with the creation of the Lennon Drain Branch, together with all associated allowances. The estimated net increase in cost to the project caused by the above special improvements for Lennon Drain Branch is **$14,800.00** and shall be assessed as a Special Benefit.

Distribution of Unforeseen Costs

These non-proratable assessments to the M.T.O. and the Town of LaSalle do not include any unforeseen costs that may arise during construction, nor does it include any potential costs for appeals to the Court of Revision, Tribunal or Referee. Any costs to the project associated with dealing with any of these Appeals may be shared by all assessments in the Construction Schedule of Assessment including all Section 6 non-proratable assessments, as well as any Special Benefit Assessments on a pro-rata basis, unless otherwise established in any Decisions from these forums.

Furthermore, during construction, it may become necessary to temporarily or permanently relocate existing utilities that may conflict with the works outlined within this report. Under these circumstances, the relocation of these utilities shall be assessed any relocation costs against the public utility having jurisdiction in accordance with Section 26 of the Drainage Act. In accordance with Section 69 of the Drainage Act, the utility company is allowed the option to carry out this work utilizing their own forces and at their own cost. However, should they not exercise this option within a reasonable time, the Town may arrange to have this work completed and the costs for this work

shall be charged to the appropriate public utility. Furthermore, any unforeseen construction costs directly related to the Section 26 works shall be assessed entirely, as an extra, to the applicable Road Authority or Utility.

VIII. SPECIAL CONSIDERATIONS

Block Assessments

As identified within **PART A - TECHNICAL CONSIDERATIONS** portion of this report prepared by Mr. Tim Oliver, P.Eng., of Dillon, outlined that there has been on-going residential development within various areas of the Town of LaSalle. As it relates to the Lower Portion of the Lennon Drain, the lands within the watershed are primarily of urban land-use. The increased runoff created by the development of these residential areas has been accounted for within our assessment rationale.

Considering that most of the lands affected by the Lower Portion of the Lennon Drain are of urban land-use, The Town of LaSalle has confirmed that all built-up areas shall not be assessed for individual Municipal Drain assessments. The Town of LaSalle has elected to designate Block Assessments to all lands and roads within the Municipality based on sub-watersheds and tributaries of the Lower Portion of the Lennon Drain. As such, the Town of LaSalle has confirmed that these lands shall be assessed as Block Assessments pursuant to Section 25 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2020". The lands and roads within the Town of LaSalle have been divided into three (3) distinct blocks (Block 'A', Block 'B', and Block 'C') within the watershed.

The City of Windsor, through Council Resolution CR388/2007 (and further amended through CR64/2015), has elected to use general tax levy or the sewer surcharge levy, depending on location for drain maintenance, for all Drainage Act assessments in accordance with the City of Windsor Act, 1968. As such, all assessments to the City of Windsor have been assessed as a Block Assessment for all lands and roads that utilize the Lower Portion of the Lennon Drain for drainage purposes. As such, the City of Windsor has confirmed that these lands shall be assessed as Block Assessments pursuant to Section 25 of the "Drainage Act, R.S.O. 1990, Chapter D.17, as amended 2020".

Based on the information outlined above, we have allocated Block Assessments within the Schedules of Assessment for all lands and roads within the urban areas of the City of Windsor and the Town of LaSalle that utilize the Lennon Drain for drainage purposes.

Stormwater Management Provisions

It shall be noted that some developments within the Lower Portion of the Lennon Drain watershed convey their runoff through existing Stormwater Management (S.W.M.) facilities. S.W.M. facilities are utilized to control stormwater discharge from a site with increased runoff caused by development and further restrict flows to a pre-development flow rate (or less). As a result, rainfall onto sites with increased impermeable conditions creates an additional volume of runoff that is stored within S.W.M. ponds. The increased total volume of water is discharged from the S.W.M. ponds over an extended period, to empty the pond after a rain event. As a result, S.W.M. facilities generally contribute a higher total volume of water that travels through the receiving drains, which essentially causes injury to said drains in the form of extended saturation and higher direct erosion throughout the drain bottom. These extended flows and added volume tend to destabilize the drain banks, as the receiving drains are wetter for longer periods. The effects of S.W.M. are considered an injuring liability to the receiving drains, which will generally reduce the service life of the open drain and resulting in more periodic drain maintenance. Thus, creating increased maintenance costs. Pursuant to Section 23 of the Drainage Act we have taken into account the increased volume of artificial runoff discharging from the S.W.M. systems and have factored this provision into the outlet assessment for the lands being served by the S.W.M. systems within our new Schedules of Assessment for the Lower Portion of the Lennon Drain.

Future Developments

The assessments derived within the Schedules of Assessments have been evaluated based on the current conditions and existing developments. Should any remaining vacant lands within the watershed be developed, these future developments will create higher runoff from each site and will result in increased flows into the Lower Portion of the Lennon Drain. **Therefore, we recommend that S.W.M. provisions be incorporated as part of these future developments to restrict their outflow to a 1:5 year storm pre-development runoff rate for the entire area to be connected.** Proper S.W.M. facilities restricting the flows to the allowable release rate will ensure that the subsequent flows will have no adverse effect on the capacity of the Lower Portion of the Lennon Drain. However, as outlined above, S.W.M. provisions will increase the total volume of water that travels through the receiving drains. Therefore, if the Town of LaSalle and/or the City of Windsor are prepared to approve the increased total flow volumes from the future developments, we recommend that an update to the "Outlet Assessments" shall be established for each future development site, through Section 65 or Section 76 of the Drainage Act.

IX. FUTURE MAINTENANCE

Lower Portion of the Lennon Drain - Open Drain

After the completion of all of the works associated with this Engineer's Report, we would recommend that the Lower Portion of the Lennon Drain as established within this report, be kept up and maintained in the future at the expense of the lands and roads included within the Maintenance Schedules of Assessment attached herein and labelled **Appendix "A"**.

We have identified two (2) distinct sections of the Lower Portion of the Lennon Drain where maintenance provisions shall be established and distributed on the following basis:

1. Downstream Section (Station 0+000 to Station 1+150)

When future maintenance works are performed strictly between Station 0+000 and Station 1+150 within the Lower Portion of the Lennon Drain, we recommend that it be maintained in the future by the Town of LaSalle. The cost for these works of future maintenance shall be shared by the abutting landowner and upstream affected lands and roads, following the same proportions established within the **Maintenance Schedule of Assessment #1 Lower Portion of the Lennon Drain - Downstream Section (Sta. 0+000 to Sta. 1+150)** included within **Appendix "A"**. This Schedule of Assessment has been developed based on an assumed cost of **$50,000.00** and the future maintenance costs shall be levied pro-rata to the affected lands and roads that are situated adjacent to and upstream of this section of drain for which future maintenance works have been carried out. Therefore, when **$50,000.00** worth of future maintenance work is expended on this section of the drain, the assessment to the affected property owners and roads shall be levied per the noted Maintenance Schedule of Assessment. It should be clearly understood that the amounts shown within this Schedule are only for prorating future maintenance costs for the drain and does not form part of the current cost for the work.

2. Upstream Section (Station 1+150 to Station 1+713)

The section of Municipal Drain between Station 1+150 to Station 1+713 within the Lower Portion of the Lennon Drain was modified as part of the improvements carried out by the Rt. Hon. Herb Gray Parkway construction and to accommodate the changes to the Parkway corridor. When future maintenance works are performed strictly on this drain segment, we recommend that it be maintained in the future by the operating road authority per the existing maintenance agreements with the Town of LaSalle and the City of Windsor. However, should the operating road authority neglect to properly maintain the drain, the affected Municipalities which has the responsibility and liability to ensure that this section of the drain is maintained and kept in good working order, has the rights and powers through the provisions of the Drainage Act to proceed accordingly. Upon the expiration of this agreement, we

recommend that this section of the Municipal Drain be maintained in the future by the Town of LaSalle and the City of Windsor, within their respective jurisdiction.

Following the expiration of the maintenance agreements, the cost for these works of future maintenance shall be shared by the abutting landowner and upstream affected lands and roads, following the same proportions established within the **Maintenance Schedule of Assessment #2 Lower Portion of the Lennon Drain - Upstream Section (Sta. 1+150 to Sta. 1+713)** included within **Appendix "A"**. This Schedule of Assessment has been developed based on an assumed cost of **$50,000.00** and the future maintenance costs shall be levied pro-rata to the affected lands and roads that are adjacent to and situated upstream of this section of drain for which future maintenance works have been carried out. Therefore, when **$50,000.00** worth of future maintenance work is expended on this section of the drain, the assessment to each of the individual affected property owners and roads shall be levied per the noted Maintenance Schedule of Assessment. It should be clearly understood that the amounts shown within this Schedule are only for prorating future maintenance costs for the drain and does not form part of the current cost for the work.

The attached Maintenance Schedules of Assessment for the Lower Portion of the Lennon Drain is to be utilized only for the maintenance of the open drain, together with the flushing of sediment material within any existing access and municipal roadway crossing structures in the drain. This schedule shall not be utilized for any other maintenance and repair works being conducted to any of the existing access or roadway crossing structures. These existing structures are to be assessed in a different fashion, as outlined below.

Lennon Drain Branch (Station 0+000A to Station 0+265A)

When future maintenance works are performed over the entire length of the Lennon Drain Branch, we recommend that the cost for these works of future maintenance shall be shared by the abutting landowners and upstream affected lands and roads, following the same proportions established within the **Maintenance Schedule of Assessment #3 Lennon Drain Branch (Sta. 0+000A to Sta. 0+265A)** included within **Appendix "A"**. This Schedule of Assessment has been developed based on an assumed cost of **$10,000.00** and the future maintenance costs shall be levied pro-rata to the affected lands and roads that are adjacent to and situated upstream of this section of drain for which future maintenance works have been carried out. Therefore, when **$10,000.00** worth of future maintenance work is expended on the entire length of the drain, the assessment to each of the individual affected property owners and roads shall be levied per the noted Maintenance Schedule of Assessment. It should be clearly understood that the amounts shown within this Schedule are only for prorating future maintenance costs for the drain and does not form part of the current cost for the work.

Lower Portion of the Lennon Drain - Road Crossing & Flow Control Structures

It shall be noted that for the Lower Portion of the Lennon Drain a mechanism shall be established herein so that the Municipality can undertake future maintenance works to the existing roadway crossing and flow control structures within this Municipal Drain so that the future maintenance costs associated with each of same can be properly assessed to the affected lands and roads.

Therefore, as a mechanism for allocation of the cost for any works of future maintenance to all of the roadway crossing and flow control structures within the Lower Portion of the Lennon Drain, the following provisions related to cost allocation for each of same, per the percentages shown in the following table:

TABLE SHOWING COST SHARING FOR ROAD CROSSING AND FLOW CONTROL STRUCTURES IN THE LOWER PORTION OF THE LENNON DRAIN

STRUCTURE	STATION	ROAD AUTHORITY OR UTILITY	OWNERS	% TO BENEFITING OWNER	% TO UPSTREAM LANDS AND ROADS
1	0+575.0	Normandy Street (road crossing)	Town of LaSalle Roads Department	100.0%	0.0%
2	0+670.0	Brooklyn Avenue (road crossing)	Town of LaSalle Roads Department	100.0%	0.0%
3	1+350.0	Rt. Hon. Herb Gray Parkway	Ministry of Transportation Ontario (M.T.O.)	100.0%	0.0%
4	1+708.0	Rt. Hon. Herb Gray Parkway	Ministry of Transportation Ontario (M.T.O.)	Assessed per the Maintenance Schedule of Assessment #1 Lower Portion of the Lennon Drain (Sta. 0+000 to Sta. 1+150)	

As it relates to **Bridge No.4 (Flow Control Structure)**, this structure is not intended to be utilized as an access or drain crossing. This structure has specifically been installed to limit the peak flows from the developed lands within the City of Windsor to protect the Lower Portion of the Lennon Drain from excess flows and flooding. As such, if any maintenance work is required in the future to this structure, the costs for same shall be shared in the same proportions established within the **Maintenance Schedule of Assessment #1 Lower Portion of the Lennon Drain (Sta. 0+000 to Sta. 1+150)** attached herein and labelled **Appendix "A"**.

As noted above, each road crossing structure within the Lower Portion of the Lennon Drain is within or under the jurisdiction of a road authority or public utility. Therefore, under no circumstances shall any of the costs for the maintenance or replacement of these structures be assessed to any upstream lands or roads within the drain's watershed, unless otherwise noted. Furthermore, when future maintenance is required to these structures, each governing road authority or public utility may elect to carry out the future works on these structures using their own forces, through Section 69 of the Drainage Act, if they choose to do so.

All of the above provisions for the future maintenance of the Lower Portion of the Lennon Drain shall remain as aforesaid until otherwise varied and/or determined under the provisions of the "Drainage Act, R.S.O. 1990, Chapter, D.17, as amended 2020", or subsequent amendments made thereto.

All of which is respectfully submitted.

N. J. PERALTA ENGINEERING LTD.

Antonio B. Peralta, P.Eng.

ABP/amm

Att.

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N9Y 1E1

CONSTRUCTION SCHEDULE OF ASSESSMENT

LOWER PORTION OF THE LENNON DRAIN

TOWN OF LASALLE

TOWN OF LASALLE

2. ONTARIO LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Herb Gray Parkway				64.42	26.070	Ministry of Transportation Ontario	$ 18,081.00	$ 6,976.00	$ -	$ 25,057.00
Total on Ontario Lands							**$ 18,081.00**	**$ 6,976.00**	**$ -**	**$ 25,057.00**

3. MUNICIPAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Block 'A' Roads				41.76	16.900	Town of LaSalle	$ 10,100.00	$ 2,297.00	$ -	$ 12,397.00
Block 'B' Roads				8.87	3.590	Town of LaSalle	$ 2,765.00	$ 837.00	$ -	$ 3,602.00
Block 'C' Roads				5.19	2.100	Town of LaSalle	$ 1,774.00	$ 644.00	$ -	$ 2,418.00
Total on Municipal Lands							**$ 14,639.00**	**$ 3,778.00**	**$ -**	**$ 18,417.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Block 'A' Lands				124.99	50.580	Town of LaSalle	$ 20,487.00	$ 4,010.00	$ -	$ 24,497.00
Block 'B' Lands				28.32	11.460	Town of LaSalle	$ 6,452.00	$ 2,227.00	$ -	$ 8,679.00
Block 'C' Lands				21.94	8.880	Town of LaSalle	$ 5,081.00	$ 1,361.00	$ -	$ 6,442.00
Total on Privately Owned - Non-Agricultural Lands							**$ 32,020.00**	**$ 7,598.00**	**$ -**	**$ 39,618.00**

6. SPECIAL NON PRO-RATEABLE ASSESSMENTS (non-agricultural Sec.26):

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
A.	Drain Cleaning & Widening Improvements - Const. Items 2, 3 and 5 (Shared)					Ministry of Transportation Ontario	$ 60,157.00	$ -	$ -	$ 60,157.00
B.	Replacement of Bridge 4 (Flow Control Structure) - Const. Items 7					Ministry of Transportation Ontario	$ 71,239.00	$ -	$ -	$ 71,239.00
C.	Bridge 1 & 2 Flushing (Normandy Street & Brooklyn Avenue) - Const. Item 4a and 4b					Town of LaSalle Road Authority	$ 15,832.00	$ -	$ -	$ 15,832.00
D.	Creation of the Lennon Drain Branch - Items 14 through 16					Ministry of Transportation Ontario	$ -	$ -	$ 14,800.00	$ 14,800.00
	Total on Special Non Pro-Rateable Assessments (non-agricultural Sec.26).....						**$ 147,228.00**	**$ -**	**$ 14,800.00**	**$ 162,028.00**
TOTAL ASSESSMENT FOR THE TOWN OF LASALLE				295.49	119.580		**$ 211,968.00**	**$ 18,352.00**	**$ 14,800.00**	**$ 245,120.00**

CITY OF WINDSOR

2. ONTARIO LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Herb Gray Parkway				58.86	23.820	Ministry of Transportation Ontario	$ 8,428.00	$ 6,374.00	$ -	$ 14,802.00
Total on Ontario Lands							**$ 8,428.00**	**$ 6,374.00**	**$ -**	**$ 14,802.00**

3. MUNICIPAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
City of Windsor Block Roads				260.52	105.430	City of Windsor	$ -	$ 44,956.00	$ -	$ 44,956.00
Total on Municipal Lands							**$ -**	**$ 44,956.00**	**$ -**	**$ 44,956.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
City of Windsor Block Lands				964.70	390.400	City of Windsor	$ -	$ 149,822.00	$ -	$ 149,822.00
Total on Privately Owned - Non-Agricultural Lands							**$ -**	**$ 149,822.00**	**$ -**	**$ 149,822.00**
TOTAL ASSESSMENT FOR THE CITY OF WINDSOR				1284.08	519.650		**$ 8,428.00**	**$ 201,152.00**	**$ -**	**$ 209,580.00**
TOTAL ASSESSMENT FOR THE TOWN OF LASALLE (brought forward)				295.49	119.580		**$ 211,968.00**	**$ 18,352.00**	**$ 14,800.00**	**$ 245,120.00**
TOTAL ASSESSMENT				1579.57	639.230		**$ 220,396.00**	**$ 219,504.00**	**$ 14,800.00**	**$ 454,700.00**

1 Hectare = 2.471 Acres
D14-034
May 25th, 2021

APPENDIX "A"

MAINTENANCE SCHEDULE OF ASSESSMENT #1

Station 0+000 to Station 1+150
(Downstream Section)

MAINTENANCE SCHEDULE OF ASSESSMENT #1

LOWER PORTION OF THE LENNON DRAIN - DOWNSTREAM (STA. 0+000 TO STA. 1+150)

TOWN OF LASALLE

TOWN OF LASALLE

2. ONTARIO LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Herb Gray Parkway				64.42	26.070	Ministry of Transportation Ontario	$ 4,325.00	$ 1,033.00	$ -	$ 5,358.00
Total on Ontario Lands							**$ 4,325.00**	**$ 1,033.00**	**$ -**	**$ 5,358.00**

3. MUNICIPAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Block 'A' Roads				41.76	16.900	Town of LaSalle	$ 2,416.00	$ 340.00	$ -	$ 2,756.00
Block 'B' Roads				8.87	3.590	Town of LaSalle	$ 661.00	$ 124.00	$ -	$ 785.00
Block 'C' Roads				5.19	2.100	Town of LaSalle	$ 424.00	$ 95.00	$ -	$ 519.00
Total on Municipal Lands							**$ 3,501.00**	**$ 559.00**	**$ -**	**$ 4,060.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Block 'A' Lands				124.99	50.580	Town of LaSalle	$ 4,900.00	$ 594.00	$ -	$ 5,494.00
Block 'B' Lands				28.32	11.460	Town of LaSalle	$ 1,543.00	$ 330.00	$ -	$ 1,873.00
Block 'C' Lands				21.94	8.880	Town of LaSalle	$ 1,215.00	$ 201.00	$ -	$ 1,416.00
Total on Privately Owned - Non-Agricultural Lands							**$ 7,658.00**	**$ 1,125.00**	**$ -**	**$ 8,783.00**
TOTAL ASSESSMENT FOR THE TOWN OF LASALLE				295.49	119.580		**$ 15,484.00**	**$ 2,717.00**	**$ -**	**$ 18,201.00**

CITY OF WINDSOR

2. ONTARIO LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Herb Gray Parkway				58.86	23.820	Ministry of Transportation Ontario	$ 2,016.00	$ 944.00	$ -	$ 2,960.00
Total on Ontario Lands							**$ 2,016.00**	**$ 944.00**	**$ -**	**$ 2,960.00**

3. MUNICIPAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
City of Windsor Block Roads				260.52	105.430	City of Windsor	$ -	$ 6,656.00	$ -	$ 6,656.00
Total on Municipal Lands							**$ -**	**$ 6,656.00**	**$ -**	**$ 6,656.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
City of Windsor Block Lands				964.70	390.400	City of Windsor	$ -	$ 22,183.00	$ -	$ 22,183.00
Total on Privately Owned - Non-Agricultural Lands							**$ -**	**$ 22,183.00**	**$ -**	**$ 22,183.00**
TOTAL ASSESSMENT FOR THE CITY OF WINDSOR				1284.08	519.650		**$ 2,016.00**	**$ 29,783.00**	**$ -**	**$ 31,799.00**
TOTAL ASSESSMENT FOR THE TOWN OF LASALLE (brought forward)				295.49	119.580		**$ 15,484.00**	**$ 2,717.00**	**$ -**	**$ 18,201.00**
TOTAL ASSESSMENT				1579.57	639.230		**$ 17,500.00**	**$ 32,500.00**	**$ -**	**$ 50,000.00**

1 Hectare = 2.471 Acres
D14-034
May 25th, 2021

MAINTENANCE SCHEDULE OF ASSESSMENT #1

Station 0+000 to Station 1+150
(Downstream Section)

MAINTENANCE SCHEDULE OF ASSESSMENT #2

LOWER PORTION OF THE LENNON DRAIN - UPSTREAM (STA. 1+150 TO STA. 1+713)

TOWN OF LASALLE

TOWN OF LASALLE

2. ONTARIO LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Herb Gray Parkway				64.42	26.070	Ministry of Transportation Ontario	$ 25,579.00	$ 419.00	$ -	$ 25,998.00
Total on Ontario Lands							**$ 25,579.00**	**$ 419.00**	**$ -**	**$ 25,998.00**
TOTAL ASSESSMENT FOR THE TOWN OF LASALLE				64.42	26.070		**$ 25,579.00**	**$ 419.00**	**$ -**	**$ 25,998.00**

CITY OF WINDSOR

2. ONTARIO LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Herb Gray Parkway				58.86	23.820	Ministry of Transportation Ontario	$ 11,921.00	$ 383.00	$ -	$ 12,304.00
Total on Ontario Lands							**$ 11,921.00**	**$ 383.00**	**$ -**	**$ 12,304.00**

3. MUNICIPAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
City of Windsor Block Roads				260.52	105.430	City of Windsor	$ -	$ 2,700.00	$ -	$ 2,700.00
Total on Municipal Lands							**$ -**	**$ 2,700.00**	**$ -**	**$ 2,700.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
City of Windsor Block Lands				964.70	390.400	City of Windsor	$ -	$ 8,998.00	$ -	$ 8,998.00
Total on Privately Owned - Non-Agricultural Lands							**$ -**	**$ 8,998.00**	**$ -**	**$ 8,998.00**
TOTAL ASSESSMENT FOR THE CITY OF WINDSOR				1284.08	519.650		**$ 11,921.00**	**$ 12,081.00**	**$ -**	**$ 24,002.00**
TOTAL ASSESSMENT FOR THE TOWN OF LASALLE (brought forward)				64.42	26.070		**$ 25,579.00**	**$ 419.00**	**$ -**	**$ 25,998.00**
TOTAL ASSESSMENT				1348.50	545.720		**$ 37,500.00**	**$ 12,500.00**	**$ -**	**$ 50,000.00**

1 Hectare = 2.471 Acres
D14-034
May 25th, 2021

MAINTENANCE SCHEDULE OF ASSESSMENT #3

Lennon Drain Branch
Station 0+000A to Station 0+265A

MAINTENANCE SCHEDULE OF ASSESSMENT #3

LENNON BRANCH DRAIN (STA 0+000A TO STA. 0+265A)

TOWN OF LASALLE

2. ONTARIO LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Herb Gray Parkway				4.23	1.710	Ministry of Transportation Ontario	$ -	$ 1,427.00	$ -	$ 1,427.00
Total on Ontario Lands							**$ -**	**$ 1,427.00**	**$ -**	**$ 1,427.00**

3. MUNICIPAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Block 'C' Roads				5.19	2.100	Town of LaSalle	$ 1,199.00	$ 1,147.00	$ -	$ 2,346.00
Total on Municipal Lands							**$ 1,199.00**	**$ 1,147.00**	**$ -**	**$ 2,346.00**

4. PRIVATELY OWNED - NON-AGRICULTURAL LANDS:

Tax Roll Number	Con. or Plan Number	Lot or Part of Lot	Acres Owned	Acres Affected	Hectares Affected	Owner's Name	Value of Benefit	Value of Outlet	Value of Special Benefit	TOTAL VALUE
Block 'C' Lands				21.94	8.880	Town of LaSalle	$ 3,801.00	$ 2,426.00	$ -	$ 6,227.00
Total on Privately Owned - Non-Agricultural Lands							**$ 3,801.00**	**$ 2,426.00**	**$ -**	**$ 6,227.00**
TOTAL ASSESSMENT FOR THE TOWN OF LASALLE				31.36	12.690		**$ 5,000.00**	**$ 5,000.00**	**$ -**	**$ 10,000.00**

1 Hectare = 2.471 Acres
D14-034
May 25th, 2021