ERB STREET WEST
ENVIRONMENTAL STUDY REPORT

REGION OF WATERLOO

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT
ERB STREET IMPROVEMENTS FOR FISCHER-HALLMAN ROAD TO WILMOT LINE, CITY OF WATERLOO

Report Date March 22, 2019

APPENDICES A to O (DOCUMENT 2 OF 3)

WALTERFEDY

REGION OF WATERLOO

ERB STREET WEST
ENVIRONMENTAL STUDY REPORT

APPENDICES A TO O (DOCUMENT 2 OF 3)

Table of Contents

Appendix A Typical Cross-Sections of Design Alternatives
Appendix B Notice of Study Commencement
Appendix C Natural Environment Study Report
Appendix D Cultural Heritage Resource Assessment
Appendix E Stage 1 Archaeological Assessment
Appendix F Tree Inventory Plan
Appendix G Erb Street Class EA Transportation Report
Appendix H Acoustical Impact Assessment
Appendix I Geotechnical Investigation Report
Appendix J Phase 1 Environmental Site Assessment
Appendix K Air Quality Assessment
Appendix L Evaluation Matrix
Appendix M Recommended Design Alternative 2C (Modified)
Appendix N Typical Cross-Sections and Preliminary Plans of Recommended Design Alternative
Appendix O Preliminary Property Impact Plans

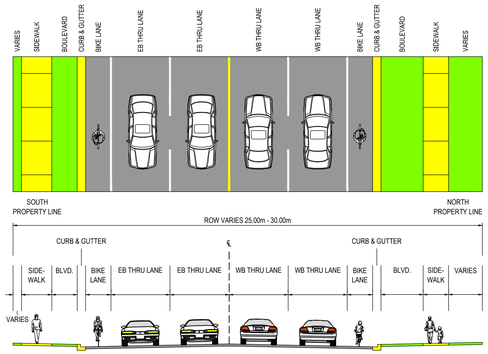
APPENDIX A

Typical Cross-Sections of Design Alternatives

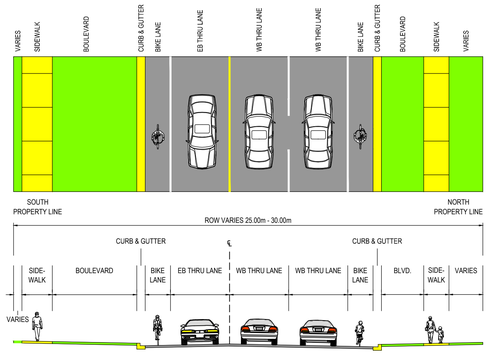
Alternative Solutions

Alternative 1

Urbanize the Existing Road with Widening to 4-lanes West of Ira Needles and Add Active Transportation Facilities



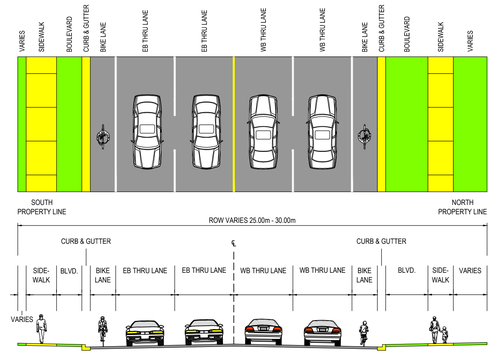
FISCHER-HALLMAN ROAD TO GATEVIEW DRIVE & ERBSVILLE ROAD / IRA NEEDLES BOULEVARD TO ROUNDABOUT AT GATE 1 REGION WASTE MANAGEMENT CENTRE / WEST WATERLOO COMMERCIAL CENTRE (COSTCO) ENTRANCE TYPICAL SECTION



GATEVIEW DRIVE TO ERBSVILLE COURT TYPICAL SECTION

Alternative 2A

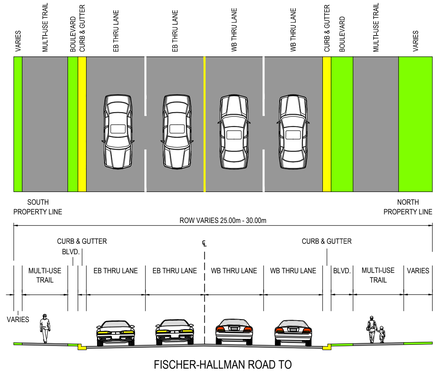
Widen the Road to 4-lanes, Urbanize and Add Active Transportation Facilities for Sidewalks and On-Road Bike Lanes



FISCHER-HALLMAN ROAD TO ROUNDABOUT AT GATE 1 REGION WASTE MANAGEMENT CENTRE / WEST WATERLOO COMMERCIAL CENTRE (COSTCO) ENTRANCE TYPICAL SECTION

Alternative 2B

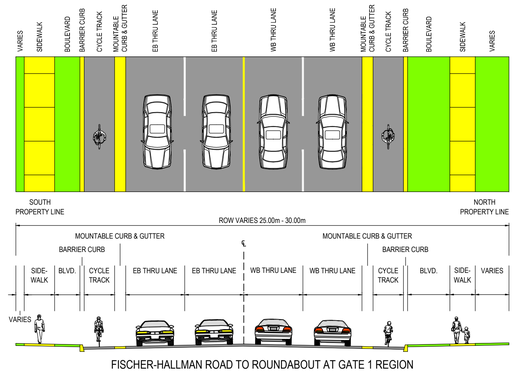
Widen the Road to 4-lanes, Urbanize and Add Active Transportation Facilities for Multi-Use Trails



FISCHER-HALLMAN ROAD TO ROUNDABOUT AT GATE 1 REGION WASTE MANAGEMENT CENTRE / WEST WATERLOO COMMERCIAL CENTRE (COSTCO) ENTRANCE TYPICAL SECTION

Alternative 2C

Alternative 2C - Widen the Road to 4-lanes, Urbanize and Add Active Transportation Facilities for Sidewalks and On-Road Cycle Tracks



FISCHER-HALLMAN ROAD TO ROUNDABOUT AT GATE 1 REGION WASTE MANAGEMENT CENTRE / WEST WATERLOO COMMERCIAL CENTRE (COSTCO) ENTRANCE TYPICAL SECTION

Region of Waterloo

WALTERFEDY

APPENDIX B

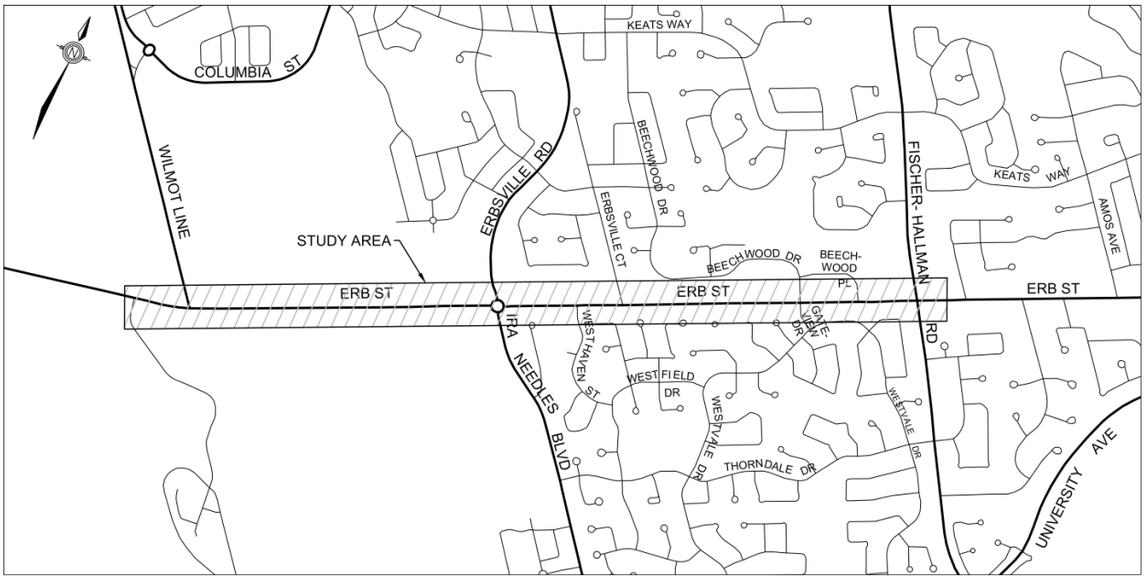
Notice of Study Commencement

Region of Waterloo

Notice of Study Commencement

Erb Street Improvements
Fischer-Hallman Road to Wilmot Line
City of Waterloo
Municipal Class Environmental Assessment, Schedule 'C'

The Regional Municipality of Waterloo is undertaking a Schedule "C" Municipal Class Environmental Assessment (Class EA) for improvements to the Erb Street road corridor from Fischer-Hallman Road to Wilmot Line in the City of Waterloo. Improvements along Erb Street are being considered in order to improve roadway capacity to meet projected traffic growth and to improve active transportation facilities for pedestrians and cyclists along the corridor.



The study will be completed following the guidelines of the "Municipal Class Environmental Assessment", dated October 2000 (as revised 2011), for Schedule "C" projects. The Class EA planning process will consider the potential social, economical and environmental impacts of improvements on the study area.

As part of the Class EA process, the public and involved stakeholders will have an opportunity to review the study findings, and provide input on the impact assessment and associated recommendations prior to any approvals. The first of multiple Public Consultation Centres will be held later this year to invite input into the Study. The public will also be notified of the Study completion and recommendations in advance of completing the Class EA process.

If you wish to be added to the Study mailing list to receive further information, or have any comments or questions regarding the Study, please contact either of the following:

William Gilbert, P. Eng.
Senior Project Manager
Regional Municipality of Waterloo
150 Frederick Street,
Kitchener, ON N2G 4J3
Phone: 519-575-4603
Email: WGilbert@regionofwaterloo.ca

Mark Christensen, P.Eng.
Project Manager
WALTERFEDY
675 Queen St. S., Suite 111
Kitchener, ON N2M 1A1
Phone: 519.576.2150 x285
Email: mchristensen@walterfedy.com

All comments and information received from individuals, stakeholder groups and agencies regarding this project are being collected to assist the Region of Waterloo in making a decision. Under the "Municipal Act", personal information such as name, address, telephone number, and property location that may be included in a submission becomes part of the public record. Questions regarding the collection of this information should be referred to William Gilbert at the Region of Waterloo.

DOCS #1854418

APPENDIX C

Natural Environment Study Report

June 2017

NATURAL ENVIRONMENT STUDY REPORT

Erb Street Widening and Corridor Improvements, Fisher-Hallman Road to Wilmot Line

Submitted to:
Walterfedy
675 Queen Street South
Suite 111
Kitchener, ON
N2M 1A1

REPORT

Report Number: 13-1186-0383

Distribution:

1 e-copy: Walterfedy
1 e-copy: Golder Associates Ltd.

Golder Associates

Table of Contents

1.0 INTRODUCTION 1

1.1 Purpose 1

1.2 Study Area Description 1

2.0 ENVIRONMENTAL POLICY CONTEXT 3

2.1 Provincial Policy Statement 3

2.2 City of Waterloo and Region of Waterloo Official Plans 4

2.3 Grand River Conservation Authority 4

2.4 Fisheries Act 5

2.5 Species at Risk 5

2.5.1 Species at Risk Act 5

2.5.2 Endangered Species Act, 2007 5

3.0 METHODS 6

3.1 Background Review 6

3.2 Species at Risk Screening 6

3.3 Field Investigations 7

4.0 EXISTING CONDITIONS 8

4.1 Regional Setting 8

4.2 Watershed Context 8

4.3 Natural Features 8

4.3.1 Vegetation Communities 8

4.3.2 Aquatic Features 9

4.4 Wildlife 9

5.0 ASSESSMENT 10

5.1 Areas of Significance 10

5.2 Hazard Lands 10

5.3 Vegetation 10

5.4 Fish Habitat 10

5.5 Wildlife 10

5.6 Sensitive Species and Species at Risk 10

5.7 Migratory Birds 11

6.0 CONCLUSIONS 11

7.0 REFERENCES 12

FIGURES

Figure 1: Site Location, Ecological Land Classification and Wildlife Monitoring Stations 2

APPENDICES

APPENDIX A
Species at Risk Screening

APPENDIX B
Vascular Plants Identified at the Site

APPENDIX C
Wildlife Species Identified at the Site

1.0 INTRODUCTION

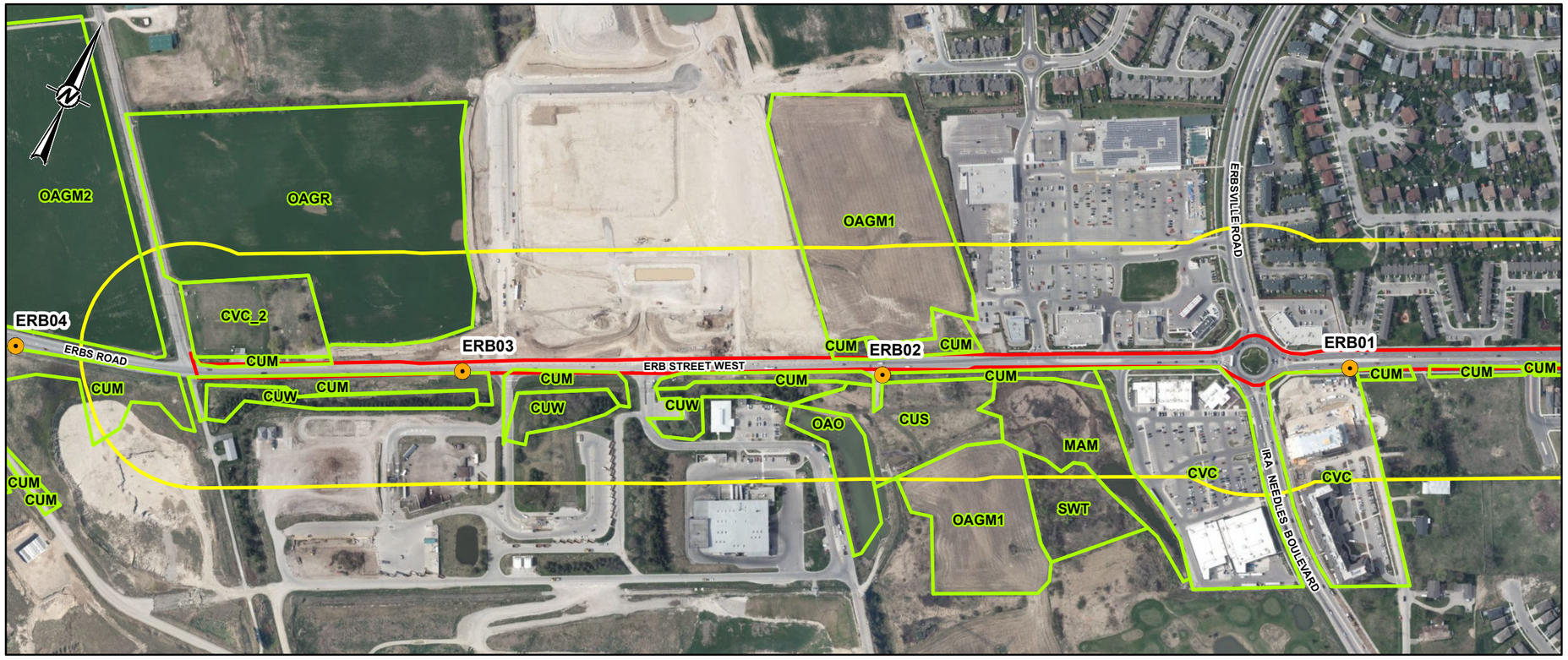
Golder Associates Limited (Golder) was retained by Walterfedy to conduct a natural heritage assessment along Erb Street between Wilmot Line and Fisher-Hallman Road North in the City of Waterloo (the site) in advance of proposed road widening to accommodate increased traffic (the Project).

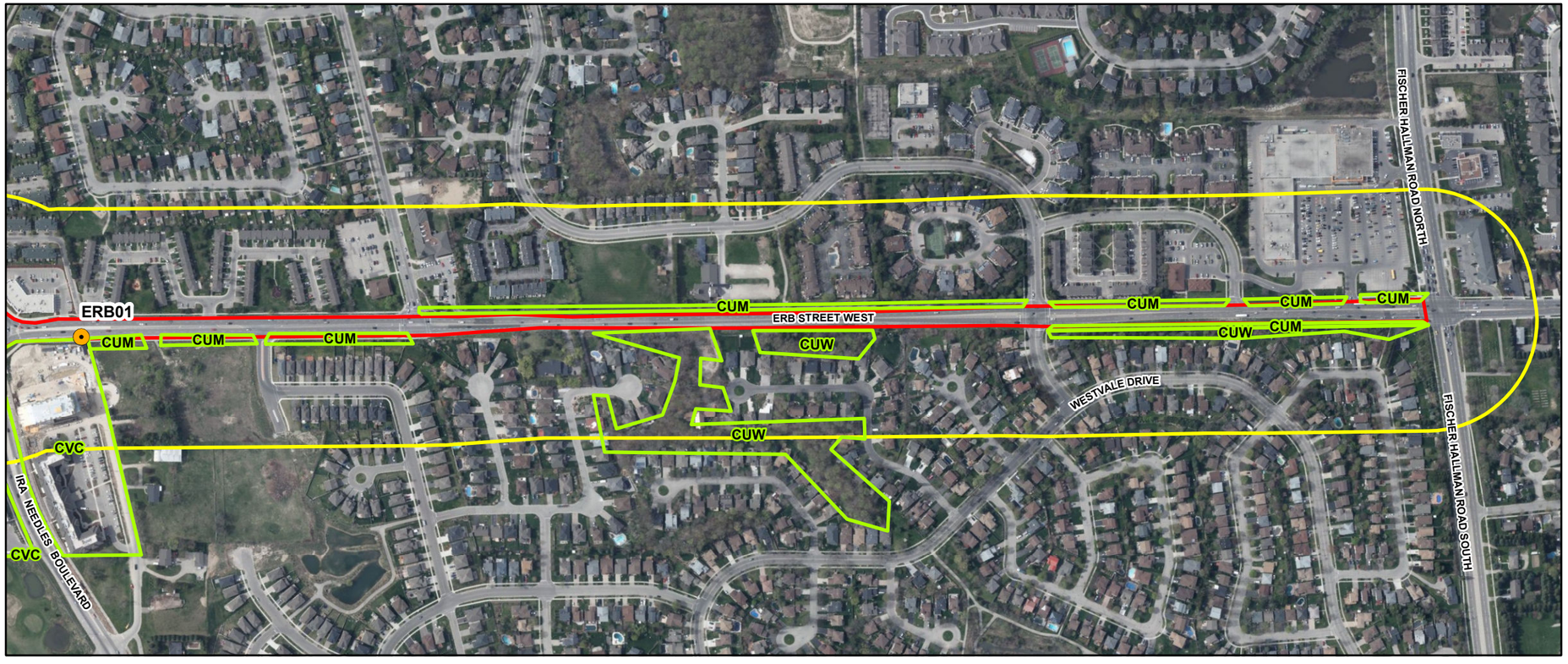
1.1 Purpose

This report characterizes the natural heritage features on the site and on adjacent lands (combined referred to as the study area) with the purpose to identify potential natural heritage constraints to the Project. The assessment includes recommended mitigation measures to minimize potential impacts to the natural heritage features in the study area and identifies the need for any permits or additional requirements, as necessary.

1.2 Study Area Description

The study area for the Project includes the site and adjacent lands within 120 m of the site (Figure 1). Land uses along Erb Street include urban development and agriculture. Much of the study area has been recently developed for residential and commercial use. A Hydro One transmission line easement traverses the site west of Ira Needles Boulevard.





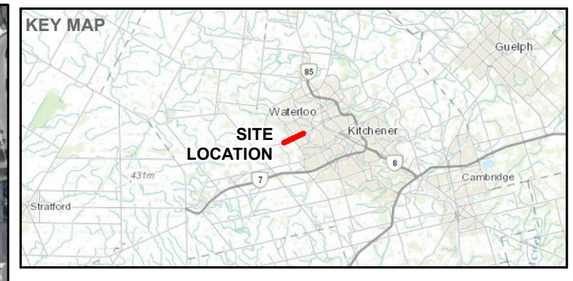
LEGEND

- WILDLIFE MONITORING STATIONS
- SITE LOCATION
- STUDY AREA
- ECOLOGICAL LAND CLASSIFICATION (ELC)

0 100 200 300

1:5,500 METRES

KEY MAP



REFERENCE(S)

BASE DATA - MNRF LIO, OBTAINED 2016, ESRI, HERE, DELORME, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), SWISSTOPO, MAPMYINDIA, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
IMAGERY - REGION OF WATERLOO IMAGERY WMS, 2016
PRODUCED BY GOLDER ASSOCIATES LTD UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2017
IMAGERY - ESRI WORLD IMAGERY WMS, 2017
PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17

CLIENT
WALTERFEDY

PROJECT
ERB STREET WIDENING AND CORRIDOR IMPROVEMENTS, FISHER-HALLMAN ROAD TO WILMOT LINE

TITLE
SITE LOCATION, ECOLOGICAL LAND CLASSIFICATION AND WILDLIFE MONITORING STATIONS

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-06-01
DESIGNED	JR
PREPARED	JR
REVIEWED	BB
APPROVED	RB

PROJECT NO.	CONTROL	REV.	FIGURE
1311860383		1.0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

G:\Project\2013\13-11\60-0383\GIS\MXDs\Reporting\Natural_Heritage\ELC.mxd

2.0 ENVIRONMENTAL POLICY CONTEXT

Natural heritage features and watercourses described in this report will be governed under the requirements of the following planning policies, government bodies and regulatory agencies:

- Provincial Policy Statement (MMAH 2014);
- City of Waterloo Official Plan (City of Waterloo 2014);
- Region of Waterloo Official Plan (Region of Waterloo 2015);
- Ontario Regulation 150/06: Grand River Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses.
- *Fisheries Act* (Government of Canada 1985);
- *Species at Risk Act* (Government of Canada 2002); and
- *Endangered Species Act, 2007* (Government of Ontario 2007).

Sections 2.1 through 2.5 provide a summary of applicable environmental policies for the site.

2.1 Provincial Policy Statement

The Provincial Policy Statement (PPS) was issued under Section 3 of the *Planning Act* and came into effect on April 30, 2014. It replaces the PPS issued March 1, 2005 and applies to all applications, matters or proceedings commenced on or after April 30, 2014.

The natural heritage policies of the PPS require that:

2.1.1 Natural features and areas shall be protected for the long term;

2.1.2 The diversity and connectivity of natural features in an area, and the long-term *ecological function* and biodiversity of *natural heritage systems*, should be maintained, restored or, where possible, improved, recognizing linkages between and among *natural heritage features and areas*, *surface water features* and *ground water features;*

2.1.3 Natural heritage systems shall be identified in Ecoregions 6E and 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas;

2.1.4 *Development* and *site alteration* shall not be permitted in:

a) significant wetlands in Ecoregions 5E, 6E and 7E; and

b) significant coastal wetlands.

2.1.5 Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and site alteration shall not be permitted in:

a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;

b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);

c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);

d) significant wildlife habitat;

e) significant areas of natural and scientific interest; and

f) coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b).

2.1.6 *Development* and *site alteration* shall not be permitted in *fish habitat* except in accordance with *provincial and federal requirements;*

2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements; and

2.1.8 *Development* and *site alteration* shall not be permitted on *adjacent lands* to the *natural heritage features and areas* identified in policies 2.1.3, 2.1.4 and 2.1.5 unless the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no *negative impacts* on the natural features or on their *ecological functions*.

2.2 City of Waterloo and Region of Waterloo Official Plans

The Official Plan for the City of Waterloo (City OP) is currently in redevelopment and the most recent update is dated September 2014. Under the City OP, the lands surrounding Erb Street fall under several different zoning categories. From Fisher-Hallman Road west to Ira Needles Boulevard the predominant zoning is residential, with a small portion zoned as commercial. West of Ira Needles Boulevard, the area is zoned as commercial, employment and open space.

The Official Plan for the Region of Waterloo (Regional OP) was approved by regional council, with modification in December 2010. The Regional OP was under appeal with the Ontario Municipal Board, but subsequently approved and came into effect on June 18, 2015. According to the Regional OP there are no regionally sensitive or designated areas on the site.

2.3 Grand River Conservation Authority

The Grand River Conservation Authority (GRCA) has jurisdiction over waterbodies (watercourses, wetlands, inland lakes) and their regulation limits. Ontario Regulation 150/06 was enacted under the authority of Section 28 of the *Conservation Authorities Act* to ensure public safety by protecting property with respect to natural hazards, and to safeguard watershed health by preventing pollution and destruction of sensitive environmental areas such as wetlands, shorelines and watercourses. O. Reg. 150/06 establishes regulated areas where development could be subject to flooding, erosion or dynamic beaches, or where interference with wetlands and alterations to shorelines and watercourses might have an adverse effect on those environmental features. As per O. Reg. 150/06, development, interference or alteration of these features including within their regulated limits is prohibited without written permission from the GRCA.

2.4 Fisheries Act

The purpose of the *Fisheries Act* is to maintain healthy, sustainable and productive Canadian fisheries through the prevention of pollution, and the protection of fish and their habitat. In 2012, changes were made to the *Fisheries Act* to enhance the ability of Fisheries and Oceans Canada (DFO) to manage threats to Canada's commercial, recreational and Aboriginal (CRA) fisheries. Revised project screening, reporting and mitigation tools were implemented in 2013 to make regulatory requirements clear and consistent and improve compliance.

Projects affecting waterbodies supporting Canada's CRA fisheries must comply with the provisions of the *Fisheries Act*. The proponent is responsible for determining if the Project is likely to cause impacts to CRA fisheries and if these impacts can be avoided or mitigated. The proponent must gather information on the type and scale of impact on the fishery and determine if the impacts will result in *serious harm to fish*. Proponents have a duty to maintain records of self-assessments completed for projects they undertake, and need to provide this information to DFO upon request. Serious harm to fish is defined as the death of fish and/or any permanent alteration to, or destruction of, fish habitat. If it is determined that the impacts cannot be avoided or mitigated and will result in serious harm to fish, an application for authorization must be submitted to the DFO. Projects that have the potential to obstruct fish passage or affect flows needed by fish also require an authorization, even if these occur outside of CRA fishery areas (DFO 2013).

DFO has produced standard guidance tools, an online self-assessment process and documents to assist the proponent in determining the potential impacts on fish or fish habitat. These include the Fisheries Protection Policy Statement (DFO 2013) and the Pathway of Effects for routine activities, among others. Proponents of projects requiring a *Fisheries Act* authorization are required to submit a Habitat Offsetting Plan, which provides details of how the serious harm to fish will be offset, as well as outlining associated costs and monitoring commitments. Proponents also have a duty to notify DFO of any unforeseen activities that cause serious harm to fish and outline the steps taken to address them.

2.5 Species at Risk

2.5.1 Species at Risk Act

At the federal level, species at risk (SAR) designations for species occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment, species are added to the federal List of Wildlife Species at Risk (Government of Canada 2002). Species that are included on Schedule 1 of the *Species at Risk Act* (SARA) as endangered or threatened are afforded protection of critical habitat on federal lands under the Act. On private or provincially-owned lands, only migratory birds and aquatic species listed as endangered, threatened or extirpated are protected under SARA, and critical habitat protection on non-federal lands is afforded only to aquatic species, unless ordered by the Governor in Council.

2.5.2 Endangered Species Act, 2007

Species at risk designations for species in Ontario are initially determined by the Committee on the Status of Species at Risk in Ontario (COSSARO). If approved by the provincial Minister of Natural Resources, species are added to the *Endangered Species Act, 2007* (ESA), which came into effect on June 30, 2008.

Subsection 9(1) of the ESA prohibits the killing, harming or harassing of species identified as 'endangered' or 'threatened' in the various schedules to the Act. Subsection 10(1) (a) of the ESA states that *"No person shall*

damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario (*SARO*) *list as an endangered or threatened species"*. As of June 30, 2008, the Species at Risk Ontario (SARO) list is contained in O. Reg. 230/08.

The ESA also provides general habitat protection to all species listed as threatened or endangered under the Act. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law as a regulation of the ESA. The ESA has a permitting process to allow alterations to protected species or their habitats. In addition, as of May 31, 2013 O. Reg. 323/13 (updating O. Reg. 242/08) allows a "Rules in Regulation" approach for projects meeting specific conditions.

3.0 METHODS

3.1 Background Review

A desktop review was conducted of information publicly available through the City of Waterloo, GRCA, the Ontario Ministry of the Natural Resources and Forestry (MNRF), and other sources, including:

- MNRF Natural Heritage Information Centre (NHIC) Biodiversity Explorer geographic, species and natural areas information queries (MNRF 2017).
- Atlas of Breeding Birds of Ontario (Cadman et al. 2007).
- eBird species maps (eBird 2017).
- Atlas of the Mammals of Ontario (Dobbyn 1994).
- Bat Conservation International (BCI) range maps (BCI 2017).
- Reptiles and Amphibians of Ontario Atlas (Ontario Nature 2017).
- Ontario Butterfly Atlas (Jones et al. 2017).
- Official Plan for the City of Waterloo (City of Waterloo 2014).
- Official Plan of the Region of Waterloo (Region of Waterloo 2010).
- Grand River Conservation Authority's Grand River Information Network (GRIN).
- Information contained in natural heritage related map layers from Ontario Base Map series, Natural Resource Values Information System (NRVIS) mapping and Land Information Ontario.
- Existing aerial photography.

3.2 Species at Risk Screening

A species at risk screening was completed for the site. Species at risk (SAR) considered for this report include those species listed under the ESA and SARA, species ranked S1-S3 (NHIC), and regionally rare species. An assessment was conducted to determine which SAR had potential habitat in the study area. A screening of all SAR that have the potential to be found in the vicinity of the study area was conducted first as a desktop exercise using sources listed in Section 3.1. Species with ranges overlapping the study area, or recent

occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions in the study area.

The potential for the species to occur was determined through a probability of occurrence. A ranking of low indicates no availability of suitable habitat for that species in the study area and no recorded occurrences. Moderate probability indicates more potential for the species to occur, as suitable habitat appeared to be present in the study area, but no occurrence of the species has been recorded. Alternatively, a moderate probability could indicate an observation of a species, but there is no suitable habitat in the study area. High potential indicates a known species record in the study area and good quality habitat is present.

Searches were conducted during field surveys for suitable habitats and signs of all SAR identified through the desktop screening. If the potential for the species to occur in the study area was moderate or high, the screening was refined based on field investigations (i.e., habitat assessment) and/or species-specific surveys. Any habitat identified during field verification or other field surveys that had potential to provide suitable conditions for additional SAR not already identified through the desktop screening was also assessed and recorded.

Results of the SAR screening are provided in Appendix A and discussed further below.

3.3 Field Investigations

Field surveys were conducted during spring and early summer of 2014. Field surveys were limited to publicly accessible areas. Four wildlife monitoring stations were established in the study area (Figure 1).

Amphibian call count surveys were conducted by a qualified ecologist on April 13, May 21 and June 11, 2014 using the methods established in the Marsh Monitoring Program (MMP; Konze and McLaren 1997). At each of the wildlife monitoring stations, the observer listened for anurans (frogs and toads) for a period of three minutes after two minutes of silence. The observer recorded all anurans at an unlimited distance in a semi-circle, but with a focus on anurans within 100 m within the semi-circle. Calling level abundance code and an indicator of the accuracy of the abundance estimate were recorded. A calling code of one indicates individual anurans calling that are easily countable, calling code two indicates individual anurans with overlapping calls where an estimate of anurans can be made, calling code three indicates many individual anurans with calls overlapping in full chorus and the number of individuals is not easily estimated.

Breeding bird surveys were conducted by an avian specialist at each of the four wildlife monitoring stations on June 14 and July 4, 2014 in accordance with methods outlined in the Canadian Breeding Bird Survey (Downes and Collins 2003) and the Breeding Bird Atlas of Ontario (OBBA; Cadman et al. 2007), with adaptations. The OBBA protocol requires five-minute point counts with two visits during the breeding season; however, to improve detection of species, and particularly possible species at risk, the observation period was extended to ten minutes.

Vegetation community classification and botanical inventory were conducted on June 14, 2014 along the road right-of-way. Vegetation community boundaries were delineated and characterized using classification adapted from the Ecological Land Classification (ELC) system developed by Lee et al. (1998). Existing vegetation communities were evaluated with respect to their potential as habitat for SAR determined to have moderate or high potential to occur on the site as identified by the SAR screening.

Incidental observations of wildlife using the study area were also recorded during the field investigations.

4.0 EXISTING CONDITIONS

4.1 Regional Setting

The site is located within the physiographic region known as the Waterloo Hills Area and identified as a Kame Moraine. The soils are characterized by sandy and gravely materials with mature grey-brown podzolic soils (Chapman and Putnam 1972; Map 2544 Ontario Geological Survey 1991). However, a recent history of development across the site has likely resulted in a surficial layer of fill and disturbed soils, obscuring the historical soil composition.

The site is within the Deciduous Forest Region of Ontario. The Deciduous Forest Region, which is the most southerly forest region in Ontario, is situated north of lakes Erie and Ontario. Dominant tree species of the Deciduous Forest Region include White Pine, Red Pine, Eastern Hemlock, White Cedar, Yellow Birch, Sugar and Red Maples, Basswood and Red Oak. However, species with more southern affinities can also be found in this region, including Black Walnut, Butternut, Tulip Tree, Magnolia, Black Gum, and many types of oaks, hickories and sassafras (Rowe 1972). The forest life is the most diverse in Ontario and a number of nationally rare species occur in this region, including species of plants, mammals, birds, reptiles and amphibians at the northern limit of their North American ranges (MNRF 2015).

4.2 Watershed Context

The site is located in the Grand River Watershed, which flows 300 km and through parts of 39 municipalities in southwestern Ontario, eventually draining into Lake Erie (GRWMP 2014). Of the six major tributaries of the Grand River, the site is located within the Central Grand River. At the site, surface water is diverted into stormwater management ponds, and to the small wetland west of Ira Needles Boulevard, none of which appear to have surface connections directly with the Grand River or its tributaries (GRWMP 2014).

4.3 Natural Features

4.3.1 Vegetation Communities

Natural features at the site are largely of anthropogenic origin. Vegetation is dominated by non-native, disturbance-tolerant plant species, often planted as ground cover or residential trees. Past and ongoing development has removed natural ground cover, and hardened surfaces or buildings have fragmented and disturbed vegetation communities throughout the site (Figure 1).

Most of the area where the expansion will occur has been identified as cultural meadow (CUM). This is typically a managed roadside right-of-way where non-native grasses are planted for bank stability. Plant species in these communities include Kentucky Bluegrass (*Poa pratensis*), Canada Goldenrod (*Solidago canadensis*), Russian Olive (*Elaeagnus angustifolia*) and Lamb's Quarters (*Chenopodium album*). Where rainwater accumulates in the ditches, some pioneer wetland species grow, such as Phragmites (*Phragmites australis* ssp. *australis*), Reed Canary Grass (*Phalaris arundinacea*), and cattails (*Typha* spp.).

Set back from the road to the south are cultural woodlands (CUW) which comprise planted trees such as Honey Locust (*Gleditsia triacanthos* var.), ash (*Fraxinus* spp.), and maple (*Acer* spp.). Ground cover beneath the trees is mowed lawn or invasive species similar to those in cultural meadow areas.

The agricultural fields north of Erb Street between Wilmot Line and Ira Needles Boulevard were previously annual row crop (OAGM1), but appeared to have been left fallow in 2014. These fields have been invaded with

species such as Curly Dock (*Rumex crispus*), Canada Thistle (*Cirsium arvense*), Goatsbeard (*Tragopogon* sp.), Oxeye Daisy (*Leucanthemum vulgare*), Canada Goldenrod (*Solidago canadensis*), and Common Burdock (*Arctium minus*). A portion of the agricultural fields along with some intervening cultural woodland and cultural meadow have since been cleared for development.

The wetland south of Erb Street and west of Ira Needles Boulevard contains standing water from surface runoff. The wetland contains a mix of native and non-native vegetation including Phragmites, broad-leaved cattail (*Typha latifolia*), Reed Canary Grass, and rushes (*Juncus* spp.). This area has been identified as a mineral marsh (MAM). A swamp thicket (SWT) is located south of this marsh and west of the reservoir. The swamp thicket comprises mostly willows (*Salix* spp.), with some immature Silver Maple (*Acer saccharinum*), White Pine, Trembling Aspen (*Populus trembloides*), White Elm (*Ulmus americana*), and Balsam Poplar (*Populus balsamifera*).

A complete list of plant species observed at the site is provided in Appendix B.

4.3.2 Aquatic Features

There are no MNRF classified streams or permanent aquatic features on the site. GRIN mapping indicates the occurrence of a warmwater watercourse on the site. However, this watercourse was not observed during the field investigations, confirming that there are no watercourses or aquatic features on the site.

4.4 Wildlife

Anurans identified through the three rounds of amphibian call count surveys were mostly set back from the development where wetland and stormwater pools exist. Four species were identified: American Toad (*Bufo americanus*), Spring Peeper (*Pseudacris crucifer*), Wood Frog (*Rana sylvatica*) and Grey Treefrog (*Hyla versicolor*).

Two breeding bird surveys were conducted, during which several disturbance-tolerant species were identified, including American Robin (*Turdus migratorius*), Mourning Dove (*Zenaida macroura*), American Crow (*Corvus brachyrhynchos*), Song Sparrow (*Melospiza melodia*), and European Starling (*Sturnus vulgaris*). Mallard (*Anas platyrhynchos*) and Canada Goose (*Branta canadensis*) were common in the stormwater ponds. These species are typical of open and disturbed habitat.

Painted Turtles (*Chrysemys picta*) and Snapping Turtles (*Chelydra serpentina*) were observed incidentally within the meadow marsh wetland west of Ira Needles Boulevard. Garter snakes were also observed at the edges of this habitat, and going into openings of the rocks and pavement from the new parking lot development. Snapping Turtles are listed as Special Concern under the ESA.

Barn Swallows (*Hirundo rustica*) were observed incidentally flying around a barn on the northwest corner of the roundabout at Ira Needles Boulevard and Erb Street. From this observation, it could not be determined if they were using the barn for nesting, but this structure was set back from the proposed road expansion. In addition, the location has since been developed and the barn removed. No further assessment is warranted.

A complete list of wildlife species observed at the site is provided in Appendix C.

5.0 ASSESSMENT

5.1 Areas of Significance

Natural areas that are protected under the PPS include significant habitat of endangered and threatened species, wetlands, woodlands, valleylands, fish and wildlife habitat, coastal wetlands and areas of natural and scientific interest (ANSI). These areas are protected in order to conserve biodiversity and protect essential ecological processes in the province (MNR 2010). There are no areas of natural significance in the study area.

5.2 Hazard Lands

The meadow marsh wetland west of Ira Needles Boulevard is an unevaluated wetland and has been identified on GRCA mapping as “Regulated Area,” protected from alteration under Ontario Regulation 150/06. If any development will take place within the regulated area, a permit for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses will be required. Further consultation with the GRCA to confirm the exact boundary of this regulated area and if it overlaps with the road expansion will be required.

5.3 Vegetation

The vegetation communities at the site are dominantly made up invasive species. Native plant species observed at the site are typical of areas influenced by anthropogenic disturbances. None of the native plant species observed at the site are sensitive or rare. Further disturbance to these areas is unlikely to result in significant effects to vegetation because of their current state of ongoing disturbance, low quality habitat and limited connection to adjacent natural features. No mature trees requiring a tree removal permit were observed within the disturbance area.

5.4 Fish Habitat

No fish habitat has been identified at the site. No permits are anticipated under the federal *Fisheries Act*.

5.5 Wildlife

Wildlife species observed at the site are known to be tolerant of disturbance and human presence. Most of the wildlife species observed during the field surveys are common and not considered to be of conservation concern. Potential effects can be addressed through standard mitigation, preconstruction surveys and planning. Particular attention should be paid to the wetland area to prevent intrusion to the wetland, siltation of the wetland or direct harm to species using the wetland.

5.6 Sensitive Species and Species at Risk

Of the species considered to have moderate or high probability to occur at the site (Appendix A), only the Barn Swallow and Snapping Turtle were observed. The barn where the Barn Swallows were observed has since been removed and the land developed. Other rare turtle and snake species may occur in adjacent habitat, but expansion of the road into the maintained right-of-way is not anticipated to kill, harm or harass these species or cause damage or destruction of their critical habitat. Consultation with the MNRF should be carried out to determine if any further consideration should be given to these species for this project.

5.7 Migratory Birds

The *Migratory Birds Convention Act, 1994* (MBCA) (Government of Canada 1994) protects migratory birds and their nests. It is unlawful to disturb or destroy the nest of a migratory bird protected under the MBCA. Migratory birds may build their nests in the trees, shrubs and meadow grasses on the site. Disturbance can be avoided by scheduling all vegetation clearing, including the cutting of trees on private property, outside of the migratory bird nesting season.

6.0 CONCLUSIONS

Erb Street improvements include widening of the road between Wilmot Line and Fisher-Hallman Road North in the City of Waterloo. This natural heritage survey has been carried out to identify potential natural heritage constraints to the Project.

The site is highly disturbed and surrounded by existing and expected future development. There are no areas of natural significance in the study area. Habitat availability and quality are limited on the site due to the presence of non-native vegetation communities, anthropogenic disturbances and fragmentation. Consequently the site is unlikely to be used for important life history functions. Habitat of similar or improved quality is available in the immediate vicinity of the site and any alteration of areas on the site would not be considered to pose a risk to wildlife or vegetation communities in the study area and vicinity. Standard construction mitigation methods can minimize harm to wildlife and their habitat, including sensitive species such as snapping turtle observed in the wetland west of Ira Needles Boulevard.

7.0 REFERENCES

BCI (Bat Conservation International). 2017. *Species Profiles*. Available at: http://www.batcon.org/index.php/resources/media-education/species-profiles. Accessed May 2017.

Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepage and A.R. Couturier (eds.). 2007. *Atlas of the Breeding Birds of Ontario, 2001–2005*. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, ON. xxii + 706

Chapman L.J. and D.F. Putnman. 1972. *Physiography of Southern Ontario*. Ontario Department of Mines and Northern Affairs.

City of Waterloo. 2014. Official Plan City of Waterloo. Available at: http://www.waterloo.ca/en/government/officialplan.asp

DFO (Fisheries and Oceans Canada). 2013. Fisheries Protection Policy Statement. Ecosystem Programs Policy. Her Majesty the Queen in Right of Canada.

Dobbyn, J.S. 1994. *Atlas of the Mammals of Ontario*. Federation of Ontario Naturalists, Toronto. 120 pp.

Downes, C.M. and B.T. Collins. 2003. *Canadian Breeding Bird Survey, 1967-2000*. National Wildlife Research Centre, Canadian Wildlife Service. Ottawa.

eBird. 2017. *eBird: An online database of bird distribution and abundance* [web application]. eBird, Ithaca, New York. URL: http://www.ebird.org. Accessed May 2017.

Government of Canada. 1985. *Fisheries Act* (R.S.C., 1985, c. F-14). Act current to 2017-04-25 and last amended on 2016-04-05. Available at: http://laws-lois.justice.gc.ca/eng/acts/F-14/

Government of Canada. 1994. *Migratory Birds Convention Act, 1994* (S.C. 1994, c. 22). Act current to 2017-04-25 and last amended on 2010-12-10. Available at: http://laws-lois.justice.gc.ca/eng/acts/m-7.01/

Government of Canada. 2002. *Species at Risk Act* S.C. 2002, c. 29. Minister of Justice. Act current to 2017-04-25 and last amended on 2017-04-13. Available at: http://laws-lois.justice.gc.ca/eng/acts/s-15.3/

Government of Ontario. 2007. *Endangered Species Act, 2007*. S.O. 2007. Queen's Printer for Ontario. Toronto, ON.

Government of Ontario. 2013. *Grand River Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses*. Ontario Regulation 150/06 made under the Conservation Authorities Act.

GRWMP (Grand River Watershed Water Management Plan). 2014. Prepared by the Project Team, Water Management Plan. Grand River Conservation Authority, Cambridge, ON. 137 p. + appendices

Jones, C., R. Layberry and A. Macnaughton. 2017. *Ontario Butterfly Atlas Online*. Toronto Entomologists' Association. Available at: http://www.ontarioinsects.org/atlas_online.htm. Last updated January 2017. Accessed May 2017.

Konze, K and M. McLaren. 1997. *Wildlife Monitoring Programs and Inventory Techniques for Ontario*. Ontario.

MNR (Ontario Ministry of Natural Resources). 2000. *Significant Wildlife Habitat Technical Guide*. Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, ON. 139pp.

MNR. 2010. *Natural Heritage Reference Manual for Policies the Provincial Policy Statement.* Ontario Ministry of Natural Resources. Peterborough, ON. 12pp.

MNRF (Ontario Ministry of Natural Resources and Forests). 2015. *Forest Regions*. Available at: https://www.ontario.ca/page/forest-regions. Published July 2014. Last updated October 2015. Accessed May 2017.

MNRF. 2017. Species at Risk in Ontario List. Available at: https://www.ontario.ca/environment-and-energy/species-risk-ontario-list. Accessed May 2017.

Ontario Nature. 2015. *Ontario Reptile and Amphibian Atlas*. Available at: http://www.ontarionature.org/protect/species/herpetofaunal_atlas.php. Last updated June 2015. Accessed May 2017.

Region of Waterloo. 2010. *Regional Official Plan*. Available at: http://www.regionofwaterloo.ca/en/regionalGovernment/PreviousROP.asp

Rowe, J.S. 1972. *Forest Regions of Canada*. Publication No. 1300. Ottawa: Canadian Forestry Service, Department of the Environment.

Report Signature Page

GOLDER ASSOCIATES LTD.





Barbara Bleho, M.N.R.M.
Ecologist

Richard Booth, Ph.D.
Associate, Senior Ecologist

BB/RKB/mp

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

\\golder.gds\gal\cambridge\active\2013 projects\1186 construction services\13-1186-0383 - walterfedy - erb st - waterloo\nat env\13-1186-0383-r-rev0-erb street natural environment-2017june01 .docx

APPENDIX A

Species at Risk Screening

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements	ESA Habitat Protection Provisions[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Amphibian	Jefferson salamander	*Ambystoma jeffersonianum*	THR	END	END	S2	In Ontario, Jefferson salamander is found only in southern Ontario, along southern portions of the Niagara Escarpment and western portions of the Oak Ridges moraine. Jefferson salamander prefers moist, well-drained deciduous and mixed forests with closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July).	Regulated In the geographic areas of: City of Hamilton; counties of Brant, Dufferin, Elgin, Grey, Haldimand, Norfolk, and Wellington; regional municipalities of Halton, Niagara, Peel, Waterloo and York Regulated Habitat: i. wetland, pond or vernal pool, or other temporary pool, being used or was used in previous five years, by Jefferson salamander or Jefferson dominated polyploidy ii. area within 300 m of wetland, pond or vernal or other temporary pool that provides suitable foraging, dispersal, migration or hibernation conditions iii. wetland, pond or vernal or other temporary pool that provides suitable breeding conditions, is within 1 km of an area described in i. and is connected to the area described in i. and an area described in iv. iv. an area providing suitable conditions for Jefferson salamander or Jefferson dominated polyploids to disperse and is within 1 km of an area described in i.	Low	No woodland ephemeral pools. Species not observed.
Amphibian	Western chorus frog - Great Lakes St. Lawrence/Canadian Shield Population	*Pseudacris triseriata*	THR	—	THR	S3	In Ontario, this amphibian species habitat typically consists of marshes or wooded wetlands, particularly those with dense shrub layers and grasses, as this species is a poor climber. They will breed in almost any fishless pond including roadside ditches, gravel pits and flooded swales in meadows. This species hibernates in terrestrial habitats under rocks, dead trees or leaves, in loose soil or in animal burrows. During hibernation, this species is tolerant of flooding.		Low	Few wetlands, Amphibian Call Count Surveys did not identify this species
Arthropod	Monarch	*Danaus plexippus*	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions. This butterfly is found wherever there are milkweed (*Asclepius* spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults; often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes.		Moderate	Cultural meadows contain small amounts of milkweed. Species not observed.

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements	ESA Habitat Protection Provisions[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Arthropod	West Virginia white	*Pieris virginiensis*	—	SC	—	S3	In Ontario, West Virginia white is found primarily in the southern region of the province. This butterfly lives in moist, mature, deciduous woodlands, and the caterpillars feed only on the leaves of toothwort (*Cardamine* spp.), which are small, spring-blooming plants of the forest floor. These woodland habitats are typically maple-beech-birch dominated.		Low	No moist woodlands. Species not observed.
Bird	Acadian flycatcher	*Empidonax virescens*	END	END	END	S2S3B	In Ontario, the Acadian flycatcher breeds in the understory of large, mature, closed-canopy forests, swamps and forested ravines. This bird prefers forests greater than 40 ha in size, and exhibits edge sensitivity preferring the deep interior of the forest. Its nest is loosely woven and placed near the tip of branch in a small tree or shrub often, but not always, near water.	General (as of June 30, 2013)	Low	No mature woodlands. Species not observed in Breeding Bird Surveys.
Bird	Bank swallow	*Riparia riparia*	—	THR	THR	S4B	In Ontario, the bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided.	General	Low	No exposed banks, species not observed in Breeding Bird Surveys
Bird	Barn swallow	*Hirundo rustica*	—	THR	THR	S4B	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared rights-of-way, and wetlands. Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused.	General Category 1 – Nest Category 2 – Area within 5 m of the nest Category 3 – Area between 5-200 m of the nest	Moderate	Species observed at a barn near the development, but the barn since removed. Some local buildings may provide nesting structures, but they will not be disturbed by the development.
Bird	Black tern	*Chlidonias niger*	—	SC	NAR	S3B	In Ontario, the black tern breeds in freshwater marshlands where it forms small colonies. It prefers marshes or marsh complexes greater than 20 ha in area and which are not surrounded by wooded area. Black terns are sensitive to the presence of agricultural activities. The black tern nests in wetlands with an even combination of open water and emergent vegetation, and still waters of 0.5-1.2 m deep. Preferred nest sites have short dense vegetation or tall sparse vegetation often consisting of cattails, bulrushes and occasionally burreed or other marshland plants. Black terns also		Low	High disturbance in available habitat. Species not observed in Breeding Bird Surveys.

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements	ESA Habitat Protection Provisions[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
							require posts or snags for perching.			
Bird	Bobolink	*Dolichonyx orizivorus*	—	THR	THR	S4B	In Ontario, the bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation. Bobolinks prefer grassland habitat with a broad-leaf component and a substantial litter layer. They have low tolerance for presence of woody vegetation and are sensitive to extensive mowing. They are found in greater numbers in old fields where mowing and re-sowing are infrequent. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more broad-leaved forbs.	General Category 1 – Nest and area within 10 m of nest Category 2 – Area between 10 – 60 m of the nest or centre of approximated defended territory Category 3 - Area of continuous suitable habitat between 60 – 300 m of the nest or centre of approximated defended territory	Low	No large fields suitable for breeding of this species. Species not observed in Breeding Bird Surveys.
Bird	Cerulean warbler	*Setophaga cerulea*	SC	THR	END	S3B	In Ontario, breeding habitat of the cerulean warbler consists of second-growth or mature deciduous forest with a tall canopy of uneven vertical structure and a sparse understory. This habitat occurs in both wet bottomland forests and upland areas, and often contains large hickory and oak trees. This species may be attracted to gaps or openings in the upper canopy. The cerulean warbler is associated with large forest tracks, but may occur in woodlots as small as 10 ha. Nests are usually built on a horizontal limb in the mid-story or canopy of a large deciduous tree.	General	Low	No mature woodlands. Species not observed in Breeding Bird Surveys.
Bird	Chimney swift	*Chaetura pelagica*	THR	THR	THR	S4B, S4N	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used.	General Category 1 – Human-made nest/roost, or natural nest/roost cavity and area within 90 m of natural cavity	Low	No chimneys found that will be disturbed by the Project. Species not observed.
Bird	Common nighthawk	*Chordeiles minor*	THR	SC	THR	S4B	These aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bog ferns, prairies, gravel pits and gravel rooftops in cities.		Low	No large open woodlands. Species not observed.

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements	ESA Habitat Protection Provisions[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Bird	Eastern meadowlark	*Sturnella magna*	—	THR	THR	S4B	In Ontario, the eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlarks prefer moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component. They prefer well drained sites or slopes, and sites with different cover layers.	General Category 1 – Nest and area within 10 m of the nest Category 2 – Area between 10 – 100 m of the nest or centre of approximated defended territory Category 3 – Area of continuous suitable habitat between 100 – 300 m of the nest or centre of approximated defended territory	Low	No large fields suitable for breeding of this species. Species not observed in Breeding Bird Surveys.
Bird	Eastern wood-pewee	*Contopus virens*	—	SC	SC	S4B	In Ontario, the eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediate-aged forests with a relatively sparse midstory are preferred. Tends to inhabit edges of younger forests having a relatively dense midstory. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, one to two meters above the ground, in a wide variety of deciduous and coniferous trees.		Low	No mature woodlands. Species not observed in Breeding Bird Surveys.
Bird	Red-headed woodpecker	*Melanerpes erythrocephalus*	THR	SC	THR	S4B	In Ontario, the red-headed woodpecker breeds in open, deciduous woodlands or woodland edges and are often found in parks, cemeteries, golf courses, orchards and savannahs. They may also breed in forest clearings or open agricultural areas provided that large trees are available for nesting. They prefer forests with little or no understory vegetation. They are often associated with beech or oak forests, beaver ponds and swamp forests where snags are numerous. Nests are excavated in the trunks of large dead trees.		Low	No mature woodlands. Species not observed in Breeding Bird Surveys.
Bird	Wood thrush	*Hylocichla mustelina*	—	SC	THR	S4B	During the breeding season, the wood thrush is found in moist, deciduous hardwood or mixed stands, often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. Wood thrush chooses habitats based on the structure of the forest. Specifically, this species selects nesting sites with the following characteristics: lower elevations with trees >16 m in height, a closed canopy cover (>70%), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter.		Low	No mature woodlands. Species not observed in Breeding Bird Surveys.

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements	ESA Habitat Protection Provisions[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Mammal	Eastern small-footed myotis	*Myotis leibii*	—	END	—	S2S3	In Ontario, the eastern small-footed myotis occurs primarily in hemlock forest. The species generally roosts on the ground under rocks, in rock crevices, and under loose tree bark. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty with low humidity, and may be subfreezing.	General	Low	No mature woodlands, no talus or potential hibernacula.
Mammal	Woodland vole	*Microtus pinetorum*	SC	SC	SC	S3?	This species is associated with mature deciduous forests with soft, often sandy soils and a deep litter and humic layer, suitable for burrowing.		Low	No large fields suitable for breeding of this species. Species not observed in Breeding Bird Surveys.
Mammal	Little brown myotis	*Myotis lucifugus*	END	END	END	S4	In Ontario, this species range is extensive and covers much of the province. It will roost in both natural and man-made structures. They require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used for hibernaculum, but high humidity and stable above freezing temperatures are required.	General	Moderate	No mature woodlands, no potential hibernacula. Some local buildings may provide summer roosts, but they will not be disturbed by the development.
Mammal	Northern myotis	*Myotis septentrionalis*	END	END	END	S3	In Ontario, this species range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used for hibernaculum, but high humidity and stable above freezing temperatures are required.	General	Low	No mature woodlands, no potential hibernacula.
Reptile	Blanding's turtle - Great Lakes/ St.Lawrence population	*Emydoidea blandingii*	THR	THR	THR	S3	Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in to order reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies.	General Category 1 – Nest and area within 30 m or overwintering sites and area within 30 m Category 2 – Wetland complex (i.e. all suitable wetlands or waterbodies within 500 m of each other) that extends up to 2 km from occurrence, and the area within 30 m around those suitable wetlands or waterbodies Category 3 – Area between 30 – 250 m around suitable wetlands/waterbodies identified in	Moderate	Could use wetlands near Ira Needles Blvd where Painted Turtle and Snapping turtle were observed.

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements	ESA Habitat Protection Provisions[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
								category 2, within 2 km of an occurrence		
Reptile	Eastern ribbonsnake - (Great Lakes population)	*Thamnophis sauritius*	SC	SC	SC	S3	Eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds.		Moderate	May use wetlands near Ira Needles Blvd.
Reptile	Milksnake	*Lampropeltis triangulum*	SC	SC	SC	S3	Milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations.		Moderate	May use local fields, but no suitable hibernacula were observed.
Reptile	Queensnake	*Regina septemvittata*	END	END	END	S2	Queensnake requires permanent aquatic habitat with large flat rocks, either submerged or on the bank/shoreline. Individuals rarely leaving the shoreline of permanent bodies of water with abundant shoreline cover and a healthy population of crayfish. They are fairly intolerant of silty substrates and most commonly are found in streams with bedrock and gravel substrates. The best sites have water temperatures that remain at or above 18◦C during the active season, have a swift to moderate current and woodland surroundings. Hibernacula may occur in the abutments of old bridges, clay slope above high water mark and bedrock fissures.	Regulated In the geographic areas of: Regional Municipality of Waterloo, Municipality of Chatham-Kent, cities of Brantford, London and Windsor, counties of Bruce, Brant, Essex, Huron, Lambton, Middlesex and Oxford, Haldimand County and Norfolk County Regulated Habitat: • area within 50 m of all natural or man-made hibernacula • any part of watercourse, waterbody or marsh up to high water mark that is continuous and within 250 m of area used by queensnake, and area up to 30 m inland from high water mark • where two known populations occur within 1 km of each other, intervening aquatic area and 5 m inland from high water mark protected • aquatic and riparian areas protection until 5 consecutive years of documented non-use	Low	No permanent streams with abundance of crayfish prey.
Reptile	Northern map turtle	*Graptemys geographica*	SC	SC	SC	S3	Northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Hibernation takes place in soft substrates under deep water.		Low	No large water bodies.

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements	ESA Habitat Protection Provisions[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Reptile	Snapping turtle	*Chelydra serpentina*	SC	SC	SC	S3	Snapping turtle uses a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways.		High	May use wetlands near Ira Needles Blvd. Species was observed.
Reptile	Stinkpot or Eastern musk turtle	*Sternotherus odoratus*	THR	SC	SC	S3	Eastern musk turtle is very rarely out of water and prefers permanent bodies of water that are shallow and clear, with little or no current and soft substrates with abundant organic materials. Hibernation occurs in soft substrates under water. Eggs are sometimes laid on open ground, or in shallow nests in decaying vegetation, shallow gravel or rock crevices.	General (as of June 30, 2013)	Low	No suitable habitat. Species not observed.
Vascular Plant	American gromwell	*Lithospermum latifolium*	—	—	—	S3	American gromwell is a plant of floodplains, often found in floodplain woods or open areas near the edges of woods.		Low	No floodplain woodlands. Species not observed.
Vascular Plant	Braun's holly fern	*Polystichum braunii*	—	—	—	S3	Braun's holly fern is found in deciduous or mixed woods on talus slopes, rocky ravines or streambeds, primarily in the area near Lake Superior.		Low	No mature woodlands. Species not observed.
Vascular Plant	Carolina vetch	*Vicia caroliniana*	—	—	—	S2?	Carolina vetch occurs in dry woods, thickets and prairies.		Low	No suitable habitat. Species not observed.
Vascular Plant	Emmons' white-tinged sedge	*Carex albicans var. emmonsii*	—	—	—	S2	Emmons’ white-tinged sedge grows in heath bogs.		Low	No suitable habitat. Species not observed.
Vascular Plant	Meadow evening primrose	*Oenothera pilosella*	—	—	—	S2	Meadow evening primrose grows in open, disturbed areas, prairies and along moist woodland edges.		Moderate	Disturbed open habitats may provide habitat. Species not observed.
Vascular Plant	Moss phlox	*Phlox subulata*	—	—	—	S1?	Habitat of this species includes rocky and sandy barrens, savannahs, rocky ledges, slopes, clearings and disturbed sites with sandy or gravely soils.		Moderate	Disturbed open habitats may provide habitat. Species not observed.
Vascular Plant	Scarlet beebalm	*Monarda didyma*	—	—	—	S3	Scarlet beebalm grows in moist open woods and swampy thickets. It can often be found along streambanks, thickets, woodland edges and roadsides.		Low	No suitable habitat. Species not observed.
Vascular Plant	White-tinged sedge	*Carex albicans var. albicans*	—	—	—	S3	Occurs in open sandy or rocky woods.		Low	No suitable woodland habitat. Species not observed.

Species at Risk Screening

Taxon	Common Name	Scientific Name	Species At Risk Act (Sch 1)[1]	Endangered Species Act[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements	ESA Habitat Protection Provisions[5]	Potential to Occur on Site	Rationale for Potential to Occur on Site
Vascular Plant	Wild licorice	*Glycyrrhiza lepidota*	—	—	—	S3	This species occupies meadows and fields, including anthropogenically disturbed sites such as roadsides and railway rights-of-ways. Occupied sites range from moist to moderately dry, usually in rich soils.		Moderate	Disturbed open habitats may provide habitat. Species not observed.

[1] Species at Risk Act (SARA), 2002. Schedule 1 (Last amended 8 March 2013); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

[2] Endangered Species Act (ESA), 2007 (O.Reg 242/08 last amended 13 Dec 2013 as O.Reg 323/13). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 24 Jan 2013 as O.Reg 25/13, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

[3] Committee on the Status of Endangered Wildlife in Canada (COSEWIC) http://www.cosewic.gc.ca/

[4] Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed August 2011.

[5] General Habitat Protection is applied when a species is newly listed as endangered or threatened on the SARO list under the ESA, 2007. The definition of general habitat applies to areas that a species currently depends on. These areas may include dens and nests, wetlands, forests and other areas essential for breeding, rearing, feeding, hibernation and migration. General habitat protection will also apply to all listed endangered or threatened species without a species-specific habitat regulation as of June 30, 2013 (ESA 2007, c.6, s.10 (2)). Regulated Habitat is species-specific habitat used as the legal description of that species habitat. Once a species-specific habitat regulation is created, it replaces general habitat protection. Refer to O.Reg 242/08 for full details regarding regulated habitat.

APPENDIX B

Vascular Plants Identified at the Site

Vascular Plants Identified at the Site

Scientific Name	Common Name	Origin[a]	Status[b]	G Rank[c]	S Rank[c]
Trees (27 taxa)					
Acer saccharum	Sugar maple	N		G5	S5
Betula papyrifera	White birch	N		G5	S5
Fraxinus americana	White ash	N		G5	S5
Picea pungens	Blue spruce	I		G5	SNA
Populus tremuloides	Trembling aspen	N		G5	S5
Tilia americana	Basswood	N		G5	S5
Juglans nigra	Black walnut	N		G5	S4
Acer platanoides	Norway maple	I		GNR	SNA
Tilia europaea	European linden	I		GNA	SNA
Catalpa speciosa	Northern catalpa	I		G4?	SNA
Pinus mugo	Mugo pine	I		GNR	SNA
Fraxinus pennsylvanica	Green ash	N		G5	S4
Juniperus virginiana	Eastern red cedar	N		G5	S5
Pinus sylvestris	Scott's pine	I		GNR	SNA
Picea glauca	White spruce	N		G5	S5
Populus deltoides	Eastern cottonwood	N		G5T5	S5
Acer saccharinum	Silver maple	N		G5	S5
Gleditsia triacanthos var.	Honey locust (domestic)	I			SNA
Quercus rubra	Red oak	N		G5	S5
Salix babylonica	Weeping willow	I		G5	SNA
Malus sp.	Apple sp.	I			
Acer negundo	Manitoba maple	N		G5	S5
Larix decidua	European larch	I		G5	SNA
Pinus banksiana	Jack pine	N		G5	S5
Robinia pseudoacacia	Black locust	I		G5	SNA
Pinus resinosa	Red pine	N		G5	S5
Picea abies	Norway spruce	I		G5	SNA
Small trees, shrubs and woody vines (8 taxa)					
Rhamnus cathartica	Common buckthorn	I		GNR	SNA
Syringa sp.	Lilac	I		GNR	SNA
Malus sp.	Crab apple (domestic)	I		GNR	SNA
Elaeagnus angustifolia	Russian olive	I		GNR	SNA
Parthenocissus quinquefolia	Virginia creeper	N		G5	S4?
Rhus typhina	Staghorn sumac	N		G5	S5

Vascular Plants Identified at the Site

Scientific Name	Common Name	Origin[a]	Status[b]	G Rank[c]	S Rank[c]
Salix discolor	Pussy willow	N		G5	S5
Vitis riparia	Riverbank grape	N		G5	S5
Graminoids (6 taxa)					
Elymus repens	Quackgrass	I		GNR	SNA
Dactylis glomerata	Orchard grass	I		GNR	SNA
Bromus inermis	Smooth brome	I		G5TNR	SNA
Phragmites australis ssp. *australis*	Phragmites	I		G5T5	SNA
Phalaris arundinacea	Reed canary grass	I		G5	SNA
Poa pratensis	Kentucky bluegrass	I		G5T5?	SNA
Forbs (28 taxa)					
Solidago canadensis var. *canadensis*	Canada goldenrod	N		G5TG	S5
Asclepias syriaca	Common milkweed	N		G5	S5
Melilotus albus	White sweet clover	I		G5	SNA
Melilotus officinalis	Yellow sweet clover	I		GNR	SNA
Chenopodium album	White goosefoot	I		G5	SNA
Ambrosia artemisiifolia	Annual ragweed	I		G5	SNA
Taraxacum officinale	Dandelion	I		G5	SNA
Borago officinalis	Common Borage	I		GNR	SNA
Fallopia japonica	Japanese knotweed	I		GNR	SNA
Convallaria majalis	European Lily-of-the-valley	I		G5	SNA
Leucanthemum vulgare	Oxe eye daisy	I		GNR	SNA
Tanacetum vulgare	Tansy	I		GNR	SNA
Erigeron sp	Fleabane sp	N		-	-
Cirsium arvense	Canada thistle	I		GNR	SNA
Arctium minus	Common Burdock	I		GNR	SNA
Dipsacus sp	Teasel sp	I		-	-
Securigera varia	Crown vetch	I		GNR	SNA
Inula helenium	Elecampane	I		GNR	SNA
Thlaspi arvense	Field Pennycress	I		GNR	SNA
Trifolium pratense	Red clover	I		GNR	SNA
Trifolium hybridum	Alsike clover	I		GNR	SNA
Lotus corniculatus	Bird's foot trefoil	I		GNR	SNA
Silene latifolia	White campion	I		GNR	SNA
Medicago sativa ssp. *varia*	Alfalfa	I		GNA	SNA
Tragopogon sp.	Goat's beard	I		GNR	SNA

Vascular Plants Identified at the Site

Scientific Name	Common Name	Origin[a]	Status[b]	G Rank[c]	S Rank[c]
Vicia cracca	Cowvetch	I		GNR	SNA
Rumex crispus	Curly dock	I		GNR	SNA
Erigeron philadelphicus	Philadelphia fleabane	I		G5	S5

[a] Origin N = native; I = introduced

[b] END= Endangered; SC = Special Concern; THR = Threatened; Ra = Rare.

[c] Ranks from NHIC (2012): G = Global; S = Provincial; Ranks 1-3 are imperiled or rare; Ranks 4 and 5 are secure

.

NA = Not applicable (used mainly for non-natives); NR = Not ranked (used mainly for non-natives); SU = unrankable, conflicting information exists

APPENDIX C

Wildlife Species Identified at the Site

Wildlife Species Identified at the Site

Common Name	Scientific Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]
Reptiles and Amphibians (6 taxa)						
American toad	*Anaxyrus americanus*	N	G5	S5		
Grey tree frog	*Hyla versicolor*	N	G5	S5		
Spring peeper	*Pseudacris crucifer*	N	G5	S5		
Wood frog	*Lithobates sylvaticus*	N	G5	S5		
Midland painted turtle	*Chrysemis picta marginata*	N	G5	S4		
Common snapping turtle	*Chelydra serpentina*	N	G5	S3		SC
Eastern garter snake	*Thamnophis sirtalis sirtalis*	N	G5	S5		
Birds (28 taxa)						
American crow	*Corvus brachyrhynchos*	N	G5	S5B		
American goldfinch	*Carduelis tristis*	N	G5	S5B		
American robin	*Turdus migratorius*	N	G5	S5B		
American woodcock	*Scolopax minor*	N	G5	S4B		
Barn swallow	*Hirundo rustica*	N	G5	S4B	THR	
Black-capped chickadee	*Poecile atricapillus*	N	G5	S5		
Brown-headed cowbird	*Molothrus ater*	N	G5	S4B		
Canada goose	*Branta canadensis*	N	G5	S5		
Cedar waxwing	*Bombycilla cedrorum*	N	G5	S5B		
Chipping sparrow	*Spizella passerina*	N	G5	S5B		
Common grackle	*Quiscalus quiscula*	N	G5	S5B		
Eastern kingbird	*Tyrannus tyrannus*	N	G5	S4B		
European starling	*Sturnus vulgaris*	I	G5	SNA		
Herring gull	*Larus argentatus*	N	G5	S5B,S5N		
House sparrow	*Passer domesticus*	N	G5	SNA		
Killdeer	Charadrius vociferus	N	G5	S5B,S5N		
Mallard	*Anas platyrhynchos*	N	G5	S5		
Mourning dove	*Zenaida macroura*	N	G5	S5		
Northern flicker	*Colaptes auratus*	N	G5	S4B		
Northern rough-winged swallow	*Stelgidopteryx serripennis*	N	G5	S4B		
Red-winged blackbird	*Agelaius phoeniceus*	N	G5	S4		
Ring-billed gull	*Larus delawarensis*	N	G5	S5B,S4N		

Wildlife Species Identified at the Site

Common Name	Scientific Name	Origin[a]	Global Rarity Status[b]	Ontario Rarity Status[b]	SARA[c]	ESA[d]
Rock pigeon	*Columba livia*	I	G5	SNA		
Savannah sparrow	*Passerculus sandwichensis*	N	G5	S4B		
Song sparrow	*Melospiza melodia*	N	G5	S5B		
Spotted sandpiper	*Actitis macularius*	N	G5	S5		
Tree swallow	*Tachycineta bicolor*	N	G5	S4B		
Turkey vulture	*Cathartes aura*	N	G5	S5B		
Warbling vireo	*Vireo gilvus*	N	G5	S5B		
Wild turkey	*Meleagris gallopavo*	N	G5	S5		
Yellow warbler	*Setophaga petechia*	N	G5	S5B		
Mammals (3 taxa)						
Eastern cottontail	*Sylvilagus floridanus*	N	G5	S5		
Grey squirrel	*Sciurus carolinensis*	N	G5	S5		
Skunk	*Mephitis mephitis*	N	G5	S5		

[a] Origin: N = Native; (N) = Native but not in study area region; I = Introduced.

[b] Ranks based upon determinations made by the Ontario Natural Heritage Information Centre (2012).

G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure.

SNA = Not applicable for Ontario Ranking (e.g. Exotic species); SNR = Provincial conservation status not yet assessed; B = status applies to the breeding population of the species

[c] Species at Risk Act (SARA), 2002. Schedule 1 (Last amended 6 July 2012);

[d] Ontario Endangered Species Act (ESA), 2007 (O.Reg 242/08 last amended 1 July 2012 as O.Reg 122/12). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 24 Jan 2013 as O.Reg 25/13, s. 1.);

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 44 1628 851851
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

Golder Associates Ltd.
6925 Century Avenue, Suite #100
Mississauga, Ontario, L5N 7K2
Canada
T: +1 (905) 567 4444

Golder Associates

APPENDIX D

Cultural Heritage Resource Assessment

Cultural Heritage Resource Assessment:
Built Heritage Resources and Cultural Heritage Landscapes

Existing Conditions and Assessment of Impacts

Erb Street Widening and Corridor Study
Municipal Class Environmental Assessment

Former Township of Waterloo, County of Waterloo
City of Waterloo, Regional Municipality of Waterloo

FINAL REPORT

Prepared for:

WalterFedy
675 Queen Street South, Suite 111
Kitchener, Ontario, N2M 1A1
Email: mchristensen@walterfedy.com
Phone: 519-576-2150
Fax: 519-576-5499

ASI File 13EA-205

June 2014 (Revised January 2018 and February 2019)

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iASI.to

Cultural Heritage Resource Assessment:
Built Heritage Resources and Cultural Heritage Landscapes

Existing Conditions and Assessment of Impacts

Erb Street Widening and Corridor Study
Municipal Class Environmental Assessment

Former Township of Waterloo, County of Waterloo
City of Waterloo, Regional Municipality of Waterloo

EXECUTIVE SUMMARY

Archaeological Services Inc. (ASI) was contracted by WalterFedy on behalf of the Regional Municipality of Waterloo to conduct a Cultural Heritage Resource Assessment (CHRA) as part of the Erb Street Municipal Class Environmental Assessment (EA) study. The project involves the widening and corridor study of Erb Street from Fischer-Hallman Road to Wilmot Line in the City of Waterloo.

The results of background historic research and a review of secondary source material revealed a study area with a rural land use history dating back to the early-nineteenth century. The field review confirmed that this area retains four nineteenth- and twentieth-century cultural heritage resources. A total of two built heritage resource and two cultural heritage landscapes was identified within and/or adjacent to the Erb Street study area.

Based on the results of background data collection and field review, the following recommendations were developed for the Erb Street Municipal Class EA:

1. Staging and construction activities should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources;

2. BHR 1 is expected to be impacted through alteration to setting by the removal of replaceable landscape features (i.e. vegetation, and mature trees). The feasibility of implementing tree protection zones should be investigated for all identified cultural heritage resources where tree removals are planned. If possible, tree protection zones should be implemented for BHR 1;

3. Where built heritage resources are expected to be impacted through alteration to their setting, a resource–specific cultural heritage impact assessment report should be prepared in advance of construction activities. BHR 1 should be subject to photographic documentation and compilation of a resource-specific cultural heritage impact assessment report by a qualified heritage consultant.

4. Post-construction landscaping and rehabilitation plans should be undertaken in a manner that is sympathetic to the overall setting. Wherever possible, landscaping with appropriate or sympathetic historic plant materials is recommended. Post-construction

landscaping is recommended for BHR 1 and for all properties that will be subject to the removal of vegetation or replaceable landscape features (i.e. young trees, shrubs) during construction; and,

5. Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources.

PROJECT PERSONNEL

Senior Project Manager:	Annie Veilleux, MA *Senior Heritage Specialist* *Manager, Cultural Heritage Division*
Project Manager:	Heidy Schopf, MES (2014) *Cultural Heritage Specialist*
	John Sleath, MA (2018) *Cultural Heritage Associate*
Project Coordinator:	Sarah Jagelewski, Hon. BA *Staff Archaeologist* *Assistant Manager, Environmental Assessment Division*
Project Administrator:	Carol Bella, Hon. BA *Research Archaeologist and Administrative Assistant*
Report Preparation:	Heidy Schopf (2014)
	John Sleath (2018)
Graphics Preparation:	Heidy Schopf (2014)
	John Sleath (2018)
	Blake Williams, MLitt (2014 and 2018) *Geomatics Specialist*
Report Reviewer:	Annie Veilleux (2014)
	Joel Konrad, PhD (2018) *Project Manager/ Cultural Heritage Specialist* *Interim Assistant Manager, Cultural Heritage Division*

TABLE OF CONTENTS

EXECUTIVE SUMMARY ii
PROJECT PERSONNEL iv
TABLE OF CONTENTS v
1.0 INTRODUCTION 1
2.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT CONTEXT 1
2.1 Approach and Methodology 1
2.2 Municipal Policies 5
2.3 Data Collection 8
3.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT 11
3.1 Introduction 11
3.2 Township Survey and Settlement 11
3.3 Review of Historic Mapping 12
3.4 Existing Conditions 15
3.4.1 Erb Street – Existing Conditions 16
3.4.2 Erb Street – Identified Cultural Heritage Resources 19
3.5 Screening for Potential Impacts 20
3.5.1 Potential Impacts of the Preferred Alternative 21
4.0 CONCLUSIONS 21
5.0 RECOMMENDATIONS 23
6.0 REFERENCES 24
7.0 CULTURAL HERITAGE RESOURCE INVENTORY 26
8.0 CULTURAL HERITAGE RESOURCE LOCATION MAPPING 28

LIST OF FIGURES

Figure 1: Location of the study area 1
Figure 2: The study area overlaid on the 1861 map of the County of Waterloo 14
Figure 3: The study area overlaid on the 1881 maps of the Townships of Waterloo and Wilmot 14
Figure 4: The study area overlaid on the 1946 aerial photograph of Kitchener-Waterloo 14
Figure 5: The study area overlaid on the 1955 aerial photograph of Kitchener-Waterloo 14
Figure 6: The study area overlaid on the 1998 map of Stratford 15
Figure 7: Erb Street Widening and Corridor Study – Location of Built Heritage Resources (BHR) and Cultural Heritage Landscapes (CHL) 28
Figure 8: Erb Street Widening and Corridor Study – Location of Built Heritage Resources (BHR) and Cultural Heritage Landscapes (CHL) 29

LIST OF TABLES

Table 1: Nineteenth-century property owners and historical features 12
Table 2: Summary of built heritage resources (BHR) and cultural heritage landscapes (CHL) in the study area 20
Table 3: Potential Impacts and Proposed Mitigation Measures 21
Table 4: Inventory of built heritage resources (BHR) and cultural heritage landscapes (CHL) in the study area 26

LIST OF PLATES

Plate 1: East-north east view towards the intersection of Wilmot Line and Erb Street West. 18
Plate 2: North-northwest view towards 930 Erb Street West. The farmhouse has been recently demolished... 18
Plate 3: East-northeast along Erb Street West. Note the agricultural fields and wide ROW. 18

Plate 4: South-southwest view from Erb Street West towards the active landfill. 18
Plate 5: West-southwest along Erb Street West from the Erbsville Road traffic circle. Note the recent commercial development on both sides of the road. 18
Plate 6: East-northeast view along Westhollow Court. Recent residential development borders Erb Street West for the majority of the study area. 18
Plate 7: East view to 635 Erb Street. This property was likely a historic farm complex that was recently demolished. Note the remnant landscape features (i.e. gravel driveway and established vegetation). 19
Plate 8: Northeast view from the intersection of Erb Street West and Erbsville Court. Note the historic stone schoolhouse located on the northeast side of the intersection. 19
Plate 9: East-northeast view along Erb Street West. Both sides of the road are bordered by recent residential, commercial, and institutional development. 19
Plate 10: West-southwest view from the southeast side of the intersection of Erb Street West and Fischer-Hallman Road. Note the residential development on the left and recent commercial development on the right. 19

1.0 INTRODUCTION

Archaeological Services Inc. (ASI) was contracted by WalterFedy on behalf of the Regional Municipality of Waterloo to conduct a Cultural Heritage Resource Assessment (CHRA) as part of the Erb Street Municipal Class Environmental Assessment (EA) study. The project involves the widening and corridor study of Erb Street from Fischer-Hallman Road to Wilmot Line in the City of Waterloo (Figure 1).

The purpose of this report is to present a built heritage and cultural landscape inventory of cultural heritage resources, and identify existing conditions of the proposed alternatives for the Erb Street study area. This research was conducted under the senior project management of Annie Veilleux and project management of Heidy Schopf (2014) and John Sleath (2018), of ASI.

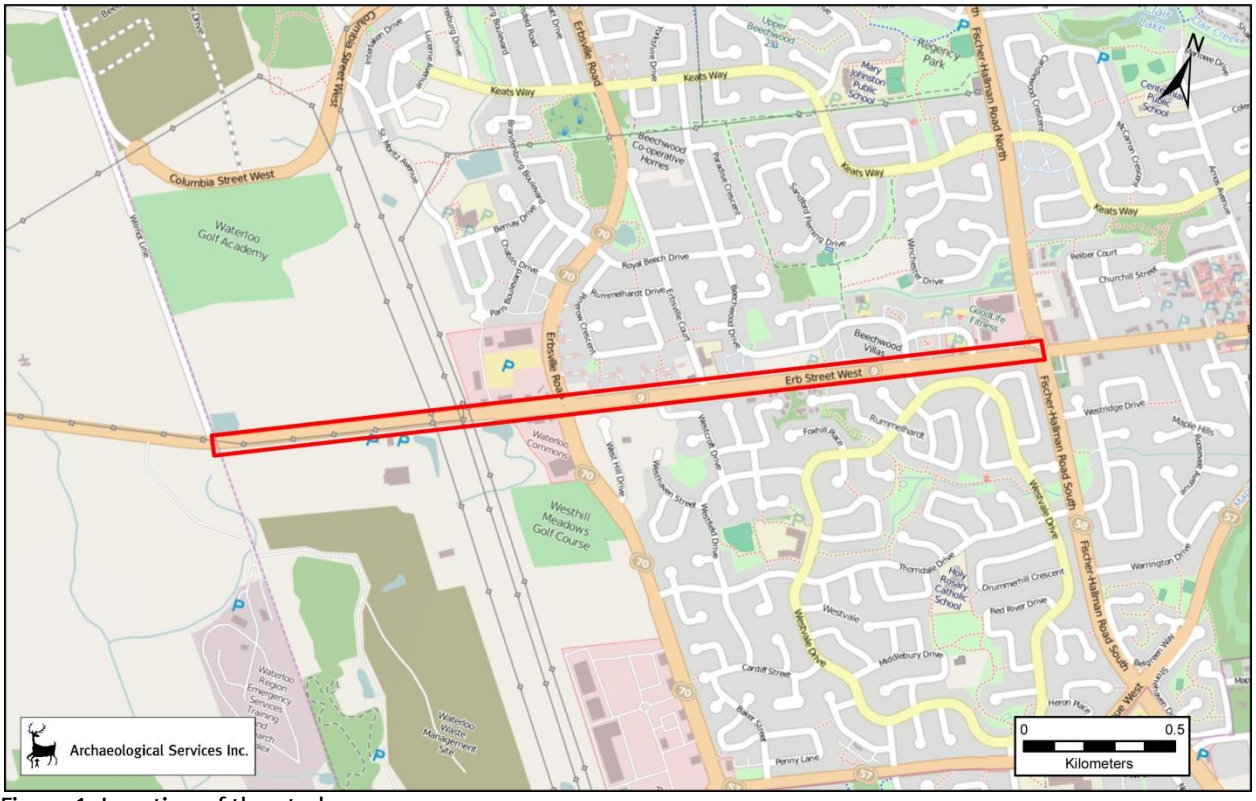


Figure 1: Location of the study area
Base Map:©OpenStreetMap and contributors, Creative Commons-Share Alike License (CC-BY-SA)

2.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT CONTEXT

2.1 Approach and Methodology

This cultural heritage assessment considers cultural heritage resources in the context of improvements to specified areas, pursuant to the *Environmental Assessment Act*. This assessment addresses above ground cultural heritage resources over 40 years old. Use of a 40 year old threshold is a guiding principle when conducting a preliminary identification of cultural heritage resources (Ministry of Transportation 2006; Ministry of Transportation 2007; Ontario Realty Corporation 2007). While identification of a resource that is 40 years old or older does not confer outright heritage significance, this threshold provides a means

to collect information about resources that may retain heritage value. Similarly, if a resource is slightly younger than 40 years old, this does not preclude the resource from retaining heritage value.

For the purposes of this assessment, the term cultural heritage resources was used to describe both cultural heritage landscapes and built heritage resources. A cultural landscape is perceived as a collection of individual built heritage resources and other related features that together form farm complexes, roadscapes and nucleated settlements. Built heritage resources are typically individual buildings or structures that may be associated with a variety of human activities, such as historical settlement and patterns of architectural development.

The analysis throughout the study process addresses cultural heritage resources under various pieces of legislation and their supporting guidelines. Under the *Environmental Assessment Act* (1990) environment is defined in Subsection 1(c) to include:

- cultural conditions that influence the life of man or a community, and;
- any building, structure, machine, or other device or thing made by man.

The Ministry of Tourism, Culture and Sport is charged under Section 2 of the *Ontario Heritage Act* with the responsibility to determine policies, priorities and programs for the conservation, protection and preservation of the heritage of Ontario and has published two guidelines to assist in assessing cultural heritage resources as part of an environmental assessment: *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (1992), and *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (1981). Accordingly, both guidelines have been utilized in this assessment process.

The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* (Section 1.0) states the following:

> When speaking of man-made heritage we are concerned with the works of man and the effects of his activities in the environment rather than with movable human artifacts or those environments that are natural and completely undisturbed by man.

In addition, environment may be interpreted to include the combination and interrelationships of human artifacts with all other aspects of the physical environment, as well as with the social, economic and cultural conditions that influence the life of the people and communities in Ontario. The *Guidelines on the Man-Made Heritage Component of Environmental Assessments* distinguish between two basic ways of visually experiencing this heritage in the environment, namely as cultural heritage landscapes and as cultural features.

Within this document, cultural heritage landscapes are defined as the following (Section 1.0):

> The use and physical appearance of the land as we see it now is a result of man's activities over time in modifying pristine landscapes for his own purposes. A cultural landscape is perceived as a collection of individual man-made features into a whole. Urban cultural landscapes are sometimes given special names such as townscapes or streetscapes that describe various scales of perception from the general scene to the particular view. Cultural landscapes in the countryside are viewed in or adjacent to natural undisturbed landscapes, or waterscapes, and include such land uses as agriculture, mining, forestry, recreation, and transportation. Like urban cultural landscapes, they too

> may be perceived at various scales: as a large area of homogeneous character; or as an intermediate sized area of homogeneous character or a collection of settings such as a group of farms; or as a discrete example of specific landscape character such as a single farm, or an individual village or hamlet.

A cultural feature is defined as the following (Section 1.0):

> …an individual part of a cultural landscape that may be focused upon as part of a broader scene, or viewed independently. The term refers to any man-made or modified object in or on the land or underwater, such as buildings of various types, street furniture, engineering works, plantings and landscaping, archaeological sites, or a collection of such objects seen as a group because of close physical or social relationships.

The Minister of Tourism, Culture, and Sport has also published *Standards and Guidelines for Conservation of Provincial Heritage Properties* (April 2010; Standards and Guidelines hereafter). These Standards and Guidelines apply to properties the Government of Ontario owns or controls that have cultural heritage value or interest. They are mandatory for Ministries and prescribed public bodies and have the authority of a Management Board or Cabinet directive. Prescribed public bodies include:

- Agricultural Research Institute of Ontario
- Hydro One Inc.
- Liquor Control Board of Ontario
- McMichael Canadian Art Collection
- Metrolinx
- The Niagara Parks Commission.
- Ontario Heritage Trust
- Ontario Infrastructure and Lands Corporation
- Ontario Lottery and Gaming Corporation
- Ontario Power Generation Inc.
- Royal Botanical Gardens
- Toronto Area Transit Operating Authority
- St. Lawrence Parks Commission

The Standards and Guidelines provide a series of definitions considered during the course of the assessment:

A provincial heritage property is defined as the following (14):

> Provincial heritage property means real property, including buildings and structures on the property, that has cultural heritage value or interest and that is owned by the Crown in right of Ontario or by a prescribed public body; or that is occupied by a ministry or a prescribed public body if the terms of the occupancy agreement are such that the ministry or public body is entitled to make the alterations to the property that may be required under these heritage standards and guidelines.

A provincial heritage property of provincial significance is defined as the following (14):

> Provincial heritage property that has been evaluated using the criteria found in *Ontario Heritage Act* O.Reg. 10/06 and has been found to have cultural heritage value or interest of provincial significance.

A built heritage resource is defined as the following (13):

> …one or more significant buildings (including fixtures or equipment located in or forming part of a building), structures, earthworks, monuments, installations, or remains associated with architectural, cultural, social, political, economic, or military history and identified as being important to a community. For the purposes of these Standards and Guidelines, "structures" does not include roadways in the provincial highway network and in-use electrical or telecommunications transmission towers.

A cultural heritage landscape is defined as the following (13):

> …a defined geographical area that human activity has modified and that has cultural heritage value. Such an area involves one or more groupings of individual heritage features, such as structures, spaces, archaeological sites, and natural elements, which together form a significant type of heritage form distinct from that of its constituent elements or parts. Heritage conservation districts designated under the *Ontario Heritage Act*, villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trails, and industrial complexes of cultural heritage value are some examples.

Additionally, the *Planning Act* (1990) and related *Provincial Policy Statement* (*PPS*), which was updated in 2014, make a number of provisions relating to heritage conservation. One of the general purposes of the *Planning Act* is to integrate matters of provincial interest in provincial and municipal planning decisions. In order to inform all those involved in planning activities of the scope of these matters of provincial interest, Section 2 of the *Planning Act* provides an extensive listing. These matters of provincial interest shall be regarded when certain authorities, including the council of a municipality, carry out their responsibilities under the *Act*. One of these provincial interests is directly concerned with:

> 2.(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest

Part 4.7 of the *PPS* states that:

> The official plan is the most important vehicle for implementation of this Provincial Policy Statement. Comprehensive, integrated and long-term planning is best achieved through official plans.
> Official plans shall identify provincial interests and set out appropriate land use designations and policies. To determine the significance of some natural heritage features and other resources, evaluation may be required.
>
> Official plans should also coordinate cross-boundary matters to complement the actions of other planning authorities and promote mutually beneficial solutions. Official plans shall provide clear, reasonable and attainable policies to protect provincial interests and direct development to suitable areas.

> In order to protect provincial interests, planning authorities shall keep their official plans up-to-date with this Provincial Policy Statement. The policies of this Provincial Policy Statement continue to apply after adoption and approval of an official plan.

Those policies of particular relevance for the conservation of heritage features are contained in Section 2-Wise Use and Management of Resources, wherein Subsection 2.6 - Cultural Heritage and Archaeological Resources, makes the following provisions:

> 2.6.1 Significant built heritage resources and significant cultural heritage landscapes shall be conserved.

A number of definitions that have specific meanings for use in a policy context accompany the policy statement. These definitions include built heritage resources and cultural heritage landscapes.

A *built heritage resource* is defined as: "a building, structure, monument, installation or any manufactured remnant that contributes to a property's cultural heritage value or interest as identified by a community, including an Aboriginal community" (PPS 2014).

A *cultural heritage landscape* is defined as "a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Aboriginal community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association" (PPS 2014). Examples may include, but are not limited to farmscapes, historical settlements, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways, and industrial complexes of cultural heritage value.

In addition, significance is also more generally defined. It is assigned a specific meaning according to the subject matter or policy context, such as wetlands or ecologically important areas. With regard to cultural heritage and archaeology resources, resources of significance are those that are valued for the important contribution they make to our understanding of the history of a place, an event, or a people (*PPS* 2014).

Criteria for determining significance for the resources are recommended by the Province, but municipal approaches that achieve or exceed the same objective may also be used. While some significant resources may already be identified and inventoried by official sources, the significance of others can only be determined after evaluation (*PPS* 2014).

Accordingly, the foregoing guidelines and relevant policy statement were used to guide the scope and methodology of the cultural heritage assessment.

2.2 Municipal Policies

The Erb Street Widening study corridor falls within the City of Waterloo. The municipal policy for the City of Waterloo was reviewed to gather direction regarding cultural heritage resources.

The City of Waterloo's Official Plan (2016), Section 4.7 (Cultural Heritage Policies), provides policy direction regarding built heritage and cultural heritage landscapes. The following is a selection of applicable cultural heritage policies as determined by the City of Waterloo.

4.7 Cultural Heritage Policies

Conservation of cultural heritage resources is an integral part of this Plan, recognizing that such resources contribute to Waterloo's identity, economic potential and quality of life. This Plan anticipates growth through intensification while recognizing the importance of conserving Waterloo's cultural heritage resources in a way that allows culturally significant buildings, structures and landscapes to be experienced and appreciated by existing and future generations.

4.7.1 General Policies

(1) The City will consult with the Municipal Heritage Committee in matters relating to heritage conservation, such as the listing of designated and non-designated heritage properties, alteration or demolition of properties with cultural heritage value or interest, creation of heritage easements and covenants, and the identification of a study area or passing of a plan for a Heritage Conservation District.

(2) To ensure appropriate conservation, the City shall designate cultural heritage resources in accordance with the Ontario Heritage Act.

(3) The City may explore fiscal tools and incentives that include but are not limited to grants and loans, heritage property tax reduction/rebate, height and/or density bonusing, extensions of land use, and parking reductions to facilitate heritage conservation in recognition of the contribution that heritage conservation makes to our community.

(6) The City may adopt additional measures to implement policies that address the conservation of cultural heritage resources where such measures are authorized by legislation such as the Planning Act, Municipal Act, Environmental Assessment Act, and Cemeteries Act.

(7) To encourage public appreciation, stewardship and the visibility of cultural heritage resources, the City shall involve the public in all aspects of the heritage conservation programs and may promote the City's heritage through means that may include but not be limited to educational programs, publicity and promotion, development of heritage sites and trails, interpretive plaques, signage, the City's heritage collection, and awards.

(8) The City shall encourage cultural heritage resource stewardship through strong collaborative relationships among stakeholders such as the City, the Region, property owners, community-based advocacy groups, and the development industry.

(9) The City will, and the Regional Municipality of Waterloo is encouraged to, give consideration to the impact of modifications to Regional or City arterial and major collector roads and other road improvements in general, including re-alignment and road widening, on cultural heritage resources. Conservation of cultural heritage resources, especially in relation to the character of streetscapes and major crossroads or intersections, shall be encouraged.

(10) Consideration shall be given to the effects of public works and development on cultural heritage resources prior to the approval of public works and development applications. Mitigation of any negative impacts shall be integrated into the design of such projects,

where appropriate, in order to complement the character, scale, access to, and appearance of the heritage resource.

4.7.3 Heritage Impact Assessment

(1) A Heritage Impact Assessment, prepared by a qualified heritage conservation professional, shall be required for all proposed development applications, or site alteration permit applications that includes or is adjacent to a protected heritage property. A Heritage Impact Assessment, prepared by a qualified heritage conservation professional, shall also be required for all proposed development applications, or site alteration permit applications that includes a listed, non-designated property.

(a) Where a Heritage Impact Assessment is required as part of a development application or site alteration permit application, the terms of reference for the Heritage Impact Assessment will be determined in consultation with the City.

(2) Where a Heritage Impact Assessment is required as part of a development application, or site alteration permit application, the heritage resource shall receive protection in accordance with the timelines set out in the Ontario Heritage Act.

(3) A Heritage Impact Assessment will include, but not necessarily be limited to the following:

(a) historical research, site analysis and evaluation;
(b) identification of the significance and heritage attributes of the cultural heritage resource;
(c) description of the proposed development or site alteration;
(d) assessment of development or site alteration impacts;
(e) consideration of alternatives, mitigation and conservation methods;
(f) schedule and reporting structure for implementation and monitoring; and
(g) a summary statement and conservation recommendations.

(4) Where approval of a development application, or site alteration permit application would result in the demolition of a built heritage resource, a Heritage Impact Assessment will require the documentation of the built heritage resource. Information to be provided will include land use history, photographs, measured drawings and other information of the heritage resource that can be used for archival purposes. The Heritage Impact Assessment shall be submitted to the Municipal Heritage Committee for review and comment prior to the proposed development application, or site alteration permit application being considered by the City.

(5) Heritage Impact Assessments may be scoped or waived by the City or Regional Municipality of Waterloo, as applicable.

(6) Where a Heritage Impact Assessment is related to a cultural heritage resource of Regional interest, the City will circulate a copy of the assessment to the Region for review. In this situation, the Heritage Impact Assessment submitted by the owner/applicant will be completed to the satisfaction of both the City and the Region.

4.7.4 Built Heritage Resources

(1) Pursuant to the Ontario Heritage Act, Council may pass by-laws to designate a Built Heritage Resource. The designating by-law shall identify the extent of the property, contain procedures and timelines for alterations to and demolition of existing buildings and/or structures as well as the erection of new buildings and/or structures.

(2) Built Heritage Resources and their heritage attributes and features shall be conserved. Where Built Heritage Resources cannot reasonably be retained, consideration is to be given to the following in order of priority:
   (a) on-site retention through adaptive re-use for built heritage that cannot be conserved intact;
   (b) relocation to another site within the same development;
   (c) relocation to a sympathetic site within the City;
   (d) rescue and reuse of components; and,
   (e) documentation of the resource.

(3) The City may enter into an easement or covenant agreement with any owner of a Built Heritage Resource, register the easement or covenant in the Land Registry Office, enforce this easement or covenant against the property owner or any subsequent owner, and/or assign an easement or covenant to any person that the City believes can provide protection of the built heritage resource."

(4) If a built heritage resource identified on the Heritage Register is the subject of a demolition application, significant alterations or other potentially adverse impacts, and a Heritage Impact Assessment has not been completed, the City may consider, within 60 days, its designation under the Ontario Heritage Act.

(5) To facilitate the processing of heritage permit applications for designated properties and designated districts, Council may delegate the power to approve, in consultation with the Municipal Heritage Committee, certain classes of alterations.

(6) The City will preserve and respect cemeteries of cultural heritage significance (including human remains, vegetation and landscape of historic, aesthetic, and contextual values) in accordance with the Cemeteries Act (Revised) and the provisions of Part IV and V of the Ontario Heritage Act.

2.3 Data Collection

In the course of the cultural heritage assessment, all potentially affected cultural heritage resources are subject to inventory. Short form names are usually applied to each resource type, (e.g. barn, residence). Generally, when conducting a preliminary identification of cultural heritage resources, three stages of research and data collection are undertaken to appropriately establish the potential for and existence of cultural heritage resources in a particular geographic area.

Background historic research, which includes consultation of primary and secondary source research and historic mapping, is undertaken to identify early settlement patterns and broad agents or themes of change in a study area. This stage in the data collection process enables the researcher to determine the presence

of sensitive heritage areas that correspond to nineteenth and twentieth-century settlement and development patterns. To augment data collected during this stage of the research process, federal, provincial, and municipal databases and/or agencies are consulted to obtain information about specific properties that have been previously identified and/or designated as retaining cultural heritage value. Typically, resources identified during these stages of the research process are reflective of particular architectural styles, associated with an important person, place, or event, and contribute to the contextual facets of a particular place, neighbourhood, or intersection.

A field review is then undertaken to confirm the location and condition of previously identified cultural heritage resources. The field review is also utilised to identify cultural heritage resources that have not been previously identified on federal, provincial, or municipal databases.

Several investigative criteria are utilised during the field review to appropriately identify new cultural heritage resources. These investigative criteria are derived from provincial guidelines, definitions, and past experience. During the course of the environmental assessment, a built structure or landscape is identified as a cultural heritage resource if it is considered to be 40 years or older, and if the resource satisfies at least one of the following criteria:

Design/Physical Value:

- It is a rare, unique, representative or early example of a style, type, expression, material or construction method.
- It displays a high degree of craftsmanship or artistic merit.
- It demonstrates a high degree of technical or scientific achievement.
- The site and/or structure retains original stylistic features and has not been irreversibly altered so as to destroy its integrity.
- It demonstrates a high degree of excellence or creative, technical or scientific achievement at a provincial level in a given period.

Historical/Associative Value:

- It has a direct association with a theme, event, belief, person, activity, organization, or institution that is significant to: the City of Waterloo; the Province of Ontario; or Canada.
- It yields, or has the potential to yield, information that contributes to an understanding of the history of the: the City of Waterloo; the Province of Ontario; or Canada.
- It demonstrates or reflects the work or ideas of an architect, artist builder, designer, or theorist who is significant to: the City of Waterloo; the Province of Ontario; or Canada.
- It represents or demonstrates a theme or pattern in Ontario's history.
- It demonstrates an uncommon, rare or unique aspect of Ontario's cultural heritage.
- It has a strong or special association with the entire province or with a community that is found in more than one part of the province. The association exists for historic, social, or cultural reasons or because of traditional use.
- It has a strong or special association with the life or work of a person, group or organization of importance to the province or with an event of importance to the province.

Contextual Value:

- It is important in defining, maintaining, or supporting the character of an area.
- It is physically, functionally, visually, or historically linked to its surroundings.
- It is a landmark.

- It illustrates a significant phase in the development of the community or a major change or turning point in the community's history.
- The landscape contains a structure other than a building (fencing, culvert, public art, statue, etc.) that is associated with the history or daily life of that area or region.
- There is evidence of previous historic and/or existing agricultural practices (e.g. terracing, deforestation, complex water canalization, apple orchards, vineyards, etc.)
- It is of aesthetic, visual or contextual important to the province.

If a resource meets one of these criteria it will be identified as a cultural heritage resource and is subject to further research where appropriate and when feasible. Typically, detailed archival research, permission to enter lands containing heritage resources, and consultation is required to determine the specific heritage significance of the identified cultural heritage resource.

When identifying cultural heritage landscapes, the following categories are typically utilized for the purposes of the classification during the field review:

Farm complexes:	comprise two or more buildings, one of which must be a farmhouse or barn, and may include a tree-lined drive, tree windbreaks, fences, domestic gardens and small orchards.
Roadscapes:	generally two-lanes in width with absence of shoulders or narrow shoulders only, ditches, tree lines, bridges, culverts and other associated features.
Waterscapes:	waterway features that contribute to the overall character of the cultural heritage landscape, usually in relation to their influence on historic development and settlement patterns.
Railscapes:	active or inactive railway lines or railway rights of way and associated features.
Historical settlements:	groupings of two or more structures with a commonly applied name.
Streetscapes:	generally consists of a paved road found in a more urban setting, and may include a series of houses that would have been built in the same time period.
Historical agricultural landscapes:	generally comprises a historically rooted settlement and farming pattern that reflects a recognizable arrangement of fields within a lot and may have associated agricultural outbuildings, structures, and vegetative elements such as tree rows.
Cemeteries:	land used for the burial of human remains.

Results of the desktop data collection and field review are contained in Sections 3.0, while Sections 4.0 and 5.0 contain conclusions and recommendations for future work to be conducted.

3.0 BUILT HERITAGE RESOURCE AND CULTURAL HERITAGE LANDSCAPE ASSESSMENT

3.1 Introduction

This section provides a brief summary of historic research and a description of identified above ground cultural heritage resources that may be affected by the proposed road improvements. A review of available primary and secondary source material was undertaken to produce a contextual overview of the study area, including a general description of Euro-Canadian settlement and land use. Historically, the study area is located in the Former Township of Waterloo, Waterloo County in part of Lots 32 and 41, German Company Tract.

3.2 Township Survey and Settlement

Waterloo Township

The historic Township of Waterloo was originally known as Block Two of the Grand River land grant, which was deeded to the Six Nations Iroquois by the British in 1784 for their loyalty to the Crown in the American War of Independence. In 1796, Block Two, a 38,045 ha tract, was acquired by Richard Beasley from Joseph Brant on behalf of the Six Nations. He subdivided and sold the land, with approximately 24,281 ha of land going to the German Company of Pennsylvania, in November 1803 (Janusas 1988: 2). Company members included Samuel and John Bricker; and Daniel, Jacob, and John Erb. The German Company of Pennsylvania had the lands surveyed by Augustus Jones to be subdivided into 128 farm lots of approximately 181 ha each and 32 farm lots of approximately 34 ha each (Janusas 1988: 96).

When Block Two was incorporated into the District of Gore (County of Halton) in 1816, it was named Waterloo Township, in honour of the battle that ended the Napoleonic Wars in Europe. It remained part of Halton County in the District of Gore until 1842 and then became part of the District of Wellington. The County of Waterloo was created in 1852 (Janusas 1988: 2).

The first immigrants to settle in Waterloo Township were almost exclusively German Mennonites from Pennsylvania, who had originally emigrated from Switzerland, Germany, and France. Most of these settlers were farmers but many were tradesmen or millers. Later settlers were generally of Scottish, English, Irish, and continental German heritage. When the railway was laid through Waterloo Township in the mid-nineteenth century, it became the leading industrial center of Waterloo County (Janusas 1988: 10-12).

Abraham Erb purchased approximately 181 ha of land in 1805 and became the first settler in the Township of Waterloo. He transferred a portion of his land and ownership of two mills to Jacob Snider in 1829. Snider's son inherited approximately 129 ha which he sold to John Hoffman and Isaac Weber, who sectioned and sold the lands in 1854, at which point the population of Waterloo began to expand (Janusas 1988: 102).

In the mid-1850s, the defining development of Waterloo Township and Waterloo County was the construction of the railway. The first railway line built into the township was a main line of the Grand Trunk Railway from Toronto, laid through in 1856. A number of other railway lines were soon laid across the township including: a Grand Trunk branch between Preston and Berlin in 1857; a Great Western line between Galt, Preston, and Guelph in 1857; a Grand Trunk branch between Waterloo, Berlin, and Galt in 1882; and a Grand Trunk Branch between Waterloo and Elmira in 1891.

3.3 Review of Historic Mapping

The 1861 *Tremaine's Map of Waterloo County* and the 1881 *Illustrated Historical Atlas of the County of Waterloo* were reviewed to determine the potential for the presence of historical features within or adjacent to the study area during the nineteenth century (Figures 2 and 3). It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases. The available data regarding property owners and historical features gathered from the historic mapping are provided in Table 1.

Table 1: Nineteenth-century property owners and historical features

Tract	Lot #	Property Owners (1861)	Property Owners (1881)	Historic Feature(s) (1861)	Historical Feature(s) (1881)
German Co.	32	David B. Eby	-	Farmstead, Schoolhouse No. 9, Mennonite Church	Schoolhouse No. 9, Church
	41	Geo. Speke, Mich. Wergott, Tom Zargner, H. _	-	-	-

The 1861 map demonstrates that Erb Street West, Wilmot Line, and Fischer-Hallman Road are historically surveyed roads (Figure 2). The map also demonstrates that two smaller roadways were located off of Erb Street West in the vicinity of the intersection of Erbsville Court. Schoolhouse No. 9 is shown on the northeast corner of the intersection of Erbsville Court and Erb Street West and a Mennonite Church is depicted on the southeast corner of the intersection of Erb Street West and Fischer-Hallman Road. A farm complex, belonging to David B. Eby is depicted on the northwest corner of the intersection of Erb Street West and Fischer-Hallman Road.

The 1881 map demonstrates that the same road network was in place during the mid-late nineteenth century with Erb Street West, Erbsville Court, Wilmot Line, and Fischer-Hallman acting as the main thoroughfares (Figure 3). No property owners are depicted in the study area but the schoolhouse is shown on the northeast corner of Erb Street West and Erbsville Court and the church is shown on the southeast corner of the intersection of Erb Street West and Fischer-Hallman Road.

The 1946 and 1955 aerial photographs of Kitchener-Waterloo show that the road network remained unchanged up to the mid-twentieth century (Figures 4 and 5). The aerial images also demonstrate that a number of farm complexes and residential properties were located on both sides of Erb Street West in the study area. A rectangular woodlot is shown within the study area on the south side of Erb Street West between Erbsville Court and Fischer-Hallman Road. A concentration of development is shown in the vicinity of the intersection of Erb Street West and Fischer-Hallman Road.

The 1998 NTS map shows that considerable change took place in the study area during the mid- to late-twentieth century (Figure 6). The vast majority of this change is located along Erb Street West between Erbsville Court and Fischer-Hallman Road where extensive residential development took place. A commercial shopping centre is also shown on the north-west corner of the intersection of Fischer-Hallman Road and Erb Street West. It should be noted that the schoolhouse is still shown in its 1861 location and the former location of the 1861 Mennonite Church is now shown as a cemetery.

A comparison of the 1998 NTS map with current mapping (see Figure 7) demonstrates that commercial and residential development has continued to spread west along Erb Street West from Erbsville Court. In addition, Erbsville Road was realigned between 1998 and 2005.

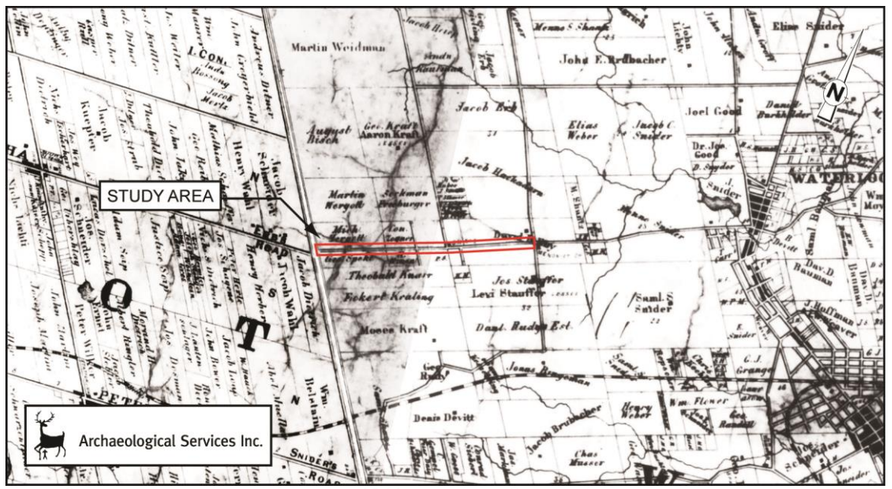


Figure 2: The study area overlaid on the 1861 map of the County of Waterloo
Base Map: *Tremaine's Map of the County of Waterloo* (Tremaine 1861)

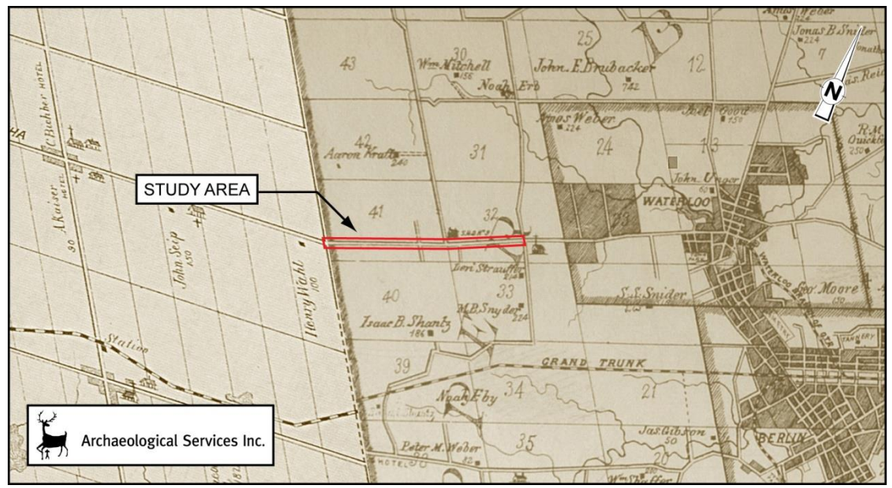


Figure 3: The study area overlaid on the 1881 maps of the Townships of Waterloo and Wilmot
Base Map: Base Map: *Illustrated Historical Atlas of the County of Waterloo* (Parsell & Co. 1881)



Figure 4: The study area overlaid on the 1946 aerial photograph of Kitchener-Waterloo
Photo Reference: Digital Historical Air Photos of Kitchener-Waterloo, Plates IM15, IM36, IM40 (1946) (University of Waterloo 2013)

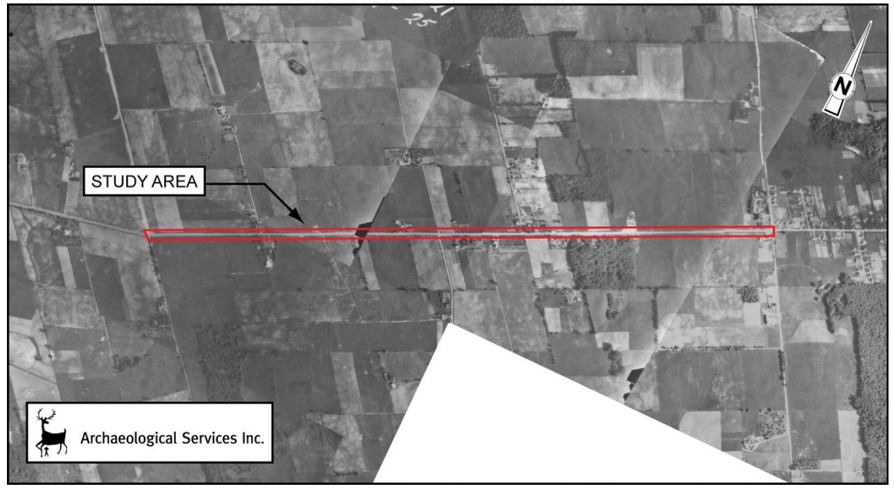


Figure 5: The study area overlaid on the 1955 aerial photograph of Kitchener-Waterloo
Photo Reference: Digital Historical Air Photos of Kitchener-Waterloo, Plates IM15, IM36, IM40 (1955) (University of Waterloo 2013)

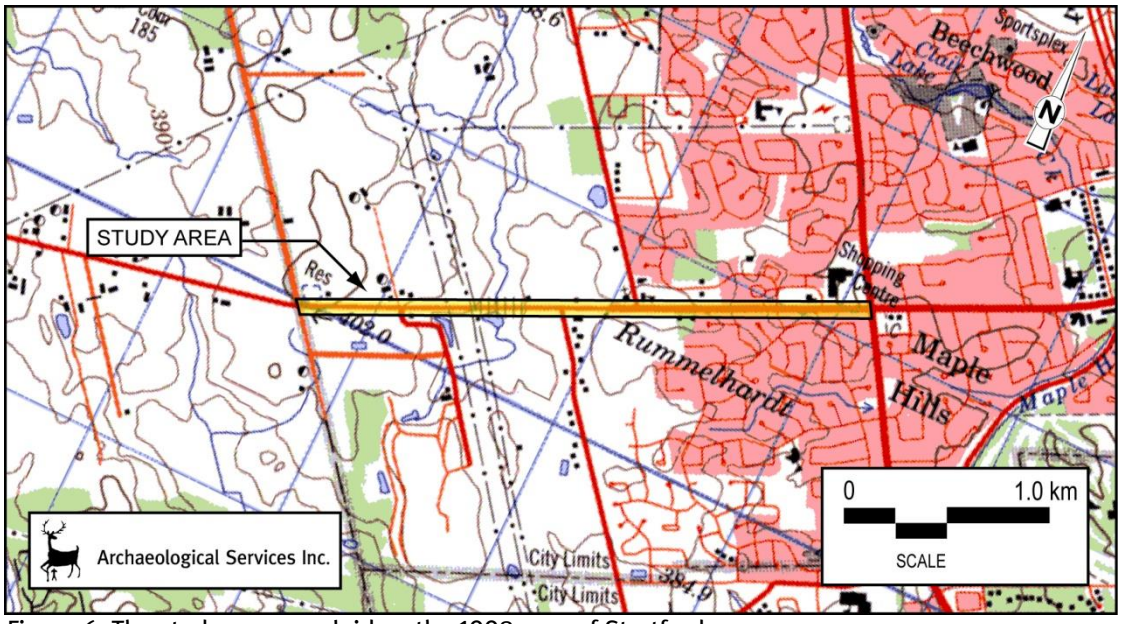


Figure 6: The study area overlaid on the 1998 map of Stratford
Base Map: NTS Sheet 40 P/07 (Stratford 1998)

3.4 Existing Conditions

In order to make a preliminary identification of existing cultural heritage resources within the study area, the following resources were consulted: the *City of Waterloo Municipal Heritage Register* (2014a); the Government of Ontario Ministry of Culture's *Ontario Heritage Properties Database* (2008); and the Federal Government's *Canada's Historic Places* website. The *City of Waterloo Municipal Heritage Register* provides a list of cultural heritage resources that are designated under Part IV and Part V of the *Ontario Heritage Act*. The register also provides a list of non-designated properties that are of cultural heritage value or interest. Both *Ontario's Heritage Properties Database*, and *Canada's Historic Places*, provide a record of the heritage properties identified to be of significance at a provincial level, which are designated under the Part IV of the *Ontario Heritage Act*. In addition, the City of Waterloo was contacted directly to gather any information on cultural heritage resources within the study area (email communication May 22 and 27, 2014). Based on the review of available data, there is one previously identified resource within or adjacent to the study area.

A field review was undertaken by Heidy Schopf, Cultural Heritage Specialist, ASI, on 23 May 2014 to document the existing conditions of the study area. The field review was preceded by a review of available, current and historic, aerial photographs and maps (including online sources such as Bing and Google maps). These large-scale maps are reviewed for any potential cultural heritage resources which may be extant in the study area. The Erb Street study area was examined to identify any built heritage resources (BHR) or cultural heritage landscapes (CHL) within or adjacent to the study area. The existing conditions of the study corridor are described below. Identified cultural heritage resources are discussed in Section 3.4.2 and mapped on Figures 7 and 8 of this report.

3.4.1 Erb Street – Existing Conditions

The study area extends along Erb Street West from Wilmot Line to Fischer-Hallman Road. The study area includes the intersections of Erb Street West with Erbsville Road, Erbsvillle Court, Gateview Drive, and Beechwood Place. There are clear divisions in land-use in the study area.

The Wilmot Line/Erb Street West intersection features a farm complex on the northwest corner, agricultural land on the northeast corner, and a waste disposal facility on the south side.

The lands north of Erb Street West between Wilmot Line and approximately 270 m west of Erbsville Road are agricultural lands that are currently being re-zoned as employment lands (City of Waterloo 2014b). This is the site of the proposed West Waterloo Commercial Centre, a planned facility that will include a Costco warehouse membership club and gas bar that will cover an area of approximately 160 000 square feet (Region of Waterloo 2014). Additional commercial uses on the proposed site will total over 65,000square feet and will include retail, restaurant, and services (Region of Waterloo 2014). These lands once featured residences (i.e. 930 and 924 Web Street West) that have been recently demolished (Plates 1 and 2). It should be noted that a large farm complex is located on the north side of Erb Street that is set back approximately 500 m north of the right-of-way (ROW). This farm complex appears on current aerial imagery but is not visible from the public ROW on either Erb Street West or Wilmot Line. Further, an examination of property parcel data revealed that this property no longer extends to Erb Street West, but is rather a smaller parcel that has been severed (see Figure 7).

The south side of Erb Street West between Wilmot Line and Erbsville Road contains a large waste disposal facility and an active landfill (Plates 3 and 4). No cultural heritage features are located in this section of the study area.

The lands surrounding the intersection of Erb Street West and Erbsville Road are dominated by recent commercial and residential development (Plates 5 and 6). This area has undergone dramatic change since 1998 and very little of the nineteenth century land-use patterns remain. One exception is a parcel of land located at 635 Erb Street West, which appears to have once contained a historic farmhouse. A review of Google Earth aerial imagery determined that the house and all other related structures were demolished between 2009 and 2013. Few landscape features remain on the property, with the exception of a gravel driveway and some established vegetation (Plate 7).

A historic schoolhouse is located within close proximity to the Erb Street West ROW on the northeast corner of the intersection of Erb Street West and Erbsville Court (Plate 8). This schoolhouse is designated under Part IV of the *Ontario Heritage Act* and was built in 1867.

The study area is dominated by recent residential development between Erbsville Court and Fischer-Hallman Road that was constructed between 1955 and 1998 (Plate 9). It should be noted that all newer housing in this area does not front onto Erb Street West, but rather front onto a series of side streets and courts that connect to Erb Street West via Westhollow Court, Erbsville Court, Gateway Drive, and Beechwood Drive. Three houses in this section of the study area front onto Erb Street West and do not conform to the street networks laid out by the recent residential subdivisions. These houses do not appear on the 1955 aerial photograph (see Figure 5) and are likely less than 40 years old given their architectural styles and materials.

The Erb Street West/Fischer-Hallman Road intersection features recent commercial development on the northwest and northeast corners, residential development on the southwest corner, and a cemetery on the southeast corner (Plate 10).



Plate 1: East-north east view towards the intersection of Wilmot Line and Erb Street West.



Plate 2: North-northwest view towards 930 Erb Street West. The farmhouse has been recently demolished.



Plate 3: East-northeast along Erb Street West. Note the agricultural fields and wide ROW.



Plate 4: South-southwest view from Erb Street West towards the active landfill.



Plate 5: West-southwest along Erb Street West from the Erbsville Road traffic circle. Note the recent commercial development on both sides of the road.



Plate 6: East-northeast view along Westhollow Court. Recent residential development borders Erb Street West for the majority of the study area.



Plate 7: East view to 635 Erb Street. This property was likely a historic farm complex that was recently demolished. Note the remnant landscape features (i.e. gravel driveway and established vegetation).



Plate 8: Northeast view from the intersection of Erb Street West and Erbsville Court. Note the historic stone schoolhouse located on the northeast side of the intersection.



Plate 9: East-northeast view along Erb Street West. Both sides of the road are bordered by recent residential, commercial, and institutional development.



Plate 10: West-southwest view from the southeast side of the intersection of Erb Street West and Fischer-Hallman Road. Note the residential development on the left and recent commercial development on the right.

3.4.2 Erb Street – Identified Cultural Heritage Resources

Based on the results of the background research and field review, two built heritage resources (BHR) and two cultural heritage landscapes (CHL) were identified within and/or adjacent to the Erb Street study area

(Table 2). A detailed inventory of these cultural heritage resources is presented in Section 7.0 and mapping of these features is provided in Section 8.0 of this report.

Table 2: Summary of built heritage resources (BHR) and cultural heritage landscapes (CHL) in the study area

Resource	Location	Type	Recognition
BHR 1	600 Erb Street West	School	Designated under Part IV of the *Ontario Heritage Act*
BHR 2	429 Erb Street West	Residence	Identified during field review
CHL 1	1074 Erbs Road	Farm Complex	Identified during field review
CHL 2	407 Erb Street West	Cemetery	Identified during field review

3.5 Screening for Potential Impacts

To assess the potential impacts of the undertaking, identified cultural heritage resources are considered against a range of possible impacts as outlined in the document entitled *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* (MTC September 2010) which include:

- Destruction of any, or part of any, significant heritage attribute or feature (III.1).
- Alteration which means a change in any manner and includes restoration, renovation, repair or disturbance (III.2).
- Shadows created that alter the appearance of a heritage attribute or change the visibility of a natural feature of plantings, such as a garden (III.3).
- Isolation of a heritage attribute from its surrounding environment, context, or a significant relationship (III.4).
- Direct or indirect obstruction of significant views or vistas from, within, or to a built and natural feature (III.5).
- A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces (III.6).
- Soil disturbance such as a change in grade, or an alteration of the drainage pattern or excavation (III.7)

A number of additional factors are also considered when evaluating potential impacts on identified cultural heritage resources. These are outlined in a document set out by the Ministry of Culture and Communications (now Ministry of Tourism, Culture and Sport) and the Ministry of the Environment entitled *Guideline for Preparing the Cultural Heritage Resource Component of Environmental Assessments* (October 1992) and include:

- Magnitude: the amount of physical alteration or destruction which can be expected;
- Severity: the irreversibility or reversibility of an impact;
- Duration: the length of time an adverse impact persists;
- Frequency: the number of times an impact can be expected;
- Range: the spatial distribution, widespread or site specific, of an adverse impact; and
- Diversity: the number of different kinds of activities to affect a heritage resource.

Where any above ground cultural heritage resources are identified, which may be affected by direct or indirect impacts, appropriate mitigation measures should be developed. This may include completing a heritage impact assessment or documentation report, or employing suitable measures such as landscaping,

buffering or other forms of mitigation, where appropriate. In this regard, provincial guidelines should be consulted for advice and further heritage assessment work should be undertaken as necessary.

3.5.1 Potential Impacts of the Preferred Alternative

The proposed undertaking for the Erb Street Widening and Corridor Study area consists of road improvement activities that will require the acquisition of property frontages and the removal of trees and vegetation and the expansion of grading limits. Figures 7 and 8 show the proposed infrastructure improvements in relation to identified cultural heritage resources. Table 3 lists potential impacts to identified cultural heritage resources and proposes mitigation measures.

Table 3: Potential Impacts and Proposed Mitigation Measures

Resource	Potential Impact(s)	Proposed Mitigation Measure(s)
BHR 1	• Alteration (III.2) due to removal of mature trees and road widening; and, • Soil disturbance (III.7) due to expanded grading limits.	• Investigate the feasibility of implementing tree protection zones to retain existing trees; • A Heritage Impact Assessment should be completed by qualified heritage consultant prior to construction, as per City of Waterloo Official Plan Section 4.7.3(1); and • Post-construction landscaping to re-establish pre-construction conditions.
BHR 2	• Soil disturbance (III.7) due to expanded grading limits; and • Alteration (III.2) due to road widening.	• Alterations are not of significant magnitude or severity. • No further work required.
CHL 1	• Soil disturbance (III.7) due to expanded grading limits.	• Alterations are not of significant magnitude or severity. • No further work required.
CHL 2	• No impacts anticipated	• No further work required.

4.0 CONCLUSIONS

The results of background historical research and a review of secondary source material, including historical mapping, revealed a study area with a rural land use history dating back to the early nineteenth century. The field review confirmed that this area retains a number of nineteenth and twentieth-century cultural heritage resources. The following provides a summary of the assessment results:

Key Findings

- A total of four cultural heritage resources were identified within and/or adjacent to the Erb Street study area;
- Two built heritage resource (BHR) and two cultural heritage landscapes (CHL) were identified within and/or adjacent to the Erb Street study area: one is designated under Part IV of the *Ontario Heritage Act* (BHR 1) and three were identified during the field review (BHR 2, CHL 1, CHL 2);
- Of the four identified cultural heritage resources: one is a farm complex (CHL 1), one is a schoolhouse (BHR 1), one is a residence (BHR 2), and one is a cemetery (CHL 2);
- Identified cultural heritage resources are historically, architecturally, and contextually associated with nineteenth-century and twentieth-century land use patterns in the City of Waterloo.

Impact Assessment

- Of the four identified cultural heritage resources, BHRs 1 and 2 and CHL 1, are expected to be impacted in some way by the proposed road widening;
- Impacts to BHR 2 and CHL 1 are considered to be of minor magnitude and severity, and no further cultural heritage work is recommended;
- BHR 2 is not anticipated to be impacted by the proposed work. No further cultural heritage work is required for the subject properties;
- Establishing tree protection zones to retain existing trees is recommended for all properties where tree removals are planned. In particular, it is recommended that the feasibility of implementing tree protection zones is investigated for BHR 1;
- A resource-specific Heritage Impact Assessment prior to construction is recommended for BHR 1 as the proposed road widening will result in disturbance due to expanded grading limits and potential tree removals; and,
- Post-construction landscaping to re-establish pre-construction conditions is recommended for all cultural heritage resources that will be subject landscape alteration resulting from the proposed undertaking (BHR 1).

5.0 RECOMMENDATIONS

The background research, data collection, and field review conducted for the study area determined that four cultural heritage resources are located within or adjacent to the Erb Street Widening and Corridor Study Municipal Class EA study area. Based on the results of the assessment, the following recommendations have been developed:

1. Staging and construction activities should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources;

2. BHR 1 is expected to be impacted through alteration to setting by the removal of replaceable landscape features (i.e. vegetation, and mature trees). The feasibility of implementing tree protection zones should be investigated for all identified cultural heritage resources where tree removals are planned. If possible, tree protection zones should be implemented for BHR 1;

3. Where built heritage resources are expected to be impacted through alteration to their setting, a resource–specific cultural heritage impact assessment report should be prepared in advance of construction activities. BHR 1 should be subject to photographic documentation and compilation of a resource-specific cultural heritage impact assessment report by a qualified heritage consultant.

4. Post-construction landscaping and rehabilitation plans should be undertaken in a manner that is sympathetic to the overall setting. Wherever possible, landscaping with appropriate or sympathetic historic plant materials is recommended. Post-construction landscaping is recommended for BHR 1 and for all properties that will be subject to the removal of vegetation or replaceable landscape features (i.e. young trees, shrubs) during construction; and,

5. Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources.

6.0 REFERENCES

Erb Street Church

2014 *Erb Street Church Cemetery*. Erb Street Mennonite Church. [online]. Available at < http://www.erbstchurch.ca/cemetery.htm>. Last accessed 27 May 2014.

Canada's Historic Places

2014 *Rummelhardt School*. Canada's Historic Places. [online]. Available at < http://www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=12846&pid=0> Last accessed 27 May 2014.

City of Waterloo

2014a *600 Erb Street West*, City of Waterloo Municipal Heritage Register. [online]. Available at <http://www.waterloo.ca/en/contentresources/resources/government/Municipal_Heritage_Register_2014.pdf> Last accessed 27 May 2014.

2014b *924 and 930 Erb Street West*. The City of Waterloo. [online]. Available at <http://www.waterloo.ca/en/business/924and930ErbStreetWest.asp> Last accessed 27 May 2014.

2016 Official Plan: City of Waterloo. November 2016 Office Consolidation. [Online] Available at http://www.waterloo.ca/en/contentresources/resources/government/OP_Nov2016_Consolidated_version.pdf.

Janusas, S.E.

1988 *An Archaeological Perspective of an Historic Overview of the Regional Municipality of Waterloo.* Regional Municipality of Waterloo: Planning and Development Department Archaeology Division.

Ministry of Consumer Services

1990 *Cemeteries Act*

2002 *Funeral, Burial and Cremation Services Act*

Ministry of Culture, Ontario

1979 *The Welland Canals*: Historical Resource Analysis and Preservation Alternatives.

1981 *Guidelines on the Man-Made Heritage Component of Environmental Assessments*

1992 *Guidelines for Preparing the Cultural Heritage Resource Component of Environmental Assessments*

2005 *Ontario Heritage Act*

2006 *Ontario Heritage Tool Kit*

Ministry of Environment, Ontario

2006 *Environmental Assessment Act*

Ministry of Municipal Affairs and Housing, Ontario

2005 *Ontario Planning Act*

2014 *Provincial Policy Statement*

Ministry of Tourism and Culture, Ontario

2010 *Standards and Guidelines for the Conservation of Provincial Heritage Properties.*
2010 *Check Sheet for Environmental Assessments: Screening for Impacts to Built Heritage Resources and Cultural Heritage Landscapes*

Ministry of Tourism, Culture and Sport
2011 *Standards and Guidelines for Consultant Archaeologists*. Cultural Programs Branch, Ontario Ministry of Tourism and Culture, Toronto.
2016 *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes: A Checklist for the Non-Specialist.* Programs and Services Branch, Ontario Ministry of Tourism, Culture, and Sport, Toronto.

Ministry of Transportation
2002 *Environmental Reference for Highway Design*
2006 *Cultural Heritage – Built Heritage and Cultural Heritage Landscapes: Technical Requirements for Environmental Impact Study and Environmental Protection/Mitigation.*
2007 *Environmental Guide for Built Heritage and Cultural Heritage Landscapes*

Parsell, H. & Co
1881 *Illustrated Historical Atlas of Waterloo & Wellington Counties*, Ontario 1881-1877

Region of Waterloo
2014 *West Waterloo Commercial Centre*. Region of Waterloo, Planning, Housing, and Community Services, Transportation Planning.

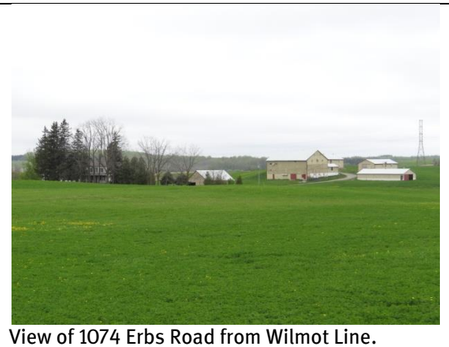
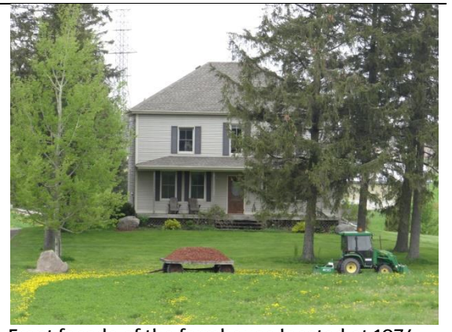
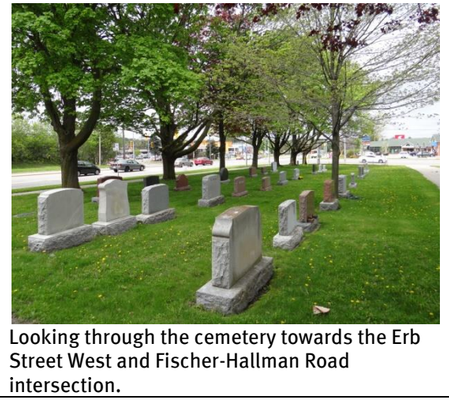
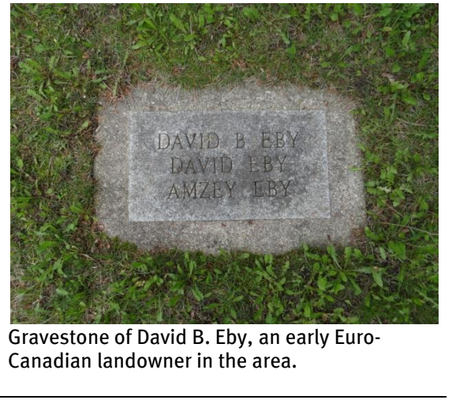
Tremaine, George
1861 *Tremaine's Map of Waterloo County.*

University of Waterloo
2013 *Digital Historical Air Photos of Kitchener-Waterloo, Plates IM15, IM36, IM40, 1946 and 1955.* Available online < http://www.lib.uwaterloo.ca/locations/umd/project/IM15.html> Last accessed 4 June 2014.

7.0 CULTURAL HERITAGE RESOURCE INVENTORY

Table 4: Inventory of built heritage resources (BHR) and cultural heritage landscapes (CHL) in the study area

Resource	Type	Address/Location	Recognition	Description	Photos
BHR 1	Schoolhouse	600 Erb Street West	Designated under Part IV of the *Ontario Heritage Act*	The Rummelhardt School has been a site of education since 1843 when a log schoolhouse was constructed on the site (Canada's Historic Places 2014). This one-storey fieldstone building was built in 1867 to replace the original log schoolhouse, which burned down in the mid-nineteenth century. The site has been continually used as a site of education since the construction of the log schoolhouse in 1843. The Rummelhardt School is the only remaining stone schoolhouse in the City of Waterloo that is located on its original site (Canada's Historic Places 2014). The stone schoolhouse is a one-storey structure and is built in the Georgian style. The walls are two-feet thick and are constructed of split granite fieldstone. The main school room features an attached teacher's room on the Erb Street side of the school. Character defining elements of the schoolhouse include: -location on its original site in the City of Waterloo -stone construction -continued use as a site for education since 1843 -split granite fieldstone -two-foot thick walls -gable roof -attached teacher's room The Rummelhardt School is visible on the 1861 Tremaine's Map of Waterloo County. The school is designated under Part IV of the *Ontario Heritage Act*.	 South elevation of the Rummelhardt School  South and west elevations of the Rummelhardt School
BHR 2	Residence	429 Erb Street West	Identified during field review	This post-war residence features a rectangular plan and a garage on the west elevation, which appears to be a recent addition. The exterior is clad in red brick. The front façade faces north towards Erb Street West. The house features a salt box roof with an exterior chimney on the east elevation. The front façade has an offset left gable and a projecting entranceway with a gable roof. The front façade also features an open concrete porch. All windows and doors appear to be recent/replaced. Landscape features include picket fencing along the property lines, an asphalt driveway, a mature coniferous treeline, and a manicured lawn. The house dates between 1946 and 1955 and is visible on the 1955 air photo of Kitchener-Waterloo.	 North elevation of 429 Erb Street West  North and west elevations of 429 Erb Street West

Resource	Type	Address/Location	Recognition	Description	Photos
CHL 1	Farm Complex	1074 Erbs Road	Identified during field review	This farm complex features a farm house, barn, and several outbuildings. The front façade (south elevation) of the farmhouse faces Erbs Road and is set back approximately 175 m from the road. Observations of the farmhouse, barn, and outbuildings are limited due to the deep set-back of the built features on the property. Landscape features include an orchard, a gravel driveway, treelines, mature trees and vegetation, and agricultural fields. This farm complex appears on the 1861 Tremaine's map of Waterloo County.	 View of 1074 Erbs Road from Wilmot Line.  Front façade of the farmhouse located at 1074 Erbs Road.
CHL 2	Cemetery	407 Erb Street West	Identified during field review	The Erb Street Church Cemetery dates to 1851 when the deed for one half-acre of land was sold to the chuch by David and Elizabeth Eby. The deed stated that the land was to be used for a "meeting house and burying ground" (Erb Street Church 2014). In 1880, David and Elizbeth's son, David B. Eby and his wife Lydia sold an additional acre to the church for one hundred dollars (Erb Street Church 2014). Eventually, the church was removed after a new church was built close to town in 1902 and the cemetery was all that remained. Some of the early pioneer families in the area are buried at the Erb Street Cemetery, including members of the Eby family. The cemetery appears on the 1861 Temaine's Map of Waterloo County as a "Mennonite Church".	 Looking through the cemetery towards the Erb Street West and Fischer-Hallman Road intersection.  Gravestone of David B. Eby, an early Euro-Canadian landowner in the area.

8.0 CULTURAL HERITAGE RESOURCE LOCATION MAPPING

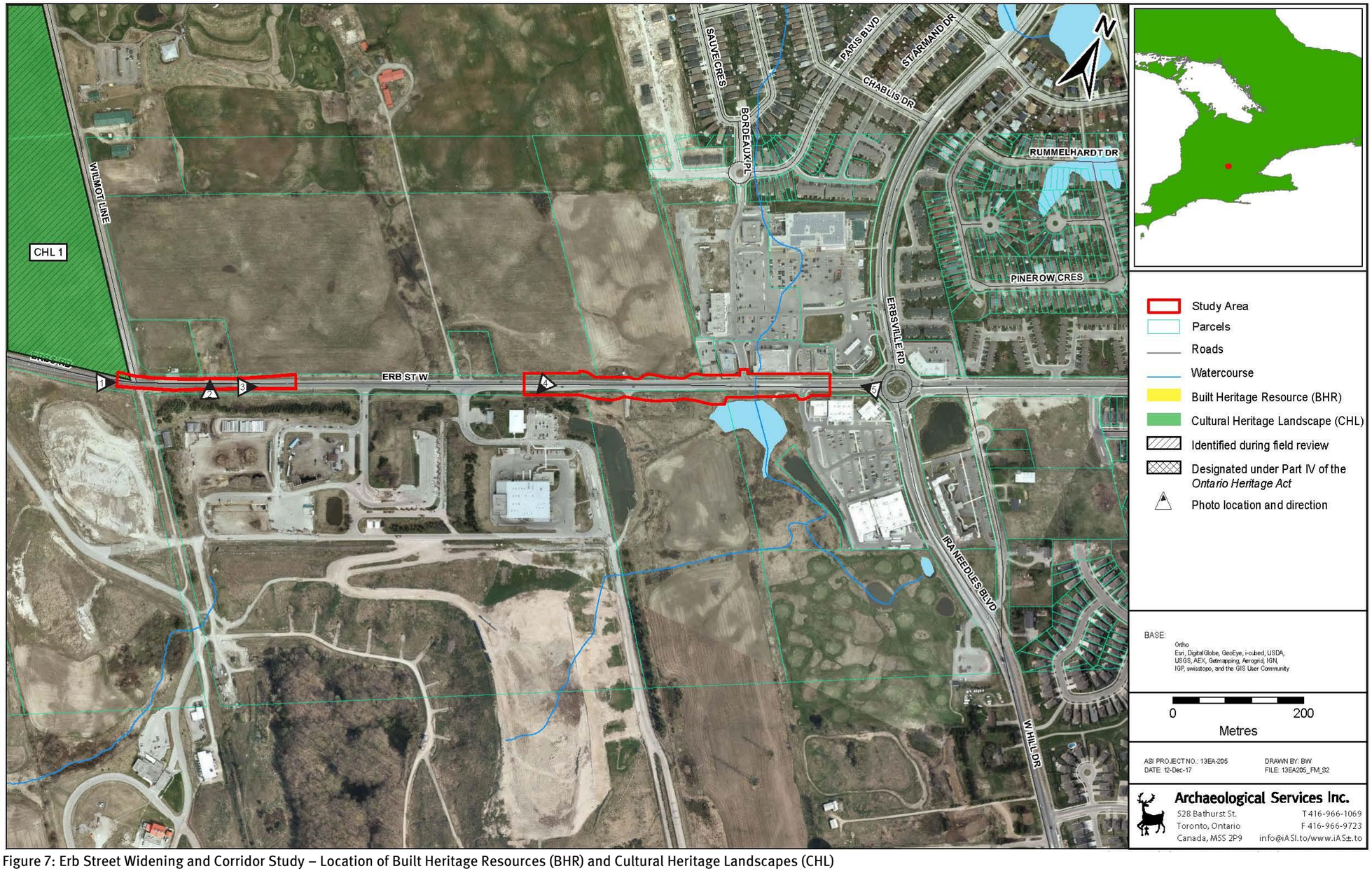


Figure 7: Erb Street Widening and Corridor Study – Location of Built Heritage Resources (BHR) and Cultural Heritage Landscapes (CHL)

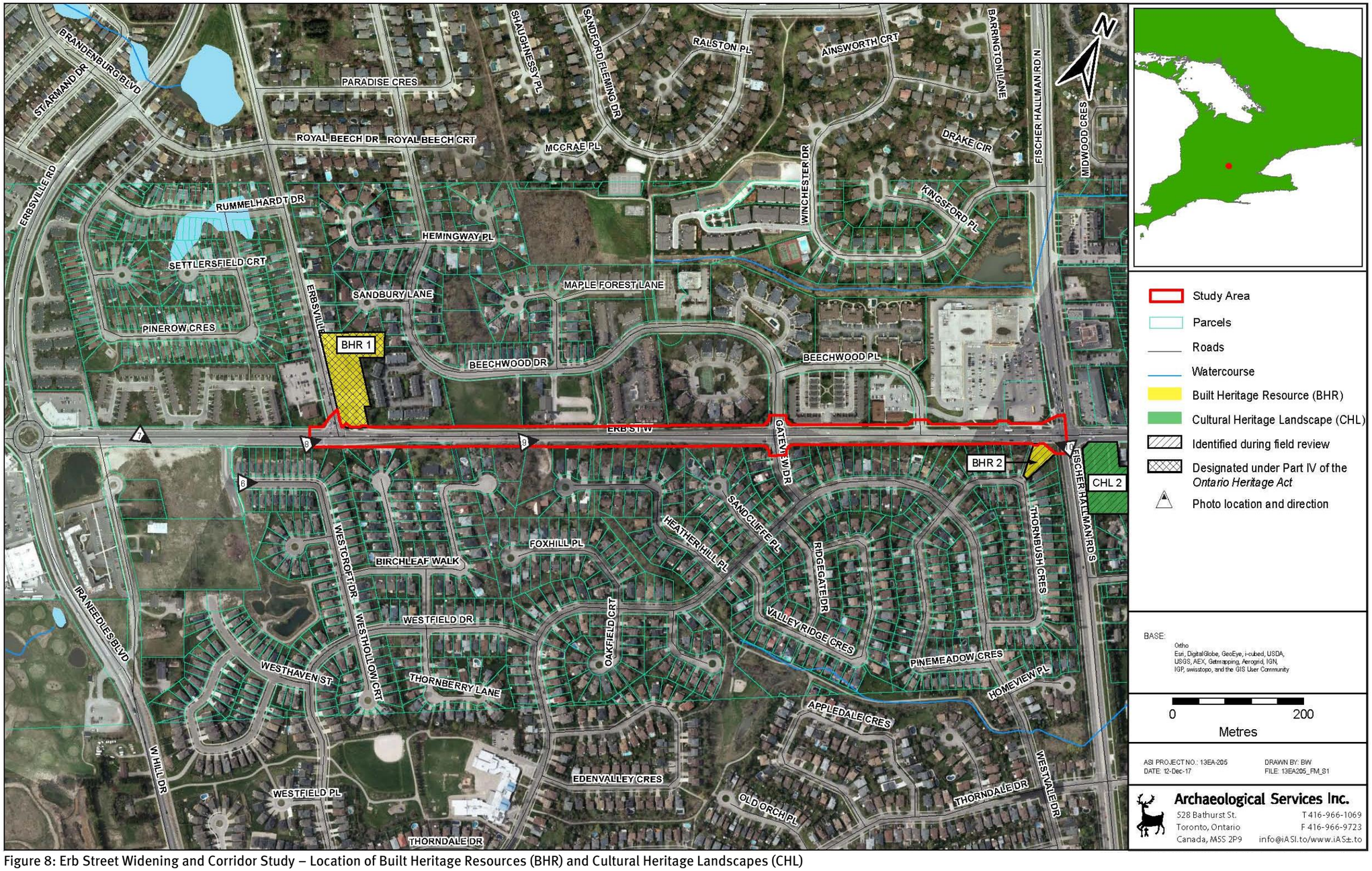


Figure 8: Erb Street Widening and Corridor Study – Location of Built Heritage Resources (BHR) and Cultural Heritage Landscapes (CHL)

APPENDIX E

Stage 1 Archaeological Assessment

ORIGINAL

Stage 1 Archaeological Assessment
(Background Research and Property Inspection)

Erb Street Widening and Corridor Study
Municipal Class Environmental Assessment
Erb Street from Fischer-Hallman Road to Wilmot Line
Part of Lots 32 and 41, German Company Tract
Former Township of Waterloo, County of Waterloo
City of Waterloo, Regional Municipality of Waterloo, Ontario

Prepared for:

WalterFedy
675 Queen Street, Suite 111
Kitchener, ON, N2M 1A1
Tel: 519-576-2150
Fax: 519-576-5499
http://walterfedy.com

Archaeological Licence P392 (Paul David Ritchie)
MTCS PIF P392-0100-2014
ASI File 13EA-204

August 28, 2015

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iASI.to

Stage 1 Archaeological Assessment
(Background Research and Property Inspection)

Erb Street Widening and Corridor Study
Municipal Class Environmental Assessment
Erb Street from Fischer-Hallman Road to Wilmot Line
Part of Lots 32 and 41, German Company Tract
Former Township of Waterloo, County of Waterloo
City of Waterloo, Regional Municipality of Waterloo, Ontario

EXECUTIVE SUMMARY

Archaeological Services Inc. (ASI) was contracted by WalterFedy on behalf of the Regional Municipality of Waterloo to conduct a Stage 1 Archaeological Assessment (Background Research and Property Inspection) as part of the Erb Street Widening and Corridor Study Municipal Class Environmental Assessment (EA) study. The purpose of this project is to undertake an EA for the widening and rehabilitation of Erb Street from Fischer-Hallman Road to Wilmot Line including intersection improvements at Erb Street and Wilmot Line, in the City of Waterloo. This assessment is being conducted under Schedule C of the Municipal Class EA process.

The background research determined that seven previously registered archaeological sites are located within one kilometre of the study area. A review of the historical and archaeological contexts of the study area also suggested that it has potential for the identification of Aboriginal and Euro-Canadian archaeological resources.

The property inspection identified some areas which possess archaeological potential and will require Stage 2 archaeological assessment. Other areas within and adjacent to the Erb Street right of way (ROW) do not retain archaeological potential.

In light of these results, the following recommendations are made:

1. Several areas within in the Erb Street Widening and Corridor Study Stage 1 study area possess archaeological potential and will require Stage 2 archaeological assessment by a combination of test-pit survey at five metre intervals and pedestrian survey at five metre intervals prior to any land disturbance by the project;

2. ROW lands and some lands adjacent to within the study area are documented to not retain archaeological potential on account of deep and extensive land disturbance. A part of the study area has been documented to have low and wet conditions. These lands do not require further archaeological assessment; and

3. Should the proposed work extend beyond the current study area then further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

ARCHAEOLOGICAL SERVICES INC.
ENVIRONMENTAL ASSESSMENT DIVISION

PROJECT PERSONNEL

Senior Project Manager:	Dr. Andrew Riddle, PhD [MTCS licence P347] *Senior Archaeologist, Manager (Projects West), Environmental Assessment Division*
Project Coordinator:	Sarah Jagelewski, Hon BA [MTCS licence R405] *Staff Archaeologist, Assistant Manager Environmental Assessment Division*
Project Manager (licensee):	Paul David Ritchie, MA [MTCS licence P392] *Staff Archaeologist*
Field Director:	Paul David Ritchie
Field Advisor:	Peter Carruthers, MA CAHP [MTCS licence P163] *Senior Associate*
Report Preparation:	Paul David Ritchie
Graphics:	Blake Williams, MLitt [MTCS licence P383] *Geomatics Technician*
Report Reviewer:	Dr. Andrew Riddle
	Robert Pihl, MA, CAHP [MTCS licence P057] *Partner and Senior Archaeologist, Manager, Environmental Assessment Division*

TABLE OF CONTENTS

EXECUTIVE SUMMARY i
PROJECT PERSONNEL ii
1.0 PROJECT CONTEXT 1
1.1 Development Context 1
1.2 Historical Context 2
1.2.1 Aboriginal Land Use and Settlement 2
1.2.2 Historic Euro-Canadian Land Use: Township Survey and Settlement 5
1.2.3 Historic Map Review 7
1.2.4 Summary of Historical Context 7
1.3 Archaeological Context 8
1.3.1 Current Land Use and Field Conditions 8
1.3.2 Geography 8
1.3.3 Previous Archaeological Research 10
1.3.4 Summary of Archaeological Context 11
2.0 FIELD METHODS: PROPERTY INSPECTION 12
3.0 ANALYSIS AND CONCLUSIONS 12
3.1 Analysis of Archaeological Potential 12
3.2 Analysis of Property Inspection Results 13
3.3 Conclusions 13
4.0 RECOMMENDATIONS 13
5.0 ADVICE ON COMPLIANCE WITH LEGISLATION ..... **Error! Bookmark not defined.**
6.0 WORKS CITED ..... **Error! Bookmark not defined.**
7.0 MAPS 19
8.0 IMAGES 30

LIST OF TABLES

Table 1: List of previously registered sites within one kilometre of the study area 11

LIST OF FIGURES

Figure 1: Erb Street Widening and Corridor Study Stage 1 Study Area Location 20
Figure 2: Erb Street Widening and Corridor Study Stage 1 Study Area overlaid on 1861 map of County of Waterloo, Canada West 21
Figure 3: Erb Street Widening and Corridor Study Stage 1 Study Area overlaid on 1881 map of Township of Waterloo 22
Figure 4: Erb Street Widening and Corridor Study Stage 1 Study Area – Surficial Geology 23
Figure 5: Erb Street Widening and Corridor Study Stage 1 Study Area – Soil Drainage 24
Figure 6: Erb Street Widening and Corridor Study Stage 1 Study Area – Property Inspection Results (Key Map) 25
Figure 7: Erb Street Widening and Corridor Study Stage 1 Study Area – Property Inspection Results (Sheet 1) 26
Figure 8: Erb Street Widening and Corridor Study Stage 1 Study Area – Property Inspection Results (Sheet 2) 27
Figure 9: Erb Street Widening and Corridor Study Stage 1 Study Area – Property Inspection Results (Sheet 3) 28
Figure 10: Erb Street Widening and Corridor Study Stage 1 Study Area – Property Inspection Results (Sheet 4) 29

LIST OF PLATES

Plate 1: View WSW of Erb Street ROW. ROW and lands beyond are disturbed. No potential.....31
Plate 2: View WSW of Erb Street ROW. ROW and lands beyond are disturbed. No potential. 31
Plate 3: View NNE of park. Park is disturbed. No potential. 31
Plate 4: View ENE of Erb Street ROW. ROW and lands beyond are disturbed. No potential. 31
Plate 5: View southwest of Erb Street ROW. ROW and lands beyond are disturbed. No potential. 31
Plate 6: View ESE of study area. Erb Street ROW is disturbed. No potential. Lands beyond ROW have potential. Require Stage 2 test-pit survey. 31
Plate 7: View south of study area. Erb Street ROW and lands beyond are disturbed. No potential. 32
Plate 8: View southwest of study area. Study area is disturbed. No potential. 32
Plate 9: View southwest of Erb Street ROW. ROW is disturbed. Adjacent lands beyond ROW are low and wet. No potential. 32
Plate 10: View northwest of study area. Erb Street ROW and Hydro Tower property are disturbed. No potential. 32
Plate 11: View WSW of study area. Erb Street ROW and lands beyond are disturbed. No potential. 32
Plate 12: View SSE of study area. Erb Street ROW and lands beyond are disturbed. No potential. 32
Plate 13: View ENE of study area. Erb Street ROW is disturbed. No potential. Lands beyond have potential. Requires Stage 2 pedestrian survey. 33
Plate 14: View northwest of study area. Area is a buried reservoir. Area is disturbed. No potential. 33

1.0 PROJECT CONTEXT

Archaeological Services Inc. (ASI) was contracted by WalterFedy on behalf of the Regional Municipality of Waterloo to conduct a Stage 1 Archaeological Assessment (Background Research and Property Inspection) as part of the Erb Street Widening and Corridor Study Municipal Class Environmental Assessment (EA) study. The purpose of this project is to undertake an environmental assessment for the widening and rehabilitation of Erb Street from Fischer-Hallman Road to Wilmot Line including intersection improvements at Erb Street and Wilmot Line, in the City of Waterloo (Figure 1).

The S & G, Section 1, discusses the objectives of a Stage 1 archaeological assessment as follows:

- To provide information about the history, current land conditions, geography, and previous archaeological fieldwork of the study area;
- To evaluate in detail the archaeological potential of the study area that can be used, if necessary, to support recommendations for Stage 2 archaeological assessment for all or parts of the study area; and,
- To recommend appropriate strategies for Stage 2 archaeological assessment, if necessary.

This report describes the Stage 1 archaeological assessment that was conducted for this project and is organized as follows: Section 1.0 summarizes the background study that was conducted to provide the historical and archaeological contexts for the project study area; Section 2.0 addresses the field methods used for the property inspection that was undertaken to document its general environment, current land use history and conditions of the study area; Section 3.0 analyses the characteristics of the project study area and evaluates its archaeological potential; Section 4.0 provides recommendations for the next assessment steps; and the remaining sections contain other report information that is required by the S & G, e.g., advice on compliance with legislation, works cited, mapping and photo-documentation.

1.1 Development Context

All work has been undertaken as required by the *Environmental Assessment Act*, RSO (1990) and regulations made under the Act, and are therefore subject to all associated legislation. This project is being conducted under Schedule C of the Municipal Class EA process.

All activities carried out during this assessment were completed in accordance with the *Ontario Heritage Act* (2005), the 2011 *Standards and Guidelines for Consultant Archaeologists* (S & G), administered by the Ministry of Tourism, Culture and Sport (MTCS) and the Municipal Engineers' Association document *Municipal Class Environmental Assessment* (2000, as amended in 2007 and 2011).

Authorization to carry out the activities necessary for the completion of the Stage 1 archaeological assessment was granted to ASI by WalterFedy on April 25, 2014.

1.2 Historical Context

The purpose of this section, according to the S & G, Section 7.5.7, Standard 1, is to describe the past and present land use and the settlement history and any other relevant historical information pertaining to the study area. A summary is first presented of the current understanding of the Aboriginal land use of the study area. This is then followed by a review of the historical Euro-Canadian settlement history.

1.2.1 Aboriginal Land Use and Settlement

Southern Ontario has been occupied by human populations, since the retreat of the Laurentide glacier, approximately 13,000 before present (BP) (Ferris 2013: 13). Populations at this time would have been highly mobile, inhabiting a boreal-parkland similar to the modern sub-arctic. By approximately 10,000 BP, the environment had progressively warmed (Edwards and Fritz 1988) and populations now occupied less extensive territories (Ellis and Deller 1990: 62-63).

Between approximately 10,000-5,500 BP, the Great Lakes basins experienced low-water levels and many sites which would have been located on those former shorelines, now submerged. This period produces the earliest evidence of heavy wood working tools and is indicative of greater investment of labour in felling trees for fuel, to build shelter, or to produce crafts and is ultimately indicative of prolonged seasonal residency at sites. By approximately 8,000 BP, evidence exists for polished stone implements and worked native copper. The latter's source from the north shore of Lake Superior is evidence of extensive exchange networks. Between approximately 4,500-3,000 BP, the earliest evidence exists at this time of cemeteries, indicative of increased social organization and investment of labour into social infrastructure, and establishing territories (Ellis *et al.* 1990; Ellis *et al.* 2009; *cf.* Brown 1995: 13).

Between 3,000-2,500 BP, settlement and subsistence systems are not entirely understood. Populations continued a semi-permanent existence and exploited seasonally available resources, and the harvesting of spawning fish continued to be an important part of their subsistence. Evidence still exists for extensive and complex exchange networks (Spence *et al.* 1990: 136, 138). By approximately 2,000 BP, evidence exists for macro-band camps, focussing on the seasonal exploitation of resources such as spawning fish and wild rice (Spence *et al.* 1990: 155, 164). It is also during this period that maize was first introduced into southern Ontario, though it would have only supplemented people's diet (Birch and Williamson 2013: 13-15). Bands likely retreated to interior camps during the winter.

By approximately 1,000 BP, until approximately 300 BP, archaeological evidence indicates lifeways similar to the historically described Aboriginal groups. Populations in southern Ontario were Iroquoian speaking though full expression of Iroquoian culture is not recognised archaeologically until the fourteenth century AD. During the Early Iroquoian phase (AD 1000-AD 1300), the communal site is replaced by the village focussed on horticulture. Seasonal disintegration of the community for the exploitation of a wider territory and more varied resource base was still practised (Williamson 1990: 317). By the second quarter of the first millennium BP, during the Middle Iroquoian phase (AD 1300-AD 1450), this episodic community disintegration was no longer practised and populations now communally occupied sites throughout the year (Dodd *et al.* 1990: 343). In the Late Iroquoian phase (AD 1450-AD 1649), this process continued with the coalescence of these small villages into larger communities (Birch and Williamson 2013). Through this process, the socio-political organization of the Aboriginal Nations, as described historically by the French and English explorers who first visited southern Ontario, was developed.

Samuel de Champlain in 1615 reported that a group of Iroquoian-speaking people situated between the New York Iroquois and the Huron-Wendat were at peace and remained "la nation neutre". In subsequent years, the French visited and traded among the Neutral, but the first documented visit was not until 1626, when the Recollet missionary Joseph de la Roche Daillon recorded his visit to the villages of the Attiwandaron, whose name in the Huron-Wendat language meant "those who speak a slightly different tongue" (the Neutral apparently referred to the Huron-Wendat by the same term). Like the Huron-Wendat, Petun and New York Iroquois, the Neutral people were settled village agriculturalists. The Neutral territory included discrete settlement clusters in the lower Grand River, Fairchild-Big Creek, Upper Twenty Mile Creek, Spencer-Bronte Creek drainages, Milton, Grimsby, Eastern Niagara Escarpment and Onondaga Escarpment areas. The study area is situated on the periphery of the Kitchener settlement cluster (Lennox and Fitzgerald 1990: Figure 13.1; Table 13.1). The Kitchener settlement cluster has documented occupation from the fifteenth century (e.g. Dry Lake site - Horne 1987) until the sixteenth century (e.g. Waterloo site - Horne 1987).

Between 1647 and 1651, the Neutral were decimated by epidemics and ultimately dispersed by the New York Iroquois, who subsequently settled along strategic trade routes on the north shore of Lake Ontario for a brief period during the mid seventeenth-century. Compared to settlements of the New York Iroquois, the "Iroquois du Nord" occupation of the landscape was less intensive. Only seven villages are identified by the early historic cartographers on the north shore and they are documented as considerably smaller than those in New York State. The populations were agriculturalists, growing maize, pumpkins and squash. These settlements also played the important alternate role of serving as stopovers and bases for New York Iroquois travelling to the north shore for the annual beaver hunt (Konrad 1974).

Beginning in the mid-late seventeenth century, the Mississaugas began to replace the Iroquois as the controlling Aboriginal group in the north shore since the Iroquois confederacy had overstretched their territory between the 1650s and 1670s (Williamson 2008). The Iroquois could not hold the region and agreed to form an alliance with the Mississaugas and share hunting territories with them. The Mississaugas traded with both the British and the French in order to have wider access to European materials at better prices and acted as trade intermediaries between the British and tribes in the north.

Following the 1764 Niagara Peace Treaty, and the follow-up treaties with Pontiac, the English colonial government considered the Mississaugas to be their allies since they had accepted the Covenant Chain. The English administrators followed the terms of the Royal Proclamation and insured that no settlements were made in the hunting grounds that had been reserved for their use (Johnston 1964; Lytwyn 2005).

Six Nations Iroquois leaders also pressured the English colonial government to respect their old treaties, especially those concerning access to hunting grounds north of Lake Ontario. In 1765, Daniel Claus, Deputy Superintendent General of Indian Affairs, wrote to Sir William Johnson and explained that he had been told that the Six Nations Iroquois' old hunting grounds were to be treated in common, "and free to one Nation as to another, in the same manner as a large Dish of Meat would be to a Company of People who were invited to eat it, when every Guest has liberty to cut as they pleased" (Johnson 1921: 917). In 1767, Chiefs from Oka and Caughnawaga met with the British Governor and also reminded him about the 1701 Peace Treaty and the promise to have shared hunting territories with the Mississaugas (Johnston 1964; Lytwyn 2005).

During the American Revolution, Mississauga warriors supported the English military. Rebel forces destroyed the villages of the Six Nations Iroquois in New York and many people were forced to move to the Niagara area. When Six Nations Iroquois leaders learned that the English planned to make a peace

treaty with the Americans and establish a boundary line that would give away their homelands they were angry. The English government offered to protect Six Nations Iroquois peoples and give them land within their boundaries. On August 8, 1783, Lord North instructed Governor Haldimand to set apart land for the Six Nations Iroquois and ensure that they carried on their hunting and fur trading with the British. On May 22, 1784, a tract of land along the Grand River was purchased by the British government from the Mississaugas who lived in the vicinity (Johnston 1964; Lytwyn 2005). The land set apart is called the Haldimand Tract, and the study area is situated in Block 2.

Joseph Brant led New York Iroquois loyalists (1600 people) to the Haldimand tract in 1784 and in the fall of 1784, Sir Frederick Haldimand formally awarded the tract to the Mohawks "and others of the Six Nations [Iroquois]." They were authorized to "Settle upon the Banks of the River" and were allotted "for that Purpose six miles [10 km] deep from each Side of [it] beginning at Lake Erie, & extending in the Proportion to [its] Head." The precise boundaries of the grant were unclear as there was no survey; for example, the northern boundary of the original deed from the Mississaugas to the Crown stated that the line extended "from the creek that falls from a small lake into…the bay known by the name of Waghquata [Burlington Bay]…until it strikes the river La Tranche [Thames]." The 1790 survey by Augustus Jones intentionally failed to include the headwaters of the Grand, an action made all the more difficult to address given the unclear description of the extent in the original deeds (Johnston 1964; Lytwyn 2005).

Brant regarded the territory as his own to manage on behalf of the Confederacy and interpreted the proclamation as tantamount to full national recognition of the Mohawks and fellow tribesmen. This interpretation was strongly denied by the British (Johnston 1964; Lytwyn 2005).

In fact, appointed as Lieutenant Governor of the new colony of Upper Canada in 1791, Simcoe refused to permit the Six Nations Iroquois to sell/lease any part of their reserve because they were arranged independently of the Crown. Brant, on the other hand, argued for the Six Nations Iroquois' need for an immediate assured income from land sales as they could no longer hope to survive by hunting exclusively. Simcoe thought that if such practices were permitted, it could lead to other Europeans attempting to seize control by any means of the better part of the Six Nations Iroquois' reserve and it was therefore unresolved as to whether Six Nations Iroquois people could dispose of their lands directly to whomever they chose (Johnston 1964; Lytwyn 2005).

In the first few years, Brant, who had been described, by some, as a Europeanized entrepreneur, took the initiative and invited white friends and acquaintances to the tract and provided them with rough land titles. Over the next 25 years (1784-1810), a considerable number of Europeans and Americans obtained similar leases authorizing them (in Brant's opinion) to occupy and improve lots overlooking the river (Johnston 1964; Lytwyn 2005).

The subsequent Peter Russel administration (1797-1798), however, recognized the leases and the sales that Brant arranged with white settlers along the Grand River Valley. Trustees were appointed to act on the behalf of the Six Nations Iroquois with the authority to receive payment of purchases. On the other hand, some Six Nations Iroquois thought that the land sale practices violated the ancient principle that land was not a "commodity which could be conveyed." Two Mohawk sachems even tried to take up arms to depose Brant because they did not agree with his ways. Their efforts were naught and they returned to the Bay of Quinte where other Six Nation Iroquois peoples, led by Sachem John Deseronto, had settled after the American Revolution (Johnston 1964; Lytwyn 2005).

A formal investigation of the matter was launched in 1812 although leases were not set aside. Due to problems of white encroachment including squatters without titles, settlers who bought land from individuals or through other transactions with Six Nations Iroquois, many of the leases were confirmed by the Crown in 1834-5. Unauthorized sales and agreements remained rampant (Johnston 1964; Lytwyn 2005).

In 1841, Samuel P. Jarvis (Indian Superintendent) informed the Six Nations Iroquois that the only way to keep white intruders off their land would be for them to surrender it to the Crown, to be administered for their sole benefit. With this plan, the Six Nations Iroquois would retain lands that they actually occupied and a reserve of approximately 8,094 hectares (ha). The surrender of land was made by the Confederacy in January, 1841 (Johnston 1964; Lytwyn 2005).

Today, this history and those surrenders are still contested and there are numerous specific land claims that have been filed by the Six Nations Iroquois with the federal government in regard to lands within the Haldimand Tract (Johnston 1964; Lytwyn 2005).

1.2.2 Historic Euro-Canadian Land Use: Township Survey and Settlement

Historically, the study area is located in the Former Township of Waterloo, Waterloo County in part of Lots 32 and 41, German Co. Tract.

The S & G stipulates that areas of early Euro-Canadian settlement (pioneer homesteads, isolated cabins, farmstead complexes), early wharf or dock complexes, pioneer churches and early cemeteries, are considered to have archaeological potential. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed on a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site are also considered to have archaeological potential.

For the Euro-Canadian period, the majority of early nineteenth century farmsteads (i.e., those which are arguably the most potentially significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be located in proximity to water. The development of the network of concession roads and railroads through the course of the nineteenth century frequently influenced the siting of farmsteads and businesses. Accordingly, undisturbed lands within 100 m of an early settlement road are also considered to have potential for the presence of Euro-Canadian archaeological sites.

The first Europeans to arrive in the area were transient merchants and traders from France and England, who followed Aboriginal pathways and set up trading posts at strategic locations along the well-traveled river routes. All of these occupations occurred at sites that afforded both natural landfalls and convenient access, by means of the various waterways and overland trails, into the hinterlands. Early transportation routes followed existing Aboriginal trails, both along the lakeshore and adjacent to various creeks and rivers (ASI 2006).

Waterloo Township

The historic Township of Waterloo was originally known as Block Two of the Grand River land grant which was deeded to the Six Nations Iroquois by the British in 1784 for their loyalty to the Crown in the

American War of Independence. In 1796, Block Two, a 38,045 ha tract, was acquired by Richard Beasley from Joseph Brant on behalf of the Six Nations. He subdivided and sold the land, with an approximately 24,281 ha tract of land going to the German Company of Pennsylvania, in November 1803 (Janusas 1988: 2). Company members included Samuel and John Bricker; and Daniel, Jacob, and John Erb. The German Company of Pennsylvania had the lands surveyed by Augustus Jones to subdivide the land into 128 farm lots of approximately 181 ha each and 32 farm lots of approximately 34 ha each (Janusas 1988: 96).

When Block Two was incorporated into the District of Gore (County of Halton) in 1816, it was named Waterloo Township, in honour of the battle that ended the Napoleonic Wars in Europe. It remained part of Halton County in the District of Gore until 1842 and then part of the District of Wellington. The County of Waterloo did not come into being until 1852 (Janusas 1988: 2).

The first immigrants to settle in Waterloo Township were almost exclusively German Mennonites from Pennsylvania, who had originally emigrated from Switzerland, Germany and France. Most of these settlers were farmers but many were tradesmen and millers. Later settlers were generally of Scottish, English, Irish, and continental German heritage, many of them farmers, but a majority of them were artisans and tradesmen. When the railway was laid through Waterloo Township in the mid-nineteenth century, it became the leading industrial center of Waterloo County (Janusas 1988: 10-12).

Abraham Erb purchased approximately 181 ha of land in 1805 and became the first settler in the City of Waterloo. He transferred a portion of his land and ownership of two mills to Jacob Snider in 1829. Snider's son inherited approximately 129 ha which he sold to John Hoffman and Isaac Weber, who sectioned and sold the lands in 1854, at which point the population of Waterloo began to expand (Janusas 1988: 102).

In the mid-1850s, the defining development of Waterloo Township and Waterloo County was the construction of the railway. The first railway line built into the township was a main line of the Grand Trunk Railway from Toronto, laid through in 1856. A number of other railway lines were soon laid across the township including: a Grand Trunk branch between Preston and Berlin in 1857; a Great Western line from Galt, Preston, and Guelph in 1857; a Grand Trunk branch between Berlin (Kitchener) and Galt in 1882; and a Grand Trunk Branch between Waterloo and Elmira in 1891.

Rummelhardt School

The Rummelhardt School is situated at 600 Erb Street West. The property was purchased in 1843 and a log-structure school house was built on the site the same year. This log-structure was replaced by the extant fieldstone structure in 1867. The structure is the only stone schoolhouse n the City of Waterloo and was designated in August 2000 (City of Waterloo n.d.).

1.2.3 Historic Map Review

The 1861 *Tremaine's Map of the County of Waterloo, Canada West* and the 1881 *Illustrated Historical Atlas of the County of Waterloo* were reviewed to determine the potential for the presence of historical features within or abutting the study area during the nineteenth century (Figures 2 and 3). It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases.

Use of historic map sources to reconstruct/predict the location of former features within the modern landscape generally proceeds by using common reference points between the various sources. These sources are then geo-referenced in order to provide the most accurate determination of the location of any property on historic mapping sources. The results of such exercises are often imprecise or even contradictory, as there are numerous potential sources of error inherent in such a process. These include the vagaries of map production (both past and present), the need to resolve differences of scale and resolution, and distortions introduced by reproduction of the sources. To a large degree, the significance of such margins of error is dependent on the size of the feature one is attempting to plot, the constancy of reference points, the distances between them, and the consistency with which both they and the target feature are depicted on the period mapping.

The 1861 map of the study area indicates land tenure of the land parcels however the degraded condition of the map has made this information barely legible. The map does, however, clearly indicate the Rummelhardt school house (Figure 2; *c.f.* Section 1.2.2). The 1881 map does not indicate land tenure, however, but likewise depicts the Rummelhardt schoolhouse (Figure 3).

The historic mapping also demonstrates that Erb Street West, Fischer Hallman Road, Erbsville Court, West Hill Drive, the southern part of the alignment of the driveway of 667 Pine Row Crescent and Wilmot Line are all historic transportation routes.

Transportation and communication networks are important because they serve to integrate social and economic activities between disparate settlement centres. As these settlements grew, and traffic increased between them, toll gates, taverns, hotels and other services for travellers were established where major transportation routes were crossed. Early overland routes followed the natural topography, avoiding swamps or rocky outcrops.

1.2.4 Summary of Historical Context

The background research demonstrates that the study area has been occupied by Aboriginal peoples for thousands of years and is located upon the periphery of a documented Neutral Nation settlement cluster. It was subsequently utilised by the Seneca and Mississauga for resource extraction and later settled by the Six Nations Iroquois.

The background research and historic mapping also demonstrates that the study area is located in the Former Township of Waterloo, County of Waterloo in part of Lots 32 and 41, German Co. Tract. Both historic maps indicate that the study area is located in proximity to a historic schoolhouse (Rummelhardt

Schoolhouse) and that the study area is aligned with and intersected by multiple historic transportation routes.

1.3 Archaeological Context

This section provides background research pertaining to previous archaeological fieldwork conducted within and in the vicinity of the study area, its environmental characteristics (including drainage, soils or surficial geology and topography, etc.), and current land use and field conditions. Three sources of information were consulted to provide information about previous archaeological research: the site record forms for registered sites housed at the MTCS; published and unpublished documentary sources; and the files of ASI.

1.3.1 Current Land Use and Field Conditions

The study area is aligned with Erb Street and spans from Fischer-Hallman Road South in the east to Wilmot Line in the west. The study area includes right-of-way (ROW) lands as well as lands adjacent to the ROW, predominantly surrounded by residential development that is expanding westward along Erb Street. The western end of the study area is still a wider rural landscape with some agricultural land use. Many of the original rural residences along the study area have been demolished, and there is some industrial land use on the south side of Erb Street in the western end of the study area.

1.3.2 Geography

In addition to the known archaeological sites, the state of the natural environment is a helpful indicator of archaeological potential. Accordingly, a description of the physiography and soils, are briefly discussed for the study area.

The S & G stipulates that primary water sources (lakes, rivers, streams, creeks, etc.), secondary water sources (intermittent streams and creeks, springs, marshes, swamps, etc.), ancient water sources (glacial lake shorelines indicated by the presence of raised sand or gravel beach ridges, relic river or stream channels indicated by clear dip or swale in the topography, shorelines of drained lakes or marshes, cobble beaches, etc.), as well as accessible or inaccessible shorelines (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh, etc.) are characteristics that indicate archaeological potential.

Water has been identified as the major determinant of site selection and the presence of potable water is the single most important resource necessary for any extended human occupation or settlement. Since water sources have remained relatively stable in Ontario since 5,000 BP (Karrow and Warner 1990: Figure 2.16), proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location.

Other geographic characteristics that can indicate archaeological potential include: elevated topography (eskers, drumlins, large knolls, and plateaux), pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground, distinctive land formations that might have been special or spiritual places,

such as waterfalls, rock outcrops, caverns, mounds, and promontories and their bases. There may be physical indicators of their use, such as burials, structures, offerings, rock paintings or carvings. Resource areas, including; food or medicinal plants (migratory routes, spawning areas) are also considered characteristics that indicate archaeological potential (S *&* *G*, Section 1.3.1).

The study area is situated within the Waterloo Hills physiographic region of southern Ontario in kame moraine. The rolling terrain of ridges and hills was formed as till and kame moraines. Flowing southward through the moraines is the Grand River spillway comprised of level alluvial terraces (Chapman and Putnam 1984: 136). North of Waterloo, the spillway channel splits into two channels that rejoin south of Kitchener. The present course of the Grand River follows the eastern channel while Schneider Creek follows the western channel. The study area is situated to the north of the southern confluence. Terrain in the study area is complex, varying from almost level to strongly sloping in the upland area that overlooks the large river valley.

Figures 4 and 5 depict surficial geology and soil drainage for the study area, respectively. The surficial geology mapping demonstrates that the study area contains areas of diamicton (poorly sorted sediments) and sand. Soil drainage information is incomplete for the study area, however it does include some areas of well-drained soils.

Soils within the study area consist of: Brant loam with Tuscola loam; Bennington loam with St. Clements silt loam and Tavistock loam; St. Clements silt loam with St. Clements sandy loam and Wellesley silt loam; and, Waterloo fine sandy loam with St. Clements silt loam and Heidelberg fine sandy loam. The study area also includes urban areas for which soils information is not available (Dept. of Agriculture and Agri-Food Canada 1996).

Areas of the above soil distinction are described by their dominant (former) and subdominant (latter) soil types. As the subdominant soil types are described on the virtue that they exist as concentrations within the dominant soil type (Ecologistics Ltd. 1996: 27), they merit expanded description in addition to dominant soil types. Expanded description of soil types is given below.

Brant loam is developed on well-drained lacustrine sediments and occurs on moderately sloping hummocky topography. Soil colour ranges from very dark brown to brown through the horizon. Soil pH ranges from basic to slightly acidic through the horizon (Presant and Wicklund 1971: 25).

Tuscola loam is developed on imperfectly drained loam sediments. This soil type typically occurs on low-lying and depressional areas as well as in channels. This soil typically has a seasonally high water table. Soil colour ranges from very dark brown to mottled brown through the horizon. Soil pH is typically basic (Presant and Wicklund 1971: 39).

Bennington loam is developed on well-drained deposits of loam overlaying clay deposits. Topography may be relative steep or complex. In areas of slope this soil may be subject to seepage. Soil colour ranges from very dark greyish brown to light olive brown through the horizon. Soil pH is basic (Presant and Wicklund 1971: 23-24).

St. Clements silt loam and sandy loam soils are developed on well-drained materials consisting mainly of silty clay loam and silty clay. Soil topography is varied. Soil colour ranges from very dark greyish brown to brown through the horizon. Soil pH is typically basic (Presant and Wicklund 1971: 37-38).

Tavistock loam is an imperfectly drained soil that has developed on loam and silt loam overlaying clay. Organic content is typically high and is often stonefree. Soil slop is sometime complex and on slopes this soil may be subject to seepage. Soil colour ranges from very dark gray to mottled brown through the horizon. Soil pH ranges from basic to acidic through the horizon (Presant and Wicklund 1971: 38-39).

Wellesley silt loam is an imperfectly drained soil and is typically found in level or gently sloping areas, though the slope may be complex. Soil colour ranges from very dark gray to mottled dark brown through the horizon. Soil pH is typically basic (Presant and Wicklund 1971: 40).

Waterloo fine sandy loam is a well-drained soil typically occurring on fairly steep slopes though slope may be complex. Organic content through the horizon ranges from medium to high. Soil colour ranges from very dark grayish brown to brown through the horizon. Soil pH ranges between neutral to acidic through the horizon (Presant and Wicklund 1971: 39-40).

Heidelberg fine sandy loam is an imperfectly drained soil developed from alluvial and lacustrine materials. This soil is often underlain by gravel. This soil has a seasonally high water table. Soil colour ranges from very dark grayish brown to mottled yellowish brown. Soil pH is typically acidic (Presant and Wicklund 1971: 32-33).

The study area is located in proximity to the upper reaches of Clair Creek, a tributary of Laurel Creek. Clair Creek drains a total area of 150 hectares (PEIL 2003). Laurel Creek ultimately drains into the Grand River, an important transportation route and a critical resource extraction area for generations of Aboriginal people. Historically, the Grand River has been utilised as a navigable water-way, as a power source (such power sites served as settlement nuclei) and, above Brantford, as a course for driving logs (Chapman and Putnam 1984: 98).

1.3.3 Previous Archaeological Research

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD) maintained by the MTCS. This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 km east to west, and approximately 18.5 km north to south. Each Borden block is referenced by a four-letter designator, and sites within a block are numbered sequentially as they are found. The study area under review is located in Borden block *AiHd.*

According to the OASD (MTCS 2014), seven previously registered archaeological sites are located within one kilometre of the study area. Site details are presented in Table 1.

According to the background research, two archaeological assessments have been conducted within 50 metres of the study area (ASI 1999; 2007; Stantec 2013). Due to access constraints the Stantec (2013) report was not able to be reviewed for this assessment.

ASI (1999) conducted a Stage 1-2 archaeological assessment of the Clair Hills subdivision – Phase 2 (30T-97017, 30T-97018) in the City of Waterloo, Regional Municipality of Waterloo under the project direction of Dr. Rob MacDonald (Licence #98-014). The background research determined that the study area possessed archaeological potential. The property assessment was conducted on June 5 and 19 and November 19, 1998 by pedestrian survey at five metre intervals, and identified three archaeological sites

and seven findspots. Two previously registered archaeological sites were also located within the study area. No cultural resources were located within the present study area.

Table 1: List of previously registered sites within one kilometre of the study area

Borden #	Site Name	Cultural Affiliation	Site Type	Researcher
AiHd-1	Waterloo	Neutral	Village	Wright 1961; Redmond 1981
AiHd-30	Beechwood 6	Aboriginal (pre-16th century)	Findspot	MPP 1986
AiHd-31	Beechwood 7	Aboriginal (pre-16th century)	Lithic workshop	MPP 1986
AiHd-121	Freiberger	Euro-Canadian (mid 19th century)†	Homestead	MacDonald [ASI] 1998; Wilson 1999
AiHd-124		Aboriginal (pre-16th century)	Findspot	Macdonald [ASI] 1998
AiHd-125		Aboriginal (pre-16th century)	Campsite	Macdonald [ASI] 1998
AiHd-132	Greyerbiehl I	Aboriginal (pre-16th century)	n/a	n/a

N.B. – Dates based on Ferris 2013: 13
† -Dates based on MTCS 2014
ASI – Archaeological Services Inc.
MPP – Mayer, Pihl, Poulton & Associates Inc.

ASI (2007) conducted a Stage 1 archaeological assessment for the Erb Street and Wilmot Line Class EA in the City of Waterloo, Regional Municipality of Waterloo under the project direction of Rob Pihl (MCL PIF P057-318-2006). The Stage 1 archaeological assessment determined that some lands beyond the Erb Street West ROW possessed archaeological potential and required Stage 2 archaeological assessment, however lands within the Erb Street West ROW were disturbed and did not require further archaeological assessment.

1.3.4 Summary of Archaeological Context

The review of archaeological work conducted in the area demonstrated that seven previously registered archaeological sites are located within one kilometre of the study area. The study area is located in proximity to Clair Creek and includes areas of well-drained sandy soil. The study area is also located in proximity to the Speed River, the course of which is consistent with that during the Late Pleistocene/early Holocene era. The study area contains well-drained sandy soil.

The historical context demonstrates that the study area is located in proximity to a historic schoolhouse as well as historic transportation routes.

The above criteria are indicative that the study area possesses potential for Aboriginal and Euro-Canadian archaeological resources, depending on the degree to which soils have been subject to deep disturbance.

2.0 FIELD METHODS: PROPERTY INSPECTION

A Stage 1 property inspection must adhere to the S & G, Section 1.2, Standards 1-6, which are discussed below. The entire property and its periphery must be inspected. The inspection may be either systematic or random. Coverage must be sufficient to identify the presence or absence of any features of archaeological potential. The inspection must be conducted when weather conditions permit good visibility of land features. Natural landforms and watercourses are to be confirmed if previously identified. Additional features such as elevated topography, relic water channels, glacial shorelines, well-drained soils within heavy soils and slightly elevated areas within low and wet areas should be identified and documented, if present. Features affecting assessment strategies should be identified and documented such as woodlots, bogs or other permanently wet areas, areas of steeper grade than indicated on topographic mapping, areas of overgrown vegetation, areas of heavy soil, and recent land disturbance such as grading, fill deposits and vegetation clearing. The inspection should also identify and document structures and built features which will affect assessment strategies such as heritage structures or landscapes, cairns, monuments or plaques, and cemeteries.

The Stage 1 archaeological assessment property inspection was conducted by Paul David Ritchie (P392) of ASI on August 21, 2014, with Peter Carruthers (P163) advising, also of ASI, in order to gain first-hand knowledge of the geography, topography, and current conditions and to evaluate and map archaeological potential of the study area. It was a visual inspection only and did not include excavation or collection of archaeological resources.

Weather conditions for the inspection were a mix of overcast and clear skies with a temperature of approximately 23 degrees Celsius. Previously identified features of archaeological potential were examined; additional features of archaeological potential not visible on mapping were identified and documented as well as any features that will affect assessment strategies. Field observations are compiled onto maps of the study area in Section 7.0 (Figures 6-10) and associated photographic plates are presented in Section 8.0 (Plates 1-14).

3.0 ANALYSIS AND CONCLUSIONS

The historical and archaeological contexts have been analyzed to help determine the archaeological potential of the study area. This data is presented below in Section 3.1. Results of the analysis of the property inspection are then presented for the study area (Section 3.2).

3.1 Analysis of Archaeological Potential

The S & G, section 1.3.1, list criteria that are indicative of archaeological potential. The Erb Street Widening and Corridor study area meets the following criteria indicative of archaeological potential:

- Previously identified archaeological sites (e.g. Freiberger *AiHd-121*);
- Water sources: primary, secondary, or past water source (e.g. Clair Creek);
- Well-drained sandy soils (e.g. Waterloo fine sandy loam)
- Areas of Euro-Canadian Settlement (e.g. schoolhouse);
- Early historic transportation routes (e.g. Erb Street)

These criteria are indicative of potential for the identification of Aboriginal and Euro-Canadian archaeological resources, depending on the degree to which it has been subject to disturbance.

3.2 Analysis of Property Inspection Results

The Erb Street Widening and Corridor Study Stage 1 study area includes publicly owned ROW lands as well as private lands adjacent to the ROW. Much of the study area was documented to have deep and extensive land disturbance due to utility installation, ROW construction, and grading as well as adjacent development (Figures 7-10: areas marked in yellow). These lands do not require further archaeological assessment as per the S & G, Section 1.3.2.

Typically, a ROW can be divided into two areas: the disturbed ROW, and ROW lands beyond the disturbed ROW. The typically disturbed ROW extends outwards from either side of the centerline of the traveled lanes, and it includes the traveled lanes and shoulders and extends to the toe of the fill slope, the top of the cut slope, or the outside edge of the drainage ditch, whichever is furthest from the centerline. Subsurface disturbance within these lands may be considered deep and extensive, thereby negating any archaeological potential for such lands.

ROW construction disturbance may be found to extend beyond the typical disturbed ROW area, and this generally includes additional grading, cutting and filling, additional drainage ditching, watercourse alteration or channelization, servicing, removals, intensive landscaping, and heavy construction traffic. Areas beyond the typically disturbed ROW generally require archaeological assessment in order to determine archaeological potential relative to the type or scale of disturbances that may have occurred in these zones.

Some areas of the Erb Street Corridor possess archaeological potential (Figures 8-10: areas marked in green and orange) and require Stage 2 archaeological assessment by a combination of test-pit survey at five metre intervals and pedestrian survey at five metre intervals, in accordance with the S & G, Sections 2.1.1 and 2.1.2, if they are to be impacted by the project developments.

3.3 Conclusions

The Stage 1 background study determined that 13 previously registered archaeological sites and three unregistered archaeological findspots are located within one kilometre of the study area. A review of the geography of the study area suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources, depending on the degree to which soils have been disturbed.

The property inspection identified some areas within the study area which possess archaeological potential and will require Stage 2 archaeological assessment. The remainder of the study area, however, does not retain archaeological potential.

4.0 RECOMMENDATIONS

In light of these results, the following recommendations are made:

1. Several areas within in the Erb Street Widening and Corridor Study Stage 1 study area possess archaeological potential and will require Stage 2 archaeological assessment by a combination of test-pit survey at five metre intervals and pedestrian survey at five metre intervals (Figures 8-10: areas marked in green and orange), prior to any land disturbance by the project;

2. ROW lands and some lands adjacent to within the study area are documented to not retain archaeological potential on account of deep and extensive land disturbance (Figures 7-10: areas marked in yellow). A part of the study area has been documented to have low and wet conditions (Figure 9: area marked in blue). These lands do not require further archaeological assessment; and,

3. Should the proposed work extend beyond the current study area then further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands

Notwithstanding the results and recommendations presented in this study, ASI notes that no archaeological assessment, no matter how thorough or carefully completed, can necessarily predict, account for, or identify every form of isolated or deeply buried archaeological deposit. In the event that archaeological remains are found during subsequent construction activities, the consultant archaeologist, approval authority, and the Cultural Programs Unit of the MTCS should be immediately notified.

5.0 ADVICE ON COMPLIANCE WITH LEGISLATION

ASI also advises compliance with the following legislation:

- This report is submitted to the Minister of Tourism, Culture and Sport as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, RSO 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological field work and report recommendations ensure the conservation, preservation and protection of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MTCS, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

- It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological field work on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act.*

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the *Ontario Heritage Act*.

- The *Funeral, Burial and Cremation Services Act* (2002) require that any person discovering human remains must immediately notify the police or coroner.

- The documentation related to this archaeological assessment will be curated by ASI until such a time that arrangements for their ultimate transfer to Her Majesty the Queen in right of Ontario, or other public institution, can be made to the satisfaction of the project owner(s), the Ontario MTCS, and any other legitimate interest groups.

6.0 WORKS CITED

Archaeological Services Inc. (ASI)

1999 Stage 1/2 Archaeological Assessment of of [*sic*.] the Clair Hills Subdivision – Phase 2 (30T-97017, 30T-97018), city of Waterloo, Regional Municipality of Waterloo, Ontario.

2006 Historical Overview and Assessment of Archaeological Potential Don River Watershed, City Of Toronto.

2007 Stage 1 Archaeological Assessment. Erb Street and Wilmot Line Class Environmental Assessment, City of Waterloo, Regional Municipality of Waterloo, Ontario. Revised.

Birch, J. and R.F. Williamson

2013 *The Mantle Site: An Archaeological History of an Ancestral Wendat Community.* Lanham*:* Rowman & Littlefield Publishers, Inc.

Brown, J.

1995 On Mortuary Analysis – with Special Reference to the Saxe-Binford Research Program. In: R*egional Approaches to Mortuary Analysis*, edited by L. A. Beck. NewYork: Plenum Press, pp. 3-23.

Chapman, L. J. and F. Putnam

1984 *The Physiography of Southern Ontario.* Ontario Geological Survey, Special Volume 2. Ontario Ministry of Natural Resources, Toronto.

Department of Agriculture of Agri-Food Canada

1996 1:50,000. *Soils of Waterloo County, Ontario.* Soil Survey Report No. 44. Sheet 4.

Dodd, C.F., D.R. Poulton, P.A. Lennox, D.G. Smith and G.A. Warrick.

1990 The Middle Ontario Iroquoian Stage. In: *The Archaeology of Southern Ontario to A.D. 1650*. Edited by: C.J. Ellis and N. Ferris. Occasional Publication of the London Chapter, OAS Number 5. London: Ontario Archaeological Society Inc., pp. 321-360.

Ecologistics Ltd.
1996 *Research Sub-Program. State of the Resources: Improving the Land Resource Data Base – The Regional Municipality of Waterloo Soil Information Upgrade.* COESA Report No.: RES/MON-011/96. <http://sis.agr.gc.ca/cansis/publications/surveys/on/on44a/on44a_report.pdf>

Edwards, T.W.D. and P. Fritz
1988 Stable-isotope palaeoclimate records from southern Ontario, Canada: comparison of results from marl and wood. *Canadian Journal of Earth Sciences,* 25: 1397-1406.

Ellis, C.J. and D.B. Deller
1990 Paleo-Indians. In: *The Archaeology of Southern Ontario to A.D. 1650*. Edited by: C.J. Ellis and N. Ferris. Occasional Publication of the London Chapter, OAS Number 5. London: Ontario Archaeological Society Inc., pp. 37-64.

Ellis, C.J., I.T. Kenyon and M.W. Spence.
1990 The Archaic. In *The Archaeology of Southern Ontario to A.D. 1650.* Edited by C.J. Ellis and N. Ferris, pp. 65-124. London Chapter, Ontario Archaeological Society, London, Ontario.

Ellis, C.J., P.A. Timmins and H. Martelle
2009 At the Crossroads and Periphery: The Archaic Archaeological Record of Southern Ontario. In: *Archaic Societies: Diversity and Complexity across the Midcontinent*. Edited by: T.E. Emerson, D.L. McElrath and A.C. Fortier. Albany, New York: State University of New York Press, pp. 787-837.

Ferris, N.
2013 Introduction: Seeing Ontario's Past Archaeologically. In: *Before Ontario: The Archaeology of a Province*. Edited by: M.K. Munson and S.M. Jamieson. Montreal & Kingston: McGill-Queen's University Press, pp. 3-23.

Horne, M.
1987 A Preliminary Examination of Site Selection Criteria for Middleport-Neutral Sites in the Waterloo Region. *Kewa,* 87(2): 4-24.

Janusas, S.E.
1988 *An Archaeological Perspective of an Historic Overview of the Regional Municipality of Waterloo.* Regional Municipality of Waterloo: Planning and Development Department Archaeology Division.

Johnson, W., Sir.
1921 *The Papers of Sir William Johnson*, Volume 11: The Indian Uprising, 1764-1765. Albany: University of the State of New York.

Johnston, C.E.
1964 *The Valley of the Six Nations: A Collection of Documents on the Indian Lands of the Grand River*. Toronto: The Champlain Society.

Karrow, P.F. and B.G. Warner
1990 The Geological and Biological Environment for Human Occupation in Southern Ontario. In *The Archaeology of Southern Ontario to A.D. 1650*. Edited by: C.J. Ellis and N. Ferris. London Chapter, OAS, No. 5. London, Ontario, pp. 5-36.

Konrad, V.A.
1974 *Iroquois Villages on the North Shore of Lake Ontario, 1665-1687.* Paper Presented at the Fall Meeting of the Ontario Historical Geographers. November 9, 1974, Carleton University, Ottawa, Ontario.

Lennox, P.A. and W.R. Fitzgerald
1990 The Culture History and Archaeology of the Neutral Iroquoians. In: *The Archaeology of Southern Ontario to A.D. 1650*. Edited by: C.J. Ellis and N. Ferris. Occasional Publication of the London Chapter, OAS Number 5. London: Ontario Archaeological Society Inc., pp. 405-456.

Lytwyn, V.P.
2005 Historical research report: Aboriginal Settlement and Use of the North Pickering Development Planning Are and Adjacent Lands, 1690-1923.

Ministry of Consumer Services
2002 *Funeral, Burial and Cremation Services Act*

Ministry of Culture
2005 *Ontario Heritage Act.*

Ministry of Environment
1990 *Environmental Assessment Act*

Ministry of Tourism and Culture
2011 *Standards and Guidelines for Consultant Archaeologists*. Cultural Programs Branch, Ontario Ministry of Culture, Toronto.

Ministry of Tourism, Culture and Sport (MTCS)
2013 *Email communication*, Robert von Bitter, MTCS Data Coordinator, September 2, 2014

Municipal Engineers' Association
2000 *Municipal Class Environmental Assessment* [as amended in 2007 and 2011]

Parsell, H. & Co
1881 *Illustrated Historical Atlas of Waterloo & Wellington Counties*, Ontario 1881-1877

Planning & Engineering Initiative Ltd. (PEIL)
2003 Clair Creek Subwatershed 317 Drainage Study, City of Waterloo. <http://www.waterloo.ca/en/contentresources/resources/living/clair_creek_subwatershed_drainage_study.pdf>

Presant, E.W. and R.E. Wicklund
1971 *The Soils of Waterloo County.* Report No. 44 of the Ontario Soil Survey. Canada Department of Agriculture.

Spence, M.W., R.H. Pihl and C. Murphy
1990 Cultural Complexes of the Early and Middle Woodland Periods. In: *The Archaeology of Southern Ontario to A.D. 1650*. Edited by: C.J. Ellis and N. Ferris. Occasional Publications 5. London Chapter, Ontario Archaeological Society, London, pp. 125-170.

Stantec
2013 Stage 1 Archaeological Assessment 930 Erb Street West Part of Lots 41 and 42, German Company Tract, City of Waterloo, Regional Municipality of Waterloo, Ontario

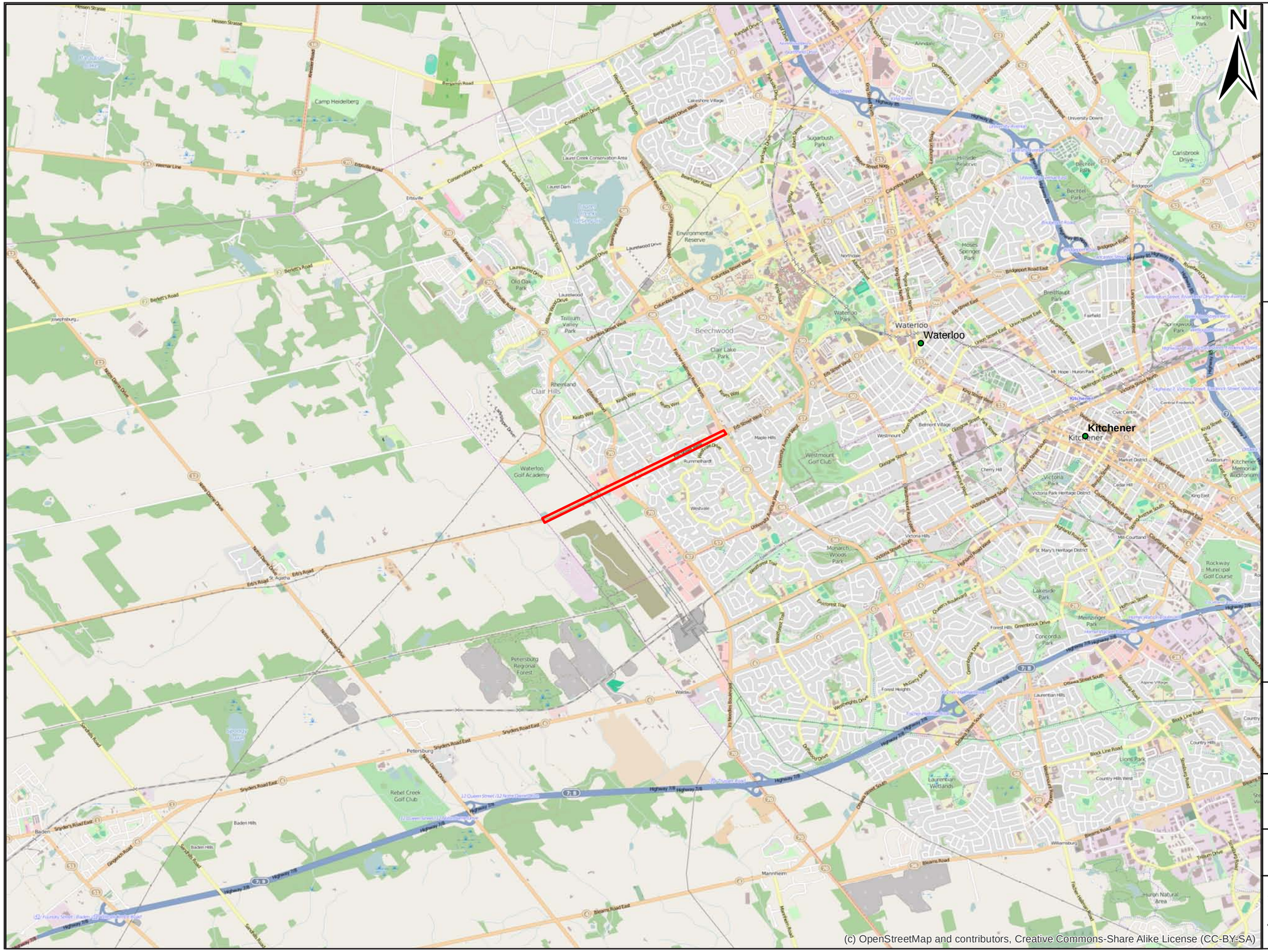
Tremaine, G.C.
1861 [scale unknown]. *Tremaine's Map of the County of Waterloo, Canada West.* Toronto: Geo. C. Tremaine.

Waterloo, City of
n.d. *Heritage Property – Rummelhardt School.* <http://www.waterloo.ca/en/contentresources/resources/government/heritage_property_rummelhardt_school.pdf>

Williamson, R.F.
1990 The Early Iroquoian Period of Southern Ontario. In: *The Archaeology of Southern Ontario to A.D. 1650*. Edited by: C.J. Ellis and N. Ferris. Occasional Publication of the London Chapter, OAS Number 5. London: Ontario Archaeological Society Inc., pp. 291-320.

2008 *Toronto: An Illustrated History of its First 12,000 Years*. Edited by: R. Williamson. Toronto: James Lorimer & Co.

7.0 MAPS





Study Area

BASE: OpenStreetMap (OSM)
OpenStreetMap and contributors,
Creative Commons-Share Alike License (CC-BY-SA)
2013

0 2,500
Metres

ASI PROJECT NO.: 13EA-204
DATE: 20 Aug 2014

DRAWN BY: BW
FILE: 13EA204_Fig1

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iASI.to

Figure 1: Erb Street Widening and Corridor Study Stage 1 Study Area Location

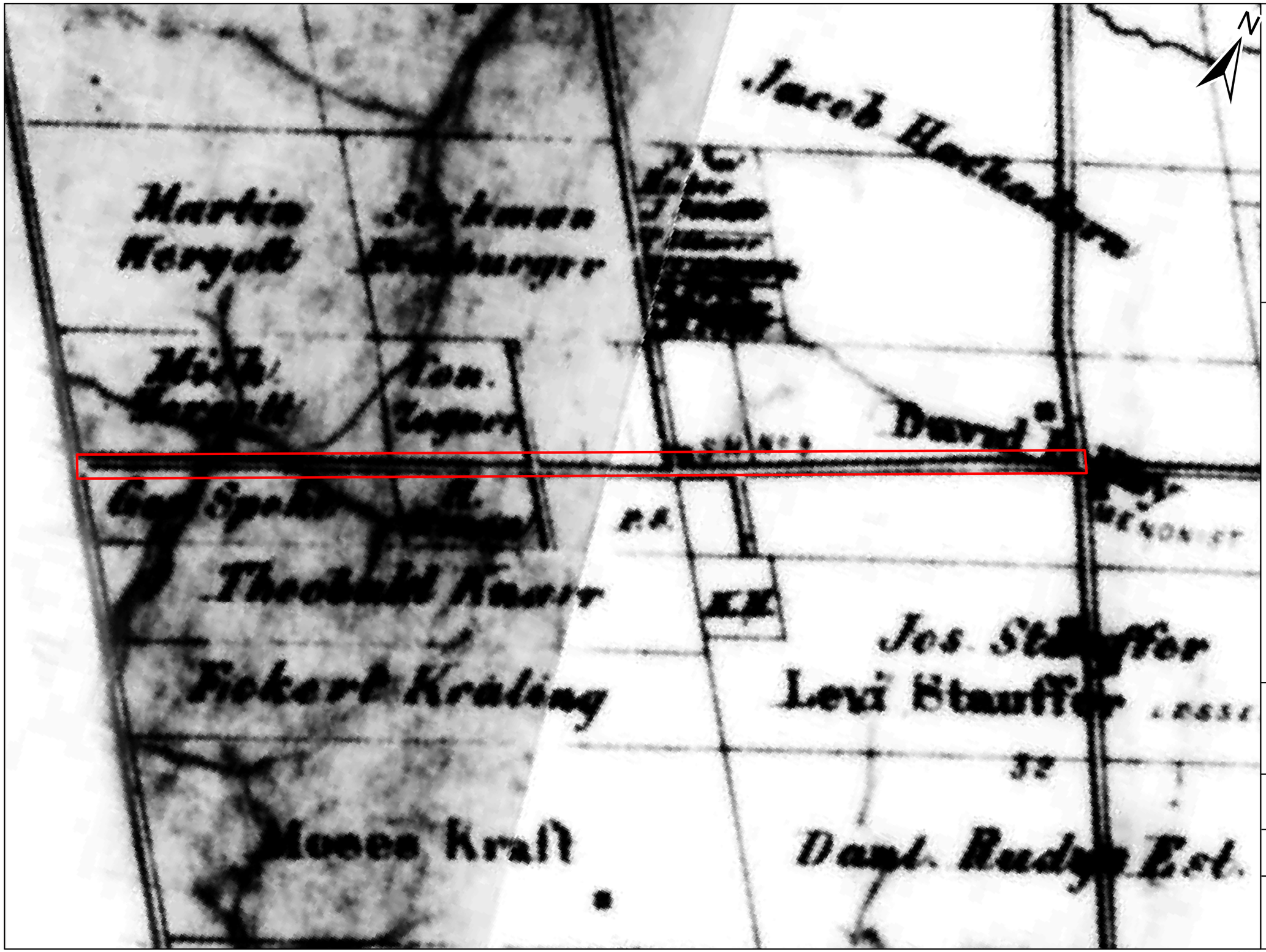
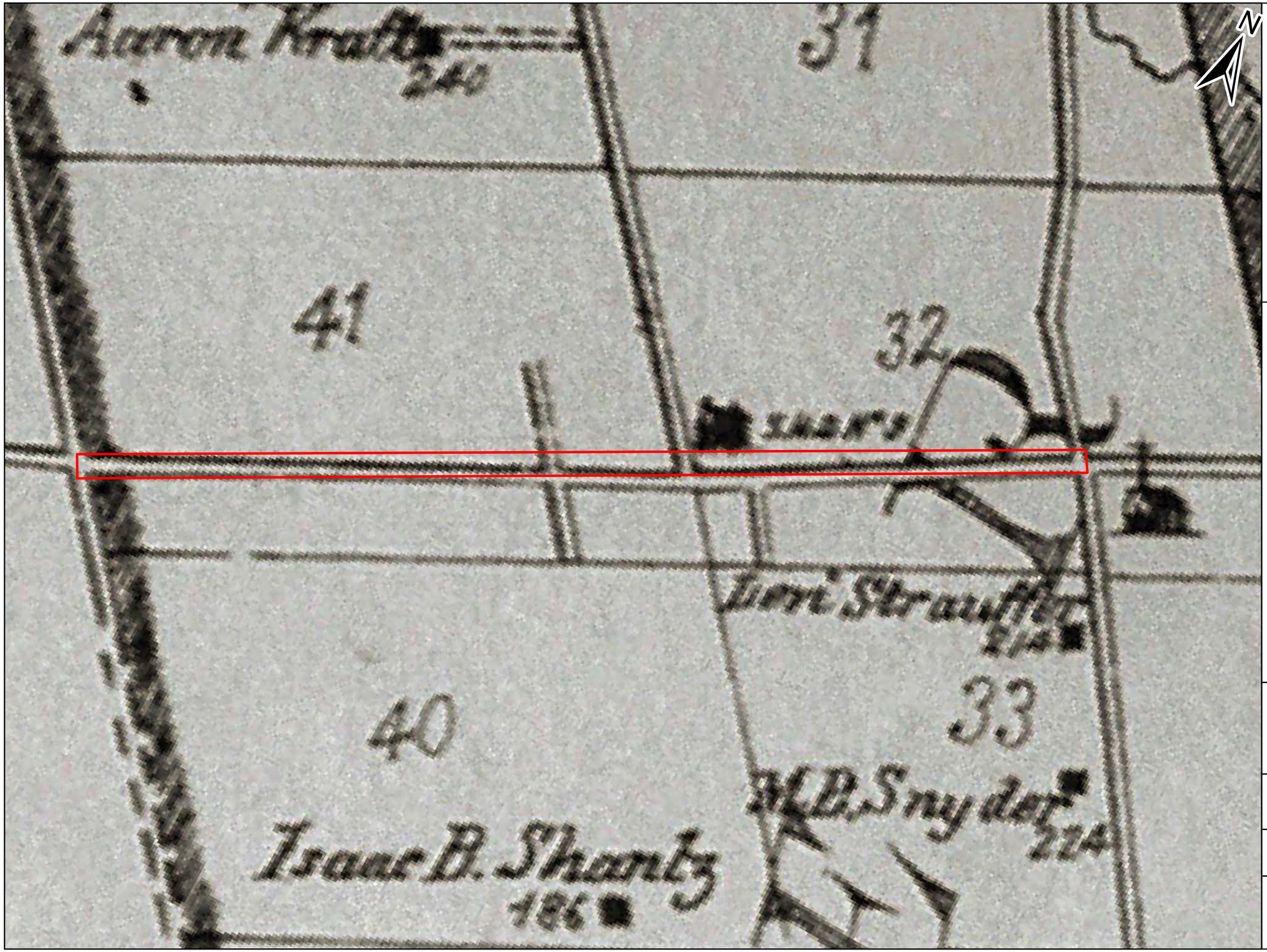
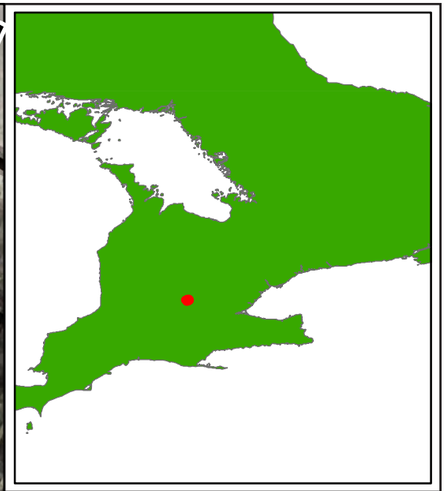


Figure 2: Erb Street Widening and Corridor Study Stage 1 Study Area overlaid on 1861 map of County of Waterloo, Canada West

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd





Study Area

BASE:

Waterloo County
Waterloo Township
1881

0 500
Metres

ASI PROJECT NO.: 13EA-204
DATE: 21 Aug 2014

DRAWN BY: BW
FILE: 13EA204_Fig3_1881

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

Figure 3: Erb Street Widening and Corridor Study Stage 1 Study Area overlaid on 1881 map of Township of Waterloo

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd

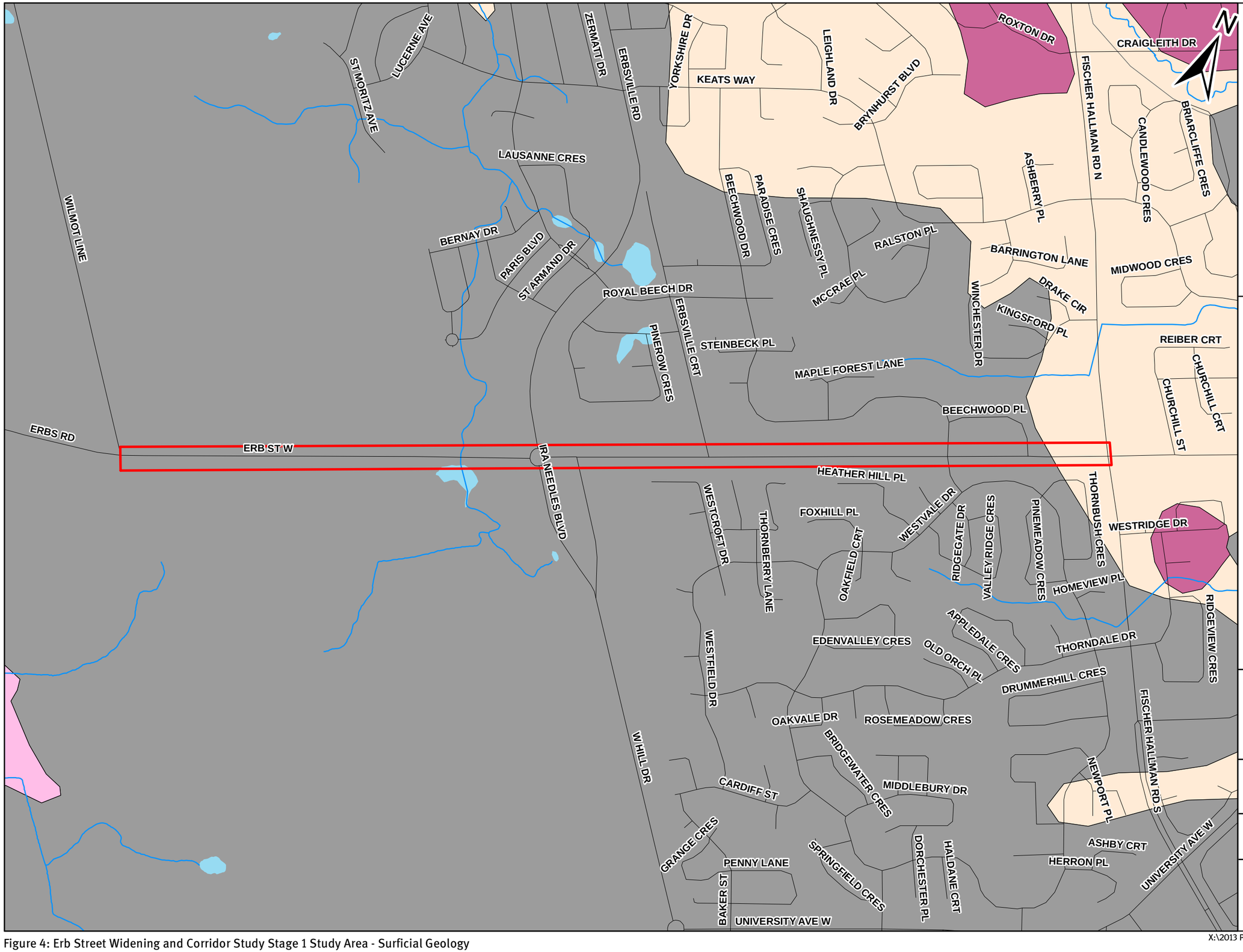


Figure 4: Erb Street Widening and Corridor Study Stage 1 Study Area - Surficial Geology

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd



Study Area
No Data
Well Drained
Poorly Drained

BASE:

0 500
Metres

ASI PROJECT NO.: 13EA-204
DATE: 21 Aug 2014

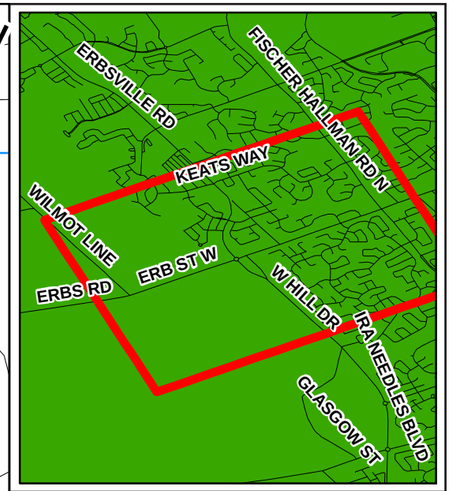
DRAWN BY: BW
FILE: 13EA204_Fig5_Drain

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

Figure 5: Erb Street Widening and Corridor Study Stage 1 Study Area - Soil Drainage

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd





Study

BASE:

Ortho
Imagery20121.TIF
WalterFredy

0 500
Metres

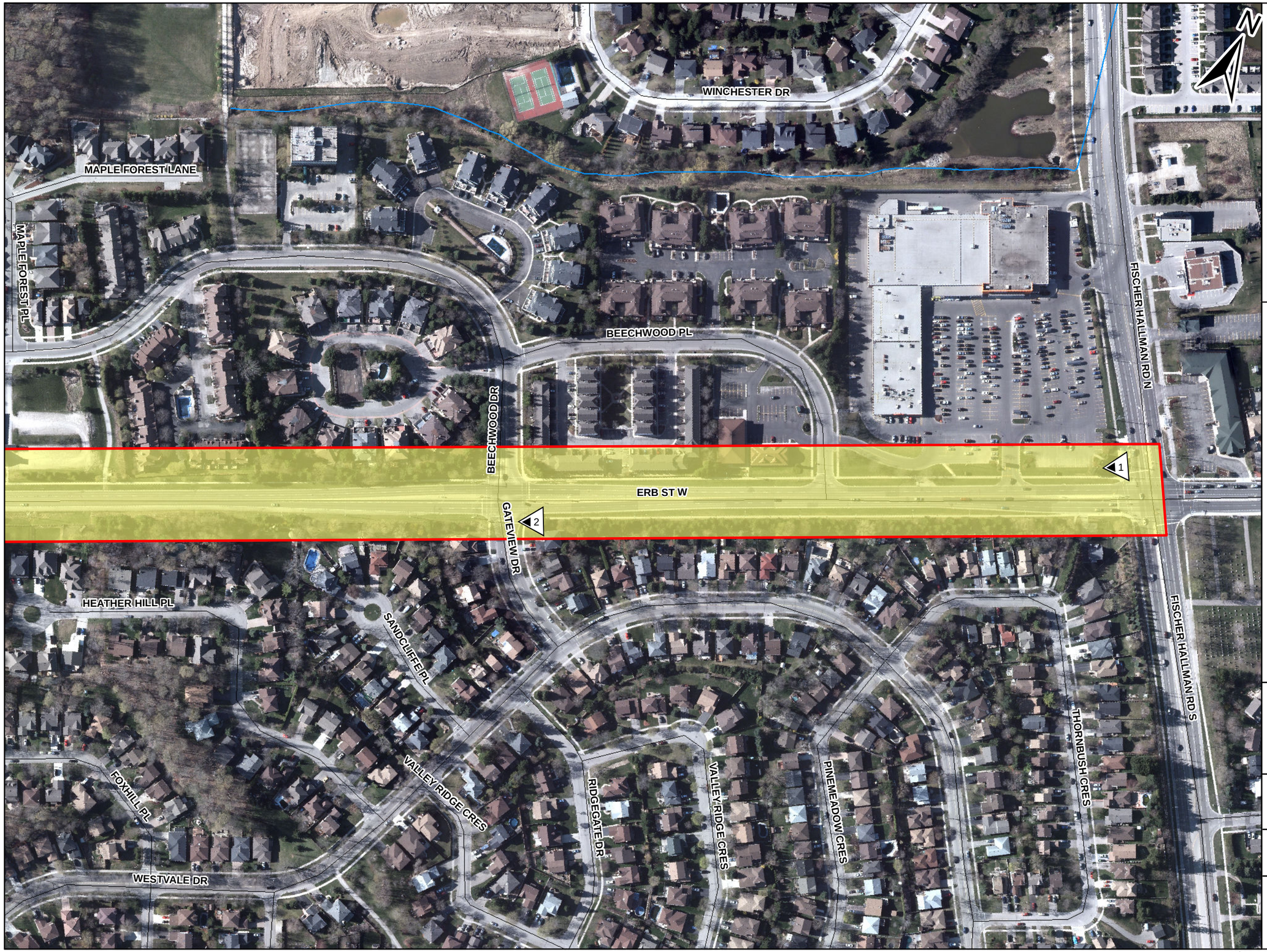
ASI PROJECT NO.: 13EA-204
DATE: 06 Oct 2014

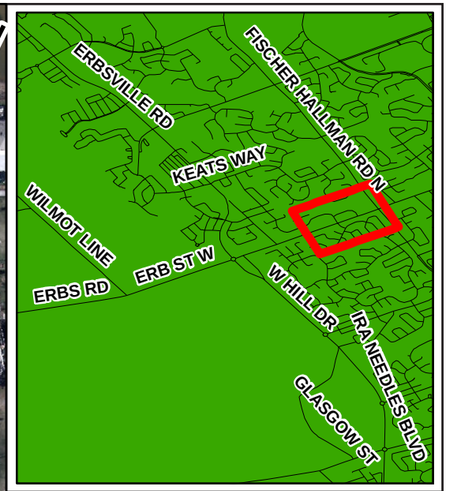
DRAWN BY: BW
FILE: 13EA204_Fig6_KP

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

Figure 6: Erb Street Widening and Corridor Study Stage 1 Study Area - Property Inspection Results (Key Map)

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd





Study

Photo Plate

No Potential:

BASE:

Ortho
Imagery20121.TIF
WalterFredy

0 100

Metres

ASI PROJECT NO.: 13EA-204
DATE: 06 Oct 2014

DRAWN BY: BW
FILE: 13EA204_Fig7_S1

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

Figure 7: Erb Street Widening and Corridor Study Stage 1 Study Area - Property Inspection Results (Sheet 1)

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd

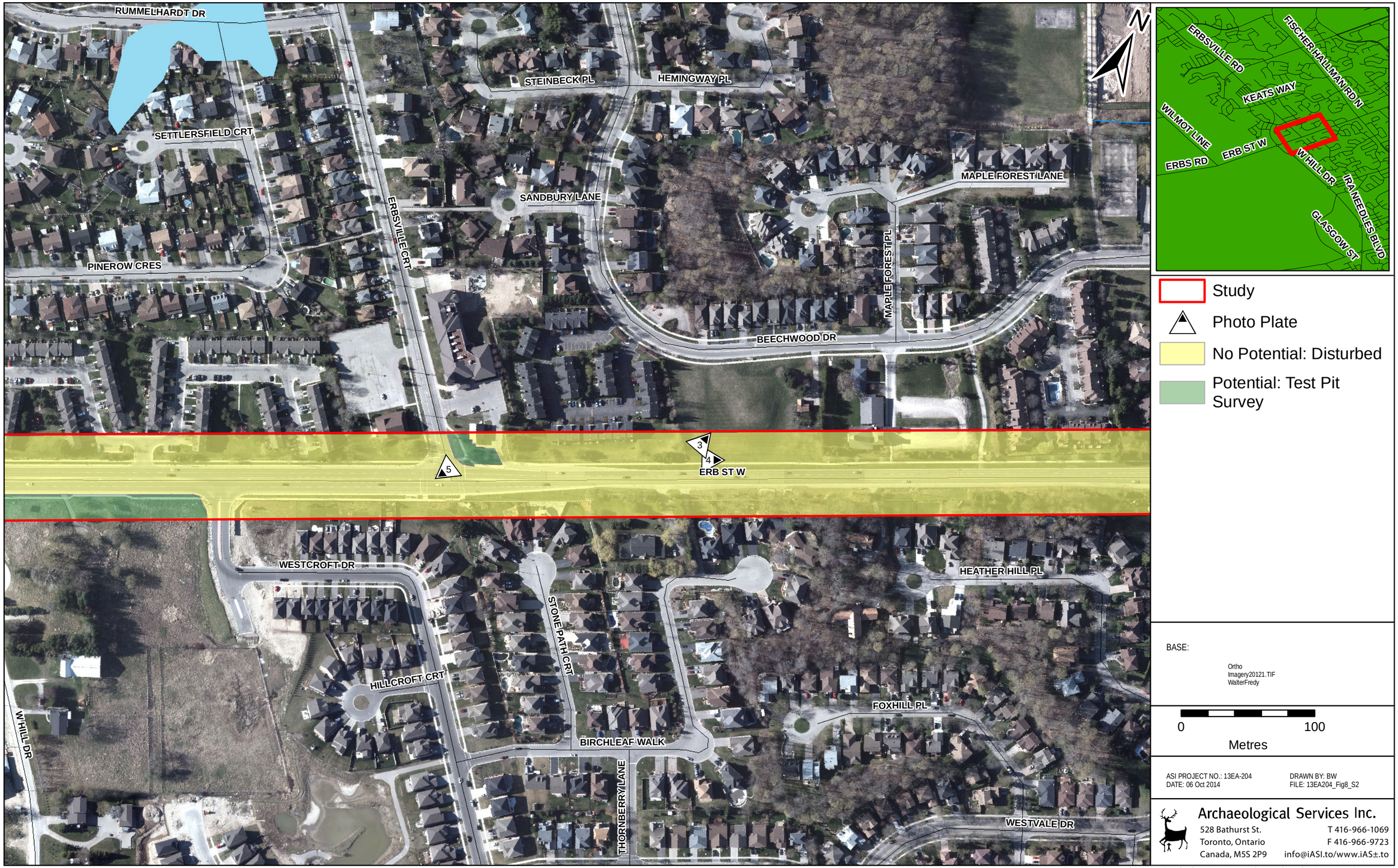
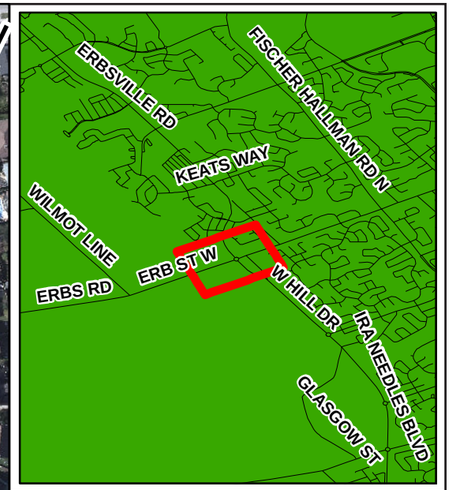


Figure 8: Erb Street Widening and Corridor Study Stage 1 Study Area - Property Inspection Results (Sheet 2)

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd





Study

Photo Plate

No Potential: Disturbed

Potential: Pedestrian Survey

Potential: Test Pit Survey

No Potential: Wet

BASE:

Ortho
Imagery20121.TIF
WalterFredy

0 100
Metres

ASI PROJECT NO.: 13EA-204
DATE: 06 Oct 2014

DRAWN BY: BW
FILE: 13EA204_Fig9_S3

Archaeological Services Inc.
528 Bathurst St.
Toronto, Ontario
Canada, M5S 2P9
T 416-966-1069
F 416-966-9723
info@iASI.to/www.iAS±.to

Figure 9: Erb Street Widening and Corridor Study Stage 1 Study Area - Property Inspection Results (Sheet 3)

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd



Figure 10: Erb Street Widening and Corridor Study Stage 1 Study Area - Property Inspection Results (Sheet 4)

X:\2013 Projects\EA\13EA-204_205 Erb Street\View\13EA204_workspace.mxd

8.0 IMAGES



Plate 1: View WSW of Erb Street ROW. ROW and lands beyond are disturbed. No potential.



Plate 2: View WSW of Erb Street ROW. ROW and lands beyond are disturbed. No potential.



Plate 3: View NNE of park. Park is disturbed. No potential.



Plate 4: View ENE of Erb Street ROW. ROW and lands beyond are disturbed. No potential.



Plate 5: View southwest of Erb Street ROW. ROW and lands beyond are disturbed. No potential.



Plate 6: View ESE of study area. Erb Street ROW is disturbed. No potential. Lands beyond ROW have potential. Require Stage 2 test-pit survey.



Plate 7: View south of study area. Erb Street ROW and lands beyond are disturbed. No potential.



Plate 8: View southwest of study area. Study area is disturbed. No potential.



Plate 9: View southwest of Erb Street ROW. ROW is disturbed. Adjacent lands beyond ROW are low and wet. No potential.



Plate 10: View northwest of study area. Erb Street ROW and Hydro Tower property are disturbed. No potential.



Plate 11: View WSW of study area. Erb Street ROW and lands beyond are disturbed. No potential.



Plate 12: View SSE of study area. Erb Street ROW and lands beyond are disturbed. No potential.



Plate 13: View ENE of study area. Erb Street ROW is disturbed. No potential. Lands beyond have potential. Requires Stage 2 pedestrian survey.

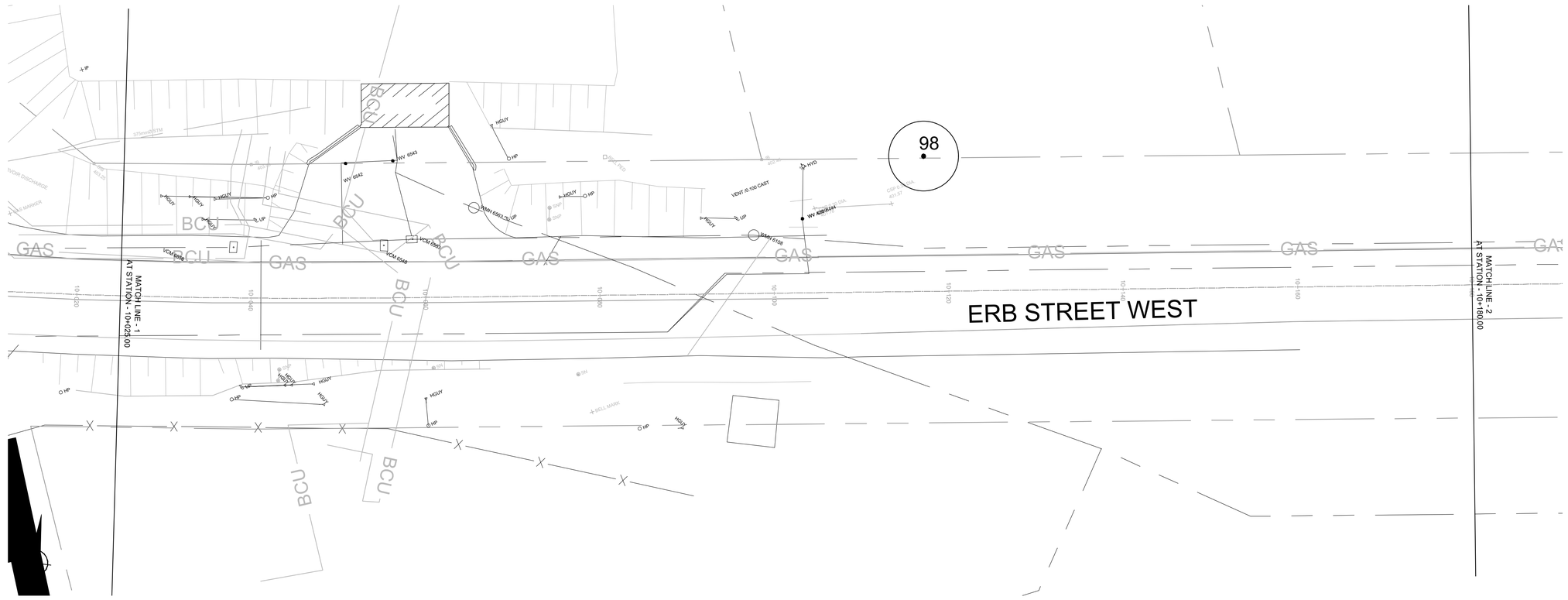


Plate 14: View northwest of study area. Area is a buried reservoir. Area is disturbed. No potential.

APPENDIX F

Tree Inventory Plan





KEY PLAN
N.T.S.



Legend

Existing Trees

GENERAL NOTES:

1. Drawings not to be used for construction unless authorized by the Landscape Architect
2. Contractor shall report any discrepancies between the drawings and site conditions prior to commencement of the work
3. All utility locates are the responsibility of the Contractor. Hand dig within the limits recommended by the service utility. Utility conflicts with proposed tree locations must be reported immediately to the Landscape Architect
4. Base drawing provided by Walter Fedy
5. For Grading information refer to drawing by Walter Fedy. For servicing information refer to drawings by Walter Fedy.
6. Landscape drawings show engineering information for design purposes only. Do not construct engineering works from these drawings.

Region of Waterloo

TREE INVENTORY

ERB STREET WEST, WATERLOO ROAD WIDENING

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
JUSTIN WILLIAM
OALA
Mar. 1, 2019
MEMBER

DATE	ISSUE	BY
Oct 23/14	Preliminary Tree Inventory	RT
Mar 1/19	Issued for EAR	RT

DATE	REVISIONS	BY

GSP group
201-72 Victoria Street South
Kitchener, Ontario N2G 4Y9
T 519 569 8883
F 519 569 8643

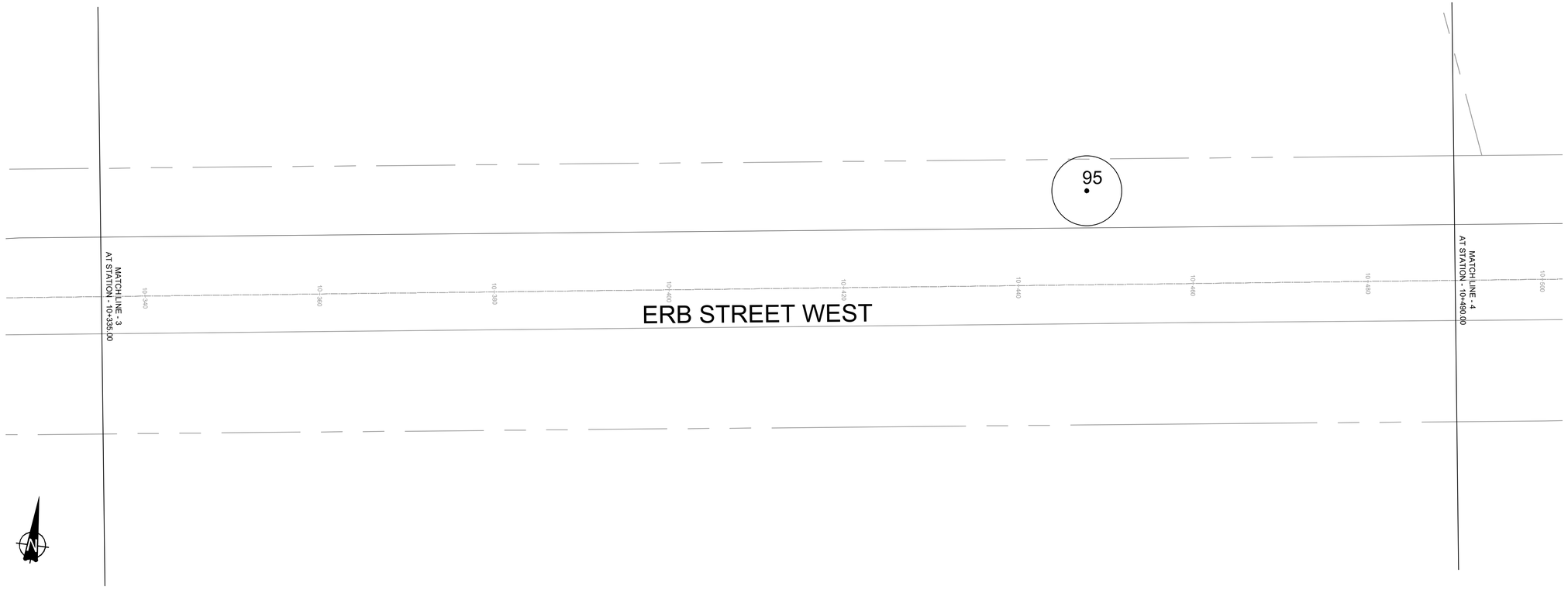
29 Rebecca Street, Suite 200
Hamilton, Ontario L8R 1B3
T 905 572 7477

www.gspgroup.ca

L1

Date: July 25, 2014
Drawn By: CZ
Scale: 1: 250
Project No.: 14052





KEY PLAN
N.T.S.



Legend

Existing Trees

GENERAL NOTES:

1. Drawings not to be used for construction unless authorized by the Landscape Architect
2. Contractor shall report any discrepancies between the drawings and site conditions prior to commencement of the work
3. All utility locates are the responsibility of the Contractor. Hand dig within the limits recommended by the service utility. Utility conflicts with proposed tree locations must be reported immediately to the Landscape Architect
4. Base drawing provided by Walter Fedy
5. For Grading information refer to drawing by Walter Fedy. For servicing information refer to drawings by Walter Fedy.
6. Landscape drawings show engineering information for design purposes only. Do not construct engineering works from these drawings.

Region of Waterloo

TREE INVENTORY

ERB STREET WEST, WATERLOO ROAD WIDENING

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
JUSTIN WALKER
OALA
Mar. 1, 2019
MEMBER

DATE	ISSUE	BY
Oct 23/14	Preliminary Tree Inventory	RT
Mar 1/19	Issued for EAR	RT

DATE	REVISIONS	BY

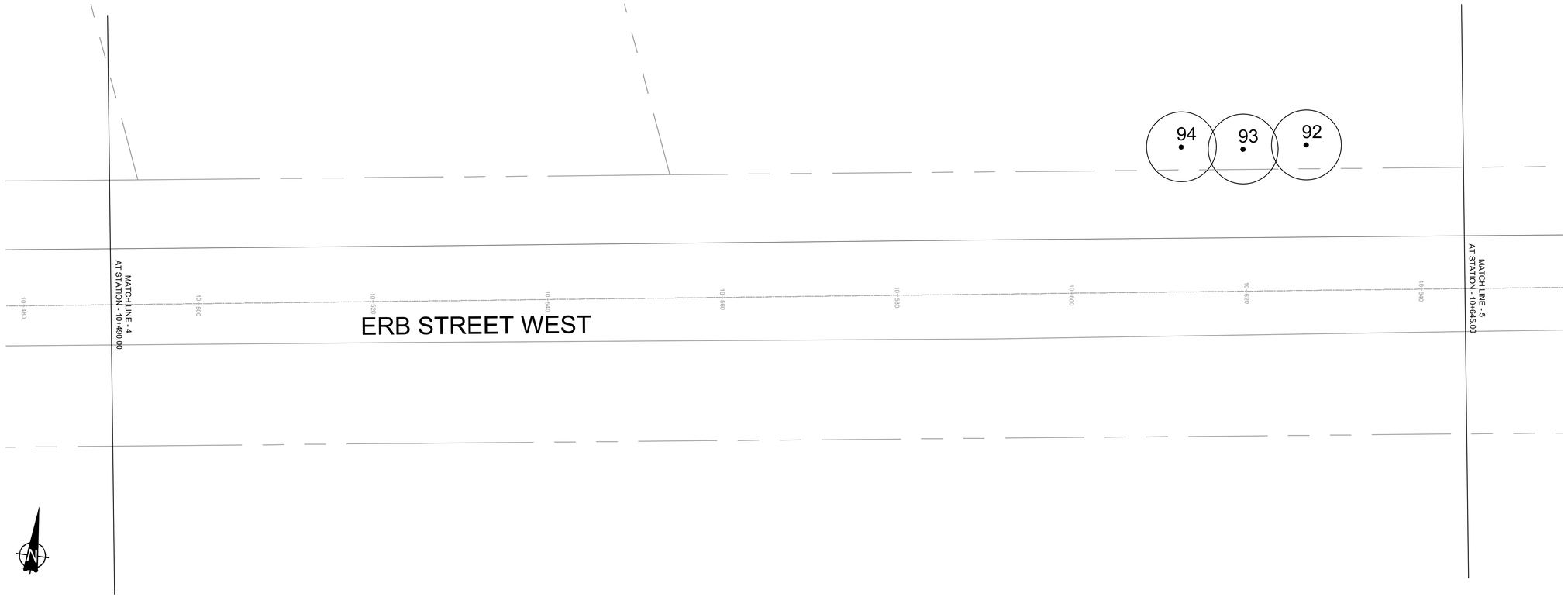
GSP group
201-72 Victoria Street South
Kitchener, Ontario N2G 4Y9
T 519 569 8883
F 519 569 8643

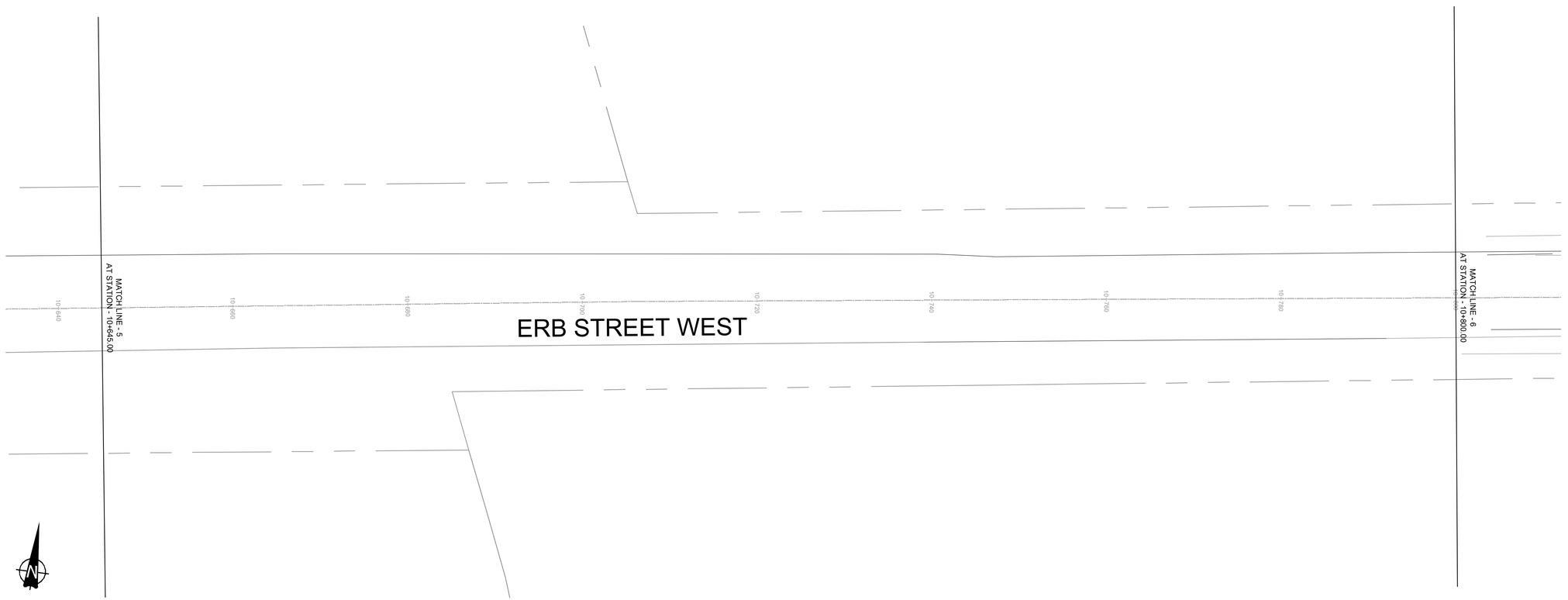
29 Rebecca Street, Suite 200
Hamilton, Ontario L8R 1B3
T 905 572 7477

www.gspgroup.ca

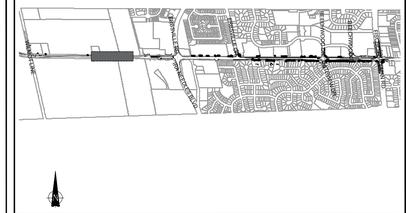
L2

Date: July 25, 2014 | Drawn By: CZ
Scale: 1: 250 | Project No.: 14052





KEY PLAN
N.T.S.



Legend

Existing Trees

GENERAL NOTES:

1. Drawings not to be used for construction unless authorized by the Landscape Architect
2. Contractor shall report any discrepancies between the drawings and site conditions prior to commencement of the work
3. All utility locates are the responsibility of the Contractor. Hand dig within the limits recommended by the service utility. Utility conflicts with proposed tree locations must be reported immediately to the Landscape Architect
4. Base drawing provided by Walter Fedy
5. For Grading information refer to drawing by Walter Fedy. For servicing information refer to drawings by Walter Fedy.
6. Landscape drawings show engineering information for design purposes only. Do not construct engineering works from these drawings.

Region of Waterloo

TREE INVENTORY

ERB STREET WEST, WATERLOO ROAD WIDENING

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
JUSTIN WALKER
OALA
Mar. 1, 2019
MEMBER

DATE	ISSUE	BY
Oct 23/14	Preliminary Tree Inventory	RT
Mar 1/19	Issued for EAR	RT

DATE	REVISIONS	BY

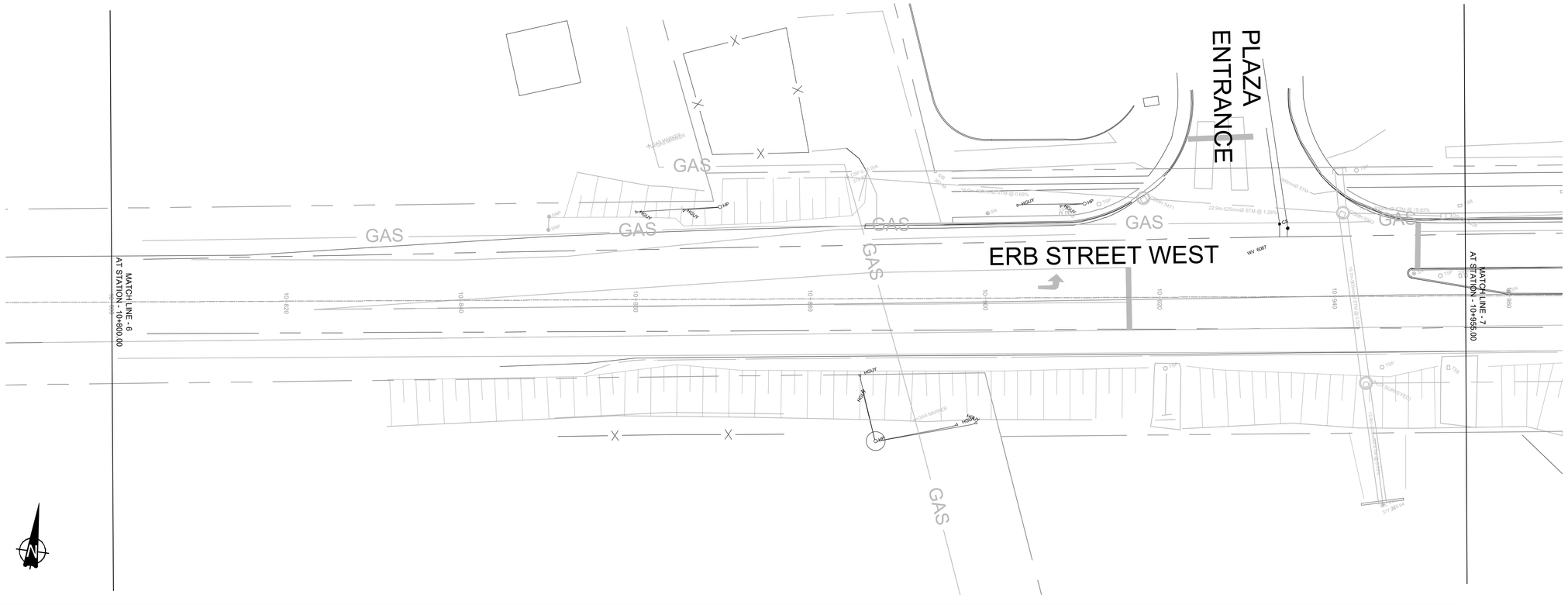
GSP group
201-72 Victoria Street South
Kitchener, Ontario N2G 4Y9
T 519 569 8883
F 519 569 8643

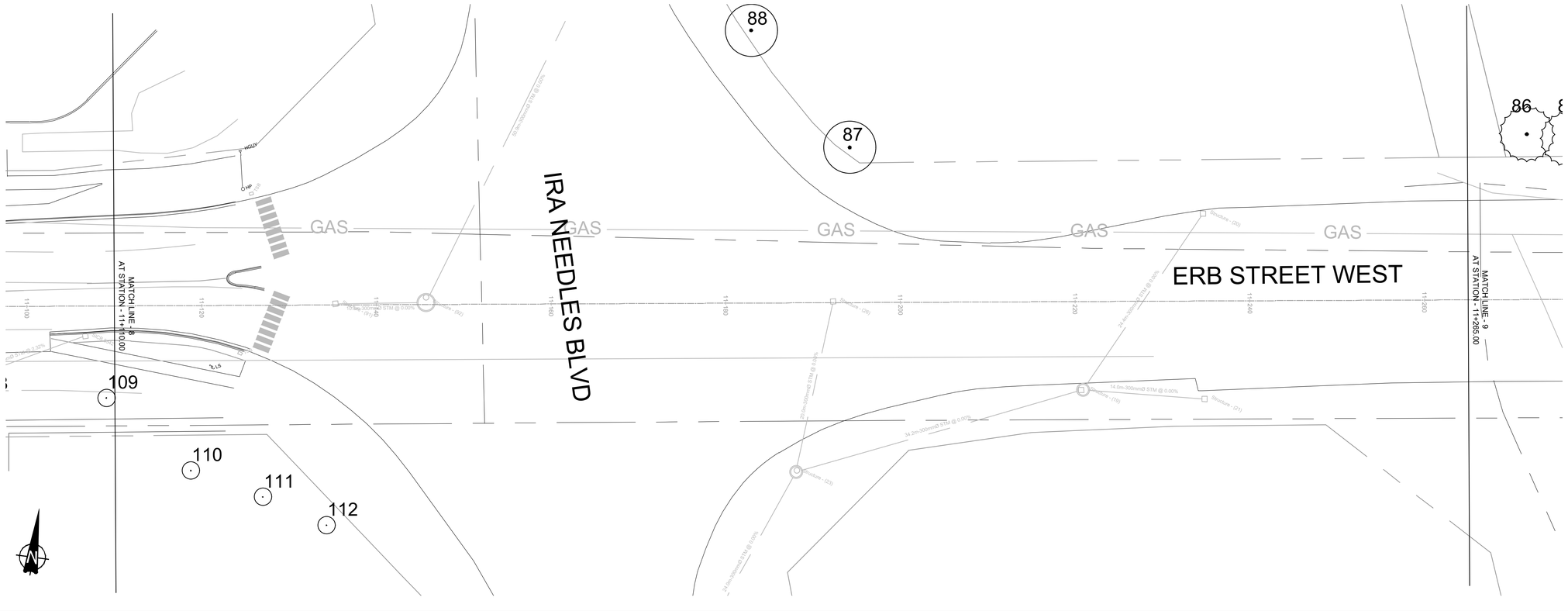
29 Rebecca Street, Suite 200
Hamilton, Ontario L8R 1B3
T 905 572 7477

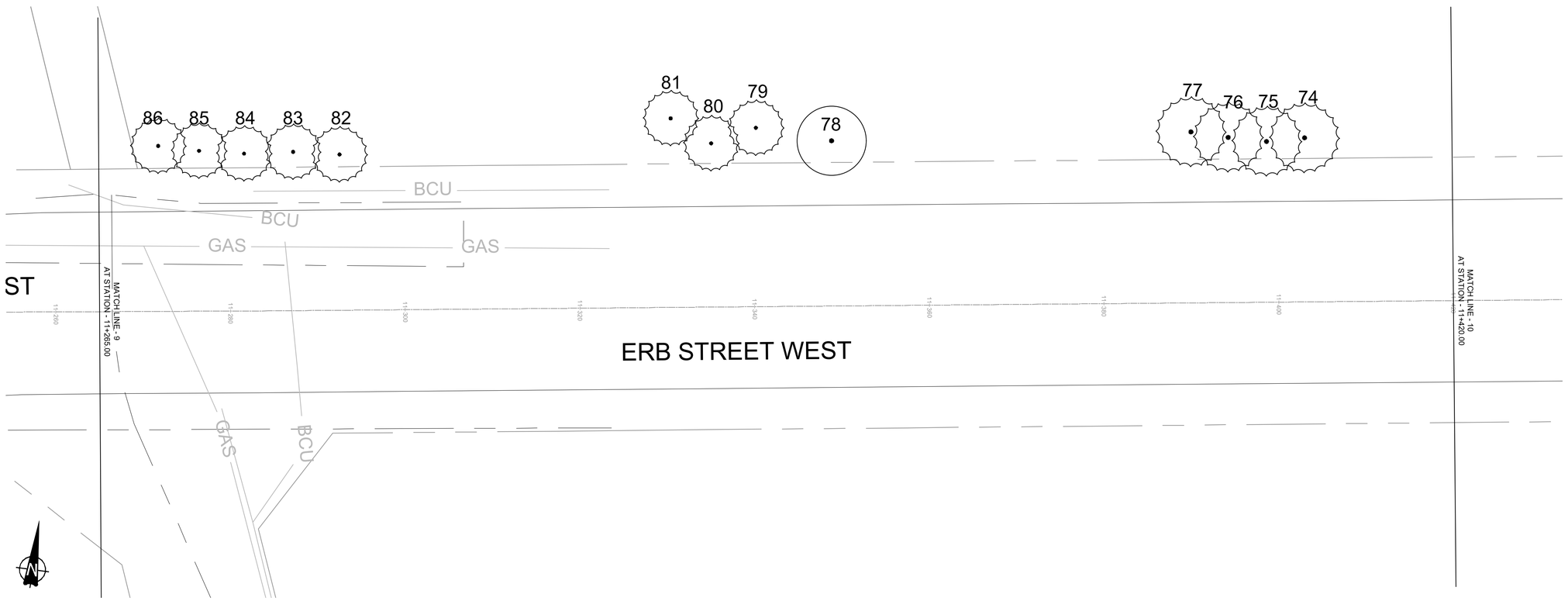
www.gspgroup.ca

L3

Date: July 25, 2014 | Drawn By: CZ
Scale: 1: 250 | Project No.: 14052


PLAZA ENTRANCE
ERB STREET WEST
MATCH LINE - 6
AT STATION - 10+800.00
MATCH LINE - 7
AT STATION - 10+955.00
GAS
HYDRO
HP
SAN
STM
WV 6067
GAS MARKER
SURVEYED
CB 3A
CB 3B
CB 4A
CB 4B
CB 5A
CB 5B
CB 6A
CB 6B
CB 7A
CB 7B
CB 8A
CB 8B
CB 9A
CB 9B
CB 10A
CB 10B
CB 11A
CB 11B
CB 12A
CB 12B
CB





KEY PLAN
N.T.S.



Legend

Existing Trees

GENERAL NOTES:

1. Drawings not to be used for construction unless authorized by the Landscape Architect
2. Contractor shall report any discrepancies between the drawings and site conditions prior to commencement of the work
3. All utility locates are the responsibility of the Contractor. Hand dig within the limits recommended by the service utility. Utility conflicts with proposed tree locations must be reported immediately to the Landscape Architect
4. Base drawing provided by Walter Fedy
5. For Grading information refer to drawing by Walter Fedy. For servicing information refer to drawings by Walter Fedy.
6. Landscape drawings show engineering information for design purposes only. Do not construct engineering works from these drawings.

Region of Waterloo

TREE INVENTORY

ERB STREET WEST, WATERLOO
ROAD WIDENING

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
JUSTIN WILLIAM FOX
OALA
Mar. 1, 2019
MEMBER

DATE	ISSUE	BY
Oct 23/14	Preliminary Tree Inventory	RT
Mar 1/19	Issued for EAR	RT

DATE	REVISIONS	BY

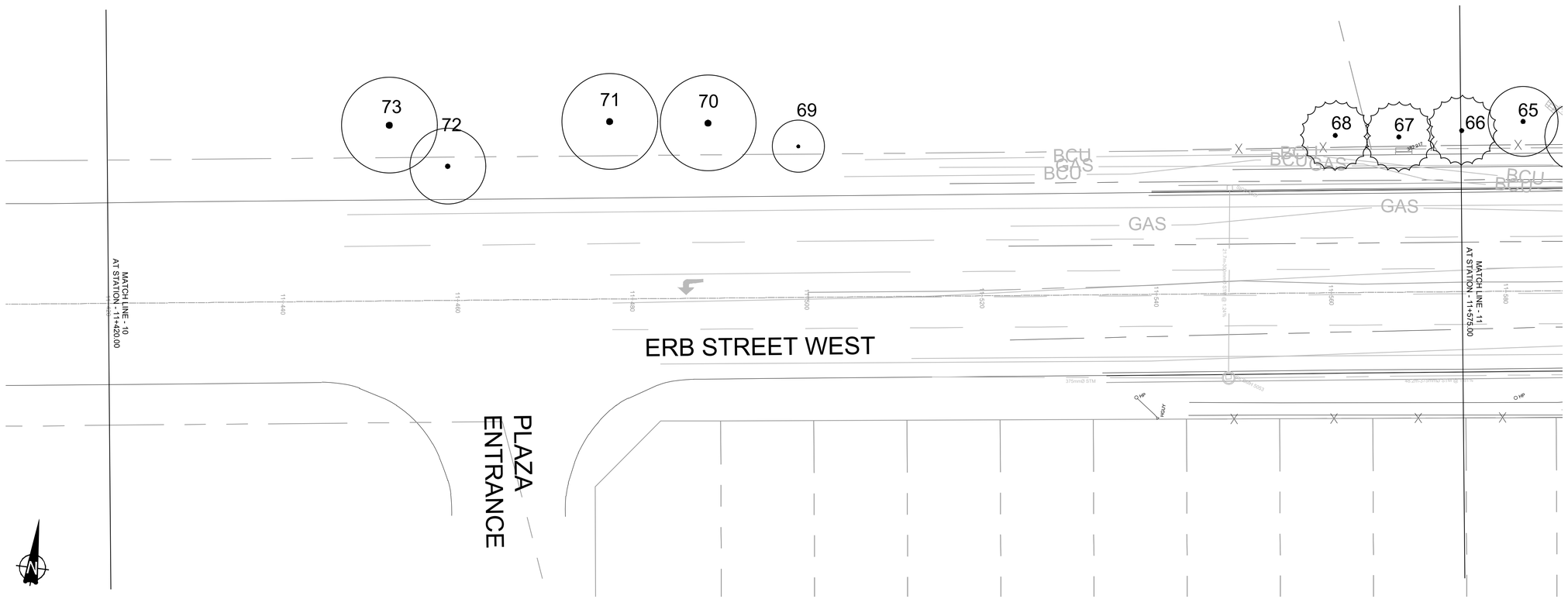
GSP group
201-72 Victoria Street South
Kitchener, Ontario N2G 4Y9
T 519 569 8883
F 519 569 8643

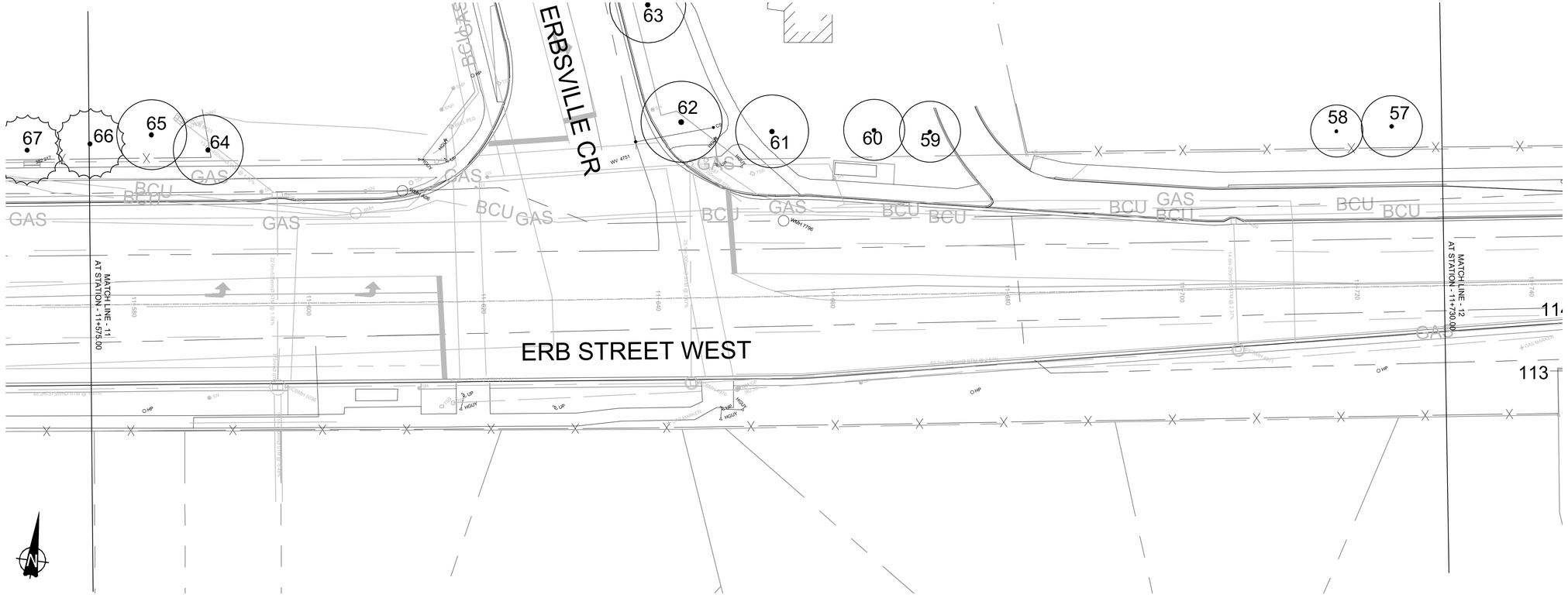
29 Rebecca Street, Suite 200
Hamilton, Ontario L8R 1B3
T 905 572 7477

www.gspgroup.ca

L5

Date: July 25, 2014
Drawn By: CZ
Scale: 1: 250
Project No.: 14052





KEY PLAN
N.T.S.



Legend

Existing Trees

GENERAL NOTES:

1. Drawings not to be used for construction unless authorized by the Landscape Architect
2. Contractor shall report any discrepancies between the drawings and site conditions prior to commencement of the work
3. All utility locates are the responsibility of the Contractor. Hand dig within the limits recommended by the service utility. Utility conflicts with proposed tree locations must be reported immediately to the Landscape Architect
4. Base drawing provided by Walter Fedy
5. For Grading information refer to drawing by Walter Fedy. For servicing information refer to drawings by Walter Fedy.
6. Landscape drawings show engineering information for design purposes only. Do not construct engineering works from these drawings.

Region of Waterloo

TREE INVENTORY

ERB STREET WEST, WATERLOO ROAD WIDENING

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
JUSTIN WALKER
OALA
Mar. 1, 2019
MEMBER

DATE	ISSUE	BY
Oct 23/14	Preliminary Tree Inventory	RT
Mar 1/19	Issued for EAR	RT

DATE	REVISIONS	BY

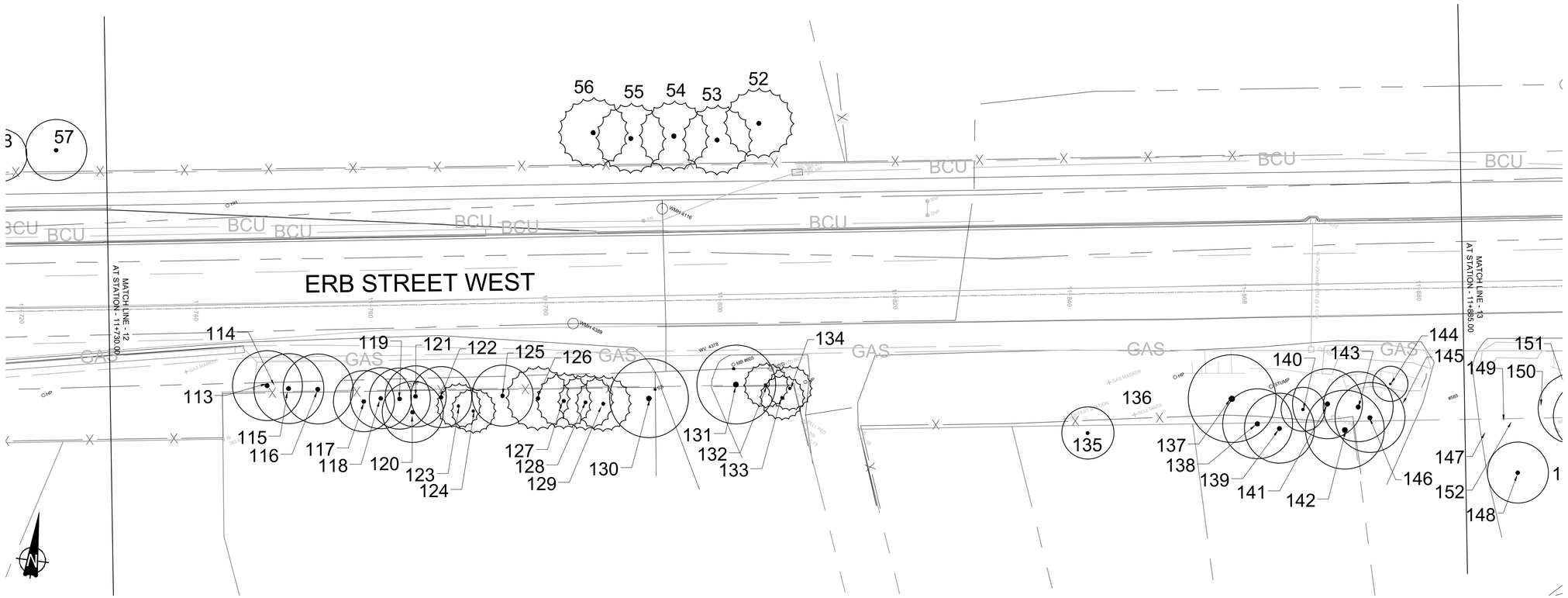
GSP group
201-72 Victoria Street South
Kitchener, Ontario N2G 4Y9
T 519 569 8883
F 519 569 8643

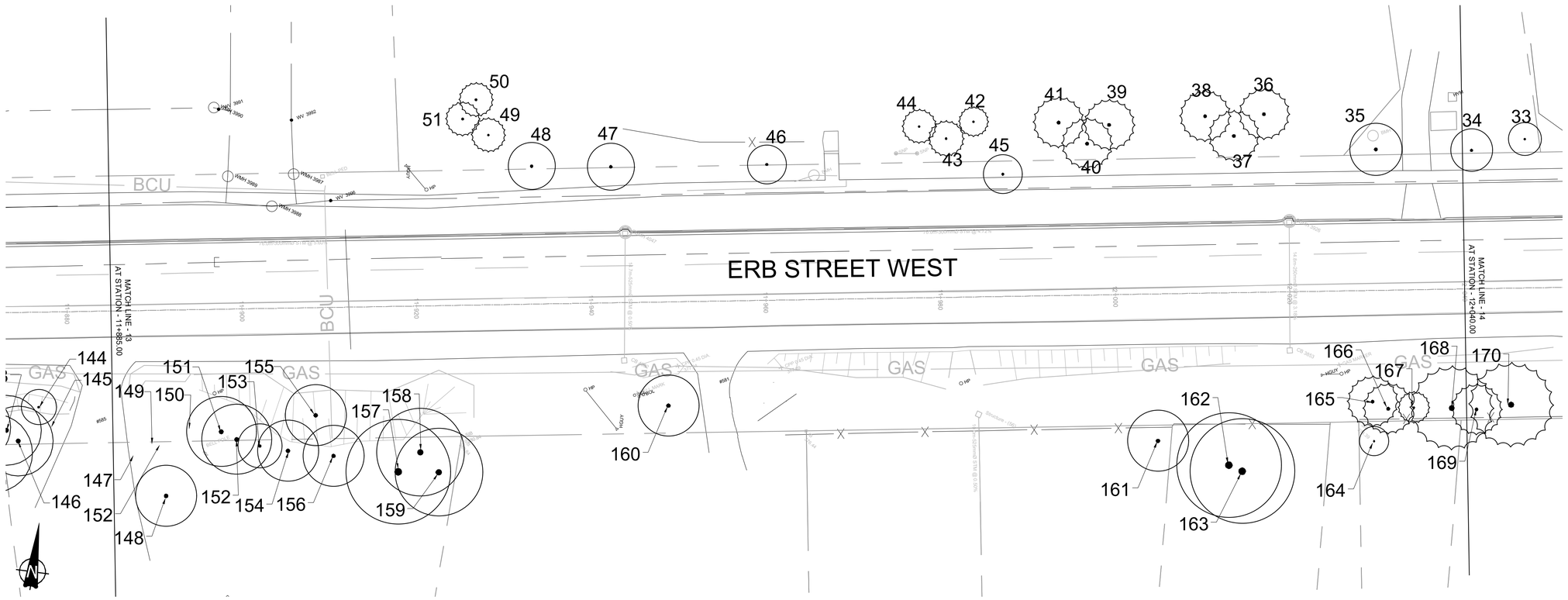
29 Rebecca Street, Suite 200
Hamilton, Ontario L8R 1B3
T 905 572 7477

www.gspgroup.ca

L6

Date: July 25, 2014
Drawn By: CZ
Scale: 1: 250
Project No.: 14052





KEY PLAN
N.T.S.



Legend

Existing Trees

GENERAL NOTES:

1. Drawings not to be used for construction unless authorized by the Landscape Architect
2. Contractor shall report any discrepancies between the drawings and site conditions prior to commencement of the work
3. All utility locates are the responsibility of the Contractor. Hand dig within the limits recommended by the service utility. Utility conflicts with proposed tree locations must be reported immediately to the Landscape Architect
4. Base drawing provided by Walter Fedy
5. For Grading information refer to drawing by Walter Fedy. For servicing information refer to drawings by Walter Fedy.
6. Landscape drawings show engineering information for design purposes only. Do not construct engineering works from these drawings.

Region of Waterloo

TREE INVENTORY

ERB STREET WEST, WATERLOO
ROAD WIDENING

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
JUSTIN WILLIAM FOX
OALA
Mar. 1, 2019
MEMBER

DATE	ISSUE	BY
Oct 23/14	Preliminary Tree Inventory	RT
Mar 1/19	Issued for EAR	RT

DATE	REVISIONS	BY

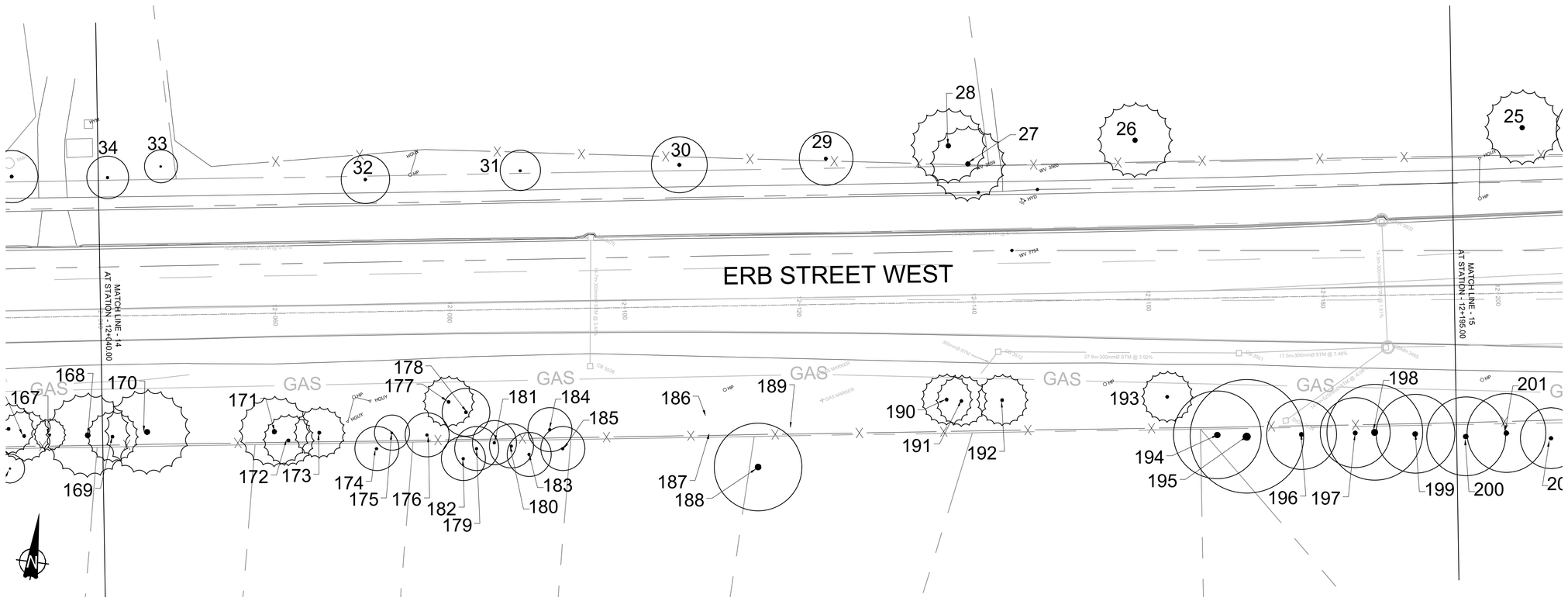
GSP group
201-72 Victoria Street South
Kitchener, Ontario N2G 4Y9
T 519 569 8883
F 519 569 8643

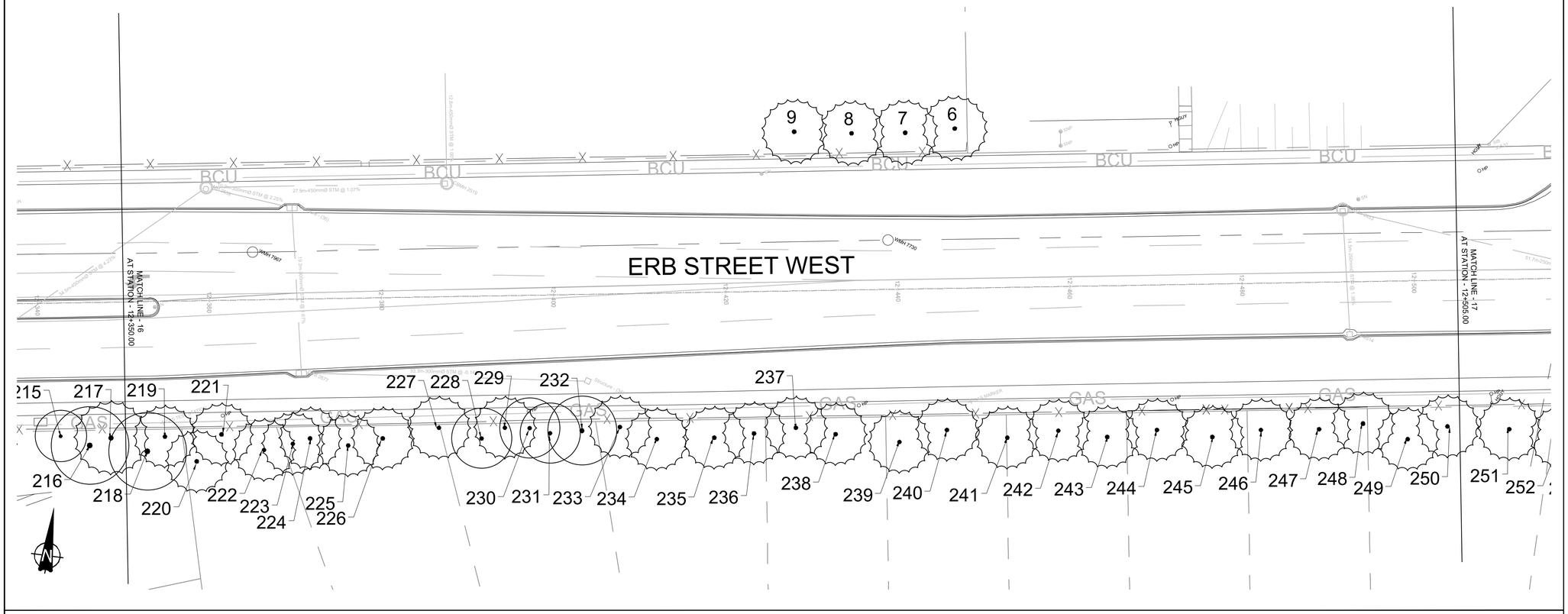
29 Rebecca Street, Suite 200
Hamilton, Ontario L8R 1B3
T 905 572 7477

www.gspgroup.ca

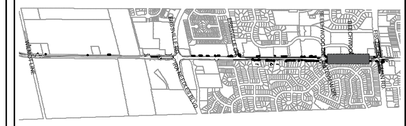
L7

Date: July 25, 2014
Drawn By: CZ
Scale: 1: 250
Project No.: 14052


ERB STREET WEST
MATCH LINE - 14
AT STATION - 12+140.00
MATCH LINE - 15
AT STATION - 12+195.00
GAS
CATV
BCU
HP
HGUY
WV 3585
WV 7754
CB 3572
CB 3601
CB 3639
MH 3465
MH 3602
MH 7896
MH 7903
MH 7904
27.6m-300mmØ STM @ 3.92%
17.0m-300mmØ STM @ 7.46%
14.5m-300mmØ STM @ 5.51%
76.2m-375mmØ STM @ 5.43%
67.7m-450mmØ STM @ 2.93%
14.3m-300mmØ STM @ 4.62%
34.9m-450mmØ STM @ 4.63%
300mmØ STM
12+100
12+120
12+140
12+160
12+180
12+200
12+220
12+240
12+260
12+280
12+300
12+320
12+340
12+360
12+380
12+400
12+420
12+440
12+460
12+480
12+500
12+520
12+540
12+560
12+580
12+600
12+620
12+640
12+660
12+680
12+700
12+720
12+740
12+760
12+780
12+800
12+820
12+840
12+860
12+880



KEY PLAN
N.T.S.



Legend

Existing Trees

GENERAL NOTES:

1. Drawings not to be used for construction unless authorized by the Landscape Architect
2. Contractor shall report any discrepancies between the drawings and site conditions prior to commencement of the work
3. All utility locates are the responsibility of the Contractor. Hand dig within the limits recommended by the service utility. Utility conflicts with proposed tree locations must be reported immediately to the Landscape Architect
4. Base drawing provided by Walter Fedy
5. For Grading information refer to drawing by Walter Fedy. For servicing information refer to drawings by Walter Fedy.
6. Landscape drawings show engineering information for design purposes only. Do not construct engineering works from these drawings.

Region of Waterloo

TREE INVENTORY

ERB STREET WEST, WATERLOO
ROAD WIDENING

ONTARIO ASSOCIATION OF LANDSCAPE ARCHITECTS
JUSTIN WALKER
OALA
Mar. 1, 2019
MEMBER

DATE	ISSUE	BY
Oct 23/14	Preliminary Tree Inventory	RT
Mar 1/19	Issued for EAR	RT

DATE	REVISIONS	BY

GSP group
201-72 Victoria Street South
Kitchener, Ontario N2G 4Y9
T 519 569 8883
F 519 569 8643

29 Rebecca Street, Suite 200
Hamilton, Ontario L8R 1B3
T 905 572 7477

www.gspgroup.ca

L9

Date: July 25, 2014 | Drawn By: CZ
Scale: 1: 250 | Project No.: 14052

APPENDIX G

Erb Street Class EA Transportation Report

SALVINI CONSULTING
Transportation Engineering and Planning

Erb Street West
Fischer-Hallman Road to Wilmot Line
Municipal Class Environmental Assessment

Transportation Report

Prepared for:
Region of Waterloo

Located in:
City of Waterloo

Draft June 2018
Published March 2019

Executive Summary

This Transportation Report is provided in support of the Erb Street West Municipal Class EA extending from Fisher-Hallman Road to Wilmot Line in the City of Waterloo. The corridor has been identified for improvements to both the vehicular roadway and the active transportation infrastructure to accommodate future traffic. The Class EA considers transportation concerns and needs in the corridor to a planning horizon of 2024, assessing traffic operations, safety and collisions, public transit and infrastructure for walking and cycling.

Recommendations for future infrastructure needs were made in the context of both Regional and City Transportation Master Plans and Active Transportation Master Plans along with current guidelines and policies related to transportation. The area around the Erb Street corridor has been the subject of multiple transportation studies and significant planned growth in recent years. The traffic forecasts developed for this Transportation Study reflect the ongoing and planned development in the area and the broader Region.

It is the recommendation of this study that the following considerations be included in the preferred alternative for the corridor:

- Extensions to the eastbound left turn lane at Fischer-Hallman Road and the westbound left turn lane at Beechwood/Gateview along with a new proposed eastbound left turn lane to Beechwood Place suggest that a centre left turn lane between Beechwood/Gateview and Fischer-Hallman Road would provide the needed storage and taper for each of the intersections in this section of the corridor.
- Erb Street should be widened to include four through lanes between Beechwood/Gateview and Erbsville Court along with the addition of a sidewalk on the south side of the road to complete the pedestrian network in this area.
- The driveway to the Kitchener-Waterloo Bilingual School located just east of Erbsville Court should be retained, but the right turn bypass lane should be reviewed in conjunction with other design elements of the corridor during the Class EA or during the detailed design, as appropriate.
- No further changes are being considered at the Ira Needles/Erbsville intersection.
- Erb Street should be widened to include four through lanes through the Hydro One corridor crossing between the Westside Marketplace and the WWCC.
- Regional Transportation staff have been working with Waste Management staff to eliminate queuing on to Erb Street at Gate 2 by monitoring the volumes of traffic and the queues and by testing several mitigation measures. There have not been any reported issues at Gate 2 since the two new roundabout intersections opened in late 2016.
- At the Gate 1 intersection with Erb Street there have been issues with traffic queuing from inside the Costco site into the Erb Street roundabout. Regional staff have been working with the landowner and recommended on-site traffic improvements that should mitigate the queuing onto Erb Street.
- No changes are recommended at this time at the Wilmot Line intersection. Analysis indicates that the intersection meets minimum Regional criteria for sight lines and that collisions are not a significant issue. Regional staff should monitor the left turn movement from Wilmot Line in case a peak period restriction is needed in the future to address capacity constraints.



- Pedestrian facilities should be added on the north side of Erb Street across the Hydro One corridor, connecting to the existing sidewalk near the Westside Marketplace with the newly constructed multiuse trail near the Costco.
- Separated bike facilities should be considered where possible in the corridor based on the Region's initial screening.



Table of Contents

1.0 Introduction 1
Background 1
Justification 2
Other Transportation Studies 2
Problem Statement 3
2.0 Existing Traffic Conditions 4
Road Conditions 4
Land Use 4
Traffic Volumes 5
Public Transit 6
Pedestrian Infrastructure and Traffic 7
Cycling Infrastructure and Traffic 8
Heavy Vehicle Traffic 9
Traffic Operations Assessment 9
Collision Assessment 9
Erb Street at Fischer-Hallman Road 10
Erb Street at Ira Needles/Erbsville 11
Erb Street at Wilmot Line 11
Region's Roundabout Policy 11
3.0 Future Traffic Conditions 11
Planned Development 11
Study Area Transportation Infrastructure Improvements 12
Forecast Traffic Volumes 12
Future Traffic Assessment 14
Fischer-Hallman Road Intersection and Beechwood Centre Driveway 14
Beechwood Place Intersection 14
Beechwood Drive/Gateview Drive Intersection 15
Beechwood Drive to Erbsville Court 15
Erbsville Court Intersection 15
Ira Needles/Erbsville Road Intersection 15
Erb Street at Hydro One Corridor Crossing 15
Waterloo Waste Management Centre Driveways 15
Wilmot Line Intersection 16
Active Transportation Infrastructure 16
4.0 Conclusions and Recommendations 17

Table 1: Existing Erb Street Average Annual Daily Traffic 6
Table 2: GRT Route Frequency 7
Table 3: Existing Pedestrian Traffic 8
Table 4: Existing Cyclist Traffic – 8-Hour Totals 9
Table 5: Five-Year Collision History in Study Area (January 2012 to December 2016) 10
Table 6: 2024 Erb Street Average Annual Daily Traffic 13

Figure 1: Study Area 1
Figure 2: Existing Erb Street Corridor 4
Figure 3: Existing Traffic Volumes 5
Figure 4: GRT Transit Route Map 6
Figure 5: 2024 Traffic Volumes 13

Appendix A: Regional Transportation Memo – June 2018
Appendix B: Existing Traffic Analysis
Appendix C: 2024 Future Traffic Analysis
Appendix D: Initial Roundabout Screening – Erb/Beechwood Place

1.0 Introduction

Background

The Region of Waterloo is undertaking a Municipal Class Environmental Assessment (Class EA) for Erb Street West (Regional Road 9), from Fischer-Hallman Road to Wilmot Line, in the City of Waterloo. Figure 1 shows the study area. This segment of Erb Street West is just less than three kilometres long. The study area does not include the intersection with Fischer-Hallman Road, although the intersection has been included in the transportation report in order to understand the needs of the corridor leading up to the intersection. The intersection at Ira Needles Boulevard/Erbsville Road was the subject of a detailed study in 2013 and construction was recently completed at the intersection and along Ira Needles Boulevard implementing the recommended changes in that study. The intersection has been included for reporting purposes, but further changes are not recommended.

The Class EA will consider transportation concerns and needs in the corridor to a planning horizon of 2024, assessing traffic operations, collisions, public transit, and infrastructure for walking and cycling. This Transportation Report provides the information needed to recommend the best transportation alternative for the corridor.

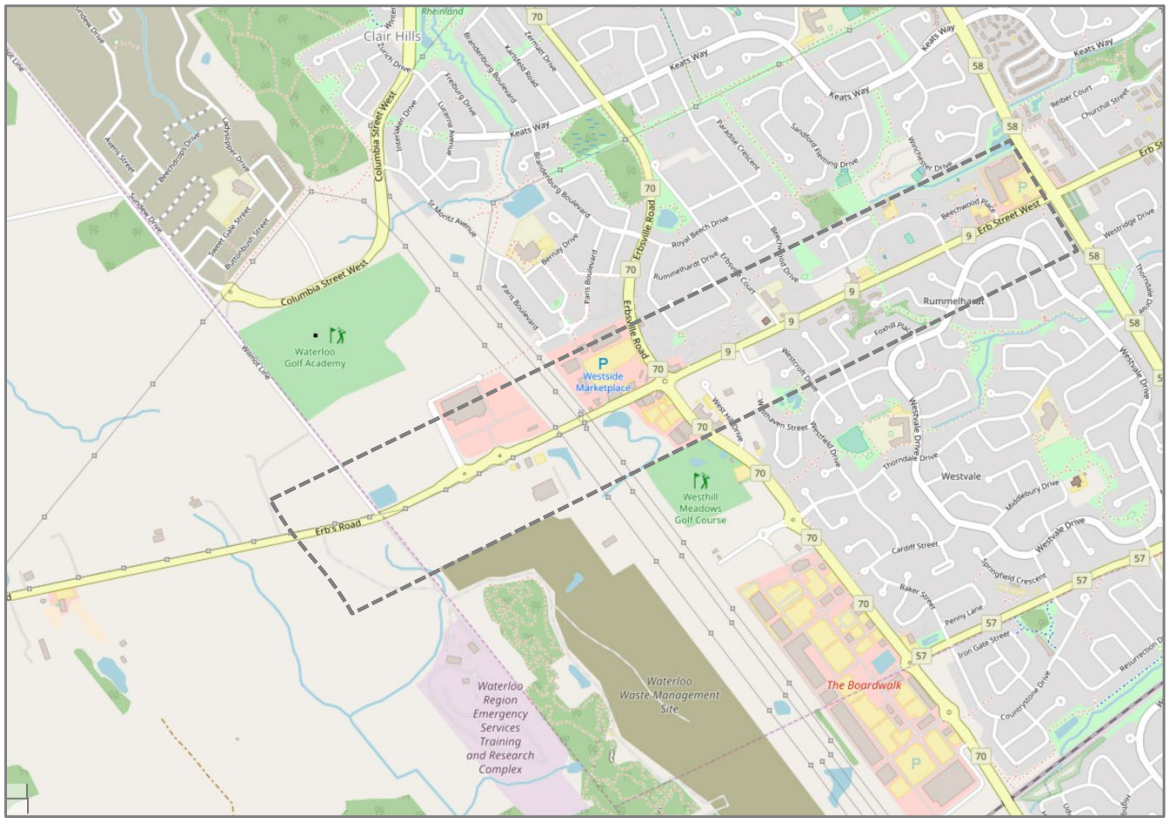


Figure 1: Study Area
© OpenStreetMap Contributors

Justification

The Regional Official Plan designates Erb Street West as a Regional Road. The 2010 Regional Transportation Master Plan (RTMP) has identified this section of Erb Street West for a Schedule C Municipal Class EA to study widening of the road between Erbsville Court and Beechwood Drive to four lanes in the 5-10 year timeframe.

The Transportation Impact Study that was submitted in support of the West Waterloo Commercial Centre (WWCC or Costco) development identified the need to widen Erb Street to four lanes near the site between Ira Needles Boulevard and Wilmot Line. In addition, the Study recommended two new modern roundabout intersections at Gates 1 and 2 of the Waterloo Waste Management Centre to provide connections to a driveway for the WWCC opposite Gate 1 and to Platinum Drive opposite Gate 2.

Walk Cycle Waterloo Region, the Region's Active Transportation Master Plan (ATMP), identifies further improvements in the corridor including:

- Sidewalks on the south side of Erb Street West between Erbsville Court and Beechwood Drive in 2019
- Bicycle lanes between Erbsville Court and Fischer-Hallman Road in 2019
- Sidewalks on the north side of Erb Street West between Erbsville Road and Wilmot Line beyond ten years.

Other Transportation Studies

Erb Street West is designated a Neighbourhood Connector – Avenue in the Context Sensitive Regional Transportation Corridor Design Guidelines. Neighbourhood Connectors are intended to move large volumes of people and goods, and Avenues should do this through a combination of private automobiles, public transit, cycling and walking. According to the guidelines, pedestrian facilities, landscaping zones, transit facilities and provisions for utilities are all "necessary" elements. Additionally, consideration for transit priority lanes, cycling facilities, passing lanes, auxiliary lanes at intersections and curbs is considered "important".

In the guidelines, Erbsville Road and Fischer-Hallman Road are also designated Neighbourhood Connector – Avenue. Ira Needles Boulevard is designated as a Community Connector; these roads incorporate a high degree of access control, focussing on moving vehicles, and can be considered for higher order transit corridors.

The Region of Waterloo recently reconstructed and widened Ira Needles Boulevard including the intersection with Erb Street. The intersection improvements at Erb Street were developed based on a GHD Intersection Comparison Study completed in December 2013 and included the addition of northbound and southbound semi right turn by-pass lanes. This construction project included widening of the west leg of the subject intersection to include two exiting lanes from the roundabout westerly to the signalized driveway connection to the Westside Marketplace, the retail centre on the northwest corner of the intersection. The extension of the two-lane section was developed to provide a longer opportunity for vehicles to merge into the single westbound lane that continues to the west. At the Westside Marketplace intersection, one westbound lane continues through and the second lane becomes a right turn lane.

A Costco warehouse and gas bar was opened in late 2016 on the north side of Erb Street between Ira Needles Boulevard and Wilmot Line. The full build-out of the site, known as the West Waterloo Commercial Centre or WWCC, will include the addition of some ancillary retail

uses along Erb Street. As part of the Costco development, Erb Street was widened to four lanes across the frontage of the site and two roundabout intersections were constructed at Gates 1 and 2 of the Waterloo Waste Management Centre; a driveway to the WWCC aligns opposite Gate 1 and Platinum Drive aligns opposite Gate 2. Platinum Drive was initially built along the side of the WWCC site, and is ultimately planned to connect northerly to Columbia Street.

In addition to the considerations outlined above, concerns have been raised about the traffic operations on Erb Street at the Wilmot Line intersection and the operation of the new roundabouts at Gates 1 and 2 following the build out of the WWCC site.

In anticipation of the Costco development and the traffic concerns that had been raised early in the Class EA process, the study area for this Class EA was developed to capture the identified road improvements in the RTMP and ATMP and the additional transportation issues that have been raised west of Ira Needles Boulevard.

This study will refer to peer review work in the area undertaken by Salvini Consulting Inc. on behalf of the City of Waterloo along with a memo from Regional Transportation Staff providing information in support of the Erb Street Class EA Study (included in Appendix A).

Problem Statement

Erb Street's current cross section does not provide sufficient capacity to serve future projected traffic volumes along the corridor. The Regional Transportation Master Plan identifies the widening of Erb Street from 3 to 4 lanes between Gateview Drive and Erbsville Court under the 5-10 year priority listing.

The road has been recently widened to four lanes near the Region's Waste Management Centre, but a short section remains two lanes creating a bottleneck for east-west traffic on Erb Street at the Hydro One corridor.

There are gaps in the active transportation infrastructure in the corridor including missing sidewalks on the south side of the road between Gateview Drive and Erbsville Court and bike lanes east of Erbsville Court. Completion of the active transportation infrastructure in this corridor is identified in the Ten Year Walking and Cycling Networks in the Region of Waterloo Active Transportation Master Plan along with future sidewalks on the north side of Erb Street west of the Hydro One corridor.

Concerns have been raised about the limited sight lines available for Wilmot Line traffic to see Erb Street traffic.

Operational Improvements should be considered at the following driveways and intersections within the study limits:

- Landfill driveways
- Waterloo Commons driveway
- Kitchener-Waterloo Bilingual School driveway
- Beechwood Place intersection
- Beechwood Centre driveway

Consideration should also be given to how the changes to Erb Street associated with the WWCC development will integrate with any improvements in the corridor.

2.0 Existing Traffic Conditions

Road Conditions

Erb Street is a Regional road that varies in use within the study area, currently carrying AADT volumes between 9,000 and 20,000. Generally, there are two travel lanes in each of the eastbound and westbound directions with a few exceptions:

- Between Beechwood Drive and Erbsville Court, the road narrows and although there are two westbound travel lanes, there is only one eastbound travel lane.
- A Hydro One corridor crosses Erb Street west of the Westside Marketplace with large towers on both the north and south sides of the road. The road narrows to one lane in each direction in order to pass between the hydro towers.
- West of Platinum Drive, the road narrows to one lane in each direction through the project limits at Wilmot Line.

Turning lanes are provided at many of the area intersections. The speed limit on Erb Street in the study area is 60 km/hr. West of the study area, the speed limit increases to 80 km/hr. The traffic control and lane configurations in the study area are illustrated in Figure 2.

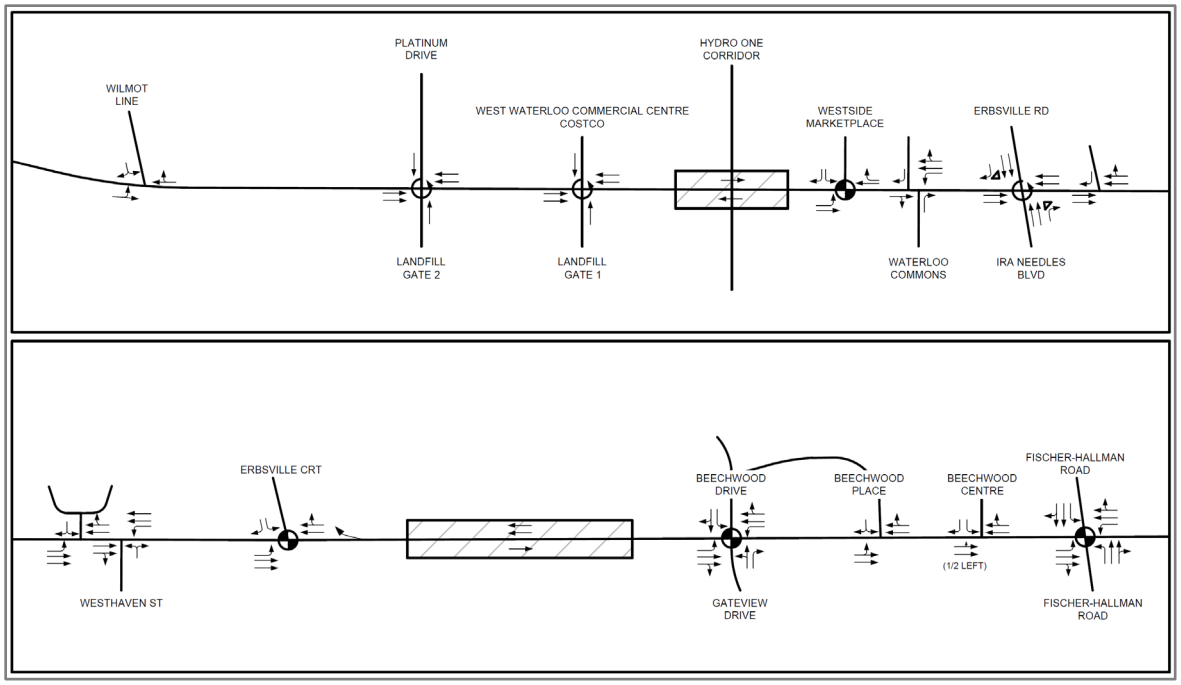


Figure 2: Existing Erb Street Corridor
Source: WalterFedy

Land Use

Land use varies along the length of the corridor. Between Fischer-Hallman Road and Ira Needles Boulevard/Erbsville Road, the land use abutting the road corridor is predominantly residential, with retail centres on the north corners of the Fischer-Hallman Road intersection and on all four corners of the Ira Needles/Erbsville intersection. The Westminster United Church is located on the north side of the corridor off Beechwood Drive without direct access to Erb Street. At the Erbsville Court intersection, the Kitchener-Waterloo Chinese Alliance Church is located on the

northwest corner with the Kitchener-Waterloo Bilingual School on the northeast corner.

The Region of Waterloo Waste Management Centre is located on the south side of the road west of the Hydro One corridor. The lands on the north side of the road in this area are designated for retail commercial (the WWCC or Costco site) and for future employment uses westerly to Wilmot Line.

Traffic Volumes

Turning movement counts were undertaken at all of the study area intersections in March of 2014. At the time, there was construction activity further south on Ira Needles Boulevard that impacted on how traffic moved through the intersection with Erb Street. The traffic count data that was collected was adjusted to remove the impact of the construction by reviewing historical traffic data. Existing Average Annual Daily Traffic (AADT) volumes for each section of the study area is provided in Table 1 and traffic in the weekday morning and afternoon peak hours is illustrated in Figure 3.

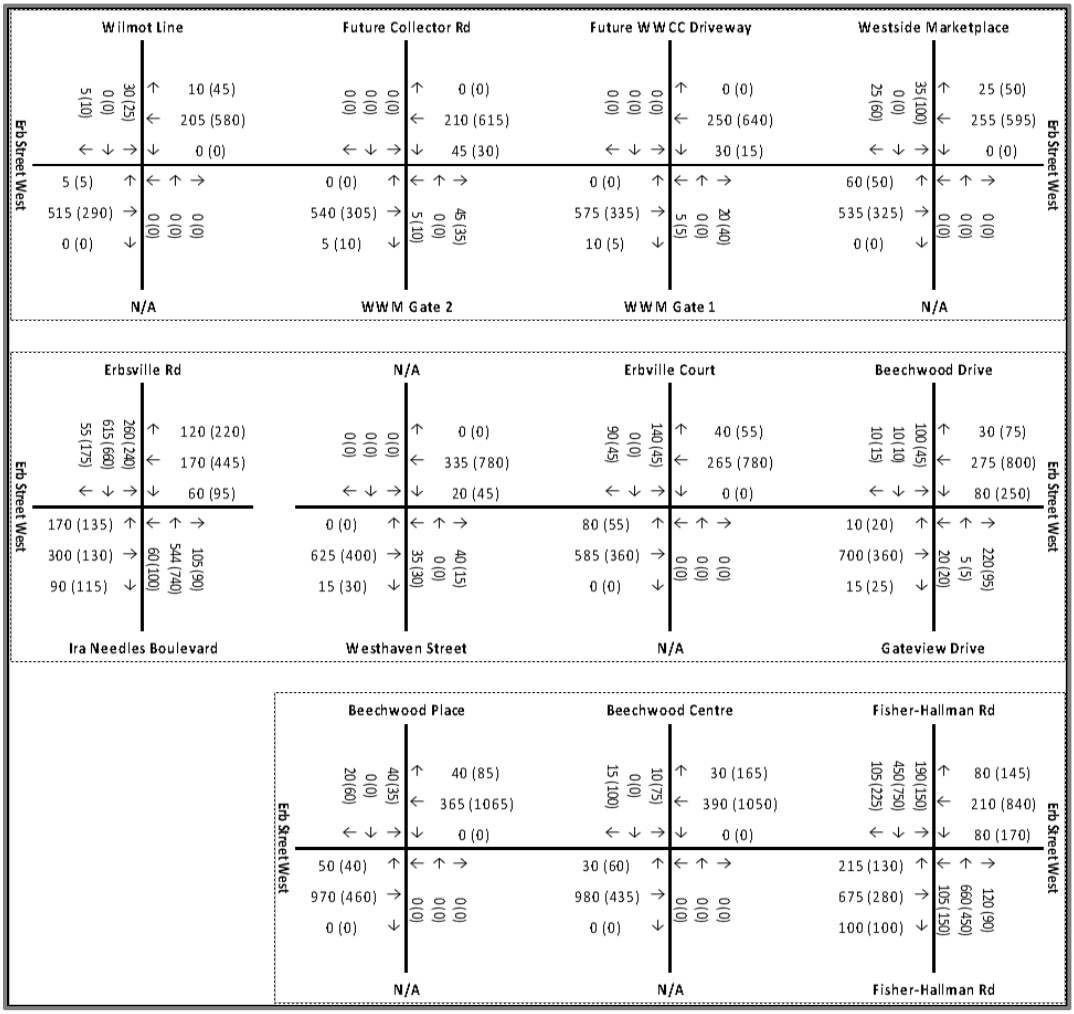


Figure 3: Existing Traffic Volumes
Source: Region of Waterloo

Section	AADT
West of Wilmot Line	8330
Wilmot Line to Waterloo Waste Management Site	9280
Waterloo Waste Management Site to Westside Marketplace	10230
Westside Marketplace to Ira Needles/Erbsville	10850
Ira Needles/Erbsville to Westhaven	12780
Westhaven to Erbsville Crt.	13200
Erbsville Crt. To Beechwood/Gateview	13860
Beechwood/Gateview to Beechwood Pl.	19720
Beechwood Pl. to Beechwood Centre	19860
Beechwood Centre to Fischer-Hallman	20235
East of Fischer-Hallman	19325

Table 1: Existing Erb Street Average Annual Daily Traffic

Public Transit

The study area is served by a number of Grand River Transit (GRT) bus routes including the iXpress routes 201 and 202. The transit map illustrating the routes is shown in Figure 4 and the frequency of each route is outlined in Table 2.

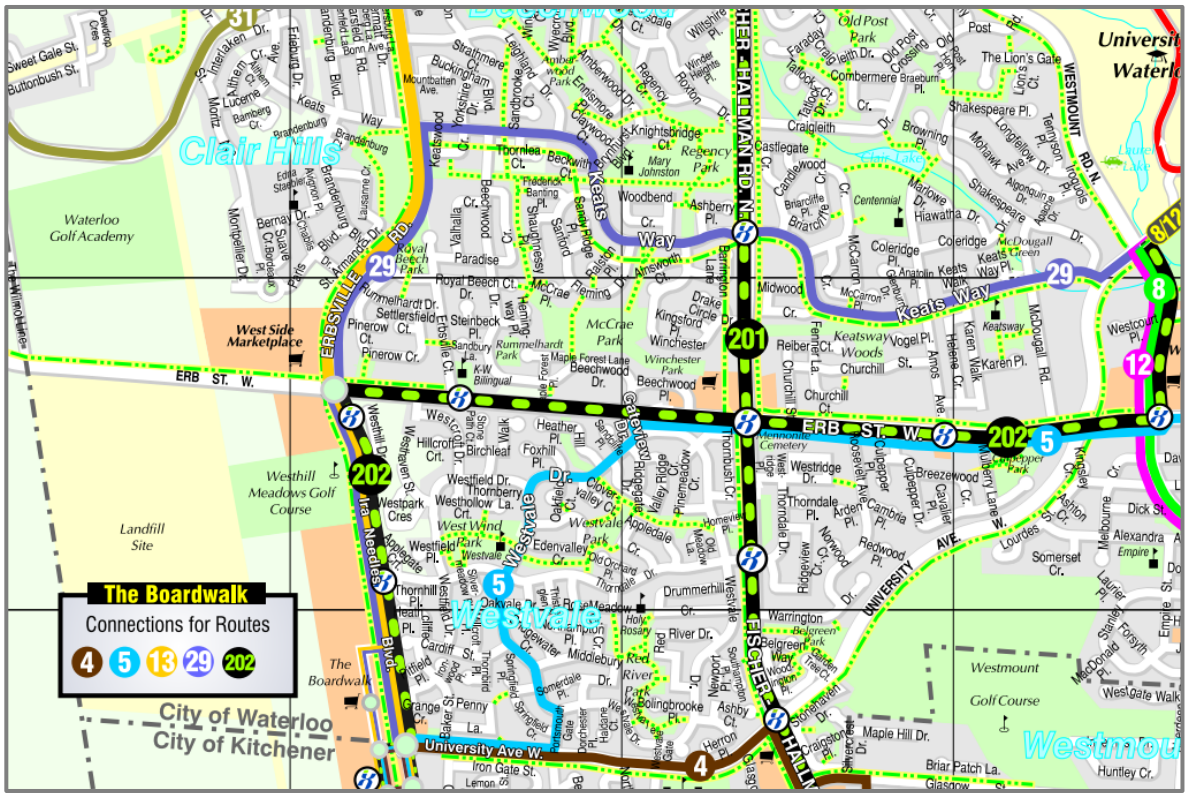


Figure 4: GRT Transit Route Map

The number of people getting on and off GRT buses in the corridor is about 1700 on an average weekday and about 1600 on an average weekend (Saturday and Sunday together).

Route	Frequency
201	Weekday peak periods – 15 minutes, Off peak and weekends – 30 minutes
202	Weekday peak periods – 15 minutes, Off peak and weekends – 30 minutes
29	Weekdays and Saturdays – 30 minutes, Sundays and holidays – 45 minutes
5	Weekdays and Saturdays – 30 minutes, Sundays and holidays – 45 minutes
13	Weekdays and Saturdays – 30 minutes, Sundays and holidays – 45 minute

Table 2: GRT Route Frequency

Pedestrian Infrastructure and Traffic

The pedestrian network within the study area is not complete resulting in some very low pedestrian volumes, in particular on the south side of the road. Sidewalks are available on the north side of the road from Fischer-Hallman Road through to the Hydro One corridor. On the south side of the road, sidewalks are available from Fischer-Hallman Road to Beechwood Drive and then again from Erbsville Court through the Ira Needles/Erbsville intersection. There is a missing link in the south side sidewalk between Beechwood Drive and Erbsville Court, the three-lane section of Erb Street.

Walk Cycle Waterloo Region calls for the construction of a sidewalk on the south side of Erb Street between Beechwood Drive and Erbsville Court in the Recommended Waterloo Walking Network. In addition, a sidewalk on the north side of Erb Street is recommended from the Hydro One corridor westerly to serve the future retail and employment lands.

As part of the road improvements that were constructed in support of the Costco development a multi-use trail was constructed on the north side of the road across the frontage of the site completing the pedestrian infrastructure identified in the Regional ATMP in that area, but pedestrian infrastructure is still needed along Erb Street at the Hydro One corridor.

The pedestrian crossing volumes at each of the study area intersections are included in Table 3.



Intersection with Erb Street	Period	East Leg	West Leg	North Leg	South Leg
		Average	Average	Average	Average
Wilmot Line	AM Pk Hr	0	0	0	-
	PM Pk Hr	0	0	0	
	8-Hr Total	0	0	0	
Landfill Gate 2	AM Pk Hr	0	0	-	0
	PM Pk Hr	0	0		0
	8-Hr Total	0	0		0
Landfill Gate 1	AM Pk Hr	0	0	-	0
	PM Pk Hr	0	0		0
	8-Hr Total	0	1		2
Westside Marketplace	AM Pk Hr	0	0	0	-
	PM Pk Hr	0	0	0	
	8-Hr Total	0	0	4	
Ira Needles Boulevard/	AM Pk Hr	0	3	7	0
Erbsville Road (2011)	PM Pk Hr	0	0	5	2
	8-Hr Total	2	15	50	11
Westhaven Street	AM Pk Hr	0	0	-	1
	PM Pk Hr	0	0		0
	8-Hr Total	0	0		8
Erbsville Court	AM Pk Hr	1	7	12	-
	PM Pk Hr	0	3	7	
	8-Hr Total	3	27	43	
Beechwood/Gateview	AM Pk Hr	13	0	3	1
	PM Pk Hr	0	1	0	0
	8-Hr Total	33	13	25	3
Beechwood Place	AM Pk Hr	0	0	11	-
	PM Pk Hr	0	0	2	
	8-Hr Total	0	0	27	
Beechwood Centre	AM Pk Hr	0	0	5	-
	PM Pk Hr	1	0	3	
	8-Hr Total	6	0	38	
Fischer-Hallman Road	AM Pk Hr	19	8	34	19
	PM Pk Hr	23	19	54	12
	8-Hr Total	116	86	247	82

Table 3: Existing Pedestrian Traffic

Cycling Infrastructure and Traffic

Bike lanes are present on Erb Street in both directions from Erbsville Court west through the study area beyond Wilmot Line. There are also bike lanes on Fischer-Hallman Road in the vicinity of the study area and on Erb Street east of Fischer-Hallman Road. Walk Cycle Waterloo Region calls for the addition of bike lanes to connect the existing facilities between Fischer-Hallman Road and Erbsville Court in the Recommended Waterloo Cycling Network. Existing cyclist traffic volumes are given in Table 4 below.

The Region has recommended that separated cycling facilities be provided in the corridor where possible.

Intersection with Erb Street	East Leg	West Leg	North Leg	South Leg
	Average	Average	Average	Average
Wilmot Line	1	1	1	-
Landfill Gate 2	1	0	-	0
Landfill Gate 1	1	0	-	0
Westside Marketplace	0	0	0	-
Ira Needles Boulevard/ Erbsville Road (2011)	0	4	7	3
Westhaven Street	2	3	-	2
Erbsville Court	1	3	1	-
Beechwood/Gateview	2	0	0	2
Beechwood Place	0	2	0	-
Beechwood Centre	2	3	1	-
Fischer-Hallman Road	3	1	5	5

Table 4: Existing Cyclist Traffic – 8-Hour Totals

Heavy Vehicle Traffic

Some parts of the study area carry significant heavy vehicle traffic because of the presence of the Waterloo Waste Management Centre. During the weekday, in particular, garbage trucks that are collecting residential waste come and go from the Waterloo Waste Management Centre throughout the day, accessing the landfill via Gate 1. In the peak periods, heavy vehicle traffic is generally three (3) to five (5) percent of the through movements between Fischer-Hallman Road and Ira Needles/Erbsville. West of Ira Needles/Erbsville, heavy vehicle traffic grows to between six (6) and seven (7) percent on the through movements and represents 43 to 60 percent of the turning movements at Gate 1 of the landfill.

Traffic Operations Assessment

Capacity analysis was undertaken by Regional staff for each of the study area intersections in the weekday morning and afternoon peak hours in order to identify any concerns with existing intersection operations. Details of the capacity analysis and a summary for the AM and PM peak hours are included in Appendix B.

The Erb/Ira Needles intersection was not included in the operations assessment because it was the subject of recent study and was also recently reconstructed. The intersection is not being considered for improvement as part of this study.

The analysis indicates that the intersections in the corridor are operating at acceptable levels with the individual movements at less than 90 percent of capacity during both the weekday morning and afternoon peak hours. The left turn lane at Beechwood/Gateway is experiencing 95th percentile queues that exceed the available storage by nine metres in the PM Peak Hour. Opportunities to extend the turn lane as part of this project should be considered.

Collision Assessment

The five year collision history (January 2012 to December 2016) in the corridor was reviewed at each intersection and at each link between intersections. Details regarding the accident classification, impact type, environmental and road surface conditions, and vehicle type were

also reviewed. The data is summarized in Table 5 below.

Location	Five-Year History	Notes
Intersection Collisions		
Fischer-Hallman	68	15 injury collisions including 1 pedestrian fatality. 2 other pedestrian collisions.
Beechwood Place	9	1 injury collision
Beechwood/Gateview	13	7 injury collisions
Erbsville Court	3	1 injury collision. 1 pedestrian collision.
Westhaven	1	
Ira Needles/Erbsville	215	28 injury collisions. 8 pedestrian collisions. 1 bike collision.
Westside Marketplace	6	2 injury collisions
Gate 1/Costco*		
Gate 2/Platinum*		
Wilmot Line	3	
Midblock Collisions		
Fischer-Hallman – Beechwood Place	11	1 injury collision
Beechwood Place – Beechwood/Gateview	2	1 injury collision
Beechwood/Gateview – Erbsville Court	2	1 animal collision
Westhaven – Ira Needles/Erbsville	9	1 injury collision
Ira Needles/Erbsville – Westside Marketplace	1	
Westside Marketplace – Gate 1/Costco	1	
Gate 1/Costco – Gate 2/Platinum	0	
Gate 2/Platinum – Wilmot Line	1	1 injury collision

Table 5: Five-Year Collision History in Study Area (January 2012 to December 2016)
*NOTE: New intersection with partial data

In addition to the five-year collision history, the Region's 2016 Collision Report was reviewed to identify any intersections or midblock sections in the study area that appear in the rankings for collisions, pedestrian collisions, or cyclist collisions.

The Erb/Ira Needles/Erbsville intersection is ranked 55 in the Top 100 Locations for collisions with an excess social cost of $49,774 per year on average. The Erb/Fischer-Hallman intersection is ranked 80 in the same list with an excess social cost of $35,847 per year on average.

The Erb/Ira Needles/Erbsville intersection is ranked five (5) in the Top 20 Locations for pedestrian collisions. Intersections within the study area do not appear in the Top 20 Locations for cyclist collisions.

Further detail is provided below for a few key locations.

Erb Street at Fischer-Hallman Road

There were 68 collisions at the Fischer-Hallman/Erb intersection. One of the collisions was a

fatal pedestrian collision where the pedestrian crossed 40+ metres east of the intersection during the Erb Street green phase of the traffic signal. 53 of the collisions, or 78%, did not involve injuries. The most common type of collision was rear-end accounting for 33 incidents or 49%.

Erb Street at Ira Needles/Erbsville

There were 215 collisions at the Erb/Ira Needles/Erbsville roundabout including eight (8) pedestrian related collisions and one cyclist collision. 187 of the collisions, or 87%, did not involve injuries.

In 2016, the Ira Needles Boulevard corridor was expanded to four through lanes south of Erb Street and further improvements at this intersection were built to accommodate planned traffic growth. Collision data in the coming years should reflect the improvements at the intersection.

Erb Street at Wilmot Line

There were three collisions at the Erb/Wilmot intersection. One of the collisions involved a vehicle hitting a fixed object when the road was packed with snow. The other two collisions were turning movement collisions and involved a southbound vehicle from Wilmot Line colliding with a vehicle on Erb Street. As reported in the Region's Transportation Memo, the intersection meets Regional standards for stopping sight distance.

In 2016 two new modern roundabout intersections were constructed on Erb Street east of Wilmot Line. As part of that construction, the speed limit on Erb Street was lowered and it is anticipated that the operating speeds eastbound and westbound on Erb Street will also decrease as a result of the new roundabouts.

Region's Roundabout Policy

The Region of Waterloo has a Roundabout policy that states that an Initial Roundabout Screening be conducted when design work is being considered for:

- a new intersection on a Regional road
- an existing intersection where traffic signals are warranted
- an existing Regional road intersection that is programmed for improvements to address an identified safety or capacity problem;
- any other location as determined by Regional staff or Regional Councillors.

Any recommended improvements as part of this study to address capacity deficiencies will be subject to an Initial Roundabout Screening and will be reviewed later in this report.

3.0 Future Traffic Conditions

Planned Development

There are a large number of development projects in various stages of completion in and around the Erb Street corridor, in particular at the west end. Each of the planned development projects was accounted for specifically in determining future traffic conditions along Erb Street including the following.

- Completion of Westside Marketplace (northwest corner of Erb/Ira Needles)

- Sifton site development at southeast corner of Erb/Ira Needles
- Full build-out of Vista Hills residential lands
- Some initial development on the City of Waterloo's employments lands located North of Erb Street and west of the Hydro corridor (about 400 jobs)
- Planned commercial and employment uses along Ira Needles Boulevard south of Erb Street
- Full build-out of the West Waterloo Commercial Centre with Costco uses.

Study Area Transportation Infrastructure Improvements

In anticipation of the transportation needs associated with the planned development in the area and general traffic growth, both the City of Waterloo and the Region of Waterloo have a number of transportation infrastructure improvement projects that are recently completed or underway including:

- Widening of Ira Needles Boulevard and upgrades to the intersection at Erb (completed late 2016)
- Improvements to Erb Street across the frontage of West Waterloo Commercial Centre including two new roundabouts (completed fall 2016)
- Widening of Columbia Street (underway, planned completion 2018)
- Platinum Drive extension connecting Erb Street and Columbia Street (planned construction after lease with Golf Academy expires in 2017).

Forecast Traffic Volumes

Future 2024 traffic volumes were forecast based on information developed by both Regional Transportation Staff and Salvini Consulting.

A detailed traffic forecast was developed for the Erb/Ira Needles/Erbsville intersection as part of the 2013 study that was undertaken for the intersection. The forecast was developed by Regional staff using available traffic counts and the Regional Transportation Planning Model, which forecasts traffic growth based on changes in population and employment throughout the Region. With the exception of the WWCC (Costco) site, the forecast included specifically for all the planned development identified above. The forecasts made general allowances for new traffic generated by the WWCC.

Salvini Consulting was retained by the City of Waterloo in 2014 to peer review the transportation studies prepared for the WWCC site in the context of the many other completed and ongoing transportation studies in the area. As part of the peer review work, updated 2024 traffic forecasts were prepared for the Erb/Ira Needles/Erbsville intersection to build on the earlier forecasts developed by Regional staff and to reflect specific development plans for the WWCC. The work for this Erb Street Class EA study was already underway and so the base year traffic data was reviewed along with information from the Regional Transportation Planning Model and the forecasts were updated to reflect the new information.

The updated forecast at Erb/Ira Needles/Erbsville was extended throughout the corridor based on the same information from the Regional Transportation Planning Model and the WWCC forecasts developed by Salvini Consulting. The resulting 2024 Traffic Volumes are shown in Figure 5. The daily traffic volumes are included in Table 8 below.

Section	AADT
West of Wilmot Line	13720
Wilmot Line to Waterloo Waste Management Site	14930
Waterloo Waste Management Site to Westside Marketplace	20560
Westside Marketplace to Ira Needles/Erbsville	21480
Ira Needles/Erbsville to Westhaven	20720
Westhaven to Erbsville Crt.	21980
Erbsville Crt. To Beechwood/Gateview	22970
Beechwood/Gateview to Beechwood Pl.	29140
Beechwood Pl. to Beechwood Centre	29335
Beechwood Centre to Fischer-Hallman	29610
East of Fischer-Hallman	26555

Table 6: 2024 Erb Street Average Annual Daily Traffic

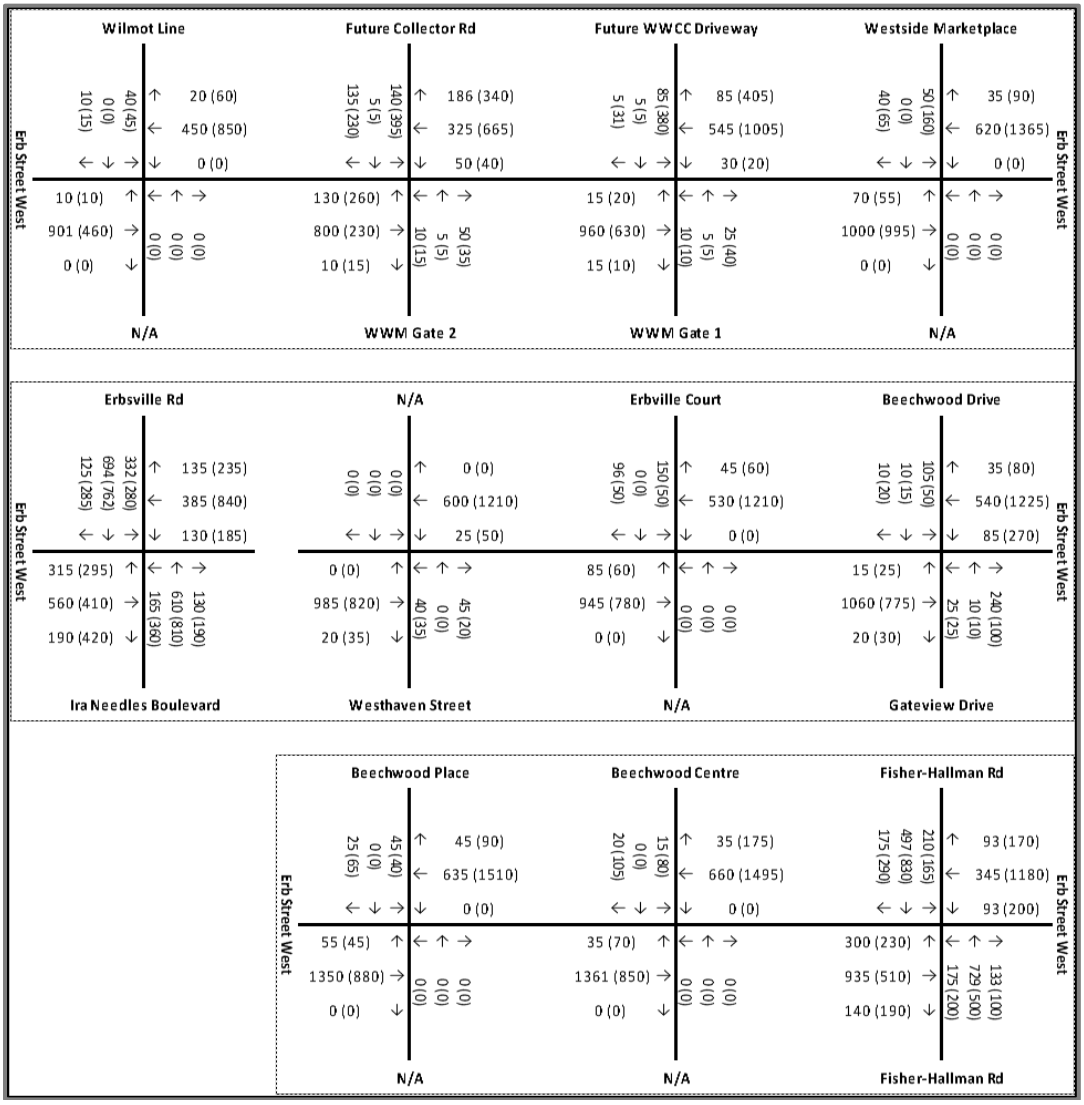


Figure 5: 2024 Traffic Volumes
Source: Region of Waterloo

Future Traffic Assessment

Capacity analysis was undertaken for each of the study area intersections in the weekday morning and afternoon peak hours for 2024 traffic levels in order to identify any additional concerns with future intersection operations in the corridor. The three roundabout intersections at the west end of the corridor were not included since they were the subject of previous detailed analysis and will not be modified as part of this study. Details of the capacity analysis along with a summary of the results are included in Appendix C.

The analysis indicates some possible future operational constraints in the corridor as outlined below and in the memo prepared by Regional staff in Appendix A.

Fischer-Hallman Road Intersection and Beechwood Centre Driveway

The analysis indicates that under 2024 traffic conditions, the volumes at Fischer-Hallman Road will exceed the capacity of the intersection by five to ten percent of the critical movements in each direction during the weekday afternoon peak hour. Under these conditions, queues extending beyond the available storage in the eastbound and northbound left turn lanes is expected. Although this intersection is not part of the Erb Street Class EA, a number of potential solutions were explored to understand if any improvements along Erb Street are needed. Based on the information in this study, the best solution would be to add a southbound right turn lane to the intersection. This possible improvement has been noted by Regional staff and will be explored in a project scheduled for construction in 2022 that will look at widening along Fischer-Hallman Road between Highway 7/8 and Columbia Street to accommodate higher level transit operations.

The eastbound left turn lane should be lengthened to accommodate existing and future queues at the intersection. The storage portion of the lane currently extends to just before the driveway to the Beechwood Centre, tapering across the driveway. At the Beechwood Centre driveway, the eastbound left turn lane is about half a lane wide. It would be desirable to extend the storage for the left turn lane beyond the Beechwood Centre driveway, providing for a standard left turn lane to the shopping centre. The extended eastbound left turn lane could be continued to Beechwood Place where a new eastbound left turn lane is recommended as outlined below.

The outbound left turn movement from the Beechwood Centre is forecast to operate at 78 percent of capacity and level of service F (112 seconds of average delay) in the weekday afternoon peak hour. If the delay is too high for vehicles wishing to turn left from Beechwood Centre to eastbound Erb Street, they can use the Fischer-Hallman driveway, turning right out of the Beechwood Centre to access Erb Street eastbound and Fischer-Hallman Road southbound at the Erb/Fischer-Hallman intersection. Regional staff should monitor traffic operations for this movement in case an afternoon peak hour left turn restriction is needed. No restriction is recommended at this time.

Beechwood Place Intersection

Regional staff have recommended that a new eastbound left turn lane be constructed at the Beechwood Place intersection with storage of 55 metres. A traffic signal is not warranted in this location.

A roundabout screening was undertaken for this intersection in accordance with the Region's Roundabout Policy because the new lane would provide additional capacity at the intersection (attached in Appendix D). The screening indicates that a roundabout would have a total cost of

more than 1.5 times the cost of adding a left turn lane, when considering both the construction cost and the collision cost of the two intersection configurations. As a result, further analysis of a roundabout option is not recommended and an eastbound left turn lane with 55 metres storage is recommended. An eastbound left turn lane with 55 metres would accommodate the forecast 95th percentile queues in the weekday morning and afternoon peak hours.

Beechwood Drive/Gateview Drive Intersection

The westbound left turn lane at this intersection does not provide enough storage to accommodate future 95th percentile queues and consideration should be given to increasing the storage in this location to provide for 50 metres of storage – the weekday afternoon peak hour 95th percentile queue. Given the proposed eastbound left turn lane to Beechwood Place, the two left turn lanes could be provided in a back-to-back configuration or as a centre two-way left turn lane.

Beechwood Drive to Erbsville Court

Regional staff have recommended that this section of Erb Street be widened to four travel lanes. The forecast 2024 traffic volumes are approaching the capacity of a single lane facility and a consistent cross-section along Erb Street would provide for improved operations.

Erbsville Court Intersection

There is a right turn bypass lane from westbound Erb Street to the Kitchener-Waterloo Bilingual School just to the east of the Erbsville Court intersection. Regional staff are recommending that the driveway be retained, but that the bypass lane be reviewed in conjunction with other design elements of the corridor, during the EA or during detailed design, as appropriate.

Ira Needles/Erbsville Road Intersection

Improvements to this intersection are not being considered as part of this Class EA. Previous work by Salvini Consulting for the City of Waterloo indicates that the updated traffic forecasts support the 2013 GHD recommendations for the intersection which was recently reconstructed.

Erb Street at Hydro One Corridor Crossing

Regional staff have recommended that this section of Erb Street be widened to four travel lanes to accommodate forecast traffic levels in the eastbound and westbound directions and to improve traffic operations by removing the bottleneck configuration in this area.

Waterloo Waste Management Centre Driveways

Traffic entering the Waterloo Waste Management Centre at Gates 1 and 2 has been able to queue on Erb Street in a left turn lane without blocking through traffic in the past. During the busy spring and fall drop-off season, queueing on Erb Street occurs regularly on Saturdays at Gate 2 where the public enters. With the conversion to roundabout operation at the two Gate intersections, queued vehicles entering the Waste Management Centre would block traffic on Erb Street through the roundabout. Regional Transportation staff have been working with Waste Management staff to eliminate queuing on to Erb Street at gate two by monitoring the volumes of traffic and the queues and by testing several mitigation measures. These measures are available to staff to ensure that traffic continues to flow through the new roundabouts and there have not been any reported issues at Gate 2 since the two new roundabout intersections

opened in late 2016.

However, at the Gate 1 intersection there have been issues with traffic queuing from inside the Costco site into the Erb Street roundabout. Regional staff have been working with the landowner and recommended on-site traffic improvements that should mitigate the queuing onto Erb Street.

Wilmot Line Intersection

Analysis by Regional staff indicates that the sight lines for left turning traffic from Wilmot Line meet minimum Regional standards and that collisions are not a significant issue. They are recommending that the current configuration of the intersection be retained. Should it be necessary in the future, it would be possible to improve the sight lines by regrading the slope on the northeast corner of the intersection.

The capacity analysis indicates that with the growth in traffic along Erb Street, the delays for traffic exiting Wilmot Line will increase from 16 and 19 seconds (both level of service C) in the weekday morning and afternoon peak hours to 43 (level of service E) and 45 seconds (level of service E) under future conditions. The increase in delay for exiting vehicles is likely to discourage southbound left turning traffic in the weekday peak periods and potentially reduce traffic on Wilmot Line at those times of day. Regional staff should monitor the left turn operations in the event that a peak hour left turn restriction from Wilmot Line is needed in the future. No turning restrictions at the intersection are recommended at this time.

Active Transportation Infrastructure

This Class EA should implement the recommendations of the Region's Active Transportation Master Plan by providing new sidewalks on the south side of Erb Street between Beechwood Drive and Erbsville Court and along the north side of Erb Street from the Hydro One corridor across the frontage of the WWCC.

In addition, Regional staff are recommending that the preferred alternative consider the implementation of separated bike facilities where possible in the corridor based on the Region's initial screening.

4.0 Conclusions and Recommendations

The following considerations should be included in the preferred alternative for the corridor.

- Extensions to the eastbound left turn lane at Fischer-Hallman Road and the westbound left turn lane at Beechwood/Gateview along with a new proposed eastbound left turn lane to Beechwood Place suggest that a centre left turn lane between Beechwood/Gateview and Fischer-Hallman Road would provide the needed storage and taper for each of the intersections in this section of the corridor.
- Erb Street should be widened to include four through lanes between Beechwood/Gateview and Erbsville Court along with the addition of a sidewalk on the south side of the road to complete the pedestrian network in this area.
- The driveway to the Kitchener-Waterloo Bilingual School located just east of Erbsville Court should be retained, but the right turn bypass lane should be reviewed in conjunction with other design elements of the corridor during the Class EA or during the detailed design, as appropriate.
- No further changes are being considered at the Ira Needles/Erbsville intersection.
- Erb Street should be widened to include four through lanes through the Hydro One corridor crossing between the Westside Marketplace and the WWCC.
- Regional Transportation staff have been working with Waste Management staff to eliminate queuing on to Erb Street at Gate 2 by monitoring the volumes of traffic and the queues and by testing several mitigation measures. There have not been any reported issues at Gate 2 since the two new roundabout intersections opened in late 2016.
- At the Gate 1 intersection with Erb Street there have been issues with traffic queuing from inside the Costco site into the Erb Street roundabout. Regional staff have been working with the landowner and recommended on-site traffic improvements that should mitigate the queuing onto Erb Street.
- No changes are recommended at this time at the Wilmot Line intersection. Analysis indicates that the intersection meets minimum Regional criteria for sight lines and that collisions are not a significant issue. Regional staff should monitor the left turn movement from Wilmot Line in case a peak period restriction is needed in the future to address capacity constraints.
- Pedestrian facilities should be added on the north side of Erb Street across the Hydro One corridor, connecting to the existing sidewalk near the Westside Marketplace with the newly constructed multiuse trail near the Costco.
- Separated bike facilities should be considered where possible in the corridor based on the Region's initial screening.

Appendix A: Regional Transportation Memo – June 2018

Region of Waterloo

Transportation and Environmental Services

Transportation

Date: 2018.06.13

Memorandum

To: William Gilbert, Senior Project Manager

From: Geoffrey Keyworth, Acting Manager, Strategic Transportation Planning

Subject: Erb Street West Environmental Assessment

File No: T04-20/5390/7297/7327

Introduction

The 2016 Transportation Capital Program identified three projects along Erb Street West from Fischer-Hallman Road to Wilmot line. These projects were:

- 5390 Reconstruction of Erb Street from Fischer-Hallman Road to Gateview Drive
- 7297 Widening of Erb Street from Gateview Drive to Beechwood Court
- 7327 Widening of Erb Street from Ira Needles Boulevard to Wilmot Line

The Regional Transportation Master Plan (RTMP, 2010) identified the need for widening the three lane section between Beechwood Drive and Erbsville Court in the five to ten year horizon (2015 to 2020). Since the development of the RTMP, the City of Waterloo has updated their Official Plan (2012) which included provisions for a more intensive form of commercial development than considered by the population and employment forecasts used for the RTMP. This development is located immediately west of the Hydro One transmission corridor on the north side of Erb Street West.

This parcel of commercial land was pursued for retail development. The proposal known as the West Waterloo Commercial Centre (WWCC) pursued the development of a Costco Warehouse and gas bar as well as ancillary retail.

The current cross section of Erb Street West varies as it proceeds from Fischer-Hallman Road to Wilmot Line. At Fischer-Hallman Road it is a four lane road with additional turn lanes. West of Gateview Drive / Beechwood Drive it narrows to a three lane cross section (two westbound, one eastbound) before widening back to four lanes at Erbsville Court. Approximately 250 metres west of Ira Needles Boulevard the road once again narrows, this time to a two lane cross section. Erb Street was recently widened to four lanes between the two new roundabouts fronting the Regional Waste Management Centre Gates 1 and 2, and the WWCC access and Platinum Drive on the north side.

This memo summarizes the findings of a variety of transportation assessments conducted in the vicinity of this road widening project. It describes issues to be addressed as part of the Erb Street West Widening Environmental Assessment (EA) and recommends actions to be taken to improve transportation infrastructure.

Planned Improvements

There were some planned or proposed improvements scheduled before any construction resulting from this EA would take place. These localized improvements were not subject to this Schedule “C” EA process but were considered here to further illustrate the transportation needs for the corridor.

Ira Needles Boulevard

Ira Needles Boulevard was widened from two lanes to four lanes. Additional northbound and southbound right-turn bypass lanes were added to the roundabout at Erb Street and Ira Needles Boulevard / Erbsville Road as part of this work. Erbsville Road was also widened north of this intersection to improve lane utilization. As part of this project, Erb St was widened to four (4) lanes between Ira Needles Boulevard and the Westside Market Place entrance. This work was completed by the end of 2016.

Level 2 Pedestrian Crossovers (PXOs) have been installed at the Erb Street and Ira Needles Boulevard / Erbsville Road roundabout as part of an approved plan by Regional Council. This plan recommended the Region to implement an educational outreach program to install Level 2 Pedestrian Crossovers at all existing roundabouts within the Region as outlined in report #TES-TRP-16-05 and report #TES-TRP-16-14, dated February 2, 2016 and June 14, 2016 respectively.

Planned Erb Street and WWCC Roundabouts

As part of the work completed for the WWCC development, two new roundabouts on Erb Street West were constructed at Gates 1 and 2 of the Waterloo Waste Management (WWM) site. These facilitate access to the WWCC development via a site driveway opposite Gate 1 and Platinum Drive opposite Gate 2. Level 2 PXOs were installed to comply with the new Regional standards once the roundabouts were constructed.

Previous Studies

Costco TIS

As part of the WWCC proposal, a transportation impact study (TIS) was prepared by Stantec Consulting. This TIS (commonly known as the “Costco TIS”) was supplemented by additional documents to provide follow up analysis. These included:

- The West Waterloo Commercial Centre Intersection Control Study, January 16, 2014

- The West Waterloo Commercial Centre Transportation Impact Study Report (Version 3), January 28, 2014
- The West Waterloo Commercial Centre – Transportation Impact Study Update, March 5, 2014
- The West Waterloo Commercial Centre Transportation Assessment Sensitivity Assessment Related to Proposed Holding Provision, March 28, 2014

These documents pointed to the need for several transportation improvements to support the WWCC development including:

- Constructing Platinum Drive (a new north-south City of Waterloo collector road) connecting WWM Gate 2 to Columbia Street in two stages, first adjacent the WWCC site then extending to Columbia Street
- Constructing roundabouts at Waterloo Waste Management (WWM) site Gate 1 and Gate 2 (Platinum Drive)
- Widening of Erb Street to four lanes between Platinum Drive and Ira Needles Boulevard to accommodate estimated vehicle traffic volumes
- Constructing a multi-use trail connection to Paris Boulevard to provide an active transportation link to the adjacent residential neighbourhood
- Maintaining cycling lanes and constructing a sidewalk along the north side of Erb Street to provide active transportation connections to the WWCC site
- Making vehicle capacity improvements to the intersection of Erb Street and Ira Needles Boulevard / Erbsville Road

Ira Needles Widening

An assessment of intersection operations was completed as part of widening Ira Needles Boulevard to four lanes. This assessment considered the development potential in the area and provided justification for modifications made at the roundabout at the intersection of Erb Street and Ira Needles Boulevard / Erbsville Road. An Intersection Comparison Study was completed as part of this assessment.

Intersection Comparison Study Ira Needles Boulevard and Erb Street

This study, prepared by the consulting firm GHD (December 17, 2013), compared traffic control signals and several different roundabout design options at Erb Street and Ira Needles Boulevard. The scope for the comparison of each option included:

- construction capital costs,
- safety performance, and
- operational performance

The recommended solution based on this study called for the addition of northbound and southbound right-turn bypass lanes to the existing roundabout. While this option did not have the best operational performance of all the options considered, it had the best balance of safety, cost and operations. This project also included widening Erb Street West to four (4) lanes between Ira Needles Boulevard and Westside Market Place entrance with construction completed in 2016.

Erb Street Resurfacing

Erb Street West and Erb's Road were recently resurfaced in the vicinity of this project. As this was only a resurfacing project, no major changes to the road profile or alignment were made. However, a previous issue with sight distances at Wilmot Line was raised

and deferred at the time given it was not within the scope of the project. This is detailed further below.

Existing Volumes

In March of 2014 a thorough round of traffic counts was conducted along this corridor. However, ongoing construction along Ira Needles Boulevard may have affected the quality of these counts. To account for this effect, the 2012 base year turning movement forecast at the intersection of Erb Street & Ira Needles Boulevard was used as a control to adjust the 2014 counts. These changes were propagated and balanced throughout the intersections within the Erb Street EA study area (Wilmot Line – Fisher Hallman Road) to generate a set of 2012 baseline volumes for the entire corridor (see Figure 1).

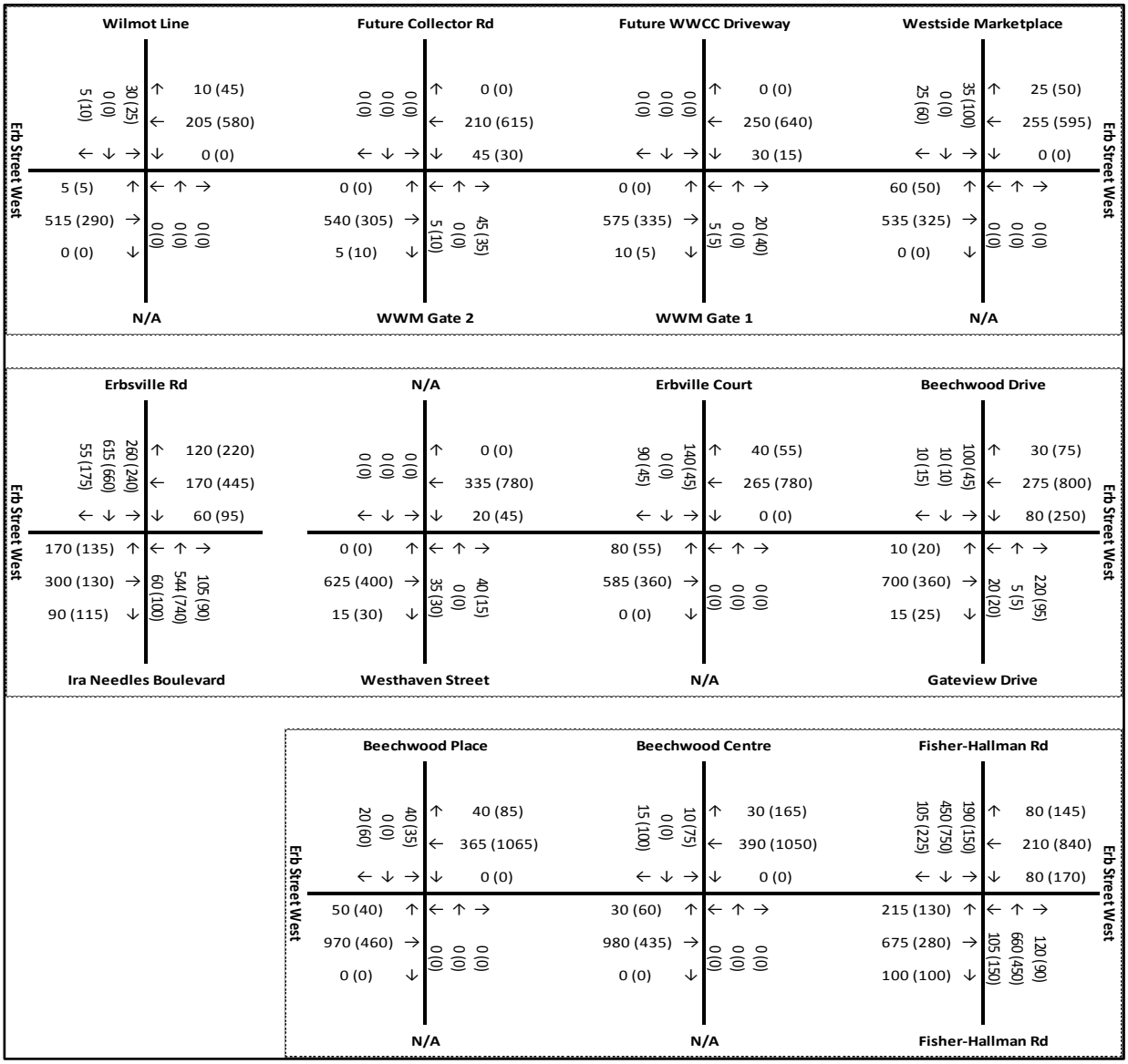


Figure 1: 2012 Baseline Volumes – AM (PM)

Future Volumes

The 2024 forecasts were estimated using 2024 forecasts prepared for the WWCC at the intersection of Erb Street West and Ira Needles Boulevard by Salvini Consulting. A background growth rate of 0.5% was used to estimate traffic from the side streets at the following intersections along the corridor:

- Erb St W / Wilmot Line
- Erb St W / Gate 2
- Erb St W / Gate 1
- Erb St W / Westhaven St
- Erb St W / Erbsville Court
- Erb St W / Beechwood Drive
- Erb St W / Beachwood Place
- Erb St W / Beechwood Centre

The eastbound and westbound traffic along the Erb Street corridor was estimated by calculating the difference between the 2024 eastbound and westbound volumes at the intersection of Erb Street West and Ira Needles Boulevard against that from the 2012 baseline year. The calculated difference was assigned through all the intersections in the corridor and balanced to forecast the 2024 volumes shown in Figure 2 below.

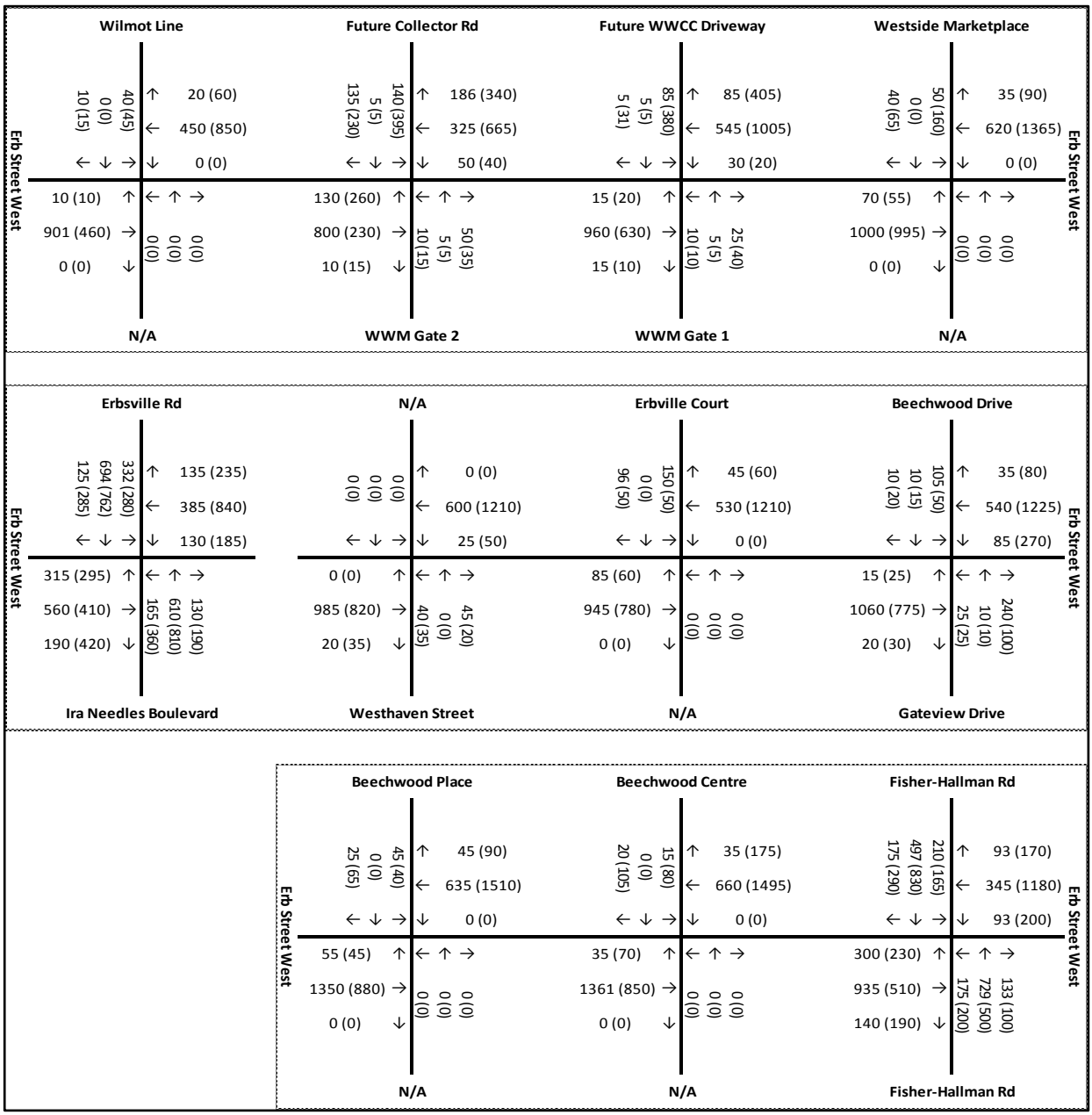


Figure 2: 2024 Forecast – AM (PM)

Wilmot Line

Wilmot Line intersects with Erb Street West / Erb's Road at the western limit of this project. A crest in the road profile located immediately east of Wilmot Line makes it difficult for drivers exiting Wilmot Line to see vehicles approaching from the east.

The sight distance from Wilmot Line looking east was measured in December 2014. It was found to be 147 metres measured from the edge of the pavement along Erb Street West and 90 metres measured from behind the stop bar on Wilmot Line. A speed study conducted on November 25, 2015 found the westbound average speed was 74 km/h and the 85th percentile speed was 82 km/h along Erb St W, measured approximately 100 metres east of Wilmot Line. The Region's standard for stopping sight distance

(SSD) is based on guidance from Table 2.5.3 (SSD on Grades) obtained from the 2017 Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads (GDG). The minimum SSD on downgrades, for a range of design speeds are shown below.

Design speed	Downgrades%		
	3.0	6.0	9.0
70 km/hr	110 m	116 m	124 m
80 km/hr	136 m	144 m	154 m
90 km/hr	164 m	174 m	187 m

The downgrade slope along Erb Street West towards Wilmot Line for the westbound approach is estimated at 2.8% (at the steepest section). With this information, the minimum SSD at an operating speed of 82 km/h was estimated through interpolation using the SSD at design speeds of 80 km/h and 90 km/h respectively for a downgrade of 3.0%. At this operating speed, the estimated SSD was found to be 142 m, which falls within the threshold SSD of 147 m measured from the edge of the pavement along Erb St. This implies there is available SSD for westbound traveling vehicles approaching the Erb Street and Wilmot Line intersection.

To monitor the effect of the future roundabouts on operational speeds at Gate #1 and Gate #2, a speed study was carried out at the following locations on November 25, 2015, and reported below:

Location	85^{th} Percentile Speed	Average Speed
Approx. 250 m west of Westside Marketplace	76 km/h	68 km/h
Approx. 250 m east of Wilmot Line	82 km/h	75 km/h

The construction of two new roundabouts and a proposed reduction in posted speed limit would likely reduce operating speeds along Erb Street West between Westside Marketplace Entrance and Wilmot Line. It is also possible to improve sight lines by cutting back the hill on the northeast corner of the intersection should it become necessary in the future. The observed 85^{th} percentile speeds in both directions were about 5% - 15 % higher than the 70 km/h posted speed limit.

Collision History – Erb Street West & Wilmot Line

Collision records show that a total of three collisions occurred at this intersection between 2012 and 2016. Two of these happened in 2015 and they involved southbound drivers on Wilmot Line failing to yield right-of-way before making a left-turn onto Erb Street West resulting in them being struck by eastbound and westbound through vehicles in separate instances. Both collisions occurred under clear weather and dry pavement conditions and were recorded as Property Damage Only (PDO) collisions.

Given the unpaved road surface and limited connections to the Regional road network, Wilmot Line is not expected to experience significant traffic volume growth over the next

15 to 20 years despite growth in the adjacent employment and commercial lands. The 2012 baseline counts and 2024 forecast show that volumes on the road are below 1,000 vehicles per day. As such, changes to this intersection to accommodate more vehicular traffic are not recommended.

As the current design of the intersection meets sightline criteria and collisions are not a significant issue, it is recommended to retain the current configuration of the intersection. Should more collisions be experienced, it would be possible to improve sightlines further through re-grading of the slope on the northeast quadrant of the intersection. Other network alternatives to re-route traffic to other roads could also be explored.

Widening – West of Ira Needles Boulevard

Immediately west of the Westside Marketplace, Erb Street narrows to one travel lane in each direction. Base year peak direction flows on this section range between 600 and 700 vehicles per peak hour. The forecast estimates that westbound traffic volumes would grow by 500 to 600 vehicles in the PM peak hour peak direction by 2024. This level of growth would push this road segment over the capacity of a single travel lane in an urbanized environment. Additional roadway capacity will be required beyond 2024 as Vista Hills and the City of Waterloo Employment Lands continue to develop.

It should be noted that subsequent analysis received from BA Group in support of Phase 2 of the West Waterloo Commercial Centre development in March 2017 estimated the total existing two-way traffic on this section of Erb Street at about 1,800 vehicles per hour, or at least 900 vehicles per hour in each direction, assuming that it is equally distributed. This suggests that some growth, at least 200 vehicles per hour in each direction, has already occurred along this segment of the corridor.

Widening of this section will lead to improved lane utilization and further improve the performance of the roundabouts at the Landfill Gate 1 & Gate 2 site accesses and at Erb Street and Ira Needles Boulevard / Erbsville Road.

Widening of Three Lane Cross-section – Erb Street West

Erb Street West narrows to one travel lane in the eastbound direction between Beechwood Drive and Erbsville Court. The RTMP identified this section for expansion to two travel lanes in each direction in the five (5) to ten (10) year horizon. This expansion will eliminate a bottleneck in the transportation network in the area.

For planning purposes, Transportation Planning commonly uses estimates of vehicles per hour per lane (“vphpl”) to determine when Regional roads should be considered for widening. For a high capacity facility such as Erb Street, a threshold of 900 vphpl is typically used. Although current traffic volumes of 725 vehicles in the peak direction during the AM peak hour are within acceptable limits for a single lane facility, traffic in this section is expected to grow. The 2024 future traffic forecast estimates 1095 vehicles per hour in the eastbound AM peak hour direction. This is beyond the standard recommended Regional threshold of 900 vphpl maximum flow for a single lane facility. This confirms the RTMP’s recommendation for widening this section to create a consistent cross-section and provide adequate capacity.

Beechwood Place and Erb Street Intersection

The Transportation Capital Program identifies the construction of a new eastbound left turn lane at Beechwood Place as part of this set of projects. The 2012 PM peak hour baseline volumes show 40 eastbound left turns and 1,065 westbound through movements.

While no significant increase in eastbound left turning vehicles is expected at this intersection, an increase in traffic volume along Erb Street is expected. Based on the updated 2024 volumes, opposing traffic volumes are expected to increase by 250 vehicles and 500 vehicles in the AM and PM peak hours respectively, between 2012 and 2024.

Using the 2012 baseline volumes and a four lane cross-section, an eastbound left-turn lane with storage of 25 m is warranted based on MTO nomographs obtained from Figure EB-1 (Appendix C) of the Geometric Design Standards. Although the number of eastbound left-turns will not increase significantly based on the 2024 forecast, an increase in the opposing traffic would warrant that the eastbound left-turn storage lane at this intersection be increased to 55 m by 2024.

Turning movement counts collected on May 15, 2014 were used to carry out a traffic signal warrant analysis at the intersection of Erb Street West and Beachwood Place. The result of the analysis showed that traffic signals were not warranted for this intersection. However, given an exclusive left turn lane has been recommended to improve operations at the intersection, a roundabout screening is required for this intersection.

Waterloo Waste Management (WWM) Landfill Entrance – Gate #1

As part of the WWCC proposal, two roundabouts were constructed at the Gate #1 and Gate #2 entrances into the WWM landfill site. The opening of Costco has resulted in queuing on Erb Street West at the Gate #1 entrance. Regional staff has been working with the developer (Rice Group) to address this problem and have recommended changes to the current traffic operations within the WWCC site. These include removing a stop sign at the intersection located immediately north of the Erb Street West and WWM Gate #1 roundabout to allow for free-flow entry for northbound traffic heading to Costco. It is anticipated that this traffic operational improvement within the site will mitigate the queuing problem currently experienced along Erb Street West at the WWM Gate #1 roundabout.

Erb Street West and Erbsville Court – Turning Movement Count Review

Video counts carried out in 2014 at the intersection of Erb Street West and Erbsville Court were reviewed to determine the number of vehicles using the westbound right-turn bypass lane to access the Kitchener-Waterloo Bilingual School located at the northeast corner of this intersection. Figure 5 and Figure 6 show that a considerable number of vehicles use the westbound right-turn by-pass lane to access the school during the morning and afternoon peak period, as shown by the red lines in the graphs.

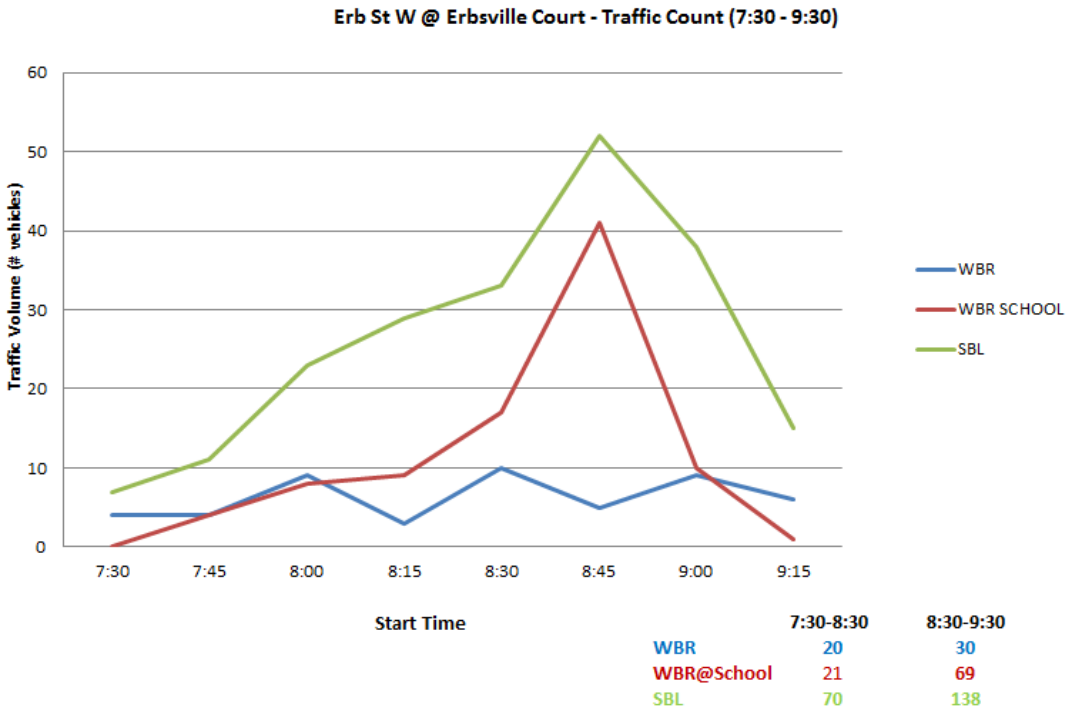


Figure 5: Traffic Count – Erb Street West and Erbsville Court (AM)

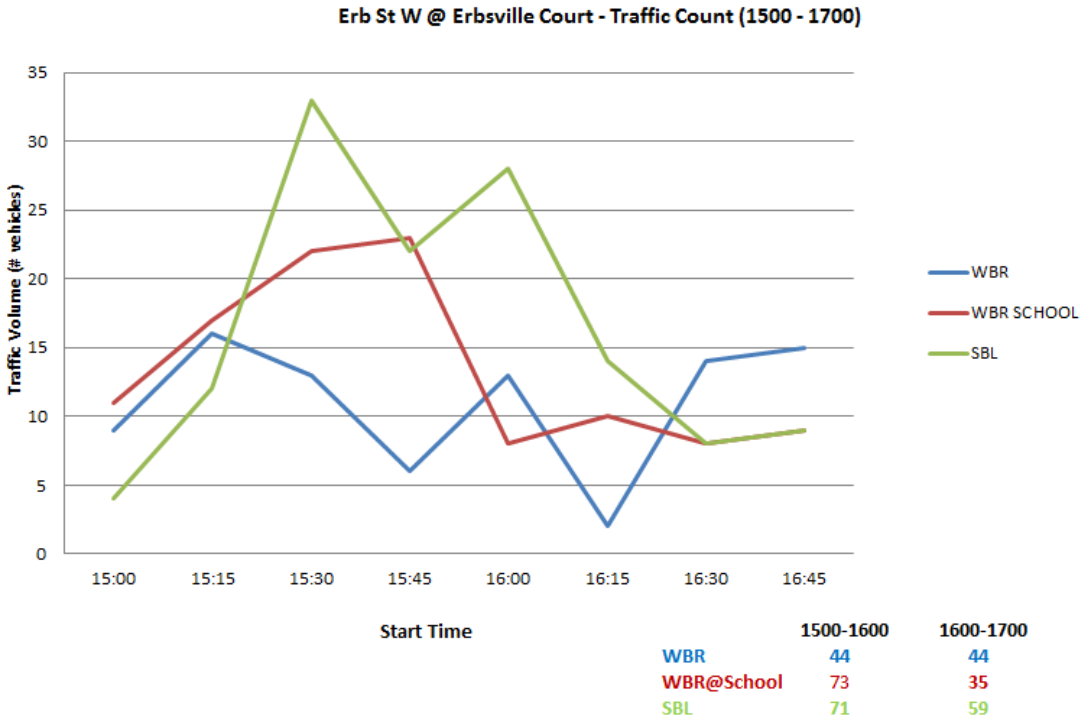


Figure 6: Traffic Count – Erb Street West and Erbsville Court (PM)

Considering the high usage, maintaining the driveway into the school property is an important consideration. However, it is not clear that the lengthy bypass lane itself provides any benefit to accessing this driveway, and may impede the ability to add other design elements to this corridor. It is recommended that the driveway be retained, but

that the bypass lane be reviewed in conjunction with other design elements of the corridor, during the EA or during detailed design, as appropriate.

Active Transportation

There is an existing on road cycling facility along Erb Street between Wilmot Line and Erbsville Court. There is also an existing sidewalk on both sides along Erb Street between Ira Needles Boulevard and Fisher-Hallman Road, except between Erbsville Court and Gateview Drive where the sidewalk exists only on the north side of Erb Street. The Active Transportation Master Plan (ATMP) recommends on road bike lanes to be provided between Erbsville Court and Fisher-Hallman Road. In addition to the on road bike lanes proposed by the ATMP, three other alternatives could be considered as potential cycling facilities along Erb Street West:

- Multi-use trail (MUT)
- Separated bike lanes
- Buffered bike lane

A cycling facility pre-selection nomograph obtained from Figure 3.3 of OTM Book 18 and shown in Figure 7 below was used to screen cycling facilities for various segments along Erb Street West between Wilmot Line and Fischer-Hallman Road. The screening used AADT volumes for both the base year (2012) and planning horizon year (2024), and the estimated operating speed for the various segments as identified in the Table 1 below. For road segments with more than one lane per direction, the observed AADTs were adjusted to an equivalent AADT for a 2-lane roadway and rounded up to the nearest 1,000. The desirable types of cycling facilities for each segment along Erb Street West established using the nomograph in Figure 7 are shown in the Table 1.

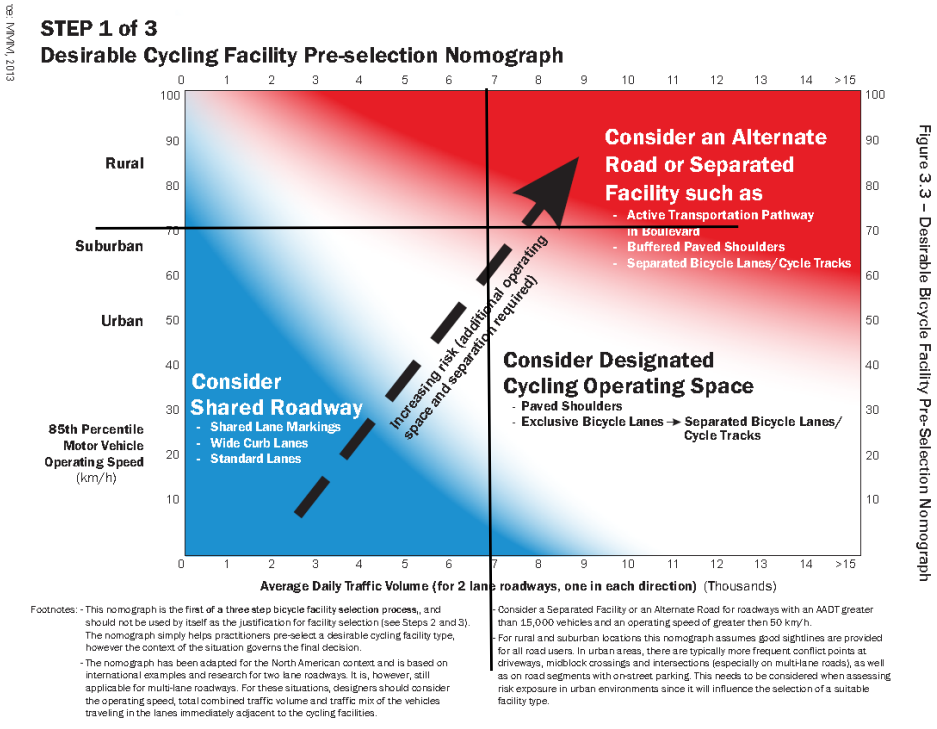


Figure 7: Desirable Bicycle Facility Pre-Selection Nomograph

Table 1: Pre-Selected Cycling Facility

Segment	Estimated 85th-ile Speed*	2012 AADT		2024 AADT		Pre-Selected Cycling Facility	
		Observed	Adjusted **	Observed	Adjusted **	Base Year	Future Year
Wilmot Line to Ira Needles Blvd	70 km/h	4,900	5,000	8,500	5,000	Designated Cycling Operating Space (minimum) or Separated Cycling Facility (Preferred)	Designated Cycling Operating Space (minimum) or Separated Cycling Facility (Preferred)
Ira Needles Blvd to Erbsville Ct	70 km/h	6,500	4,000	10,200	6,000	Designated Cycling Operating Space	Designated Cycling Operating Space (minimum) or Separated Cycling Facility (Preferred)
Erbsville Ct to Gateview Dr	70 km/h	7,000	5,000	10,600	6,000	Designated Cycling Operating Space	Designated Cycling Operating Space (minimum) or Separated Cycling Facility (Preferred)
Gateview Dr to Fischer-Hallman Rd	70 km/h	9,900	5,000	13,300	7,000	Designated Cycling Operating Space	Designated Cycling Operating Space (minimum) or Separated Cycling Facility (Preferred)

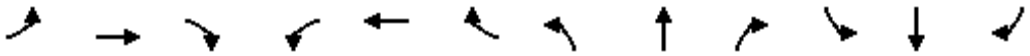
*The 85th percentile speed was assumed to be the posted speed plus 10 km/h
**2-way 2-lane roadway equivalent.

The above cycling facility screening process suggests that a separated cycling facility, such as separated bike lanes or multi-use trails, should be provided for the 2024 future horizon year where possible. Space and budget constraints should be taken into consideration during the EA when selecting the type of facility to be provided.

Appendix B: Existing Traffic Analysis

Analysis Horizon	Analysis Scenario	Analysis Period	Control Type	Intersection	Measure	Direction / Movement / Approach												Analysis Details
						EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
2012 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	3: Wilmot Line & Erb Street SKIPPED!	LOS	A	A			A	A				C		C	Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay	0	0			0	0				16		16	
					v/c	0.00	0.00			0.00	0.00				0.10		0.10	
					Queue	0	0			0	0				3		3	
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	6: Landfill Gate #2 & Erb Street SKIPPED!	LOS		A	A	A	A		C		B				Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay		0	0	9	0		16		12				
					v/c		0.32	0.32	0.04	0.12		0.02		0.08				
					Queue		0	0	1	0		0		2				
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	8: Landfill Gate #1 & Erb Street SKIPPED!	LOS		A	A	A	A		B		B				Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay		0	0	9	0		13		13				
					v/c		0.34	0.01	0.03	0.15		0.04		0.04				
					Queue		0	0	1	0		1		1				
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	15: Westhaven Street & Erb Street SKIPPED!	LOS		A	A	A	A		B		B				Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay		0	0	9	0		15		15				
					v/c		0.25	0.13	0.02	0.10		0.12		0.12				
					Queue		0	0	1	0		3		3				
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	22: Erb Street & Beachwood Place SKIPPED!	LOS	A	A			A	A				C		A	Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay	0	1			0	0				19		10	
					v/c	0.03	0.29			0.15	0.09				0.04		0.02	
					Queue	1	1			0	0				4		1	
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	24: Erb Street & Beachwood Centre SKIPPED!	LOS	A	A			A	A				C		A	Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay	8	0			0	0				19		9	
					v/c	0.03	0.29			0.15	0.09				0.04		0.02	
					Queue	1	0			0	0				1		0	
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	AM Peak	Actuated-Coordinated (Cycle: 120s)	46: Fischer-Hallman & Erb Street	LOS	C	C		C	C		C	D		C	C		Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay	24	32		24	28		22	38		33	27		
					v/c	0.46	0.62		0.34	0.31		0.33	0.71		0.69	0.45		
					Queue	50	**104**		21	37		25	111		43	67		
					Storage	50		0	50		0	80		0	80		0	
					Link Length		73			493			544			384		
2012 Volumes	Existing Lanes	AM Peak	Semi Act-Uncoord (Cycle: 85.5s)	214: Erb Street & Erbsville Court	LOS	A	A			A					C		A	Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay	5	6			4					32		8	
					v/c	0.11	0.32			0.14					0.45		0.26	
					Queue	11	44			14					34		11	
					Storage	35					0				55		0	
					Link Length		143			650						313		
2012 Volumes	Existing Lanes	AM Peak	Semi Act-Uncoord (Cycle: 74s)	327: Gateview Drive/Beechwood Drive & Erb Street	LOS	A	A		B	A			B	B	B	A		Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay	9	9		11	7			14	10	17	10		
					v/c	0.02	0.37		0.24	0.16			0.07	0.46	0.29	0.05		
					Queue	3	54		19	21			6	20	17	4		
					Storage	30		0	30		0	0		0	20		0	
					Link Length		650			193			96			99		
2012 Volumes	Existing Lanes	AM Peak	Semi Act-Uncoord (Cycle: 70s)	859: Erb Street & Westside Market	LOS	A	A			A					C		B	Analyst: NG Analysis Date: 06/22/2018 Data Date: 06/18/2018 Path: I:\EA\Erb Street EA\2018 Volume Update\AM 2012.syn
					Delay	3	3			3					27		12	
					v/c	0.07	0.36			0.22					0.16		0.12	
					Queue	5	36			17					12		6	
					Storage	30					0				50		0	
					Link Length		405			209						52		

Analysis Horizon	Analysis Scenario	Analysis Period	Control Type	Intersection	Measure	Direction / Movement / Approach												Analysis Details
						EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
2012 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	3: Wilmot Line & Erb Street SKIPPED!	LOS	A	A			A	A				C		C	Analyst: NG
					Delay	0	0			0	0				19		19	Analysis Date: 06/22/2018
					v/c	0.01	0.01			0.00	0.00				0.12		0.12	Data Date: 06/18/2018
					Queue	0	0			0	0				3		3	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	6: Landfill Gate #2 & Erb Street SKIPPED!	LOS		A	A	A	A					C		B	Analyst: NG
					Delay		0	0	8	0					19		10	Analysis Date: 06/22/2018
					v/c		0.19	0.19	0.02	0.36					0.04		0.05	Data Date: 06/18/2018
					Queue		0	0	0	0					1		1	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	8: Landfill Gate #1 & Erb Street SKIPPED!	LOS		A	A	A	A					B		B	Analyst: NG
					Delay		0	0	8	0					12		12	Analysis Date: 06/22/2018
					v/c		0.21	0.00	0.01	0.38					0.06		0.06	Data Date: 06/18/2018
					Queue		0	0	0	0					2		2	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	15: Westhaven Street & Erb Street SKIPPED!	LOS		A	A	A	A		C		C				Analyst: NG
					Delay		0	0	8	0		15		15				Analysis Date: 06/22/2018
					v/c		0.16	0.10	0.04	0.23		0.10		0.10				Data Date: 06/18/2018
					Queue		0	0	8	0		3		3				Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	22: Erb Street & Beachwood Place SKIPPED!	LOS	A	A			A	A				D		A	Analyst: NG
					Delay	1	1			0	0				27		10	Analysis Date: 06/22/2018
					v/c	0.05	0.18			0.42	0.26				0.17		0.07	Data Date: 06/18/2018
					Queue	1	1			0	0				5		2	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	24: Erb Street & Beachwood Centre SKIPPED!	LOS	B	A			A	A				E		B	Analyst: NG
					Delay	10	0			0	0				38		10	Analysis Date: 06/22/2018
					v/c	0.08	0.13			0.41	0.30				0.41		0.13	Data Date: 06/18/2018
					Queue	2	0			0	0				15		3	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage													
					Link Length													
2012 Volumes	Existing Lanes	PM Peak	Actuated-Coordinated (Cycle: 120s)	46: Fischer-Hallman & Erb Street	LOS	D	C		C	D		D	C		C	D		Analyst: NG
					Delay	43	25		23	41		47	29		24	44		Analysis Date: 06/22/2018
					v/c	0.72	0.32		0.42	0.82		0.75	0.45		0.46	**0.86**		Data Date: 06/18/2018
					Queue	**#43**	44		39	142		#52	67		35	143		Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage	50		0	50		0	80		0	80		0	
					Link Length		73			493			544			384			
2012 Volumes	Existing Lanes	PM Peak	Semi Act-Uncoord (Cycle: 85.5s)	214: Erb Street & Erbsville Court	LOS	A	A			A					C		A	Analyst: NG
					Delay	5	4			4					30		10	Analysis Date: 06/22/2018
					v/c	0.12	0.17			0.32					0.17		0.17	Data Date: 06/18/2018
					Queue	9	26			45					14		8	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage	35					0				55		0	
					Link Length		143			650						313			
2012 Volumes	Existing Lanes	PM Peak	Semi Act-Uncoord (Cycle: 88s)	327: Gateview Drive/Beechwood Drive & Erb Street	LOS	B	B		A	A			C	A	C	B		Analyst: NG
					Delay	15	12		8	7			21	6	22	13		Analysis Date: 06/22/2018
					v/c	0.07	0.22		0.36	0.37			0.08	0.24	0.15	0.07		Data Date: 06/18/2018
					Queue	8	36		**39**	65			8	9	12	6		Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage	30		0	30		0	0		0	20		0	
					Link Length		650			193			96			99			
2012 Volumes	Existing Lanes	PM Peak	Semi Act-Uncoord (Cycle: 70s)	859: Erb Street & Westside Market	LOS	A	A			A					C		A	Analyst: NG
					Delay	4	4			5					31		10	Analysis Date: 06/22/2018
					v/c	0.12	0.23			0.47					0.39		0.21	Data Date: 06/18/2018
					Queue	5	21			50					26		9	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2012.syn
					Storage	30					0				50		0	
					Link Length		405			209						52			



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	515	0	0	205	10	0	0	0	30	0	5
Future Volume (vph)	5	515	0	0	205	10	0	0	0	30	0	5
Ideal Flow (vphpl)	1900	1550	1900	1900	1550	1900	1900	1550	1900	1900	1550	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.994						0.981	
Flt Protected											0.959	
Satd. Flow (prot)	0	1520	0	0	1510	0	0	1520	0	0	1430	0
Flt Permitted											0.959	
Satd. Flow (perm)	0	1520	0	0	1510	0	0	1520	0	0	1430	0
Link Speed (k/h)		70			70			60			60	
Link Distance (m)		320.8			348.1			163.0			427.1	
Travel Time (s)		16.5			17.9			9.8			25.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	515	0	0	205	10	0	0	0	30	0	5
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	520	0	0	215	0	0	0	0	0	35	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 48.1%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	540	5	45	210	5	45
Future Volume (vph)	540	5	45	210	5	45
Ideal Flow (vphpl)	1650	1000	1775	1900	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	130.0		0.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.999					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1616	0	1653	1863	1653	1458
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1616	0	1653	1863	1653	1458
Link Speed (k/h)	70			70	50	
Link Distance (m)	348.1			150.9	150.2	
Travel Time (s)	17.9			7.8	10.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	540	5	45	210	5	45
Shared Lane Traffic (%)						
Lane Group Flow (vph)	545	0	45	210	5	45
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.7%		ICU Level of Service A	
Analysis Period (min) 15			

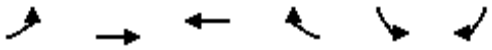


Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	575	10	30	250	5	20
Future Volume (vph)	575	10	30	250	5	20
Ideal Flow (vphpl)	1900	1750	1775	1900	1775	1650
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		50.0	220.0		0.0	25.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1458	1653	1863	1653	1375
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1458	1653	1863	1653	1375
Link Speed (k/h)	70			70	50	
Link Distance (m)	150.9			428.9	65.2	
Travel Time (s)	7.8			22.1	4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	575	10	30	250	5	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	575	10	30	250	5	20
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.3%		ICU Level of Service A	
Analysis Period (min) 15			

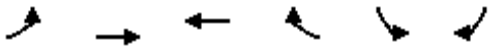
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	625	15	20	335	35	40
Future Volume (vph)	625	15	20	335	35	40
Ideal Flow (vphpl)	1775	1000	1775	1900	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	35.0		0.0	15.0
Storage Lanes		0	1		1	1
Taper Length (m)			45.0		7.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt	0.996					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3293	0	1653	3539	1653	1458
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3293	0	1653	3539	1653	1458
Link Speed (k/h)	60			60	50	
Link Distance (m)	303.0			167.3	121.9	
Travel Time (s)	18.2			10.0	8.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	625	15	20	335	35	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	640	0	20	335	35	40
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 29.0%		ICU Level of Service A	
Analysis Period (min) 15			



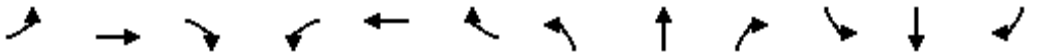
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	50	970	365	40	40	20
Future Volume (vph)	50	970	365	40	40	20
Ideal Flow (vphpl)	1000	1775	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.985			0.850
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	3300	3257	0	1653	1458
Flt Permitted		0.998			0.950	
Satd. Flow (perm)	0	3300	3257	0	1653	1458
Link Speed (k/h)		60	60		50	
Link Distance (m)		216.8	126.7		69.8	
Travel Time (s)		13.0	7.6		5.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	50	970	365	40	40	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1020	405	0	40	20
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.8%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	980	390	30	10	15
Future Volume (vph)	30	980	390	30	10	15
Ideal Flow (vphpl)	1775	1900	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	10.0			0.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.989			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1653	3539	3270	0	1653	1458
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1653	3539	3270	0	1653	1458
Link Speed (k/h)		60	60		50	
Link Distance (m)		126.7	96.7		39.9	
Travel Time (s)		7.6	5.8		2.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	30	980	390	30	10	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	30	980	420	0	10	15
Sign Control		Free	Free		Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.1%		ICU Level of Service A	
Analysis Period (min) 15			

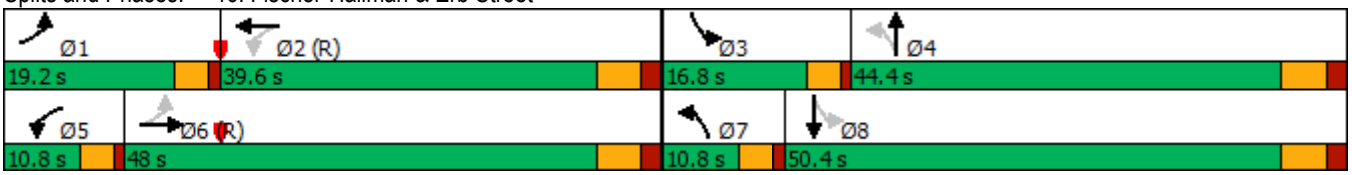


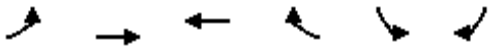
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	215	675	100	80	210	80	105	660	120	190	450	105
Future Volume (vph)	215	675	100	80	210	80	105	660	120	190	450	105
Ideal Flow (vphpl)	1775	1775	1000	1775	1775	1000	1775	1775	1000	1775	1775	1000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		0.0	50.0		0.0	80.0		0.0	80.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	40.0			40.0			40.0			40.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.99	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Frt		0.981			0.959			0.977			0.972	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1670	3241	0	1653	2960	0	1606	3171	0	1670	3123	0
Flt Permitted	0.461			0.261			0.386			0.165		
Satd. Flow (perm)	803	3241	0	454	2960	0	651	3171	0	289	3123	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		15			47			19			27	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		96.7			517.2			567.9			407.8	
Travel Time (s)		5.8			31.0			34.1			24.5	
Confl. Peds. (#/hr)	13		3	3		13	4		11	11		4
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	1%	2%	4%	20%	5%	3%	6%	1%	5%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	215	675	100	80	210	80	105	660	120	190	450	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	215	775	0	80	290	0	105	780	0	190	555	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	31.0		9.0	31.0	
Total Split (s)	19.2	48.0		10.8	39.6		10.8	44.4		16.8	50.4	
Total Split (%)	16.0%	40.0%		9.0%	33.0%		9.0%	37.0%		14.0%	42.0%	
Maximum Green (s)	15.2	42.0		6.8	33.6		6.8	38.4		12.8	44.4	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	
Walk Time (s)		8.0			8.0			10.0			10.0	
Flash Dont Walk (s)		21.0			21.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	54.8	46.2		43.7	37.1		48.1	41.3		56.9	46.4	
Actuated g/C Ratio	0.46	0.38		0.36	0.31		0.40	0.34		0.47	0.39	
v/c Ratio	0.46	0.62		0.34	0.31		0.33	0.71		0.69	0.45	
Control Delay	24.0	32.4		23.7	27.7		21.5	37.7		32.5	27.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	24.0	32.4		23.7	27.7		21.5	37.7		32.5	27.4	
LOS	C	C		C	C		C	D		C	C	
Approach Delay		30.6			26.9			35.7			28.7	
Approach LOS		C			C			D			C	
Queue Length 50th (m)	32.5	81.6		11.1	24.3		14.2	86.6		27.0	50.5	
Queue Length 95th (m)	50.4	103.7		20.9	36.9		25.1	110.6		43.1	67.0	
Internal Link Dist (m)		72.7			493.2			543.9			383.8	
Turn Bay Length (m)	50.0			50.0			80.0			80.0		
Base Capacity (vph)	476	1255		233	947		315	1104		285	1224	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.45	0.62		0.34	0.31		0.33	0.71		0.67	0.45	

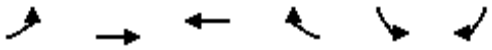
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 13 (11%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 31.2		Intersection LOS: C	
Intersection Capacity Utilization 85.3%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 46: Fischer-Hallman & Erb Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	80	585	265	40	140	90
Future Volume (vph)	80	585	265	40	140	90
Ideal Flow (vphpl)	1775	1900	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	35.0			0.0	55.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	45.0				15.0	
Lane Util. Factor	1.00	*0.70	0.95	0.95	1.00	1.00
Ped Bike Factor	0.98		0.99		1.00	0.98
Frt			0.980			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1670	2583	3123	0	1686	1473
Flt Permitted	0.566				0.950	
Satd. Flow (perm)	979	2583	3123	0	1684	1443
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			37			90
Link Speed (k/h)		60	60		50	
Link Distance (m)		167.3	674.3		336.7	
Travel Time (s)		10.0	40.5		24.2	
Confl. Peds. (#/hr)	12			12	1	7
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	3%	6%	0%	0%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	80	585	265	40	140	90
Shared Lane Traffic (%)						
Lane Group Flow (vph)	80	585	305	0	140	90
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	2		4	
Permitted Phases	2					4
Detector Phase	2	2	2		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		8.0	8.0
Minimum Split (s)	27.0	27.0	27.0		28.0	28.0
Total Split (s)	57.5	57.5	57.5		28.0	28.0
Total Split (%)	67.3%	67.3%	67.3%		32.7%	32.7%
Maximum Green (s)	51.5	51.5	51.5		22.0	22.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0



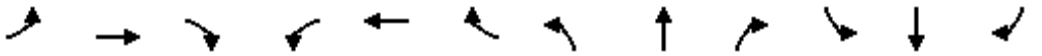
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Gap (s)	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0	0.0
Recall Mode	Max	Max	Max		None	None
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0	0		5	5
Act Effct Green (s)	57.0	57.0	57.0		14.9	14.9
Actuated g/C Ratio	0.71	0.71	0.71		0.19	0.19
v/c Ratio	0.11	0.32	0.14		0.45	0.26
Control Delay	5.2	5.5	4.0		32.1	7.9
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	5.2	5.5	4.0		32.1	7.9
LOS	A	A	A		C	A
Approach Delay		5.4	4.0		22.6	
Approach LOS		A	A		C	
Queue Length 50th (m)	3.0	18.5	5.3		18.8	0.0
Queue Length 95th (m)	10.9	44.4	14.2		34.3	10.7
Internal Link Dist (m)		143.3	650.3		312.7	
Turn Bay Length (m)	35.0				55.0	
Base Capacity (vph)	698	1843	2238		508	497
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.11	0.32	0.14		0.28	0.18

Intersection Summary			
Area Type:	Other		
Cycle Length: 85.5			
Actuated Cycle Length: 79.9			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.45			
Intersection Signal Delay: 8.4		Intersection LOS: A	
Intersection Capacity Utilization 42.6%		ICU Level of Service A	
Analysis Period (min) 15			

* User Entered Value

Splits and Phases: 214: Erb Street & Erbsville Court



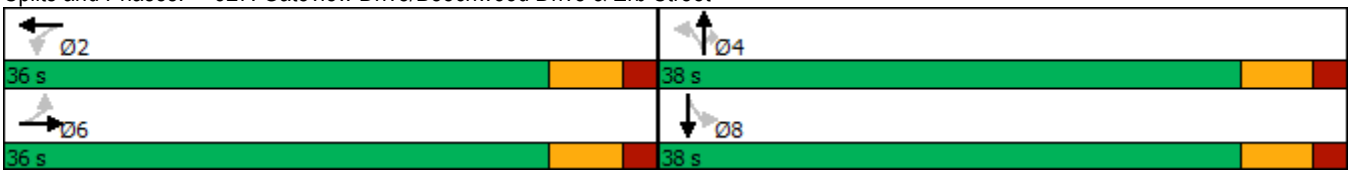


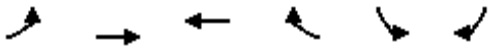
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	700	15	80	275	30	20	5	220	100	10	10
Future Volume (vph)	10	700	15	80	275	30	20	5	220	100	10	10
Ideal Flow (vphpl)	1775	1775	1000	1775	1775	1000	1000	1650	1750	1775	1650	1000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (m)	30.0			30.0			7.5			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		1.00	1.00				0.98	0.99		
Frt		0.997			0.985				0.850		0.925	
Flt Protected	0.950			0.950				0.962		0.950		
Satd. Flow (prot)	1686	3297	0	1547	3174	0	0	1489	1444	1670	1454	0
Flt Permitted	0.566			0.354				0.834		0.741		
Satd. Flow (perm)	1001	3297	0	576	3174	0	0	1291	1414	1291	1454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			20				128		10	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		674.3			216.8			120.2			123.2	
Travel Time (s)		40.5			13.0			8.7			8.9	
Confl. Peds. (#/hr)	3		1	1		3			13	13		
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	9%	4%	8%	4%	17%	3%	1%	10%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	10	700	15	80	275	30	20	5	220	100	10	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	715	0	80	305	0	0	25	220	100	20	0
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4		4	8		
Detector Phase	6	6		2	2		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		27.0	27.0		38.0	38.0	38.0	38.0	38.0	
Total Split (s)	36.0	36.0		36.0	36.0		38.0	38.0	38.0	38.0	38.0	
Total Split (%)	48.6%	48.6%		48.6%	48.6%		51.4%	51.4%	51.4%	51.4%	51.4%	
Maximum Green (s)	30.0	30.0		30.0	30.0		32.0	32.0	32.0	32.0	32.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Recall Mode	Max	Max		Max	Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		15.0	15.0	15.0	15.0	15.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		17.0	17.0	17.0	17.0	17.0	
Pedestrian Calls (#/hr)	0	0		0	0		5	5	5	5	5	
Act Effct Green (s)	34.9	34.9		34.9	34.9			16.0	16.0	16.0	16.0	
Actuated g/C Ratio	0.59	0.59		0.59	0.59			0.27	0.27	0.27	0.27	
v/c Ratio	0.02	0.37		0.24	0.16			0.07	0.46	0.29	0.05	
Control Delay	8.6	8.5		11.1	7.0			14.0	10.2	17.2	10.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	8.6	8.5		11.1	7.0			14.0	10.2	17.2	10.0	
LOS	A	A		B	A			B	B	B	A	
Approach Delay		8.5			7.8			10.5			16.0	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	0.3	14.9		2.9	5.1			1.9	7.4	8.2	0.8	
Queue Length 95th (m)	3.4	53.4		18.5	21.2			5.9	20.2	17.3	4.3	
Internal Link Dist (m)		650.3			192.8			96.2			99.2	
Turn Bay Length (m)	30.0			30.0						20.0		
Base Capacity (vph)	591	1949		340	1883			758	883	758	858	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.02	0.37		0.24	0.16			0.03	0.25	0.13	0.02	

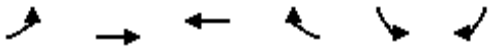
Intersection Summary			
Area Type:	Other		
Cycle Length: 74			
Actuated Cycle Length: 59.1			
Natural Cycle: 65			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.46			
Intersection Signal Delay: 9.3		Intersection LOS: A	
Intersection Capacity Utilization 59.4%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 327: Gateview Drive/Beechwood Drive & Erb Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	535	255	25	35	25
Future Volume (vph)	60	535	255	25	35	25
Ideal Flow (vphpl)	1775	1900	1650	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	30.0			0.0	50.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1606	1792	1482	0	1591	1365
Flt Permitted	0.588				0.950	
Satd. Flow (perm)	994	1792	1482	0	1591	1365
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			18			25
Link Speed (k/h)		60	60		50	
Link Distance (m)		428.9	232.9		75.5	
Travel Time (s)		25.7	14.0		5.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	6%	11%	0%	6%	9%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	60	535	255	25	35	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	535	280	0	35	25
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	2		4	
Permitted Phases	2					4
Detector Phase	2	2	2		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		7.0	7.0
Minimum Split (s)	11.0	11.0	11.0		13.0	13.0
Total Split (s)	54.0	54.0	54.0		16.0	16.0
Total Split (%)	77.1%	77.1%	77.1%		22.9%	22.9%
Maximum Green (s)	48.0	48.0	48.0		10.0	10.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0

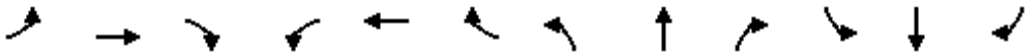


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Gap (s)	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0	0.0
Recall Mode	Max	Max	Max		None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	57.5	57.5	57.5		9.6	9.6
Actuated g/C Ratio	0.84	0.84	0.84		0.14	0.14
v/c Ratio	0.07	0.36	0.22		0.16	0.12
Control Delay	2.6	3.4	2.7		27.3	12.3
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	2.6	3.4	2.7		27.3	12.3
LOS	A	A	A		C	B
Approach Delay		3.3	2.7		21.0	
Approach LOS		A	A		C	
Queue Length 50th (m)	1.6	18.7	7.8		4.1	0.0
Queue Length 95th (m)	4.7	36.2	16.8		11.7	6.1
Internal Link Dist (m)		404.9	208.9		51.5	
Turn Bay Length (m)	30.0				50.0	
Base Capacity (vph)	836	1507	1249		278	260
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.07	0.36	0.22		0.13	0.10

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 68.4			
Natural Cycle: 40			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.36			
Intersection Signal Delay: 4.3		Intersection LOS: A	
Intersection Capacity Utilization 40.7%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 859: Erb Street & Westside Market





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	290	0	0	580	45	0	0	0	25	0	10
Future Volume (vph)	5	290	0	0	580	45	0	0	0	25	0	10
Ideal Flow (vphpl)	1900	1550	1900	1900	1550	1900	1900	1550	1900	1900	1550	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.990						0.961	
Flt Protected		0.999									0.966	
Satd. Flow (prot)	0	1518	0	0	1504	0	0	1520	0	0	1411	0
Flt Permitted		0.999									0.966	
Satd. Flow (perm)	0	1518	0	0	1504	0	0	1520	0	0	1411	0
Link Speed (k/h)		70			70			60			60	
Link Distance (m)		320.8			348.1			163.0			427.1	
Travel Time (s)		16.5			17.9			9.8			25.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	5	290	0	0	580	45	0	0	0	25	0	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	295	0	0	625	0	0	0	0	0	35	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.8%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	305	10	30	615	10	35
Future Volume (vph)	305	10	30	615	10	35
Ideal Flow (vphpl)	1650	1000	1775	1900	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	130.0		0.0	0.0
Storage Lanes		0	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt	0.996					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1611	0	1653	1863	1653	1458
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1611	0	1653	1863	1653	1458
Link Speed (k/h)	70			70	50	
Link Distance (m)	348.1			150.9	150.2	
Travel Time (s)	17.9			7.8	10.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	305	10	30	615	10	35
Shared Lane Traffic (%)						
Lane Group Flow (vph)	315	0	30	615	10	35
Sign Control	Free			Free	Stop	

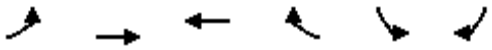
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 42.4%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	355	5	15	640	5	40
Future Volume (vph)	355	5	15	640	5	40
Ideal Flow (vphpl)	1900	1750	1775	1900	1775	1650
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		50.0	220.0		0.0	25.0
Storage Lanes		1	1		1	1
Taper Length (m)			7.5		7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1863	1458	1653	1863	1653	1375
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1863	1458	1653	1863	1653	1375
Link Speed (k/h)	70			70	50	
Link Distance (m)	150.9			428.9	65.2	
Travel Time (s)	7.8			22.1	4.7	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	355	5	15	640	5	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	355	5	15	640	5	40
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.7%		ICU Level of Service A	
Analysis Period (min) 15			

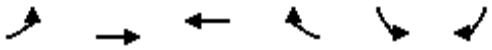
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	400	30	45	780	30	15
Future Volume (vph)	400	30	45	780	30	15
Ideal Flow (vphpl)	1775	1000	1775	1900	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	35.0		0.0	15.0
Storage Lanes		0	1		1	1
Taper Length (m)			45.0		7.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt	0.990					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3273	0	1653	3539	1653	1458
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3273	0	1653	3539	1653	1458
Link Speed (k/h)	60			60	50	
Link Distance (m)	303.0			167.3	121.9	
Travel Time (s)	18.2			10.0	8.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	400	30	45	780	30	15
Shared Lane Traffic (%)						
Lane Group Flow (vph)	430	0	45	780	30	15
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 31.6%		ICU Level of Service A	
Analysis Period (min) 15			



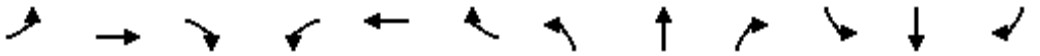
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	40	460	1065	85	35	60
Future Volume (vph)	40	460	1065	85	35	60
Ideal Flow (vphpl)	1000	1775	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.989			0.850
Flt Protected		0.996			0.950	
Satd. Flow (prot)	0	3293	3270	0	1653	1458
Flt Permitted		0.996			0.950	
Satd. Flow (perm)	0	3293	3270	0	1653	1458
Link Speed (k/h)		60	60		50	
Link Distance (m)		216.8	126.7		69.8	
Travel Time (s)		13.0	7.6		5.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	40	460	1065	85	35	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	500	1150	0	35	60
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.5%		ICU Level of Service B	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	435	1050	165	75	100
Future Volume (vph)	60	435	1050	165	75	100
Ideal Flow (vphpl)	1775	1900	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	10.0			0.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.980			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1653	3539	3240	0	1653	1458
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1653	3539	3240	0	1653	1458
Link Speed (k/h)		60	60		50	
Link Distance (m)		126.7	96.7		39.9	
Travel Time (s)		7.6	5.8		2.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	60	435	1050	165	75	100
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	435	1215	0	75	100
Sign Control		Free	Free		Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 54.7%		ICU Level of Service A	
Analysis Period (min) 15			

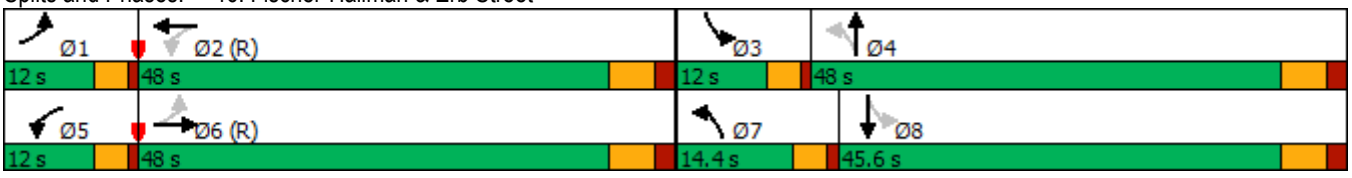


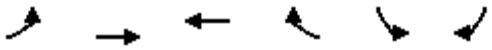
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	280	100	170	840	145	150	450	90	150	750	225
Future Volume (vph)	130	280	100	170	840	145	150	450	90	150	750	225
Ideal Flow (vphpl)	1775	1775	1000	1775	1775	1000	1775	1775	1000	1775	1775	1000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		0.0	50.0		0.0	80.0		0.0	80.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	40.0			40.0			40.0			40.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	1.00	1.00		1.00	1.00			0.99		0.99	0.99	
Frt		0.961			0.978			0.975			0.965	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1686	3195	0	1686	3248	0	1670	3224	0	1670	3194	0
Flt Permitted	0.106			0.458			0.095			0.358		
Satd. Flow (perm)	188	3195	0	811	3248	0	167	3224	0	622	3194	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		47			18			22			36	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		96.7			517.2			567.9			407.8	
Travel Time (s)		5.8			31.0			34.1			24.5	
Confl. Peds. (#/hr)	13		4	4		13	11		19	19		11
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	1%	1%	0%	1%	2%	1%	1%	3%	1%	1%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	130	280	100	170	840	145	150	450	90	150	750	225
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	380	0	170	985	0	150	540	0	150	975	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	31.0		9.0	31.0	
Total Split (s)	12.0	48.0		12.0	48.0		14.4	48.0		12.0	45.6	
Total Split (%)	10.0%	40.0%		10.0%	40.0%		12.0%	40.0%		10.0%	38.0%	
Maximum Green (s)	8.0	42.0		8.0	42.0		10.4	42.0		8.0	39.6	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	
Walk Time (s)		8.0			8.0			10.0			10.0	
Flash Dont Walk (s)		21.0			21.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	52.0	44.0		52.0	44.0		54.0	44.0		50.0	42.0	
Actuated g/C Ratio	0.43	0.37		0.43	0.37		0.45	0.37		0.42	0.35	
v/c Ratio	0.72	0.32		0.42	0.82		0.75	0.45		0.46	0.86	
Control Delay	43.2	24.5		23.0	40.5		46.6	29.1		24.4	43.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	43.2	24.5		23.0	40.5		46.6	29.1		24.4	43.7	
LOS	D	C		C	D		D	C		C	D	
Approach Delay		29.3			37.9			32.9			41.1	
Approach LOS		C			D			C			D	
Queue Length 50th (m)	18.2	30.5		24.3	113.4		21.3	50.7		21.3	114.1	
Queue Length 95th (m)	#43.4	43.5		39.3	141.6		#51.5	67.3		35.1	142.9	
Internal Link Dist (m)		72.7			493.2			543.9			383.8	
Turn Bay Length (m)	50.0			50.0			80.0			80.0		
Base Capacity (vph)	181	1201		409	1203		205	1196		328	1140	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.72	0.32		0.42	0.82		0.73	0.45		0.46	0.86	

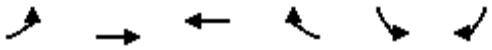
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 13 (11%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 36.7		Intersection LOS: D	
Intersection Capacity Utilization 90.1%		ICU Level of Service E	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 46: Fischer-Hallman & Erb Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	55	360	780	55	45	45
Future Volume (vph)	55	360	780	55	45	45
Ideal Flow (vphpl)	1775	1900	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	35.0			0.0	55.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	45.0				15.0	
Lane Util. Factor	1.00	*0.70	0.95	0.95	1.00	1.00
Ped Bike Factor	1.00		1.00		1.00	
Frt			0.990			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1637	2660	3296	0	1686	1488
Flt Permitted	0.326				0.950	
Satd. Flow (perm)	560	2660	3296	0	1680	1488
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			16			45
Link Speed (k/h)		60	60		50	
Link Distance (m)		167.3	674.3		336.7	
Travel Time (s)		10.0	40.5		24.2	
Confl. Peds. (#/hr)	7			7	3	
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	0%	1%	2%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	55	360	780	55	45	45
Shared Lane Traffic (%)						
Lane Group Flow (vph)	55	360	835	0	45	45
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	2		4	
Permitted Phases	2					4
Detector Phase	2	2	2		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		8.0	8.0
Minimum Split (s)	27.0	27.0	27.0		28.0	28.0
Total Split (s)	57.5	57.5	57.5		28.0	28.0
Total Split (%)	67.3%	67.3%	67.3%		32.7%	32.7%
Maximum Green (s)	51.5	51.5	51.5		22.0	22.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0



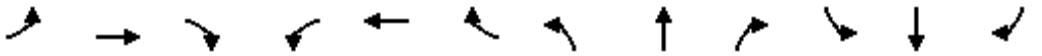
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Gap (s)	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0	0.0
Recall Mode	Max	Max	Max		None	None
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0	0		5	5
Act Effct Green (s)	64.7	64.7	64.7		12.8	12.8
Actuated g/C Ratio	0.79	0.79	0.79		0.16	0.16
v/c Ratio	0.12	0.17	0.32		0.17	0.17
Control Delay	5.0	3.7	4.2		29.9	9.7
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	5.0	3.7	4.2		29.9	9.7
LOS	A	A	A		C	A
Approach Delay		3.9	4.2		19.8	
Approach LOS		A	A		B	
Queue Length 50th (m)	1.6	8.0	15.2		7.2	0.0
Queue Length 95th (m)	8.9	25.8	44.5		13.8	7.7
Internal Link Dist (m)		143.3	650.3		312.7	
Turn Bay Length (m)	35.0				55.0	
Base Capacity (vph)	444	2111	2620		499	472
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.12	0.17	0.32		0.09	0.10

Intersection Summary			
Area Type:	Other		
Cycle Length: 85.5			
Actuated Cycle Length: 81.5			
Natural Cycle: 55			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.32			
Intersection Signal Delay: 5.1		Intersection LOS: A	
Intersection Capacity Utilization 45.8%		ICU Level of Service A	
Analysis Period (min) 15			

* User Entered Value

Splits and Phases: 214: Erb Street & Erbsville Court





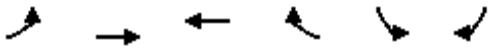
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	360	25	250	800	75	20	5	95	45	10	15
Future Volume (vph)	20	360	25	250	800	75	20	5	95	45	10	15
Ideal Flow (vphpl)	1775	1775	1000	1775	1775	1000	1000	1650	1750	1775	1650	1000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (m)	30.0			30.0			7.5			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								1.00			0.99	
Frt		0.990			0.987				0.850		0.910	
Flt Protected	0.950			0.950				0.962		0.950		
Satd. Flow (prot)	1576	3277	0	1670	3298	0	0	1587	1444	1686	1490	0
Flt Permitted	0.324			0.464				0.808		0.741		
Satd. Flow (perm)	537	3277	0	815	3298	0	0	1332	1444	1315	1490	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		9			17				95		15	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		674.3			216.8			120.2			123.2	
Travel Time (s)		40.5			13.0			8.7			8.9	
Confl. Peds. (#/hr)							1					1
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	7%	2%	0%	1%	1%	0%	0%	0%	3%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	20	360	25	250	800	75	20	5	95	45	10	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	20	385	0	250	875	0	0	25	95	45	25	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			4			8	
Permitted Phases	6			2			4		4	8		
Detector Phase	6	6		5	2		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		9.0	27.0		38.0	38.0	38.0	38.0	38.0	
Total Split (s)	36.0	36.0		14.0	50.0		38.0	38.0	38.0	38.0	38.0	
Total Split (%)	40.9%	40.9%		15.9%	56.8%		43.2%	43.2%	43.2%	43.2%	43.2%	
Maximum Green (s)	30.0	30.0		10.0	44.0		32.0	32.0	32.0	32.0	32.0	
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		0.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Recall Mode	Max	Max		None	Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0			7.0		15.0	15.0	15.0	15.0	15.0	
Flash Dont Walk (s)	14.0	14.0			14.0		17.0	17.0	17.0	17.0	17.0	
Pedestrian Calls (#/hr)	0	0			0		5	5	5	5	5	
Act Effct Green (s)	35.8	35.8		48.5	49.5			15.7	15.7	15.7	15.7	
Actuated g/C Ratio	0.52	0.52		0.71	0.72			0.23	0.23	0.23	0.23	
v/c Ratio	0.07	0.22		0.36	0.37			0.08	0.24	0.15	0.07	
Control Delay	14.8	12.2		7.8	6.7			20.7	6.3	21.9	12.8	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	14.8	12.2		7.8	6.7			20.7	6.3	21.9	12.8	
LOS	B	B		A	A			C	A	C	B	
Approach Delay		12.3			7.0			9.3			18.7	
Approach LOS		B			A			A			B	
Queue Length 50th (m)	1.3	13.4		9.2	19.0			2.7	0.0	5.0	1.1	
Queue Length 95th (m)	7.5	36.4		38.6	65.2			7.9	9.4	12.1	6.1	
Internal Link Dist (m)		650.3			192.8			96.2			99.2	
Turn Bay Length (m)	30.0			30.0						20.0		
Base Capacity (vph)	280	1716		704	2388			674	778	666	761	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.07	0.22		0.36	0.37			0.04	0.12	0.07	0.03	

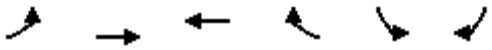
Intersection Summary			
Area Type:	Other		
Cycle Length: 88			
Actuated Cycle Length: 68.5			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.37			
Intersection Signal Delay: 8.9		Intersection LOS: A	
Intersection Capacity Utilization 50.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 327: Gateview Drive/Beechwood Drive & Erb Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	325	595	50	100	60
Future Volume (vph)	60	325	595	50	100	60
Ideal Flow (vphpl)	1775	1900	1800	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	30.0			0.0	50.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.990			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1621	1792	1750	0	1653	1488
Flt Permitted	0.374				0.950	
Satd. Flow (perm)	638	1792	1750	0	1653	1488
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			15			60
Link Speed (k/h)		60	60		50	
Link Distance (m)		428.9	232.9		75.5	
Travel Time (s)		25.7	14.0		5.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	6%	2%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	60	325	595	50	100	60
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	325	645	0	100	60
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	2		4	
Permitted Phases	2					4
Detector Phase	2	2	2		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		7.0	7.0
Minimum Split (s)	11.0	11.0	11.0		13.0	13.0
Total Split (s)	54.0	54.0	54.0		16.0	16.0
Total Split (%)	77.1%	77.1%	77.1%		22.9%	22.9%
Maximum Green (s)	48.0	48.0	48.0		10.0	10.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Gap (s)	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0	0.0
Recall Mode	Max	Max	Max		None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	53.8	53.8	53.8		10.9	10.9
Actuated g/C Ratio	0.78	0.78	0.78		0.16	0.16
v/c Ratio	0.12	0.23	0.47		0.39	0.21
Control Delay	3.8	3.6	5.2		30.7	9.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	3.8	3.6	5.2		30.7	9.8
LOS	A	A	A		C	A
Approach Delay		3.6	5.2		22.9	
Approach LOS		A	A		C	
Queue Length 50th (m)	2.0	12.0	29.7		12.3	0.0
Queue Length 95th (m)	5.4	20.7	50.3		25.7	9.3
Internal Link Dist (m)		404.9	208.9		51.5	
Turn Bay Length (m)	30.0				50.0	
Base Capacity (vph)	495	1392	1363		286	307
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.12	0.23	0.47		0.35	0.20

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 69.3			
Natural Cycle: 40			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.47			
Intersection Signal Delay: 7.1		Intersection LOS: A	
Intersection Capacity Utilization 56.4%		ICU Level of Service B	
Analysis Period (min) 15			

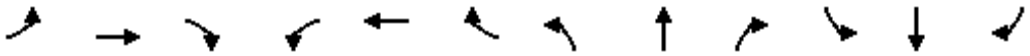
Splits and Phases: 859: Erb Street & Westside Market



Appendix C: 2024 Future Traffic Analysis

Analysis Horizon	Analysis Scenario	Analysis Period	Control Type	Intersection	Measure	Direction / Movement / Approach												Analysis Details
						EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
2024 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	3: Wilmot Line & Erb Street SKIPPED!	LOS	A	A			A	A				E		E	Analyst: NG
					Delay	0	0			0	0				43		43	Analysis Date: 06/22/2018
					v/c	0.01	0.01			0.00	0.00				0.35		0.35	Data Date: 06/18/2018
					Queue	0	0			0	0				12		12	Path: I:\EA\Erb Street
					Storage													EA\2018 Volume Update\AM
					Link Length													2024.syn
2024 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	15: Westhaven Street & Erb Street SKIPPED!	LOS		A	A	B	A		C		C				Analyst: NG
					Delay		0	0	10	0		24		24				Analysis Date: 06/22/2018
					v/c		0.39	0.20	0.04	0.18		0.28		0.28				Data Date: 06/18/2018
					Queue		0	0	1	0		8		8				Path: I:\EA\Erb Street
					Storage													EA\2018 Volume Update\AM
					Link Length													2024.syn
2024 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	22: Erb Street & Beachwood Place SKIPPED!	LOS	A	A			A	A				C		A	Analyst: NG
					Delay	0	0			0	0				22		10	Analysis Date: 06/22/2018
					v/c	0.06	0.53			0.25	0.15				0.17		0.03	Data Date: 06/18/2018
					Queue	0	0			0	0				5		1	Path: I:\EA\Erb Street
					Storage													EA\2018 Volume Update\AM
					Link Length													2024.syn
2024 Volumes	Existing Lanes	AM Peak	Side Street Stop Control	24: Erb Street & Beachwood Centre SKIPPED!	LOS	A	A			A	A				C		A	Analyst: NG
					Delay	9	0			0	0				16		9	Analysis Date: 06/22/2018
					v/c	0.04	0.40			0.26	0.15				0.05		0.02	Data Date: 06/18/2018
					Queue	1	0			0	0				1		1	Path: I:\EA\Erb Street
					Storage													EA\2018 Volume Update\AM
					Link Length													2024.syn
2024 Volumes	Existing Lanes	AM Peak	Actuated-Coordinated (Cycle: 120s)	46: Fischer-Hallman & Erb Street	LOS	C	D		D	D		C	D		D	C		Analyst: NG
					Delay	32	42		43	35		30	47		52	33		Analysis Date: 06/22/2018
					v/c	0.71	0.86		0.65	0.48		0.62	**0.85**		0.82	0.61		Data Date: 06/18/2018
					Queue	**70**	**156**		#31	62		41	#139		**#72**	89		Path: I:\EA\Erb Street
					Storage	50		0	50		0	80		0	80		0	EA\2018 Volume Update\AM
					Link Length		73			493			544			384		2024.syn
2024 Volumes	Existing Lanes	AM Peak	Semi Act-Uncoord (Cycle: 85.5s)	214: Erb Street & Erbsville Court	LOS	A	A			A					C		A	Analyst: NG
					Delay	6	7			5					33		8	Analysis Date: 06/22/2018
					v/c	0.16	0.52			0.26					0.47		0.27	Data Date: 06/18/2018
					Queue	12	85			29					37		11	Path: I:\EA\Erb Street
					Storage	35					0				55		0	EA\2018 Volume Update\AM
					Link Length		143			650						313		2024.syn
2024 Volumes	Existing Lanes	AM Peak	Semi Act-Uncoord (Cycle: 84s)	327: Gateview Drive/Beechwood Drive & Erb Street	LOS	B	B		A	A			B	A	C	B		Analyst: NG
					Delay	13	16		10	7			19	8	23	13		Analysis Date: 06/22/2018
					v/c	0.04	0.63		0.31	0.28			0.11	0.49	0.34	0.06		Data Date: 06/18/2018
					Queue	6	#124		15	41			9	18	**23**	6		Path: I:\EA\Erb Street
					Storage	30		0	30		0	0		0	20		0	EA\2018 Volume Update\AM
					Link Length		650			193			96			99		2024.syn
2024 Volumes	Existing Lanes	AM Peak	Semi Act-Uncoord (Cycle: 70s)	859: Erb Street & Westside Market	LOS	A	A			A					C		B	Analyst: NG
					Delay	3	8			5					28		11	Analysis Date: 06/22/2018
					v/c	0.13	0.67			0.53					0.22		0.17	Data Date: 06/18/2018
					Queue	6	#124			63					15		8	Path: I:\EA\Erb Street
					Storage	30					0				50		0	EA\2018 Volume Update\AM
					Link Length		904			209						52		2024.syn

Analysis Horizon	Analysis Scenario	Analysis Period	Control Type	Intersection	Measure	Direction / Movement / Approach												Analysis Details
						EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
2024 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	3: Wilmot Line & Erb Street SKIPPED!	LOS	A	A			A	A				E		E	Analyst: NG
					Delay	0	1			0	0				45		45	Analysis Date: 06/22/2018
					v/c	0.01	0.01			0.00	0.00				0.41		0.41	Data Date: 06/18/2018
					Queue	1	1			0	0				14		14	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2024.syn
					Storage													
					Link Length													
2024 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	15: Westhaven Street & Erb Street SKIPPED!	LOS		A	A	A	A		D		D				Analyst: NG
					Delay		0	0	10	0		34		34				Analysis Date: 06/22/2018
					v/c		0.32	0.18	0.06	0.36		0.29		0.29				Data Date: 06/18/2018
					Queue		0	0	2	0		9		9				Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2024.syn
					Storage													
					Link Length													
2024 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	22: Erb Street & Beachwood Place SKIPPED!	LOS	A	A			A	A				D		B	Analyst: NG
					Delay	3	0			0	0				28		11	Analysis Date: 06/22/2018
					v/c	0.09	0.35			0.59	0.35				0.20		0.09	Data Date: 06/18/2018
					Queue	2	2			0	0				6		2	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2024.syn
					Storage													
					Link Length													
2024 Volumes	Existing Lanes	PM Peak	Side Street Stop Control	24: Erb Street & Beachwood Centre SKIPPED!	LOS	B	A			A	A				**F**		B	Analyst: NG
					Delay	14	0			0	0				**112**		12	Analysis Date: 06/22/2018
					v/c	0.15	0.25			0.59	0.40				0.78		0.15	Data Date: 06/18/2018
					Queue	4	0			0	0				34		4	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2024.syn
					Storage													
					Link Length													
2024 Volumes	Existing Lanes	PM Peak	Actuated-Coordinated (Cycle: 120s)	46: Fischer-Hallman & Erb Street	LOS	**F**	C		C	**F**		**F**	D		C	**F**		Analyst: NG
					Delay	**111**	31		24	**83**		**115**	39		30	**91**		Analysis Date: 06/22/2018
					v/c	**1.06**	0.57		0.59	**1.07**		**1.07**	0.63		0.57	**1.08**		Data Date: 06/18/2018
					Queue	**101**	**91**		42	**#240**		**#89**	87		42	**#204**		Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2024.syn
					Storage	50		0	50		0	80		0	80		0	
					Link Length	73			493			544			384			
2024 Volumes	Existing Lanes	PM Peak	Semi Act-Uncoord (Cycle: 85.5s)	214: Erb Street & Erbsville Court	LOS	A	A			A					C		A	Analyst: NG
					Delay	7	5			5					30		10	Analysis Date: 06/22/2018
					v/c	0.23	0.37			0.48					0.19		0.18	Data Date: 06/18/2018
					Queue	12	62			77					15		8	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2024.syn
					Storage	35					0				55		0	
					Link Length	143			650						313			
2024 Volumes	Existing Lanes	PM Peak	Semi Act-Uncoord (Cycle: 88s)	327: Gateview Drive/Beechwood Drive & Erb Street	LOS	B	B		B	A			C	A	C	B		Analyst: NG
					Delay	17	15		12	8			21	6	22	13		Analysis Date: 06/22/2018
					v/c	0.14	0.49		0.56	0.54			0.11	0.24	0.17	0.10		Data Date: 06/18/2018
					Queue	10	83		**#50**	118			10	10	13	8		Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2024.syn
					Storage	30		0	30		0	0		0	20		0	
					Link Length	650			193			96			99			
2024 Volumes	Existing Lanes	PM Peak	Semi Act-Uncoord (Cycle: 82s)	859: Erb Street & Westside Market	LOS	D	A			E					D		B	Analyst: NG
					Delay	48	7			67					49		11	Analysis Date: 06/22/2018
					v/c	0.66	0.73			**1.09**					0.68		0.24	Data Date: 06/18/2018
					Queue	#14	115			**#356**					**#51**		11	Path: I:\EA\Erb Street EA\2018 Volume Update\PM 2024.syn
					Storage	30					0				50		0	
					Link Length	904			209						52			

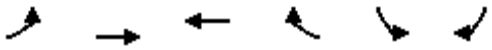


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	901	0	0	450	20	0	0	0	40	0	10
Future Volume (vph)	10	901	0	0	450	20	0	0	0	40	0	10
Ideal Flow (vphpl)	1900	1550	1900	1900	1550	1900	1900	1550	1900	1900	1550	1900
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (m)	7.5			7.5			7.5			7.5		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt					0.994						0.973	
Flt Protected		0.999									0.962	
Satd. Flow (prot)	0	1518	0	0	1510	0	0	1520	0	0	1422	0
Flt Permitted		0.999									0.962	
Satd. Flow (perm)	0	1518	0	0	1510	0	0	1520	0	0	1422	0
Link Speed (k/h)		70			70			60			60	
Link Distance (m)		320.8			927.8			163.0			427.1	
Travel Time (s)		16.5			47.7			9.8			25.6	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	10	901	0	0	450	20	0	0	0	40	0	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	911	0	0	470	0	0	0	0	0	50	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 78.0%		ICU Level of Service D	
Analysis Period (min) 15			

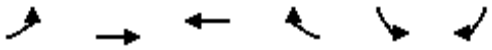
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	985	20	25	600	40	45
Future Volume (vph)	985	20	25	600	40	45
Ideal Flow (vphpl)	1775	1000	1775	1900	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)	0%			0%	0%	
Storage Length (m)		0.0	35.0		0.0	15.0
Storage Lanes		0	1		1	1
Taper Length (m)			45.0		7.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Ped Bike Factor						
Frt	0.997					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3296	0	1653	3539	1653	1458
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3296	0	1653	3539	1653	1458
Link Speed (k/h)	60			60	50	
Link Distance (m)	303.0			167.3	121.9	
Travel Time (s)	18.2			10.0	8.8	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Adj. Flow (vph)	985	20	25	600	40	45
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1005	0	25	600	40	45
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.8%		ICU Level of Service A	
Analysis Period (min) 15			



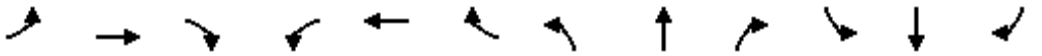
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	55	1350	635	45	45	25
Future Volume (vph)	55	1350	635	45	45	25
Ideal Flow (vphpl)	1000	1775	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.990			0.850
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	3300	3273	0	1653	1458
Flt Permitted		0.998			0.950	
Satd. Flow (perm)	0	3300	3273	0	1653	1458
Link Speed (k/h)		60	60		50	
Link Distance (m)		216.8	126.7		69.8	
Travel Time (s)		13.0	7.6		5.0	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	55	1350	635	45	45	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1405	680	0	45	25
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 75.3%		ICU Level of Service D	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	35	1361	660	35	15	20
Future Volume (vph)	35	1361	660	35	15	20
Ideal Flow (vphpl)	1775	1900	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	10.0			0.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor						
Frt			0.992			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1653	3539	3280	0	1653	1458
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1653	3539	3280	0	1653	1458
Link Speed (k/h)		60	60		50	
Link Distance (m)		126.7	96.7		39.9	
Travel Time (s)		7.6	5.8		2.9	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	35	1361	660	35	15	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	35	1361	695	0	15	20
Sign Control		Free	Free		Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 47.6%		ICU Level of Service A	
Analysis Period (min) 15			



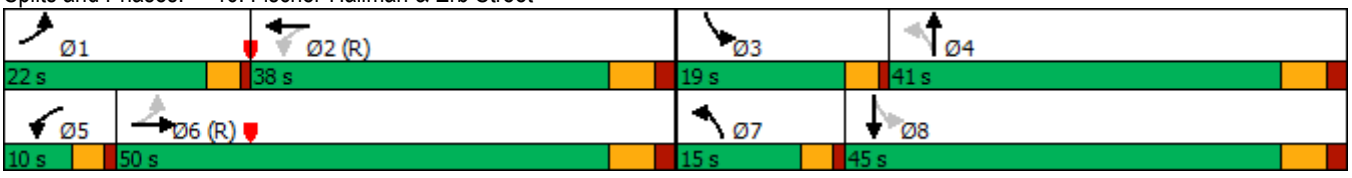
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	935	140	93	345	93	175	729	133	210	497	175
Future Volume (vph)	300	935	140	93	345	93	175	729	133	210	497	175
Ideal Flow (vphpl)	1775	1775	1000	1775	1775	1000	1775	1775	1000	1775	1775	1000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	50.0		0.0	50.0		0.0	80.0		0.0	80.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	40.0			40.0			40.0			40.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor	0.99	1.00		1.00	0.99		1.00	1.00			1.00	
Frt		0.980			0.968			0.977			0.961	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1670	3238	0	1653	3022	0	1606	3171	0	1670	3088	0
Flt Permitted	0.331			0.120			0.265			0.104		
Satd. Flow (perm)	578	3238	0	209	3022	0	447	3171	0	183	3088	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			28			18			45	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		96.7			517.2			567.9			407.8	
Travel Time (s)		5.8			31.0			34.1			24.5	
Confl. Peds. (#/hr)	13		3	3		13	4		11	11		4
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	2%	1%	2%	4%	20%	5%	3%	6%	1%	5%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	300	935	140	93	345	93	175	729	133	210	497	175
Shared Lane Traffic (%)												
Lane Group Flow (vph)	300	1075	0	93	438	0	175	862	0	210	672	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	31.0		9.0	31.0	
Total Split (s)	22.0	50.0		10.0	38.0		15.0	41.0		19.0	45.0	
Total Split (%)	18.3%	41.7%		8.3%	31.7%		12.5%	34.2%		15.8%	37.5%	
Maximum Green (s)	18.0	44.0		6.0	32.0		11.0	35.0		15.0	39.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	

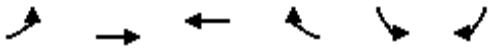
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	
Walk Time (s)		8.0			8.0			10.0			10.0	
Flash Dont Walk (s)		21.0			21.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	56.0	46.0		41.2	35.2		48.7	38.1		55.3	41.4	
Actuated g/C Ratio	0.47	0.38		0.34	0.29		0.41	0.32		0.46	0.34	
v/c Ratio	0.71	0.86		0.65	0.48		0.62	0.85		0.82	0.61	
Control Delay	31.3	41.8		42.8	35.0		30.3	46.7		51.8	33.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.3	41.8		42.8	35.0		30.3	46.7		51.8	33.3	
LOS	C	D		D	D		C	D		D	C	
Approach Delay		39.5			36.4			43.9			37.7	
Approach LOS		D			D			D			D	
Queue Length 50th (m)	47.2	125.8		12.7	44.6		25.3	104.2		33.8	68.0	
Queue Length 95th (m)	70.1	156.3		#30.9	61.4		41.0	#139.2		#72.0	88.9	
Internal Link Dist (m)		72.7			493.2			543.9			383.8	
Turn Bay Length (m)	50.0			50.0			80.0			80.0		
Base Capacity (vph)	433	1251		143	907		289	1020		271	1095	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.69	0.86		0.65	0.48		0.61	0.85		0.77	0.61	

Intersection Summary

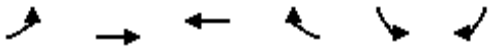
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 13 (11%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 85
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 39.9 Intersection LOS: D
Intersection Capacity Utilization 94.0% ICU Level of Service F
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 46: Fischer-Hallman & Erb Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	85	945	530	45	150	96
Future Volume (vph)	85	945	530	45	150	96
Ideal Flow (vphpl)	1775	1900	1775	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	35.0			0.0	55.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	45.0				15.0	
Lane Util. Factor	1.00	*0.70	0.95	0.95	1.00	1.00
Ped Bike Factor	0.99		1.00		1.00	0.98
Frt			0.988			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1670	2583	3147	0	1686	1473
Flt Permitted	0.430				0.950	
Satd. Flow (perm)	748	2583	3147	0	1684	1443
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			20			96
Link Speed (k/h)		60	60		50	
Link Distance (m)		167.3	674.3		336.7	
Travel Time (s)		10.0	40.5		24.2	
Confl. Peds. (#/hr)	12			12	1	7
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	3%	6%	0%	0%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	85	945	530	45	150	96
Shared Lane Traffic (%)						
Lane Group Flow (vph)	85	945	575	0	150	96
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	2		4	
Permitted Phases	2					4
Detector Phase	2	2	2		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		8.0	8.0
Minimum Split (s)	27.0	27.0	27.0		28.0	28.0
Total Split (s)	57.5	57.5	57.5		28.0	28.0
Total Split (%)	67.3%	67.3%	67.3%		32.7%	32.7%
Maximum Green (s)	51.5	51.5	51.5		22.0	22.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0



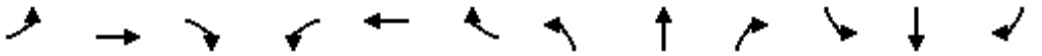
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Gap (s)	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0	0.0
Recall Mode	Max	Max	Max		None	None
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0	0		5	5
Act Effct Green (s)	56.8	56.8	56.8		15.2	15.2
Actuated g/C Ratio	0.71	0.71	0.71		0.19	0.19
v/c Ratio	0.16	0.52	0.26		0.47	0.27
Control Delay	5.9	7.4	4.9		32.5	7.8
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	5.9	7.4	4.9		32.5	7.8
LOS	A	A	A		C	A
Approach Delay		7.2	4.9		22.8	
Approach LOS		A	A		C	
Queue Length 50th (m)	3.4	37.7	12.5		20.3	0.0
Queue Length 95th (m)	12.2	85.2	28.9		36.8	11.2
Internal Link Dist (m)		143.3	650.3		312.7	
Turn Bay Length (m)	35.0				55.0	
Base Capacity (vph)	531	1834	2240		507	501
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.16	0.52	0.26		0.30	0.19

Intersection Summary			
Area Type:	Other		
Cycle Length: 85.5			
Actuated Cycle Length: 80			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.52			
Intersection Signal Delay: 8.6		Intersection LOS: A	
Intersection Capacity Utilization 43.6%		ICU Level of Service A	
Analysis Period (min) 15			

* User Entered Value

Splits and Phases: 214: Erb Street & Erbsville Court



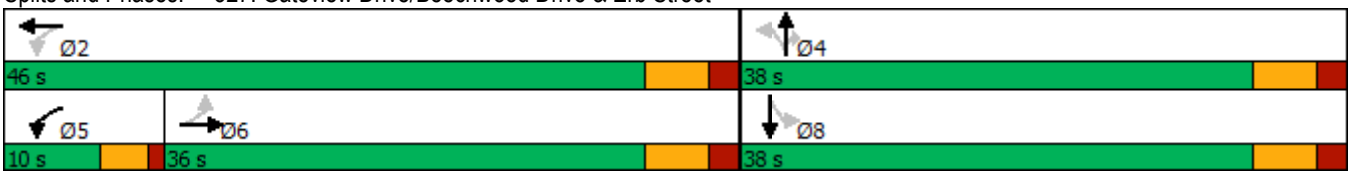


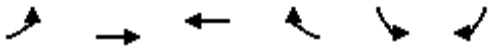
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1060	20	85	540	35	25	10	240	105	10	10
Future Volume (vph)	15	1060	20	85	540	35	25	10	240	105	10	10
Ideal Flow (vphpl)	1775	1775	1000	1775	1775	1000	1000	1650	1750	1775	1650	1000
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (m)	30.0			30.0			7.5			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00			1.00				0.98	0.99		
Frt		0.997			0.991				0.850		0.925	
Flt Protected	0.950			0.950				0.966		0.950		
Satd. Flow (prot)	1686	3297	0	1547	3201	0	0	1480	1444	1670	1454	0
Flt Permitted	0.436			0.157				0.835		0.734		
Satd. Flow (perm)	772	3297	0	256	3201	0	0	1279	1412	1277	1454	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			11				202		10	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		674.3			216.8			120.2			123.2	
Travel Time (s)		40.5			13.0			8.7			8.9	
Confl. Peds. (#/hr)	3		1	1		3			13	13		
Confl. Bikes (#/hr)												
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	0%	9%	4%	8%	4%	17%	3%	1%	10%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	15	1060	20	85	540	35	25	10	240	105	10	10
Shared Lane Traffic (%)												
Lane Group Flow (vph)	15	1080	0	85	575	0	0	35	240	105	20	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			4			8	
Permitted Phases	6			2			4		4	8		
Detector Phase	6	6		5	2		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		9.0	27.0		38.0	38.0	38.0	38.0	38.0	
Total Split (s)	36.0	36.0		10.0	46.0		38.0	38.0	38.0	38.0	38.0	
Total Split (%)	42.9%	42.9%		11.9%	54.8%		45.2%	45.2%	45.2%	45.2%	45.2%	
Maximum Green (s)	30.0	30.0		6.0	40.0		32.0	32.0	32.0	32.0	32.0	
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		0.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Recall Mode	Max	Max		None	Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0			7.0		15.0	15.0	15.0	15.0	15.0	
Flash Dont Walk (s)	14.0	14.0			14.0		17.0	17.0	17.0	17.0	17.0	
Pedestrian Calls (#/hr)	0	0			0		5	5	5	5	5	
Act Effct Green (s)	35.5	35.5		43.6	43.6			16.3	16.3	16.3	16.3	
Actuated g/C Ratio	0.52	0.52		0.64	0.64			0.24	0.24	0.24	0.24	
v/c Ratio	0.04	0.63		0.31	0.28			0.11	0.49	0.34	0.06	
Control Delay	12.9	16.3		9.7	7.0			19.2	8.3	23.3	13.0	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	12.9	16.3		9.7	7.0			19.2	8.3	23.3	13.0	
LOS	B	B		A	A			B	A	C	B	
Approach Delay		16.3			7.3			9.7			21.6	
Approach LOS		B			A			A			C	
Queue Length 50th (m)	0.8	45.5		2.9	11.4			3.5	3.8	11.2	1.0	
Queue Length 95th (m)	5.6	#123.9		14.9	40.5			9.4	18.2	22.4	5.2	
Internal Link Dist (m)		650.3			192.8			96.2			99.2	
Turn Bay Length (m)	30.0			30.0						20.0		
Base Capacity (vph)	403	1723		279	2058			648	815	647	741	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.04	0.63		0.30	0.28			0.05	0.29	0.16	0.03	

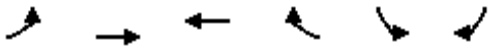
Intersection Summary			
Area Type:	Other		
Cycle Length: 84			
Actuated Cycle Length: 68			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 13.0		Intersection LOS: B	
Intersection Capacity Utilization 71.1%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 327: Gateview Drive/Beechwood Drive & Erb Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	1000	620	35	50	40
Future Volume (vph)	70	1000	620	35	50	40
Ideal Flow (vphpl)	1775	1900	1650	1000	1775	1750
Lane Width (m)	3.6	3.6	3.6	3.6	3.6	3.6
Grade (%)		0%	0%		0%	
Storage Length (m)	30.0			0.0	50.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.993			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1606	1792	1484	0	1591	1365
Flt Permitted	0.381				0.950	
Satd. Flow (perm)	644	1792	1484	0	1591	1365
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			10			40
Link Speed (k/h)		60	60		50	
Link Distance (m)		927.8	232.9		75.5	
Travel Time (s)		55.7	14.0		5.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	6%	11%	0%	6%	9%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	70	1000	620	35	50	40
Shared Lane Traffic (%)						
Lane Group Flow (vph)	70	1000	655	0	50	40
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	2		4	
Permitted Phases	2					4
Detector Phase	2	2	2		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		7.0	7.0
Minimum Split (s)	11.0	11.0	11.0		13.0	13.0
Total Split (s)	54.0	54.0	54.0		16.0	16.0
Total Split (%)	77.1%	77.1%	77.1%		22.9%	22.9%
Maximum Green (s)	48.0	48.0	48.0		10.0	10.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0

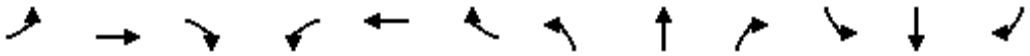


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Minimum Gap (s)	3.0	3.0	3.0		3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0		0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0		0.0	0.0
Recall Mode	Max	Max	Max		None	None
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
Act Effct Green (s)	57.6	57.6	57.6		10.0	10.0
Actuated g/C Ratio	0.84	0.84	0.84		0.15	0.15
v/c Ratio	0.13	0.67	0.53		0.22	0.17
Control Delay	3.4	7.6	5.5		28.0	11.0
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	3.4	7.6	5.5		28.0	11.0
LOS	A	A	A		C	B
Approach Delay		7.3	5.5		20.5	
Approach LOS		A	A		C	
Queue Length 50th (m)	2.0	57.9	29.4		6.0	0.0
Queue Length 95th (m)	6.2	124.3	63.0		15.0	7.8
Internal Link Dist (m)		903.8	208.9		51.5	
Turn Bay Length (m)	30.0				50.0	
Base Capacity (vph)	539	1499	1243		277	271
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.13	0.67	0.53		0.18	0.15

Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 68.8			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 7.3		Intersection LOS: A	
Intersection Capacity Utilization 65.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 859: Erb Street & Westside Market





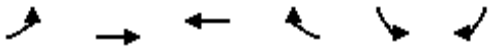
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	460	0	0	850	60	0	0	0	45	0	15
Future Volume (vph)	10	460	0	0	850	60	0	0	0	45	0	15
Ideal Flow (vphpl)	1900	1550	1900	1900	1550	1900	1900	1550	1900	1900	1550	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.991						0.966	
Flt Protected		0.999									0.964	
Satd. Flow (prot)	0	1518	0	0	1506	0	0	1520	0	0	1415	0
Flt Permitted		0.999									0.964	
Satd. Flow (perm)	0	1518	0	0	1506	0	0	1520	0	0	1415	0
Link Speed (k/h)		70			70			60			60	
Link Distance (m)		320.8			927.8			163.0			427.1	
Travel Time (s)		16.5			47.7			9.8			25.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	460	0	0	850	60	0	0	0	45	0	15
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	470	0	0	910	0	0	0	0	0	60	0
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 70.1%		ICU Level of Service C	
Analysis Period (min) 15			



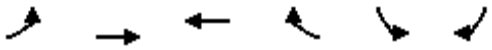
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	820	35	50	1210	35	20
Future Volume (vph)	820	35	50	1210	35	20
Ideal Flow (vphpl)	1775	1000	1775	1900	1775	1750
Storage Length (m)		0.0	35.0		0.0	15.0
Storage Lanes		0	1		1	1
Taper Length (m)			45.0		7.5	
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.994					0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3287	0	1653	3539	1653	1458
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	3287	0	1653	3539	1653	1458
Link Speed (k/h)	60			60	50	
Link Distance (m)	303.0			167.3	121.9	
Travel Time (s)	18.2			10.0	8.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	820	35	50	1210	35	20
Shared Lane Traffic (%)						
Lane Group Flow (vph)	855	0	50	1210	35	20
Sign Control	Free			Free	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 43.4%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	45	880	1510	90	40	65
Future Volume (vph)	45	880	1510	90	40	65
Ideal Flow (vphpl)	1000	1775	1775	1000	1775	1750
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.992			0.850
Flt Protected		0.998			0.950	
Satd. Flow (prot)	0	3300	3280	0	1653	1458
Flt Permitted		0.998			0.950	
Satd. Flow (perm)	0	3300	3280	0	1653	1458
Link Speed (k/h)		60	60		50	
Link Distance (m)		216.8	126.7		69.8	
Travel Time (s)		13.0	7.6		5.0	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	45	880	1510	90	40	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	925	1600	0	40	65
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 71.7%		ICU Level of Service C	
Analysis Period (min) 15			



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	70	850	1495	175	80	105
Future Volume (vph)	70	850	1495	175	80	105
Ideal Flow (vphpl)	1775	1900	1775	1000	1775	1750
Storage Length (m)	10.0			0.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.984			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1653	3539	3253	0	1653	1458
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1653	3539	3253	0	1653	1458
Link Speed (k/h)		60	60		50	
Link Distance (m)		126.7	96.7		39.9	
Travel Time (s)		7.6	5.8		2.9	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	70	850	1495	175	80	105
Shared Lane Traffic (%)						
Lane Group Flow (vph)	70	850	1670	0	80	105
Sign Control		Free	Free		Yield	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 69.1%		ICU Level of Service C	
Analysis Period (min) 15			

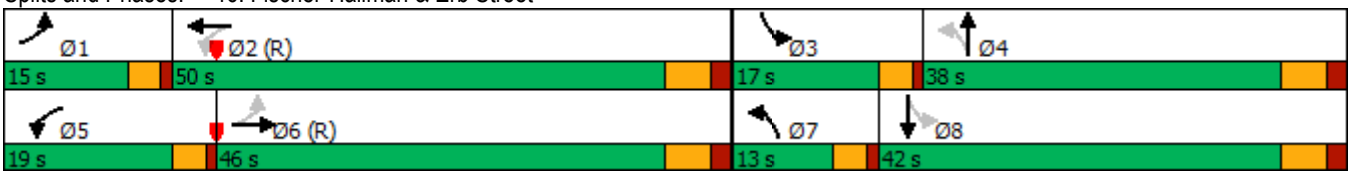
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	230	510	190	200	1180	170	200	500	100	165	830	290
Future Volume (vph)	230	510	190	200	1180	170	200	500	100	165	830	290
Ideal Flow (vphpl)	1775	1775	1000	1775	1775	1000	1775	1775	1000	1775	1775	1000
Storage Length (m)	50.0		0.0	50.0		0.0	80.0		0.0	80.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	40.0			40.0			40.0			40.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95	1.00	0.95	0.95
Ped Bike Factor		1.00		1.00	1.00			0.99		0.99	0.99	
Frt		0.959			0.981			0.975			0.961	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1686	3188	0	1686	3260	0	1670	3224	0	1670	3178	0
Flt Permitted	0.095			0.234			0.120			0.226		
Satd. Flow (perm)	169	3188	0	415	3260	0	211	3224	0	394	3178	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		49			15			19			43	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		96.7			517.2			567.9			407.8	
Travel Time (s)		5.8			31.0			34.1			24.5	
Confl. Peds. (#/hr)	13		4	4		13	11		19	19		11
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	0%	1%	1%	0%	1%	2%	1%	1%	3%	1%	1%	2%
Adj. Flow (vph)	230	510	190	200	1180	170	200	500	100	165	830	290
Shared Lane Traffic (%)												
Lane Group Flow (vph)	230	700	0	200	1350	0	200	600	0	165	1120	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases	6			2			4			8		
Detector Phase	1	6		5	2		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.0	35.0		9.0	35.0		9.0	31.0		9.0	31.0	
Total Split (s)	15.0	46.0		19.0	50.0		13.0	38.0		17.0	42.0	
Total Split (%)	12.5%	38.3%		15.8%	41.7%		10.8%	31.7%		14.2%	35.0%	
Maximum Green (s)	11.0	40.0		15.0	44.0		9.0	32.0		13.0	36.0	
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	4.0		3.0	4.0	
All-Red Time (s)	1.0	2.0		1.0	2.0		1.0	2.0		1.0	2.0	
Lost Time Adjust (s)	0.0	-2.0		0.0	-2.0		0.0	-2.0		0.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	Max		None	Max	
Walk Time (s)		8.0			8.0			10.0			10.0	
Flash Dont Walk (s)		21.0			21.0			15.0			15.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	55.2	44.2		58.8	46.0		44.2	35.2		49.8	38.0	
Actuated g/C Ratio	0.46	0.37		0.49	0.38		0.37	0.29		0.42	0.32	
v/c Ratio	1.06	0.58		0.59	1.07		1.07	0.63		0.57	1.08	

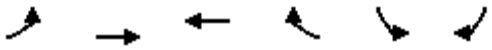
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	110.3	30.9		24.1	83.1		114.8	39.2		30.4	90.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	110.3	30.9		24.1	83.1		114.8	39.2		30.4	90.8	
LOS	F	C		C	F		F	D		C	F	
Approach Delay		50.6			75.5			58.1			83.0	
Approach LOS		D			E			E			F	
Queue Length 50th (m)	~46.7	68.2		26.7	~194.7		~39.3	66.6		25.6	~159.7	
Queue Length 95th (m)	#100.4	90.6		42.0	#239.7		#88.9	87.2		41.8	#203.8	
Internal Link Dist (m)		72.7			493.2			543.9			383.8	
Turn Bay Length (m)	50.0			50.0			80.0			80.0		
Base Capacity (vph)	216	1204		369	1258		187	959		305	1035	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	1.06	0.58		0.54	1.07		1.07	0.63		0.54	1.08	

Intersection Summary

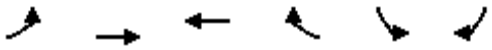
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 13 (11%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green
Natural Cycle: 95
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.08
Intersection Signal Delay: 69.5 Intersection LOS: E
Intersection Capacity Utilization 114.5% ICU Level of Service H
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 46: Fischer-Hallman & Erb Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	60	780	1210	60	50	50
Future Volume (vph)	60	780	1210	60	50	50
Ideal Flow (vphpl)	1775	1900	1775	1000	1775	1750
Storage Length (m)	35.0			0.0	55.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	45.0				15.0	
Lane Util. Factor	1.00	*0.70	0.95	0.95	1.00	1.00
Ped Bike Factor	1.00		1.00		1.00	
Frt			0.993			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1637	2660	3309	0	1686	1488
Flt Permitted	0.194				0.950	
Satd. Flow (perm)	334	2660	3309	0	1680	1488
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			11			50
Link Speed (k/h)		60	60		50	
Link Distance (m)		167.3	674.3		336.7	
Travel Time (s)		10.0	40.5		24.2	
Confl. Peds. (#/hr)	7			7	3	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	0%	1%	2%	0%	0%
Adj. Flow (vph)	60	780	1210	60	50	50
Shared Lane Traffic (%)						
Lane Group Flow (vph)	60	780	1270	0	50	50
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	2		4	
Permitted Phases	2					4
Detector Phase	2	2	2		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		8.0	8.0
Minimum Split (s)	27.0	27.0	27.0		28.0	28.0
Total Split (s)	57.5	57.5	57.5		28.0	28.0
Total Split (%)	67.3%	67.3%	67.3%		32.7%	32.7%
Maximum Green (s)	51.5	51.5	51.5		22.0	22.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	Max	Max	Max		None	None
Walk Time (s)	7.0	7.0	7.0		7.0	7.0
Flash Dont Walk (s)	14.0	14.0	14.0		15.0	15.0
Pedestrian Calls (#/hr)	0	0	0		5	5
Act Effct Green (s)	63.8	63.8	63.8		12.8	12.8
Actuated g/C Ratio	0.79	0.79	0.79		0.16	0.16
v/c Ratio	0.23	0.37	0.48		0.19	0.18



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Control Delay	7.4	4.8	5.4		29.7	9.5
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	7.4	4.8	5.4		29.7	9.5
LOS	A	A	A		C	A
Approach Delay		5.0	5.4		19.6	
Approach LOS		A	A		B	
Queue Length 50th (m)	2.0	21.1	28.6		7.7	0.0
Queue Length 95th (m)	12.2	63.0	81.3		15.0	8.1
Internal Link Dist (m)		143.3	650.3		312.7	
Turn Bay Length (m)	35.0				55.0	
Base Capacity (vph)	264	2104	2620		504	479
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.23	0.37	0.48		0.10	0.10

Intersection Summary			
Area Type:	Other		
Cycle Length: 85.5			
Actuated Cycle Length: 80.7			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.48			
Intersection Signal Delay: 5.9		Intersection LOS: A	
Intersection Capacity Utilization 58.7%		ICU Level of Service B	
Analysis Period (min) 15			

* User Entered Value

Splits and Phases: 214: Erb Street & Erbsville Court



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	775	30	270	1225	80	25	10	100	50	15	20
Future Volume (vph)	25	775	30	270	1225	80	25	10	100	50	15	20
Ideal Flow (vphpl)	1775	1775	1000	1775	1775	1000	1000	1650	1750	1775	1650	1000
Storage Length (m)	30.0		0.0	30.0		0.0	0.0		0.0	20.0		0.0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (m)	30.0			30.0			7.5			30.0		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor								1.00			0.99	
Frt		0.994			0.991				0.850		0.914	
Flt Protected	0.950			0.950				0.966		0.950		
Satd. Flow (prot)	1576	3289	0	1670	3311	0	0	1594	1444	1686	1497	0
Flt Permitted	0.211			0.245				0.810		0.734		
Satd. Flow (perm)	350	3289	0	431	3311	0	0	1336	1444	1303	1497	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			11				100		20	
Link Speed (k/h)		60			60			50			50	
Link Distance (m)		674.3			216.8			120.2			123.2	
Travel Time (s)		40.5			13.0			8.7			8.9	
Confl. Peds. (#/hr)							1					1
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	7%	2%	0%	1%	1%	0%	0%	0%	3%	0%	0%	0%
Adj. Flow (vph)	25	775	30	270	1225	80	25	10	100	50	15	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	25	805	0	270	1305	0	0	35	100	50	35	0
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		6		5	2			4			8	
Permitted Phases	6			2			4		4	8		
Detector Phase	6	6		5	2		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		10.0	10.0	10.0	10.0	10.0	
Minimum Split (s)	27.0	27.0		9.0	27.0		38.0	38.0	38.0	38.0	38.0	
Total Split (s)	36.0	36.0		14.0	50.0		38.0	38.0	38.0	38.0	38.0	
Total Split (%)	40.9%	40.9%		15.9%	56.8%		43.2%	43.2%	43.2%	43.2%	43.2%	
Maximum Green (s)	30.0	30.0		10.0	44.0		32.0	32.0	32.0	32.0	32.0	
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		1.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		0.0	-2.0			-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0			4.0	4.0	4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	Max	Max		None	Max		None	None	None	None	None	
Walk Time (s)	7.0	7.0			7.0		15.0	15.0	15.0	15.0	15.0	
Flash Dont Walk (s)	14.0	14.0			14.0		17.0	17.0	17.0	17.0	17.0	
Pedestrian Calls (#/hr)	0	0			0		5	5	5	5	5	
Act Effct Green (s)	34.3	34.3		48.1	49.1			15.7	15.7	15.7	15.7	
Actuated g/C Ratio	0.50	0.50		0.71	0.72			0.23	0.23	0.23	0.23	
v/c Ratio	0.14	0.49		0.56	0.54			0.11	0.24	0.17	0.10	

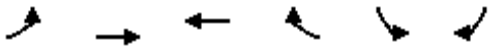
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	17.1	15.2		12.6	8.7			21.3	6.2	22.2	12.7	
Queue Delay	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	17.1	15.2		12.6	8.7			21.3	6.2	22.2	12.7	
LOS	B	B		B	A			C	A	C	B	
Approach Delay		15.3			9.4			10.1			18.3	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	1.7	34.6		10.1	34.9			3.8	0.0	5.6	1.6	
Queue Length 95th (m)	9.7	82.8		#49.2	117.0			9.9	9.7	13.1	7.5	
Internal Link Dist (m)		650.3			192.8			96.2			99.2	
Turn Bay Length (m)	30.0			30.0						20.0		
Base Capacity (vph)	176	1659		492	2396			684	788	667	776	
Starvation Cap Reductn	0	0		0	0			0	0	0	0	
Spillback Cap Reductn	0	0		0	0			0	0	0	0	
Storage Cap Reductn	0	0		0	0			0	0	0	0	
Reduced v/c Ratio	0.14	0.49		0.55	0.54			0.05	0.13	0.07	0.05	

Intersection Summary			
Area Type:	Other		
Cycle Length: 88			
Actuated Cycle Length: 68			
Natural Cycle: 75			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 11.6		Intersection LOS: B	
Intersection Capacity Utilization 63.3%		ICU Level of Service B	
Analysis Period (min) 15			

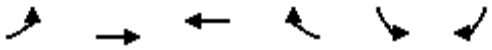
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 327: Gateview Drive/Beechwood Drive & Erb Street





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	55	995	1365	90	160	65
Future Volume (vph)	55	995	1365	90	160	65
Ideal Flow (vphpl)	1775	1900	1800	1000	1775	1750
Storage Length (m)	30.0			0.0	50.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.992			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1621	1792	1753	0	1653	1488
Flt Permitted	0.065				0.950	
Satd. Flow (perm)	111	1792	1753	0	1653	1488
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			12			65
Link Speed (k/h)		60	60		50	
Link Distance (m)		927.8	232.9		75.5	
Travel Time (s)		55.7	14.0		5.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	6%	2%	0%	2%	0%
Adj. Flow (vph)	55	995	1365	90	160	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	55	995	1455	0	160	65
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		2	2		4	
Permitted Phases	2					4
Detector Phase	2	2	2		4	4
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0		7.0	7.0
Minimum Split (s)	11.0	11.0	11.0		13.0	13.0
Total Split (s)	66.0	66.0	66.0		16.0	16.0
Total Split (%)	80.5%	80.5%	80.5%		19.5%	19.5%
Maximum Green (s)	60.0	60.0	60.0		10.0	10.0
Yellow Time (s)	4.0	4.0	4.0		4.0	4.0
All-Red Time (s)	2.0	2.0	2.0		2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0		4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	Max	Max	Max		None	None
Act Effct Green (s)	62.0	62.0	62.0		11.7	11.7
Actuated g/C Ratio	0.76	0.76	0.76		0.14	0.14
v/c Ratio	0.66	0.73	1.09		0.68	0.24
Control Delay	48.3	9.5	67.1		49.3	11.2
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	48.3	9.5	67.1		49.3	11.2
LOS	D	A	E		D	B
Approach Delay		11.5	67.1		38.3	



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Approach LOS		B	E		D	
Queue Length 50th (m)	3.4	69.8	~274.9		25.2	0.0
Queue Length 95th (m)	#13.8	114.7	#356.4		#51.0	10.9
Internal Link Dist (m)		903.8	208.9		51.5	
Turn Bay Length (m)	30.0				50.0	
Base Capacity (vph)	83	1360	1334		242	274
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.66	0.73	1.09		0.66	0.24

Intersection Summary			
Area Type:	Other		
Cycle Length: 82			
Actuated Cycle Length: 81.7			
Natural Cycle: 90			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 1.09			
Intersection Signal Delay: 43.4		Intersection LOS: D	
Intersection Capacity Utilization 97.7%		ICU Level of Service F	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 859: Erb Street & Westside Market



Appendix D: Initial Roundabout Screening – Erb/Beechwood Place

March 7, 2019

Region of Waterloo

REGION OF WATERLOO
ROUNDABOUT FEASIBILITY
INITIAL SCREENING TOOL VERSION 2.0

The intent of this screening tool is to provide a relatively quick assessment of the feasibility of a modern roundabout at a particular intersection in comparison to other appropriate forms of traffic control or road improvements including auxiliary lanes, traffic control signals, four-way stop, etc. The intended outcome of this tool is to provide enough information to assist staff in deciding whether or not to proceed to an Intersection Control Study to further investigate in more detail the feasibility of a roundabout.

1) Project Name/Region File No. (completed Screening Tools are to be stored in Docs Public Folder/Roundabout Coordination Committee/Intersection Locations) .:

   Erb Street West Class Environmental Assessment

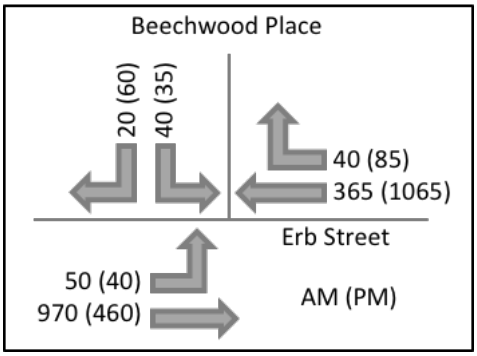
2) Intersection Location
   (Street/Road Names, municipality, distance from major intersection, etc.):

   Erb Street West and Beechwood Place, City of Waterloo

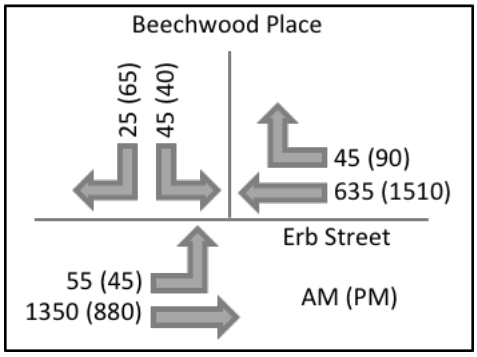
3) Brief Description of Existing Intersection
   (Number of Legs, Lanes on each leg, total existing AADT, existing AADT on each road, etc. Attach or sketch diagram showing existing and horizon-year turning movements.):

   Existing three-leg unsignalized intersection. Two travel lanes on Erb Street in each direction with shared turn lanes. One lane inbound and outbound onBeechwood Place (north leg). Peak hour volumes shown below.

Existing Traffic



2024 Future Traffic



4) What operational problems are being experienced at this location?

   Existing traffic warrants a 25 metre eastbound left turn lane. 2024 future traffic warrants a 55 metre eastbound left turn lane.

5) Is it a new intersection or is it a retrofit of an existing intersection? If existing, what is the existing traffic control?

Existing unsignalized intersection stop-controlled on the Beechwood Place approach.

6) Is the intersection in the vicinity of a railroad crossing *or another intersection?* If so, how close and what type of traffic control exists at the adjacent intersection(s)? Will queues be a problem?

Signalized intersection at Beechwood/Gateview 220 metres to the west – no problem with queueing. Unsignalized driveway to Beechwood Centre 130 metres to east – no problem with queueing. Signalized intersection at Fischer-Hallman Road 230 metres to the east – no problem with queueing.

7) Would the intersection be located within a coordinated signal system?

Yes

8) Is the intersection located within a corridor that is scheduled for improvements in the 10 Year Transportation Capital Program? What is the ultimate cross-section of the approach roads?
Yes, two through lanes on Erb Street in the eastbound and westbound directions (as existing) with proposed centre turn lane extending from Fischer-Hallman Road to Beechwood/Gateview.

9) What is the collision history of the intersection over the past five years? Is there a collision problem that needs to be addressed? What is the current and past ranking of this intersection as identified in the Region's Annual Collision Report?

Two collisions 2010 – 2014. One involving an impaired driver hitting a fixed object not in the intersection. One involving an eastbound vehicle rear-ending a stopped eastbound through vehicle at a private drive because they were travelling too fast on an icy road during freezing rain. No collision problem to be addressed.

10) What traditional road improvements are warranted for this intersection and what year is it warranted?
(eg. traffic signals, all-way stop, auxiliary lanes, etc. based on Region of Waterloo warrants) Please attach a sketch of the traditional road improvements. A sample sketch is attached (DOCS #529440).

Eastbound left turn lane – 55 metres.

11) What size of roundabout is being considered for this intersection? (eg. Single-lane, two-lane entry or three-lane entry?) Please attach a Traffic Flowsheet and lane configuration diagram. Please attach a sketch showing how a roundabout would "fit" into the right-of-way.

Two-lane entry.

12) 20-Year Life Cycle Cost Estimate

Base Year AADT: 21,540

10-Year (post construction) AADT: 29,780

20 YEAR LIFE-CYCLE COST COMPARISON		
Cost Item	**Other Traffic Control**	**Roundabout**
Implementation Cost	$250,000	$1,200,000
Injury Collision Cost (Present Value)	$443,708.17	$604,366.58
Total Life Cycle Cost	**X$693,708.17**	**Y$1,804,366.58**

Notes:

- Please attach copy of completed Region of Waterloo ***HSM 20-year Present Value Collision Costs rev March 2016***
- Implementation Cost = sum of costs for construction, property utility relocations, illumination, engineering (20%), contingency (20%) and maintenance (5%);
- Generally the roundabout is preferred if it is 1.5 times the cost or less than other Traffic Control

Conclusions and Recommendation

Given that the total capital cost of the roundabout is more than 1.5 times the cost of a stop-controlled intersection in this location, a roundabout is not recommended and the intersection improvement as identified should proceed.

INTERSECTION CONTROL STUDIES
SAFETY ASSESSMENT METHODOLOGY (HSM)

Region of Waterloo

Mar 2017 - Test

Scenario: Erb St at Beechwood Place

Major Road: Erb Street

Minor Road: Beechwood Place

Major Road Direction:	East / West
Urban or Rural:	Urban
Proposed Control:	Stop Control
Proposed Config.	3-Leg Intersection

LT Lanes Proposed (non roundabout):		RT Lanes Proposed (non roundabout):	
Major	1 Approach	Major	No RT Lanes
Minor	No LT Lanes	Minor	No RT Lanes

Is there going to be any fully protected left-turn phasing?	NO
Number of approaches with FPLTP:	N/A

Is the proposed intersection "new" or is it existing:	EXISTING
Does control and number of approaches remain the same:	YES
Will the proposed intersection have illumination:	YES

5-Year Total Collisions: 9

5-Year PDO Collisions: 7

Proposed Multi-Lane or Single Lane RA? MULTI-LANE ROUNDABOUT

Major Road (mid-block) 10-Year Horizon AADT:

Minor Road (mid-block) 10-Year Horizon AADT:

10-Year Horizon AADT(North Leg) 4,050

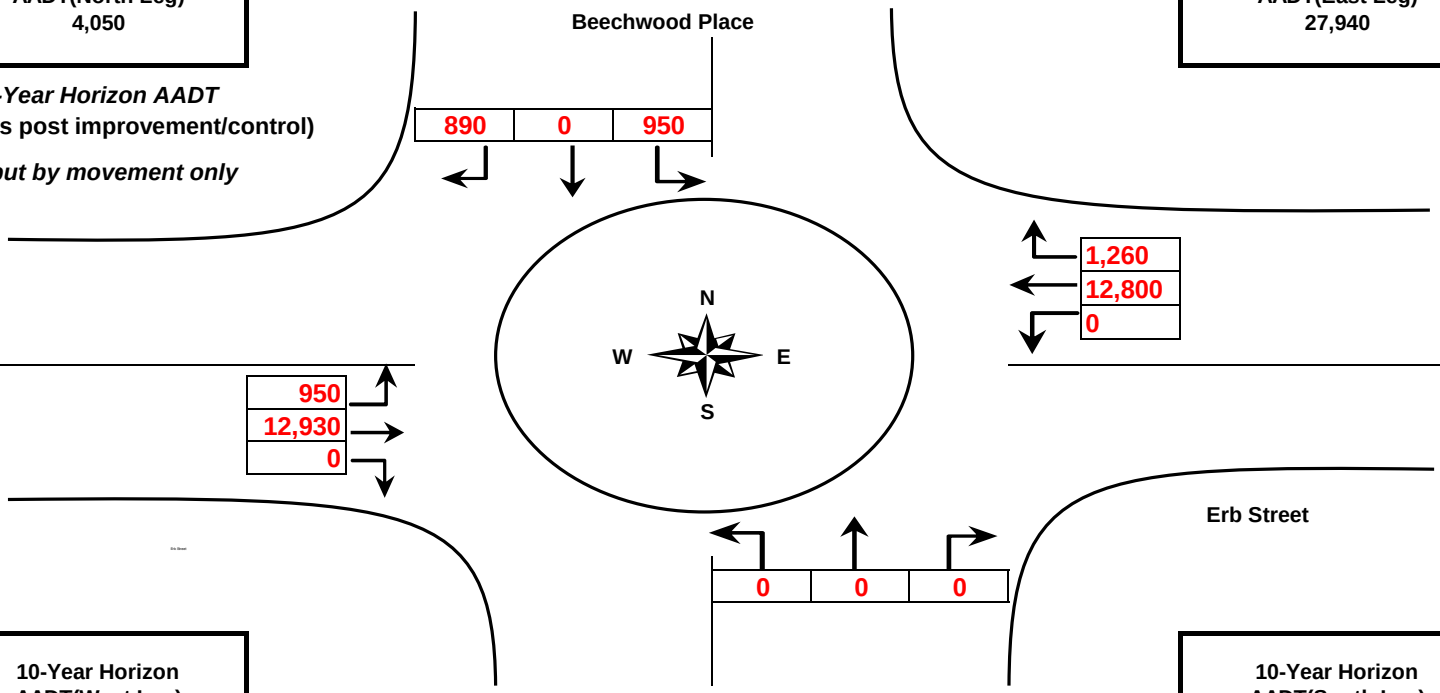
10-Year Horizon AADT(East Leg) 27,940

10-Year Horizon AADT(West Leg) 27,570

10-Year Horizon AADT(South Leg) 0

** 10-Year Horizon AADT (10ys post improvement/control)*

** Input by movement only*



Direct Capital Costs

20-Year Present Value Collision Costs (DIRECT CAPITAL COSTS)				
Collisions by Severity	**Total**	**PDO**	**Injury**	**Fatal**
Stop Control	$443,708.17	$88,318	$298,390	$56,999.77
Roundabout	$604,366.58	$257,786.69	$346,579.89	$0.00

INTERSECTION CONTROL STUDIES
SAFETY ASSESSMENT METHODOLOGY (HSM)

Region of Waterloo

Mar 2017 - Test

Scenario: **Erb St at Beechwood Place**

Major Road: **Erb Street**
Minor Road: **Beechwood Place**

Major Road Direction:

Urban or Rural:

Proposed Control:

Proposed Config.

Roundabout Conflicts: **8430**

5-Year Total Collisions: **9**

5-Year PDO Collisions: **7**

Estimated **ANNUAL (1-YEAR ONLY)** Collisions				
Future Expected Collisions by Severity	**Total**	**PDO**	**Injury**	**Fatal**
Stop Control	**1.97**	**1.54**	**0.43**	**0.00**
Roundabout	**5.0**	**4.5**	**0.5**	**0.0**

TOTAL CRASH COEFFICIENTS USED IN CALCULATION						Fatal/Inj. Ratio	Collision Factor
Control	Intersection Config	Intercept	AADTmaj	AADTmin	Overdispersion		
Stop Control	3-Leg Intersection	**-13.36**	**1.11**	**0.41**	**0.8**	**0.006**	**n/a**

PDO CRASH COEFFICIENTS USED IN CALCULATION						Fatal/Inj. Ratio	Collision Factor
Control	Intersection Config	Intercept	AADTmaj	AADTmin	Overdispersion		
Stop Control	3-Leg Intersection	**-15.38**	**1.2**	**0.51**	**0.77**	**0.006**	**n/a**

Collision Modification Factors (cmf's)	Left Turn Lane	Right Turn Lane	Calibration Factor	Empirical Bays Weighting	
			0.61	Total	PDO
				0.867614127	**0.888523948**
	Illumination	Protected LT Phasing			
	0.91	**1.00**			

Comments:

APPENDIX H

Acoustical Impact Assessment

Region of Waterloo

ACOUSTICAL IMPACT ASSESSMENT

THE REGION OF WATERLOO

ERB STREET WIDENING
Project No.: 2014-0114-10

June 15, 2018

WALTERFEDY

REGION OF WATERLOO

ACOUSTICAL IMPACT ASSESSMENT
Erb Street Widening

Table of Contents

Page

1.0 INTRODUCTION....1
2.0 Noise Level Criteria....1
2.1 Line Source Criteria....1
3.0 Source Information....1
3.1 Sensitive Receivers....2
4.0 Noise Impact Assessment Results....4
5.0 Mitigation Measures....5
5.1 Acoustical Barriers....5
6.0 Recommendations and Conclusions....6

APPENDICES

Appendix A Noise Information Plan
Appendix B Traffic Data
Appendix C Calculation Results

1.0 INTRODUCTION

WalterFedy was retained to conduct an Environmental Assessment (EA) report for the projected widening of Erb Street between Ira Needles Boulevard/Erbsville Road and Fischer-Hallman Road in the Region of Waterloo. As part of the EA report, an Acoustical Impact Assessment Study is required to determine the acoustical impacts resulting from the improvements.

This study will identify the noise impacts at the sensitive receivers and determine the mitigation measures, if required, to be included as part of the works for the widening of Erb Street.

2.0 NOISE LEVEL CRITERIA

A condition of the preparation of the EA report is to review the impacts of noise levels created from acoustical sources as a result of the improvements to Erb Street. The Region of Waterloo (ROW) has developed criteria that outline the allowable permissible acoustic levels for the surrounding sensitive receivers. "Sensitive receivers" are defined as land uses that may be adversely impacted by noise levels, and that must be planned and/or designed using appropriate land use compatibility principles (NPC-300). The existing surrounding developments are located in the urban boundary of the City of Kitchener and, therefore, are assumed to be in a "Class 1 Area" (urban) as defined by the Ministry of Environment (MOE).

2.1 Line Source Criteria

A "Line Source" is defined as a source of noise that traverses along a line such as a transportation corridor (i.e. roadways or railways). Acoustical impacts from these sources are to be determined at all sensitive receivers within the existing adjacent developments and are to be assessed as outlined by the guidelines stipulated by the ROW. The ROW criteria for noise levels resulting from improvements to line sources are summarized as follows:

- The increase in acoustical level at each sensitive receiver, when comparing current annual average daily traffic (AADT) volumes to ultimate AADT, may not exceed 5.0 dBA.
- The acoustical level at each sensitive receiver based on ultimate AADT does not exceed 65.0dBA.
- Should either of these criteria be exceeded, acoustical mitigation measures are to be integrated into the design of the roadway improvements, which is completed by incorporating the construction of acoustical barriers to protect the sensitive receivers.

3.0 SOURCE INFORMATION

Erb Street between Ira Needles Boulevard/Erbsville Road and Fischer-Hallman Road is a Regional road and is classified as a neighbourhood connector (avenue). Neighbourhood connectors are typically continuous across several communities/neighbourhoods within the Region. Neighbourhood connectors balance active transportation (bicycles and pedestrians), transit, and vehicle movement, providing a higher level of priority (design and comfort) for pedestrians, cyclists, and transit users.

Data for Erb Street was obtained from the Region of Waterloo and has been divided into separate road sections to accurately depict the impact due to defined AADT. The following table shows the relevant information required for noise level calculations for each road section. Refer to Appendix B for all collected traffic data.

Table 3: Roadway Data

Road Section	AADT (vpd)	Count Year	Speed Limit	Medium Trucks (%)	Heavy Trucks (%)	Road Grade	Day/Night Split
Ira Needles/Erbsville to Westhaven	12,780	2016	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Ira Needles/Erbsville to Westhaven	20,720	2026	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Westhaven to Erbsville Court	13,200	2016	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Westhaven to Erbsville Court	21,980	2026	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Erbsville Court to Beechwood/Gateview	13,860	2016	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Erbsville Court to Beechwood/Gateview	22,970	2026	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Beechwood/Gateview to Beechwood Place	19,720	2016	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Beechwood/Gateview to Beechwood Place	29,140	2026	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Beechwood Place to Beechwood Centre	19,860	2016	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Beechwood Place to Beechwood Centre	29,335	2026	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Beechwood Centre to Fischer-Hallman	20,235	2016	50 km/h	2.0%	5.0%	1.5%	90% / 10%
Beechwood Centre to Fischer-Hallman	29,610	2026	50 km/h	2.0%	5.0%	1.5%	90% / 10%
East of Fischer-Hallman	19,325	2016	50 km/h	2.0%	5.0%	1.5%	90% / 10%
East of Fischer-Hallman	26,555	2026	50 km/h	2.0%	5.0%	1.5%	90% / 10%

3.1 Sensitive Receivers

The existing developments surrounding Erb Street consist of a mix of residential and commercial. Due to the nature of commercial developments, the Regional criteria for acoustical impacts do not apply. As such, only the residential receivers will be assessed as part of this report.

Residential developments adjacent to Erb Street are parts of larger subdivision blocks and, therefore, all units back onto the right-of-way. As such, the sensitive receiver locations are defined as the rear yards of these units, identified as outdoor living areas (OLA) per the Ministry of the Environment (MOE) publication NPC-300, for determination of daytime noise impacts and the second storey window, at the face of the unit, for determination of night time noise impacts.

The minimum distance setbacks for each sensitive receiver location are shown in the following table.

Table 4: Sensitive Receiver Locations

Road Section	North Side Source to Receiver Distance	South Side Source to Receiver Distance
Ira Needles/Erbsville to Westhaven	19.4 m	N/A
Westhaven to Erbsville Court	18.8 m	33.0 m
Erbsville Court to Beechwood/Gateview	18.6 m	20.7 m
Beechwood/Gateview to Beechwood Place	15.2 m	33.6 m
Beechwood Place to Beechwood Centre	N/A	33.6 m
Beechwood Centre to Fischer-Hallman	N/A	31.5 m
East of Fischer-Hallman	N/A	N/A

Refer to Appendix A, which contains the Noise Information Plan showing the location of each sensitive receiver.

4.0 NOISE IMPACT ASSESSMENT RESULTS

Sound levels produced from Erb Street have been calculated using the MOE's ORNAMENT prediction procedure to determine theoretical impacts. A computer program, STAMSON version 5.0, has been used for this analysis, which incorporates both ORNAMENT (road) and STEAM (rail) prediction methods. Acoustical impacts at each receiver location have been calculated and are shown in the following table. Calculation results are found in Appendix C.

Table 5 - Acoustical Impacts from Erb Street

Road Section (North Side)	Noise Impact 2016 (Day)	Noise Impact Ultimate (Day)	Diff.	Noise Impact 2016 (Night)	Noise Impact Ultimate (Night)	Diff.
Ira Needles/Erbsville to Westhaven	64.4	66.5	2.1	58.1	60.2	2.1
Westhaven to Erbsville Court	64.8	67.0	2.2	58.5	60.7	2.2
Erbsville Court to Beechwood/Gateview	65.1	67.3	2.2	58.8	61.0	2.2
Beechwood/Gateview to Beechwood Place	68.1	69.8	1.7	61.7	63.4	1.7
Beechwood Place to Beechwood Centre	--	--		--	--	
Beechwood Centre to Fischer-Hallman	--	--		--	--	
East of Fischer-Hallman	--	--		--	--	
Ira Needles/Erbsville to Westhaven	--	--		--	--	
Westhaven to Erbsville Court	60.7	63.0	2.3	54.7	56.9	2.2
Erbsville Court to Beechwood/Gateview	64.3	66.5	2.2	58.1	60.3	2.2
Beechwood/Gateview to Beechwood Place	62.4	64.1	1.7	56.3	58.0	1.7
Beechwood Place to Beechwood Centre	62.4	64.1	1.7	56.3	58.0	1.7
Beechwood Centre to Fischer-Hallman	62.9	64.6	1.7	56.8	58.5	1.7
East of Fischer-Hallman	--	--		--	--	

As shown in the above table, acoustical impacts at a number of receivers are above levels outlined within the Regional guidelines and, therefore, will require mitigation to reduce impacts. It is noted that the night time impacts are within the allowable limits and mitigation measures will only be required to mitigate daytime levels and protect the OLA of the adjacent units.

5.0 MITIGATION MEASURES

The results of the calculations indicate noise levels at a number of receivers are above the allowable criteria outlined by the Region of Waterloo. Mitigation of acoustical impacts is to be performed through the use of barriers to protect the OLA as no additional mitigation is required for night time impacts.

5.1 Acoustical Barriers

Because the daytime noise levels at the OLA exceed the ROW criteria, a barrier is required to provide mitigation to reduce acoustical impacts. Calculations were conducted using STAMSON to assess the construction of acoustical barrier to protect the rear yards as shown on the Noise Information Plan (Appendix A). As a result of calculations, it was determined that a barrier with a height shown in the following table measured from the highest finished grade elevation within the adjacent lot be installed adjacent to the rear yards as shown in the Noise Information Plan.

Table 6: Noise Barrier Requirements

Road Section (North Side)	North Side Acoustical Barrier Height (m)	South Side Acoustical Barrier Height (m)
Ira Needles/Erbsville to Westhaven	2.0	--
Westhaven to Erbsville Court	2.0	--
Erbsville Court to Beechwood/Gateview	2.0	2.0
Beechwood/Gateview to Beechwood Place	2.0	--
Beechwood Place to Beechwood Centre	--	--
Beechwood Centre to Fischer-Hallman	--	--
East of Fischer-Hallman	--	--

Acoustical barrier is to be installed with a minimum density of 20 kg/m², with no holes or gaps within or below the barrier, and prior to occupancy of adjacent lots. The barrier should be inspected to ensure that there are no gaps or holes within or below the barrier.

6.0 RECOMMENDATIONS AND CONCLUSIONS

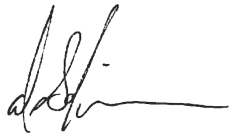
Based on the discussion herein, the following recommendations are proposed for the existing residential sensitive receivers to provide mitigation to acoustical impacts and provide acoustical levels within the criteria specified by the Region of Waterloo.

- Acoustical impacts are such that acoustical barriers are required to protect certain units along the Erb Street corridor as identified above and shown graphically within the Noise Information Plan contained in Appendix A.
- Acoustical barriers are to be installed with a minimum density of 20 kg/m², with no holes or gaps within or below the barrier.
- Prior to construction, an acoustical engineer should review the shop drawings for all acoustical barriers to ensure that they meet the requirements based on final grading and location.
- Due to the nature of commercial developments, no additional mitigation measures are required for these developments.

Therefore, with the inclusion of the specified mitigation measures outlined within this report, acoustical impacts will conform to the criteria specified by the Region of Waterloo.

All of which is respectfully submitted,

WALTERFEDY

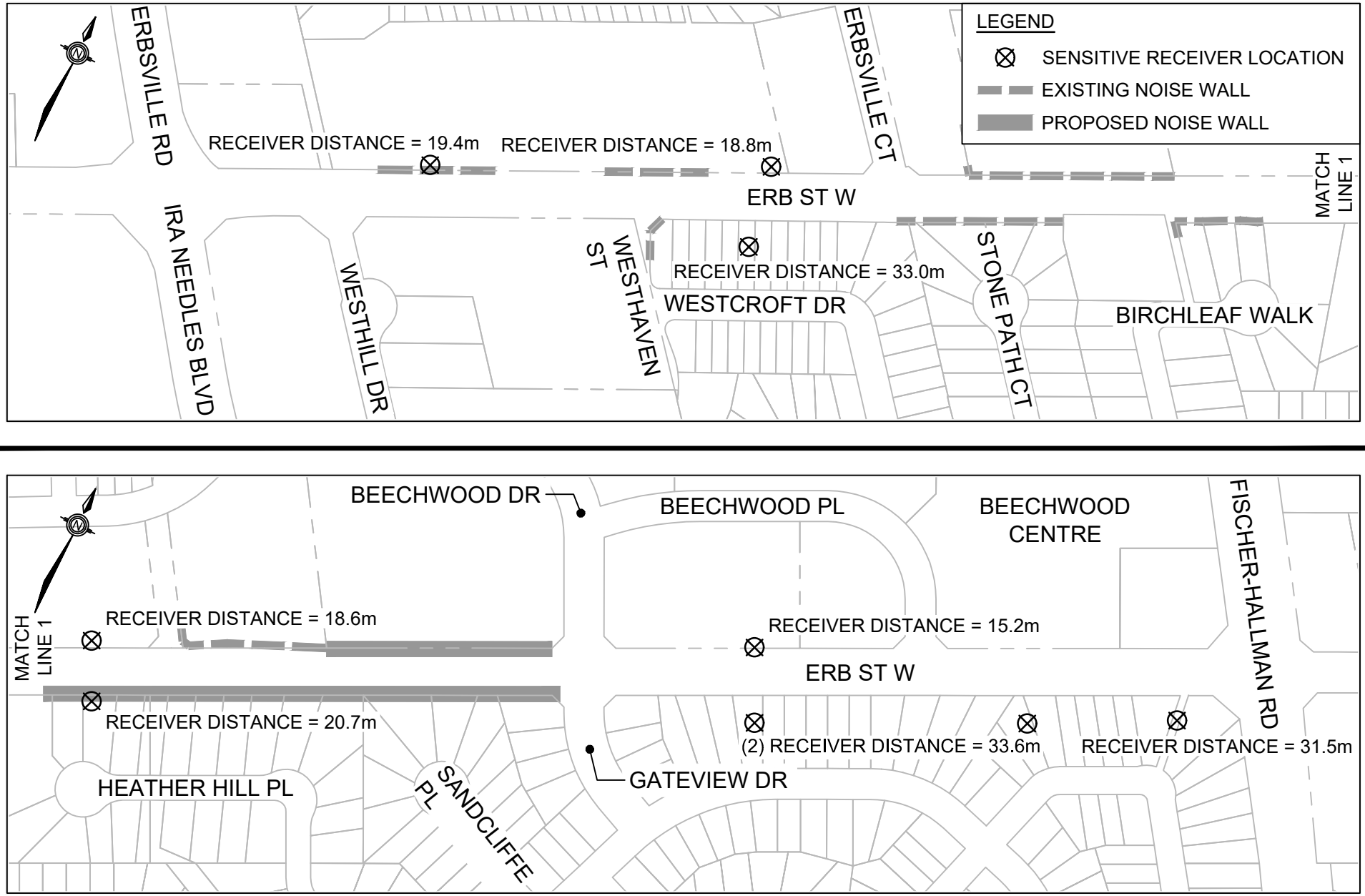


Dan Schipper, P.Eng.
Civil Engineering
Associate

dschipper@walterfedy.com
519.576.2150 Ext. 276

APPENDIX A

Noise Information Plan



title:
ERB STREET WIDENING & CORRIDOR STUDY
NOISE INFORMATION PLAN

sheet no.:

FIG. 1

APPENDIX B

Traffic Data

Erb Street - Traffic Data

	2016	**Ultimate**	Difference
Section	**AADT**	**AADT**	**AADT**
~~West of Wilmot Line~~	~~8,330~~	~~13,720~~	~~5,390~~
~~Wilmot Line to Waterloo Waste Management Site~~	~~9,280~~	~~14,930~~	~~5,650~~
~~Waterloo Waste Management Site to Westside Marketplace~~	~~10,230~~	~~20,560~~	~~10,330~~
~~Westside Marketplace to Ira Needles/Erbsville~~	~~10,850~~	~~21,480~~	~~10,630~~
Ira Needles/Erbsville to Westhaven	12,780	20,720	7,940
Westhaven to Erbsville Crt.	13,200	21,980	8,780
Erbsville Crt. To Beechwood/Gateview	13,860	22,970	9,110
Beechwood/Gateview to Beechwood Pl.	19,720	29,140	9,420
Beechwood Pl. to Beechwood Centre	19,860	29,335	9,475
Beechwood Centre to Fischer-Hallman	20,235	29,610	9,375
East of Fischer-Hallman	19,325	26,555	7,230

APPENDIX C

Calculation Results

ERB STREET WIDENING - ACOUTICAL IMPACT ASSESSMENT

Project #: 2014-0114-05
Date: 2016-08-26

	Erb Street Offset		Traffic Counts		North Side						South Side					
Road Section:	**Closest North (m):**	**Closest South (m):**	**2016 AADT**	**Ultimate AADT**	**Noise Impact 2016 (Day)**	**Noise Impact Ultimate (Day)**	**Difference (dBA)**	**Noise Impact 2016 (Night)**	**Noise Impact Ultimate (Night)**	**Difference (dBA)**	**Noise Impact 2016 (Day)**	**Noise Impact Ultimate (Day)**	**Difference (dBA)**	**Noise Impact 2016 (Night)**	**Noise Impact Ultimate (Night)**	**Difference (dBA)**
Ira Needles/Erbsville to Westhaven	19.4	N/A	12,780	20,720	64.4	66.5	2.1	58.1	60.2	2.1	--	--		--	--	
Westhaven to Erbsville Crt.	18.8	33.0	13,200	21,980	64.8	67.0	2.2	58.5	60.7	2.2	60.7	63.0	2.3	54.7	56.9	2.2
Erbsville Crt. To Beechwoood/Gateview	18.6	20.7	13,860	22,970	65.1	67.3	2.2	58.8	61.0	2.2	64.3	66.5	2.2	58.1	60.3	2.2
Beechwood/Gateview to Beechwood Pl.	15.2	33.6	19,720	29,140	68.1	69.8	1.7	61.7	63.4	1.7	62.4	64.1	1.7	56.3	58.0	1.7
Beechwood Pl. to Beechwood Centre	N/A	33.6	19,860	29,335	--	--		--	--		62.4	64.1	1.7	56.3	58.0	1.7
Beechwood Centre to Fischer-Hallman	N/A	31.5	20,235	29,610	--	--		--	--		62.9	64.6	1.7	56.8	58.5	1.7
East of Fischer-Hallman	N/A	N/A	19,325	26,555	--	--		--	--		--	--		--	--	

Exceedance of 65dBA and triggers need for acoustical barrier from existing traffic

Exceedance of 65dBA and triggers need for acoustical barrier from ultimate traffic

Notes:

Region requirements state that noise levels from reconstruction/widening projects are to be reviewed from an acoustical perspective and based on the following may require acoustical barriers.
- If the acoustical levels based on Ultimate traffic volumes exceed 65dBA, acoutical barriers shall be installed.
- If the acoustical levels increase by more than 5dBA between acoustical levels from current traffic volumes compared to ulitmate tarffic volumes, where acoustical levels are below 65dBA, acoustical barriers shall be installed.

APPENDIX I

Geotechnical Investigation Report

June 1, 2017

FINAL GEOTECHNICAL INVESTIGATION REPORT FOR ROAD WIDENING AND RECONSTRUCTION, REGION OF WATERLOO

Erb Street West Corridor, Fischer-Hallman Road to Wilmot Line, Waterloo

Submitted to:
Walterfedy
675 Queen Street South
Suite 111
Kitchener, ON
N2M 1A1

REPORT

Report Number: 13-1186-0383 (1000)

Distribution:

1 E-Copy: Walterfedy
1 E-Copy: Golder Associates Ltd.

Golder Associates

Table of Contents

1.0 INTRODUCTION 1

2.0 SITE AND PROJECT DESCRIPTION 1

3.0 INVESTIGATION PROCEDURES 2

4.0 SUBSURFACE CONDITIONS 2

4.1 Asphalt 3

4.2 Sand and Gravel (Granular Base/Subbase) 3

4.3 Fill 3

4.4 Organic Layer - Topsoil 3

4.5 Asphalt Treated Sand and Gravel 3

4.6 Silty Clay to Clayey Silt 4

4.7 Silty Sand, Sand and Gravel Non-Cohesive Deposits /Interlayers 4

4.8 Groundwater Conditions 4

5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS 5

5.1 General 5

5.2 Proposed Noise Barrier Walls 5

5.2.1 Shallow Foundations 5

5.3 Excavation for Site Services 7

5.3.1 Open Cut Excavations and Groundwater Control 7

5.3.2 Pipe Bedding and Cover 7

5.3.3 Trench Backfill 7

5.3.4 Decommissioning of Wells 8

6.0 PAVEMENT DESIGN RECOMMENDATIONS 8

6.1 Traffic Analysis 8

6.2 Pavement Design Analysis 9

6.3 Pavement Structure Recommendation and Comments 10

7.0 ADDITIONAL WORK, INSPECTION AND TESTING 10

Important Information and Limitations of This Report
Method of Soil Classification
Abbreviations and Terms Used on Records of Boreholes and Test Pits
List of Symbols

FIGURES
Figures 1 to 4 – Borehole Location Plan

APPENDICES

APPENDIX A
Record of Boreholes 14-01 to 14-32

APPENDIX B
Geotechnical Laboratory Test Results

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by Walterfedy on behalf of the Region of Waterloo (Region) to provide geotechnical engineering services related to the widening of Erb Street West from Wilmot Line to Fischer-Hallman Road including the following components:

- Replacement of watermain, storm and sanitary sewer along the above noted section of Erb Street West;
- Reconstruction of the pavement along Erb Street West; and
- Construction of sound barrier walls.

The terms of reference and scope of work for the geotechnical investigation and design services are outlined in Golder's Proposal No. P3-1186-0383, dated December 5, 2013.

Our professional services for this assignment address only the geotechnical (physical) aspects of the subsurface conditions at this site. Geo-environmental (chemical) aspects of the project, including consequences of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources, are outside our terms of reference for this project and are not addressed herein.

The factual data, interpretations and recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. If the project is modified in scope, concept, location or elevation, or if the project is not initiated within twelve months of the date of the report, Golder Associates Ltd. (Golder) should be given an opportunity to confirm that the recommendations are still valid.

This report should be read in conjunction with "Important Information and Limitations of This Report", attached. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2.0 SITE AND PROJECT DESCRIPTION

It is understood that the project involves the widening of Erb Street West from Wilmot Line to Fischer-Hallman Road (Project Limits) in the Region of Waterloo, Ontario. The surrounding ground surface north and south of the road is generally at about the same elevation as the road.

The current roadway alignment is bordered by commercial developments, farm lands and residential lands on the north and south sides of the road.

The specific aspects of Golder's scope of work addressed in this report include:

- Geotechnical recommendations for the installation of the new watermain, storm and sanitary sewers along the road;
- Pavement Design; and
- Foundation recommendations for the proposed sound barrier walls along the project limits. The proposed walls are to be constructed at about Station 10+060 on the north side of the road, Station 10+850 on both north and south sides of the road and Station 12+030 on the south side of the road.

3.0 INVESTIGATION PROCEDURES

The field work for the current investigation was carried out from December 1 to 10, 2014, and comprised drilling a total of thirty two (32) conventionally sampled geotechnical boreholes as summarized below and as shown on Figures 1 to 4, following the text of this report.

Borehole No.	Proposed Works	Approximate Borehole Depth (m) Below Existing Ground Surface (bgs)
14-01 to 14-32	Road Widening and replacement of Sewers and Watermain along Erb Street	5.2 m to 9.8 m
14-10, 14-11, 14-20, 14-22, 14-31 and 14-32	Proposed Sound Barrier Walls	6.7 m to 9.8 m

The field investigation was carried out using a truck-mounted CME 75 drill rig supplied by Geo-Environmental Drilling Inc., Ontario. These boreholes were advanced using 150 mm outside diameter hollow stem augers. Soil samples were obtained at 0.75 m and 1.5 m intervals of depth, using 50 mm outside diameter split spoon samplers driven by an automatic hammer in accordance with Standard Penetration Test procedures outlined in ASTM D1586-08a.

The groundwater conditions in the open boreholes were observed during the drilling operations and monitoring wells were installed in Boreholes 14-02, 14-05, 14-11, 14-18 to permit long term monitoring of the groundwater levels at the site. The monitoring wells consisted of 51 mm diameter PVC pipe, with a slotted screen sealed at a select depth within the borehole. A sand filter pack surrounds the screen and above the screen the borehole and annulus surrounding the monitoring wells pipe were backfilled to the ground surface with holeplug. The monitoring well installation details and water level readings are provided on the Record of Borehole Sheets following the text of this report. The boreholes in which no monitoring well was installed were backfilled with bentonite upon completion in accordance with Ontario Regulation 903 (as amended).

The field work was observed by members of Golder's engineering and technical staff, who located the boreholes, arranged for the clearance of underground services, observed the drilling, sampling and in situ testing operations, logged the boreholes, and examined and cared for the soil samples. The soil samples were identified in the field, placed in appropriate containers, labelled and transported to Golder's geotechnical laboratory in Cambridge where the soil samples underwent further detailed visual examination and geotechnical classification testing (water content, Atterberg limits and grain size distribution tests).

4.0 SUBSURFACE CONDITIONS

The detailed subsurface soil and groundwater conditions as encountered in the boreholes advanced for this investigation and the results of laboratory tests carried out on selected soil samples are shown on the Record of Borehole sheets following the text of this report in Appendix A and Figures B1 to B5 in Appendix B. List of Abbreviations and Symbols are also provided to assist in the interpretation of the borehole logs. The stratigraphic boundaries shown on the borehole records are inferred from non-continuous sampling, observations of drilling

progress and the results of Standard Penetration Tests. These boundaries, therefore, represent transitions between soil types rather than exact planes of geological change. The subsoil conditions will vary between and beyond the borehole locations.

In general, the subsurface conditions within the road consists of asphalt underlain by varying thicknesses of fill with some topsoil interlayers. The fill is underlain by a silty clay to clayey silt deposit within which interlayers of silty sand to sandy silt and/or sand were encountered.

More detailed descriptions of the subsurface conditions encountered in the boreholes are provided in the following sections.

4.1 Asphalt

All boreholes (except Borehole 14-32) were advanced through the existing pavement structure of Erb Street West and encountered a surface layer of asphalt having a thickness ranging from 130 mm to 280 mm.

4.2 Sand and Gravel (Granular Base/Subbase)

Road base fill materials consisting of sand and gravel, sand some gravel to silty sand some gravel (granular base/subbase materials) were encountered underlying the asphalt in Boreholes 14-01 to 14-31 and at surface in Borehole 14-32 and ranged in thickness from about 0.51 m to 1.45 m.

4.3 Fill

Fill materials consisting mainly of silty sand to sand fill to silty clay/clayey silt fill were encountered in the majority of the boreholes with the exception of Boreholes 14-02, 14-04, 14-08 to 14-09, 14-15, 14-16, 14-20, 14-23, 14-26 to 14-27, 14-31. The fill materials were encountered underlying the sand and gravel pavement structure and extended to depths ranging from about 0.7 m to 4.1 m below ground surface.

Standard Penetration Test (SPT) 'N' values measured in the non-cohesive fill materials yielded SPT "N" values ranging from 1 blow per 0.3 m of penetration to 34 blows per 0.3 m of penetration indicating a very loose to compact relative density.

SPT 'N' values measured in the cohesive fill materials yielded SPT "N" values ranging from 2 blows per 0.3 m of penetration to 12 blows per 0.3 m of penetration indicating a very soft to very stiff consistency.

Laboratory testing on selected samples of the fill materials indicates that the natural water contents typically ranged from 2 percent to 14 percent of the dry weight.

The results of grain size distributions on selected samples of the non-cohesive and cohesive fills are presented on Figures B1 and B2 in Appendix B.

4.4 Organic Layer - Topsoil

An approximately 1.5 m thick layer of topsoil/organics was encountered within the fill material in Borehole 14-22.

4.5 Asphalt Treated Sand and Gravel

An approximately 100 mm to 380 mm thick layer of an existing asphalt treated sand and gravel material was encountered at depth in Boreholes 14-01, 14-02, 14-06, 14-08 and 14-10.

4.6 Silty Clay to Clayey Silt

A silty clay to clayey silt deposit was encountered below the sand and gravel pavement structure and/or surficial fill materials in the majority of the boreholes with the exception for Boreholes 14-09, 14-12, 14-24 and 14-26.

The silty clay to clayey silt till deposit was brown to grey in colour and contained varying amounts of sand and gravel.

SPT 'N' values within the silty clay to clayey silt till deposit yielded SPT "N" values ranging from 4 blows to 56 blows per 0.3 m of penetration indicating a firm to hard consistency.

Laboratory testing on selected samples of the silty clay to clayey silt materials indicates that the natural water contents typically ranged from 10 percent to 23 percent of the dry weight.

The results of grain size distributions and Atterberg Limits analyses carried out on representative samples of the silty clay to clayey silt, are presented on Figures B3 and B4, in Appendix B.

4.7 Silty Sand, Sand and Gravel Non-Cohesive Deposits /Interlayers

Non-cohesive deposits were encountered in Boreholes 14-02, 14-03, 14-08 to 14-12, 14-16, 14-18, 14-23 to 14-27, and 14-29 to 14-32 and consisted of silty sand to sandy silt, sand to sand and gravel below the fill materials.

The silty sand to sandy silt, sand to sand and gravel were brown to grey in colour and contained varying amounts of clay and gravel.

SPT 'N' values within the silty sand to sandy silt, sand to sand and gravel typically ranged from 3 blows to greater than 89 blows per 0.3 m of penetration indicating a very loose to very dense relative density.

Laboratory testing on selected samples of the Silty Sand and Sand and Gravel materials indicates that the natural water contents typically ranged from 1 percent to 18 percent of the dry weight.

The results of grain size distributions on selected samples of the non-cohesive deposit are presented on Figure B5 in Appendix B.

4.8 Groundwater Conditions

Monitoring wells were installed in four (4) boreholes (Boreholes 14-02, 14-05, 14-11 and 14-18) to permit monitoring of the groundwater levels. Details of the monitoring wells installation are shown on the Record of Borehole sheets, following the text of this report. The measured water levels in the standpipe piezometers are summarized below:

Borehole Number	Upon Completion of Drilling (December 1 to 4, 2014)	March 19, 2015
	Depth	Depth
14-02	3.5 m	2.6 m
14-05	3.0 m	Dry
14-11	5.8 m	3.0 m
14-18	3.9 m	2.0 m

It should be noted that the groundwater levels in the area are subject to seasonal fluctuations and precipitation events, and should be expected to be higher during the wet periods of the year. Perched groundwater conditions may develop above the fine-grained glacial till soils, most notably during and following periods of sustained precipitation.

5.0 GEOTECHNICAL DESIGN RECOMMENDATIONS

5.1 General

This section of the report provides engineering information related to the geotechnical design aspects of the project, based on our interpretation of the borehole information and our understanding of the project requirements. The information in this portion of the report is provided for the guidance of the design engineers and professionals. Where comments are made on construction, they are provided only in order to highlight aspects of construction that could affect the design of the project. Contractors bidding on or undertaking any work at the site should examine the factual results of the investigation, satisfy themselves as to the adequacy of the information for construction and make their own interpretation of the factual data as it affects their proposed construction techniques, schedule, equipment capabilities, costs, sequencing and the like.

5.2 Proposed Noise Barrier Walls

5.2.1 Shallow Foundations

For support of the proposed sound barrier walls, strip or spread footings should be founded below the fill and any loose or soft to stiff surficial soils, on competent native soil deposits. Minimum founding depths, geotechnical resistance at Ultimate Limit State (ULS) and at Serviceability Limit State (SLS) corresponding to about 25 mm of settlement for the design of spread footings are provided in the table below. These parameters assume axially and concentrically loaded square spread footings up to about 1 m wide.

Soft cohesive soils were encountered in borehole 14-22 (approximate Station 12+000, south of the road) that could experience higher settlements relative to adjacent areas. A lower geotechnical reaction at SLS is advised at this location (as indicated in the table above). To reduce distortions caused by differential settlement between Station 11+800 (near borehole 14-20) and Station 12+200 (near borehole 14-22), consideration should be given to using shorter spans between foundation elements.

Retaining Wall Location	Adjacent Borehole (s)	Proposed Founding Depth (below existing ground surface) at the location of the borehole	Founding Stratum	Factored Geotechnical Resistance at Ultimate Limit States (ULS)	Geotechnical Reaction at Serviceability Limit States (SLS)
From Station 10+000 to Station 10+120 north side of the Road	14-31	1.5 m	Stiff silty clay/clayey silt	200 kPa	150 kPa
From station 10+820 to Station 10+890 on the north side of the Road	14-32	3.8 m	Stiff clayey silt	200 kPa	150 kPa
From station 10+820 to Station 10+980 on the south side of the Road*	14-10 and 14-11	3.2 m to 3.8 m	Compact sand	250 kPa	200 kPa
From station 11+700 to Station 12+160 on the south side of the Road*	14-20 and 14-22	1.5 m to 2.2 m	Firm silty clay/clayey silt	200 kPa	75 kPa

* Additional investigation will be required at the exact location of the proposed retaining wall to confirm the recommended founding depths.

Alternatively, subexcavation can be carried out to the elevations identified in the table above, then backfilled with compacted Ontario Provincial Standard Specification (OPSS) 1010 Granular A or Granular B Type II engineered fill prior to construction of the footings at a higher elevation. In this case, the founding elevations for the new footings should be a minimum of 1.4 m below the lowest surrounding grade elevation to provide adequate protection against frost penetration, per Ontario Provincial Standard Drawing (OPSD) 3090.101 *(Foundation Frost Depths for Southern Ontario)*. The engineered granular pad should extend at least 1 m beyond the front and back edge of the new footings, then outward and downward at 1H:1V. The granular fill should be placed in lifts and compacted to 100 percent Standard Proctor Maximum dry density (SPMDD) in accordance with MTO Special Provision 105S10 *(Compaction).*

The footing subgrade should be inspected by a qualified geotechnical engineer following excavation, in accordance with OPSS 902 *(Excavating and Backfilling Structures)* to verify that all existing fill, loose or soft to stiff surficial soils, or other unsuitable material have been removed. The founding soils will be susceptible to disturbance. If the concrete for the footings cannot be poured immediately, it is recommended that a 100 mm thick concrete working slab (of 20 MPa compressive strength concrete) be placed on the prepared subgrade within four hours of its inspection and approval.

The ULS resistance and settlement are dependent on the footing size, configuration and applied loads; therefore, the factored geotechnical resistances provided above should be reviewed when the foundation designs have been determined, or if the founding stratum differs from those outlined above. In addition, these geotechnical

resistances are provided for loads applied perpendicular to the surface of the footings; where applicable, inclination of the load should be taken into account in accordance with Section 6.7.4 of the *Canadian Highway Bridge Design Code (CHBDC 2006)* and it's *Commentary*.

The geotechnical resistance values provided above may need to be re-evaluated and modified as necessary during the detail design phase, based on the requirements of the structural engineer.

5.3 Excavation for Site Services

5.3.1 Open Cut Excavations and Groundwater Control

It is understood that the invert depth of the proposed watermain, storm and sanitary sewers will be about 2 m to 3 m below the existing ground surface (bgs). Conventional open cut excavation construction for the proposed watermain, storm and sanitary sewers will be through fill materials and/or clayey silt to silty clay. In accordance with the Occupational Health and Safety Act (OHSA) of Ontario, the existing fill materials and the firm to stiff silty clay to clayey silt till at this site are classified as Type 3 or Type 4 soils and the very stiff clayey silt to silty clay till is classified as Type 2 soil. Temporary open-cut excavations through the Type 4 soils should be made with side slopes not steeper than 3 horizontal to 1 vertical (3H:1V). Temporary open-cut excavations through the Type 3 soils should be made with side slopes not steeper than 1 horizontal to 1 vertical (1H:1V). Temporary open cut excavations through the Type 2 soil may be made sloped to within 1.2 m of its bottom at 1H:1V and steeper for the lower 1.2 m. To limit the lateral extent of the excavation a trench box could be used in the lower portion of the open cut excavation.

Based on the water levels measured in the open boreholes, the groundwater is typically between about 3.0 m to 5.8 m below ground surface. Excavations for the installation of the watermain, storm and sanitary sewers are anticipated to be above the groundwater table for most of the road alignment. Seepage from zones of perched water within the fill materials should be expected particularly where granular zones are intercepted in the excavation. The seepage through these fill materials is expected to be minor and pumping from properly filtered sumps located at the base of the excavation should provide sufficient control of surface water and any "perched" groundwater. Shallower side slopes may be required to minimize surficial sloughing if the construction is carried out at times of high "perched" water levels. Surface water should be directed away from the excavation areas.

5.3.2 Pipe Bedding and Cover

A minimum of 150 mm of Granular "A" meeting OPSS 1010 should be used as pipe bedding for the storm and sanitary sewers. The bedding material should extend to the spring line of the pipe and should be compacted to at least 95 percent of the SPMDD using suitable vibratory compaction equipment. Cover material, from the spring line of the pipe to at least 300 mm above the top of the pipe, should consist of OPSS 1010 Granular "A" or Granular "B" Type II with a maximum particle size of 25 mm. Clear stone should not be used as bedding material. All bedding and cover material should be placed in 150 mm loose lifts and uniformly compacted to at least 95 percent of the materials SPMDD.

5.3.3 Trench Backfill

Trench backfill above the pipe cover material should consist of approved excavated material (such as the existing granular fill and cohesive till), imported selected subgrade material (SSM) or OPSS 1010 Granular "B" Type II. For frost heave compatibility and roadway performance, the trench backfill within the frost zone depth of 1.4 m and the existing roadway base/subbase/asphaltic concrete layers should match the existing materials exposed on the

trench walls as much as practically possible. This will require some separation of material upon excavation for reuse in the frost zone. Failure to match the existing materials within the frost zone and roadway structure may result in differential frost heave along the trench which, given the highly frost susceptible material encountered at this site, could be significant.

The site soils may be used for trench backfill provided they are free of topsoil, organic material or other deleterious material. Care should be taken to minimize the potential for over-wetting of the soils during the construction operations. Difficulties with compaction and/or backfill performance should be anticipated for soils where the water content is above the optimum for compaction purposes. Soils that are significantly above their optimum water content for compaction are not considered suitable for re-use as trench backfill. Therefore, these soils would require drying or mixing with drier materials prior to re-use as trench backfill.

All trench backfill materials should be placed in lifts with maximum 300 mm loose thickness and uniformly compacted to at least 95 percent of SPMDD within the pavement areas. If backfilling operations are carried out during cold weather, it should be ensured that no inclusions of frozen lumps of soil, snow or ice are incorporated into the backfill. Backfill placed and compacted under such conditions must be carried out so that the fill temperature is above 0° C throughout the placement and compaction process.

Normal post-construction settlement of the compacted trench backfill should be anticipated with the majority of such settlement taking place within about six months following the completion of trench backfilling operations.

5.3.4 Decommissioning of Wells

The wells installed at the site have been left functional in order to allow future monitoring of the groundwater level at the site. However, these piezometers may provide a conduit for groundwater flow and should be abandoned prior to construction of the proposed reconstruction or if the project is put on hold. Ontario Regulation (O.Reg.) 903, amended, of the Ontario Water Resources Act identifies the required decommissioning procedures for monitoring wells/piezometers.

6.0 PAVEMENT DESIGN RECOMMENDATIONS

Preliminary pavement design recommendations have been developed for the reconstruction of Erb Street West throughout the project limits. Further investigation including but not limited to a visual pavement condition inspection and review of existing drainage conditions should be carried out prior to finalizing the pavement structure design. The following preliminary pavement design recommendation is based on the results of Golder's field investigation, limited laboratory testing and traffic data provided by Salvini Consulting (Salvini).

6.1 Traffic Analysis

Traffic data (Average Annual Daily Traffic (AADT), growth rate and truck percentage) for the length of the project was provided by Salvini. The AADT and percentage of truck traffic varied throughout the project length. For the purpose of this analysis for preliminary design a consistent AADT and percentage of truck traffic has been assumed for the entire project length. The largest AADT and percentage of truck traffic values experienced throughout the project length have been selected. It is understood that widening is planned for portions of the project length, however, the extent of the widening (number of lanes in each direction) has not been finalized. For the purpose of this initial analysis, two thru lanes have been assumed in each direction throughout the length of

the project limits. The traffic analysis should be reviewed during prior to finalizing the pavement structure design. The following table presents the traffic parameters used in determining the cumulative Equivalent Single Axle Loads (ESALs) over a 20 year period on Erb Street West.

Traffic Parameter	Value
2012 AADT*	20,235
2015 AADT	22,240
2024 AADT*	29,610
2035 AADT	41,758
Growth Rate	3.2 %
Percentage Truck Traffic*	7 %
Truck Factor	1.8
Lane Distribution Factor	0.8
20 Year Cumulative ESALs	22,500,000
Note: * Data provided by Salvini Consulting	

6.2 Pavement Design Analysis

The results of Golder's field investigation, limited laboratory testing and the provided traffic data were used to design the recommended preliminary pavement structure for Erb Street West. The following table presents the design parameters used in *1993 AASHTO Guide for the Design of Pavement Structures* to design the recommended preliminary pavement structure.

Parameter		Value
Design ESALs		22,500,000
Reliability		90 %
Standard Deviation		0.45
Subgrade Resilient Modulus		20 MPa
Initial Serviceability		4.4
Terminal Serviceability		2.5
Structural Coefficient	New Hot Mix Asphalt	0.44
	New Granular A	0.14
	New Granular B, Type II	0.12
Drainage Coefficient	New Hot Mix Asphalt	1.0
	New Granular A	1.0
	New Granular B, Type II	1.0

Based on the above parameter values, the required structural number for the reconstructed pavement structure to accommodate future traffic loading was calculated to be 182 mm.

6.3 Pavement Structure Recommendation and Comments

It is understood that the Region plans to reconstruct Erb Street West throughout the length of the project and therefore only one pavement structure design has been provided. The following pavement structure reconstruction design is a preliminary recommendation based on Golder's investigation and available data to date. The pavement structure reconstruction recommendation should be further evaluated before being finalized.

- 190 mm Hot Mix Asphalt;
- 150 mm Granular A Base; and
- 650 mm Granular B Type II Subbase.

The limited laboratory testing indicated the presence of moderately to highly frost susceptible materials in areas directly below the proposed new pavement structure. The location of these materials should be further evaluated before finalizing the pavement design.

The water table level fluctuated throughout the length of the project; therefore, proper drainage should be incorporated in the final project design.

Organic materials were identified in some of the boreholes. If this material is exposed during construction it should be removed. The limits of the organic material should be confirmed prior to the final project design.

7.0 ADDITIONAL WORK, INSPECTION AND TESTING

Prior to finalizing the design of the proposed works, the geotechnical aspects of the design drawings/specifications including the proposed pavement structure aspects should be reviewed by this office to confirm that the intent of this report has been met. Further, prior to tendering, the geotechnical aspects of the final design drawings/specifications and proposed construction methodology should be reviewed by this office to confirm that the intent of this report has been met.

During construction, Golder personnel should carry out periodic monitoring during excavations for the roadway construction to confirm that the subsurface conditions encountered at subgrade level are consistent with those in the boreholes and to identify potential zones of weaker soils that would require remedial works. Golder personnel should also carry out sufficient site visits and subgrade inspections during construction to monitor conformance with the pertinent project specifications.

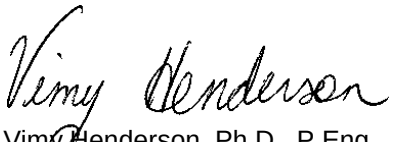
We trust that this report provides sufficient geotechnical engineering information to complete the design of this project. If you have any questions regarding the contents of this report or require additional information, please do not hesitate to contact this office

Report Signature Page

GOLDER ASSOCIATES LTD.



Chad Davis
Project Manager



Vimy Henderson, Ph.D., P.Eng.
Pavements and Materials Engineer



Joe M. Tavares, C.E.T.
Principal

CD/MM/VH/AVD/JMT/ll

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

n:\active\2013 projects\1186 construction services\13-1186-0383 - walterfedy - erb st - waterloo\geotech\final\13-1186-0383 final rpt erb st 1june2017.docx

IMPORTANT INFORMATION AND LIMITATIONS OF THIS REPORT

Standard of Care: Golder Associates Ltd. (Golder) has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied is made.

Basis and Use o f the Report: This report has been prepared for the specific site, design objective, development and purpose described to Golder by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this report and are not applicable to any other project or site location. Any change of site conditions, purpose, development plans or if the project is not initiated within eighteen months of the date of the report may alter the validity of the report. Golder can not be responsible for use of this report, or portions thereof, unless Golder is requested to review and, if necessary, revise the report.

The information, recommendations and opinions expressed in this report are for the sole benefit of the Client. No other party may use or rely on this report or any portion thereof without Golder's express written consent. If the report was prepared to be included for a specific permit application process, then upon the reasonable request of the client, Golder may authorize in writing the use of this report by the regulatory agency as an Approved User for the specific and identified purpose of the applicable permit review process. Any other use of this report by others is prohibited and is without responsibility to Golder. The report, all plans, data, drawings and other documents as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder, who authorizes only the Client and Approved Users to make copies of the report, but only in such quantities as are reasonably necessary for the use of the report by those parties. The Client and Approved Users may not give, lend, sell, or otherwise make available the report or any portion thereof to any other party without the express written permission of Golder. The Client acknowledges that electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore the Client can not rely upon the electronic media versions of Golder's report or other work products.

The report is of a summary nature and is not intended to stand alone without reference to the instructions given to Golder by the Client, communications between Golder and the Client, and to any other reports prepared by Golder for the Client relative to the specific site described in the report. In order to properly understand the suggestions, recommendations and opinions expressed in this report, reference must be made to the whole of the report. Golder can not be responsible for use of portions of the report without reference to the entire report.

Unless otherwise stated, the suggestions, recommendations and opinions given in this report are intended only for the guidance of the Client in the design of the specific project. The extent and detail of investigations, including the number of test holes, necessary to determine all of the relevant conditions which may affect construction costs would normally be greater than has been carried out for design purposes. Contractors bidding on, or undertaking the work, should rely on their own investigations, as well as their own interpretations of the factual data presented in the report, as to how subsurface conditions may affect their work, including but not limited to proposed construction techniques, schedule, safety and equipment capabilities.

Soil, Rock and Ground water Conditions: Classification and identification of soils, rocks, and geologic units have been based on commonly accepted methods employed in the practice of geotechnical engineering and related disciplines. Classification and identification of the type and condition of these materials or units involves judgment, and boundaries between different soil, rock or geologic types or units may be transitional rather than abrupt. Accordingly, Golder does not warrant or guarantee the exactness of the descriptions.

Special risks occur whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive investigation, sampling and testing program may fail to detect all or certain subsurface conditions. The environmental, geologic, geotechnical, geochemical and hydrogeologic conditions that Golder interprets to exist between and beyond sampling points may differ from those that actually exist. In addition to soil variability, fill of variable physical and chemical composition can be present over portions of the site or on adjacent properties. The professional services retained for this project include only the geotechnical aspects of the subsurface conditions at the site, unless otherwise specifically stated and identified in the report. The presence or implication(s) of possible surface and/or subsurface contamination resulting from previous activities or uses of the site and/or resulting from the introduction onto the site of materials from off-site sources are outside the terms of reference for this project and have not been investigated or addressed.

Soil and groundwater conditions shown in the factual data and described in the report are the observed conditions at the time of their determination or measurement. Unless otherwise noted, those conditions form the basis of the recommendations in the report. Groundwater conditions may vary between and beyond reported locations and can be affected by annual, seasonal and meteorological conditions. The condition of the soil, rock and groundwater may be significantly altered by construction activities (traffic, excavation, groundwater level lowering, pile driving, blasting, etc.) on the site or on adjacent sites. Excavation may expose the soils to changes due to wetting, drying or frost. Unless otherwise indicated the soil must be protected from these changes during construction.

Sample Disposal: Golder will dispose of all uncontaminated soil and/or rock samples 90 days following issue of this report or, upon written request of the Client, will store uncontaminated samples and materials at the Client's expense. In the event that actual contaminated soils, fills or groundwater are encountered or are inferred to be present, all contaminated samples shall remain the property and responsibility of the Client for proper disposal.

Follow-Up and Construction Services: All details of the design were not known at the time of submission of Golder's report. Golder should be retained to review the final design, project plans and documents prior to construction, to confirm that they are consistent with the intent of Golder's report.

During construction, Golder should be retained to perform sufficient and timely observations of encountered conditions to confirm and document that the subsurface conditions do not materially differ from those interpreted conditions considered in the preparation of Golder's report and to confirm and document that construction activities do not adversely affect the suggestions, recommendations and opinions contained in Golder's report. Adequate field review, observation and testing during construction are necessary for Golder to be able to provide letters of assurance, in accordance with the requirements of many regulatory authorities. In cases where this recommendation is not followed, Golder's responsibility is limited to interpreting accurately the information encountered at the borehole locations, at the time of their initial determination or measurement during the preparation of the Report.

Changed Conditions and Drainage: Where conditions encountered at the site differ significantly from those anticipated in this report, either due to natural variability of subsurface conditions or construction activities, it is a condition of this report that Golder be notified of any changes and be provided with an opportunity to review or revise the recommendations within this report. Recognition of changed soil and rock conditions requires experience and it is recommended that Golder be employed to visit the site with sufficient frequency to detect if conditions have changed significantly.

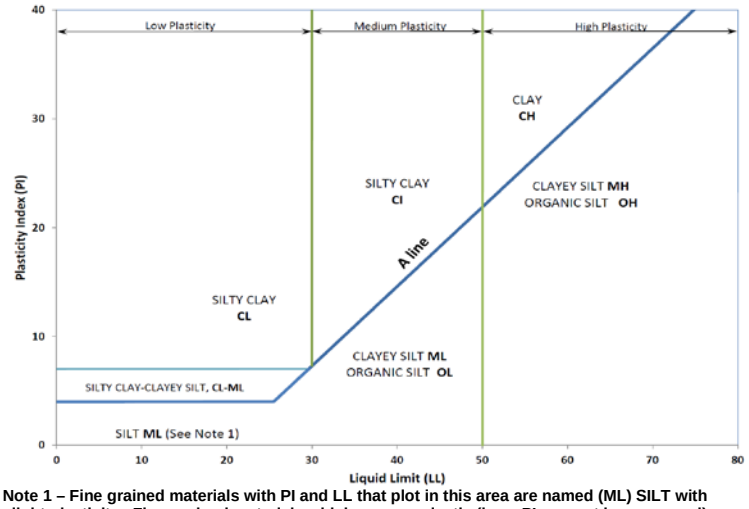
Drainage of subsurface water is commonly required either for temporary or permanent installations for the project. Improper design or construction of drainage or dewatering can have serious consequences. Golder takes no responsibility for the effects of drainage unless specifically involved in the detailed design and construction monitoring of the system.

METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil		Gradation or Plasticity	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil		Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
					Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)		Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
					Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
					Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
				Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
					None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)		Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
				Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
				Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures								30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat								75% to 100%		PEAT



Note 1 – Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are named SILT.
Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.
For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.
For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML.
A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to ~~or~~ indicate~~s~~ a range of similar soil types within a stratum.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (*i.e.,* SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL , w_p	plastic limit
LL , w_L	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

1. Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

Term	SPT 'N' (blows/0.3m)[1]
Very Loose	0 - 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	>50

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N_{60} values.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N'[1] (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
σ_1, σ_2, σ_3	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(a) Index Properties (continued)

w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

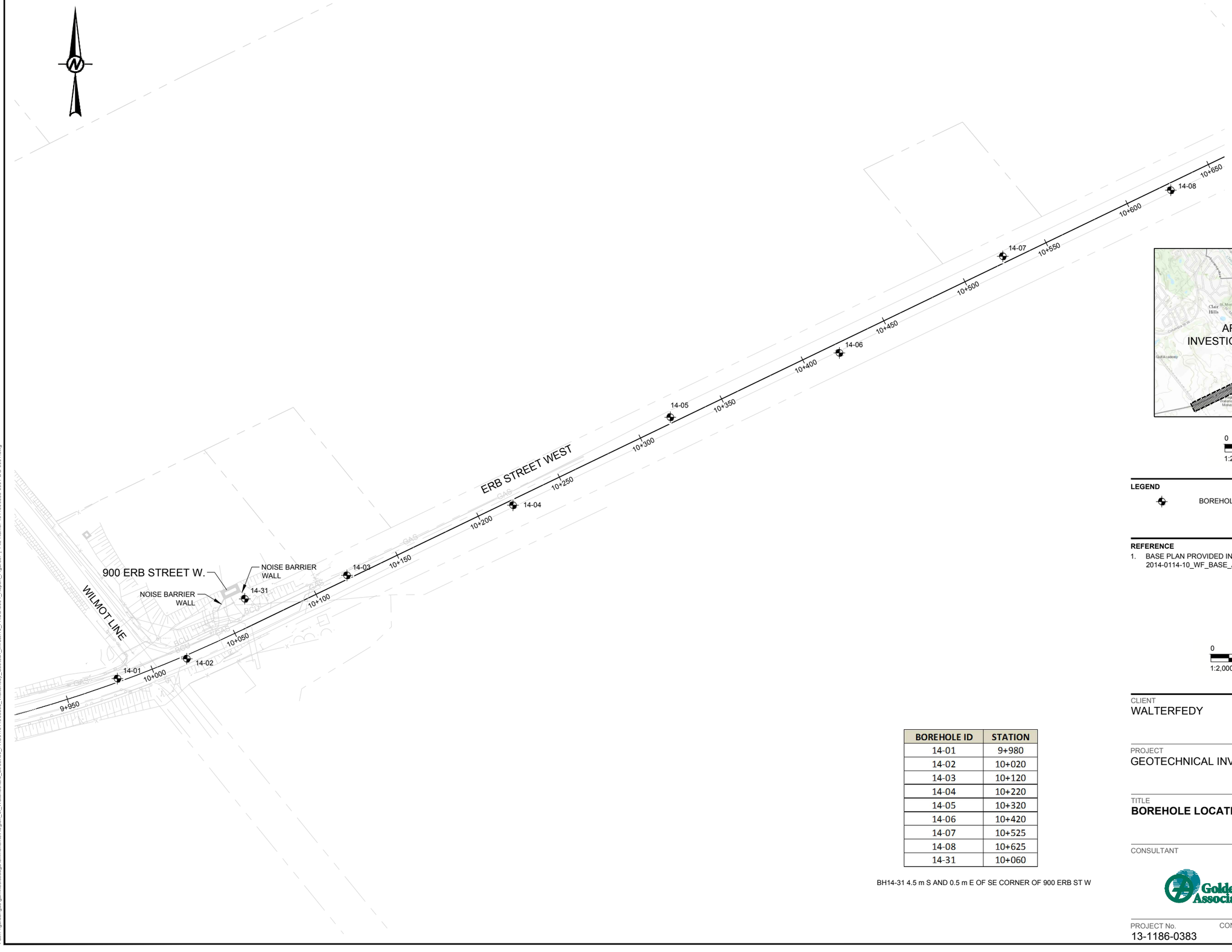
τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c′	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

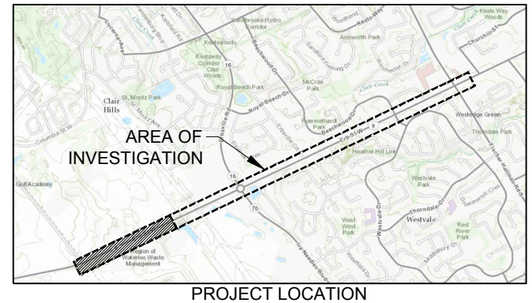
Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

FIGURES

Figures 1 to 4 - Borehole Location Plan





PROJECT LOCATION

0 50 100
1:2,000 METRES

LEGEND

BOREHOLE

REFERENCE

1. BASE PLAN PROVIDED IN DIGITAL FORMAT BY WALTERFEDY, FILE NO. 2014-0114-10_WF_BASE_ACAD.dwg, RECEIVED JULY 24, 2014.

0 50 100
1:2,000 METRES

BOREHOLE ID	STATION
14-01	9+980
14-02	10+020
14-03	10+120
14-04	10+220
14-05	10+320
14-06	10+420
14-07	10+525
14-08	10+625
14-31	10+060

BH14-31 4.5 m S AND 0.5 m E OF SE CORNER OF 900 ERB ST W

CLIENT
WALTERFEDY

PROJECT
GEOTECHNICAL INVESTIGATION

TITLE
BOREHOLE LOCATION PLAN

CONSULTANT
Golder Associates

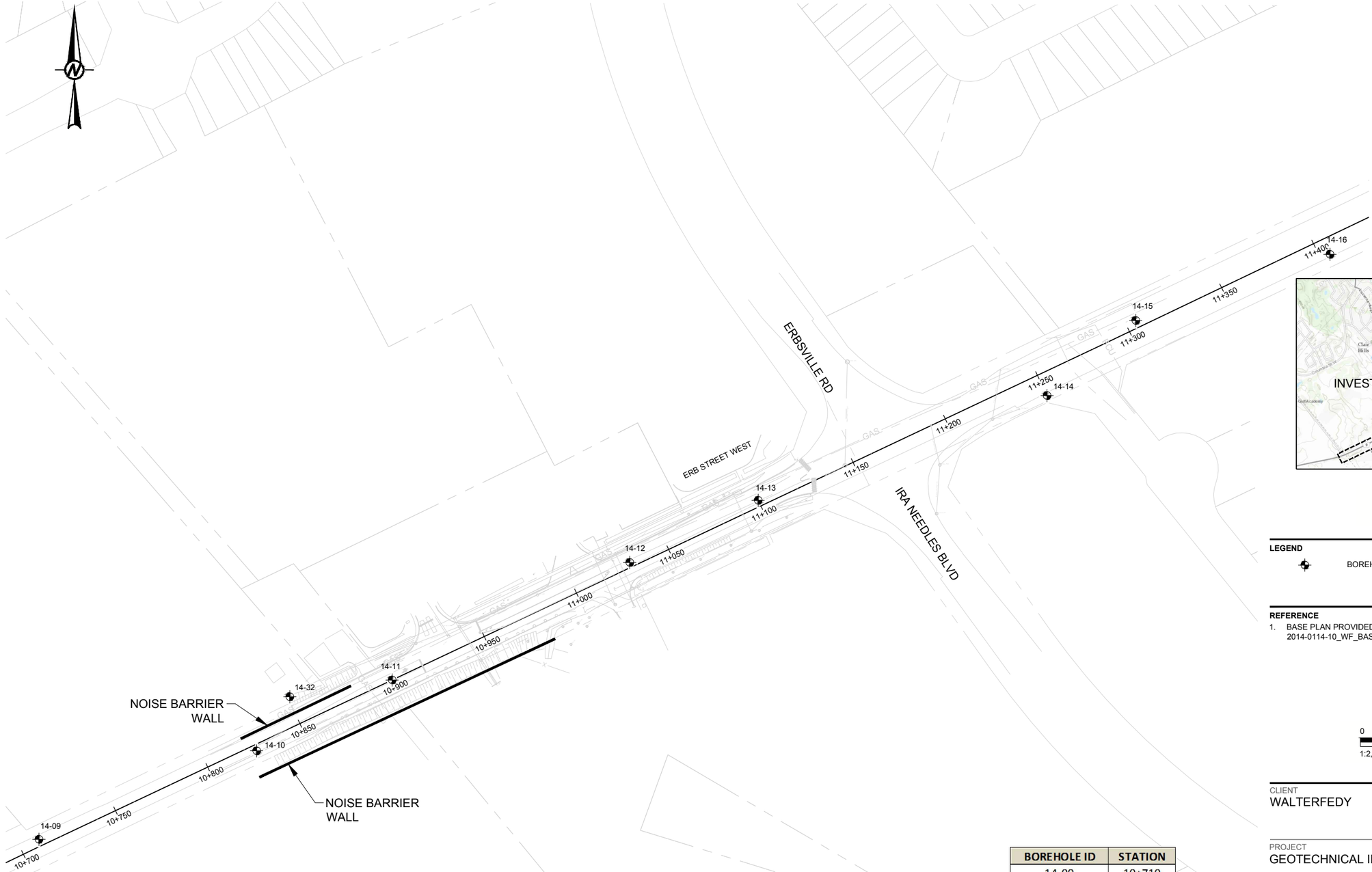
YYYY-MM-DD	2015-03-20
PREPARED	DD
DESIGN	
REVIEW	CD
APPROVED	

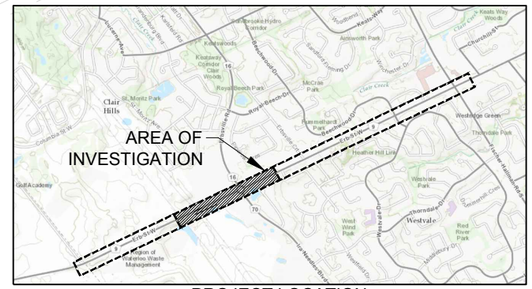
PROJECT No. 13-1186-0383 | CONTROL | Rev. A | FIGURE 1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25 mm

Path: \\golder.gds\gal\Mississauga\SIM\Clients\Region_of_Waterloo\Erb_Street\99_PROJ\1311860383_WalterFedy_Geotech_Invest\40_PROD\0001_Report_Figures\ | File Name: 1311860383-0001-BG-0001.dwg





PROJECT LOCATION

0 1,000 2,000

1:40,000 METRES

LEGEND

BOREHOLE

REFERENCE

1. BASE PLAN PROVIDED IN DIGITAL FORMAT BY WALTERFEDY, FILE NO. 2014-0114-10_WF_BASE_ACAD.dwg, RECEIVED JULY 24, 2014.

0 50 100

1:2,000 METRES

BOREHOLE ID	STATION
14-09	10+710
14-10	10+825
14-11	10+900
14-12	11+030
14-13	11+100
14-14	11+250
14-15	11+305
14-16	11+405
14-32	10+860

BH14-32 8.0 m S AND 6.0 m W OF SW CORNER OF BMO BANK

CLIENT
WALTERFEDY

PROJECT
GEOTECHNICAL INVESTIGATION

TITLE
BOREHOLE LOCATION PLAN

CONSULTANT

Golder Associates

YYYY-MM-DD	2015-03-20
PREPARED	DD
DESIGN	
REVIEW	CD
APPROVED	

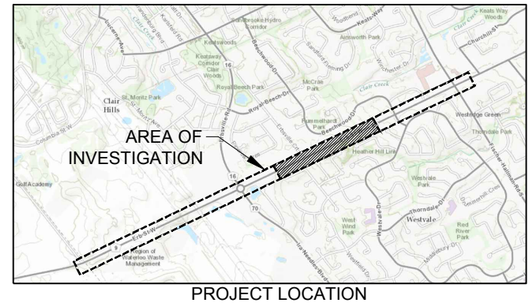
PROJECT No. 13-1186-0383 | CONTROL | Rev. A | FIGURE 2

Path: \\golder.gds\gal\Mississauga\SIM\Clients\Region_of_Waterloo\Erb_Street\99_PRO\1311860383_Walterfedy_Geotech_Invest\40_PROD\0001_Report_Figures\ | File Name: 1311860383-0001-BG-0002.dwg

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

25 mm 0





PROJECT LOCATION

0 50 100

1:2,000 METRES

LEGEND

BOREHOLE

REFERENCE

1. BASE PLAN PROVIDED IN DIGITAL FORMAT BY WALTERFEDY, FILE NO. 2014-0114-10_WF_BASE_ACAD.dwg, RECEIVED JULY 24, 2014.

0 50 100

1:2,000 METRES

BOREHOLE ID	STATION
14-17	11+505
14-18	11+600
14-19	11+705
14-20	11+800
14-21	11+910
14-22	12+000
14-23	12+100

CLIENT
WALTERFEDY

PROJECT
GEOTECHNICAL INVESTIGATION

TITLE
BOREHOLE LOCATION PLAN

CONSULTANT

Golder Associates

YYYY-MM-DD	2015-02-02
PREPARED	DD
DESIGN	
REVIEW	CD
APPROVED	

PROJECT No. 13-1186-0383 | CONTROL | Rev. A | FIGURE 3

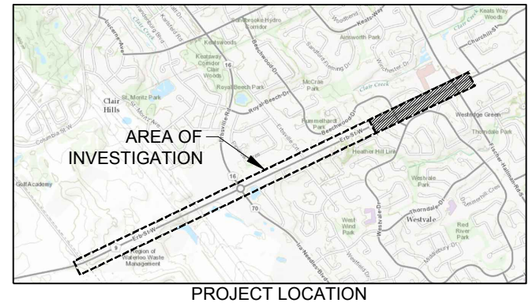
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

Path: \\golder.gds\gal\Mississauga\SIM\Clients\Region_of_Waterloo\Erb_Street\99_PRO\1311860383_Walterfedy_Geotech_Invest\40_PROD\0001_Report_Figures\ | File Name: 1311860383-0001-BG-0003.dwg





PROJECT LOCATION

0 50 100
1:2,000 METRES

LEGEND

BOREHOLE

REFERENCE

1. BASE PLAN PROVIDED IN DIGITAL FORMAT BY WALTERFEDY, FILE NO. 2014-0114-10_WF_BASE_ACAD.dwg, RECEIVED JULY 24, 2014.

0 50 100
1:2,000 METRES

BOREHOLE ID	STATION
14-24	12+200
14-25	12+340
14-26	12+400
14-27	12+480
14-28	12+600
14-29	12+685
14-30	12+795

CLIENT
WALTERFEDY

PROJECT
GEOTECHNICAL INVESTIGATION

TITLE
BOREHOLE LOCATION PLAN

CONSULTANT
Golder Associates

YYYY-MM-DD	2015-03-20
PREPARED	DD
DESIGN	
REVIEW	CD
APPROVED	

PROJECT No. 13-1186-0383 | CONTROL | Rev. A | FIGURE 4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B
25 mm
0

Path: \\golder.gds\gal\Mississauga\SIM\Clients\Region_of_Waterloo\Erb_Street\99_PRO\1311186\0383_Walterfedy_Geotech_Invest\40_PROD\0001_Report_Figures\ | File Name: 1311860383-0001-BG-0004.dwg

APPENDIX A

Record of Boreholes 14-01 to 14-32

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-01

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 9+980

BORING DATE: December 9, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Hollow Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, compact to dense		0.24	1	SS	30				
		FILL - (CL) SILTY CLAY, some sand, some gravel; brown; cohesive		0.61							
1		FILL - (SM) Gravelly SILTY SAND, trace clay, some gravel; brown; non-cohesive, compact to loose		0.76	2	SS	18		O		
					3A	SS	7				
2		FILL - (SW) SAND and GRAVEL, contains asphalt; black; non-cohesive, moist, loose		1.98	3B						
		FILL - (ML) CLAYEY SILT, some sand, trace gravel, contains organics; brown to grey; cohesive, stiff to firm		2.21	4	SS	9		O		
3					5	SS	5				
		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, stiff		3.73	6	SS	13		O		▽
4											
					7	SS	14				
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Borehole was open to a depth of about 4.4m on completion.									
6		2. Water level measured at a depth of 4.3 m below ground surface on December 9, 2014.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: MC

CHECKED: CD

Golder Associates

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-02

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+020

BORING DATE: December 1, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Hollow Stem Augers	ASPHALT		0.00							Cement
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.18	1A	SS	53				
		FILL - (SW) (GP) SAND, some gravel, some silt, contains asphalt; brown; non-cohesive,moist, very dense		0.40	1B				○		Bentonite
1					2A						
		FILL - (SP) SAND and GRAVEL, contains asphalt, trace silt; black; non-cohesive, moist, very dense		1.07	2B	SS	62/ 0.10				Sand
		(SP/GP) SAND and GRAVEL, brown; non-cohesive, moist, compact to very dense		1.45	3	SS	78		○		
2					4	SS	11				
											Screen
3		(ML) Sandy SILT, some clay, trace gravel; brown; non-cohesive, loose		2.97	5A	SS	9		○	MH	
		(CL) SILTY CLAY, some sand, trace gravel; brown; cohesive, stiff		3.50	5B						
4		Sand seam at 4.11 m			6	SS	13				
					7	SS	13		○		
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Water level measurements in well:									
		Date Depth (m) 12/01/14 3.5 03/19/15 2.6									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-03

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+120

BORING DATE: December 3, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Hollow Stem Augers	ASPHALT		0.00							
		FILL - (SP) (GP) SAND and GRAVEL, contains some organics from 1.1 m to 1.4 m; brown; non-cohesive, moist, very dense to dense		0.27	1	SS	91				
1					2	SS	3		○		
		FILL - (CL) SILTY CLAY, some to trace sand, trace gravel, contains organics; brown to grey; cohesive, firm to soft		1.45	3	SS	7				
2					4	SS	2		○		▽
3		(ML) Sandy SILT, trace gravel; brown; non-cohesive, wet, loose		2.97	5A						
		(CL-ML) SILTY CLAY - CLAYEY SILT, some sand, trace gravel; brown to grey; cohesive, stiff		3.35	5B		9				
4					6	SS	12		⊖⊣	MH	
					7	SS	9				
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Borehole was open to a depth of about 3.0m on completion.									
		2. Water level measured at a depth of 2.4 m below ground surface on December 9, 2014.									
6											
7											
8											
9											
10											

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-04

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+220

BORING DATE: December 1, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE											
0	CME 75 - Power Auger; 178 mm O.D. Hollow Stem Augers	ASPHALT		0.00									
		FILL - (SW/GW) SAND and GRAVEL, contains asphalt; brown; moist, dense		0.23	1	SS	49				○		
1					2A	SS	35						
		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, firm to very stiff		1.07	2B								
2					3	SS	4				○		
					4	SS	20						
3					5	SS	15				○		
4					6	SS	17						
					7	SS	52						
5		END OF BOREHOLE		5.18									
		NOTE:											
		1. Open borehole was dry upon completion of drilling.											
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-05

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+320

BORING DATE: December 3, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 178 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.14	1A						Cement
					1B	SS	63		○		
1					2A	SS	41				
		FILL - (ML) CLAYEY SILT and SAND, contains organics; trace gravel; grey; cohesive, very soft to soft		1.22	2B						Bentonite
					3	SS	2		○	MH	
2					4	SS	3		○		
		(CL) SILTY CLAY, trace to some sand, trace gravel; brown to grey; cohesive, stiff to very stiff		2.97							Sand
3					5	SS	11				
											Screen
4					6	SS	15		○		
					7	SS	27				
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Water level measurements in well:									
		Date Depth (m) 12/03/14 3.0 03/19/15 DRY									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: MC

CHECKED: CD

Golder Associates

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-06

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+420

BORING DATE: December 1, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Hollow Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.13	1A	SS	64/ 0.20				
					1B						
		FILL - (SW) SAND and GRAVEL, contains asphalt; brown; non-cohesive, moist, very dense		0.51	1C						
		FILL - (ML) Sandy SILT, contains organics, trace gravel; brown; non-cohesive, moist, compact		0.61	2A						
1					2B	SS	13		○	MH	
					3	SS	4				
2					4	SS	8		○	MH	
3		(CL) SILTY CLAY, some to trace sand, trace gravel; brown to grey; cohesive, very stiff to stiff		2.97	5	SS	16				
4					6	SS	12		○		
5					7	SS	13				
		END OF BOREHOLE		5.18							
6		NOTE: 1. Water level measured at a depth of 3.8 m below ground surface on December 9, 2014.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-07

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+525

BORING DATE: December 3, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 178 mm O.D. Hollow Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense to dense		0.13	1A	SS	51				
					1B				○		
1					2A	SS	34				
		FILL - (SM) SILTY SAND; brown; non-cohesive, moist, dense		1.14	2B						
		(CL-ML) SILTY CLAY - CLAYEY SILT, some to trace sand, trace gravel; brown; cohesive, firm to very stiff		1.45	3	SS	6		○		
2					4	SS	8				
3					5	SS	15		○		
4					6	SS	18				
		150 mm sand seam at 4.9 m			7	SS	21		○		
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-08

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+625

BORING DATE: December 2, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.18	1A	SS	97				
		FILL - (SP) SAND and GRAVEL, trace silt; black; non-cohesive, moist, very dense (Asphalt treated base)		0.56	1B						
				0.66	2A						
1		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, very dense		1.07	2B	SS	28			MH	
		(ML) Sandy SILT, some gravel, trace clay; brown; non-cohesive, moist, loose to compact			3	SS	11				
2					4	SS	6				
3		(CL) SILTY CLAY, trace to some sand; brown; cohesive, very stiff		2.97	5	SS	16				
4					6	SS	24				
5					7	SS	22				
		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-09

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+710

BORING DATE: December 2, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE											
0	CME 75 - Power Auger, 150 mm O.D. Solid Stem Augers	ASPHALT		0.00									
		FILL - (SW) (SP) SAND and GRAVEL; brown; non-cohesive, moist, compact		0.18	1A	SS	19						
					1B								
1					2A	SS	29						
		(SP) SAND, some silt to silty, some gravel; brown; non-cohesive, moist, compact to very dense		1.06	2B								
					3	SS	35					MH	
2													
					4	SS	73						
3													
					5	SS	45						
4													
					6	SS	54						
5					7	SS	89						
		END OF BOREHOLE		5.10									
		NOTE:											
		1. Borehole was open to a depth of about 4.0m on completion.											
		2. Borehole was dry upon completion of drilling.											
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-10

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 10+825

BORING DATE: December 2, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, dense		0.14	1	SS	40				
		FILL - (SM) SILTY SAND, some gravel, some clay; grey; non-cohesive, moist, compact		0.69	2A				○		
1		FILL - (SP) SAND and GRAVEL, trace silt; black; non-cohesive, moist, compact (Asphalt treated base)		0.91	2B	SS	24				
		FILL - (SW/GP) SAND and GRAVEL; brown; non-cohesive, moist, compact		1.07	2C						
		(SM) SILTY SAND, trace gravel; brown; non-cohesive, moist, loose		1.22	2D						
2					3	SS	8				
		(ML) Sandy SILT, trace clay; brown; non-cohesive, wet, loose		2.21	4A				○	MH	
		(CL) SILTY CLAY, some sand; brown; cohesive, firm		2.60	4B	SS	7				
3					5A						
		(SM) SILTY SAND, some gravel; brown; non-cohesive, moist, compact		3.20	5B	SS	14				
		(CL) SILTY CLAY, some sand, trace gravel; brown; cohesive, very stiff		3.73	6	SS	20		○	MH	
4											
5					7	SS	16				
		END OF BOREHOLE		5.18							
6		NOTE: 1. Borehole was open to a depth of about 3.0m on completion. 2. Borehole was dry upon completion of drilling.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-11

SHEET 1 OF 2

LOCATION: See Borehole Location Plan - Station 10+900

BORING DATE: December 2, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, compact		0.14	1A	SS	25		○		Cement
					1B						
1		FILL - (SM) Gravelly SILTY SAND, contains organics; grey; non-cohesive, moist to wet, compact		0.70	2	SS	11				
					3	SS	15		○	MH	
2		FILL - (SP) SAND, some gravel, some silt, contains organics; grey; non-cohesive, moist, loose		2.21	4	SS	8				
3					5A	SS	5		○		Bentonite ▽
		FILL - (CL) SILTY CLAY, some sand, contains organics; brown; cohesive, firm		3.45	5B						
		(SM) SILTY SAND; brown; non-cohesive, wet, compact		3.73	6	SS	20				
4											
5					7	SS	12		○		
		(SP) SAND and GRAVEL, some silt; brown; non-cohesive, wet, compact		5.60							Sand
6					8	SS	25				
7											
		(ML) Sandy CLAYEY SILT, trace gravel; brown to grey; cohesive, very stiff		7.16							Screen
8					9	SS	15		○		
9											
					10	SS	18		○	MH	
		END OF BOREHOLE		9.75							
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-11

SHEET 2 OF 2

LOCATION: See Borehole Location Plan - Station 10+900

BORING DATE: December 2, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		NOTE: 1. Water level measurements in well: Date Depth (m) 12/02/14 5.8 03/19/15 3.0									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-12

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+030

BORING DATE: December 3, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 178 mm O.D. Hollow Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense to compact		0.18	1A	SS	65				
					1B						
					2A						
1		FILL - (SM) SILTY SAND, some gravel, contains organics; brown; non-cohesive, moist, compact		0.94	2B	SS	21		○		
		FILL - (CL) SILTY CLAY, some sand, some to trace gravel, contains organics; brownish grey; cohesive, stiff to firm		1.45	3	SS	9				
2					4	SS	4		○		
3		(SP) SAND and GRAVEL, trace silt; brown; non-cohesive, wet, loose		2.97	5A						▽
		(SM) SILTY SAND, trace clay, trace gravel; brown; non-cohesive, wet, loose		3.25	5B	SS	6				
		(ML) Sandy SILT, trace clay; brown; non-cohesive, compact		3.74	6	SS	17		○		
4											
					7	SS	22				
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Water level measured at a depth of 3.0 m below ground surface on December 9, 2014.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-13

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+100

BORING DATE: December 3, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE											
0	CME 75 - Power Auger 178 mm O.D. Hollow Stem Augers	ASPHALT		0.00									
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, dense		0.18	1A / 1B	SS	37				○		
1		FILL - (SM) SILTY SAND, trace clay, contains organics; brown; non-cohesive, moist, loose		0.79	2	SS	9						
		FILL - (CL) SILTY CLAY, trace sand, trace gravel, contains organics; brown; cohesive, soft		1.45	3	SS	4				○		
2					4	SS	3						
3		(CL) SILTY CLAY, trace sand, trace gravel; brown to grey, cohesive, stiff to very stiff		3.05	5	SS	8				○	MH	
4					6	SS	18						
5					7	SS	10				○		
		END OF BOREHOLE		5.18									
6		NOTE: 1. Water level measured at a depth of 4.3 m below ground surface on December 3, 2014.											
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-14

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+250

BORING DATE: December 4, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.19	1A	SS	68				
					1B						
					2A						
1		FILL - (SM) Gravelly SILTY SAND, contains organics; brown; non-cohesive, moist, compact to dense		0.89	2B	SS	17		○	MH	
					3A						
		(CL) SILTY CLAY, trace to some sand, trace gravel; brown; cohesive, firm to very stiff		1.83		SS	7				
2					3B						
					4	SS	10		○		
3											
					5	SS	13				
4											
					6	SS	18				
					7	SS	20		○		
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-15

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+305

BORING DATE: December 9, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, compact		0.17	1A	SS	23				
					1B						
					2A						
1		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, stiff to very stiff		0.91	2B	SS	9		○		
					3	SS	20				
2					4	SS	16		Wp ⊢○W⊣ Wl	MH	
3					5	SS	19				
4					6	SS	13		○		
					7	SS	12				
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-16

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+405

BORING DATE: December 4, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp ○W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Hollow Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, dense		0.20	1A	SS	46		○		
					1B						
1					2	SS	31				
		(CL) SILTY CLAY, some sand, some gravel; brown; cohesive, firm		1.45	3	SS	7		○		
2		(ML) Sandy SILT; brown; non-cohesive, wet, loose		2.21	4A						
		(CL) SILTY CLAY, trace sand; brown; cohesive, firm		2.60	4B	SS	6				
		(SM) SILTY SAND; brown; non-cohesive, wet, compact		2.74	4C						
3					5A				○	MH	▽
		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, stiff		3.35	5B	SS	11				
		(SP) Sandy SILT; brown; non-cohesive, wet, loose		3.73	6A						
4		(CL) SILTY CLAY, trace to some sand, trace gravel; brown; cohesive, stiff		4.11	6B	SS	9				
					7	SS	11		○		
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Borehole was open to a depth of about 4.0m on completion.									
6		2. Water level measured at a depth of 3.4 m below ground surface on December 4, 2014.									
7											
8											
9											
10											

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-17

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+505

BORING DATE: December 4, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, dense		0.18	1A	SS	46				
					1B						
		FILL - (CL) SILTY CLAY, some sand, contains organics; grey to black; cohesive, firm		0.69	2	SS	9				
1											
					3	SS	5				
2											
		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, stiff to very stiff		2.21	4	SS	10				
3											
					5	SS	21				
4					6	SS	10				▽
					7	SS	12				
5											
		END OF BOREHOLE		5.18							
		NOTE:									
		1. Borehole was open to a depth of about 4.5m on completion.									
		2. Water level measured at a depth of 4.0 m below ground surface on December 4, 2014.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-18

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+600

BORING DATE: December 4, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE											
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	ASPHALT		0.00									Cement
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.17	1A	SS	53				○		
					1B								
1					2A								
		FILL - (SM) SILTY SAND and GRAVEL; brown; non-cohesive, moist, compact		1.09	2B	SS	17						Bentonite
					3A								
2		(CL) SILTY CLAY, some sand; brown; cohesive, firm		1.83	3B	SS	5				○		
					4A								
		(SM) Gravelly SILTY SAND; brown; non-cohesive, wet, compact		2.60	4B	SS	12						Sand
3					5	SS	15				○	MH	Screen
		(SP) SAND, some silt, some gravel; brown; non-cohesive, wet, compact		3.73	6	SS	24						
4		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, very stiff		4.50	7	SS	20				○		
5		END OF BOREHOLE		5.18									
		NOTE:											
		1. Water level measurements in well:											
		Date Depth (m) 12/04/14 3.9 03/19/15 2.0											
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-19

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+705

BORING DATE: December 9, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.18	1A	SS	50/ 0.10				
					1B						
					2A						
1		FILL - (CL) SILTY CLAY, some sand, some gravel; brown; cohesive, stiff to firm		0.91	2B	SS	12		W		
					3	SS	4				
2					4	SS			W		
3		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, stiff		3.05	5	SS	8				
4					6	SS	8		W		
5					7	SS	9				
		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-20

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+800

BORING DATE: December 5, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.15	1	SS	30				
1		(ML) Sandy SILT, trace gravel, trace clay; brown; non-cohesive, moist, stiff		0.70	2	SS	16			MH	
		(CL) SILTY CLAY, trace to some sand, trace gravel; brown; cohesive, stiff to very stiff		1.45	3	SS	11				
2					4	SS	13				
3					5	SS	16				
4					6	SS	12				
5					7	SS	14				
		END OF BOREHOLE		5.18							
6		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-21

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 11+910

BORING DATE: December 5, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, dense		0.20	1A	SS	34		○		
					1B						
					2A						
1		FILL - (ML) CLAYEY SILT, some sand, some gravel; brown; cohesive, firm to stiff		0.81	2B	SS	12				
2					3	SS	4		○		
		FILL - (SP) (ML) SANDY SILT, some gravel, trace clay; brown; non-cohesive, moist, loose		2.21	4A	SS	9				
		(CL) SILTY CLAY, some to trace sand, trace gravel; brown to grey; cohesive, stiff		2.64	4B						
3					5	SS	8		○		
4					6	SS	10				
5					7	SS	15		○		
		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-22

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 12+000

BORING DATE: December 5, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist		0.28	1A	AS			○		
		FILL - (SM) SILTY SAND, some gravel, contains organics; brown; non-cohesive, moist, compact		0.51	1B						
					2A						
1		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, compact		0.97	2B	SS	14				
		FILL - (CL) SILTY CLAY, some sand, trace gravel, contains organics; brown to grey to black; cohesive, soft to firm		1.45	3	SS	4		○		
2		(ML) CLAYEY SILT, some sand, contains organics; grey to black; cohesive, firm		2.21	4	SS	6				
3					5	SS	6		○	MH	
		(CL) SILTY CLAY, trace to some sand, trace gravel; grey to brown; cohesive, firm to very stiff		3.73	6	SS	6				
4											
5					7	SS	3		○		
6					8	SS	20				
		END OF BOREHOLE		6.10							
7		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-23

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 12+100

BORING DATE: December 9, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE											
0	CME 75 - Power Auger; 150 mm O.D. Hollow Stem Augers	ASPHALT		0.00									
		FILL - (SW) (GP) SAND and GRAVEL, some silt; brown; non-cohesive, moist, dense		0.20	1A	SS	36						
					1B								
					2A								
1		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive		0.84	2B	SS	20						
2					3	SS	30						
					4A	SS	35						
		(SP) SAND, some silt; brown; non-cohesive, wet, dense		2.64	4B								
					4C								
3		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, hard		2.97	5A								
		(SM/SP) SILTY SAND to SAND; brown; non-cohesive, moist to dry, very dense		3.35	5B	SS	56						
4					6A								
					6B	SS	75/ 0.28						
					7A								
5					7B	SS	76						
		END OF BOREHOLE		5.18									
		NOTE:											
		1. Open borehole was dry upon completion of drilling.											
6													
7													
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-24

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 12+200

BORING DATE: December 5, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.18	1A	SS	43				
					1B						
		FILL - (SP) SAND, trace gravel; brown; non-cohesive, moist, compact		0.63							
1					2A	SS	21				
		FILL - (SM) SILTY SAND, trace gravel, trace clay; brown; non-cohesive, wet to moist, loose		1.22	2B						
					3A	SS	6				
2		FILL - (SP) SAND; brown; non-cohesive, moist, loose to compact		1.83	3B						
					4	SS	9				
3											
					5	SS	10				
		(SP) SAND, brown; non-cohesive, moist, compact		3.78							
4					6	SS	20				
					7	SS	25				
5											
		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-25

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 12+340

BORING DATE: December 8, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, compact		0.18	1A						
					1B	SS	17		○		
					2A						
1		FILL - (SM) SILTY SAND, trace clay, contains organics; brown to black; non-cohesive, moist, compact		0.84	2B	SS	18				
		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, firm		1.45	3	SS	5		○		
2											
		(SP) SAND, some silt, trace clay, trace gravel; brown; non-cohesive, moist, very loose to loose		2.21	4	SS	3				
3					5	SS	4		○		
		(SP) SAND; brown; non-cohesive, moist, compact to dense		3.73	6	SS	16				
4											
					7	SS	30		○		
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-26

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 12+400

BORING DATE: December 5, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.13	1A	SS	77		○		
					1B						
					2A						
1		(SP) SAND, trace silt to silty; brown; non-cohesive, moist to dry, dense to compact to dense		0.91	2B	SS	41				
					3		27		○		
2					4	SS	37				
3					5	SS	46		○	MH	
4					6	SS	45				
					7	SS	23		○		
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-27

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 12+480

BORING DATE: December 8, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, very dense		0.14	1A						
					1B	SS	76				
					2A				○		
1		(CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, stiff to very stiff		0.81	2B	SS	34				
					3A						
		0.1m sand seam at 1.7 m.			3B	SS	13				
2					3C						
					4	SS	16		○		
3					5	SS	18				
4					6	SS	17		○		
					7	SS	21				
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-28

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 12+600

BORING DATE: December 5, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist		0.23	1A	AS					
					1B						
1		FILL - (SM) SILTY SAND, contains organics; brown; non-cohesive, moist, compact		0.75	2	SS	12		○		
		FILL - (SP) SAND, trace silt; brown; non-cohesive, moist, loose		1.45	3A	SS	9				
2		FILL - (SM) SILTY SAND, trace gravel; brown; non-cohesive, moist to wet, loose to very loose		1.91	3B						
					4A						
		FILL - (SP) SAND; brown; non-cohesive, wet, very loose		2.44	4B	SS	1		○	MH	▽
3		(CL) SILTY CLAY, trace sand, trace gravel; brown to grey; cohesive, very soft to very stiff		2.74	4C						
					5	SS	15				
4					6	SS	18		○		
					7	SS	15				
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Borehole was open to a depth of about 4.0m on completion.									
6		2. Water level measured at a depth of 2.6 m below ground surface on December 5, 2014.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-29

SHEET 1 OF 1

LOCATION: See Borehole Location Plan - Station 12+685

BORING DATE: December 8, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist		0.20	1A 1B	SS					
1		FILL - (SP) SILTY SAND and GRAVEL, trace clay, contains organics; dark brown; non-cohesive, wet, compact		0.81	2A 2B	SS	15				
		FILL - (SP) SAND, some silt; brown; non-cohesive, wet, very loose to compact		1.83	3A 3B	SS	2				
2					4	SS	2				
3					5	SS	5				
4					6A						
		(CL) SILTY CLAY, some sand; brown; cohesive, stiff		4.11	6B	SS	10				
		(SP) SAND, some silt; brown; non-cohesive, moist, compact		4.50	7	SS	22				
5		END OF BOREHOLE NOTE: 1. Open borehole was dry upon completion of drilling.		5.18							
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-30

SHEET 1 OF 1

LOCATION: See Borehole Location Plan

BORING DATE: December 8, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger 150 mm O.D. Solid Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, dense		0.20	1A	SS	41		○		
					1B						
					2A						
1		FILL - (CL) SILTY CLAY, some sand; brown; cohesive, stiff to firm		0.91	2B	SS	14				
					3	SS	4		○		
2											
					4A						
		FILL - (CL-ML) SILTY CLAY - CLAYEY SILT, some sand, contains organics; brown to black; cohesive, soft		2.57	4B	SS	2				
3		(SM) SILTY SAND; brown; non-cohesive, wet, loose		2.97							
					5A	SS	60		○		
		(CL) SILTY CLAY, some sand, trace gravel; brown; cohesive, firm		3.50	5B						
4					6A	SS	7				
		(SP) SAND AND GRAVEL, some silt; brown; non-cohesive, moist, compact		4.27	6B						
					7	SS	25		○		
5		END OF BOREHOLE		5.18							
		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-31

SHEET 1 OF 1

LOCATION: See Borehole Location Plan

BORING DATE: December 10, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○; 20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger, 178 mm O.D. Hollow Stem Augers	ASPHALT		0.00							
		FILL - (SW/GW) SAND and GRAVEL; brown; non-cohesive, moist, loose		0.13	1	SS	8				
1		(ML) Sandy SILT; brown; non-cohesive, wet, compact		0.76	2	SS	15				
		(CL-ML) SILTY CLAY - CLAYEY SILT, some sand, trace gravel; brown; cohesive, stiff		1.45	3	SS	10				
2					4	SS	13				
3		(ML) Sandy SILT, trace gravel; brown; non-cohesive, wet, compact		2.97	5	SS	13				
4					6	SS	12				
5					7	SS	11				
					8	SS	11				
6					9	SS	13				
		END OF BOREHOLE		6.71							
7		NOTE:									
		1. Open borehole was dry upon completion of drilling.									
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-32

SHEET 1 OF 2

LOCATION: See Borehole Location Plan

BORING DATE: December 10, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	CME 75 - Power Auger; 150 mm O.D. Solid Stem Augers	FILL - (SW/GW) SAND and GRAVEL, trace silt; brown; non-cohesive, moist, compact		0.00	1	SS	26		○		
1					2	SS	29				
		FILL - (SP) SILTY SAND and GRAVEL; brown; non-cohesive, moist to wet, compact		1.45	3	SS	21		○		
2		(ML) Sandy SILT, trace gravel; brown; non-cohesive, wet, loose		2.19	4	SS	5				
3					5A	SS	9				
		(CL-ML) SILTY CLAY - CLAYEY SILT, trace to and sand; brown to grey; cohesive, stiff to very stiff		3.35	5B				○		
4					6	SS	13				
5					7	SS	20		○		
		(CL) SILTY CLAY, some to trace sand, trace gravel; grey; cohesive, firm to stiff		5.60	8	SS	13		○		
6											
7					9	SS	8				
8					10	SS	7				
9					11	SS	13		⊖	MH	
		END OF BOREHOLE		9.75							
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

PROJECT: 13-1186-0383 (1000)

RECORD OF BOREHOLE: 14-32

SHEET 2 OF 2

LOCATION: See Borehole Location Plan

BORING DATE: December 10, 2014

DATUM: NOT SURVEYED

SPT/DCPT HAMMER: MASS, 64kg; DROP, 760mm

HAMMER TYPE: AUTOMATIC

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		NOTE: 1. Open borehole was dry upon completion of drilling.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MC

CHECKED: CD

GTA-BHS 001 S:\CLIENTS\REGION_OF_WATERLOO\ERB_STREET\02_DATA\GINT\1311860383.GPJ GAL-MIS.GDT 6/1/17 DD

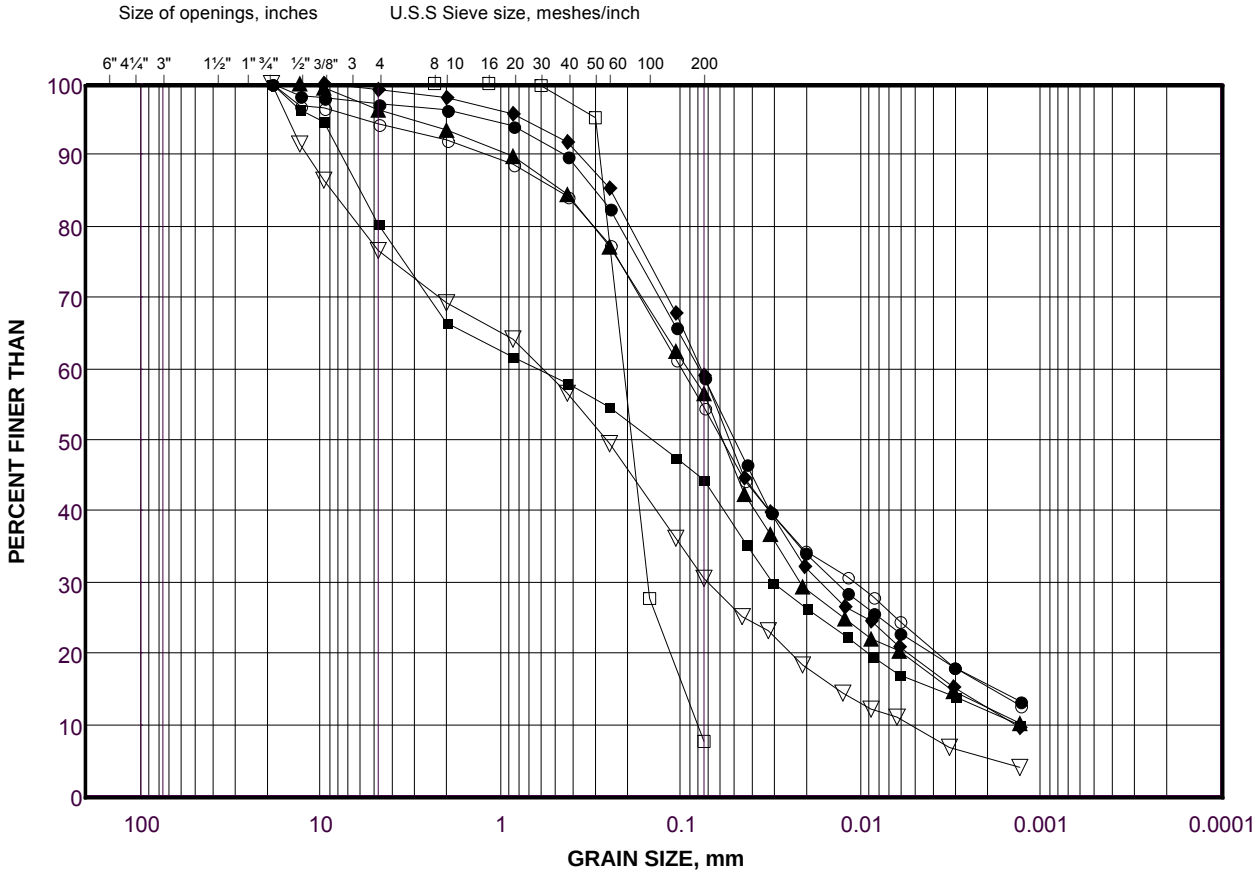
APPENDIX B

Geotechnical Laboratory Test Results

GRAIN SIZE DISTRIBUTION

Non-Cohesive Fill

FIGURE B1



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	14-20	2	0.76 - 1.37
■	14-14	2	0.76 - 1.37
◆	14-08	2B	1.07 - 1.37
▲	14-06	2B	1.01 - 1.37
▽	14-11	3	1.52 - 2.13
❍	14-06	4	2.29 - 2.90
□	14-28	4B	2.44 - 2.74

Project Number: 13-1186-0383

Checked By: JR

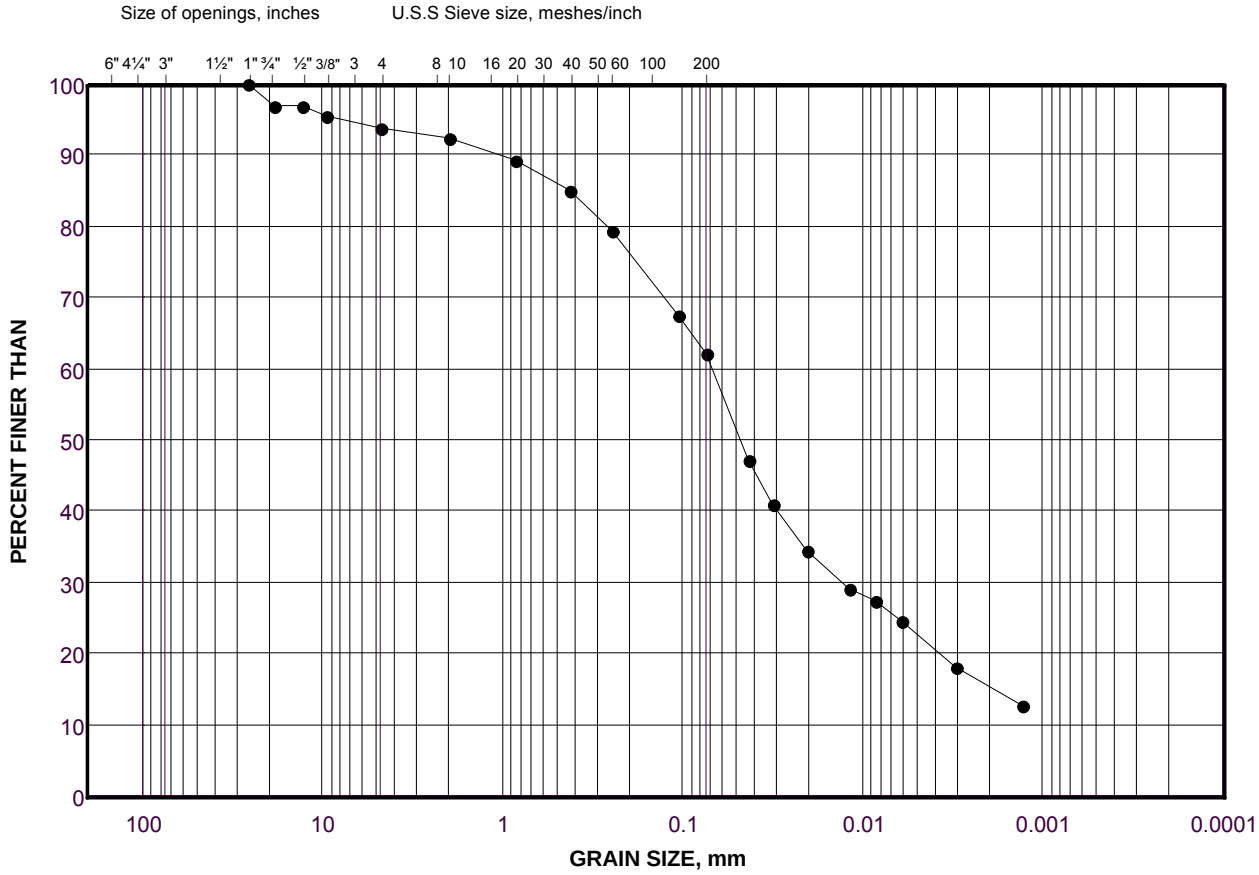
Golder Associates

Date: 30-Apr-15

GRAIN SIZE DISTRIBUTION

Cohesive Fill

FIGURE B2



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	14-05	3	1.52 - 2.13

Project Number: 13-1186-0383

Checked By: JR

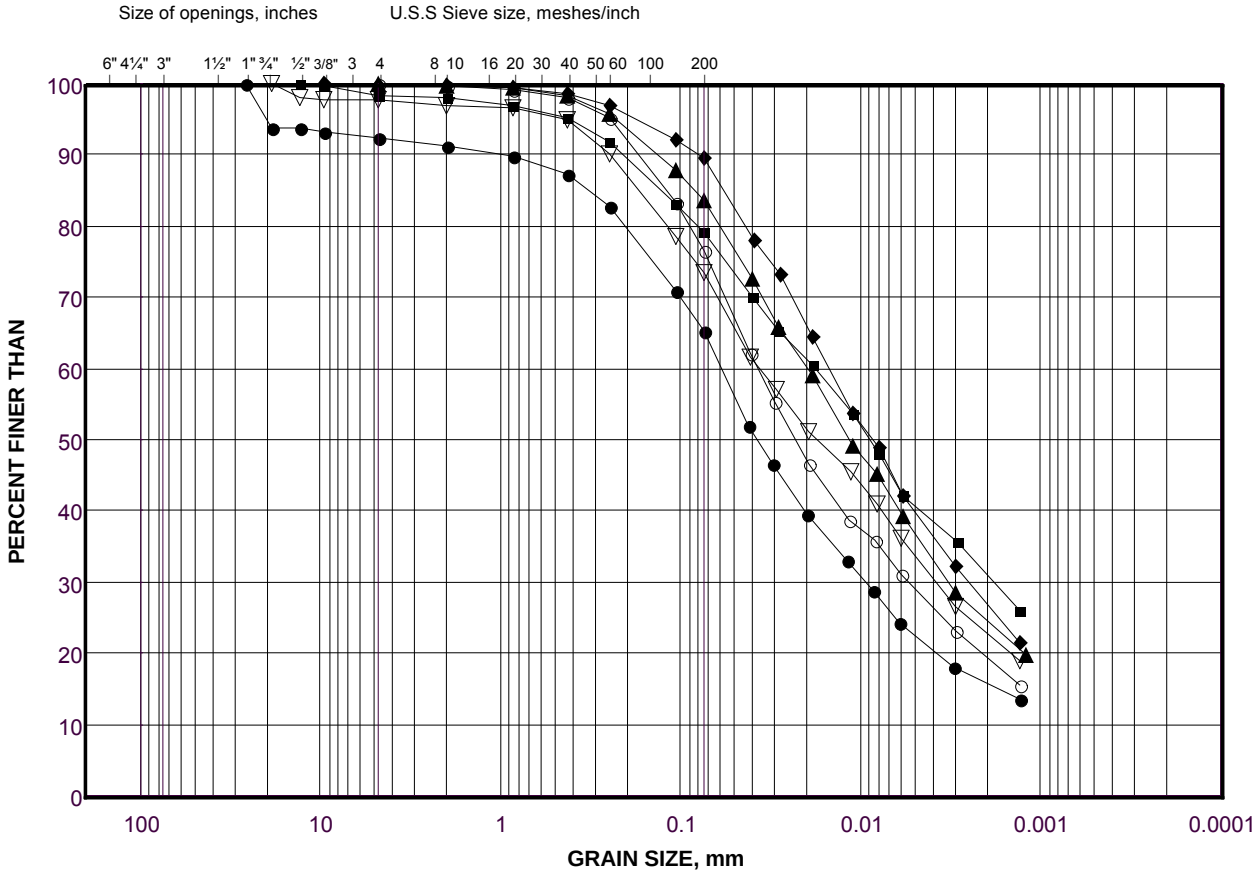
Golder Associates

Date: 30-Apr-15

GRAIN SIZE DISTRIBUTION

Silty Clay/Clayey Silt

FIGURE B3



LEGEND

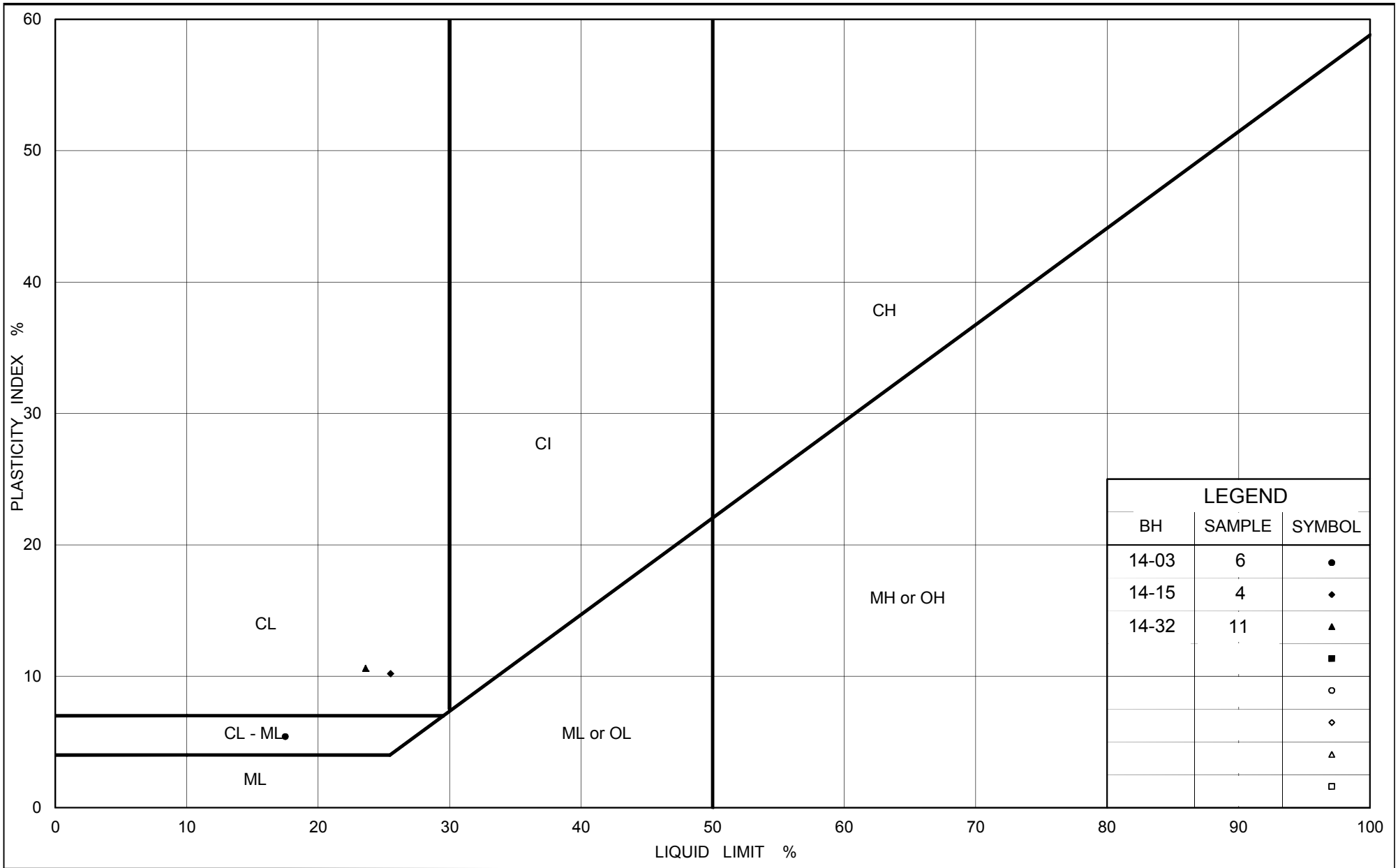
SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	14-11	10	9.14 - 9.75
■	14-32	11	9.14 - 9.75
◆	14-15	4	2.29 - 2.90
▲	14-13	5	3.05 - 3.66
▽	14-10	6	3.81 - 4.42
❍	14-03	6	3.81 - 4.42

Project Number: 13-1186-0383

Checked By: JR

Golder Associates

Date: 30-Apr-15



Golder Associates

PLASTICITY CHART

Silty Clay/Clayey Silt

Figure No. B4

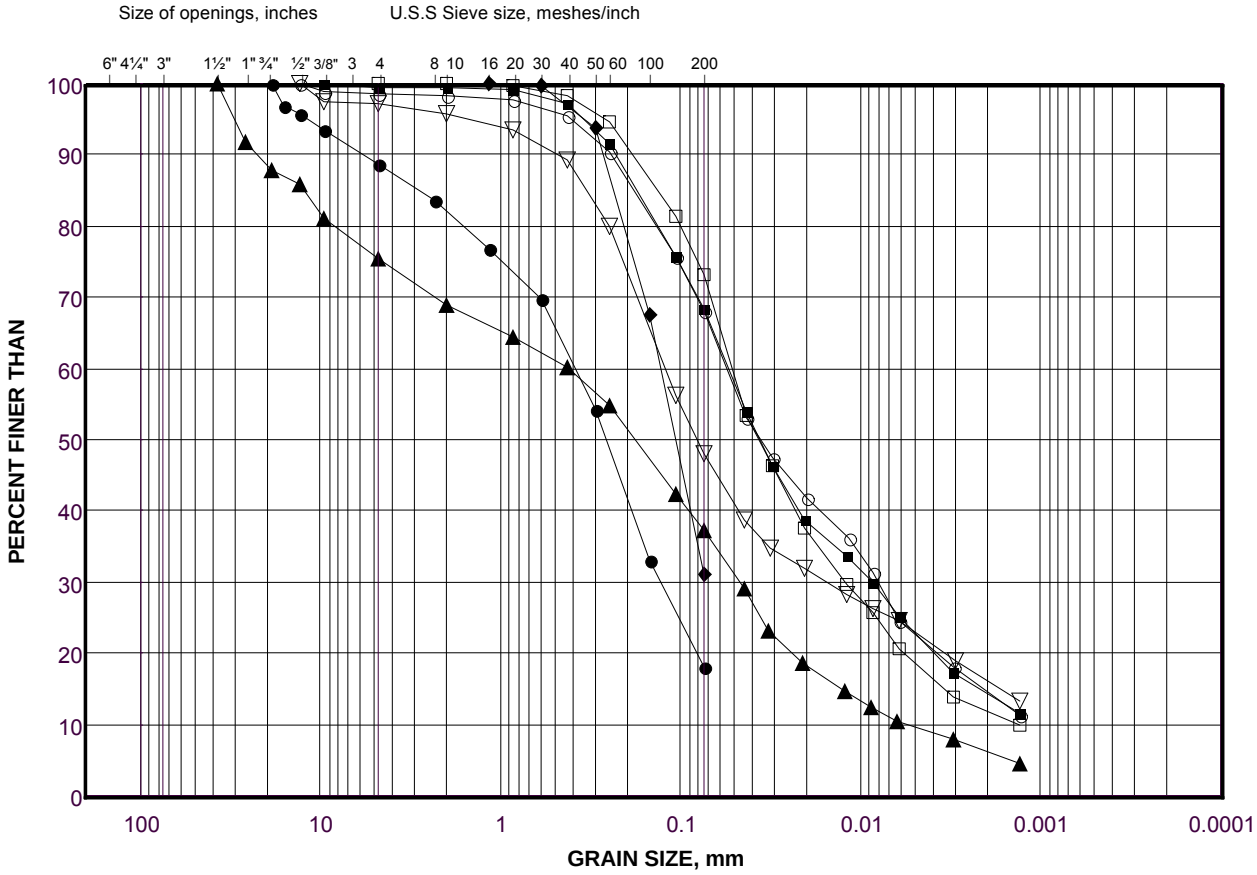
Project No. 13-1186-0383

Checked By: JR

GRAIN SIZE DISTRIBUTION

Non-Cohesive Deposit

FIGURE B5



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	14-09	3	1.52 - 2.13
■	14-10	4A	2.29 - 2.59
◆	14-26	5	3.05 - 3.66
▲	14-18	5	3.05 - 3.66
▽	14-16	5A	3.05 - 3.35
❍	14-02	5A	3.05 - 3.51
□	14-12	6	3.81 - 4.42

Project Number: 13-1186-0383

Checked By: JR

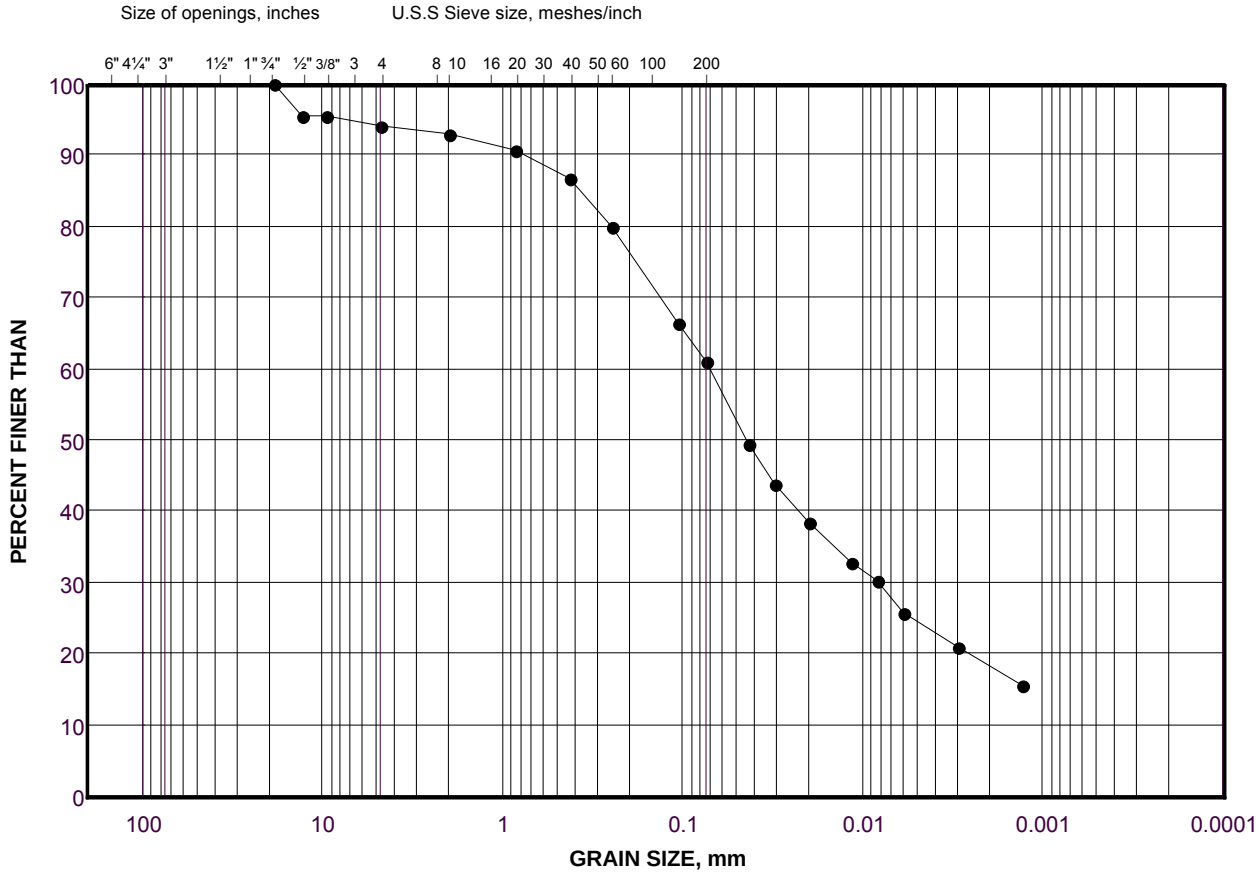
Golder Associates

Date: 30-Apr-15

GRAIN SIZE DISTRIBUTION

Clayey Silt (Topsoil)

FIGURE B6



LEGEND

SYMBOL	BOREHOLE	SAMPLE	DEPTH(m)
●	14-22	5	3.05 - 3.66

Project Number: 13-1186-0383

Checked By: JR

Golder Associates

Date: 01-May-15

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 44 1628 851851
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

Golder Associates Ltd.
210 Sheldon Drive
Cambridge, Ontario N1T 1A8
Canada
T: +1 (519) 620 1222

Golder Associates

APPENDIX J

Phase 1 Environmental Site Assessment

May 2017

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Erb Street Corridor, Fischer-Hallman Road to Wilmot Line, Waterloo, Ontario

Submitted to:
Walterfedy
675 Queen Street South
Suite 111
Kitchener, ON
N2M 1A1

REPORT

Report Number: 13-1186-0383 (3000)

Distribution:

1 E-copy - Walterfedy
1 E-copy - Golder Associates Ltd.

Golder Associates

Executive Summary

Golder Associates Ltd. ("Golder") was retained by Walterfedy to conduct a Phase I Environmental Site Assessment ("Phase I ESA") of a corridor / right-of-way located on Erb Street West, between Fischer-Hallman Road and the Wilmot Line in Waterloo, Ontario (hereinafter referred to as the "corridor", "right-of-way" or "Site"). This Phase I ESA is part of the Erb Street Widening and Corridor Study (LOI C-2013-(TOR)).

The original Phase I ESA work was conducted in 2014 and a Draft Phase I ESA report was issued on July 11, 2014. Golder understands that Walterfedy used the Phase I ESA report in draft form for the purposes of their work. In May 2017, Golder was asked to finalize the Phase I ESA Draft report. Given that over 18 months had passed since the original work, Golder conducted a second Site visit on May 24, 2017 to confirm if Site conditions had changed since the time of the original 2014 Site visit.

The linear configuration of the Site differs from the parcel size and configuration to which a Phase I ESA typically applies. Golder, to the extent practicable, conducted the assessment following the principal components of the Canadian Standards Association standard CSA Z768-01 'Phase I Environmental Site Assessment'. The assessment involved the investigation of historical uses of the Site and properties immediately surrounding the Site to identify known and potential sources of contamination at the Site or that may impact the Site from adjacent properties and included a desktop review, evaluation of readily available information, and reporting, subject to the limitations outlined in Section 7.0 of this report.

The Phase I ESA included a Site reconnaissance visit ("Site reconnaissance"). The Site original reconnaissance was conducted on June 11, 2014, following the desktop review, and was targeted to viewing areas of the Site (i.e. roadway) that were in close proximity to surrounding properties, which were identified in the desktop review as having the potential to contribute to environmental contamination. The Site reconnaissance was limited to a visual assessment of the right-of-way and other areas in the vicinity of the right-of-way from publicly accessible locations. As previously noted, a second Site visit was conducted on May 24, 2017 to verify if Site conditions had changed since the time of the original 2014 Site visit.

The following summarizes the findings of the Phase I ESA. The Phase I ESA findings are based on acquired evidence of historical and/or actual and/or potential environmental impact, and represent those potential environmental issues that may have a material impact on the Site or operations contained within. The Phase I ESA findings have been grouped into six areas of potential environmental concern ("APECs") along the Site and include:

- APEC 1: 925 Erb Street

  During the Site visits the Waterloo Landfill facilities (Recycling and Hazardous Waste Depots) were observed to be located immediately south of the Site. The EcoLog ERIS Waste Disposal Sites – MOE CA Inventory database indicated that the property described as located at "Western 1/3 of G.C.T. 40 East of Twp Rd 41, South of County Road #9), has been operating as the "Waterloo Landfill Site" since at least the early 1970's (1972/73). The landfill and waste management areas on the property were typically at distances of approximately 200 m from the Site boundary. Based on the distance of landfill activities to the Site and with the operation of groundwater control and leachate management systems at the landfill property, the Waterloo Landfill is considered to have low to medium potential as an environmental risk APEC to the Site.

- APEC 2: North of the Site, from Wilmot Line to Costco property.

  During the Site visit, the properties located north of the west portion of the Site were observed to consist of agricultural land, from Wilmot Line to west of the Costco store / gasoline service station property. At the time of the Site visits, the storage of pesticides and/or herbicides was not observed at this property. The potential use of pesticides and herbicides on the agricultural land north of the Site represents an issue of potential environmental concern; however, it is considered to have low potential as an environmental risk APEC to the Site.

- APEC 3: 650 Erb Street West

  During the Site visit a service station (Canadian Tire) was located at 650 Erb Street West, immediately north of the Site on the northwest corner of the intersection of Erb Street and Erbsville Road. The EcoLog ERIS report listed this property as having two 75,000 L double walled gasoline underground storage tanks ("USTs") installed in 2009. The presence of a gasoline station located immediately adjacent and at an inferred up-gradient location to the Site represents an issue of potential environmental concern for the Site and has the potential to contribute to soil and/or groundwater contamination at depths relevant to development of the right-of-way. This property is considered to have high potential as an environmental risk APEC to the Site.

- APEC 4: 656 Erb Street West

  The EcoLog ERIS report listed the property at 656 Erb Street West as Canadian Tire #674 and J&S Young Merchants Ltd. for the generation of various hazardous wastes including halogenated pesticides from 2007 to as of April 2014. During the Site visit, the property was observed to be occupied by a Canadian Tire store (within the Westside Market Place Plaza). The Canadian Tire store building was located approximately 215 m north of the Site. Based on the distance of this waste generator to the Site, the property at 656 Erb Street West is considered to have low potential as an environmental risk APEC to the Site.

- APEC 5: 450 Erb Street West

  During the Site visit, a dry-cleaning facility (Sketchley Cleaners) was observed within the Beechwood Centre (Plaza) at 450 Erb Street West (immediately north of the east end of the Site). Commercial dry cleaning facilities typically generate hazardous wastes including, but not limited to, used solvents and surplus chemicals. The facility at 450 Erb Street West was not listed in the EcoLog ERIS databases as a generator of hazardous wastes; however, based on proximity and inferred up-gradient location, the unknown chemical and waste management and handling practices at this property represent an issue of potential environmental concern for the Site and has the potential to contribute to soil and/or groundwater contamination at depths relevant to development of the right-of-way. This property is considered to have high potential as an environmental risk APEC to the Site.

- APEC 6: 930 Erb Street West

  At the time of the May 25, 2017 Site visit, a Costco store and associated commercial gasoline service station had been developed north of the Site on the west portion of the Site, west of the electrical utility corridor. The gasoline service station was observed to be located on the southeast portion of the Costco property, adjacent to Erb Street West. The gasoline service operation is considered an APEC for the Site; however, based on

the age and technology of the infrastructure associated with the service station, it poses a low to medium environmental risk APEC to the Erb Street corridor..

Based on the results of the Phase I ESA, a subsurface investigation may be considered to obtain more information on soil and groundwater conditions at the Site.

Table of Contents

1.0 INTRODUCTION 1

1.1 Background 1

1.2 Scope of Work 1

2.0 SITE DESCRIPTION 2

2.1 Topographic, Geologic and Hydrogeologic Conditions 2

2.2 Site Physical Description 4

2.3 Site Operations 5

3.0 HISTORICAL RECORDS REVIEW 5

3.1 Site Interviews and Documents 5

4.0 DESKTOP REVIEW 5

4.1 Desktop Review Screening Methodology 6

4.2 Desktop Review Summary 7

5.0 SITE RECONNAISSANCE FINDINGS 8

5.1 Air Emissions 8

5.2 Water and Wastewater Discharges 9

5.3 Hazardous and Non-hazardous Waste 9

5.4 Materials and Chemicals 10

5.5 Asbestos-Containing Materials 10

5.6 Polychlorinated Biphenyls (“PCB”) Containing Materials and Equipment 10

5.7 Special Attention Items 10

5.8 Storage Tanks 11

5.8.1 Aboveground Storage Tanks (“ASTs”) 11

5.8.2 Underground Storage Tanks (“USTs”) 11

5.9 Spills 11

5.10 Surrounding Land Use 11

6.0 FINDINGS AND CONCLUSIONS 13

7.0 LIMITATIONS AND USE OF REPORT 15

8.0 LIST OF REFERENCES 16

9.0 QUALIFICATIONS OF THE ASSESSORS 17

10.0 CLOSURE.....17

FIGURES

Figure 1 – Site Location

Figure 2 – Site and Surrounding Land Use

Figure 3 – Areas of Potential Environmental Concern (APECs)

APPENDICES

APPENDIX A
Risk Table

APPENDIX B
Ecolog ERIS Report

APPENDIX C
Site Photographs

1.0 INTRODUCTION

1.1 Background

Golder Associates Ltd. ("Golder") was retained by Walterdedy to conduct a Phase I Environmental Site Assessment ("Phase I ESA") of a corridor/right-of-way located along Erb Street, between Fischer-Hallman Road to Wilmot Line in Waterloo, Ontario (hereinafter referred to as the "corridor", "right-of-way" or "Site"). At the time of the Golder Site reconnaissance on June 11, 2014, the Site was developed with a roadway which extended approximately 2.75 km (1.708 miles) in length.

The original Phase I ESA work was conducted in 2014 and a Draft Phase I ESA report was issued on July 11, 2014. Golder understands that Walterfedy used the Phase I ESA report in draft form, for the purposes of their work. In In May 2017, Golder was asked to finalize the Phase I ESA Draft report. Given that over 18 months had passed since the original work, Golder conducted a second Site visit on May 24, 2017 to confirm if Site conditions had changed since the time of the original 2014 Site visit.

A Phase I ESA is a preliminary qualitative assessment of the environmental condition of a property, based on a review of current activities and historical information for the subject property and also a review of available environmental related information for the surrounding properties. The objective of the Phase I ESA is to identify and report on evidence of actual and/or potential contamination on a property from current activities at the property or from adjacent properties. The Phase I ESA is also used to identify environmental concerns from historical activities at the property. The Phase I ESA is designed to identify and report on evidence of actual or potential environmental impact at the Site.

The Site location, Site and Surrounding Land Use and areas of potential environmental concern ("APECs") are shown on **Figures 1**, **2** and **3**.

1.2 Scope of Work

Golder's assignment was completed in accordance with the terms and conditions outlined in Golder's Proposal P3-1186-0383, dated December 5, 2013. Authorization to proceed was provided to Golder by Mr. Mark Christensen of Walterfedy on April 23, 2014.

The linear configuration of the Site differs from the parcel size and configuration to which a Phase I ESA typically applies. Golder, to the extent practicable, conducted the assessment following the principal components of the Canadian Standards Association standard CSA Z768-01 'Phase I Environmental Site Assessment'. The assessment included the investigation of historical uses of the Site and properties immediately surrounding the Site to identify known and potential sources of contamination at the Site or that may impact the Site from adjacent properties. The assessment included the following activities:

1) Desktop Review - Based on the size and extent of the Site, Golder conducted a preliminary desktop environmental due diligence review ("desktop review") for the Site in order to categorize properties located within 250 m of the Site as having low, moderate, or high potential to contribute to environmental contamination along the right-of-way.

2) Site Reconnaissance – Two Site visits were conducted, the first on June 11, 2014 and subsequently on May 24, 2017. The Site visits included walkovers along the sides of the right-of-way; however, it did not include

walking on any parts of the roadway. The original Site reconnaissance was conducted following the desktop review and was targeted to viewing areas of the Site (i.e. roadway) that were in close proximity to surrounding properties, which were identified in the desktop review as having a high potential to contribute to environmental contamination and allowed for confirmation of high risk areas along the Site. Both Site visits were limited to visually assessing the identified areas along or in the vicinity of the roadway line that were accessible from public areas.

It should be noted that Golder was not accompanied by a Site Representative during either of the Site visits and an interview with a Site Representative was not conducted.

2.0 SITE DESCRIPTION

2.1 Topographic, Geologic and Hydrogeologic Conditions

Topic	Conditions	Comment / Source
Subsurface Soils	Maryhill Till (Erie Lobe) consisting predominantly of silty clay to clay matrix, moderate to high matrix carbonate content, clast poor.	Ontario Ministry Of Northern Development And Mines, Ontario Geological Survey, Map 2556, "*Quaternary Geology Of Ontario, Southern Sheet*", 1991.
Type of Bedrock	Salina Formation consisting of limestone, dolostone, shale, sandstone, gypsum, salt.	Ontario Ministry Of Northern Development And Mines, Map No. 2544, "*Bedrock Geology Of Ontario, Southern Sheet*", 1991.
Depth to Bedrock	Depth to bedrock was reported to range between approximately 97 m bgs (318 ft bgs) to 345 ft bgs (105.15 m bgs) based on information provided by water well data in the surrounding properties.	EcoLog ERIS report.
Depth to Groundwater	Static water level readings were reported to range from approximately 6.1 m bgs (20 ft bgs) to 50.3 m bgs (165 ft bgs), based on information provided by water well data in the surrounding properties.	EcoLog ERIS report.
Nearest Open Water Body	A tributary creek, part of the Clair Creek appears to cross under the Site (i.e. Erb Street) on the west portion of the Site. A small pond (possibly a storm water management pond) is located south of the central portion of the Site (southwest of the intersection of Erb Street and Ira Needles Boulevard (adjacent to the commercial plaza).	Natural Resources Canada *"The Atlas of Canada",* Toporama Topographic Maps and Visual observations.

Topic	Conditions	Comment / Source
	Maple Hills Creek is located approximately 800 m southeast of the east portion of the Site.	
Slope of Site Ground Surface	The ground surface of the Site follows the general undulating topography of the area with a general slope to the southeast.	Visual observations.
Inferred Near Surface Groundwater Flow	Based on the topography of the area, the inferred direction of shallow groundwater flow at the Site is to the southeast.	Natural Resources Canada *"The Atlas of Canada",* Toporama Topographic Maps
Topography of Site and Surrounding Area	In general, the Site and surrounding area have an undulating topography, with a general slope to the southeast.	Visual observations.
Site Grade Relative to the Adjoining Properties	Given that the area has an undulating topography, there are some variations in grade between the Site and surrounding properties along the right-of-way. The western-most part of the Site is generally at a lower grade than areas to the north and at a higher grade than areas to the south. At some points along the central and eastern parts of the Site, the ground surface of the Site is both at a similar grade or higher grade than surrounding properties to the north and south.	Visual observations.
Water Wells / Monitoring Wells on Site (Depth, Drilling Date, Use)	None observed and/or reported.	Visual observations and EcoLog ERIS report.
Water Wells / Monitoring Wells on the Neighbouring Properties	The EcoLog ERIS report listed thirty (30) wells within 250 m from the Site. The EcoLog ERIS Map shows the wells located to the north and south of the Site, mainly on neighbouring areas adjacent to the central and eastern parts of the Site. The final status of the wells is reported as test hole, water supply, observation well or abandoned/other. The wells were developed at various periods of time ranging between 1946 and 2012. The wells (for which	EcoLog ERIS report.

Topic	Conditions	Comment / Source
	information was provided) reportedly extended to depths ranging between 1.52 m (5 ft) to 236.83 m (777 ft).	
Presence of Fill Material on-Site	The presence of fill material was not observed on-Site and as previously mentioned, the Site is generally at grade relative to adjacent properties. Given that a roadway was developed on the Site, it is expected that some granular fill was imported as road bed material.	Visual observations.
Prominent Physical Features on-Site or Surrounding Area	An electrical utility corridor intersects the Site on the west portion of the Site (approximately 325 m west of Erbsville Road / Ira Needles Boulevard). Various electrical utility towers are located on the neighbouring properties along the north and south sides of the Site, from Wilmot Line to the electrical utility corridor intersection. An underground natural gas line and natural gas connection pipes (Union Gas) are located along the north neighbouring areas of the Site from Wilmot Line to the Union Gas station, located immediately west of Westside Market Place (Plaza). Pole-mounted transformers are located throughout the neighbouring areas to the north and south of the Site. A roundabout is located on the Site (i.e. on Erb Street West) at the intersection of Erbsville Road / Ira Needles Boulevard.	Visual observations.

2.2 Site Physical Description

Topic	Observations	Comment / Source
Site Area	The Site consists of Erb Street West from Wilmot Line to	Visual observations and Natural Resources Canada *"The Atlas of*

Topic	Observations	Comment / Source
	Fischer Hallman Road, extending approximately 2.75 km (1.708 miles).	*Canada",* Toporama Topographic Maps
Number of Buildings on the Site	No buildings are located on the Site.	Visual observations.
Approximate Floor Space of Buildings	Not applicable.	Visual observations.
Approximate Percentage of Site Covered by Site Building(s)	0%	Visual observations.
Approximate Percentage of Site Consisting of Landscaped/ Grassed/Bare Ground Areas	<1%%	Visual observations.
Approximate Percentage of Site Consisting of Paved or Other Sealed Surface Materials	99%	Visual observations.
Number of Floors (include all levels, whether above or below ground)	Not applicable.	Visual observations.
Number of Levels Below Ground Level	Not applicable.	Visual observations.

2.3 Site Operations

The Site consists of a roadway (i.e. Erb Street West) and operations are limited to vehicular and pedestrian traffic, and road maintenance activities.

3.0 HISTORICAL RECORDS REVIEW

3.1 Site Interviews and Documents

A Site Representative was not available for interview by Golder and no previous environmental reports relating to the Site were provided to Golder for review.

4.0 DESKTOP REVIEW

Requests were made to regulatory agencies in order to establish if there is information on file pertaining to the environmental status of the Site. Relevant information from these inquiries is presented below.

4.1 Desktop Review Screening Methodology

Based on the extent of the Site, Golder conducted a preliminary desktop environmental due diligence review ("desktop review") for the Site. The desktop review was limited to a review of environmental databases to obtain information concerning potentially contaminating activities that may have affected the Site, including the usage, storage, treatment, and disposal of potentially contaminating substances.

Golder contracted the services of EcoLog Environmental Risk Information Services Ltd. ("EcoLog ERIS") of Don Mills, Ontario to conduct a search of their federal, provincial and private sector databases for information on the surrounding area (i.e., 250 m) from the Site. The EcoLog ERIS report contains a summary of environmental and historical information compiled from government and private sources for properties within the Project area. The complete EcoLog ERIS report dated, May 27, 2014, including a brief description of each of the databases searched for this Phase I ESA, is included in **Appendix B**.

Preliminary screening information on properties that may have contributed to or have the potential to contribute to environmental contamination along the roadway was obtained from the EcoLog ERIS report databases. Properties located within 250 m of the roadway were included in the reviewed databases and were included[1] in this preliminary screening exercise. Based on the information reviewed, properties within the 250 m of the Site were categorized by Golder as having low, moderate, or high potential to contribute to environmental contamination in the Project area (i.e. the roadway)[2].

In addition to factors such as distance, inferred hydrogeological gradient and site specific information, the criteria that were used to assign a risk rating to portions/areas of the Site are summarized below:

Low Potential to Contribute to Environmental Contamination –The criteria used to assign a low risk rating included the following:

- <10 years of use, bulk storage, or disposal of hydrocarbon products or non-chlorinated solvents;
- <10 years of liquid industrial or hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents);
- Propane handling and storage facilities;
- Storage and handling of pesticides (vendors only);
- Pathological waste;
- No fuel or chemical underground storage tanks;
- Occupancy that suggests the use of only small quantities of potentially contaminating materials on site; and
- One-time spill events < 50 L (to paved areas or storm sewers).

[1] Many of the databases that were reviewed as part of this program are based on voluntary submissions. Other databases reflect information that has been submitted to an agency as a condition of approval or Regulation. It is to be expected that not all properties within the 250 m of the Site will be included in the reviewed databases. For example, if an industrial property has not registered with the Ontario Ministry of Environment as a waste generator, then that property will not be listed in the Ontario Regulation 347 Waste Generators Summary database. It cannot be inferred that properties that are not listed in the databases have a low potential for contributing to environmental contamination.

[2] 250 m represents the *Canadian Standards Association (CSA) Z768-01 Standard for Phase I Environmental Site Assessment* recommended search radius.

Moderate Potential to Contribute to Environmental Contamination –The criteria used to assign a moderate risk included the following:

- Landfill Sites between 50 to 250 m of the Site;
- >10 years of use, bulk storage or disposal of hydrocarbon products or non-chlorinated solvents;
- >10 years of liquid industrial or hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents);
- Bulk fuel storage as a site use that is ancillary to the primary business on the property (i.e. incidental use);
- Bulk storage, use and handling of substances such as pesticides;
- Automobile wrecking and recycling facilities;
- Storage and use small quantities of chlorinated solvents (e.g. laboratory use only); and
- One-time spill events to soil between 50 L and 100 L.

High Potential to Contribute to Environmental Contamination –The criteria used to assign a high risk rating included the following:

- Landfill sites within 50 m of the Site;
- >15 years of use, bulk storage or disposal of hydrocarbon products and non-chlorinated solvents;
- >15 years of liquid industrial or hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents);
- Bulk fuel handling and storage facilities as a primary business on the property;
- PCB storage site and/or reported PCB spills;
- Storage, use, or disposal of chlorinated solvents, where it cannot be confirmed based on existing information that only small quantities were used; and
- One-time spill events to soil (>100L).

4.2 Desktop Review Summary

The table below summarizes the absolute number of properties assigned a low, moderate or high risk rating located within the 250 m of the Site, based on the EcoLog ERIS information. It is important to note that these numbers include only those properties that were listed within at least one of the public or private databases in the EcoLog ERIS report.

Potential to Contribute to Environmental Contamination	Number of Sites
Low	5
Moderate	1
High	6
Total Number (see Footnote 1)	12

Figure 3 shows the approximate locations of the properties identified as having a high, medium or low potential to contribute to environmental contamination on the Site, based on the EcoLog ERIS report and the Site reconnaissance visits, and **Table 1** (in **Appendix A**) provides a tabular summary of the high, medium and low potential properties listed within the databases and within the 250 m of the Site.

5.0 SITE RECONNAISSANCE FINDINGS

Ms. Valentina Ulloa of Golder conducted the Site reconnaissance on June 11, 2014. Golder conducted a second Site visit on May 24, 2017 to confirm if Site conditions had changed since the time of the original 2014 Site visit. Both Site visits consisted of a walk along the boundaries of the Site, and included a cursory inspection of surrounding properties from publicly accessible areas. The weather at the time of the 2014 Site visit was a mix of sunny and cloudy conditions and the temperature was approximately 25^{o}C. The Site was developed with a roadway (Erb Street) at the time of the Site visit. Golder was not accompanied on the Site reconnaissance by a Site representative. Weather conditions on May 24, 2017 were overcast with a temperature of approximately 10 ^{o}C.

As previously mentioned, the 2014 Site reconnaissance was conducted following the desktop review and was targeted to viewing areas of the Site (i.e. roadway) that were in close proximity to surrounding properties which were identified in the desktop review as having a high potential to contribute to environmental contamination ("high potential areas"). Both Site visits were limited to a visual assessment of the roadway right-of-way and other areas in the vicinity of the roadway from publicly accessible locations.

Photographs of some of the features noted during the Site reconnaissance are attached in **Appendix C**.

The results of the Site reconnaissance are presented below.

5.1 Air Emissions

Topic	Observations/Findings
Process Exhausts	Not applicable. No buildings present on-Site.
Heating and Cooling System(s)	Not applicable. No buildings present on-Site.
Other Exhausts	Exhausts may relate to emissions from vehicles observed or operated throughout the Site.
Odours	No strong, pungent or noxious odours were noted during the Site visit.
Visible Emissions	No visible emissions were noted during the Site visit.

5.2 Water and Wastewater Discharges

Topic	Observations/Findings
Water Supply Source	Water is not supplied to the Site.
Water Use	Water is not used on-Site.
Wastewater Treatment	Not applicable. No wastewater is generated at the Site.
Sanitary/Process Wastewater Receptor	No utility drawings showing the sanitary sewer connection were available for the Site; therefore, Golder could not conclude if a sanitary sewer connection is located along the Site.
Sanitary Sewer Connection	Not applicable. The Site is not connected to the sanitary sewer.
Septic Systems	None observed and/or reported.
Storm Water Flow	No utility drawings showing the storm sewer connection were available for the Site. Overland flow of stormwater from precipitation across the paved areas of the Site to the catch basins is inferred to occur at the Site.
Storm Sewer Connection	No utility drawings showing the sanitary sewer connection were available for the Site; therefore, Golder could not conclude if a sanitary sewer connection is located on the Site.
Storm Water Infiltration	Stormwater infiltration is inferred to potentially occur through the surfaces of bare/vegetated areas at the Site. The only vegetated area observed within the Site was the interior area of the roundabout at the intersection of Erb Street and Ira Needles Boulevard/Erbsville Road. Unpaved, bare exposed ground surfaces were observed along the north and south sides of the right-of-way in the western part of the Site.
Watercourses, Ditches or Ponded Water	Watercourses, ditches or ponded water were not observed at the Site. A tributary of Clair Creek appears to cross under Erb Street on the west portion of the Site (between Wilmot Line and Erbsville Road/Ira Needles Boulevard).

5.3 Hazardous and Non-hazardous Waste

Topic	Observations/Findings
Material Use and Storage	Material use and storage at the Site was not observed during the Site visit.
In-floor or In-ground Sumps, Trenches or Pits	None observed or reported.
Grease Traps Present	None observed or reported.
Oil / water Separators Present	None observed or reported.
Hydraulic Hoists Present	None observed or reported.
Staining or Evidence of Upset	Spot oil staining was observed on the asphalt floor surface area, due to vehicle traffic through the Site.

5.4 Materials and Chemicals

Topic	Observations/Findings
Material Use and Storage	Material use and storage at the Site was not observed during the Site visit.
In-floor or In-ground Sumps, Trenches or Pits	None observed or reported.
Grease Traps Present	None observed or reported.
Oil / water Separators Present	None observed or reported.
Hydraulic Hoists Present	None observed or reported.
Staining or Evidence of Upset	Spot oil staining was observed on the asphalt floor surface area, due to vehicle traffic through the Site.

5.5 Asbestos-Containing Materials

Topic	Observations/Findings
Potential Friable ACMs and Potential Non-Friable ACMs	Since there is no building located at the Site, the issue of ACMs in building materials is not considered to be relevant.

5.6 Polychlorinated Biphenyls ("PCB") Containing Materials and Equipment

Topic	Observations/Findings
Electricity Source	No electricity is supplied to the Site. Light posts are located along the perimeter surrounding properties of the Site.
Transformer(s)	None observed on-Site. Pole-mounted transformers are located throughout the north and south surrounding perimeter areas of Site.
Capacitors	None observed.
Light Ballasts	None observed.
Elevators on-Site (Use and Type)	None observed.

5.7 Special Attention Items

Topic	Observations/Findings
Lead-Based Paints ("LBPs")	No buildings are present on-Site and as such, LBPs are not considered to be an issue of concern for the Site.
Ozone-Depleting Substances ("ODSs")	Based on observations made during the Site visit, no ozone-depleting substance containing equipment is currently used on-Site. Ozone depleting solvents are not currently used on-Site and there is no record of their use historically.
Radon Gas	Not applicable. There are no buildings (or underground levels) at the Site.

Topic	Observations/Findings
	Considering that soils in this part of Ontario have a low radon gas generating potential, radon is not considered to be an issue of environmental concern at the Site.
Mould	No evidence of mould was observed at the Site.
Pesticides and Herbicides	The historical or current on-Site use of pesticides and herbicides is unknown; no records were available for review.
Mercury Containing Equipment	No mercury containing equipment (i.e., thermostats, fluorescent light tubes) was observed during the Site reconnaissance.
Urea Formaldehyde Foam Insulation ("UFFI")	No buildings are present on-Site and as such, UFFI is not considered to be an issue of concern for the Site.
Radioactive materials	The presence of equipment that may contain radioactive isotopes was not observed during the Site reconnaissance.
Presence of Stressed Vegetation	No areas of stressed vegetation were noted during the Site reconnaissance.

5.8 Storage Tanks

5.8.1 Aboveground Storage Tanks ("ASTs")

No permanent AST structures were observed along the Site during the Site reconnaissance visit.

5.8.2 Underground Storage Tanks ("USTs")

No evidence of underground storage tanks ("USTs"), such as fill pipes and vent pipes, was observed on-Site during the Site reconnaissance.

5.9 Spills

A spill is broadly termed an event or release that may cause, or is likely to cause, adverse effects on human health or the natural environment. Spills may occur during the use, storage and/or transfer of such materials located on-Site, and may result in significant environmental impact if not managed appropriately.

During the Site visit, no evidence of discharges or upsets of chemicals were observed on-Site. Minor/spot oil staining was observed on the asphalt surface of the Site, due to vehicle traffic.

No significant ground staining was observed at the time of the Site visit. No evidence of discharges or upsets of chemicals were observed on-Site.

5.10 Surrounding Land Use

During the Site visit, a visual reconnaissance of the outdoor operations of the adjacent properties that may potentially impact the Site was carried out from the Site and publicly accessible areas.

The surrounding properties have been developed for agricultural, commercial and industrial uses, as detailed on **Figure 2**.

North (Inferred Up-gradient)

From Wilmot Line to Erbsville Road / Ira Needles Boulevard intersection:

An electrical utility corridor was observed to intersect the west portion of the Site (approximately 325 m west of Erbsville Road / Ira Needles Boulevard) and various electrical utility towers were located on the surrounding properties along the north side of the Site, from Wilmot Line up to the electrical utility corridor intersection.

An underground natural gas line, natural gas connection pipes and a Union Gas station were located on the north neighbouring areas of Site from Wilmot Line to the Union Gas station, located immediately west of Westside Market Place (Plaza) (at 650 – 688 Erb Street West). The Union Gas station was observed to have a sign indicating the use of pesticides in this area.

A small structure (building), suspected to be part of the Waterloo Region Water Services was located north of the Site, on the northeast corner of the intersection of Erb Street and Wilmot Line (at 990 Erb Street West). Agricultural land is located north of the Site, from Wilmot Line to the Westside Market Place Plaza.

A commercial plaza (Westside Market Place) is located at the northwest intersection of Erb Street and Erbsville Road, i.e. immediately north of the Site. A service station (Canadian Tire) is located immediately north of the Site, within the plaza.

Sometime between June 2014 and May 2017, a Costco store and associated commercial gasoline service station were developed north of the Site on the west portion of the Site, west of the electrical utility corridor. The gasoline service station was observed to be located on the southeast portion of the Costco property, adjacent to Erb Street West. The gasoline service operation is considered an APEC for the Site; however, based on the age and technology of the infrastructure associated with the service station, it does not pose an immediate threat to the environmental condition of the Erb Street corridor.

From Erbsville Road / Ira Needles Boulevard intersection to Fischer Hallman Road:

A commercial plaza (West Quarter Plaza) is located immediately north of the Site, at the northeast corner of the intersection at Erb Street and Erbsville Road. The majority of the surrounding properties north of the Site in this section of the Site consist of residential area with some institutional properties (churches and schools). Commercial plazas are located immediately north of the east end of the Site, including the Beechwood Professional Centre (445 Erb Street West) and the Beechwood Centre (Plaza) (450 Erb Street West). A dry-cleaning facility was observed with the Beechwood Centre (Sketchley Cleaners).

During the May 24, 2017 Site visit, a residential property – The Westhill Retirement Residence building on the southeast corner of the Erb Street/Ira Needles Boulevard intersection was present, and a new multi-unit high-rise apartment building was in the final stages of construction immediately adjacent to Erb Street. .

East (Inferred Cross-gradient)

The continuation of Erb Street is located immediately east of the Site. Commercial properties (including Beechmount Plaza) were located further northeast of the Site, across Fischer Hallman Road, followed by residential properties. The Erb Street Menonite Church Cemetery (407 Erb Street West) was located further southeast of the Site, followed by residential properties.

South (Inferred Down-gradient)

From Wilmot Line to Erbsville Road / Ira Needles Boulevard intersection:

An electrical utility corridor was observed to intersect the Site on the west portion of the Site (approximately 325 m west of Erbsville Road / Ira Needles Boulevard) and various electrical utility towers were located on the neighbouring properties along the south side of the Site, from Wilmot Line up to the electrical utility corridor intersection.

The Waterloo Landfill was located immediately south of the Site including the Public Waste & Recycling Depot (Gate #2) and the Industrial Waste Depot and Main Office (Gate #1).

A commercial plaza was located immediately south of the Site on the southwest intersection of Erb Street and Ira Needles Boulevard. A small pond (possibly a storm water management pond) was located further south of the Site, adjacent to the west side of the commercial plaza.

From Erbsville Road / Ira Needles Boulevard intersection to Fischer Hallman Road:

A partially cleared area was located at the southeast corner of the intersection of Erb Street and Ira Needles Boulevard. Residential properties are located south of the Site from the cleared land to Fischer Hallman Road.

West (Inferred Cross-gradient)

The continuation of Erb Street was located immediately west of the Site. Agricultural land was located further northwest of the Site, across Wilmot Line. The Waterloo Landfill Emergency Services Training Centre (Gate #3) was located further southwest of the Site.

6.0 FINDINGS AND CONCLUSIONS

From the six properties identified from the desktop review (Section 3.2) and Site reconnaissance visits, two properties were identified as being “high risk” based on observations made during the Site visits and assessment of other factors that included hydrogeological gradient, site grade relative to the adjacent properties, location of spills that had occurred (if any), and distance from the Site. The properties considered to be APECs included the following:

APEC	Description of Potential Source
APEC 1: Potential Source of Contamination: The Waterloo Landfill – 925 Erb Street West	During the Site reconnaissance the Waterloo Landfill facilities (Recycling and Hazardous Waste Depots) were observed to be located immediately south of the Site. The EcoLog ERIS Waste Disposal Sites – MOE CA Inventory database indicated that the property described as located at “Western 1/3 of G.C.T. 40 East of Twp Rd 41, South of County Road #9) has been operating as the “Waterloo Landfill Site” since at least the early 1970’s (1972/73). The landfill and waste management areas on the property were typically at a distance of approximately 200 m from the Site boundary. Based on the distance of landfill activities to the Site and with the landfill groundwater control and leachate management systems at the landfill property, the Waterloo

APEC	Description of Potential Source
	Landfill is considered to have low to medium potential as an environmental risk APEC to the Site.
APEC 2: Potential Source of Contamination: Agricultural land.	During the Site visit, the properties located north of the west portion of the Site were observed to consist of agricultural land, from Wilmot Line up to the electrical utility corridor intersection. At the time of the Site visit, the storage of pesticides and/or herbicides was not observed at these properties. The potential use and possible storage and mixing of pesticides and herbicides on the agricultural land north of the Site represents an issue of potential environmental concern for the Site; however, it is considered to have low to medium potential as an environmental risk APEC to the Site.
APEC 3: Potential Source of Contamination: Canadian Tire Service Station at 650 Erb Street West.	During the Site visit, a service station (Canadian Tire) was located at 650 Erb Street West, immediately north of the Site on the northwest corner of the intersection of Erb Street and Erbsville Road. The EcoLog ERIS reported listed this property as having two 75,000 L double walled gasoline USTs installed in 2009. The presence of a gasoline station located immediately adjacent and at an inferred up-gradient location to the Site represents an issue of potential environmental concern for the Site and has the potential to contribute to soil and/or groundwater contamination at depths of several metres on the right-of-way. This property is considered to have high potential as an environmental risk APEC to the Site.
APEC 4: Potential Source of Contamination: 656 Erb Street West	During the Site visit, the property at 656 Erb Street was observed to be occupied by a Canadian Tire store (within the Westside Market Place Plaza). The EcoLog ERIS report listed this property as Canadian Tire #674 and J&S Young Merchants Ltd. for the generation of various hazardous wastes including halogenated pesticides from 2007 to as of April 2014. Based on the distance of this waste generator to the Site, the property at 656 Erb Street West is considered to have low potential as an environmental risk APEC to the Site.
APEC 5: Potential Source of Contamination: 450 Erb Street West	During the Site visit, a dry-cleaning facility (Sketchley Cleaners) was observed within the Beechwood Centre (Plaza) at 450 Erb Street West (immediately north of the Site). Commercial dry cleaning facilities typically generate hazardous wastes including, but not limited to, used solvents and surplus chemicals. The facility at 450 Erb Street West was not listed in the EcoLog ERIS databases as a generator of hazardous wastes; however, based on proximity and inferred up-gradient location, the unknown chemical and waste management and handling practices at this property represent an issue of potential environmental concern for the Site and has the potential to contribute to soil and/or groundwater contamination at depths of several metres on the

APEC	Description of Potential Source
	right-of-way. This property is considered to have high potential as an environmental risk APEC to the Site.
APEC 6 Potential Source of Contamination: 930 Erb Street West	During the May 25, 2017 Site visit, a Costco store and associated commercial gasoline service station had been developed north of the Site on the west portion of the Site, west of the electrical utility corridor. The gasoline service station was observed to be located on the southeast portion of the Costco property, adjacent to Erb Street West. The gasoline service operation is considered an APEC for the Site; however, based on the age and technology of the infrastructure associated with the service station, it poses a low to medium environmental risk APEC to the Erb Street corridor.

The locations of the five (5) APECs are shown in **Figure 3**.

7.0 LIMITATIONS AND USE OF REPORT

This report (the "Report") was prepared for the exclusive use of Walterfedy for the express purpose of providing advice with respect to the environmental condition of the Site.

The Report is intended to provide a review of available data in accordance, to the extent possible, with the principal components of CSA Z768-01 'Phase I Environmental Site Assessment' to investigate historical uses, and to identify known and potential sources of contamination at the Site identified as the Erb Street Widening Corridor at the time of the desktop review and Site reconnaissance. The Site reconnaissance was conducted following the desktop review and was targeted to viewing areas of the Site (i.e. roadway) that were in close proximity to surrounding properties which were identified in the desktop review as having a high potential to contribute to environmental contamination. The Site reconnaissance was limited to a visual assessment of the roadway right-of-way and other areas in the vicinity of the Site from publicly accessible locations.

The Report is based on data and information collected during the desktop review and the Site reconnaissance of the property conducted by Golder, and must be considered in its entirety. It is based solely on the conditions on the Site encountered at the time of the Site reconnaissance visits on June 11, 2014 and May 24, 2017. Except as otherwise may be requested, Golder disclaims any obligation to update this Report for events taking place, or with respect to information that becomes available to Golder after the time during which Golder conducted the work. No soil, water, liquid, gas, product or chemical sampling and analytical testing other than that described herein at or in the vicinity of the Site was conducted as part of this Work.

In evaluating the property, Golder has relied in good faith on information provided by other companies or government agencies noted in the Report. Golder has assumed that the information provided is factual and accurate and Golder has not independently verified the accuracy or completeness of such information. Golder accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this Report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted. Golder makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this letter, including, but not limited to, ownership of any property, or the application of any

law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to periodic amendment. In addition, regulatory statutes are subject to interpretation and these interpretations may change over time.

The scope and the period of Golder's assessment are described in this Report, and are subject to restrictions, assumptions and limitations. Except as noted herein, the work was conducted in accordance with the scope, terms and conditions of Golder's Proposal P3-1186-0383, dated December 5, 2013, approved by Mr. Mark Christensen of Walterfedy, on April 23, 2014. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report. Conditions may therefore exist which were not detected given the limited nature of the inquiry Golder was retained to undertake with respect to the Site. Accordingly, additional environmental studies and actions may be required. In addition, it is recognized that the passage of time affects the information provided in the Report. Golder's opinions are based upon information that existed at the time of the writing of the Report. It is understood that the services provided for in the scope of work allowed Golder to form no more than an opinion of the actual conditions at the Site at the time the site was visited, and cannot be used to assess the effect of any subsequent changes in any laws, regulations, the environmental quality of the site or its surroundings. Asbestos and mould surveys were not performed. If a service is not expressly indicated, do not assume it has been provided.

Any use which a third party makes of this Report, or any reliance on or decisions to be made based on it, are the sole responsibility of the third parties. Should additional parties require reliance on this Report, written authorization from Golder will be required. Golder disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

Should you have any questions concerning this report, or the limitations set herein, please do not hesitate to contact our office.

8.0 LIST OF REFERENCES

The following is a list of references reviewed for the purposes of preparing this report:

Source	Date
Canadian Standards Association Document Z768-01 'Phase I – Environmental Site Assessments'	November 2001
Ontario Ministry Of Northern Development And Mines, Map No. 2544, "*Bedrock Geology Of Ontario, Southern Sheet*"	1991
Ontario Ministry Of Northern Development And Mines, Ontario Geological Survey, Map 2556, "*Quaternary Geology Of Ontario, Southern Sheet*"	1991
Natural Resources Canada *"The Atlas of Canada",* Toporama Topographic Maps (1:15,000) [http://atlas.nrcan.gc.ca/site/english/maps/topo/map/]	2014
EcoLog Environmental Risk Information Services (EcoLog ERIS Report)	May 27, 2014

9.0 QUALIFICATIONS OF THE ASSESSORS

Valentina Ulloa, B.Sc. (Env.), Assessor

Valentina Ulloa is an Environmental Scientist/Assessor in the Mississauga, Ontario office of Golder's Environmental Services Division. Ms. Ulloa has contributed to numerous environmental projects throughout Ontario. Ms. Ulloa is most actively involved in assisting facilities in the identification and analysis of regulatory and non-regulatory (best practice) initiatives in industrial setting. Valentina has conducted and/or managed greater than eighty Phase I Environmental Site Assessments of Sites in Canada and Mexico for clients in a variety of agricultural, commercial and industrial properties sectors, including, but not limited to: logistics /warehousing, service stations and automotive parts manufacturing. In addition, Valentina has conducted various environmental compliance audits and due diligence reviews of sites throughout Ontario. Ms. Ulloa completed her academic training at University of Toronto, specializing in Biology and Environmental Science, and at Sheridan College Institute of Technology and Advanced Learning, specializing in Environmental Control.

David Smyth, Senior Hydrogeologist, QP_{ESA}

David Smyth, P.Geo., QPESA (ON) is a Principal in the Site Characterization and Restoration Group within the Environmental Sciences Division in the Golder GTA office, and acted as QPESA. He received his B.Sc. (Earth Sciences, 1979) and M.Sc (Hydrogeology, 1981) from the University of Waterloo. Between 1981 and 1987, he worked as a hydrogeologist in the Toronto area for Golder Associates on site investigation and environmental management projects for the petroleum, industrial and municipal sectors, in addition to mining related environmental projects. Between 1988 and 2006, he worked at the University of Waterloo, first as Manager of Waterloo Centre for Groundwater Research, then as Manager of the University Consortium Solvents-in-Groundwater Research Program until 1999, and then as a hydrogeologist on laboratory and field projects related to the in situ remediation of metals and inorganic contaminants in the subsurface until 2006. In 2007, he re-joined Golder Associates and has provided senior supervision and technical advice on projects involving site assessment, management, remediation and water resource protection for clients dealing with the environmental management of a range of contaminants including petroleum hydrocarbons, chlorinated solvents and inorganic contaminants (metals and radionuclides) in soil and groundwater. In addition to extensive recent experience at the Cameco Port Hope Conversion Facility, he has acted as Project Director and senior reviewer for Phase I and Phase II ESA and site management projects for commercial, industrial, and municipal and federal clients including the City of Mississauga and Public Works and Government Services Canada.

10.0 CLOSURE

We trust that the information presented in this report meets your current requirement. Should you have any questions, or concerns, please do not hesitate to contact the undersigned.

Report Signature Page

GOLDER ASSOCIATES LTD.





Valentina Ulloa, B.Sc.(Hon)
Environmental Scientist

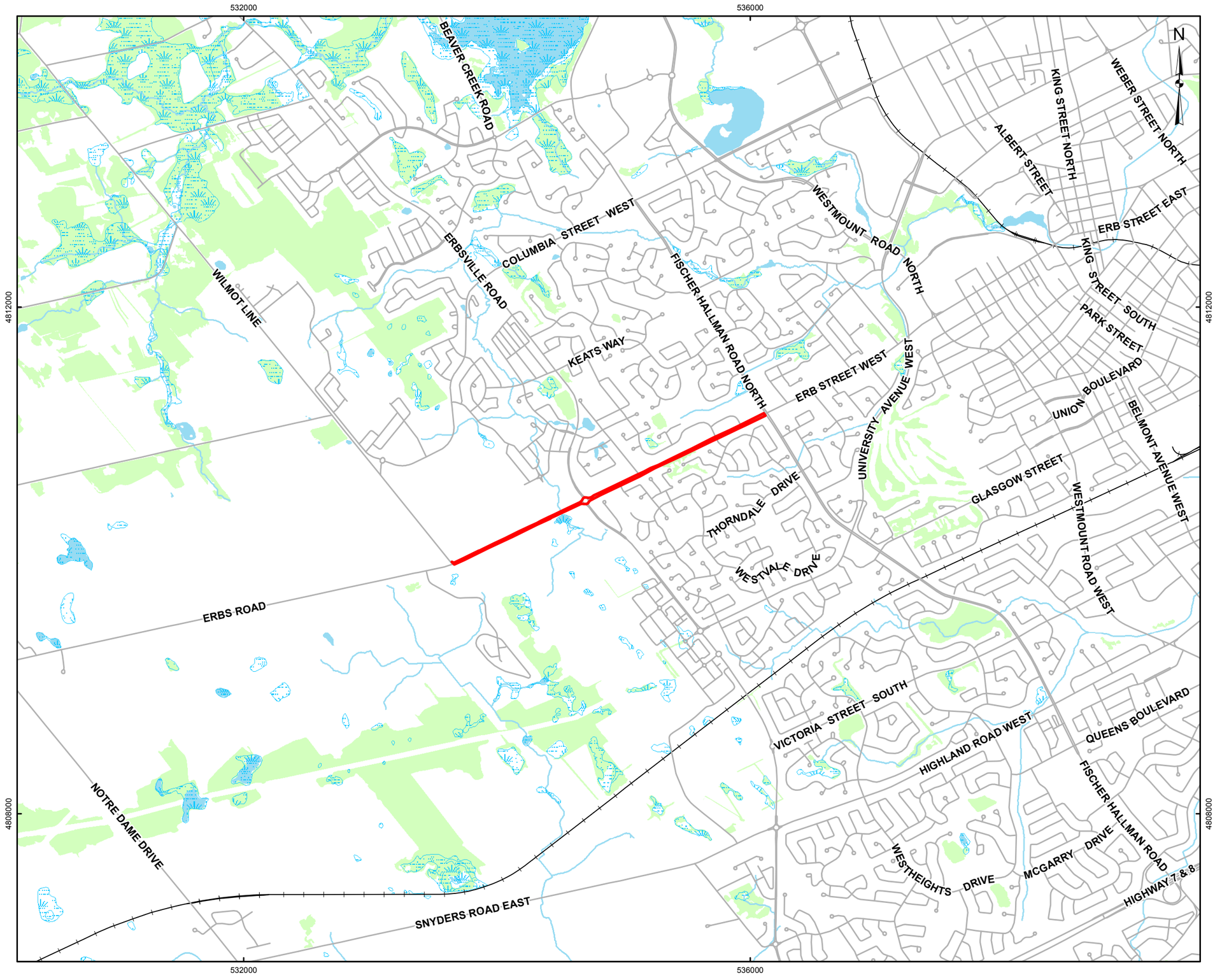
David Smyth, P. Geo
Principal

VU/DS/rh

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

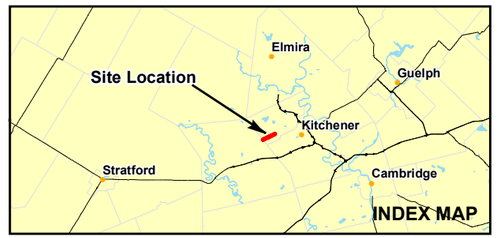
\\golder.gds\gal\cambridge\active\2013 projects\1186 construction services\13-1186-0383 - walterfedy - erb st - waterloo\environmental\phase i esa report\final report\13-1186-0383_final rpt_ph iesa_erbstcorridor_2017may29.docx

FIGURES



LEGEND

- Road
- Railways
- Watercourse
- Waterbody
- Wetland
- Wooded Area
- Site Location



REFERENCE

Base Data - MNR LIO, obtained 2013
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2013
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

500 250 0 500 1,000 1,500
SCALE 1:30,000 METRES

PROJECT
PHASE I ENVIRONMENTAL SITE ASSESSMENT
ERB STREET CORRIDOR
WATERLOO, ONTARIO

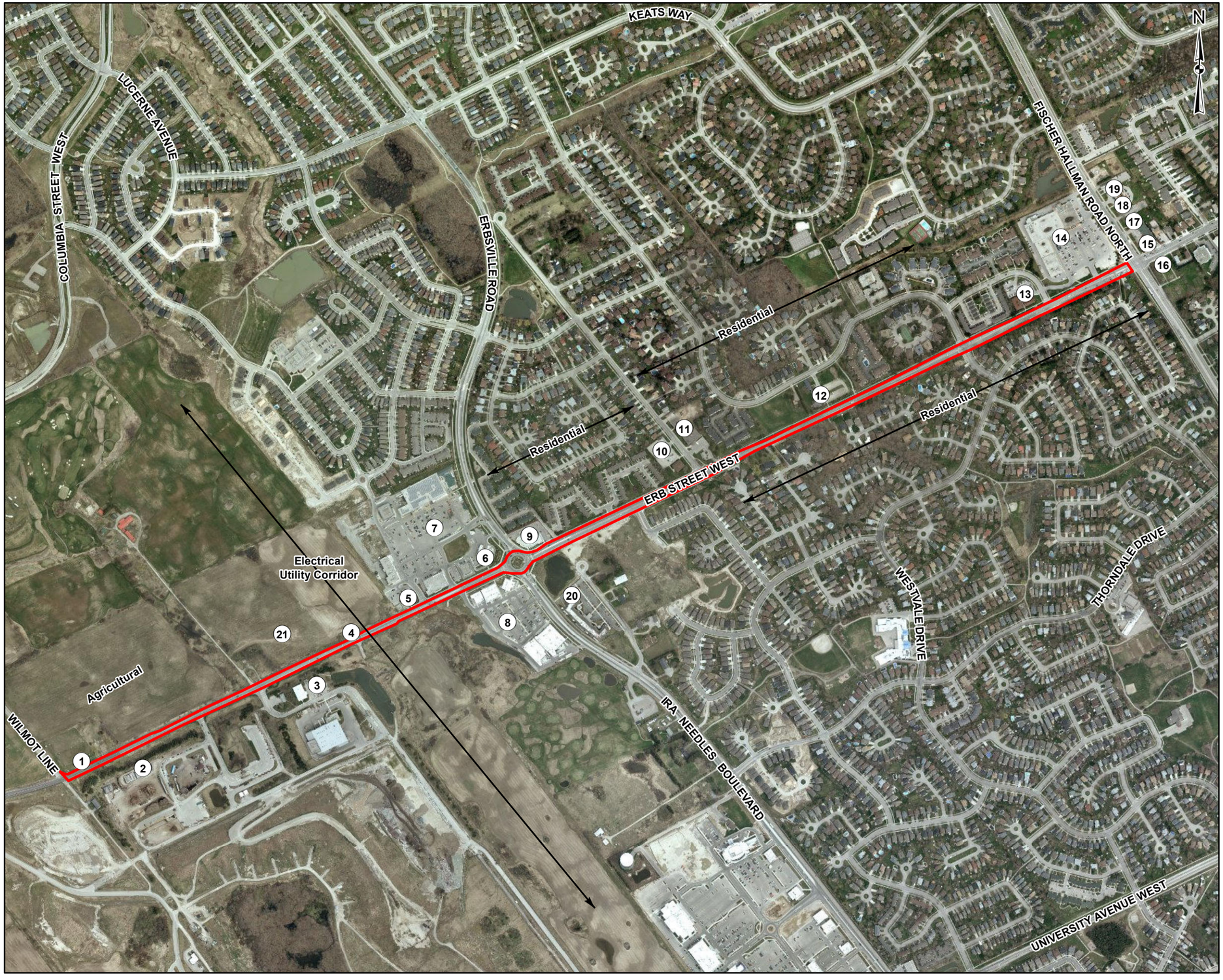
TITLE
SITE LOCATION

Golder Associates
Mississauga, Ontario

PROJECT NO. 13-1186-0383 (3000)			SCALE AS SHOWN	REV. 0.0
DESIGN	ME	9 Jul. 2014		
GIS	ME/MM	26 May. 2017		
CHECK	VU	26 May. 2017		
REVIEW	VU	26 May. 2017		

FIGURE: 1

G:\Projects\2013\13-1186-0383\GIS\MXDs\Reporting\Figure1_SiteLocation.mxd



LEGEND

Site Location

No.	Address
1.	Region of Waterloo - 990 Erb Street W
2.	Waterloo Landfill Gate #2 Public Waste & Recycling Depot - 925 Erb Street W
3.	Waterloo Landfill Gate #1 Industrial Waste and Main Office - 925 Erb Street W
4.	Hydro Vault - No address
5.	Union Gas Station - No address
6.	Canadian Tire Service Station - 650 Erb Street W
7.	Westside Market Place (Plaza) - 650 - 688 Erb Street W
8.	Commercial Retail Plaza - Waterloo Commons
9.	West Quarter Plaza - 646 Erb Street W
10.	Chinese Alliance Church - 612 Erb Street W
11.	KW Bilingual School - 600 Erb Street W
12.	The Cedars Westminster United Church - 543 Beechwood Drive
13.	Beechwood Professional Centre - 445 Erb Street W
14.	Beechwood Centre (Plaza) - 450 Erb Street W
15.	Beechmount Plaza - 420 Erb Street W
16.	Erb Street Menonite Church Cemetery - 407 Erb Street W
17.	Oxford Learning - 10 Fischer Hallman Road N
18.	Scotiabank and Commercial Building - 14 and 18 Fischer Hallman Road N
19.	Union Gas Station - No address
20.	The Westhill Retirement Residence - 25 Westhill Drive
21.	Costco Wholesale & Gasoline Service Station - 930 Erb Street W



REFERENCE

Base Data - MNR LIO, obtained 2013
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2013
Imagery - ESRI World Imagery WMS, 2014
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

100 50 0 100 200 300
SCALE 1:9,000 METRES

PROJECT
PHASE I ENVIRONMENTAL SITE ASSESSMENT
ERB STREET CORRIDOR
WATERLOO, ONTARIO

TITLE
SITE AND SURROUNDING LAND USE

Golder Associates
Mississauga, Ontario

PROJECT NO. 13-1186-0383 (3000)			SCALE AS SHOWN	REV. 0.0
DESIGN	ME	9 Jul. 2014		
GIS	ME/MM	26 May. 2017		
CHECK	VU	26 May. 2017		
REVIEW	VU	26 May. 2017		

FIGURE: 2

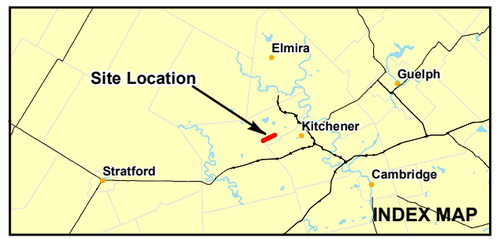
G:\Projects\2013\13-1186-0383\GIS\MXDs\Reporting\Figure2_SiteAndSurroundingLandUse.mxd



LEGEND

Site Location

Areas of Potential Environmental Concern	
1.	925 Erb Street West: Waterloo Landfill
2.	North of Site, from Wilmot Line to Costco: Agricultural Activites
3.	650 Erb Street West: Canadian Tire Service Station
4.	656 Erb Street West: Canadian Tire Store (Hazardous Waste Generator)
5.	450 Erb Street West: Sketchley Cleaners
6.	930 Erb Street West: Costco Wholesale Service Station



REFERENCE

Base Data - MNR LIO, obtained 2013
Produced by Golder Associates Ltd under licence from
Ontario Ministry of Natural Resources, © Queens Printer 2013
Imagery - ESRI World Imagery WMS, 2014
Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 17

100 50 0 100 200 300
SCALE 1:9,000 METRES

PROJECT
PHASE I ENVIRONMENTAL SITE ASSESSMENT
ERB STREET CORRIDOR
WATERLOO, ONTARIO

TITLE
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN

Golder Associates
Mississauga, Ontario

PROJECT NO. 13-1186-0383 (3000)			SCALE AS SHOWN	REV. 0.0
DESIGN	ME	9 Jul. 2014	FIGURE: 3	
GIS	ME	26 May. 2017		
CHECK	VU	26 May. 2017		
REVIEW	VU	26 May. 2017		

G:\Projects\2013\13-1186-0383\GIS\MXDs\Reporting\Figure3_APECs.mxd

APPENDIX A

Risk Table

PROPERTIES OF LOW, MEDIUM AND HIGH POTENTIAL TO CONTRIBUTE TO ENVIRONMENTAL CONTAMINATION ON THE SITE

ECOLOG MAP KEY #	GOLDER ID	PROPERTY ADDRESS	RATING RATIONALE
11	H01	ERB ST & ERBSVILLE RD	Spill events > 180 L
18	H02	650 ERB ST W	Bulk fuel handling and storage facilities as a primary business on the property.
24	H03	656 ERB ST W	Storage, use, or disposal of chlorinated solvents, where it cannot be confirmed based on existing information that only small quantities were used
26	L01	561 STONE PATH CRES	One-time spill events to paved areas
29	L02	664 ERB ST W	One-time spill events to air
40	H04	925 ERB ST - WATERLOO LANDFILL SITE	Landfill operations
52	M01	450 ERB ST W	< 10 years of liquid industrial and hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents)
			Pesticide Register - Vendor and Limited Vendor
54	H05	990 ERB ST W	Spill events > 150 L
63	L03	22 FISCHER HALLMAN	< 10 years of liquid industrial and hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents)
67	L04	420 ERB ST W	< 10 years of liquid industrial and hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents)
69	L05	414 ERB ST W	< 10 years of liquid industrial and hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents)
70	H06	1001 ERB ST W	>10 years of liquid industrial and hazardous waste generation (e.g. oils and lubricants, photo processing chemicals, non-chlorinated solvents)

APPENDIX B

Ecolog ERIS Report

ENVIRONMENTAL RISK INFORMATION SERVICE

DATABASE REPORT

Project Property:	*ERB Street Widening* *Erb Street And Fischer Hallmand Road* *Waterloo ON*
Report Type:	*Custom-Build Your Own Report*
Order #:	*20140520008*
Requested by:	*Golder Associates Ltd.*
Date:	*May 27, 2014*

Ecolog ERIS Ltd.
Environmental Risk Information Service Ltd. (ERIS)
A division of Glacier Media Inc.
P: 1.866.517.5204
E: info@erisinfo.com

www.erisinfo.com

Table of Contents

Table of Contents....1
Executive Summary....2
Executive Summary: Report Summary....3
Executive Summary: Site Report Summary - Project Property....5
Executive Summary: Site Report Summary - Surrounding Properties....6
Executive Summary: Summary By Data Source....15
Map....25
Aerial....26
Detail Report....27
Unplottable Summary....103
Unplottable Report....108
Appendix: Database Descriptions....133
Definitions....143

Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as a database review on environmental records.

License for use of information in Report: No page of this report can be used without this cover page, this notice and the project property identifier. The information in Report(s) may not be modified or re-sold.

Your Liability for misuse: Using this Service and/or its reports in a manner contrary to this Notice or your agreement will be in breach of copyright and contract and ERIS may obtain damages for such mis-use, including damages caused to third parties, and gives ERIS the right to terminate your account, rescind your license to any previous reports and to bar you from future use of the Service.

No warranty of Accuracy or Liability for ERIS: The information contained in this report has been produced by EcoLog Environmental Risk Information Services Ltd ("ERIS") using various sources of information, including information provided by Federal and Provincial government departments. The report applies only to the address and up to the date specified on the cover of this report, and any alterations or deviation from this description will require a new report. This report and the data contained herein does not purport to be and does not constitute a guarantee of the accuracy of the information contained herein and does not constitute a legal opinion nor medical advice. Although ERIS has endeavored to present you with information that is accurate, EcoLog ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of EcoLog ERIS is limited to the monetary value paid for this report.

Trademark and Copyright: You may not use the ERIS trademarks or attribute any work to ERIS other than as outlined above. This Service and Report(s) are protected by copyright owned by EcoLog ERIS Ltd. Copyright in data used in the Service or Report(s) (the "Data") is owned by EcoLog ERIS or its licensors. The Service, Report(s) and Data may not be copied or reproduced in whole or in any substantial part without prior written consent of EcoLog ERIS.

Executive Summary

Property Information:

Project Property:	*ERB Street Widening* *Erb Street And Fischer Hallmand Road Waterloo ON*

Order Information:

Order No.:	*20140520008*
Date Requested:	*28/05/2014*
Requested by:	*Golder Associates Ltd.*
Report Type:	*Custom-Build Your Own Report*

Additional Products:

Executive Summary: Report Summary

Database	Name	Searched	Project Property	Boundary to 0.25km	Total
AAGR	Abandoned Aggregate Inventory	Y	0	0	0
AGR	Aggregate Inventory	Y	0	0	0
AMIS	Abandoned Mine Information System	Y	0	0	0
ANDR	Anderson's Waste Disposal Sites	Y	0	0	0
AUWR	Automobile Wrecking & Supplies	Y	0	0	0
BORE	Borehole	Y	0	7	7
CA	Certificates of Approval	Y	0	17	17
CFOT	Commercial Fuel Oil Tanks	Y	0	0	0
CHEM	Chemical Register	Y	0	0	0
COAL	Inventory of Coal Gasification Plants and Coal Tar Sites	Y	0	0	0
CONV	Compliance and Convictions	Y	0	0	0
CPU	Certificates of Property Use	Y	0	0	0
DRL	Drill Hole Database	Y	0	0	0
EASR	Environmental Activity and Sector Registry	Y	0	0	0
EBR	Environmental Registry	Y	0	0	0
ECA	Environmental Compliance Approval	Y	0	0	0
EEM	Environmental Effects Monitoring	Y	0	0	0
EHS	ERIS Historical Searches	Y	0	12	12
EIIS	Environmental Issues Inventory System	Y	0	0	0
EXP	List of TSSA Expired Facilities	Y	0	0	0
FCON	Federal Convictions	Y	0	0	0
FCS	Contaminated Sites on Federal Land	Y	0	0	0
FOFT	Fisheries & Oceans Fuel Tanks	Y	0	0	0
FST	Fuel Storage Tank	Y	0	2	2
FSTH	Fuel Storage Tank - Historic	Y	0	0	0
GEN	Ontario Regulation 347 Waste Generators Summary	Y	0	38	38
HINC	TSSA Historic Incidents	Y	0	1	1
IAFT	Indian & Northern Affairs Fuel Tanks	Y	0	0	0
INC	TSSA Incidents	Y	0	0	0
LIMO	Landfill Inventory Management Ontario	Y	0	0	0
MINE	Canadian Mine Locations	Y	0	0	0
MNR	Mineral Occurrences	Y	0	0	0
NATE	National Analysis of Trends in Emergencies System (NATES)	Y	0	0	0
NCPL	Non-Compliance Reports	Y	0	0	0
NDFT	National Defence & Canadian Forces Fuel Tanks	Y	0	0	0
NDSP	National Defence & Canadian Forces Spills	Y	0	0	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	Y	0	0	0

Database	Name	Searched	Project Property	Boundary to 0.25km	Total
NEES	National Environmental Emergencies System (NEES)	Y	0	0	0
NPCB	National PCB Inventory	Y	0	0	0
NPRI	National Pollutant Release Inventory	Y	0	18	18
OGW	Oil and Gas Wells	Y	0	0	0
OOGW	Ontario Oil and Gas Wells	Y	0	0	0
OPCB	Inventory of PCB Storage Sites	Y	0	0	0
ORD	Orders	Y	0	0	0
PAP	Canadian Pulp and Paper	Y	0	0	0
PCFT	Parks Canada Fuel Storage Tanks	Y	0	0	0
PES	Pesticide Register	Y	0	11	11
PINC	TSSA Pipeline Incidents	Y	0	0	0
PRT	Private and Retail Fuel Storage Tanks	Y	0	0	0
PTTW	Permit to Take Water	Y	0	0	0
REC	Ontario Regulation 347 Waste Receivers Summary	Y	0	0	0
RSC	Record of Site Condition	Y	0	0	0
RST	Retail Fuel Storage Tanks	Y	0	0	0
SCT	Scott's Manufacturing Directory	Y	0	7	7
SPL	Ontario Spills	Y	0	9	9
SRDS	Wastewater Discharger Registration Database	Y	0	0	0
TANK	Anderson's Storage Tanks	Y	0	0	0
TCFT	Transport Canada Fuel Storage Tanks	Y	0	0	0
VAR	TSSA Variances for Abandonment of Underground Storage Tanks	Y	0	0	0
WDS	Waste Disposal Sites - MOE CA Inventory	Y	0	16	16
WDSH	Waste Disposal Sites - MOE 1991 Historical Approval Inventory	Y	0	0	0
WWIS	Water Well Information System	Y	0	30	30
	Total:		0	168	168

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number

No records found in the selected databases for the project property.

Executive Summary: Site Report Summary - Surrounding *Properties*

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
1	CA	REID'S HERITAGE HOMES LTD.	634 & 636 ERB STREET WEST WATERLOO CITY ON	N/7.6	385.67	27
1	CA	REID'S HERITAGE HOMES LTD.	634 & 636 ERB STREET WEST WATERLOO CITY ON	N/7.6	385.67	27
2	EHS		635 Erb Street West Waterloo ON N2J 3Z4	SE/40.9	386.00	27
3	CA	WATERLOO CITY - WEST HILL DR.	WEST HILL DR/ERB ST/UNIVERSITY WATERLOO CITY ON	WSW/2.3	385.67	27
3	CA	R.M. OF WATERLOO-WATERLOO LANDFILL SITE	ERB ST. S./WEST HILL DR. W. WATERLOO CITY ON	WSW/2.3	385.67	28
4	EHS		Erb St. W. and Ira Needles Blvd.(SE corner) Waterloo ON	SSW/74.8	384.98	28
5	CA	The Regional Municipality of Waterloo	Ira Needles Blvd., Erb St. W., West Hill Dr. Waterloo ON	WSW/6.4	385.00	28
5	CA	WATERLOO CITY-ERBSVILLE RD/KAHLEN CONSTR	ERBSVILLE ROAD/WESTHILL DRIVE WATERLOO CITY ON	WSW/6.4	385.00	29
6	EHS		646 Erb Street West Waterloo ON	WSW/8.1	385.00	29
7	WWIS		ON	E/61.8	383.01	29
8	CA	The Corporation of the City of Waterloo	25 West Hill Dr Waterloo ON	S/158.9	386.00	30
9	CA	The Regional Municipality of Waterloo	Erb Street West and Ira Needles Blvd. Waterloo ON	WSW/28.4	385.00	30
9	CA	The Regional Municipality of Waterloo	Ira Needles Blvd. and Erb St. West Waterloo ON	WSW/28.4	385.00	30
10	GEN	RICHARD IRVINE 33-973	622B PINEROW CRESCENT WATERLOO ON N2T 2K6	N/177.1	380.00	31
11	SPL	WATERLOO NORTH HYDRO	ALFRED HAECHEN TOWNHOUSING SITE ERBSVILLE RD. & ERB ST. (PINE ROW) WATERLOO CITY ON	WSW/18.0	385.00	31
11	SPL	The Regional Municipality of Waterloo	Erb Street and Erbsville Road, KW Bilingual School<UNOFFICIAL> Waterloo ON	WSW/18.0	385.00	31

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
12	WWIS		lot 41 ON	SSE/205.9	384.02	31
13	WWIS		lot 41 ON	NE/89.3	381.61	32
14	WWIS		lot 41 ON	ENE/29.1	383.93	33
15	WWIS		lot 41 ON	WSW/28.0	385.00	33
16	SCT	Lambda Controls	17 Erbsville Crt RR 3 Waterloo ON N2J 3Z4	NNE/135.4	380.02	33
17	WWIS		lot 32 ON	NE/117.7	381.00	34
18	FST	CANADIAN TIRE CORP LTD C/O Canadian Tire Petroleum 17 Flr**	650 ERB ST W WATERLOO ON N2T 2Z7	WSW/5.2	383.81	35
18	FST	CANADIAN TIRE CORP LTD C/O Canadian Tire Petroleum 17 Flr**	650 ERB ST W WATERLOO ON N2T 2Z7	WSW/5.2	383.81	35
19	WWIS		lot 41 ON	SSW/169.3	381.44	36
20	WWIS		lot 41 ON	W/73.8	382.64	36
21	WWIS		ON	SSW/178.6	381.02	37
22	WWIS		lot 41 ON	W/135.5	381.27	37
23	WWIS		lot 41 ON	SW/162.0	380.14	38
24	GEN	Canadian Tire #674	656 Erb Street Waterloo ON N2T2Z7	WSW/7.6	381.00	38
24	GEN	J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON	WSW/7.6	381.00	39
24	GEN	J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON	WSW/7.6	381.00	40
24	GEN	J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON N2T2Z7	WSW/7.6	381.00	41
24	GEN	J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON N2T2Z7	WSW/7.6	381.00	42
24	GEN	J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON	WSW/7.6	381.00	42

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
24	PES	J & S YOUNG MERCHANTS LTD	656 ERB STREET WEST WATERLOO ON N2T 2Z7	WSW/7.6	381.00	43
24	PES	J & S YOUNG MERCHANTS LTD	656 ERB STREET WEST WATERLOO ON N2T 2Z7	WSW/7.6	381.00	43
24	PES	J & S YOUNG MERCHANTS LTD	656 ERB STREET WEST WATERLOO ON N2T 2Z7	WSW/7.6	381.00	43
25	NPRI	Toromont Energy Limited	925 Erb Street West Waterloo ON N2J 3Z4	WSW/12.5	380.96	44
25	NPRI	TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	WSW/12.5	380.96	44
25	NPRI	TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	WSW/12.5	380.96	45
25	NPRI	Toromont Energy Limited	925 Erb Street West Waterloo ON N2J 3Z4	WSW/12.5	380.96	45
25	NPRI	TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	WSW/12.5	380.96	46
25	NPRI	TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	WSW/12.5	380.96	46
25	NPRI	TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	WSW/12.5	380.96	47
25	NPRI	Toromont Energy Ltd.	925 Erb Street Waterloo ON N2J3Z4	WSW/12.5	380.96	48
25	NPRI	TOROMONT ENERGY	1001 ERB Street West Waterloo ON	WSW/12.5	380.96	48
26	SPL	WATERLOO NORTH HYDRO	561 STONE PATH CRES TRANSFORMER WATERLOO CITY ON N2T 2W6	ENE/93.2	384.71	49
27	WWIS		lot 41 ON	SW/141.6	379.00	49
28	WWIS		lot 32 ON	ENE/17.4	386.68	49
29	HINC		664 ERB STREET WEST WATERLOO ON N2T 2Z7	WSW/31.7	379.28	50
29	SPL	Union Gas Limited	664 Erb St Waterloo ON	WSW/31.7	379.28	50
30	SPL	The Corporation of the City of Waterloo	585 Erb Street West<UNOFFICIAL> Waterloo ON	ENE/21.7	385.25	51
31	WWIS		lot 32 ON	ENE/63.2	379.01	51

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
32	WWIS		lot 32 ON	ENE/41.3	381.18	52
32	WWIS		lot 32 ON	ENE/41.3	381.18	52
33	WWIS		lot 32 ON	NE/130.8	376.21	53
34	CA	WATERLOO CITY	BEECHWOOD DR/MAPLE FOREST PL. WATERLOO CITY ON	NE/108.4	375.43	53
34	CA	WATERLOO CITY	BEECHWOOD DR/MAPLE FOREST PL. WATERLOO CITY ON	NE/108.4	375.43	54
35	WWIS		lot 32 ON	ENE/60.6	378.54	54
36	WWIS		ON	SW/241.3	383.00	56
37	WWIS		lot 32 ON	ENE/66.1	372.01	56
38	BORE		ON	ENE/67.0	373.67	57
39	SCT	Wooden Stairs & Railings Ltd.	499 Heatherhill Pl Waterloo ON N2T 1H7	ENE/131.6	374.62	57
40	CA	R.M. OF WATERLOO	RR #9, WATERLOO L-FILL SITE WATERLOO CITY ON	WSW/27.3	390.00	57
40	CA	WATERLOO CITY	WATERLOO LANDFILL SITE - WWTP WATERLOO CITY ON	WSW/27.3	390.00	57
40	CA	R.M. OF WATERLOO STORMWATER MANAGEMENT	N. AREA OF WATERLOO LANDFILL WATERLOO CITY ON	WSW/27.3	390.00	58
40	CA	R.M. OF WATERLOO	FORCEMAIN FORM WATERLOO LANDFL WATERLOO CITY ON	WSW/27.3	390.00	58
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	WSW/27.3	390.00	58
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	WSW/27.3	390.00	59
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) TOWNSHIP OF WATERLOO ON	WSW/27.3	390.00	60
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	WSW/27.3	390.00	61
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	WSW/27.3	390.00	62

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	WSW/27.3	390.00	62
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	WSW/27.3	390.00	63
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	WSW/27.3	390.00	64
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	WSW/27.3	390.00	65
40	WDS	WATERLOO LANDFILL SITE	(ERB ST. W.) TOWNSHIP OF WATERLOO ON	WSW/27.3	390.00	66
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	WSW/27.3	390.00	66
40	WDS	WATERLOO LANDFILL SITE	(ERB ST. W.) TOWNSHIP OF WATERLOO ON	WSW/27.3	390.00	67
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	WSW/27.3	390.00	68
40	WDS	WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	WSW/27.3	390.00	69
40	WDS	WATERLOO LANDFILL SITE	(ERB ST. W.) TOWNSHIP OF WATERLOO ON	WSW/27.3	390.00	69
40	WDS	WATERLOO LANDFILL SITE	(ERB ST. W.) TOWNSHIP OF WATERLOO ON	WSW/27.3	390.00	70
41	WWIS		lot 32 ON	ENE/84.3	360.30	71
42	SCT	Hergott Cider Mill & Products	928 Erb St W Waterloo ON N2J 3Z4	WSW/13.3	392.00	71
42	SCT	HERGOTT CIDER MILL	928 Erb St W Kitchener ON N2J 3Z4	WSW/13.3	392.00	72
42	SCT	HERGOTT CIDER MILL	928 ERB ST W WATERLOO ON N2J 3Z4	WSW/13.3	392.00	73
42	SCT	HERGOTT CIDER MILL	928 ERB ST W WATERLOO ON N2J 3Z4	WSW/13.3	392.00	73
43	EHS		930 Erb Street West Waterloo ON N2J 3Z4	WSW/35.8	393.57	73
44	WWIS		lot 32 ON	ENE/108.2	358.50	74
45	WWIS		lot 32 ON	ENE/88.2	359.00	74

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	75
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	76
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	76
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	76
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	77
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	77
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	78
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	78
46	NPRI	Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	SW/203.7	395.00	78
47	WWIS		ON	NE/170.8	356.00	79
48	EHS		930 Erb St W Waterloo ON	WSW/137.4	398.91	79
48	EHS		930 Erb St W Waterloo ON N2J 3Z4	WSW/137.4	398.91	80
49	WWIS		lot 41 ON	WSW/83.8	397.22	80
50	EHS		928 Erb Street West Waterloo ON N2J 3Z4	WSW/83.6	402.32	80
51	BORE		ON	WSW/21.2	402.05	81
52	EHS		450 Erb St W Waterloo ON N2T 1H4	ENE/171.1	350.65	81
52	EHS		450 Erb Street West Waterloo ON N2T 1H4	ENE/171.1	350.65	82
52	GEN	Zehrs #524	450 Erb St. W. Waterloo ON	ENE/171.1	350.65	82
52	PES	ZEHRS MARKETS	450 ERB STREET WEST WATERLOO ON N2T 1H4	ENE/171.1	350.65	83

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
52	PES	ZEHRS MARKETS, DIV. OF ZEHRMART LTD.	450 ERB STREET W WATERLOO ON N2T 1H4	ENE/171.1	350.65	83
52	PES	ZEHRS MARKETS, DIV. OF ZEHRMART LTD.	450 ERB STREET WEST WATERLOO ON N2T 1H4	ENE/171.1	350.65	83
52	PES	ZEHRS MARKETS, DIV. OF ZEHRMART LTD.	450 ERB STREET WEST WATERLOO ON N2T 1H4	ENE/171.1	350.65	83
52	PES	LOBLAWS COMPANIES LTD	450 ERB ST W WATERLOO ON N2T 1H4	ENE/171.1	350.65	83
52	PES	ZEHRS BEECHWOOD	450 ERB ST W WATERLOO ON N2T 1H4	ENE/171.1	350.65	83
52	PES	SHOPPERS DRUG MART #0730 (BEECHWOOD CENTRE)	450 ERB STREET WEST WATERLOO ON N2T 1H4	ENE/171.1	350.65	84
52	PES	ZEHRS #524 (BEECHWOOD)	450 ERB ST W WATERLOO ON N2T 1H4	ENE/171.1	350.65	84
52	SCT	VALET VENDING LTD.	450 ERB ST W WATERLOO ON N2T 1H4	ENE/171.1	350.65	84
52	SPL		450 Erb St Waterloo ON	ENE/171.1	350.65	84
52	SPL	Arcturus Realty Corporation	450 Erb St Waterloo ON N2T 1H4	ENE/171.1	350.65	84
52	SPL	Loblaw Companies Ltd.	450 Erb St Waterloo ON N2T 1H4	ENE/171.1	350.65	85
53	BORE		ON	WSW/10.6	404.91	85
54	SPL	The Regional Municipality of Waterloo	990 Erb St W Waterloo ON	WSW/4.2	404.70	86
55	BORE		ON	WSW/32.0	405.93	86
56	BORE		ON	WSW/13.8	404.88	87
57	BORE		ON	WSW/62.8	405.00	88
58	CA	R.M. OF WATERLOO	ERB ST.W/WILMOT LINE WATERLOO CITY ON	WSW/8.0	402.83	88
59	WWIS		lot 32 ON	ENE/121.8	351.05	89
60	WWIS		lot 32 ON	ENE/111.7	351.02	90

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
61	BORE		ON	ENE/86.5	357.02	90
62	EHS		24 Fischer Hallman Rd North Waterloo ON	NE/246.2	345.54	91
63	GEN	Union Gas Limited	22 Fischer Hallman Waterloo ON N2L 2X3	NE/223.3	345.90	91
63	GEN	Union Gas Limited	22 Fischer Hallman Waterloo ON N2L 2X3	NE/223.3	345.90	91
64	EHS		10 Fischer Hallman Rd N Waterloo ON N2L 2X3	ENE/133.2	348.84	91
65	WWIS		ON	ENE/202.6	346.18	91
66	EHS		10 Fischer Hallman Rd N & 420 & 422 Erb St W Waterloo ON N2L 2X3	ENE/87.4	350.96	92
67	GEN	Beechwood Apothecaries Inc	7-420 Erb Street West Waterloo ON	ENE/89.8	350.98	92
67	GEN	Beechwood Wellness Pharmacy	7-420 Erb Street West Waterloo ON	ENE/89.8	350.98	92
67	GEN	Beechwood Wellness Pharmacy	7-420 Erb Street West Waterloo ON	ENE/89.8	350.98	92
67	GEN	WATERLOO WEST ANIMAL HOSPITAL	420 ERB STREET WEST, UNIT 6 WATERLOO ON N2L 6H6	ENE/89.8	350.98	93
67	GEN	Beechwood Wellness Pharmacy	7-420 Erb Street West Waterloo ON N2L 6H6	ENE/89.8	350.98	93
68	WWIS		lot 1 ON	WSW/202.3	394.00	93
69	GEN	Waterloo West Animal Hospital Professional Corpora	414 Erb St W Waterloo ON N2L 1W8	ENE/103.1	350.89	94
69	GEN	Waterloo West Animal Hospital Professional Corpora	414 Erb St W Waterloo ON N2L 1W8	ENE/103.1	350.89	95
69	GEN	Waterloo West Animal Hospital Professional Corpora	414 Erb St W Waterloo ON N2L 1W8	ENE/103.1	350.89	95
69	GEN	Waterloo West Animal Hospital Professional Corpora	414 Erb St W Waterloo ON N2L 1W8	ENE/103.1	350.89	95
70	GEN	TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON N2J 3Z4	WSW/94.8	398.66	96
70	GEN	University of Waterloo	1001 Erb's Rd Wilmot Township ON N2J 3Z4	WSW/94.8	398.66	96

Map Key	DB	Company/Site Name	Address	Dir/Dist m	Elev diff m	Page Number
70	GEN	The Regional Municipality of Waterloo Transportation & Environmental Services	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	WSW/94.8	398.66	96
70	GEN	TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON N2J 3Z4	WSW/94.8	398.66	96
70	GEN	The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	WSW/94.8	398.66	97
70	GEN	University of Waterloo	1001 Erb's Rd Wilmot Township ON	WSW/94.8	398.66	97
70	GEN	TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON	WSW/94.8	398.66	97
70	GEN	University of Waterloo	1001 Erb's Rd Wilmot Township ON	WSW/94.8	398.66	98
70	GEN	TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON	WSW/94.8	398.66	98
70	GEN	The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	WSW/94.8	398.66	98
70	GEN	TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON	WSW/94.8	398.66	98
70	GEN	University of Waterloo	1001 Erb's Rd Wilmot Township ON	WSW/94.8	398.66	99
70	GEN	TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON	WSW/94.8	398.66	99
70	GEN	The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	WSW/94.8	398.66	99
70	GEN	TOROMONT ENERGY	1001 ERB STREET WEST WATERLOO ON N2J 3Z4	WSW/94.8	398.66	99
70	GEN	The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	WSW/94.8	398.66	100
70	GEN	University of Waterloo	1001 Erb's Rd Wilmot Township ON	WSW/94.8	398.66	100
70	GEN	The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	WSW/94.8	398.66	100
70	GEN	University of Waterloo	1001 Erb's Rd Wilmot Township ON	WSW/94.8	398.66	100
71	WWIS		lot 32 ON	ENE/129.9	349.08	101
72	CA	WATERLOO CITY	CHURCHILL ST./ERB ST. WATERLOO CITY ON	ENE/196.5	351.46	101

Executive Summary: Summary By Data Source

BORE - Borehole

A search of the BORE database, dated 1875-Aug 2011 has found that there are 7 BORE site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
	ON	67.0	38
	ON	21.2	51
	ON	10.6	53
	ON	32.0	55
	ON	13.8	56
	ON	62.8	57
	ON	86.5	61

CA - Certificates of Approval

A search of the CA database, dated 1985-Oct 30, 2011* has found that there are 17 CA site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
REID'S HERITAGE HOMES LTD.	634 & 636 ERB STREET WEST WATERLOO CITY ON	7.6	1
REID'S HERITAGE HOMES LTD.	634 & 636 ERB STREET WEST WATERLOO CITY ON	7.6	1
WATERLOO CITY - WEST HILL DR.	WEST HILL DR/ERB ST/UNIVERSITY WATERLOO CITY ON	2.3	3
R.M. OF WATERLOO-WATERLOO LANDFILL SITE	ERB ST. S./WEST HILL DR. W. WATERLOO CITY ON	2.3	3
The Regional Municipality of Waterloo	Ira Needles Blvd., Erb St. W., West Hill Dr. Waterloo ON	6.4	5
WATERLOO CITY-ERBSVILLE RD/KAHLEN CONSTR	ERBSVILLE ROAD/WESTHILL DRIVE WATERLOO CITY ON	6.4	5
The Corporation of the City of Waterloo	25 West Hill Dr Waterloo ON	158.9	8

Site	Address	Distance m	Map Key
The Regional Municipality of Waterloo	Erb Street West and Ira Needles Blvd. Waterloo ON	28.4	9
The Regional Municipality of Waterloo	Ira Needles Blvd. and Erb St. West Waterloo ON	28.4	9
WATERLOO CITY	BEECHWOOD DR/MAPLE FOREST PL. WATERLOO CITY ON	108.4	34
WATERLOO CITY	BEECHWOOD DR/MAPLE FOREST PL. WATERLOO CITY ON	108.4	34
R.M. OF WATERLOO	FORCEMAIN FORM WATERLOO LANDFL WATERLOO CITY ON	27.3	40
R.M. OF WATERLOO STORMWATER MANAGEMENT	N. AREA OF WATERLOO LANDFILL WATERLOO CITY ON	27.3	40
WATERLOO CITY	WATERLOO LANDFILL SITE - WWTP WATERLOO CITY ON	27.3	40
R.M. OF WATERLOO	RR #9, WATERLOO L-FILL SITE WATERLOO CITY ON	27.3	40
R.M. OF WATERLOO	ERB ST.W/WILMOT LINE WATERLOO CITY ON	8.0	58
WATERLOO CITY	CHURCHILL ST./ERB ST. WATERLOO CITY ON	196.5	72

EHS - ERIS Historical Searches

A search of the EHS database, dated 1999-Mar 2013 has found that there are 12 EHS site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
	635 Erb Street West Waterloo ON N2J 3Z4	40.9	2
	Erb St. W. and Ira Needles Blvd.(SE corner) Waterloo ON	74.8	4
	646 Erb Street West Waterloo ON	8.1	6
	930 Erb Street West Waterloo ON N2J 3Z4	35.8	43
	930 Erb St W Waterloo ON	137.4	48
	930 Erb St W Waterloo ON N2J 3Z4	137.4	48
	928 Erb Street West Waterloo ON N2J 3Z4	83.6	50
	450 Erb Street West Waterloo ON N2T 1H4	171.1	52
	450 Erb St W Waterloo ON N2T 1H4	171.1	52

Site	Address	Distance m	Map Key
	24 Fischer Hallman Rd North Waterloo ON	246.2	62
	10 Fischer Hallman Rd N Waterloo ON N2L 2X3	133.2	64
	10 Fischer Hallman Rd N & 420 & 422 Erb St W Waterloo ON N2L 2X3	87.4	66

FST - Fuel Storage Tank

A search of the FST database, dated 2010-May 2013 has found that there are 2 FST site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
CANADIAN TIRE CORP LTD C/O Canadian Tire Petroleum 17 Flr**	650 ERB ST W WATERLOO ON N2T 2Z7	5.2	18
CANADIAN TIRE CORP LTD C/O Canadian Tire Petroleum 17 Flr**	650 ERB ST W WATERLOO ON N2T 2Z7	5.2	18

GEN - Ontario Regulation 347 Waste Generators Summary

A search of the GEN database, dated 1986-Apr 2014 has found that there are 38 GEN site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
RICHARD IRVINE 33-973	622B PINEROW CRESCENT WATERLOO ON N2T 2K6	177.1	10
Canadian Tire #674	656 Erb Street Waterloo ON N2T2Z7	7.6	24
J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON	7.6	24
J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON	7.6	24
J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON N2T2Z7	7.6	24
J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON N2T2Z7	7.6	24
J. & S. Young Merchants Ltd.	656 Erb Street Waterloo ON	7.6	24
Zehrs #524	450 Erb St. W. Waterloo ON	171.1	52
Union Gas Limited	22 Fischer Hallman Waterloo ON N2L 2X3	223.3	63
Union Gas Limited	22 Fischer Hallman Waterloo ON N2L 2X3	223.3	63
Beechwood Apothecaries Inc	7-420 Erb Street West Waterloo ON	89.8	67

Site	Address	Distance m	Map Key
Beechwood Wellness Pharmacy	7-420 Erb Street West Waterloo ON	89.8	67
Beechwood Wellness Pharmacy	7-420 Erb Street West Waterloo ON	89.8	67
WATERLOO WEST ANIMAL HOSPITAL	420 ERB STREET WEST, UNIT 6 WATERLOO ON N2L 6H6	89.8	67
Beechwood Wellness Pharmacy	7-420 Erb Street West Waterloo ON N2L 6H6	89.8	67
Waterloo West Animal Hospital Professional Corpora	414 Erb St W Waterloo ON N2L 1W8	103.1	69
Waterloo West Animal Hospital Professional Corpora	414 Erb St W Waterloo ON N2L 1W8	103.1	69
Waterloo West Animal Hospital Professional Corpora	414 Erb St W Waterloo ON N2L 1W8	103.1	69
Waterloo West Animal Hospital Professional Corpora	414 Erb St W Waterloo ON N2L 1W8	103.1	69
TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON N2J 3Z4	94.8	70
University of Waterloo	1001 Erb's Rd Wilmot Township ON N2J 3Z4	94.8	70
The Regional Municipality of Waterloo Transportation & Environmental Services	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	94.8	70
TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON N2J 3Z4	94.8	70
The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	94.8	70
University of Waterloo	1001 Erb's Rd Wilmot Township ON	94.8	70
TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON	94.8	70
University of Waterloo	1001 Erb's Rd Wilmot Township ON	94.8	70
TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON	94.8	70
The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	94.8	70
TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON	94.8	70
University of Waterloo	1001 Erb's Rd Wilmot Township ON	94.8	70
TOROMONT ENERGY LTD.	1001 ERB STREET WEST WATERLOO ON	94.8	70
The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	94.8	70

Site	Address	Distance m	Map Key
TOROMONT ENERGY	1001 ERB STREET WEST WATERLOO ON N2J 3Z4	94.8	70
The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	94.8	70
University of Waterloo	1001 Erb's Rd Wilmot Township ON	94.8	70
The Regional Municipality of Waterloo	1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	94.8	70
University of Waterloo	1001 Erb's Rd Wilmot Township ON	94.8	70

HINC - TSSA Historic Incidents

A search of the HINC database, dated 2006-June 2009 has found that there are 1 HINC site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
	664 ERB STREET WEST WATERLOO ON N2T 2Z7	31.7	29

NPRI - National Pollutant Release Inventory

A search of the NPRI database, dated 1993-2011 has found that there are 18 NPRI site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
TOROMONT ENERGY	1001 ERB Street West Waterloo ON	12.5	25
Toromont Energy Limited	925 Erb Street West Waterloo ON N2J 3Z4	12.5	25
TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	12.5	25
TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	12.5	25
Toromont Energy Limited	925 Erb Street West Waterloo ON N2J 3Z4	12.5	25
TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	12.5	25
TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	12.5	25
TOROMONT ENERGY	925 Erb Street West Waterloo ON N2J 3Z4	12.5	25
Toromont Energy Ltd.	925 Erb Street Waterloo ON N2J3Z4	12.5	25
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46

Site	Address	Distance m	Map Key
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46
Region of Waterloo	925 Erb Street West Waterloo ON N2J 3Z4	203.7	46

PES - Pesticide Register

A search of the PES database, dated 1988-Jun 2013 has found that there are 11 PES site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
J & S YOUNG MERCHANTS LTD	656 ERB STREET WEST WATERLOO ON N2T 2Z7	7.6	24
J & S YOUNG MERCHANTS LTD	656 ERB STREET WEST WATERLOO ON N2T 2Z7	7.6	24
J & S YOUNG MERCHANTS LTD	656 ERB STREET WEST WATERLOO ON N2T 2Z7	7.6	24
ZEHRS MARKETS	450 ERB STREET WEST WATERLOO ON N2T 1H4	171.1	52
ZEHRS MARKETS, DIV. OF ZEHRMART LTD.	450 ERB STREET W WATERLOO ON N2T 1H4	171.1	52
ZEHRS MARKETS, DIV. OF ZEHRMART LTD.	450 ERB STREET WEST WATERLOO ON N2T 1H4	171.1	52
ZEHRS MARKETS, DIV. OF ZEHRMART LTD.	450 ERB STREET WEST WATERLOO ON N2T 1H4	171.1	52
LOBLAWS COMPANIES LTD	450 ERB ST W WATERLOO ON N2T 1H4	171.1	52
SHOPPERS DRUG MART #0730 (BEECHWOOD CENTRE)	450 ERB STREET WEST WATERLOO ON N2T 1H4	171.1	52
ZEHRS #524 (BEECHWOOD)	450 ERB ST W WATERLOO ON N2T 1H4	171.1	52
ZEHRS BEECHWOOD	450 ERB ST W WATERLOO ON N2T 1H4	171.1	52

SCT - Scott's Manufacturing Directory

A search of the SCT database, dated 1992-Mar 2011 has found that there are 7 SCT site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
Lambda Controls	17 Erbsville Crt RR 3 Waterloo ON N2J 3Z4	135.4	16
Wooden Stairs & Railings Ltd.	499 Heatherhill Pl Waterloo ON N2T 1H7	131.6	39
HERGOTT CIDER MILL	928 ERB ST W WATERLOO ON N2J 3Z4	13.3	42
HERGOTT CIDER MILL	928 Erb St W Kitchener ON N2J 3Z4	13.3	42
Hergott Cider Mill & Products	928 Erb St W Waterloo ON N2J 3Z4	13.3	42
HERGOTT CIDER MILL	928 ERB ST W WATERLOO ON N2J 3Z4	13.3	42
VALET VENDING LTD.	450 ERB ST W WATERLOO ON N2T 1H4	171.1	52

SPL - Ontario Spills

A search of the SPL database, dated 1988-Jun 2013 has found that there are 9 SPL site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
The Regional Municipality of Waterloo	Erb Street and Erbsville Road, KW Bilingual School<UNOFFICIAL> Waterloo ON	18.0	11
WATERLOO NORTH HYDRO	ALFRED HAECHEN TOWNHOUSING SITE ERBSVILLE RD. & ERB ST. (PINE ROW) WATERLOO CITY ON	18.0	11
WATERLOO NORTH HYDRO	561 STONE PATH CRES TRANSFORMER WATERLOO CITY ON N2T 2W6	93.2	26
Union Gas Limited	664 Erb St Waterloo ON	31.7	29
The Corporation of the City of Waterloo	585 Erb Street West<UNOFFICIAL> Waterloo ON	21.7	30
	450 Erb St Waterloo ON	171.1	52
Loblaw Companies Ltd.	450 Erb St Waterloo ON N2T 1H4	171.1	52
Arcturus Realty Corporation	450 Erb St Waterloo ON N2T 1H4	171.1	52
The Regional Municipality of Waterloo	990 Erb St W Waterloo ON	4.2	54

WDS - Waste Disposal Sites - MOE CA Inventory

A search of the WDS database, dated 1970-Feb 2014 has found that there are 16 WDS site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
WATERLOO LANDFILL SITE	(ERB ST. W.) TOWNSHIP OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST. W.) TOWNSHIP OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST. W.) TOWNSHIP OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) WATERLOO, CITY OF ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) TOWNSHIP OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST W) CITY OF WATERLOO ON	27.3	40
WATERLOO LANDFILL SITE	(ERB ST. W.) TOWNSHIP OF WATERLOO ON	27.3	40

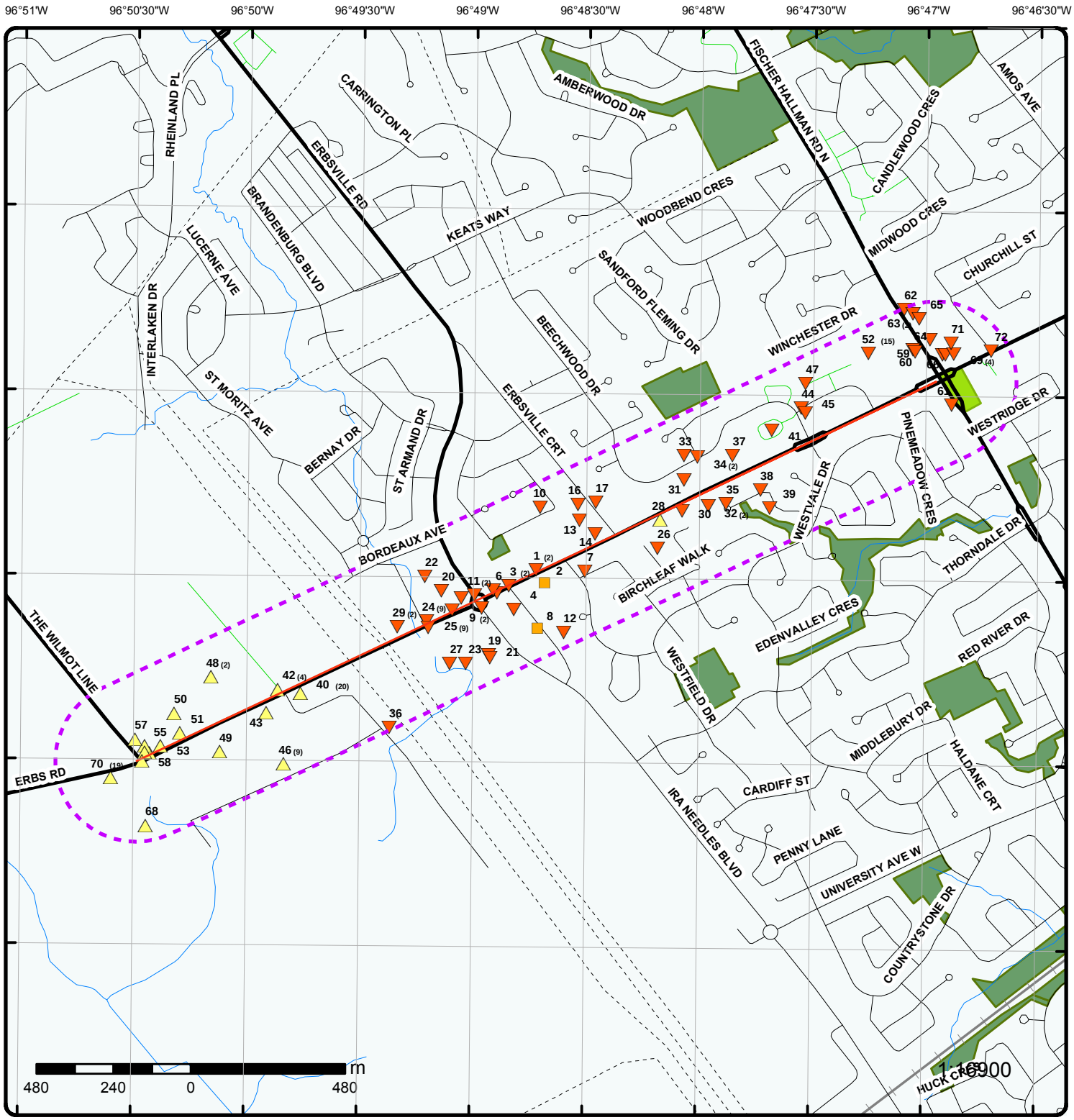
WWIS - Water Well Information System

A search of the WWIS database, dated 1955-May 2013 has found that there are 30 WWIS site(s) within approximately 0.25 kilometers of the project property.

Site	Address	Distance m	Map Key
	ON	61.8	7

Site	Address	Distance m	Map Key
	lot 41 ON	205.9	12
	lot 41 ON	89.3	13
	lot 41 ON	29.1	14
	lot 41 ON	28.0	15
	lot 32 ON	117.7	17
	lot 41 ON	169.3	19
	lot 41 ON	73.8	20
	ON	178.6	21
	lot 41 ON	135.5	22
	lot 41 ON	162.0	23
	lot 41 ON	141.6	27
	lot 32 ON	17.4	28
	lot 32 ON	63.2	31
	lot 32 ON	41.3	32
	lot 32 ON	41.3	32
	lot 32 ON	130.8	33
	lot 32 ON	60.6	35
	ON	241.3	36
	lot 32 ON	66.1	37
	lot 32 ON	84.3	41
	lot 32 ON	108.2	44
	lot 32 ON	88.2	45
	ON	170.8	47
	lot 41 ON	83.8	49

Site	Address	Distance m	Map Key
	lot 32 ON	121.8	59
	lot 32 ON	111.7	60
	ON	202.6	65
	lot 1 ON	202.3	68
	lot 32 ON	129.9	71



Map

Order No: 20140520008

Address: Erb Street And Fischer Hallmand Road, Waterloo, ON

- Project Property
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Expressway
- Principal Highway
- Secondary Highway
- Major Road
- Local road
- Trail
- Proposed Road
- Ferry Route/Ice Road
- Industrial and Resource - Regions
- Main Line
- Sidetrack
- Transit Line
- Abandoned Line
- National Park
- Provincial or Territorial Park
- Other Park
- Golf Course or Driving Range
- Park or Sports Field
- Other Recreation Area

Source: © 2012 DMTI Spatial Inc.

© Ecolog ERIS Ltd



Aerial

Order No: 20140520008

Address: Erb Street And Fischer Hallmand Road, Waterloo, ON

Source: ESRI World Imagery, Updated December 2012

© Ecolog ERIS Ltd

Detail Report

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
1	1 of 2	N/7.6	385.7	REID'S HERITAGE HOMES LTD. 634 & 636 ERB STREET WEST WATERLOO CITY ON	CA

Certificate #:	3-1093-90-
Application Year:	90
Issue Date:	6/22/1990
Approval Type:	Municipal sewage
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
1	2 of 2	N/7.6	385.7	REID'S HERITAGE HOMES LTD. 634 & 636 ERB STREET WEST WATERLOO CITY ON	CA

Certificate #:	7-0889-90-
Application Year:	90
Issue Date:	6/22/1990
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
2	1 of 1	SE/40.9	386.0	635 Erb Street West Waterloo ON N2J 3Z4	EHS

Order No.:	20100107028
Report Date:	1/18/2010
Report Type:	Standard Report
Search Radius (km):	0.25
Addit. Info Ordered:	

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
3	1 of 2	WSW/2.3	385.7	WATERLOO CITY - WEST HILL DR. WEST HILL DR/ERB ST/UNIVERSITY	CA

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
				WATERLOO CITY ON	

Certificate #: 7-1523-90-
Application Year: 90
Issue Date: 10/5/1990
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
3	***2 of 2***	***WSW/2.3***	***385.7***	***R.M. OF WATERLOO-WATERLOO LANDFILL SITE*** ***ERB ST. S./WEST HILL DR. W.*** ***WATERLOO CITY ON***	***CA***

Certificate #: 3-1104-92-
Application Year: 92
Issue Date: 12/30/1992
Approval Type: Municipal sewage
Status: Revised
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
4	***1 of 1***	***SSW/74.8***	***385.0***	***Erb St. W. and Ira Needles Blvd.(SE corner)*** ***Waterloo ON***	***EHS***

Order No.: 20080125002
Report Date: 1/30/2008
Report Type: Complete Report
Search Radius (km): 0.25
Addit. Info Ordered:

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
5	***1 of 2***	***WSW/6.4***	***385.0***	***The Regional Municipality of Waterloo*** ***Ira Needles Blvd., Erb St. W., West Hill Dr.*** ***Waterloo ON***	***CA***

Certificate #: 3462-5Z6QU9
Application Year: 2004
Issue Date: 5/25/2004
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

---

5 **2 of 2** **WSW/6.4** **385.0** **WATERLOO CITY-ERBSVILLE RD/KAHLEN CONSTR**
ERBSVILLE ROAD/WESTHILL DRIVE
WATERLOO CITY ON **CA**

Certificate #: 7-1721-89-
Application Year: 89
Issue Date: 10/19/1989
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

---

6 **1 of 1** **WSW/8.1** **385.0** **646 Erb Street West**
Waterloo ON **EHS**

Order No.: 20110831019
Report Date: 9/6/2011
Report Type: Standard Report
Search Radius (km): 0.25
Addit. Info Ordered:

---

7 **1 of 1** **E/61.8** **383.0**
ON **WWIS**

Well ID: 7140394
Concession:
County: WATERLOO
Easting Nad83: 535030
Zone: 17

Primary Water Use: Monitoring
Sec. Water Use:
Pump Rate:
Flow Rate:
Specific Capacity:
Construction Method: Boring
Elevation (m): 386.02
Depth to Bedrock:
Water Type:

Lot:
Concession Name:
Municipality: WATERLOO
Northing Nad83: 4810563
Utm Reliability: margin of error : 10 - 30 m,margin of error : 30 m - 100 m

Construction Date: 19-JAN-10
Well Depth: 9.6 m
Static Water Level: 3 m
Clear/Cloudy:
Final Well Status: Test Hole
Flowing (y/n):
Elevation Reliability:
Overburden/Bedrock:
Casing Material: PLASTIC

--- Details ---

Thickness: .4 m
Material Colour: BROWN

Original Depth: .4 m
Material: SILT, TOPSOIL

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
+					
Thickness:	2.6 m			*Original Depth:* 3 m	
Material Colour:	BROWN			*Material:* SILT, CLAY, SAND	
+					
Thickness:	6.6 m			*Original Depth:* 9.6 m	
Material Colour:	GREY			*Material:* SILT, CLAY, GRAVEL	
8	1 of 1	S/158.9	386.0	**The Corporation of the City of Waterloo** **25 West Hill Dr** **Waterloo ON**	CA
Certificate #:	1294-8GGQ3T				
Application Year:	2011				
Issue Date:	5/20/2011				
Approval Type:	Municipal and Private Sewage Works				
Status:	Approved				
Application Type:					
Client Name:					
Client Address:					
Client City:					
Client Postal Code:					
Project Description:					
Contaminants:					
Emission Control:					
9	1 of 2	WSW/28.4	385.0	**The Regional Municipality of Waterloo** **Erb Street West and Ira Needles Blvd.** **Waterloo ON**	CA
Certificate #:	8499-5YVPEZ				
Application Year:	2004				
Issue Date:	5/31/2004				
Approval Type:	Municipal and Private Sewage Works				
Status:	Approved				
Application Type:					
Client Name:					
Client Address:					
Client City:					
Client Postal Code:					
Project Description:					
Contaminants:					
Emission Control:					
9	2 of 2	WSW/28.4	385.0	**The Regional Municipality of Waterloo** **Ira Needles Blvd. and Erb St. West** **Waterloo ON**	CA
Certificate #:	0592-5ZCNKH				
Application Year:	2004				
Issue Date:	5/28/2004				
Approval Type:	Municipal and Private Sewage Works				
Status:	Approved				
Application Type:					
Client Name:					
Client Address:					
Client City:					

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site		DB

Client Postal Code:
Project Description:
Contaminants:
Emission Control:

---

10 | ***1 of 1*** | ***N/177.1*** | ***380.0*** | ***RICHARD IRVINE*** ***33-973*** | ***GEN***

622B PINEROW CRESCENT
WATERLOO ON N2T 2K6

SIC Code: 4275
SIC Description: PAINT. & DECOR. WORK
Generator #: ON1654400
Approval Yrs: 92,93,94,95,96,97,98

--- Details ---
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES

---

11 | ***1 of 2*** | ***WSW/18.0*** | ***385.0*** | ***WATERLOO NORTH HYDRO*** | ***SPL***

ALFRED HAECHEN TOWNHOUSING SITE
ERBSVILLE RD. & ERB ST. (PINE ROW)
WATERLOO CITY ON

Ref No.: 53107
Incident Dt: 6/26/1991
MOE Reported Dt: 6/27/1991
Contaminant Name:
Contaminant Quantity:
Incident Summary: WATERLOO NORTH HYDRO - 280L TRANSFORMER OIL TO SOIL WHEN BUSHING BROKE.
Incident Cause: COOLING SYSTEM LEAK
Incident Reason: ERROR
Nature of Impact: Soil contamination
Receiving Medium: LAND
Environmental Impact: POSSIBLE

---

11 | ***2 of 2*** | ***WSW/18.0*** | ***385.0*** | ***The Regional Municipality of Waterloo*** | ***SPL***

Erb Street and Erbsville Road, KW
Bilingual School<UNOFFICIAL>
Waterloo ON

Ref No.: 7588-68ELGG
Incident Dt: 1/6/2005
MOE Reported Dt: 1/7/2005
Contaminant Name: HYDROGEN SULFIDE
Contaminant Quantity: unknown
Incident Summary: KW school: H2S and C0 from sewer stack
Incident Cause: Unknown
Incident Reason:
Nature of Impact: Human Health/Safety
Receiving Medium: Air
Environmental Impact: Not Anticipated

---

12 | ***1 of 1*** | ***SSE/205.9*** | ***384.0*** | ***lot 41*** | ***WWIS***

ON

Well ID: 6503952 *Lot:* 041

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	534964	*Northing Nad83:*	4810373
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	05-JUN-73
Sec. Water Use:		*Well Depth:*	88 ft
Pump Rate:	10 GPM	*Static Water Level:*	123 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	385.17	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	23 ft	*Original Depth:*	23 ft
Material Colour:	BROWN	*Material:*	CLAY, HARD
+			
Thickness:	25 ft	*Original Depth:*	48 ft
Material Colour:	BROWN	*Material:*	CLAY, SAND, SOFT
+			
Thickness:	40 ft	*Original Depth:*	88 ft
Material Colour:	BROWN	*Material:*	CLAY, HARD
+			
Thickness:	56 ft	*Original Depth:*	144 ft
Material Colour:	BROWN	*Material:*	CLAY, SAND, SOFT
+			
Thickness:	8 ft	*Original Depth:*	152 ft
Material Colour:	BROWN	*Material:*	SAND, LOOSE

---

13 **1 of 1** **NE/89.3** **381.6** **lot 41 ON** **WWIS**

Well ID:	6501390	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535014	*Northing Nad83:*	4810723
Zone:	17	*Utm Reliability:*	unknown UTM
Primary Water Use:	Irrigation	*Construction Date:*	01-JUL-46
Sec. Water Use:	Domestic	*Well Depth:*	200 ft
Pump Rate:	35 GPM	*Static Water Level:*	165 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	381.78	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	20 ft	*Original Depth:*	20 ft
Material Colour:		*Material:*	CLAY
+			
Thickness:	80 ft	*Original Depth:*	100 ft
Material Colour:		*Material:*	MEDIUM SAND
+			

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Thickness:	85 ft	*Original Depth:*	185 ft
Material Colour:		*Material:*	MEDIUM SAND, SILT
+			
Thickness:	15 ft	*Original Depth:*	200 ft
Material Colour:		*Material:*	COARSE SAND

14 **1 of 1** **ENE/29.1** **383.9** **lot 41 ON** **WWIS**

Well ID:	6509800	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535062	*Northing Nad83:*	4810679
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:		*Construction Date:*	07-JUL-04
Sec. Water Use:		*Well Depth:*	
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	
Construction Method:		*Flowing (y/n):*	
Elevation (m):	384.01	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	No formation data
Water Type:		*Casing Material:*	

15 **1 of 1** **WSW/28.0** **385.0** **lot 41 ON** **WWIS**

Well ID:	6509919	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	534647	*Northing Nad83:*	4810482
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:	Not Used	*Construction Date:*	13-OCT-04
Sec. Water Use:		*Well Depth:*	7 m
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Observation Wells
Construction Method:	Other Method	*Flowing (y/n):*	
Elevation (m):	384.93	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	PLASTIC

--- Details ---

Thickness:	7 m	*Original Depth:*	7 m
Material Colour:	BROWN	*Material:*	SILT, SAND, GRAVEL

16 **1 of 1** **NNE/135.4** **380.0** **Lambda Controls 17 Erbsville Crt RR 3 Waterloo ON N2J 3Z4** **SCT**

Established:	01-JAN-00
Plant Size (ft²):	
Employment:	

--- Details ---

SIC/NAICS Code:	541510
Description:	Computer Systems Design and Related Services

+
SIC/NAICS Code: 611510
Description: Technical and Trade Schools
+
SIC/NAICS Code: 334610
Description: Manufacturing and Reproducing Magnetic and Optical Media
+
SIC/NAICS Code: 541990
Description: All Other Professional, Scientific and Technical Services
+
SIC/NAICS Code: 417310
Description: Computer, Computer Peripheral and Pre-Packaged Software Wholesaler-Distributors
+
SIC/NAICS Code: 541330
Description: Engineering Services

---

17 **1 of 1** **NE/117.7** **381.0** **lot 32 ON** **WWIS**

Well ID:	6501307	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535064	*Northing Nad83:*	4810778
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	29-JUN-55
Sec. Water Use:		*Well Depth:*	75 ft
Pump Rate:	13 GPM	*Static Water Level:*	140 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	381.41	*Elevation Reliability:*	
Depth to Bedrock:	345	*Overburden/Bedrock:*	Bedrock
Water Type:	MINERIAL	*Casing Material:*	OPEN HOLE,STEEL

--- Details ---

Thickness:	2 ft	*Original Depth:*	2 ft
Material Colour:		*Material:*	TOPSOIL
+			
Thickness:	15 ft	*Original Depth:*	17 ft
Material Colour:	YELLOW	*Material:*	CLAY, STONES
+			
Thickness:	33 ft	*Original Depth:*	50 ft
Material Colour:	BLUE	*Material:*	CLAY, MEDIUM SAND
+			
Thickness:	25 ft	*Original Depth:*	75 ft
Material Colour:	BROWN	*Material:*	CLAY, MEDIUM SAND
+			
Thickness:	75 ft	*Original Depth:*	150 ft
Material Colour:	GREY	*Material:*	FINE SAND, SILT
+			
Thickness:	78 ft	*Original Depth:*	228 ft
Material Colour:	BLUE	*Material:*	CLAY, MEDIUM SAND
+			
Thickness:	3 ft	*Original Depth:*	231 ft
Material Colour:		*Material:*	STONES

+

Thickness:	14 ft	*Original Depth:*	245 ft
Material Colour:	BROWN	*Material:*	CLAY, MEDIUM SAND

+

Thickness:	35 ft	*Original Depth:*	280 ft
Material Colour:		*Material:*	MEDIUM SAND, GRAVEL

+

Thickness:	30 ft	*Original Depth:*	310 ft
Material Colour:	RED	*Material:*	CLAY, MEDIUM SAND

+

Thickness:	35 ft	*Original Depth:*	345 ft
Material Colour:		*Material:*	HARDPAN, STONES

+

Thickness:	25 ft	*Original Depth:*	370 ft
Material Colour:	BROWN	*Material:*	SHALE

+

Thickness:	32 ft	*Original Depth:*	402 ft
Material Colour:	BLUE	*Material:*	SHALE

+

Thickness:	6 ft	*Original Depth:*	408 ft
Material Colour:	BLUE	*Material:*	ROCK

---

18 ***1 of 2*** ***WSW/5.2*** ***383.8*** ***CANADIAN TIRE CORP LTD C/O Canadian Tire Petroleum 17 Flr*****
650 ERB ST W
WATERLOO ON N2T 2Z7 ***FST***

Instance Number:	63433653
Cont Name:	GEORGE BROWN COLLEGE
Instance Type:	FS Liquid Fuel Tank
Fuel Type:	Gasoline
Status Name:	Active
Capacity:	75000
Tank Material:	Fiberglass (FRP)
Corrosion Protection:	
Tank Type:	Liquid Fuel Double Wall UST
Install Year:	2009
Expired Date:	
Parent Facility Type:	FS GASOLINE STATION - SELF SERVE
Facility Type:	FS Liquid Fuel Tank

---

18 ***2 of 2*** ***WSW/5.2*** ***383.8*** ***CANADIAN TIRE CORP LTD C/O Canadian Tire Petroleum 17 Flr*****
650 ERB ST W
WATERLOO ON N2T 2Z7 ***FST***

Instance Number:	63433654
Cont Name:	GEORGE BROWN COLLEGE
Instance Type:	FS Liquid Fuel Tank
Fuel Type:	Diesel
Status Name:	Active
Capacity:	75000
Tank Material:	Fiberglass (FRP)
Corrosion Protection:	

Tank Type: Liquid Fuel Double Wall UST
Install Year: 2009
Expired Date:
Parent Facility Type: FS GASOLINE STATION - SELF SERVE
Facility Type: FS Liquid Fuel Tank

---

19 **1 of 1** **SSW/169.3** **381.4** **lot 41 ON** **WWIS**

Well ID:	7121013	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	534730	*Northing Nad83:*	4810303
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:		*Construction Date:*	13-NOV-08
Sec. Water Use:		*Well Depth:*	
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Abandoned-Other
Construction Method:		*Flowing (y/n):*	
Elevation (m):	381.11	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	
Water Type:		*Casing Material:*	

--- Details ---

Thickness:	ft	*Original Depth:*	ft
Material Colour:		*Material:*	

---

20 **1 of 1** **W/73.8** **382.6** **lot 41 ON** **WWIS**

Well ID:	6503093	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	534584	*Northing Nad83:*	4810503
Zone:	17	*Utm Reliability:*	margin of error : 30 m - 100 m
Primary Water Use:	Domestic	*Construction Date:*	17-SEP-69
Sec. Water Use:		*Well Depth:*	300 ft
Pump Rate:	10 GPM	*Static Water Level:*	150 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	382.6	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	Not stated	*Casing Material:*	STEEL

--- Details ---

Thickness:	2 ft	*Original Depth:*	2 ft
Material Colour:		*Material:*	FILL
+			
Thickness:	21 ft	*Original Depth:*	23 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	101 ft	*Original Depth:*	124 ft
Material Colour:	GREY	*Material:*	MEDIUM SAND, CLAY
+			

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Thickness:	56 ft	*Original Depth:*	180 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	20 ft	*Original Depth:*	200 ft
Material Colour:		*Material:*	MEDIUM SAND, CLAY
+			
Thickness:	98 ft	*Original Depth:*	298 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	2 ft	*Original Depth:*	300 ft
Material Colour:		*Material:*	MEDIUM SAND, GRAVEL

21 ***1 of 1*** ***SSW/178.6*** ***381.0*** ***WWIS***
ON

Well ID:	7111295	*Lot:*	
Concession:		*Concession Name:*	
County:	WATERLOO	*Municipality:*	WATERLOO
Easting Nad83:	534735	*Northing Nad83:*	4810295
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:	Other	*Construction Date:*	02-SEP-08
Sec. Water Use:		*Well Depth:*	4.6 m
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Observation Wells
Construction Method:	Boring	*Flowing (y/n):*	
Elevation (m):	380.75	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	
Water Type:		*Casing Material:*	PLASTIC

--- Details ---

Thickness:	.8 m	*Original Depth:*	.8 m
Material Colour:	BROWN	*Material:*	FILL, SILT, LOOSE
+			
Thickness:	.6 m	*Original Depth:*	1.4 m
Material Colour:	BROWN	*Material:*	SAND, SILT, DENSE
+			
Thickness:	1.8 m	*Original Depth:*	3.2 m
Material Colour:	BROWN	*Material:*	SILT, SAND, DENSE
+			
Thickness:	1.4 m	*Original Depth:*	4.6 m
Material Colour:	GREY	*Material:*	SILT, SAND, DENSE
+			
Thickness:	m	*Original Depth:*	m
Material Colour:		*Material:*	WATER-BEARING

22 ***1 of 1*** ***W/135.5*** ***381.3*** ***lot 41*** ***WWIS***
ON

Well ID:	6509436	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	534533	*Northing Nad83:*	4810547
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Primary Water Use:	Not Used	*Construction Date:*	25-JUL-03
Sec. Water Use:		*Well Depth:*	
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Abandoned-Other
Construction Method:	Not Known	*Flowing (y/n):*	
Elevation (m):	380.67	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	No formation data
Water Type:		*Casing Material:*	

---

23 ***1 of 1*** ***SW/162.0*** ***380.1*** ***lot 41 ON*** ***WWIS***

Well ID:	6509663	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	534660	*Northing Nad83:*	4810278
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:		*Construction Date:*	06-FEB-04
Sec. Water Use:		*Well Depth:*	5 m
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Observation Wells
Construction Method:	Boring	*Flowing (y/n):*	
Elevation (m):	379.48	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	PLASTIC

--- Details ---

Thickness:	.4 m	*Original Depth:*	.4 m
Material Colour:	BROWN	*Material:*	TOPSOIL
+			
Thickness:	4.6 m	*Original Depth:*	5 m
Material Colour:	GREY	*Material:*	CLAY, SILT, TILL

---

24 ***1 of 9*** ***WSW/7.6*** ***381.0*** ***Canadian Tire #674 656 Erb Street Waterloo ON N2T2Z7*** ***GEN***

SIC Code:	452991 452999
SIC Description:	Home and Auto Supplies Stores, All Other Miscellaneous General Merchandise Stores
Generator #:	ON8997750
Approval Yrs:	07,08

--- Details ---

Waste Code:	112
Waste Description:	ACID WASTE - HEAVY METALS
+	
Waste Code:	122
Waste Description:	ALKALINE WASTES - OTHER METALS
+	
Waste Code:	135
Waste Description:	REACTIVE ANION WASTES
+	
Waste Code:	145
Waste Description:	PAINT/PIGMENT/COATING RESIDUES
+	
Waste Code:	147

Waste Description:	CHEMICAL FERTILIZER WASTES
+	
Waste Code:	148
Waste Description:	INORGANIC LABORATORY CHEMICALS
+	
Waste Code:	213
Waste Description:	PETROLEUM DISTILLATES
+	
Waste Code:	221
Waste Description:	LIGHT FUELS
+	
Waste Code:	222
Waste Description:	HEAVY FUELS
+	
Waste Code:	242
Waste Description:	HALOGENATED PESTICIDES
+	
Waste Code:	252
Waste Description:	WASTE OILS & LUBRICANTS
+	
Waste Code:	262
Waste Description:	DETERGENTS/SOAPS
+	
Waste Code:	269
Waste Description:	NON-HALOGENATED PESTICIDES
+	
Waste Code:	331
Waste Description:	WASTE COMPRESSED GASES

24 **2 of 9** **WSW/7.6** **381.0** **J. & S. Young Merchants Ltd.**
656 Erb Street
Waterloo ON
GEN

SIC Code:	452991, 452999
SIC Description:	Home and Auto Supplies Stores, All Other Miscellaneous General Merchandise Stores
Generator #:	ON8997750
Approval Yrs:	2011

--- Details ---

Waste Code:	222
Waste Description:	HEAVY FUELS
+	
Waste Code:	263
Waste Description:	ORGANIC LABORATORY CHEMICALS
+	
Waste Code:	242
Waste Description:	HALOGENATED PESTICIDES
+	
Waste Code:	252
Waste Description:	WASTE OILS & LUBRICANTS
+	
Waste Code:	221
Waste Description:	LIGHT FUELS
+	
Waste Code:	262
Waste Description:	DETERGENTS/SOAPS
+	
Waste Code:	148
Waste Description:	INORGANIC LABORATORY CHEMICALS
+	
Waste Code:	331

Waste Description: WASTE COMPRESSED GASES
+
Waste Code: 145
Waste Description: PAINT/PIGMENT/COATING RESIDUES
+
Waste Code: 269
Waste Description: NON-HALOGENATED PESTICIDES
+
Waste Code: 147
Waste Description: CHEMICAL FERTILIZER WASTES
+
Waste Code: 135
Waste Description: REACTIVE ANION WASTES
+
Waste Code: 122
Waste Description: ALKALINE WASTES - OTHER METALS
+
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES
+
Waste Code: 112
Waste Description: ACID WASTE - HEAVY METALS
+
Waste Code: 212
Waste Description: ALIPHATIC SOLVENTS

---

24 | **3 of 9** | **WSW/7.6** | **381.0** | **J. & S. Young Merchants Ltd.**
656 Erb Street
Waterloo ON | **GEN**

SIC Code: 452991, 452999
SIC Description: Home and Auto Supplies Stores, All Other Miscellaneous General Merchandise Stores
Generator #: ON8997750
Approval Yrs: 2009

--- Details ---
Waste Code: 112
Waste Description: ACID WASTE - HEAVY METALS
+
Waste Code: 122
Waste Description: ALKALINE WASTES - OTHER METALS
+
Waste Code: 135
Waste Description: REACTIVE ANION WASTES
+
Waste Code: 145
Waste Description: PAINT/PIGMENT/COATING RESIDUES
+
Waste Code: 147
Waste Description: CHEMICAL FERTILIZER WASTES
+
Waste Code: 148
Waste Description: INORGANIC LABORATORY CHEMICALS
+
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES
+
Waste Code: 221
Waste Description: LIGHT FUELS
+
Waste Code: 222

Waste Description: HEAVY FUELS
+
Waste Code: 242
Waste Description: HALOGENATED PESTICIDES
+
Waste Code: 252
Waste Description: WASTE OILS & LUBRICANTS
+
Waste Code: 262
Waste Description: DETERGENTS/SOAPS
+
Waste Code: 269
Waste Description: NON-HALOGENATED PESTICIDES
+
Waste Code: 331
Waste Description: WASTE COMPRESSED GASES

---

24 | **4 of 9** | **WSW/7.6** | **381.0** | **J. & S. Young Merchants Ltd.**
656 Erb Street
Waterloo ON N2T2Z7 | **GEN**

SIC Code: 452991, 452999
SIC Description: Home and Auto Supplies Stores, All Other Miscellaneous General Merchandise Stores
Generator #: ON8997750
Approval Yrs: 2012

--- Details ---
Waste Code: 263
Waste Description: ORGANIC LABORATORY CHEMICALS
+
Waste Code: 145
Waste Description: PAINT/PIGMENT/COATING RESIDUES
+
Waste Code: 112
Waste Description: ACID WASTE - HEAVY METALS
+
Waste Code: 212
Waste Description: ALIPHATIC SOLVENTS
+
Waste Code: 242
Waste Description: HALOGENATED PESTICIDES
+
Waste Code: 122
Waste Description: ALKALINE WASTES - OTHER METALS
+
Waste Code: 331
Waste Description: WASTE COMPRESSED GASES
+
Waste Code: 147
Waste Description: CHEMICAL FERTILIZER WASTES
+
Waste Code: 135
Waste Description: REACTIVE ANION WASTES
+
Waste Code: 221
Waste Description: LIGHT FUELS
+
Waste Code: 222
Waste Description: HEAVY FUELS
+
Waste Code: 269

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Waste Description: NON-HALOGENATED PESTICIDES
+
Waste Code: 262
Waste Description: DETERGENTS/SOAPS
+
Waste Code: 148
Waste Description: INORGANIC LABORATORY CHEMICALS
+
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES
+
Waste Code: 252
Waste Description: WASTE OILS & LUBRICANTS

---

24 **5 of 9** **WSW/7.6** **381.0** **J. & S. Young Merchants Ltd.**
656 Erb Street
Waterloo ON N2T2Z7 **GEN**

SIC Code:
SIC Description:
Generator #: ON8997750
Approval Yrs: As of April 2014

--- Details ---
Waste Code: 242
Waste Description: Halogenated pesticides and herbicides
+
Waste Code: 145
Waste Description: Wastes from the use of pigments, coatings and paints
+
Waste Code: 148
Waste Description: Misc. wastes and inorganic chemicals
+
Waste Code: 263
Waste Description: Misc. waste organic chemicals
+
Waste Code: 212
Waste Description: Aliphatic solvents and residues
+
Waste Code: 331
Waste Description: Waste compressed gases including cylinders

---

24 **6 of 9** **WSW/7.6** **381.0** **J. & S. Young Merchants Ltd.**
656 Erb Street
Waterloo ON **GEN**

SIC Code: 452991, 452999
SIC Description: Home and Auto Supplies Stores, All Other Miscellaneous General Merchandise Stores
Generator #: ON8997750
Approval Yrs: 2010

--- Details ---
Waste Code: 112
Waste Description: ACID WASTE - HEAVY METALS
+
Waste Code: 263
Waste Description: ORGANIC LABORATORY CHEMICALS
+
Waste Code: 262
Waste Description: DETERGENTS/SOAPS

+
Waste Code: 145
Waste Description: PAINT/PIGMENT/COATING RESIDUES
+
Waste Code: 212
Waste Description: ALIPHATIC SOLVENTS
+
Waste Code: 252
Waste Description: WASTE OILS & LUBRICANTS
+
Waste Code: 135
Waste Description: REACTIVE ANION WASTES
+
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES
+
Waste Code: 221
Waste Description: LIGHT FUELS
+
Waste Code: 331
Waste Description: WASTE COMPRESSED GASES
+
Waste Code: 242
Waste Description: HALOGENATED PESTICIDES
+
Waste Code: 269
Waste Description: NON-HALOGENATED PESTICIDES
+
Waste Code: 222
Waste Description: HEAVY FUELS
+
Waste Code: 122
Waste Description: ALKALINE WASTES - OTHER METALS
+
Waste Code: 148
Waste Description: INORGANIC LABORATORY CHEMICALS
+
Waste Code: 147
Waste Description: CHEMICAL FERTILIZER WASTES

24	***7 of 9***	***WSW/7.6***	***381.0***	***J & S YOUNG MERCHANTS LTD 656 ERB STREET WEST WATERLOO ON N2T 2Z7***	***PES***

Licence No.:
Licence Type: Vendor

24	***8 of 9***	***WSW/7.6***	***381.0***	***J & S YOUNG MERCHANTS LTD 656 ERB STREET WEST WATERLOO ON N2T 2Z7***	***PES***

Licence No.:
Licence Type: Limited Vendor

24	***9 of 9***	***WSW/7.6***	***381.0***	***J & S YOUNG MERCHANTS LTD 656 ERB STREET WEST WATERLOO ON N2T 2Z7***	***PES***

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Licence No.: 23-01-14175-0
Licence Type: LIMITED

---

25 **1 of 9** **WSW/12.5** **381.0** **Toromont Energy Limited**
925 Erb Street West
Waterloo ON N2J 3Z4
NPRI

NPRI #: 7226
Year: 2002
Longitude:
Latitude:

--- Details ---
Air: 61.736
Water: 0
Land: 0
Units: tonnes
Substances Released: Oxides of nitrogen (expressed as NO2)
+
Air: 147.667
Water: 0
Land: 0
Units: tonnes
Substances Released: Carbon monoxide
+
Air: 0.517
Water: 0
Land: 0
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.517
Water: 0
Land: 0
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

25 **2 of 9** **WSW/12.5** **381.0** **TOROMONT ENERGY**
925 Erb Street West
Waterloo ON N2J 3Z4
NPRI

NPRI #: 7226
Year: 2008
Longitude: -80.5731
Latitude: 43.4456

--- Details ---
Air: 80.717
Water:
Land:
Units: tonnes
Substances Released: Oxides of nitrogen (expressed as NO2)
+
Air: 193.066
Water:
Land:
Units: tonnes
Substances Released: Carbon monoxide

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

+
Air: 0.676
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.676
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

25 | **3 of 9** | **WSW/12.5** | **381.0** | **TOROMONT ENERGY**
925 Erb Street West
Waterloo ON N2J 3Z4 | **NPRI**

NPRI #: 7226
Year: 2005
Longitude: -80.5786
Latitude: 43.4437

--- Details ---
Air: 85.27
Water:
Land:
Units: tonnes
Substances Released: Oxides of nitrogen (expressed as NO2)
+
Air: 203.96
Water:
Land:
Units: tonnes
Substances Released: Carbon monoxide
+
Air: 0.71
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.71
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

25 | **4 of 9** | **WSW/12.5** | **381.0** | **Toromont Energy Limited**
925 Erb Street West
Waterloo ON N2J 3Z4 | **NPRI**

NPRI #: 7226
Year: 2003
Longitude:
Latitude:

--- Details ---
Air: 64.11
Water: 0.00
Land: 0.00

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Units:	tonnes
Substances Released:	Oxides of nitrogen (expressed as NO2)
+	
Air:	153.44
Water:	0.00
Land:	0.00
Units:	tonnes
Substances Released:	Carbon monoxide
+	
Air:	0.54
Water:	0.00
Land:	0.00
Units:	tonnes
Substances Released:	PM10 - Particulate Matter <= 10 Microns
+	
Air:	0.54
Water:	0.00
Land:	0.00
Units:	tonnes
Substances Released:	PM2.5 - Particulate Matter <= 2.5 Microns

---

25 **5 of 9** **WSW/12.5** **381.0** **TOROMONT ENERGY**
925 Erb Street West
Waterloo ON N2J 3Z4
NPRI

NPRI #:	7226
Year:	2009
Longitude:	-80.5731
Latitude:	43.4456
--- Details ---	
Air:	79.31
Water:	
Land:	
Units:	tonnes
Substances Released:	Nitrogen oxides (expressed as NO2)
+	
Air:	229.293
Water:	
Land:	
Units:	tonnes
Substances Released:	Carbon monoxide
+	
Air:	0.854
Water:	
Land:	
Units:	tonnes
Substances Released:	PM10 - Particulate Matter <= 10 Microns
+	
Air:	0.854
Water:	
Land:	
Units:	tonnes
Substances Released:	PM2.5 - Particulate Matter <= 2.5 Microns

---

25 **6 of 9** **WSW/12.5** **381.0** **TOROMONT ENERGY**
925 Erb Street West
Waterloo ON N2J 3Z4
NPRI

NPRI #:	7226

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Year: 2006
Longitude: -80.5786
Latitude: 43.4437

--- Details ---
Air: 85.87
Water:
Land:
Units: tonnes
Substances Released: Oxides of nitrogen (expressed as NO2)
+
Air: 205.39
Water:
Land:
Units: tonnes
Substances Released: Carbon monoxide
+
Air: 0.72
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.72
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

25 | ***7 of 9*** | ***WSW/12.5*** | ***381.0*** | ***TOROMONT ENERGY 925 Erb Street West Waterloo ON N2J 3Z4*** | ***NPRI***

NPRI #: 7226
Year: 2007
Longitude:
Latitude:

--- Details ---
Air: 83.35
Water:
Land:
Units: tonnes
Substances Released: Oxides of nitrogen (expressed as NO2)
+
Air: 199.35
Water:
Land:
Units: tonnes
Substances Released: Carbon monoxide
+
Air: 0.70
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.70
Water:
Land:
Units: tonnes

Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

25 **8 of 9** **WSW/12.5** **381.0** **Toromont Energy Ltd.**
925 Erb Street
Waterloo ON N2J3Z4
NPRI

NPRI #: 7226
Year: 2010
Longitude: -80.5731
Latitude: 43.4456

--- Details ---
Air: 73.32
Water:
Land:
Units: tonnes
Substances Released: Nitrogen oxides (expressed as NO2)
+
Air: 228.634
Water:
Land:
Units: tonnes
Substances Released: Carbon monoxide
+
Air: 0.864
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.864
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns
+
Air: 11.462
Water:
Land:
Units: tonnes
Substances Released: Volatile Organic Compounds (VOCs)

---

25 **9 of 9** **WSW/12.5** **381.0** **TOROMONT ENERGY**
1001 ERB Street West
Waterloo ON
NPRI

NPRI #: 7226
Year: 2004
Longitude: -80.5786
Latitude: 43.4437

--- Details ---
Air: 75.48
Water:
Land:
Units: tonnes
Substances Released: Oxides of nitrogen (expressed as NO2)
+
Air: 180.55
Water:

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Land:	
Units:	tonnes
Substances Released:	Carbon monoxide
+	
Air:	0.63
Water:	
Land:	
Units:	tonnes
Substances Released:	PM10 - Particulate Matter <= 10 Microns
+	
Air:	0.63
Water:	
Land:	
Units:	tonnes
Substances Released:	PM2.5 - Particulate Matter <= 2.5 Microns

---

26 **1 of 1** **ENE/93.2** **384.7** **WATERLOO NORTH HYDRO**
561 STONE PATH CRES TRANSFORMER
WATERLOO CITY ON N2T 2W6 **SPL**

Ref No.:	239664
Incident Dt:	9/16/2002
MOE Reported Dt:	9/16/2002
Contaminant Name:	
Contaminant Quantity:	
Incident Summary:	WATERLOO HYDRO-100 LITRES NON PCB TRANSFORMER OIL TO GROUND CLEANED N
Incident Cause:	COOLING SYSTEM LEAK
Incident Reason:	DAMAGE BY MOVING EQUIPMENT
Nature of Impact:	Soil contamination
Receiving Medium:	LAND
Environmental Impact:	POSSIBLE

---

27 **1 of 1** **SW/141.6** **379.0** **lot 41**
ON **WWIS**

Well ID:	6509435	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	534610	*Northing Nad83:*	4810277
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Not Used	*Construction Date:*	25-JUL-03
Sec. Water Use:		*Well Depth:*	
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Abandoned-Other
Construction Method:	Not Known	*Flowing (y/n):*	
Elevation (m):	378.79	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	No formation data
Water Type:		*Casing Material:*	

---

28 **1 of 1** **ENE/17.4** **386.7** **lot 32**
ON **WWIS**

Well ID:	6501313	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535264.1	*Northing Nad83:*	4810723

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	15-OCT-62
Sec. Water Use:		*Well Depth:*	5 ft
Pump Rate:	3 GPM	*Static Water Level:*	20 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Boring	*Flowing (y/n):*	N
Elevation (m):	386.93	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	CONCRETE

--- Details ---

Thickness:	5 ft	*Original Depth:*	5 ft
Material Colour:	BROWN	*Material:*	CLAY
+			
Thickness:	38 ft	*Original Depth:*	43 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	2 ft	*Original Depth:*	45 ft
Material Colour:		*Material:*	GRAVEL

---

29 ***1 of 2*** ***WSW/31.7*** ***379.3*** ***664 ERB STREET WEST WATERLOO ON N2T 2Z7*** ***HINC***

External File Num:	FS INC 0902-01076
Date of Occurrence:	2/26/2009
Fuel Occurrence Type:	Pipeline Strike
Fuel Type Involved:	Natural Gas
Status Desc:	Completed - Causal Analysis(End)
Job Type Desc:	Incident/Near-Miss Occurrence (FS)
Oper. Type Involved:	Construction Site (pipeline strike)
Service Interruptions:	Yes
Property Damage:	Yes
Fuel Life Cycle Stage:	Transmission, Distribution and Transportation
Root Cause:	Root Cause: Equipment/Material/Component:No Procedures:Yes Maintenance:No Design:No Training:Yes Management:Yes Human Factors:Yes
Reported Details:	
Fuel Category:	Gaseous Fuel
Occurrence Type:	Incident
Affiliation:	Industry Stakeholder (Licensee/Registration/Certificate Holder, Facility Owner, etc.)
County Name:	Waterloo
Approx. Quant. Rel:	
Nearby body of water:	
Enter Drainage Syst.:	
Approx. Quant. Unit:	
Environmental Impact:	

---

29 ***2 of 2*** ***WSW/31.7*** ***379.3*** ***Union Gas Limited 664 Erb St Waterloo ON*** ***SPL***

Ref No.:	1367-7PMPKT
Incident Dt:	
MOE Reported Dt:	2/26/2009
Contaminant Name:	NATURAL GAS (METHANE)
Contaminant Quantity:	0 other - see incident description
Incident Summary:	TSSA: 1.25" gas line cut by contractor

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Incident Cause: Pipe Or Hose Leak
Incident Reason: Damage By Moving Equipment - Containers damaged by moving
Nature of Impact: Air Pollution
Receiving Medium:
Environmental Impact: Not Anticipated

---

30 **1 of 1** **ENE/21.7** **385.2** **The Corporation of the City of Waterloo**
585 Erb Street West<UNOFFICIAL>
Waterloo ON **SPL**

Ref No.: 1126-89TT7F
Incident Dt:
MOE Reported Dt: 10/1/2010
Contaminant Name: SEWAGE,RAW UNCHLORINATED
Contaminant Quantity:
Incident Summary: Private Residence-Ukn Qty Sewage to Grnd & Pond.
Incident Cause:
Incident Reason:
Nature of Impact:
Receiving Medium:
Environmental Impact: Not Anticipated

---

31 **1 of 1** **ENE/63.2** **379.0** **lot 32**
ON **WWIS**

Well ID:	6501302	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535339.1	*Northing Nad83:*	4810848
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	31-JUL-52
Sec. Water Use:		*Well Depth:*	50 ft
Pump Rate:	15 GPM	*Static Water Level:*	125 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	379.02	*Elevation Reliability:*	
Depth to Bedrock:	336	*Overburden/Bedrock:*	Bedrock
Water Type:	FRESH	*Casing Material:*	OPEN HOLE,STEEL

--- Details ---

Thickness:	50 ft	*Original Depth:*	50 ft
Material Colour:		*Material:*	PREVIOUSLY DUG
+			
Thickness:	82 ft	*Original Depth:*	132 ft
Material Colour:		*Material:*	CLAY, MEDIUM SAND
+			
Thickness:	36 ft	*Original Depth:*	168 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	15 ft	*Original Depth:*	183 ft
Material Colour:		*Material:*	HARDPAN
+			
Thickness:	111 ft	*Original Depth:*	294 ft
Material Colour:		*Material:*	MEDIUM SAND

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

+			
Thickness:	17 ft	*Original Depth:*	311 ft
Material Colour:	BROWN	*Material:*	MEDIUM SAND
+			
Thickness:	7 ft	*Original Depth:*	318 ft
Material Colour:	BLUE	*Material:*	CLAY, MEDIUM SAND, STONES
+			
Thickness:	18 ft	*Original Depth:*	336 ft
Material Colour:		*Material:*	MEDIUM SAND
+			
Thickness:	1 ft	*Original Depth:*	337 ft
Material Colour:		*Material:*	ROCK

32 **1 of 2** **ENE/41.3** **381.2** **lot 32 ON** **WWIS**

Well ID:	6501300	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535414.1	*Northing Nad83:*	4810768
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	19-NOV-49
Sec. Water Use:		*Well Depth:*	5 ft
Pump Rate:	5 GPM	*Static Water Level:*	85 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	382.04	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	5 ft	*Original Depth:*	5 ft
Material Colour:		*Material:*	TOPSOIL
+			
Thickness:	20 ft	*Original Depth:*	25 ft
Material Colour:		*Material:*	CLAY
+			
Thickness:	110 ft	*Original Depth:*	135 ft
Material Colour:		*Material:*	HARDPAN, MEDIUM SAND
+			
Thickness:	6 ft	*Original Depth:*	141 ft
Material Colour:		*Material:*	MEDIUM SAND

32 **2 of 2** **ENE/41.3** **381.2** **lot 32 ON** **WWIS**

Well ID:	6501299	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535414.1	*Northing Nad83:*	4810768
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	18-OCT-49
Sec. Water Use:		*Well Depth:*	2 ft

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Pump Rate:		*Static Water Level:*	68 ft
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	382.04	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	2 ft	*Original Depth:*	2 ft
Material Colour:	BLACK	*Material:*	TOPSOIL
+			
Thickness:	10 ft	*Original Depth:*	12 ft
Material Colour:		*Material:*	CLAY
+			
Thickness:	118 ft	*Original Depth:*	130 ft
Material Colour:		*Material:*	HARDPAN
+			
Thickness:	8 ft	*Original Depth:*	138 ft
Material Colour:	BLACK	*Material:*	MEDIUM SAND

---

33 ***1 of 1*** ***NE/130.8*** ***376.2*** ***lot 32 ON*** ***WWIS***

Well ID:	6501310	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535339.1	*Northing Nad83:*	4810923
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Public	*Construction Date:*	27-FEB-60
Sec. Water Use:		*Well Depth:*	84 ft
Pump Rate:	40 GPM	*Static Water Level:*	72 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	376.5	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	38 ft	*Original Depth:*	38 ft
Material Colour:		*Material:*	CLAY, STONES
+			
Thickness:	46 ft	*Original Depth:*	84 ft
Material Colour:		*Material:*	MEDIUM SAND
+			
Thickness:	44 ft	*Original Depth:*	128 ft
Material Colour:		*Material:*	QUICKSAND

---

34 ***1 of 2*** ***NE/108.4*** ***375.4*** ***WATERLOO CITY BEECHWOOD DR/MAPLE FOREST PL. WATERLOO CITY ON*** ***CA***

Certificate #:	3-1316-95-95
Application Year:	

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Issue Date: 9/25/1995
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

---

34 **2 of 2** **NE/108.4** **375.4** **WATERLOO CITY**
BEECHWOOD DR/MAPLE FOREST PL.
WATERLOO CITY ON
CA

Certificate #: 7-0938-95-
Application Year: 95
Issue Date: 9/25/1995
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

---

35 **1 of 1** **ENE/60.6** **378.5** **lot 32**
ON
WWIS

Well ID:	6501303	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535469.1	*Northing Nad83:*	4810773
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	18-SEP-52
Sec. Water Use:		*Well Depth:*	98 ft
Pump Rate:	13 GPM	*Static Water Level:*	140 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	379.66	*Elevation Reliability:*	
Depth to Bedrock:	325	*Overburden/Bedrock:*	Overburden below Bedrock
Water Type:	SULPHUR	*Casing Material:*	STEEL

--- Details ---

Thickness:	22 ft	*Original Depth:*	22 ft
Material Colour:	YELLOW	*Material:*	CLAY
+			
Thickness:	23 ft	*Original Depth:*	45 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	20 ft	*Original Depth:*	65 ft

Material Colour:	BLUE	*Material:*	CLAY, MEDIUM SAND
+			
Thickness:	6 ft	*Original Depth:*	71 ft
Material Colour:		*Material:*	HARDPAN
+			
Thickness:	27 ft	*Original Depth:*	98 ft
Material Colour:		*Material:*	MEDIUM SAND, CLAY
+			
Thickness:	11 ft	*Original Depth:*	109 ft
Material Colour:		*Material:*	HARDPAN
+			
Thickness:	38 ft	*Original Depth:*	147 ft
Material Colour:		*Material:*	MEDIUM SAND, CLAY
+			
Thickness:	10 ft	*Original Depth:*	157 ft
Material Colour:		*Material:*	QUICKSAND
+			
Thickness:	68 ft	*Original Depth:*	225 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	32 ft	*Original Depth:*	257 ft
Material Colour:		*Material:*	HARDPAN
+			
Thickness:	7 ft	*Original Depth:*	264 ft
Material Colour:		*Material:*	MEDIUM SAND
+			
Thickness:	13 ft	*Original Depth:*	277 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	42 ft	*Original Depth:*	319 ft
Material Colour:		*Material:*	MEDIUM SAND, GRAVEL
+			
Thickness:	6 ft	*Original Depth:*	325 ft
Material Colour:	BLUE	*Material:*	CLAY
+			
Thickness:	35 ft	*Original Depth:*	360 ft
Material Colour:	BLUE	*Material:*	ROCK
+			
Thickness:	6 ft	*Original Depth:*	366 ft
Material Colour:		*Material:*	MEDIUM SAND
+			
Thickness:	31 ft	*Original Depth:*	397 ft
Material Colour:		*Material:*	SHALE
+			
Thickness:	6 ft	*Original Depth:*	403 ft
Material Colour:		*Material:*	LIMESTONE
+			
Thickness:	2 ft	*Original Depth:*	405 ft
Material Colour:		*Material:*	ROCK

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

36 **1 of 1** **SW/241.3** **383.0** **ON** **WWIS**

Well ID:	7177568	*Lot:*	
Concession:		*Concession Name:*	
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	534422	*Northing Nad83:*	4810078
Zone:	17	*Utm Reliability:*	margin of error : 30 m - 100 m
Primary Water Use:	Monitoring	*Construction Date:*	25-JAN-12
Sec. Water Use:		*Well Depth:*	777 ft
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Observation Wells
Construction Method:	Rotary (Convent.)	*Flowing (y/n):*	
Elevation (m):		*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	
Water Type:	Untested	*Casing Material:*	PLASTIC

--- Details ---

Thickness:	172 ft	*Original Depth:*	172 ft
Material Colour:	BROWN	*Material:*	SAND, SILT, SILTY
+			
Thickness:	605 ft	*Original Depth:*	777 ft
Material Colour:	GREY	*Material:*	CLAY, SILT, SAND

37 **1 of 1** **ENE/66.1** **372.0** **lot 32** **ON** **WWIS**

Well ID:	6501308	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535489.1	*Northing Nad83:*	4810923
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	29-AUG-58
Sec. Water Use:		*Well Depth:*	98 ft
Pump Rate:	9 GPM	*Static Water Level:*	71 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	371.98	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	12 ft	*Original Depth:*	12 ft
Material Colour:		*Material:*	CLAY, GRAVEL
+			
Thickness:	30 ft	*Original Depth:*	42 ft
Material Colour:		*Material:*	CLAY
+			
Thickness:	14 ft	*Original Depth:*	56 ft
Material Colour:		*Material:*	CLAY, SILT
+			
Thickness:	14 ft	*Original Depth:*	70 ft
Material Colour:		*Material:*	FINE SAND

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
+					

Thickness:	28 ft	*Original Depth:*	98 ft
Material Colour:		*Material:*	MEDIUM SAND

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
38	1 of 1	ENE/67.0	373.7	ON	BORE

Borehole ID:	700257	*Type:*	GeoColumn
Use:	Geotechnical/Geological Investigation	*Status:*	
Drill Method:		*UTM Zone:*	17
Easting:	535576.000	*Northing:*	4810817.000
Location Accuracy:		*Orig. Ground Elev m:*	
Elev. Reliability Note:		*DEM Ground Elev m:*	375.500000
Total Depth m:	-999.000000	*Primary Name:*	S-465
Township:	WATERLOO CITY (WATERLOO TWP)	*Concession:*	
Lot:		*Municipality:*	
Completion Date:	1993	*Static Water Level:*	
Primary Water Use:		*Sec. Water Use:*	

--- Details ---

Stratum ID:	218341756	*Top Depth m:*	0
Bottom Depth m:	0	*Stratum Desc:*	Silt till (Maryhill Till); Sample S-465

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
39	1 of 1	ENE/131.6	374.6	**Wooden Stairs & Railings Ltd.** **499 Heatherhill Pl** **Waterloo ON N2T 1H7**	SCT

Established:	1971
Plant Size (ft²):	
Employment:	7

--- Details ---

SIC/NAICS Code:	321919
Description:	Other Millwork

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
40	1 of 20	WSW/27.3	390.0	**R.M. OF WATERLOO** **RR #9, WATERLOO L-FILL SITE** **WATERLOO CITY ON**	CA

Certificate #:	8-2219-94-
Application Year:	94
Issue Date:	12/8/1994
Approval Type:	Industrial air
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	LANDFILL GAS CONTROL FLARES
Contaminants:	Nitrogen Oxides, Sulphur Dioxide, Carbon Monoxide, Hydrogen Sulphide
Emission Control:	Flare

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
40	2 of 20	WSW/27.3	390.0	**WATERLOO CITY** **WATERLOO LANDFILL SITE - WWTP** **WATERLOO CITY ON**	CA

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
Certificate #:		3-0013-92-			
Application Year:		92			
Issue Date:		2/6/1992			
Approval Type:		Municipal sewage			
Status:		Preliminary approval			
Application Type:					
Client Name:					
Client Address:					
Client City:					
Client Postal Code:					
Project Description:					
Contaminants:					
Emission Control:					
40	3 of 20	WSW/27.3	390.0	R.M. OF WATERLOO STORMWATER MANAGEMENT N. AREA OF WATERLOO LANDFILL WATERLOO CITY ON	CA
Certificate #:		3-1409-89-			
Application Year:		89			
Issue Date:		5/29/1991			
Approval Type:		Municipal sewage			
Status:		Approved in 1991			
Application Type:					
Client Name:					
Client Address:					
Client City:					
Client Postal Code:					
Project Description:					
Contaminants:					
Emission Control:					
40	4 of 20	WSW/27.3	390.0	R.M. OF WATERLOO FORCEMAIN FORM WATERLOO LANDFL WATERLOO CITY ON	CA
Certificate #:		3-1710-88-			
Application Year:		88			
Issue Date:		9/15/1988			
Approval Type:		Municipal sewage			
Status:		Approved			
Application Type:					
Client Name:					
Client Address:					
Client City:					
Client Postal Code:					
Project Description:					
Contaminants:					
Emission Control:					
40	5 of 20	WSW/27.3	390.0	WATERLOO LANDFILL SITE (ERB ST W) WATERLOO, CITY OF ON	WDS
Certificate No.:		A140301			

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Issue Date:	07/31/1996
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WATERLOO, WEST CENTRAL/R.M. OF
Proponent:	WATERLOO,REG. MUN. OF
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m^3):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m^3):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m^3):	0
Processing Capacity (m^3/d):	0
Processing Volume (m^3):	0
Processing Feed (m^3):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	A LETTER WAS SENT TO THE CERTIFICATE HOLDER TO CORRECT AN ERROR AND TO AVOID POSSIBLE CONFUSION. THE #'s OF SOME ADDITIONAL CONDITIONS DUPLICATED THE #'s OF EXISTING CONDITIONS. THE CONDITIONS #6-15 NOW CHANGED TO #11-20.
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	CONDITION #5: DATE OF DECEMBER 31/1991 HAS BEEN CHANGED TO DEC 31/92 BY THIS NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 & AMENDED ON NOTICES DATED JAN 12/89 & DEC 31/90 & NOW AMENDED BY THIS NOTICE.

40	***6 of 20***	***WSW/27.3***	***390.0***	***WATERLOO LANDFILL SITE (ERB ST W) CITY OF WATERLOO ON***	***WDS***

Certificate No.:	A140301
Issue Date:	07/31/1987
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG.MUN. OF WATERLOO
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF

	WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	NOTICE: THE TERMS AND CONDITIONS OF P COFA DATED SEP 19/86 HAVE BEEN ALTERED BY REVOKING EXISTING CONDITION NO. 2 AND IMPOSING CONDITIONs NO 4 & 5. ESTIMATED CAPACITY OF SITE: 4,761,000 TONNES
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	CONDITION #5: NO WASTE SHALL BE DISPOSED OF AT THE SITE AFTER SEPT. 31/1988 UNDER THIS P COFA ISSSUED PURSUANT TO SECTION 31 OF THE EPA. THIS NOTICE AMENDS COFA DATED SEPT. 19,1986, CONDITION #2.

40	7 of 20	WSW/27.3	390.0	WATERLOO LANDFILL SITE (ERB ST W) TOWNSHIP OF WATERLOO ON	WDS

Certificate No.:	A140301
Issue Date:	07/29/1983
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY ROAD #9
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG.MUN. OF WATERLOO
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, AND REGIONAL MUNICIPALITY POPULATION SERVED: 50,000 (as on application dated Apr. 14 1972)
Total Area (ha):	70
Landfill Capacity (m³):	0
Landfill Monitoring:	
Landfill Control Type:	
Est. Closure Date:	12/31/22
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	
Approval Description:	CERTIFICATE MUST BE REGISTERED ON TITLE.
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	ANTICIPATED LIFETIME: 50 YEARS (as on application dated Apr.14 1972)

40	***8 of 20***	***WSW/27.3***	***390.0***	***WATERLOO LANDFILL SITE (ERB ST W) CITY OF WATERLOO ON***	***WDS***

Certificate No.:	A140301
Issue Date:	12/31/1990
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG.MUN. OF WATERLOO
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	NOTICE: THE TERMS AND CONDITIONS OF P COFA DATED SEP 19/86 HAVE BEEN ALTERED BY THE ADDITION OF CLAUSE i) AND j) TO CONDITON 4. 31/87. ALSO, SEE AMENDMENT TO CONDITION 5 UNDER SITE CLOSURE.
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	CONDITION #5: DATE OF DECEMBER 31/1990 HAS BEEN CHANGED TO DEC 31/91 BY THIS

NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 AND AMENDED ON NOTICE DATED JAN 12/89 AND IS NOW BEING AMENDED BY THIS NOTICE.

---

40 **9 of 20** **WSW/27.3** **390.0** **WATERLOO LANDFILL SITE (ERB ST W) WATERLOO, CITY OF ON** **WDS**

Certificate No.:	A140301
Issue Date:	02/04/1992
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WATERLOO, WEST CENTRAL/R.M. OF
Proponent:	WATERLOO,REG. MUN. OF
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	A LETTER WAS SENT TO THE CERTIFICATE HOLDER TO CORRECT AN ERROR AND TO AVOID POSSIBLE CONFUSION. THE #'s OF SOME ADDITIONAL CONDITIONS DUPLICATED THE #'s OF EXISTING CONDITIONS. THE CONDITIONS #6-15 NOW CHANGED TO #11-20.
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	CONDITION #5: DATE OF DECEMBER 31/1991 HAS BEEN CHANGED TO DEC 31/92 BY THIS NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 & AMENDED ON NOTICES DATED JAN 12/89 & DEC 31/90 & NOW AMENDED BY THIS NOTICE.

---

40 **10 of 20** **WSW/27.3** **390.0** **WATERLOO LANDFILL SITE (ERB ST W) CITY OF WATERLOO ON** **WDS**

Certificate No.:	A140301
Issue Date:	12/30/1991
Status:	Approved

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG.MUN. OF WATERLOO
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	NOTICE: THE P COFA DATED SEPT 19 1986 IS AMENDED AS FOLLOWS: CONDI- TION #1 IS CHANGED, CLAUSES k) and i) ARE ADDED TO CONDITION #4, DATE IN COND- ITION #5 IS CHANGED AND CONDITIONS 6-15 (inclusive) ARE ADDED TO COFA.
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	CONDITION #5: DATE OF DECEMBER 31/1991 HAS BEEN CHANGED TO DEC 31/92 BY THIS NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 & AMENDED ON NOTICES DATED JAN 12/89 & DEC 31/90 & NOW AMENDED BY THIS NOTICE.

40	11 of 20	WSW/27.3	390.0	***WATERLOO LANDFILL SITE (ERB ST W) CITY OF WATERLOO ON***	***WDS***

Certificate No.:	A140301
Issue Date:	01/12/1989
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG.MUN. OF WATERLOO
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8

Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	NOTICE: THE TERMS AND CONDITIONS OF P COFA DATED SEP 19/86 HAVE BEEN ALTERED BY AMENDING THE ADDITION OF CONDITION #4 ON NOTICE DATED JULY 31/87. ALSO, SEE AMENDMENT TO CONDITION 5 UNDER SITE CLOSURE.
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	CONDITION #5: DATE OF DECEMBER 31/1988 HAS BEEN CHANGED TO DEC 31/90 BY THIS NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 AND IS NOW AMENDED.

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
40	12 of 20	WSW/27.3	390.0	**WATERLOO LANDFILL SITE (ERB ST W) WATERLOO, CITY OF ON**	WDS

Certificate No.:	A140301
Issue Date:	12/22/1997
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WATERLOO, WEST CENTRAL/R.M. OF
Proponent:	WATERLOO,REG. MUN. OF
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	A LETTER WAS SENT TO THE CERTIFICATE HOLDER TO CORRECT AN ERROR AND TO AVOID POSSIBLE CONFUSION. THE #'s OF SOME ADDITIONAL CONDITIONS DUPLICATED THE #'s OF EXISTING CONDITIONS. THE CONDITIONS #6-15 NOW CHANGED TO #11-20.
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	CONDITION #5: DATE OF DECEMBER 31/1991 HAS BEEN CHANGED TO DEC 31/92 BY THIS NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 & AMENDED ON NOTICES DATED JAN 12/89 & DEC 31/90 & NOW AMENDED BY THIS NOTICE.

40	***13 of 20***	***WSW/27.3***	***390.0***	***WATERLOO LANDFILL SITE (ERB ST W) WATERLOO, CITY OF ON***	***WDS***

Certificate No.:	A140301
Issue Date:	04/04/1997
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WATERLOO, WEST CENTRAL/R.M. OF
Proponent:	WATERLOO,REG. MUN. OF
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	A LETTER WAS SENT TO THE CERTIFICATE HOLDER TO CORRECT AN ERROR AND TO AVOID POSSIBLE CONFUSION. THE #'s OF SOME ADDITIONAL CONDITIONS DUPLICATED THE #'s OF EXISTING CONDITIONS. THE CONDITIONS #6-15 NOW CHANGED TO #11-20.

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Waste Description: DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description: CONDITION #5: DATE OF DECEMBER 31/1991 HAS BEEN CHANGED TO DEC 31/92 BY THIS NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 & AMENDED ON NOTICES DATED JAN 12/89 & DEC 31/90 & NOW AMENDED BY THIS NOTICE.

---

40 | **14 of 20** | **WSW/27.3** | **390.0** | **WATERLOO LANDFILL SITE (ERB ST. W.) TOWNSHIP OF WATERLOO ON** | **WDS**

Certificate No.: A140301
Issue Date: 06/30/1974
Status:
Application Status:
Concession:
Lot: WESTERN 1/3 OF G.C.T. 40* EAST OF TWP. ROAD 41* SOUTH OF COUNTY ROAD #9*
Region/County: WEST CENTRAL/R.M. OF WATERLOO
Proponent: REG. MUN. OF WATERLOO
Address: MARSLAND CENTRE,20 ERB ST. W
City: WATERLOO ONTARIO
Facility Type: Landfill
District Office: Cambridge
Municipalities Served: POPULATION SERVED: 50,000 (as on application dated Apr. 14/72)
Total Area (ha): 70
Landfill Capacity (m³): 0
Landfill Monitoring:
Landfill Control Type:
Est. Closure Date: 12/31/22
Transfer Area (ha): 0
Transfer Capacity (m³): 0
Transfer Sites Certificate No.:
Incinerator Area (ha): 0
Incinerator Capacity (t): 0
Processing Area (m³): 0
Processing Capacity (m³/d): 0
Processing Volume (m³): 0
Processing Feed (m³): 0
Mobile Units:
Mobile Description:
Mobile Capacity: 0
Mobile Unit Certificate No.:
Waste Type: domestic, commercial, non-hazardous solid-industrial
Waste Type Other: Yes
Waste Class:
Other Approvals/Permits: A #141201 WAS ISSUED FOR COFA'S DATED JAN.8/73 AND MAY 12/72.
Approval Description:
Waste Description: DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description: ANTICIPATED LIFETIME: 50 YEARS (as on application dated Apr.14/72)

---

40 | **15 of 20** | **WSW/27.3** | **390.0** | **WATERLOO LANDFILL SITE (ERB ST W) CITY OF WATERLOO ON** | **WDS**

Certificate No.: A140301
Issue Date: 09/19/1986
Status: Approved
Application Status:
Concession:
Lot: WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG.MUN. OF WATERLOO
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	3 CONDITIONS ADDED TO COFA. ESTIMATED CAPACITY OF SITE: 4,761,000 TONNES
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	CONDITION #2: NO WASTE SHALL BE DISPOSED OF AT THE SITE AFTER JUNE 30/1988 UNDER THIS P COFA ISSSUED PURSUANT TO SECTION 31 OF THE EPA.

40	***16 of 20***	***WSW/27.3***	***390.0***	***WATERLOO LANDFILL SITE (ERB ST. W.) TOWNSHIP OF WATERLOO ON***	***WDS***

Certificate No.:	A140301
Issue Date:	06/30/1973
Status:	
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40* EAST OF TWP. ROAD 41* SOUTH OF COUNTY ROAD #9*
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	CITY OF WATERLOO
Address:	MARSLAND CENTRE,20 ERB ST. W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	POPULATION SERVED: 50,000 (as on application dated Apr. 14/72)
Total Area (ha):	70
Landfill Capacity (m³):	0
Landfill Monitoring:	
Landfill Control Type:	
Est. Closure Date:	12/31/22
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	

Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	A #141201 WAS ISSUED FOR COFA'S DATED JAN.8/73 AND MAY 12/72.
Approval Description:	
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	ANTICIPATED LIFETIME: 50 YEARS (as on application dated Apr.14/72)

40 | ***17 of 20*** | ***WSW/27.3*** | ***390.0*** | ***WATERLOO LANDFILL SITE (ERB ST W) CITY OF WATERLOO ON*** | ***WDS***

Certificate No.:	A140301
Issue Date:	07/31/1991
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG.MUN. OF WATERLOO
Address:	MARSLAND CENTRE, 20 ERB ST W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha):	64.8
Landfill Capacity (m³):	0
Landfill Monitoring:	groundwater, surface water
Landfill Control Type:	leachate, surface water, groundwater
Est. Closure Date:	
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description:	NOTICE: THE P COFA DATED SEPT 19 1986 IS AMENDED TO APPROVE CONSTR- UCTION OF THE EAST SIDE LEACHATE COLLECTION SYSTEM (SOUTH) AT THE WATERLOO LANDFILL SITE

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

BY THE ADDITION OF CONDITIONS 6, 7, 8, 9 and 10.
Waste Description: DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description: CONDITION #5: DATE OF DECEMBER 31/1990 HAS BEEN CHANGED TO DEC 31/91 BY THIS NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 & AMENDED ON NOTICE DATED JAN 12/89 & IS NOW BEING AMENDED BY NOTICE DEC 31/90

---

40 | **18 of 20** | **WSW/27.3** | **390.0** | ***WATERLOO LANDFILL SITE (ERB ST W) WATERLOO, CITY OF ON*** | ***WDS***

Certificate No.: A140301
Issue Date: 12/07/1995
Status: Approved
Application Status:
Concession:
Lot: WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. ROAD 41 SOUTH OF COUNTY RD. #9
Region/County: WATERLOO, WEST CENTRAL/R.M. OF
Proponent: WATERLOO,REG. MUN. OF
Address: MARSLAND CENTRE, 20 ERB ST W
City: WATERLOO ONTARIO
Facility Type: Landfill
District Office: Cambridge
Municipalities Served: CITY OF WATERLOO, CITY OF KITCHENER, TWP. OF WOOLWICH, TWP. OF WILMOT, TWP. OF WELLESLEY POPULATION SERVED: 235,000 (as on application dated May 29,85)
Total Area (ha): 64.8
Landfill Capacity (m³): 0
Landfill Monitoring: groundwater, surface water
Landfill Control Type: leachate, surface water, groundwater
Est. Closure Date:
Transfer Area (ha): 0
Transfer Capacity (m³): 0
Transfer Sites Certificate No.:
Incinerator Area (ha): 0
Incinerator Capacity (t): 0
Processing Area (m³): 0
Processing Capacity (m³/d): 0
Processing Volume (m³): 0
Processing Feed (m³): 0
Mobile Units:
Mobile Description:
Mobile Capacity: 0
Mobile Unit Certificate No.:
Waste Type: domestic, commercial, non-hazardous solid-industrial
Waste Type Other: Yes
Waste Class:
Other Approvals/Permits: #A 141201 IS THE COFA NO. FOR THIS SITE FOR DATES MAY 12/72 AND JAN 8/73.
Approval Description: A LETTER WAS SENT TO THE CERTIFICATE HOLDER TO CORRECT AN ERROR AND TO AVOID POSSIBLE CONFUSION. THE #'s OF SOME ADDITIONAL CONDITIONS DUPLICATED THE #'s OF EXISTING CONDITIONS. THE CONDITIONS #6-15 NOW CHANGED TO #11-20.
Waste Description: DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description: CONDITION #5: DATE OF DECEMBER 31/1991 HAS BEEN CHANGED TO DEC 31/92 BY THIS NOTICE. CONDTION 5 WAS ORIGINALLY IMPOSED ON NOTICE DATED JULY 31 1987 & AMENDED ON NOTICES DATED JAN 12/89 & DEC 31/90 & NOW AMENDED BY THIS NOTICE.

---

40 | **19 of 20** | **WSW/27.3** | **390.0** | ***WATERLOO LANDFILL SITE (ERB ST. W.) TOWNSHIP OF WATERLOO ON*** | ***WDS***

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Certificate No.:	A140301
Issue Date:	07/01/1976
Status:	Approved
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40 EAST OF TWP. RD. 41 SOUTH OF COUNTY RD. #9
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG.MUN. OF WATERLOO
Address:	MARSLAND CENTRE,20 ERB ST.W.
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	POPULATION SERVED: 50,000 (as on application dated Apr. 14/72)
Total Area (ha):	70
Landfill Capacity (m³):	0
Landfill Monitoring:	
Landfill Control Type:	
Est. Closure Date:	12/31/22
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	#A 141201 IS THE COFA # FOR THIS SITE FOR THE DATES OF MAY 12/72 & JAN 8/73.
Approval Description:	
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTES, TREES]: 5%
Site Closing Description:	ANTICIPATED LIFETIME: 50 YEARS (as on application dated Apr.14/72)

40	***20 of 20***	***WSW/27.3***	***390.0***	***WATERLOO LANDFILL SITE (ERB ST. W.) TOWNSHIP OF WATERLOO ON***	***WDS***

Certificate No.:	A140301
Issue Date:	08/11/1975
Status:	
Application Status:	
Concession:	
Lot:	WESTERN 1/3 OF G.C.T. 40* EAST OF TWP. ROAD 41* SOUTH OF COUNTY ROAD #9*
Region/County:	WEST CENTRAL/R.M. OF WATERLOO
Proponent:	REG. MUN. OF WATERLOO
Address:	MARSLAND CENTRE,20 ERB ST. W
City:	WATERLOO ONTARIO
Facility Type:	Landfill
District Office:	Cambridge
Municipalities Served:	POPULATION SERVED: 50,000 (as on application dated Apr. 14/72)
Total Area (ha):	70
Landfill Capacity (m³):	0
Landfill Monitoring:	

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Landfill Control Type:	
Est. Closure Date:	12/31/22
Transfer Area (ha):	0
Transfer Capacity (m³):	0
Transfer Sites Certificate No.:	
Incinerator Area (ha):	0
Incinerator Capacity (t):	0
Processing Area (m³):	0
Processing Capacity (m³/d):	0
Processing Volume (m³):	0
Processing Feed (m³):	0
Mobile Units:	
Mobile Description:	
Mobile Capacity:	0
Mobile Unit Certificate No.:	
Waste Type:	domestic, commercial, non-hazardous solid-industrial
Waste Type Other:	Yes
Waste Class:	
Other Approvals/Permits:	A #141201 WAS ISSUED FOR COFA'S DATED JAN.8/73 AND MAY 12/72.
Approval Description:	
Waste Description:	DOMESTIC: 70%, COMMERCIAL: 15%, NoHzSIn: 10%, OTHER [DEMOLITION WASTE, TREES]: 5%
Site Closing Description:	ANTICIPATED LIFETIME: 50 YEARS (as on application dated Apr.14/72)

---

41 **1 of 1** **ENE/84.3** **360.3** **lot 32 ON** **WWIS**

Well ID:	6506884	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535612.1	*Northing Nad83:*	4811002
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:	Irrigation	*Construction Date:*	23-MAR-90
Sec. Water Use:		*Well Depth:*	48 ft
Pump Rate:	50 GPM	*Static Water Level:*	50 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Rotary (Air)	*Flowing (y/n):*	N
Elevation (m):	360.88	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	12 ft	*Original Depth:*	12 ft
Material Colour:	BROWN	*Material:*	SAND, SILT, LOOSE
+			
Thickness:	36 ft	*Original Depth:*	48 ft
Material Colour:	GREY	*Material:*	SILT, , LOOSE
+			
Thickness:	52 ft	*Original Depth:*	100 ft
Material Colour:	BROWN	*Material:*	SAND, SILT, LOOSE
+			
Thickness:	10 ft	*Original Depth:*	110 ft
Material Colour:	BROWN	*Material:*	SAND, , LOOSE

---

42 **1 of 4** **WSW/13.3** **392.0** **Hergott Cider Mill & Products 928 Erb St W** **SCT**

Waterloo ON N2J 3Z4

Established: 7/1/1929
Plant Size (ft²): 2500
Employment:

--- Details ---
SIC/NAICS Code: 311940
Description: Seasoning and Dressing Manufacturing
+
SIC/NAICS Code: 311420
Description: Fruit and Vegetable Canning, Pickling and Drying
+
SIC/NAICS Code: 418990
Description: All Other Wholesaler-Distributors
+
SIC/NAICS Code: 413210
Description: Non-Alcoholic Beverage Wholesaler-Distributors
+
SIC/NAICS Code: 311990
Description: All Other Food Manufacturing
+
SIC/NAICS Code: 316990
Description: Other Leather and Allied Product Manufacturing
+
SIC/NAICS Code: 311940
Description: Seasoning and Dressing Manufacturing
+
SIC/NAICS Code: 339990
Description: All Other Miscellaneous Manufacturing
+
SIC/NAICS Code: 314990
Description: All Other Textile Product Mills
+
SIC/NAICS Code: 413190
Description: Other Specialty-Line Food Wholesaler-Distributors

---

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
42	2 of 4	WSW/13.3	392.0	HERGOTT CIDER MILL 928 Erb St W Kitchener ON N2J 3Z4	SCT

Established: 1929
Plant Size (ft²): 2500
Employment: 2

--- Details ---
SIC/NAICS Code: 316990
Description: Other Leather and Allied Product Manufacturing
+
SIC/NAICS Code: 311420
Description: Fruit and Vegetable Canning, Pickling and Drying
+
SIC/NAICS Code: 311940
Description: Seasoning and Dressing Manufacturing
+
SIC/NAICS Code: 311990
Description: All Other Food Manufacturing
+
SIC/NAICS Code: 314990
Description: All Other Textile Product Mills

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
42	3 of 4	WSW/13.3	392.0	HERGOTT CIDER MILL 928 ERB ST W WATERLOO ON N2J 3Z4	SCT

Established: 1929
Plant Size (ft²): 2500
Employment: 2

--- Details ---
SIC/NAICS Code: 311420
Description: Fruit and Vegetable Canning, Pickling and Drying
+
SIC/NAICS Code: 311940
Description: Seasoning and Dressing Manufacturing
+
SIC/NAICS Code: 311990
Description: All Other Food Manufacturing
+
SIC/NAICS Code: 314990
Description: All Other Textile Product Mills
+
SIC/NAICS Code: 316990
Description: Other Leather and Allied Product Manufacturing
+
SIC/NAICS Code: 413190
Description: Other Specialty-Line Food Wholesaler-Distributors
+
SIC/NAICS Code: 418990
Description: All Other Wholesaler-Distributors

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
42	4 of 4	WSW/13.3	392.0	HERGOTT CIDER MILL 928 ERB ST W WATERLOO ON N2J 3Z4	SCT

Established: 1929
Plant Size (ft²): 2500
Employment: 2

--- Details ---
SIC/NAICS Code: 2033
Description: CANNED FRUITS, VEGETABLES, PRESERVES, JAMS AND JELLIES
+
SIC/NAICS Code: 2099
Description: FOOD PREPARATIONS, NOT ELSEWHERE CLASSIFIED
+
SIC/NAICS Code: 2399
Description: FABRICATED TEXTILE PRODUCTS, NOT ELSEWHERE CLASSIFIED
+
SIC/NAICS Code: 3999
Description: MANUFACTURING INDUSTRIES, NOT ELSEWHERE CLASSIFIED

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
43	1 of 1	WSW/35.8	393.6	930 Erb Street West Waterloo ON N2J 3Z4	EHS

Order No.: 20120808004
Report Date: 10-AUG-12
Report Type: Custom Report
Search Radius (km): .25
Addit. Info Ordered: Fire Insur. Maps and/or Site Plans; City Directory

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

44 **1 of 1** **ENE/108.2** **358.5** **lot 32 ON** **WWIS**

Well ID:	6507789	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535703.1	*Northing Nad83:*	4811072
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:	Irrigation	*Construction Date:*	30-JUN-95
Sec. Water Use:		*Well Depth:*	70 ft
Pump Rate:	50 GPM	*Static Water Level:*	50 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Rotary (Air)	*Flowing (y/n):*	N
Elevation (m):	358.33	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	40 ft	*Original Depth:*	40 ft
Material Colour:	BROWN	*Material:*	CLAY, SAND, SOFT
+			
Thickness:	30 ft	*Original Depth:*	70 ft
Material Colour:	BROWN	*Material:*	SAND, SOFT
+			
Thickness:	38 ft	*Original Depth:*	108 ft
Material Colour:	GREY	*Material:*	CLAY, SILT, LAYERED
+			
Thickness:	12 ft	*Original Depth:*	120 ft
Material Colour:	BROWN	*Material:*	SAND, LOOSE
+			
Thickness:	3 ft	*Original Depth:*	123 ft
Material Colour:	GREY	*Material:*	CLAY, HARD

45 **1 of 1** **ENE/88.2** **359.0** **lot 32 ON** **WWIS**

Well ID:	6507979	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535716.1	*Northing Nad83:*	4811056
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:	Domestic	*Construction Date:*	19-JUL-96
Sec. Water Use:		*Well Depth:*	55 ft
Pump Rate:	30 GPM	*Static Water Level:*	40 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	358.73	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	10 ft	*Original Depth:*	10 ft

Material Colour:	BROWN	*Material:*	CLAY, SAND
+			
Thickness:	5 ft	*Original Depth:*	15 ft
Material Colour:	BROWN	*Material:*	SAND
+			
Thickness:	7 ft	*Original Depth:*	22 ft
Material Colour:	BROWN	*Material:*	SAND, GRAVEL
+			
Thickness:	12 ft	*Original Depth:*	34 ft
Material Colour:	BROWN	*Material:*	SAND
+			
Thickness:	11 ft	*Original Depth:*	45 ft
Material Colour:	BROWN	*Material:*	SAND, CLAY
+			
Thickness:	10 ft	*Original Depth:*	55 ft
Material Colour:	BROWN	*Material:*	SAND, GRAVEL
+			
Thickness:	50 ft	*Original Depth:*	105 ft
Material Colour:	BROWN	*Material:*	CLAY, SAND
+			
Thickness:	4 ft	*Original Depth:*	109 ft
Material Colour:	BROWN	*Material:*	GRAVEL, SAND
+			
Thickness:	7 ft	*Original Depth:*	116 ft
Material Colour:	BROWN	*Material:*	CLAY

46 **1 of 9** **SW/203.7** **395.0** **Region of Waterloo**
925 Erb Street West
Waterloo ON N2J 3Z4
NPRI

NPRI #:	10399
Year:	2007
Longitude:	
Latitude:	
--- Details ---	
Air:	6.22
Water:	
Land:	
Units:	tonnes
Substances Released:	PM - Total Particulate Matter
+	
Air:	4.92
Water:	
Land:	
Units:	tonnes
Substances Released:	PM10 - Particulate Matter <= 10 Microns
+	
Air:	1.57
Water:	
Land:	
Units:	tonnes
Substances Released:	PM2.5 - Particulate Matter <= 2.5 Microns

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
46	2 of 9	SW/203.7	395.0	Region of Waterloo 925 Erb Street West Waterloo ON N2J 3Z4	NPRI

NPRI #: 10399
Year: 2006
Longitude: -80.5786
Latitude: 43.4437

--- Details ---
Air: 6.64
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.97
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
46	3 of 9	SW/203.7	395.0	Region of Waterloo 925 Erb Street West Waterloo ON N2J 3Z4	NPRI

NPRI #: 10399
Year: 2010
Longitude: -80.5787
Latitude: 43.4418

--- Details ---
Air: 9.3345
Water:
Land:
Units: tonnes
Substances Released: PM - Total Particulate Matter
+
Air: 7.007
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 1.002
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
46	4 of 9	SW/203.7	395.0	Region of Waterloo 925 Erb Street West Waterloo ON N2J 3Z4	NPRI

NPRI #: 10399
Year: 2005
Longitude: -80.5786
Latitude: 43.4437

--- Details ---

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Air: 4.11
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.60
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

46 | **5 of 9** | **SW/203.7** | **395.0** | **Region of Waterloo**
925 Erb Street West
Waterloo ON N2J 3Z4 | **NPRI**

NPRI #: 10399
Year: 2002
Longitude:
Latitude:

--- Details ---
Air: 5.541
Water: 0
Land: 0
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 1.208
Water: 0
Land: 0
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

46 | **6 of 9** | **SW/203.7** | **395.0** | **Region of Waterloo**
925 Erb Street West
Waterloo ON N2J 3Z4 | **NPRI**

NPRI #: 10399
Year: 2009
Longitude: -80.5787
Latitude: 43.4418

--- Details ---
Air: 5.765
Water:
Land:
Units: tonnes
Substances Released: PM - Total Particulate Matter
+
Air: 4.366
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.759
Water:
Land:
Units: tonnes

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

46 | **7 of 9** | **SW/203.7** | **395.0** | **Region of Waterloo**
925 Erb Street West
Waterloo ON N2J 3Z4 | **NPRI**

NPRI #: 10399
Year: 2004
Longitude: -80.5786
Latitude: 43.4437

--- Details ---
Air: 7.66
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 1.08
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

46 | **8 of 9** | **SW/203.7** | **395.0** | **Region of Waterloo**
925 Erb Street West
Waterloo ON N2J 3Z4 | **NPRI**

NPRI #: 10399
Year: 2008
Longitude: -80.5786
Latitude: 43.4437

--- Details ---
Air: 5.602
Water:
Land:
Units: tonnes
Substances Released: PM - Total Particulate Matter
+
Air: 4.246
Water:
Land:
Units: tonnes
Substances Released: PM10 - Particulate Matter <= 10 Microns
+
Air: 0.749
Water:
Land:
Units: tonnes
Substances Released: PM2.5 - Particulate Matter <= 2.5 Microns

---

46 | **9 of 9** | **SW/203.7** | **395.0** | **Region of Waterloo**
925 Erb Street West
Waterloo ON N2J 3Z4 | **NPRI**

NPRI #: 10399
Year: 2003
Longitude:

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Latitude:

--- Details ---

Air:	4.22
Water:	0.00
Land:	0.00
Units:	tonnes
Substances Released:	PM10 - Particulate Matter <= 10 Microns
+	
Air:	0.61
Water:	0.00
Land:	0.00
Units:	tonnes
Substances Released:	PM2.5 - Particulate Matter <= 2.5 Microns

---

47 **1 of 1** **NE/170.8** **356.0** **WWIS**

ON

Well ID:	6507854	*Lot:*	
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	535717.1	*Northing Nad83:*	4811148
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:	Irrigation	*Construction Date:*	22-NOV-95
Sec. Water Use:		*Well Depth:*	70 ft
Pump Rate:	30 GPM	*Static Water Level:*	35 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Rotary (Air)	*Flowing (y/n):*	N
Elevation (m):	356.3	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	12 ft	*Original Depth:*	12 ft
Material Colour:	BROWN	*Material:*	CLAY, SAND, HARD
+			
Thickness:	58 ft	*Original Depth:*	70 ft
Material Colour:	BROWN	*Material:*	SAND, CLAY, LOOSE
+			
Thickness:	39 ft	*Original Depth:*	109 ft
Material Colour:	GREY	*Material:*	SILT, CLAY, LAYERED
+			
Thickness:	5 ft	*Original Depth:*	114 ft
Material Colour:	BROWN	*Material:*	SAND, STONES, LOOSE
+			
Thickness:	4 ft	*Original Depth:*	118 ft
Material Colour:	BROWN	*Material:*	SILT, SAND, LOOSE

---

48 **1 of 2** **WSW/137.4** **398.9** **930 Erb St W Waterloo ON** **EHS**

Order No.:	20130404040
Report Date:	15-APR-13
Report Type:	Custom Report
Search Radius (km):	.25

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Addit. Info Ordered:

---

48 **2 of 2** **WSW/137.4** **398.9** **930 Erb St W Waterloo ON N2J 3Z4** **EHS**

Order No.:	20121017018
Report Date:	26-OCT-12
Report Type:	Custom Report
Search Radius (km):	.25
Addit. Info Ordered:	

---

49 **1 of 1** **WSW/83.8** **397.2** **lot 41 ON** **WWIS**

Well ID:	6502879	*Lot:*	041
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	533894	*Northing Nad83:*	4810003
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:	Domestic	*Construction Date:*	16-APR-68
Sec. Water Use:		*Well Depth:*	7 ft
Pump Rate:	14 GPM	*Static Water Level:*	135 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Water Supply
Construction Method:	Cable Tool	*Flowing (y/n):*	N
Elevation (m):	397.18	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	2 ft	*Original Depth:*	2 ft
Material Colour:		*Material:*	TOPSOIL
+			
Thickness:	5 ft	*Original Depth:*	7 ft
Material Colour:		*Material:*	QUICKSAND
+			
Thickness:	98 ft	*Original Depth:*	105 ft
Material Colour:		*Material:*	CLAY
+			
Thickness:	51 ft	*Original Depth:*	156 ft
Material Colour:		*Material:*	CLAY, MEDIUM SAND
+			
Thickness:	19 ft	*Original Depth:*	175 ft
Material Colour:		*Material:*	HARDPAN
+			
Thickness:	11 ft	*Original Depth:*	186 ft
Material Colour:		*Material:*	MEDIUM SAND
+			
Thickness:	2 ft	*Original Depth:*	188 ft
Material Colour:		*Material:*	CLAY

---

50 **1 of 1** **WSW/83.6** **402.3** **928 Erb Street West** **EHS**

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
				Waterloo ON N2J 3Z4	

Order No.: 20091208036
Report Date: 12/17/2009
Report Type: Custom Report
Search Radius (km): 0.25
Addit. Info Ordered: Fire Insur. Maps and/or Site Plans; Title Search; Aerial Photos; Topographical Maps

---

51 **1 of 1** **WSW/21.2** **402.1** **ON** **BORE**

Borehole ID:	682537	*Type:*	Borehole
Use:	Geotechnical/Geological Investigation	*Status:*	
Drill Method:	Power auger	*UTM Zone:*	17
Easting:	533771.000	*Northing:*	4810061.000
Location Accuracy:		*Orig. Ground Elev m:*	406.500000
Elev. Reliability Note:		*DEM Ground Elev m:*	402.399994
Total Depth m:	9.600000	*Primary Name:*	
Township:		*Concession:*	
Lot:		*Municipality:*	
Completion Date:	1963-APR	*Static Water Level:*	
Primary Water Use:		*Sec. Water Use:*	

--- Details ---

Stratum ID:	218558008	*Top Depth m:*	0
Bottom Depth m:	0.200000	*Stratum Desc:*	SANDY, SILTY, ORGANIC, BLACK
+			
Stratum ID:	218558009	*Top Depth m:*	0.200000
Bottom Depth m:	1.500000	*Stratum Desc:*	WITH GRITS, BROWN, WITH LIGHT BROWN FISSURES, STIFF
+			
Stratum ID:	218558010	*Top Depth m:*	1.500000
Bottom Depth m:	2.100000	*Stratum Desc:*	WITH GRITS, COHESIVE, BROWN, COMPACT OR STIFF
+			
Stratum ID:	218558011	*Top Depth m:*	2.100000
Bottom Depth m:	3.700000	*Stratum Desc:*	SLIGHTLY PLASTIC, BROWN, COMPACT OR STIFF
+			
Stratum ID:	218558012	*Top Depth m:*	3.700000
Bottom Depth m:	5.200000	*Stratum Desc:*	FISSURED, BROWN WITH YELLOW BROWN FISSURES, COMPACT TO STIFF
+			
Stratum ID:	218558013	*Top Depth m:*	5.200000
Bottom Depth m:	9.100000	*Stratum Desc:*	GREY, WITH PEBBLES, FIRM TO STIFF, WETTER THAN PLASTIC LIMIT
+			
Stratum ID:	218558014	*Top Depth m:*	9.100000
Bottom Depth m:	9.600000	*Stratum Desc:*	GREY, FIRM TO STIFF, DILATANT

---

52 **1 of 15** **ENE/171.1** **350.7** **450 Erb St W Waterloo ON N2T 1H4** **EHS**

Order No.: 20130111088

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Report Date: 23-JAN-13
Report Type: Custom Report
Search Radius (km): .25
Addit. Info Ordered:

---

52 **2 of 15** **ENE/171.1** **350.7** **450 Erb Street West**
Waterloo ON N2T 1H4 **EHS**

Order No.: 20070410026
Report Date: 4/19/2007
Report Type: CAN - Complete Report
Search Radius (km): 0.25
Addit. Info Ordered:

---

52 **3 of 15** **ENE/171.1** **350.7** **Zehrs #524**
450 Erb St. W.
Waterloo ON **GEN**

SIC Code:
SIC Description:
Generator #: ON8443007
Approval Yrs: As of April 2014

--- Details ---
Waste Code: 112
Waste Description: Acid solutions - containing heavy metals
+
Waste Code: 122
Waste Description: Alkaline slutions - containing other metals and non-metals (not cyanide)
+
Waste Code: 212
Waste Description: Aliphatic solvents and residues
+
Waste Code: 261
Waste Description: Pharmaceuticals
+
Waste Code: 148
Waste Description: Misc. wastes and inorganic chemicals
+
Waste Code: 145
Waste Description: Wastes from the use of pigments, coatings and paints
+
Waste Code: 263
Waste Description: Misc. waste organic chemicals
+
Waste Code: 213
Waste Description: Petroleum distillates
+
Waste Code: 312
Waste Description: Pathological wastes
+
Waste Code: 331
Waste Description: Waste compressed gases including cylinders
+
Waste Code: 252
Waste Description: Waste crankcase oils and lubricants
+
Waste Code: 146

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
Waste Description:		Other specified inorganic sludges, slurries or solids			
+					
Waste Code:		269			
Waste Description:		Organic non-halogenated pesticide and herbicide wastes			
+					
Waste Code:		262			
Waste Description:		Detergents and soaps			
+					
Waste Code:		242			
Waste Description:		Halogenated pesticides and herbicides			
52	***4 of 15***	***ENE/171.1***	***350.7***	***ZEHRS MARKETS*** ***450 ERB STREET WEST*** ***WATERLOO ON N2T 1H4***	***PES***
Licence No.:		23-01-11772-0			
Licence Type:		Limited Vendor			
52	***5 of 15***	***ENE/171.1***	***350.7***	***ZEHRS MARKETS, DIV. OF ZEHRMART LTD.*** ***450 ERB STREET W*** ***WATERLOO ON N2T 1H4***	***PES***
Licence No.:					
Licence Type:		Limited Vendor			
52	***6 of 15***	***ENE/171.1***	***350.7***	***ZEHRS MARKETS, DIV. OF ZEHRMART LTD.*** ***450 ERB STREET WEST*** ***WATERLOO ON N2T 1H4***	***PES***
Licence No.:					
Licence Type:		Vendor			
52	***7 of 15***	***ENE/171.1***	***350.7***	***ZEHRS MARKETS, DIV. OF ZEHRMART LTD.*** ***450 ERB STREET WEST*** ***WATERLOO ON N2T 1H4***	***PES***
Licence No.:		23-01-08728-0			
Licence Type:		Limited Vendor			
52	***8 of 15***	***ENE/171.1***	***350.7***	***LOBLAWS COMPANIES LTD*** ***450 ERB ST W*** ***WATERLOO ON N2T 1H4***	***PES***
Licence No.:					
Licence Type:		Vendor			
52	***9 of 15***	***ENE/171.1***	***350.7***	***ZEHRS BEECHWOOD*** ***450 ERB ST W*** ***WATERLOO ON N2T 1H4***	***PES***

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
Licence No.:					
Licence Type:		Limited Vendor			

52	***10 of 15***	***ENE/171.1***	***350.7***	***SHOPPERS DRUG MART #0730 (BEECHWOOD CENTRE)*** ***450 ERB STREET WEST*** ***WATERLOO ON N2T 1H4***	***PES***
Licence No.:					
Licence Type:		Limited Vendor			

52	***11 of 15***	***ENE/171.1***	***350.7***	***ZEHRS #524 (BEECHWOOD)*** ***450 ERB ST W*** ***WATERLOO ON N2T 1H4***	***PES***
Licence No.:					
Licence Type:		Vendor			

52	***12 of 15***	***ENE/171.1***	***350.7***	***VALET VENDING LTD.*** ***450 ERB ST W*** ***WATERLOO ON N2T 1H4***	***SCT***
Established:		1991			
Plant Size (ft²):		2800			
Employment:		2			
--- Details ---					
SIC/NAICS Code:		333310			
Description:		Commercial and Service Industry Machinery Manufacturing			

52	***13 of 15***	***ENE/171.1***	***350.7***	***450 Erb St*** ***Waterloo ON***	***SPL***
Ref No.:		6071-88TS94			
Incident Dt:					
MOE Reported Dt:		8/30/2010			
Contaminant Name:		REFRIGERANT GAS, N.O.S.			
Contaminant Quantity:		113 kg			
Incident Summary:		Zehr's: 113 kg of R134A to atm			
Incident Cause:		Pipe Or Hose Leak			
Incident Reason:		Other - Reason not otherwise defined			
Nature of Impact:		Air Pollution			
Receiving Medium:					
Environmental Impact:		Confirmed			

52	***14 of 15***	***ENE/171.1***	***350.7***	***Arcturus Realty Corporation*** ***450 Erb St*** ***Waterloo ON N2T 1H4***	***SPL***
Ref No.:		6572-83TKJR			
Incident Dt:					
MOE Reported Dt:		3/23/2010			
Contaminant Name:		VEGETABLE OIL			

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Contaminant Quantity: 56.78 L
Incident Summary: Zehrs - 15 gals veg oil to parking lot, clng.
Incident Cause: Pipe Or Hose Leak
Incident Reason: Equipment Failure - Malfunction of system components
Nature of Impact: Soil Contamination
Receiving Medium:
Environmental Impact: Confirmed

---

52 **15 of 15** **ENE/171.1** **350.7** **Loblaw Companies Ltd.**
450 Erb St
Waterloo ON N2T 1H4
SPL

Ref No.: 8837-7Z85XP
Incident Dt:
MOE Reported Dt: 12/29/2009
Contaminant Name: REFRIGERANT GAS, R507
Contaminant Quantity: 136.2 kg
Incident Summary: Zehrs: 136.2 kg of R507 released from meat locker coil
Incident Cause: Discharge or Emission to Air
Incident Reason: Error- Operator error
Nature of Impact: Air Pollution; Other Impact(s)
Receiving Medium:
Environmental Impact:

---

53 **1 of 1** **WSW/10.6** **404.9** **ON**
BORE

Borehole ID:	682536	*Type:*	Borehole
Use:	Geotechnical/Geological Investigation	*Status:*	
Drill Method:	Power auger	*UTM Zone:*	17
Easting:	533711.000	*Northing:*	4810021.000
Location Accuracy:		*Orig. Ground Elev m:*	402.899994
Elev. Reliability Note:		*DEM Ground Elev m:*	404.399994
Total Depth m:	6.600000	*Primary Name:*	
Township:		*Concession:*	
Lot:		*Municipality:*	
Completion Date:	1963-APR	*Static Water Level:*	
Primary Water Use:		*Sec. Water Use:*	

--- Details ---

Stratum ID:	218558002	*Top Depth m:*	0
Bottom Depth m:	0.300000	*Stratum Desc:*	SANDY, SILTY WITH ORGANIC MATTER, BROWN TO BLACK
+			
Stratum ID:	218558003	*Top Depth m:*	0.300000
Bottom Depth m:	1.500000	*Stratum Desc:*	FINE TO COARSE SAND WITH GRITS, SOME CLAY, TILL FORM BROWN-GREY, COMPACT
+			
Stratum ID:	218558004	*Top Depth m:*	1.500000
Bottom Depth m:	3	*Stratum Desc:*	BROWN, COMPACT
+			
Stratum ID:	218558005	*Top Depth m:*	3
Bottom Depth m:	3.700000	*Stratum Desc:*	BROWN, STIFF
+			

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Stratum ID:	218558006	*Top Depth m:*	3.700000
Bottom Depth m:	6.100000	*Stratum Desc:*	GREY WITH BROWN POCKETS, FIRM TO STIFF, SOME SAND& PEBBLES
+			
Stratum ID:	218558007	*Top Depth m:*	6.100000
Bottom Depth m:	6.600000	*Stratum Desc:*	SLIGHTLY PLASTIC, GREY, FI-RM TO STIFF

---

54 ***1 of 1*** ***WSW/4.2*** ***404.7*** ***The Regional Municipality of Waterloo*** ***SPL***
990 Erb St W
Waterloo ON

Ref No.:	1878-7VALZV
Incident Dt:	
MOE Reported Dt:	8/26/2009
Contaminant Name:	CHLORINATED WATER
Contaminant Quantity:	257.4 m3
Incident Summary:	Erb St Reservoir: spill 257.4 m3 chlor water to storm sewer
Incident Cause:	
Incident Reason:	
Nature of Impact:	Surface Water Pollution
Receiving Medium:	
Environmental Impact:	Not Anticipated

---

55 ***1 of 1*** ***WSW/32.0*** ***405.9*** ***BORE***
ON

Borehole ID:	682540	*Type:*	Borehole
Use:	Geotechnical/Geological Investigation	*Status:*	
Drill Method:	Power auger	*UTM Zone:*	17
Easting:	533661.000	*Northing:*	4810021.000
Location Accuracy:		*Orig. Ground Elev m:*	404
Elev. Reliability Note:		*DEM Ground Elev m:*	405.200012
Total Depth m:	18.700001	*Primary Name:*	
Township:		*Concession:*	
Lot:		*Municipality:*	
Completion Date:	1963-APR	*Static Water Level:*	
Primary Water Use:		*Sec. Water Use:*	

--- Details ---

Stratum ID:	218558037	*Top Depth m:*	16.500000
Bottom Depth m:	18.700001	*Stratum Desc:*	WITH SILTY SAND LAYERS, BROWN TO LIGHT GREY BROWN DENSE TO VERY DENSE
+			
Stratum ID:	218558036	*Top Depth m:*	13.700000
Bottom Depth m:	16.500000	*Stratum Desc:*	AS ABOVE
+			
Stratum ID:	218558028	*Top Depth m:*	0
Bottom Depth m:	0.300000	*Stratum Desc:*	SANDY AND SILTY, BROWN TO BLACK
+			
Stratum ID:	218558029	*Top Depth m:*	0.300000
Bottom Depth m:	1.500000	*Stratum Desc:*	FINE WITH SOME MEDIUM, BROWN, LOOSE TO COMPACT
+			

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Stratum ID:	218558030	*Top Depth m:*	1.500000
Bottom Depth m:	3	*Stratum Desc:*	BROWN, COMPACT TO FIRM, FINE, LARGE GRANITE STONES AT 7FT
+			
Stratum ID:	218558031	*Top Depth m:*	3
Bottom Depth m:	4.600000	*Stratum Desc:*	SANDY, CLAYEY, WITH STONES BECOMING SANDIER, DENSER, WETTER THAN PLASTIC LIMIT
+			
Stratum ID:	218558032	*Top Depth m:*	4.600000
Bottom Depth m:	6.700000	*Stratum Desc:*	WITH PEBBLES, ROWN WITH GREY POCKETS, COMPACT OR STIFF
+			
Stratum ID:	218558033	*Top Depth m:*	6.700000
Bottom Depth m:	9.600000	*Stratum Desc:*	BROWN WITH GREY POCKETS, STIFF, SOME FINE SAND
+			
Stratum ID:	218558034	*Top Depth m:*	9.600000
Bottom Depth m:	12.200000	*Stratum Desc:*	SANDY AND CLAYEY, WITH STONES
+			
Stratum ID:	218558035	*Top Depth m:*	12.200000
Bottom Depth m:	13.700000	*Stratum Desc:*	WITH GRITS, BROWN, GREY POCKETS, VERY STIFF,

56 ***1 of 1*** ***WSW/13.8*** ***404.9*** ***ON*** ***BORE***

Borehole ID:	682539	*Type:*	Borehole
Use:	Geotechnical/Geological Investigation	*Status:*	
Drill Method:	Power auger	*UTM Zone:*	17
Easting:	533661.000	*Northing:*	4810001.000
Location Accuracy:		*Orig. Ground Elev m:*	401.600006
Elev. Reliability Note:		*DEM Ground Elev m:*	404.399994
Total Depth m:	7.500000	*Primary Name:*	
Township:		*Concession:*	
Lot:		*Municipality:*	
Completion Date:	1963-APR	*Static Water Level:*	
Primary Water Use:		*Sec. Water Use:*	

--- Details ---

Stratum ID:	218558023	*Top Depth m:*	0
Bottom Depth m:	0.600000	*Stratum Desc:*	SILTY ORGANIC, BROWN TO BLACK
+			
Stratum ID:	218558024	*Top Depth m:*	0.600000
Bottom Depth m:	2.100000	*Stratum Desc:*	SLIGHTLY PLASTIC, BROWN WITH LIGHT GREY-BROWN FISSURES, SOFT TO FIRM BECOMING STIFF OR COMPACT
+			
Stratum ID:	218558025	*Top Depth m:*	2.100000
Bottom Depth m:	3.700000	*Stratum Desc:*	FINE SAND, BROWN, COHESIVE STIFF TO COMPACT
+			
Stratum ID:	218558026	*Top Depth m:*	3.700000
Bottom Depth m:	4.600000	*Stratum Desc:*	SOME CLAY, BROWN CHANGING TO GREY, STIFF OR COMPACT

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

+

Stratum ID:	218558027	*Top Depth m:*	4.600000
Bottom Depth m:	7.500000	*Stratum Desc:*	WITH PEBBLES UP TO 11/2 IN. GREY, FIRM TO STIFF

---

57 **1 of 1** **WSW/62.8** **405.0** **ON** **BORE**

Borehole ID:	682538	*Type:*	Borehole
Use:	Geotechnical/Geological Investigation	*Status:*	
Drill Method:	Power auger	*UTM Zone:*	17
Easting:	533631.000	*Northing:*	4810041.000
Location Accuracy:		*Orig. Ground Elev m:*	403.600006
Elev. Reliability Note:		*DEM Ground Elev m:*	404.500000
Total Depth m:	6.600000	*Primary Name:*	
Township:		*Concession:*	
Lot:		*Municipality:*	
Completion Date:	1963-APR	*Static Water Level:*	
Primary Water Use:		*Sec. Water Use:*	

--- Details ---

Stratum ID:	218558015	*Top Depth m:*	0
Bottom Depth m:	0.400000	*Stratum Desc:*	SILTY ORGANIC, BROWN TO BLACK

+

Stratum ID:	218558016	*Top Depth m:*	0.400000
Bottom Depth m:	1.600000	*Stratum Desc:*	FINE, COHESIVE, BROWN, FIRM

+

Stratum ID:	218558017	*Top Depth m:*	1.600000
Bottom Depth m:	1.900000	*Stratum Desc:*	MEDIUM TO FINE, BROWN, FIRM

+

Stratum ID:	218558018	*Top Depth m:*	1.900000
Bottom Depth m:	3	*Stratum Desc:*	WETTER THAN PLASTIC LIMIT

+

Stratum ID:	218558019	*Top Depth m:*	3
Bottom Depth m:	4	*Stratum Desc:*	BROWN, STIFF,

+

Stratum ID:	218558020	*Top Depth m:*	4
Bottom Depth m:	4.600000	*Stratum Desc:*	MORE PLASTIC, BROWN AND GREY LENSES, FIRM TO STIFF

+

Stratum ID:	218558021	*Top Depth m:*	4.600000
Bottom Depth m:	6.100000	*Stratum Desc:*	WITH PEBBLES, GREY, FIRM TO STIFF

+

Stratum ID:	218558022	*Top Depth m:*	6.100000
Bottom Depth m:	6.600000	*Stratum Desc:*	WITH PEBBLES, GREY, FIRM TO STIFF, LESS PLASTIC

---

58 **1 of 1** **WSW/8.0** **402.8** **R.M. OF WATERLOO ERB ST.W/WILMOT LINE WATERLOO CITY ON** **CA**

Certificate #:	7-0519-99-
Application Year:	99

Issue Date:	7/14/1999
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

59 **1 of 1** **ENE/121.8** **351.1** **lot 32 ON** **WWIS**

Well ID:	6507302	*Lot:*	032
Concession:		*Concession Name:*	GCT
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	536050.1	*Northing Nad83:*	4811253
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:	Not Used	*Construction Date:*	05-MAR-92
Sec. Water Use:		*Well Depth:*	95 ft
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Observation Wells
Construction Method:	Rotary (Convent.)	*Flowing (y/n):*	
Elevation (m):	351.37	*Elevation Reliability:*	
Depth to Bedrock:	240	*Overburden/Bedrock:*	Bedrock
Water Type:		*Casing Material:*	PLASTIC

--- Details ---

Thickness:	9 ft	*Original Depth:*	9 ft
Material Colour:	BROWN	*Material:*	CLAY, SILTY, FILL
+			
Thickness:	12 ft	*Original Depth:*	21 ft
Material Colour:	BROWN	*Material:*	CLAY, SILTY, FILL
+			
Thickness:	25 ft	*Original Depth:*	46 ft
Material Colour:	BROWN	*Material:*	GRAVEL, SANDY, SOFT
+			
Thickness:	15 ft	*Original Depth:*	61 ft
Material Colour:	BROWN	*Material:*	CLAY, SILT, TILL
+			
Thickness:	10 ft	*Original Depth:*	71 ft
Material Colour:	BROWN	*Material:*	GRAVEL, SANDY, SOFT
+			
Thickness:	6 ft	*Original Depth:*	77 ft
Material Colour:	GREY	*Material:*	SAND, SILTY, SOFT
+			
Thickness:	18 ft	*Original Depth:*	95 ft
Material Colour:	GREY	*Material:*	FINE SAND, , SOFT
+			
Thickness:	40 ft	*Original Depth:*	135 ft
Material Colour:	BROWN	*Material:*	CLAY, SILT, TILL

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

+			
Thickness:	55 ft	*Original Depth:*	190 ft
Material Colour:	GREY	*Material:*	SILT, SANDY, TILL
+			
Thickness:	10 ft	*Original Depth:*	200 ft
Material Colour:	BROWN	*Material:*	SILT, SAND, HARD
+			
Thickness:	25 ft	*Original Depth:*	225 ft
Material Colour:	BROWN	*Material:*	SILT, SANDY, HARD
+			
Thickness:	15 ft	*Original Depth:*	240 ft
Material Colour:	BROWN	*Material:*	GRAVEL, STONES, HARD
+			
Thickness:	2 ft	*Original Depth:*	242 ft
Material Colour:	GREY	*Material:*	LIMESTONE, SHALE, HARD

60 ***1 of 1*** ***ENE/111.7*** ***351.0*** ***lot 32 ON*** ***WWIS***

Well ID:	6510747	*Lot:*	032
Concession:		*Concession Name:*	
County:	WATERLOO	*Municipality:*	WATERLOO (WATERLOO TWP)
Easting Nad83:	536057	*Northing Nad83:*	4811245
Zone:	17	*Utm Reliability:*	margin of error : 10 - 30 m
Primary Water Use:		*Construction Date:*	20-JUN-06
Sec. Water Use:		*Well Depth:*	
Pump Rate:	10 LPM	*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Abandoned-Other
Construction Method:		*Flowing (y/n):*	
Elevation (m):	351.49	*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	No formation data
Water Type:		*Casing Material:*	PLASTIC

61 ***1 of 1*** ***ENE/86.5*** ***357.0*** ***ON*** ***BORE***

Borehole ID:	680314	*Type:*	Borehole
Use:	Geotechnical/Geological Investigation	*Status:*	
Drill Method:	Backhoe	*UTM Zone:*	17
Easting:	536171.000	*Northing:*	4811081.000
Location Accuracy:		*Orig. Ground Elev m:*	356.600006
Elev. Reliability Note:		*DEM Ground Elev m:*	355.899994
Total Depth m:	0.900000	*Primary Name:*	
Township:		*Concession:*	
Lot:		*Municipality:*	
Completion Date:	1965-SEP	*Static Water Level:*	
Primary Water Use:		*Sec. Water Use:*	

--- Details ---

Stratum ID:	218549937	*Top Depth m:*	0
Bottom Depth m:	0.900000	*Stratum Desc:*	BUFF.

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
62	1 of 1	NE/246.2	345.5	24 Fischer Hallman Rd North Waterloo ON	EHS

Order No.: 20050225007
Report Date: 3/3/2005
Report Type:
Search Radius (km): 0.25
Addit. Info Ordered:

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
63	1 of 2	NE/223.3	345.9	Union Gas Limited 22 Fischer Hallman Waterloo ON N2L 2X3	GEN

SIC Code: 221210
SIC Description:
Generator #: ON2576966
Approval Yrs: 2011

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
63	2 of 2	NE/223.3	345.9	Union Gas Limited 22 Fischer Hallman Waterloo ON N2L 2X3	GEN

SIC Code: 221210
SIC Description: Natural Gas Distribution
Generator #: ON2576966
Approval Yrs: 2012

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
64	1 of 1	ENE/133.2	348.8	10 Fischer Hallman Rd N Waterloo ON N2L 2X3	EHS

Order No.: 20130424044
Report Date: 03-MAY-13
Report Type: Custom Report
Search Radius (km): .25
Addit. Info Ordered:

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
65	1 of 1	ENE/202.6	346.2	ON	WWIS

Well ID: 7045906
Concession:
County: WATERLOO
Easting Nad83: 536070
Zone: 17
Primary Water Use: Not Used
Sec. Water Use:
Pump Rate:
Flow Rate:
Specific Capacity:
Construction Method: Rotary (Convent.)
Elevation (m): 347.89
Depth to Bedrock:
Water Type:

Lot:
Concession Name:
Municipality: WATERLOO
Northing Nad83: 4811348
Utm Reliability: margin of error : 10 - 30 m
Construction Date: 11-JUN-07
Well Depth: 5 m
Static Water Level:
Clear/Cloudy:
Final Well Status: Observation Wells
Flowing (y/n):
Elevation Reliability:
Overburden/Bedrock:
Casing Material: PLASTIC

--- Details ---

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Thickness:	2.5 m	*Original Depth:*	5 m
Material Colour:	GREY	*Material:*	SAND, SILT
+			
Thickness:	.25 m	*Original Depth:*	.25 m
Material Colour:	BLACK	*Material:*	TOPSOIL
+			
Thickness:	2.25 m	*Original Depth:*	2.5 m
Material Colour:	BROWN	*Material:*	SILT, SAND, FILL

---

66 | ***1 of 1*** | ***ENE/87.4*** | ***351.0*** | ***10 Fischer Hallman Rd N & 420 & 422 Erb St W Waterloo ON N2L 2X3*** | ***EHS***

Order No.: 20071218009
Report Date: 1/2/2008
Report Type: CAN - Complete Report
Search Radius (km): 0.25
Addit. Info Ordered:

---

67 | ***1 of 5*** | ***ENE/89.8*** | ***351.0*** | ***Beechwood Apothecaries Inc 7-420 Erb Street West Waterloo ON*** | ***GEN***

SIC Code:
SIC Description:
Generator #: ON8545606
Approval Yrs: As of April 2014

--- Details ---
Waste Code: 312
Waste Description: Pathological wastes
+
Waste Code: 261
Waste Description: Pharmaceuticals

---

67 | ***2 of 5*** | ***ENE/89.8*** | ***351.0*** | ***Beechwood Wellness Pharmacy 7-420 Erb Street West Waterloo ON*** | ***GEN***

SIC Code: 414510
SIC Description: Pharmaceuticals and Pharmacy Supplies Wholesaler-Distributors
Generator #: ON8545606
Approval Yrs: 2009

--- Details ---
Waste Code: 261
Waste Description: PHARMACEUTICALS
+
Waste Code: 312
Waste Description: PATHOLOGICAL WASTES

---

67 | ***3 of 5*** | ***ENE/89.8*** | ***351.0*** | ***Beechwood Wellness Pharmacy 7-420 Erb Street West Waterloo ON*** | ***GEN***

SIC Code: 414510

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

SIC Description: Pharmaceuticals and Pharmacy Supplies Wholesaler-Distributors
Generator #: ON8545606
Approval Yrs: 2010

--- Details ---
Waste Code: 261
Waste Description: PHARMACEUTICALS
+
Waste Code: 312
Waste Description: PATHOLOGICAL WASTES

---

67 **4 of 5** **ENE/89.8** **351.0** **WATERLOO WEST ANIMAL HOSPITAL**
420 ERB STREET WEST, UNIT 6
WATERLOO ON N2L 6H6
GEN

SIC Code: 0211
SIC Description: VETERINARY SERVICE
Generator #: ON2292600
Approval Yrs: 97,98,99,00,01

--- Details ---
Waste Code: 312
Waste Description: PATHOLOGICAL WASTES

---

67 **5 of 5** **ENE/89.8** **351.0** **Beechwood Wellness Pharmacy**
7-420 Erb Street West
Waterloo ON N2L 6H6
GEN

SIC Code: 414510
SIC Description: Pharmaceuticals and Pharmacy Supplies Wholesaler-D
Generator #: ON8545606
Approval Yrs: 06,07,08

--- Details ---
Waste Code: 261
Waste Description: PHARMACEUTICALS
+
Waste Code: 312
Waste Description: PATHOLOGICAL WASTES

---

68 **1 of 1** **WSW/202.3** **394.0** **lot 1**
ON
WWIS

Well ID:	6502370	*Lot:*	001
Concession:		*Concession Name:*	ER S
County:	WATERLOO	*Municipality:*	WILMOT
Easting Nad83:	533664	*Northing Nad83:*	4809773
Zone:	17	*Utm Reliability:*	margin of error : 100 m - 300 m
Primary Water Use:		*Construction Date:*	04-OCT-57
Sec. Water Use:		*Well Depth:*	95 ft
Pump Rate:		*Static Water Level:*	
Flow Rate:		*Clear/Cloudy:*	
Specific Capacity:		*Final Well Status:*	Test Hole
Construction Method:	Rotary (Convent.)	*Flowing (y/n):*	
Elevation (m):	393.07	*Elevation Reliability:*	
Depth to Bedrock:	318	*Overburden/Bedrock:*	Bedrock
Water Type:		*Casing Material:*	

--- Details ---

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
Thickness:	1 ft			*Original Depth:*	1 ft
Material Colour:				*Material:*	TOPSOIL
+					
Thickness:	15 ft			*Original Depth:*	16 ft
Material Colour:	BROWN			*Material:*	CLAY
+					
Thickness:	12 ft			*Original Depth:*	28 ft
Material Colour:	BLUE			*Material:*	CLAY
+					
Thickness:	23 ft			*Original Depth:*	51 ft
Material Colour:				*Material:*	SILT
+					
Thickness:	14 ft			*Original Depth:*	65 ft
Material Colour:				*Material:*	FINE SAND
+					
Thickness:	30 ft			*Original Depth:*	95 ft
Material Colour:				*Material:*	MEDIUM SAND
+					
Thickness:	16 ft			*Original Depth:*	111 ft
Material Colour:				*Material:*	MEDIUM SAND, CLAY
+					
Thickness:	12 ft			*Original Depth:*	123 ft
Material Colour:	BROWN			*Material:*	CLAY
+					
Thickness:	24 ft			*Original Depth:*	147 ft
Material Colour:	BLUE			*Material:*	CLAY
+					
Thickness:	70 ft			*Original Depth:*	217 ft
Material Colour:				*Material:*	SILT, MEDIUM SAND
+					
Thickness:	29 ft			*Original Depth:*	246 ft
Material Colour:				*Material:*	CLAY
+					
Thickness:	56 ft			*Original Depth:*	302 ft
Material Colour:				*Material:*	CLAY, GRAVEL, BOULDERS
+					
Thickness:	12 ft			*Original Depth:*	314 ft
Material Colour:				*Material:*	CLAY, BOULDERS
+					
Thickness:	4 ft			*Original Depth:*	318 ft
Material Colour:				*Material:*	CLAY
+					
Thickness:	3 ft			*Original Depth:*	321 ft
Material Colour:				*Material:*	ROCK

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
69	*1 of 4*	*ENE/103.1*	*350.9*	***Waterloo West Animal Hospital Professional Corpora 414 Erb St W Waterloo ON N2L 1W8***	*GEN*

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

SIC Code:
SIC Description:
Generator #: ON5467734
Approval Yrs: As of April 2014

--- Details ---
Waste Code: 261
Waste Description: Pharmaceuticals
+
Waste Code: 312
Waste Description: Pathological wastes

---

69 **2 of 4** **ENE/103.1** **350.9** **Waterloo West Animal Hospital Professional Corpora**
414 Erb St W
Waterloo ON N2L 1W8
GEN

SIC Code: 541940
SIC Description: Veterinary Services
Generator #: ON5467734
Approval Yrs: 2010

--- Details ---
Waste Code: 261
Waste Description: PHARMACEUTICALS
+
Waste Code: 312
Waste Description: PATHOLOGICAL WASTES

---

69 **3 of 4** **ENE/103.1** **350.9** **Waterloo West Animal Hospital Professional Corpora**
414 Erb St W
Waterloo ON N2L 1W8
GEN

SIC Code: 541940
SIC Description: Veterinary Services
Generator #: ON5467734
Approval Yrs: 2011

--- Details ---
Waste Code: 261
Waste Description: PHARMACEUTICALS
+
Waste Code: 312
Waste Description: PATHOLOGICAL WASTES

---

69 **4 of 4** **ENE/103.1** **350.9** **Waterloo West Animal Hospital Professional Corpora**
414 Erb St W
Waterloo ON N2L 1W8
GEN

SIC Code: 541940
SIC Description: Veterinary Services
Generator #: ON5467734
Approval Yrs: 2012

--- Details ---
Waste Code: 261
Waste Description: PHARMACEUTICALS
+

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
Waste Code:		312			
Waste Description:		PATHOLOGICAL WASTES			

70	***1 of 19***	***WSW/94.8***	***398.7***	***TOROMONT ENERGY LTD.*** ***1001 ERB STREET WEST*** ***WATERLOO ON N2J 3Z4***	***GEN***

SIC Code:
SIC Description:
Generator #: ON2088101
Approval Yrs: As of April 2014

--- Details ---
Waste Code: 122
Waste Description: Alkaline slutions - containing other metals and non-metals (not cyanide)
+
Waste Code: 213
Waste Description: Petroleum distillates
+
Waste Code: 252
Waste Description: Waste crankcase oils and lubricants
+
Waste Code: 267
Waste Description: Organic acids
+
Waste Code: 212
Waste Description: Aliphatic solvents and residues

70	***2 of 19***	***WSW/94.8***	***398.7***	***University of Waterloo*** ***1001 Erb's Rd*** ***Wilmot Township ON N2J 3Z4***	***GEN***

SIC Code:
SIC Description:
Generator #: ON8509868
Approval Yrs: As of April 2014

--- Details ---
Waste Code: 221
Waste Description: Light fuels

70	***3 of 19***	***WSW/94.8***	***398.7***	***The Regional Municipality of Waterloo*** ***Transportation & Environmental Services*** ***1001 Erb's Road, R.R.#3*** ***Waterloo ON N2J 3Z4***	***GEN***

SIC Code:
SIC Description:
Generator #: ON5362204
Approval Yrs: As of April 2014

--- Details ---
Waste Code: 251
Waste Description: Waste oils/sludges (petroleum based)

70	***4 of 19***	***WSW/94.8***	***398.7***	***TOROMONT ENERGY LTD.*** ***1001 ERB STREET WEST*** ***WATERLOO ON N2J 3Z4***	***GEN***

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

SIC Code: 221119
SIC Description: Other Electric Power Generation
Generator #: ON2088101
Approval Yrs: 2012

--- Details ---
Waste Code: 252
Waste Description: WASTE OILS & LUBRICANTS
+
Waste Code: 212
Waste Description: ALIPHATIC SOLVENTS
+
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES

---

70 | ***5 of 19*** | ***WSW/94.8*** | ***398.7*** | ***The Regional Municipality of Waterloo*** ***1001 Erb's Road, R.R.#3*** ***Waterloo ON N2J 3Z4*** | ***GEN***

SIC Code: 913910
SIC Description: Other Local Municipal and Regional Public Administration
Generator #: ON5362204
Approval Yrs: 2012

--- Details ---
Waste Code: 251
Waste Description: OIL SKIMMINGS & SLUDGES

---

70 | ***6 of 19*** | ***WSW/94.8*** | ***398.7*** | ***University of Waterloo*** ***1001 Erb's Rd*** ***Wilmot Township ON*** | ***GEN***

SIC Code: 611310
SIC Description: Universities
Generator #: ON8509868
Approval Yrs: 2012

--- Details ---
Waste Code: 221
Waste Description: LIGHT FUELS

---

70 | ***7 of 19*** | ***WSW/94.8*** | ***398.7*** | ***TOROMONT ENERGY LTD.*** ***1001 ERB STREET WEST*** ***WATERLOO ON*** | ***GEN***

SIC Code: 221119
SIC Description: Other Electric Power Generation
Generator #: ON2088101
Approval Yrs: 03,04,05,06,07,08

--- Details ---
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES
+
Waste Code: 212
Waste Description: ALIPHATIC SOLVENTS
+
Waste Code: 252
Waste Description: WASTE OILS & LUBRICANTS

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
70	8 of 19	WSW/94.8	398.7	University of Waterloo 1001 Erb's Rd Wilmot Township ON	GEN

SIC Code: 611310
SIC Description: Universities
Generator #: ON8509868
Approval Yrs: 2011

--- Details ---
Waste Code: 221
Waste Description: LIGHT FUELS

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
70	9 of 19	WSW/94.8	398.7	TOROMONT ENERGY LTD. 1001 ERB STREET WEST WATERLOO ON	GEN

SIC Code: 221119
SIC Description: Other Electric Power Generation
Generator #: ON2088101
Approval Yrs: 2009

--- Details ---
Waste Code: 212
Waste Description: ALIPHATIC SOLVENTS
+
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES
+
Waste Code: 252
Waste Description: WASTE OILS & LUBRICANTS

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
70	10 of 19	WSW/94.8	398.7	The Regional Municipality of Waterloo 1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	GEN

SIC Code: 913190
SIC Description: Other Municipal Protective Services
Generator #: ON5362204
Approval Yrs: 05,06,07,08

--- Details ---
Waste Code: 251
Waste Description: OIL SKIMMINGS & SLUDGES

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
70	11 of 19	WSW/94.8	398.7	TOROMONT ENERGY LTD. 1001 ERB STREET WEST WATERLOO ON	GEN

SIC Code: 221119
SIC Description: Other Electric Power Generation
Generator #: ON2088101
Approval Yrs: 2011

--- Details ---
Waste Code: 252
Waste Description: WASTE OILS & LUBRICANTS
+
Waste Code: 212

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Waste Description: ALIPHATIC SOLVENTS
+
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES

---

70 **12 of 19** **WSW/94.8** **398.7** **University of Waterloo** **GEN**
1001 Erb's Rd
Wilmot Township ON

SIC Code: 611310
SIC Description: Universities
Generator #: ON8509868
Approval Yrs: 03,04,05,06,07,08

--- Details ---
Waste Code: 221
Waste Description: LIGHT FUELS

---

70 **13 of 19** **WSW/94.8** **398.7** **TOROMONT ENERGY LTD.** **GEN**
1001 ERB STREET WEST
WATERLOO ON

SIC Code: 221119
SIC Description: Other Electric Power Generation
Generator #: ON2088101
Approval Yrs: 2010

--- Details ---
Waste Code: 213
Waste Description: PETROLEUM DISTILLATES
+
Waste Code: 252
Waste Description: WASTE OILS & LUBRICANTS
+
Waste Code: 212
Waste Description: ALIPHATIC SOLVENTS

---

70 **14 of 19** **WSW/94.8** **398.7** **The Regional Municipality of Waterloo** **GEN**
1001 Erb's Road, R.R.#3
Waterloo ON N2J 3Z4

SIC Code: 913910
SIC Description: Other Local Municipal and Regional Public Administration
Generator #: ON5362204
Approval Yrs: 2010

--- Details ---
Waste Code: 251
Waste Description: OIL SKIMMINGS & SLUDGES

---

70 **15 of 19** **WSW/94.8** **398.7** **TOROMONT ENERGY** **GEN**
1001 ERB STREET WEST
WATERLOO ON N2J 3Z4

SIC Code: 4911
SIC Description: ELECT. POWER SYS.
Generator #: ON2088101
Approval Yrs: 99,00,01,02

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
--- Details ---					
Waste Code:	212				
Waste Description:	ALIPHATIC SOLVENTS				
+					
Waste Code:	213				
Waste Description:	PETROLEUM DISTILLATES				
+					
Waste Code:	252				
Waste Description:	WASTE OILS & LUBRICANTS				

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
70	16 of 19	WSW/94.8	398.7	The Regional Municipality of Waterloo 1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	GEN

SIC Code:	913910
SIC Description:	Other Local Municipal and Regional Public Administration
Generator #:	ON5362204
Approval Yrs:	2009
--- Details ---	
Waste Code:	251
Waste Description:	OIL SKIMMINGS & SLUDGES

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
70	17 of 19	WSW/94.8	398.7	University of Waterloo 1001 Erb's Rd Wilmot Township ON	GEN

SIC Code:	611310
SIC Description:	Universities
Generator #:	ON8509868
Approval Yrs:	2010
--- Details ---	
Waste Code:	221
Waste Description:	LIGHT FUELS

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
70	18 of 19	WSW/94.8	398.7	The Regional Municipality of Waterloo 1001 Erb's Road, R.R.#3 Waterloo ON N2J 3Z4	GEN

SIC Code:	913910
SIC Description:	Other Local Municipal and Regional Public Administration
Generator #:	ON5362204
Approval Yrs:	2011
--- Details ---	
Waste Code:	251
Waste Description:	OIL SKIMMINGS & SLUDGES

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB
70	19 of 19	WSW/94.8	398.7	University of Waterloo 1001 Erb's Rd Wilmot Township ON	GEN

SIC Code:	611310
SIC Description:	Universities
Generator #:	ON8509868
Approval Yrs:	2009
--- Details ---	

Map Key	Number of Records	Direction/ Distance m	Elevation m	Site	DB

Waste Code: 221
Waste Description: LIGHT FUELS

---

71 **1 of 1** **ENE/129.9** **349.1** **lot 32 ON** **WWIS**

Well ID: 6501301
Concession:
County: WATERLOO
Easting Nad83: 536169.1
Zone: 17
Primary Water Use: Public
Sec. Water Use:
Pump Rate: 25 GPM
Flow Rate:
Specific Capacity:
Construction Method: Cable Tool
Elevation (m): 349.62
Depth to Bedrock:
Water Type: FRESH

Lot: 032
Concession Name: GCT
Municipality: WATERLOO (WATERLOO TWP)
Northing Nad83: 4811273
Utm Reliability: margin of error : 100 m - 300 m
Construction Date: 15-JUN-50
Well Depth: 330 ft
Static Water Level: 150 ft
Clear/Cloudy: CLOUDY
Final Well Status: Water Supply
Flowing (y/n): N
Elevation Reliability:
Overburden/Bedrock: Overburden
Casing Material: STEEL

--- Details ---

Thickness:	30 ft	*Original Depth:*	30 ft
Material Colour:		*Material:*	CLAY
+			
Thickness:	90 ft	*Original Depth:*	120 ft
Material Colour:		*Material:*	CLAY, MEDIUM SAND
+			
Thickness:	60 ft	*Original Depth:*	180 ft
Material Colour:		*Material:*	QUICKSAND
+			
Thickness:	10 ft	*Original Depth:*	190 ft
Material Colour:		*Material:*	HARDPAN, BOULDERS
+			
Thickness:	20 ft	*Original Depth:*	210 ft
Material Colour:		*Material:*	CLAY
+			
Thickness:	30 ft	*Original Depth:*	240 ft
Material Colour:		*Material:*	QUICKSAND
+			
Thickness:	30 ft	*Original Depth:*	270 ft
Material Colour:		*Material:*	HARDPAN, BOULDERS
+			
Thickness:	50 ft	*Original Depth:*	320 ft
Material Colour:		*Material:*	QUICKSAND
+			
Thickness:	10 ft	*Original Depth:*	330 ft
Material Colour:		*Material:*	COARSE SAND, GRAVEL

---

72 **1 of 1** **ENE/196.5** **351.5** **WATERLOO CITY CHURCHILL ST./ERB ST. WATERLOO CITY ON** **CA**

Certificate #:	3-0994-93-
Application Year:	93
Issue Date:	9/7/1993
Approval Type:	Municipal sewage
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Unplottable Summary

DB	Company Name/Site Name	Address	City	Postal
CA	REG.MUNIC.OF WATERLOO	ERB ST.	WATERLOO ON	
CA	REGIONAL MUNICIPALITY OF WATERLOO	ERB ST. W, FISHER-HALLMAN RD.	WATERLOO CITY ON	
CA	THE CITY	ERB ST.	WATERLOO ON	
CA	REG.MUNIC.OF WATERLOO	ERB ST.	WATERLOO ON	
CA	The Corporation of the City of Waterloo	Erb St	Waterloo ON	
CA	REG.MUNIC.OF WATERLOO	ERB ST.	WATERLOO ON	
CA	WILMOT TWP. REPLACEMENT WELL SUBM. PUMP	WELL W6B ERB STREET REG. RD.9	WILMOT TWP. ON	
CA	FREURE HOMES LIMITED BEECHWOOD COMMONS	BEECHWOOD PLACE	WATERLOO ON	
CA	FREURE HOMES LIMITED BEECHWOOD COMMONS	BEECHWOOD PLACE	WATERLOO ON	
CA	STONAT PROPERTIES LTD.	STORMW. MANGEM.BEECHWOOD GDNS.	WATERLOO CITY ON	
CA	J. D. WILLIS KIPFER SUBD. PH. 2	BEECHWOOD DRIVE	WATERLOO CITY ON	
CA	WATERLOO CITY	BEECHWOOD DR.	WATERLOO CITY ON	
CA	J.D. WILLIS KIPFER SUBD. PH. 2	BEECHWOOD DRIVE	WATERLOO CITY ON	
CA	WATERLOO CITY	BEECHWOOD DR.	WATERLOO CITY ON	
CA	WATERLOO CITY	BEECHWOOD DR.	WATERLOO CITY ON	
CA	WATERLOO CITY	BEECHWOOD DR.	WATERLOO CITY ON	
CA		Part Lot 32- G.C.T., Block 52, R.P. 1646	Waterloo ON	

CA		Part Lot 32- G.C.T., Block 52, R.P. 1646	Waterloo ON
CA	Clair Meadows Subdivision	Part of Lot 41, G.C.T.	Waterloo ON
CA	Clair Meadows Subdivision	Part of Lot 41, G.C.T.	Waterloo ON
CA	Clair Meadows Subdivision	Part of Lot 41, G.C.T.	Waterloo ON
CA	CANADIAN TIRE CORPORATION HIGHLAND PARK	STORMWATER MANAGEMENT	KITCHENER CITY ON
CA	Erbsville Road Development Inc.	Part of Lot 41 German Company Tract	Waterloo ON
CA	CANADIAN TIRE CORPORATION	HIGHLAND PARK SHOPPING CENTRE	KITCHENER CITY ON
CA	CANADIAN TIRE CORPORATION	HIGHLAND PARK SHOPPING CENTRE	KITCHENER CITY ON
CA	University of Waterloo Research and Technology Park		Waterloo ON
CA	University of Waterloo Research and Technology Park		Waterloo ON
CA	University of Waterloo		Waterloo ON
CA	The Corporation of the City of Waterloo	250 metres northwest of Wideman Road and Erbsville Road Intersection	Waterloo ON
CA	University of Waterloo		Waterloo ON
CA	COSTAIN LTD.	WESTVALE DR.	WATERLOO ON
CA	WATERLOO CITY WESTVALE ACRES SUBD.	WESTVALE DR.	WATERLOO CITY ON
CA	COSTAIN LTD.	WESTVALE DR.	WATERLOO ON
CA	COSTAIN LTD. COSTAIN SUBD. STAGE 7	WESTVALE DR.	WATERLOO CITY ON
CA	COSTAIN LTD.	WESTVALE DR.	WATERLOO ON
CA	WATERLOO CITY WESTVALE ACRES SUBD.	WESTVALE DR.	WATERLOO CITY ON
CA	COSTAIN LTD. COSTAIN SUBD. STAGE 7	WESTVALE DRIVE	WATERLOO CITY ON
CA	WATERLOO CITY WESTVALE MEADOWS	THORNBERRY LANE	WATERLOO CITY ON

CA	The Regional Municipality of Waterloo	IRA Needles Boulevard	Wilmot ON
CA	VDL (2005) Limited	Ira Needles Blvd	Kitchener ON
CA	The Regional Municipality of Waterloo	IRA Needles Boulevard	Wilmot ON
CA	The Regional Municipality of Waterloo	IRA Needles Boulevard	Wilmot ON
CA	VDL (2005) Limited	Ira Needles Blvd	Kitchener ON
CA	The Regional Municipality of Waterloo	IRA Needles Boulevard	Wilmot ON
CA	VDL (2005) Limited	Ira Needles Blvd	Kitchener ON
CA		Erbsville Road (Regional Road 16)	Waterloo ON
CA	WATERLOO CITY	ERBSVILLE RD.	WATERLOO CITY ON
CA	WATERLOO CITY	ERBSVILLE RD.,CLAIR HILLS SUB.	WATERLOO ON
CA	WATERLOO CITY ERBSVILLE RD. DEVELOP.	STORMW.DETENT. PD.ERBSVILLE RD	WATERLOO CITY ON
CA	WATERLOO REGION NON-PROFIT HOUSING CORP.	ERBSVILLE RD./BLOCK 3, RP 1639	WATERLOO CITY ON
CA	WATERLOO CITY - BLOCKS 14 & 15	ERBSVILLE RD./STM-WATER DET.	WATERLOO CITY ON
CA		Erbsville Road (Regional Road 16)	Waterloo ON
CA	Waterloo Region Emergency Services Training & Research Complex	Erb Street West	Wilmot ON
CA	R.M. OF WATERLOO	ERB STREET W.	WATERLOO CITY ON
CA	WATERLOO CITY 3-0176-88	ERB ST. WEST	WATERLOO CITY ON
CA	KURT & ROSE KAEMMLE - PT. LOT 9/RP 496	ERB ST., STORMWATER MGT. FAC.	WATERLOO CITY ON
CA	The Regional Municipality of Waterloo	Erb St	Waterloo ON
CA	R.M. OF WATERLOO	ERB STREET	WATERLOO CITY ON
CA	R.M. OF WATERLOO	ERB ST.	WATERLOO CITY ON

CA	R.M. OF WATERLOO 3-0161-88	ERB STREET	WATERLOO CITY ON
CA	R.M.OF WATERLOO	ERB STREET REG. RD. N. 9	WATERLOO CITY ON
CA	KURT & ROSE KAEMMLE - PT. LOT 9/RP 496	ERB STREET	WATERLOO CITY ON
CA	R.M. OF WATERLOO 7-0144-88	ERB STREET	WATERLOO CITY ON
CA	WATERLOO CITY 7-0156-88	ERB STREET	WATERLOO CITY ON
ECA	University of Waterloo	Waterloo	ON
GEN	Steed and Evans Limited	Fischer Hallman Rd. South	Kitchener ON
GEN	SADDLERY HARDWARE	R.R. #1, LOT 1, G.C.T.	WATERLOO ON
GEN	WATERLOO REGION DISTRICT SCHOOL BOARD	NORTH WILMOT PUBLIC SCHOOL	WILMOT TWP. ON
GEN	SADDLERY HARDWARE 34-564	R.R. #1, LOT 1, G.C.T.	WATERLOO ON
GEN	WATERLOO COUNTY BOARD OF EDUCATION	NORTH WILMOT PUBLIC SCHOOL	WILMOT TWP. ON
PTTW	Foxboro Green Inc	South of Erbs Street	Township of Wilmot ON
PTTW	Foxwood Golf Course	Erbs Road	Township of Wilmot ON
PTTW	Westhill Pitch-N-Putt Inc	Lot 40 GCT	Waterloo ON
PTTW	Dr. Z. Tukums	Erb Road	Township of Wilmot ON
PTTW	Foxwood Golf Course	Erb's Road	Township of Wilmot ON
REC	WATERLOO, REGIONAL MUNICIPALITY OF	PART LOT 40, GERMAN COMPANY TRACT	WATERLOO ON
REC	WATERLOO, REGIONAL MUNICIPALITY OF	PART LOT 40, GERMAN COMPANY TRACT	KITCHENER ON
SPL	UNKNOWN	LAUREL CREEK - BEHIND TOWERS PLAZA ERB ST.	WATERLOO CITY ON
SPL	ALPINE PLANT FOODS LTD.	ERB STREET.	WILMOT TOWNSHIP ON
SPL	PRIVATE OWNER	FISCHER-HALLMAN AND ERB STREET INTER- SECTION.	WATERLOO CITY ON
SPL	UNKNOWN	RD. #4 (WILMOT LINE)	WILMOT TWP. ON

SPL	The Corporation of the City of Waterloo; The Regional Municipality of Waterloo	On Conservation Road between Wilmont Line and Erbsville Road	Waterloo ON
SPL	WATERLOO, CITY OF	CONSTRUCTION SITE ACROSS THE STREET FROM THE ERB ST. W. LANDFILL SITE	WATERLOO CITY ON
WWIS			ON

Unplottable Report

Site: ***REG.MUNIC.OF WATERLOO***
ERB ST. WATERLOO ON

Database: ***CA***

Certificate #:	7-0554-85-006
Application Year:	85
Issue Date:	8/8/85
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***REGIONAL MUNICIPALITY OF WATERLOO***
ERB ST. W, FISHER-HALLMAN RD. WATERLOO CITY ON

Database: ***CA***

Certificate #:	7-1210-92-
Application Year:	92
Issue Date:	12/31/1992
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***THE CITY***
ERB ST. WATERLOO ON

Database: ***CA***

Certificate #:	7-0755-85-006
Application Year:	85
Issue Date:	8/23/85
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***REG.MUNIC.OF WATERLOO***
ERB ST. WATERLOO ON

Database: ***CA***

Certificate #: 7-0682-85-006
Application Year: 85
Issue Date: 8/23/85
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Corporation of the City of Waterloo***
Erb St Waterloo ON

Database: ***CA***

Certificate #: 9579-7PVLKX
Application Year: 2009
Issue Date: 3/6/2009
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***REG.MUNIC.OF WATERLOO***
ERB ST. WATERLOO ON

Database: ***CA***

Certificate #: 3-0924-85-006
Application Year: 85
Issue Date: 9/5/85
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WILMOT TWP. REPLACEMENT WELL SUBM. PUMP***
WELL W6B ERB STREET REG. RD.9 WILMOT TWP. ON

Database: ***CA***

Certificate #: 7-0284-86-
Application Year: 86
Issue Date: 8/15/1986

Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***FREURE HOMES LIMITED BEECHWOOD COMMONS BEECHWOOD PLACE WATERLOO ON*** ***Database:*** ***CA***

Certificate #: 3-0079-86-
Application Year: 86
Issue Date: 2/14/1986
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***FREURE HOMES LIMITED BEECHWOOD COMMONS BEECHWOOD PLACE WATERLOO ON*** ***Database:*** ***CA***

Certificate #: 7-0054-86-
Application Year: 86
Issue Date: 2/14/1986
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***STONAT PROPERTIES LTD. STORMW. MANGEM.BEECHWOOD GDNS. WATERLOO CITY ON*** ***Database:*** ***CA***

Certificate #: 3-2023-89-
Application Year: 89
Issue Date: 12/8/1989
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:

Project Description:
Contaminants:
Emission Control:

Site: ***J. D. WILLIS KIPFER SUBD. PH. 2***
BEECHWOOD DRIVE WATERLOO CITY ON

Database:
CA

Certificate #: 7-0326-86-
Application Year: 86
Issue Date: 5/2/1986
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY***
BEECHWOOD DR. WATERLOO CITY ON

Database:
CA

Certificate #: 7-1366-87-
Application Year: 87
Issue Date: 9/15/1987
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***J.D. WILLIS KIPFER SUBD. PH. 2***
BEECHWOOD DRIVE WATERLOO CITY ON

Database:
CA

Certificate #: 3-0454-86-
Application Year: 86
Issue Date: 5/2/1986
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY***

Database:
CA

BEECHWOOD DR. WATERLOO CITY ON

Certificate #: 3-1281-89-
Application Year: 89
Issue Date: 7/12/1989
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY***
BEECHWOOD DR. WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-1072-89-
Application Year: 89
Issue Date: 7/12/1989
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY***
BEECHWOOD DR. WATERLOO CITY ON

Database: ***CA***

Certificate #: 3-1654-87-
Application Year: 87
Issue Date: 9/15/1987
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site:
Part Lot 32- G.C.T., Block 52, R.P. 1646 Waterloo ON

Database: ***CA***

Certificate #: 2170-4MFNKQ
Application Year: 00
Issue Date: 7/25/00
Approval Type: Municipal & Private sewage
Status: Approved
Application Type: New Certificate of Approval

Client Name: Sunvest Development Corporation
Client Address: 842 Victoria Street North
Client City: Kitchener
Client Postal Code: N2B 3C1
Project Description: Installation of Storm and Sanitary sewers.
Contaminants:
Emission Control:

Site: ***Database:***
Part Lot 32- G.C.T., Block 52, R.P. 1646 Waterloo ON ***CA***

Certificate #: 3268-4MFNPT
Application Year: 00
Issue Date: 7/25/00
Approval Type: Municipal & Private water
Status: Approved
Application Type: New Certificate of Approval
Client Name: Sunvest Development Corporation
Client Address: 842 Victoria Street North
Client City: Kitchener
Client Postal Code: N2B 3C1
Project Description: Installation of Watermains on Thornberry Lane, Street B and Street C.
Contaminants:
Emission Control:

Site: ***Clair Meadows Subdivision*** ***Database:***
Part of Lot 41, G.C.T. Waterloo ON ***CA***

Certificate #: 0650-4W6QQX
Application Year: 01
Issue Date: 5/4/01
Approval Type: Municipal & Private water
Status: Approved
Application Type: New Certificate of Approval
Client Name: Erbsville Road Development Inc.
Client Address: 620 Munich Circle
Client City: Waterloo
Client Postal Code: N2T 2M9
Project Description: Watermains to be constructed on Brandenburg Boulevard, Lausanne Crescent, Bernay Drive, Avignon Place, Paris Boulevard, Chablis Drive, St. Armand Drive, Temporary Road (Lot 8) and Ira Needles Boulevard.
Contaminants:
Emission Control:

Site: ***Clair Meadows Subdivision*** ***Database:***
Part of Lot 41, G.C.T. Waterloo ON ***CA***

Certificate #: 4444-4VVL2S
Application Year: 01
Issue Date: 6/15/01
Approval Type: Municipal & Private sewage
Status: Approved
Application Type: New Certificate of Approval
Client Name: Erbsville Road Development Inc.
Client Address: 620 Munich Circle
Client City: Waterloo
Client Postal Code: N2T 2M9
Project Description: Approval is sought for a wetland stormwater management facility located at Block 15 and

adjacent lands including outlet works to Clair Creek.

Contaminants:
Emission Control:

Site: ***Clair Meadows Subdivision*** ***Database:***
Part of Lot 41, G.C.T. Waterloo ON ***CA***

Certificate #:	8612-4W6Q7D
Application Year:	01
Issue Date:	5/4/01
Approval Type:	Municipal & Private sewage
Status:	Approved
Application Type:	New Certificate of Approval
Client Name:	Erbsville Road Development Inc.
Client Address:	620 Munich Circle
Client City:	Waterloo
Client Postal Code:	N2T 2M9
Project Description:	Sanitary sewers to be constructed on Brandenburg Boulevard, Lausanne Crescent, Bernay Drive, Avignon Place, Paris Boulevard, Chablis Drive and St. Armand Drive; and storm sewers to be constructed on Brandenburg Boulevard, Storm Outlet Block 15, Lausanne Crescent, Bernay Drive, Avignon Place, Easement Lot Line 84/85, Paris Boulevard, Chablis Drive, St. Armand Drive, Ira Needles Boulevard and Hydro One Corridor.
Contaminants:	
Emission Control:	

Site: ***CANADIAN TIRE CORPORATION HIGHLAND PARK*** ***Database:***
STORMWATER MANAGEMENT KITCHENER CITY ON ***CA***

Certificate #:	3-1657-87-
Application Year:	87
Issue Date:	9/21/1987
Approval Type:	Municipal sewage
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***Erbsville Road Development Inc.*** ***Database:***
Part of Lot 41 German Company Tract Waterloo ON ***CA***

Certificate #:	8891-5RULAZ
Application Year:	2003
Issue Date:	9/30/2003
Approval Type:	Municipal and Private Sewage Works
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***CANADIAN TIRE CORPORATION***
HIGHLAND PARK SHOPPING CENTRE KITCHENER CITY ON

Database: ***CA***

Certificate #: 7-1368-87-
Application Year: 87
Issue Date: 9/21/1987
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***CANADIAN TIRE CORPORATION***
HIGHLAND PARK SHOPPING CENTRE KITCHENER CITY ON

Database: ***CA***

Certificate #: 3-1656-87-
Application Year: 87
Issue Date: 9/21/1987
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***University of Waterloo Research and Technology Park***
Waterloo ON

Database: ***CA***

Certificate #: 8685-5DPQ8N
Application Year: 02
Issue Date: 9/9/02
Approval Type: Municipal & Private sewage
Status: Approved
Application Type: New Certificate of Approval
Client Name: The Corporation of the City of Waterloo
Client Address: 265 Lexington Court
Client City: Waterloo
Client Postal Code:
Project Description: Storm and sanitary sewers on Hagey Boulevard, Wes Graham Drive, East Boundary Easement, South Boundary Easement, West Boundary Easement, and West Private Road Easement
Contaminants:
Emission Control:

Site: ***University of Waterloo Research and Technology Park***
Waterloo ON

Database: ***CA***

Certificate #: 0185-5DPPXW
Application Year: 02
Issue Date: 9/9/02
Approval Type: Municipal & Private water
Status: Approved
Application Type: New Certificate of Approval
Client Name: The Corporation of the City of Waterloo
Client Address: 265 Lexington Court
Client City: Waterloo
Client Postal Code:
Project Description: Watermains on Hagey Boulevard, Wes Graham Drive, South Boundary Easement, West Boundary Easement, and West Private Road Easement
Contaminants:
Emission Control:

Site: ***University of Waterloo***
Waterloo ON

Database: ***CA***

Certificate #: 2129-6B6NTU
Application Year: 2005
Issue Date: 4/7/2005
Approval Type: Municipal and Private Sewage Works
Status: Revoked and/or Replaced
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Corporation of the City of Waterloo***
250 metres northwest of Wideman Road and Erbsville Road Intersection Waterloo ON

Database: ***CA***

Certificate #: 2855-6LYJKQ
Application Year: 2006
Issue Date: 2/13/2006
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***University of Waterloo***
Waterloo ON

Database: ***CA***

Certificate #: 8425-6BSPGM
Application Year: 2005
Issue Date: 4/25/2005
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:

Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***COSTAIN LTD.***
WESTVALE DR. WATERLOO ON

Database: ***CA***

Certificate #: 3-0962-85-006
Application Year: 85
Issue Date: 9/19/85
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY WESTVALE ACRES SUBD.***
WESTVALE DR. WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0173-87-
Application Year: 87
Issue Date: 3/13/1987
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***COSTAIN LTD.***
WESTVALE DR. WATERLOO ON

Database: ***CA***

Certificate #: 7-0710-85-006
Application Year: 85
Issue Date: 9/19/85
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***COSTAIN LTD. COSTAIN SUBD. STAGE 7***
WESTVALE DR. WATERLOO CITY ON

Database: ***CA***

Certificate #: 3-0504-86-
Application Year: 86
Issue Date: 5/16/1986
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***COSTAIN LTD.***
WESTVALE DR. WATERLOO ON

Database: ***CA***

Certificate #: 7-0870-85-006
Application Year: 85
Issue Date: 10/24/85
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY WESTVALE ACRES SUBD.***
WESTVALE DR. WATERLOO CITY ON

Database: ***CA***

Certificate #: 3-0215-87-
Application Year: 87
Issue Date: 3/13/1987
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***COSTAIN LTD. COSTAIN SUBD. STAGE 7***
WESTVALE DRIVE WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0370-86-

Application Year: 86
Issue Date: 5/16/1986
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY WESTVALE MEADOWS***
THORNBERRY LANE WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0412-87-
Application Year: 87
Issue Date: 4/29/1987
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Regional Municipality of Waterloo***
IRA Needles Boulevard Wilmot ON

Database: ***CA***

Certificate #: 8241-6DEJTV
Application Year: 2005
Issue Date: 8/26/2005
Approval Type: Municipal and Private Sewage Works
Status: Revoked and/or Replaced
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***VDL (2005) Limited***
Ira Needles Blvd Kitchener ON

Database: ***CA***

Certificate #: 7961-7UTJ5K
Application Year: 2009
Issue Date: 8/28/2009
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:

Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Regional Municipality of Waterloo***
IRA Needles Boulevard Wilmot ON

Database: ***CA***

Certificate #: 5075-6CYHP5
Application Year: 2005
Issue Date: 6/21/2005
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Regional Municipality of Waterloo***
IRA Needles Boulevard Wilmot ON

Database: ***CA***

Certificate #: 9363-6DEKU4
Application Year: 2005
Issue Date: 8/26/2005
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***VDL (2005) Limited***
Ira Needles Blvd Kitchener ON

Database: ***CA***

Certificate #: 9353-725PBG
Application Year: 2007
Issue Date: 4/24/2007
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Regional Municipality of Waterloo***
IRA Needles Boulevard Wilmot ON

Database: ***CA***

Certificate #: 1170-6KPT3X
Application Year: 2006
Issue Date: 1/31/2006
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***VDL (2005) Limited***
Ira Needles Blvd Kitchener ON

Database: ***CA***

Certificate #: 8036-7UTJY8
Application Year: 2009
Issue Date: 8/28/2009
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site:
Erbsville Road (Regional Road 16) Waterloo ON

Database: ***CA***

Certificate #: 4283-5CXTVF
Application Year: 02
Issue Date: 8/14/02
Approval Type: Municipal & Private water
Status: Approved
Application Type: New Certificate of Approval
Client Name: The Corporation of the City of Waterloo
Client Address: 100 Regina Street South
Client City: Waterloo
Client Postal Code: N2J 4A8
Project Description: Approval is sought for the construction of watermains on Erbsville Road, Laurelwood Drive, and Balsam Poplar Drive.
Contaminants:
Emission Control:

Site: ***WATERLOO CITY***
ERBSVILLE RD. WATERLOO CITY ON

Database: ***CA***

Certificate #: 3-1911-89-
Application Year: 89
Issue Date: 9/28/1989

Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY***
ERBSVILLE RD.,CLAIR HILLS SUB. WATERLOO ON

Database: ***CA***

Certificate #: 3-1054-98-
Application Year: 98
Issue Date: 8/13/1998
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY ERBSVILLE RD. DEVELOP.***
STORMW.DETENT. PD.ERBSVILLE RD WATERLOO CITY ON

Database: ***CA***

Certificate #: 3-1615-89-
Application Year: 89
Issue Date: 9/8/1989
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO REGION NON-PROFIT HOUSING CORP.***
ERBSVILLE RD./BLOCK 3, RP 1639 WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0380-91-
Application Year: 91
Issue Date: 4/18/1991
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:

Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY - BLOCKS 14 & 15***
ERBSVILLE RD./STM-WATER DET. WATERLOO CITY ON

Database: ***CA***

Certificate #: 3-0862-92-
Application Year: 92
Issue Date: 9/4/1992
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site:
Erbsville Road (Regional Road 16) Waterloo ON

Database: ***CA***

Certificate #: 1233-5CXTG4
Application Year: 02
Issue Date: 8/14/02
Approval Type: Municipal & Private sewage
Status: Approved
Application Type: New Certificate of Approval
Client Name: The Corporation of the City of Waterloo
Client Address: 100 Regina Street South
Client City: Waterloo
Client Postal Code: N2J 4A8
Project Description: Approval is sought for the construction of storm and sanitary sewers on Laurelwood Drive, Balsam Poplar Drive, and Erbsville Road.
Contaminants:
Emission Control:

Site: ***Waterloo Region Emergency Services Training & Research Complex***
Erb Street West Wilmot ON

Database: ***CA***

Certificate #: 0288-4YTSF2
Application Year: 01
Issue Date: 8/14/01
Approval Type: Municipal & Private sewage
Status: Approved
Application Type: New Certificate of Approval
Client Name: Corporation of the Regional Municipality of Waterloo
Client Address: 150 Frederick Street, Sixth Floor
Client City: Kitchener
Client Postal Code: N2G 4J3
Project Description: This application is for the construction of a stormwater management facility, located at the southwest corner of the site providing quantity and quality control for approximately 9.0 hectares of the site and including a Sediment Forebay, a Wetland/Wet Pond Extended Detention area with total storage capacity of approximately 6,400 cubic meter, a maximum ponding depth of 1.8m (above the permanent pool) and discharging to a tributary of Alder Creek.

Contaminants:
Emission Control:

Site: ***R.M. OF WATERLOO*** ***Database:***
ERB STREET W. WATERLOO CITY ON ***CA***

Certificate #: 8-2127-90-
Application Year: 90
Issue Date: 8/23/1990
Approval Type: Industrial air
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description: DIESEL FIRE PUMP
Contaminants: Nitrogen Oxides
Emission Control: No Controls

Site: ***WATERLOO CITY 3-0176-88*** ***Database:***
ERB ST. WEST WATERLOO CITY ON ***CA***

Certificate #: 3-0161-88-
Application Year: 88
Issue Date: 2/17/1988
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***KURT & ROSE KAEMMLE - PT. LOT 9/RP 496*** ***Database:***
ERB ST., STORMWATER MGT. FAC. WATERLOO CITY ON ***CA***

Certificate #: 3-0643-91-
Application Year: 91
Issue Date: 7/26/1991
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***The Regional Municipality of Waterloo*** ***Database:***
Erb St Waterloo ON ***CA***

Certificate #: 1899-7PUJSC
Application Year: 2009
Issue Date: 3/5/2009
Approval Type: Municipal and Private Sewage Works
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***R.M. OF WATERLOO***
ERB STREET WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0814-89-
Application Year: 89
Issue Date: 6/7/1989
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***R.M. OF WATERLOO***
ERB ST. WATERLOO CITY ON

Database: ***CA***

Certificate #: 3-0949-89-
Application Year: 89
Issue Date: 6/7/1989
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***R.M. OF WATERLOO 3-0161-88***
ERB STREET WATERLOO CITY ON

Database: ***CA***

Certificate #: 3-0176-88-
Application Year: 88
Issue Date: 2/17/1988
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:

Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***R.M.OF WATERLOO***
ERB STREET REG. RD. N. 9 WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0655-86-
Application Year: 86
Issue Date: 6/27/1986
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***KURT & ROSE KAEMMLE - PT. LOT 9/RP 496***
ERB STREET WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0522-91-
Application Year: 91
Issue Date: 5/23/1991
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***R.M. OF WATERLOO 7-0144-88***
ERB STREET WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0156-88-
Application Year: 88
Issue Date: 2/17/1988
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***WATERLOO CITY 7-0156-88***
ERB STREET WATERLOO CITY ON

Database: ***CA***

Certificate #: 7-0144-88-
Application Year: 88
Issue Date: 2/17/1988
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***University of Waterloo***
Waterloo ON

Database: ***ECA***

CofA Number: 2979-8PHQRP
Date: 1/13/2012
Status: Approved
Project Type: Municipal and Private Sewage

Site: ***Steed and Evans Limited***
Fischer Hallman Rd. South Kitchener ON

Database: ***GEN***

SIC Code: 237310
SIC Description: Highway Street and Bridge Construction
Generator #: ON6622597
Approval Yrs: 06

--- Details ---
Waste Code: 221
Waste Description: LIGHT FUELS

Site: ***SADDLERY HARDWARE***
R.R. #1, LOT 1, G.C.T. WATERLOO ON

Database: ***GEN***

SIC Code: 3069
SIC Description: OTHER HARDWARE, ETC.
Generator #: ON1183400
Approval Yrs: 89

Site: ***WATERLOO REGION DISTRICT SCHOOL BOARD***
NORTH WILMOT PUBLIC SCHOOL WILMOT TWP. ON

Database: ***GEN***

SIC Code: 8511
SIC Description: ELEMT./SECON. EDUC.
Generator #: ON0184242
Approval Yrs: 97,98,99,00,01

--- Details ---
Waste Code: 221
Waste Description: LIGHT FUELS

+
Waste Code: 222
Waste Description: HEAVY FUELS

Site: ***SADDLERY HARDWARE 34-564***
R.R. #1, LOT 1, G.C.T. WATERLOO ON

Database: ***GEN***

SIC Code: 3069
SIC Description: OTHER HARDWARE, ETC.
Generator #: ON1183400
Approval Yrs: 92,93,94,95,96,97,98

--- Details ---
Waste Code: 243
Waste Description: PCB'S

Site: ***WATERLOO COUNTY BOARD OF EDUCATION***
NORTH WILMOT PUBLIC SCHOOL WILMOT TWP. ON

Database: ***GEN***

SIC Code: 8511
SIC Description: ELEMT./SECON. EDUC.
Generator #: ON0184242
Approval Yrs: 95,96

--- Details ---
Waste Code: 221
Waste Description: LIGHT FUELS
+
Waste Code: 222
Waste Description: HEAVY FUELS

Site: ***Foxboro Green Inc***
South of Erbs Street Township of Wilmot ON

Database: ***PTTW***

Year: 1999
EBR Registry No.: IA9E0378
Ministry Ref. No.:
Type: Instrument
Instrument Type: OWRA s. 34 - Permit to take water
Proposal Date: 3/19/99
Location: Township of Wilmot
Proponent Address: Foxboro Green Inc.375 University Ave.E.,Waterloo, Ontario, N2K 3M7

Site: ***Foxwood Golf Course***
Erbs Road Township of Wilmot ON

Database: ***PTTW***

Year: 1999
EBR Registry No.: IA9E0480
Ministry Ref. No.:
Type: Instrument
Instrument Type: OWRA s. 34 - Permit to take water
Proposal Date:
Location: Township of Wilmot
Proponent Address: Foxwood Golf CourseP.O. Box 5142,Baden, Ontario, N0B 1G0

Site: ***Westhill Pitch-N-Putt Inc***
Lot 40 GCT Waterloo ON

Database: ***PTTW***

Year: 2004
EBR Registry No.: IA04E1045
Ministry Ref. No.: P03276
Type: Instrument Decision
Instrument Type: Permit to take water - OWRA s. 34
Proposal Date:
Location: Lot 40 GCT, City of Waterloo, Regional Municipality of Waterloo
Proponent Address: 161 Fourth Ave. Kitchener Ontario N2C 1P3

Site: ***Dr. Z. Tukums***
Erb Road Township of Wilmot ON

Database: ***PTTW***

Year: 2000
EBR Registry No.: IA00E1094
Ministry Ref. No.:
Type: Instrument
Instrument Type: OWRA s. 34 - Permit to take water
Proposal Date:
Location: Township of Wilmot
Proponent Address: Dr. Z. TukumsR.R. #2,Baden, Ontario, N0B 1G0

Site: ***Foxwood Golf Course***
Erb's Road Township of Wilmot ON

Database: ***PTTW***

Year: 2000
EBR Registry No.: IA00E1662
Ministry Ref. No.:
Type: Instrument
Instrument Type: OWRA s. 34 - Permit to take water
Proposal Date: 10/20/00
Location: Township of Wilmot
Proponent Address: Foxwood Golf Course P.O. Box 5142, Baden, Ontario, N0B 1G0

Site: ***WATERLOO, REGIONAL MUNICIPALITY OF***
PART LOT 40, GERMAN COMPANY TRACT WATERLOO ON

Database: ***REC***

Receiver #: A140301
Facility Type: LANDFILL
Approval Yrs: 92

Site: ***WATERLOO, REGIONAL MUNICIPALITY OF***
PART LOT 40, GERMAN COMPANY TRACT KITCHENER ON

Database: ***REC***

Receiver #: A140301
Facility Type: LANDFILL
Approval Yrs: 93,94

Site: ***UNKNOWN***
LAUREL CREEK - BEHIND TOWERS PLAZA ERB ST. WATERLOO CITY ON

Database: ***SPL***

Ref No.: 5216
Incident Dt: 6/16/1988
MOE Reported Dt: 6/16/1988
Contaminant Name:
Contaminant Quantity:

Incident Summary:	R.M. VERIFIED ANONYMOUS REPORT OF FISH KILL IN LAUREL CREEK.
Incident Cause:	UNKNOWN
Incident Reason:	UNKNOWN
Nature of Impact:	
Receiving Medium:	WATER
Environmental Impact:	

Site: ***ALPINE PLANT FOODS LTD.***
ERB STREET. WILMOT TOWNSHIP ON

Database: ***SPL***

Ref No.:	94677
Incident Dt:	12/20/1993
MOE Reported Dt:	12/20/1993
Contaminant Name:	
Contaminant Quantity:	
Incident Summary:	ALPINE PLANT FOOD-9000 L LIQUID FERTILIZER TO GRNDFROM TANK TRUCK,REG & MOE
Incident Cause:	UNKNOWN
Incident Reason:	UNKNOWN
Nature of Impact:	Multi Media Pollution
Receiving Medium:	LAND
Environmental Impact:	NOT ANTICIPATED

Site: ***PRIVATE OWNER***
FISCHER-HALLMAN AND ERB STREET INTER- SECTION. WATERLOO CITY ON

Database: ***SPL***

Ref No.:	86824
Incident Dt:	6/11/1993
MOE Reported Dt:	6/11/1993
Contaminant Name:	
Contaminant Quantity:	
Incident Summary:	ZEHRS-MALODOROUS LIQUID ON THE PAVED PARKING LOT AT STORE LOCATION.
Incident Cause:	PIPE/HOSE LEAK
Incident Reason:	UNKNOWN
Nature of Impact:	Air Pollution
Receiving Medium:	LAND / AIR
Environmental Impact:	CONFIRMED

Site: ***UNKNOWN***
RD. #4 (WILMOT LINE) WILMOT TWP. ON

Database: ***SPL***

Ref No.:	27555
Incident Dt:	11/8/1989
MOE Reported Dt:	11/8/1989
Contaminant Name:	
Contaminant Quantity:	
Incident Summary:	FIRE DEPT. -REQUESTING MOE ASSISTANCE AT FIRE INVOLVING OIL-BASED MAT'L
Incident Cause:	OTHER CAUSE (N.O.S.)
Incident Reason:	FIRE/EXPLOSION
Nature of Impact:	
Receiving Medium:	AIR
Environmental Impact:	

Site: ***The Corporation of the City of Waterloo; The Regional Municipality of Waterloo***
On Conservation Road between Wilmont Line and Erbsville Road Waterloo ON

Database: ***SPL***

Ref No.:	5544-7QGRC2
Incident Dt:	
MOE Reported Dt:	3/25/2009
Contaminant Name:	OIL (PETROLEUM BASED, NOT SPECIFIED)
Contaminant Quantity:	5 L
Incident Summary:	Two 20L oil pails removed from ditch, cntd and clnd
Incident Cause:	Unknown
Incident Reason:	Unknown - Reason not determined
Nature of Impact:	Surface Water Pollution
Receiving Medium:	
Environmental Impact:	Possible

Site: ***WATERLOO, CITY OF***
CONSTRUCTION SITE ACROSS THE STREET FROM THE ERB ST. W. LANDFILL SITE WATERLOO CITY ON

Database: ***SPL***

Ref No.:	26896
Incident Dt:	10/23/1989
MOE Reported Dt:	10/23/1989
Contaminant Name:	
Contaminant Quantity:	
Incident Summary:	ERB ST. W. LANDFILL SITE - <1 CU. M OF LEACHATE TO TRENCH.
Incident Cause:	PIPE/HOSE LEAK
Incident Reason:	ERROR
Nature of Impact:	
Receiving Medium:	LAND
Environmental Impact:	NOT ANTICIPATED

Site:
ON

Database: ***WWIS***

Well ID:	6509214	*Lot:*	040
Concession:		*Concession Name:*	ER S
County:	WATERLOO	*Municipality:*	WILMOT
Easting Nad83:		*Northing Nad83:*	
Zone:	17	*Utm Reliability:*	unknown UTM
Primary Water Use:	Municipal	*Construction Date:*	19-JUL-02
Sec. Water Use:		*Well Depth:*	74 ft
Pump Rate:	100 GPM	*Static Water Level:*	130 ft
Flow Rate:		*Clear/Cloudy:*	CLEAR
Specific Capacity:		*Final Well Status:*	Observation Wells
Construction Method:	Rotary (Convent.)	*Flowing (y/n):*	N
Elevation (m):		*Elevation Reliability:*	
Depth to Bedrock:		*Overburden/Bedrock:*	Overburden
Water Type:	FRESH	*Casing Material:*	STEEL

--- Details ---

Thickness:	16 ft	*Original Depth:*	16 ft
Material Colour:	BROWN	*Material:*	CLAY, SILT
+			
Thickness:	14 ft	*Original Depth:*	30 ft
Material Colour:	BROWN	*Material:*	CLAY, GRAVEL

+

Thickness:	44 ft	*Original Depth:*	74 ft
Material Colour:	GREY	*Material:*	GRAVEL, SILT, CLAY

+

Thickness:	26 ft	*Original Depth:*	100 ft
Material Colour:	GREY	*Material:*	SILT, SANDY

+

Thickness:	35 ft	*Original Depth:*	135 ft
Material Colour:	GREY	*Material:*	SAND, SILT

+

Thickness:	19 ft	*Original Depth:*	154 ft
Material Colour:	GREY	*Material:*	SILT, SAND

+

Thickness:	10 ft	*Original Depth:*	164 ft
Material Colour:	GREY	*Material:*	SILT, SAND

+

Thickness:	48 ft	*Original Depth:*	212 ft
Material Colour:	GREY	*Material:*	MEDIUM SAND, SILT

+

Thickness:	8 ft	*Original Depth:*	220 ft
Material Colour:	GREY	*Material:*	CLAY

Appendix: Database Descriptions

Ecolog Environmental Risk Information Services Ltd can search the following databases. The extent of Historical information varies with each database and current information is determined by what is publicly available to Ecolog ERIS at the time of update. ***Note:*** *Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Abandoned Aggregate Inventory: Provincial AAGR

The MAAP Program maintains a database of all abandoned pits and quarries. Please note that the database is only referenced by lot and concession and city/town location. The database provides information regarding the location, type, size, land use, status and general comments.*

Government Publication Date: Sept 2002*

Aggregate Inventory: Provincial AGR

The Ontario Ministry of Natural Resources maintains a database of all active pits and quarries. The database provides information regarding the registered owner/operator, location name, operation type, approval type, and maximum annual tonnage.

Government Publication Date: Up to Aug 2012

Abandoned Mine Information System: Provincial AMIS

The Abandoned Mines Information System contains data on known abandoned and inactive mines located on both Crown and privately held lands. The information was provided by the Ministry of Northern Development and Mines (MNDM), with the following disclaimer: "the database provided has been compiled from various sources, and the Ministry of Northern Development and Mines makes no representation and takes no responsibility that such information is accurate, current or complete". Reported information includes official mine name, status, background information, mine start/end date, primary commodity, mine features, hazards and remediation.

Government Publication Date: 1800-Feb 2013

Anderson's Waste Disposal Sites: Private ANDR

The information provided in this database was collected by examining various historical documents which aimed to characterize the likely position of former waste disposal sites from 1860 to present. The research initiative behind the creation of this database was to identify those sites that are missing from the Ontario MOE Waste Disposal Site Inventory, as well as to provide revisions and corrections to the positions and descriptions of sites currently listed in the MOE inventory. In addition to historic waste disposal facilities, the database also identifies certain auto wreckers and scrap yards that have been extrapolated from documentary sources. Please note that the data is not warranted to be complete, exhaustive or authoritive. The information was collected for research purposes only.

Government Publication Date: 1860s-Present

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of all known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 2001-Jun 2010

Borehole: Provincial BORE

A borehole is the generalized term for any narrow shaft drilled in the ground, either vertically or horizontally. The information here includes geotechnical investigations or environmental site assessments, mineral exploration, or as a pilot hole for installing piers or underground utilities. Information is from many sources such as the Ministry of Transportation (MTO) boreholes from engineering reports and projects from the 1950 to 1990's in Southern Ontario. Boreholes from the Ontario Geological Survey (OGS) including The Urban Geology Analysis Information System (UGAIS) and the York Peel Durham Toronto (YPDT) database of the Conservation Authority Moraine Coalition. This database will include fields such as location, stratigraphy, depth, elevation, year drilled, etc. For all water well data or oil and gas well data for Ontario please refer to WWIS and OOGW.

Government Publication Date: 1875-Aug 2011

Certificates of Approval: Provincial CA

This database contains the following types of approvals: Air & Noise, Industrial Sewage, Municipal & Private Sewage, Waste Management Systems and Renewable Energy Approvals. The MOE in Ontario states that any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste, must have a Certificate of Approval before it can operate lawfully. Fields include approval number, business name, address, approval date, approval type and status. This database will no longer be updated, as CofA's have been replaced by either Environmental Activity and Sector Registry (EASR) or Environmental Compliance Approval (ECA). Please refer to those individual databases for any information after Oct.31, 2011.

Government Publication Date: 1985-Oct 30, 2011*

Commercial Fuel Oil Tanks: Provincial CFOT

Since May 2002, Ontario developed a new act where it became mandatory for fuel oil tanks to be registered with Technical Standards & Safety Authority (TSSA). This data would include all commercial underground fuel oil tanks in Ontario with fields such as location, registration number, tank material, age of tank and tank size.

Government Publication Date: 1948-Apr 2013

Chemical Register: Private CHEM

This database includes information from both a one time study conducted in 1992 and private source and is a listing of facilities that manufacture or distribute chemicals. The production of these chemical substances may involve one or more chemical reactions and/or chemical separation processes (i.e. fractionation, solvent extraction, crystallization, etc.).

Government Publication Date: 1992, 1999-Jun 2010

Inventory of Coal Gasification Plants and Coal Tar Sites: Provincial COAL

This inventory includes both the "Inventory of Coal Gasification Plant Waste Sites in Ontario-April 1987" and the Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario-November 1988) collected by the MOE. It identifies industrial sites that produced and continue to produce or use coal tar and other related tars. Detailed information is available and includes: facility type, size, land use, information on adjoining properties, soil condition, site operators/occupants, site description, potential environmental impacts and historic maps available. This was a one-time inventory.*

Government Publication Date: Apr 1987 and Nov 1988*

Compliance and Convictions: Provincial CONV

This database summarizes the fines and convictions handed down by the Ontario courts beginning in 1989. Companies and individuals named here have been found guilty of environmental offenses in Ontario courts of law.

Government Publication Date: 1989-Feb 2014

Certificates of Property Use: Provincial CPU

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all CPU's on the registry such as (EPA s. 168.6) - Certificate of Property Use.

Government Publication Date: 1994-Feb 2014

Drill Hole Database: Provincial DRL

The Ontario Drill Hole Database contains information on more than 113,000 percussion, overburden, sonic and diamond drill holes from assessment files on record with the department of Mines and Minerals. Please note that limited data is available for southern Ontario, as it was the last area to be completed. The database was created when surveys submitted to the Ministry were converted in the Assessment File Research Image Database (AFRI) project. However, the degree of accuracy (coordinates) as to the exact location of drill holes is dependent upon the source document submitted to the MNDM. Levels of accuracy used to locate holes are: centering on the mining claim; a sketch of the mining claim; a 1:50,000 map; a detailed company map; or from submitted a "Report of Work".

Government Publication Date: 1886-Jun 2013

Environmental Activity and Sector Registry: Provincial EASR

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. The EASR allows businesses to register certain activities with the ministry, rather than apply for an approval. The registry is available for common systems and processes, to which preset rules of operation can be applied. The EASR is currently available for: heating systems, standby power systems and automotive refinishing. Businesses whose activities aren't subject to the EASR may apply for an ECA (Environmental Compliance Approval), Please see our ECA database.

Government Publication Date: Oct 31 2011-Apr 2014

Environmental Registry: Provincial EBR

The Environmental Registry lists proposals, decisions and exceptions regarding policies, Acts, instruments, or regulations that could significantly affect the environment. Through the Registry, thirteen provincial ministries notify the public of upcoming proposals and invite their comments. For example, if a local business is requesting a permit, license, or certificate of approval to release substances into the air or water; these are notified on the registry. Data includes: Approval for discharge into the natural environment other than water (i.e. Air) - EPA s. 9, Approval for sewage works - OWRA s. 53(1), and EPA s. 27 - Approval for a waste disposal site. For information regarding Permit to Take Water (PTTW), Certificate of Property Use (CPU) and (ORD) Orders please refer to those individual databases.

Government Publication Date: 1994-Feb 2014

Environmental Compliance Approval: Provincial ECA

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. In the past, a business had to apply for multiple approvals (known as certificates of approval) for individual processes and pieces of equipment. Today, a business either registers itself, or applies for a single approval, depending on the types of activities it conducts. Businesses whose activities aren't subject to the EASR may apply for an ECA. A single ECA addresses all of a business's emissions, discharges and wastes. Separate approvals for air, noise and waste are no longer required. This database will also include Renewable Energy Approvals. For CofA's prior to Nov 1st, 2011, please refer to the CA database. For all Waste Disposal Sites please refer to the WDS database.

Government Publication Date: Oct 31, 2011-Feb 2014

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

EcoLog ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Mar 2013

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

List of TSSA Expired Facilities: Provincial EXP

This is a list of all expired facilities that fall under the TSSA (TSSA Act & Safety Regulations), including the six regulations that exist under the Fuels Safety Division. It will include facilities such as private fuel outlets, bulk plants, fuel oil tanks, gasoline stations, marinas, propane filling stations, liquid fuel tanks, piping systems, etc. These tanks have been removed and automatically fall under the expired facilities inventory held by TSSA.

Government Publication Date: Current to May 2013

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on all known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government.

Government Publication Date: June 2000-Jan 2014

Fisheries & Oceans Fuel Tanks: Federal FOFT

Fisheries & Oceans Canada maintains an inventory of all aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Government Publication Date: 1964-Sept 2003

Fuel Storage Tank: Provincial FST

The Technical Standards & Safety Authority (TSSA), under the Technical Standards & Safety Act of 2000 maintains a database of registered private and retail fuel storage tanks in Ontario with fields such as location, tank status, license date, tank type, tank capacity, fuel type, installation year and facility type.

Government Publication Date: 2010-May 2013

Fuel Storage Tank - Historic: Provincial FSTH

The Technical Standards & Safety Authority (TSSA), under the Technical Standards & Safety Act of 2000 maintains a database of registered private and retail fuel storage tanks in Ontario with fields such as location, tank status, license date, tank type, tank capacity, fuel type, installation year and facility type.

Government Publication Date: Pre-Jan 2010*

Ontario Regulation 347 Waste Generators Summary: Provincial GEN

Regulation 347 of the Ontario EPA defines a waste generation site as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number, company name and address of registered generators including the types of hazardous wastes generated. It includes data on waste generating facilities such as: drycleaners, waste treatment and disposal facilities, machine shops, electric power distribution etc. This information is a summary of all years from 1986 including the most currently available data. Some records may contain, within the company name, the phrase "See & Use..." followed by a series of letters and numbers. This occurs when one company is amalgamated with or taken over by another registered company. The number listed as "See & Use", refers to the new ownership and the other identification number refers to the original ownership. This phrase serves as a link between the 2 companies until operations have been fully transferred.

Government Publication Date: 1986-Apr 2014

TSSA Historic Incidents: Provincial HINC

This database will cover all incidences recorded by TSSA with their older system, before they moved to their new management system. TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. The TSSA works to protect the public, the environment and property from fuel-related hazards such as spills, fires and explosions. This database will include spills and leaks from pipelines, diesel, fuel oil, gasoline, natural gas, propane and hydrogen recorded by the TSSA.

Government Publication Date: 2006-June 2009

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of all aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

TSSA Incidents: Provincial INC

TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. Includes incidents from fuel-related hazards such as spills, fires and explosions. This database will include spills and leaks from diesel, fuel oil, gasoline, natural gas, propane and hydrogen recorded by the TSSA.

Government Publication Date: June 2009-Apr 2013

Landfill Inventory Management Ontario: Provincial LIMO

The Landfill Inventory Management Ontario (LIMO) database is updated every year, as the ministry compiles new and updated information. The inventory will include small and large landfills. Additionally, each year the ministry will request operators of the larger landfills complete a landfill data collection form that will be used to update LIMO and will include the following information from the previous operating year. This will include additional information such as estimated amount of total waste received, landfill capacity, estimated total remaining landfill capacity, fill rates, engineering designs, reporting and monitoring details, size of location, service area, approved waste types, leachate of site treatment, contaminant attenuation zone and more. The small landfills will include information such as site owner, site location and certificate of approval # and status.

Government Publication Date: 2012

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009

Mineral Occurrences: Provincial MNR

In the early 70's, the Ministry of Northern Development and Mines created an inventory of approximately 19,000 mineral occurrences in Ontario, in regard to metallic and industrial minerals, as well as some information on building stones and aggregate deposits. Please note that the "Horizontal Positional Accuracy" is approximately +/- 200 m. Many reference elements for each record were derived from field sketches using pace or chain/tape measurements against claim posts or topographic features in the area. The primary limiting factor for the level of positional accuracy is the scale of the source material. The testing of horizontal accuracy of the source materials was accomplished by comparing the planimetric (X and Y) coordinates of that point with the coordinates of the same point as defined from a source of higher accuracy.

Government Publication Date: 1846-Apr 2013

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

Non-Compliance Reports: Provincial NCPL

The Ministry of the Environment provides information about non-compliant discharges of contaminants to air and water that exceed legal allowable limits, from regulated industrial and municipal facilities. A reported non-compliance failure may be in regard to a Control Order, Certificate of Approval, Sectoral Regulation or specific regulation/act.

Government Publication Date: 1994-2012

National Defence & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defence and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defence & Canadian Forces Spills: Federal NDSP

The Department of National Defence and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Aug 2010

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for all previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. All federal out-of-service PCB containing equipment and all PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: 1993-2011

Oil and Gas Wells: Private OGW

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-Mar 2014

Ontario Oil and Gas Wells: Provincial OOGW

In 1998, the MNR handed over to the Ontario Oil, Gas and Salt Resources Corporation, the responsibility of maintaining a database of oil and gas wells drilled in Ontario. The OGSR Library has over 20,000+ wells in their database. Information available for all wells in the ERIS database include well owner/operator, location, permit issue date, well cap date, licence no., status, depth and the primary target (rock unit) of the well being drilled. All geology/stratigraphy table information, plus all water table information is also provide for each well record.

Government Publication Date: 1800-2013

Inventory of PCB Storage Sites: Provincial OPCB

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of PCB storage sites within the province. Ontario Regulation 11/82 (Waste Management - PCB) and Regulation 347 (Generator Waste Management) under the Ontario EPA requires the registration of inactive PCB storage equipment and/or disposal sites of PCB waste with the Ontario Ministry of Environment. This database contains information on: 1) waste quantities; 2) major and minor sites storing liquid or solid waste; and 3) a waste storage inventory.

Government Publication Date: 1987-Oct 2004

Orders: Provincial ORD

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all Orders on the registry such as (EPA s. 17) - Order for remedial work, (EPA s. 18) - Order for preventative measures, (EPA s. 43) - Order for removal of waste and restoration of site, (EPA s. 44) - Order for conformity with Act for waste disposal sites, (EPA s. 136) - Order for performance of environmental measures.

Government Publication Date: 1994-Feb 2014

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of all known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Pesticide Register: Provincial PES

The Ontario Ministry of Environment maintains a database of all manufacturers and vendors of registered pesticides.

Government Publication Date: 1988-Jun 2013

TSSA Pipeline Incidents: Provincial PINC

TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. This database will include spills, strike and leaks from recorded by the TSSA.

Government Publication Date: June 2009-Mar 2012

Private and Retail Fuel Storage Tanks: Provincial PRT

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks and licensed retail fuel outlets. This database includes an inventory of locations that have gasoline, oil, waste oil, natural gas and/or propane storage tanks on their property. The MCCR no longer collects this information. This information is now collected by the Technical Standards and Safety Authority (TSSA).

Government Publication Date: 1989-1996*

Permit to Take Water: Provincial PTTW

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all PTTW's on the registry such as OWRA s. 34 - Permit to take water.

Government Publication Date: 1994-Feb 2014

Ontario Regulation 347 Waste Receivers Summary: Provincial REC

Part V of the Ontario Environmental Protection Act ("EPA") regulates the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. Regulation 347 of the Ontario EPA defines a waste receiving site as any site or facility to which waste is transferred by a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address, and includes receivers of waste such as: landfills, incinerators, transfer stations, PCB storage sites, sludge farms and water pollution control plants. This information is a summary of all years from 1986 including the most currently available data.

Government Publication Date: 1986-2012

Record of Site Condition: Provincial RSC

The Record of Site Condition (RSC) is part of the Ministry of the Environment's Brownfields Environmental Site Registry. Protection from environmental cleanup orders for property owners is contingent upon documentation known as a record of site condition (RSC) being filed in the Environmental Site Registry. In order to file an RSC, the property must have been properly assessed and shown to meet the soil, sediment and groundwater standards appropriate for the use (such as residential) proposed to take place on the property. The Record of Site Condition Regulation (O. Reg. 153/04) details requirements related to site assessment and clean up.
RSCs filed after July 1, 2011 will also be included as part of the new (O.Reg. 511/09).

Government Publication Date: 1997-Sept 2001, Oct 2004-Feb 2014

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999-Jun 2010

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011

Ontario Spills: Provincial SPL

This database identifies information such as location (approximate), type and quantity of contaminant, date of spill, environmental impact, cause, nature of impact, etc. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X.

Government Publication Date: 1988-Jun 2013

Wastewater Discharger Registration Database: Provincial SRDS

Information under this heading is combination of the following 2 programs. The Municipal/Industrial Strategy for Abatement (MISA) division of the Ontario Ministry of Environment maintained a database of all direct dischargers of toxic pollutants within nine sectors including: Electric Power Generation; Mining; Petroleum Refining; Organic Chemicals; Inorganic Chemicals; Pulp & Paper; Metal Casting; Iron & Steel; and Quarries. All sampling information is now collected and stored within the Sample Result Data Store (SRDS).

Government Publication Date: 1990-2011

Anderson's Storage Tanks: Private TANK

The information provided in this database was collected by examining various historical documents, which identified the location of former storage tanks, containing substances such as fuel, water, gas, oil, and other various types of miscellaneous products. Information is available in regard to business operating at tank site, tank location, permit year, permit & installation type, no. of tanks installed & configuration and tank capacity. Data contained within this database pertains only to the city of Toronto and is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1915-1953*

Transport Canada Fuel Storage Tanks: Federal TCFT

With the provinces of BC, MB, NB, NF, ON, PE, and QC; Transport Canada currently owns and operates 90 fuel storage tanks. Our inventory provides information on the site name, location, tank age, capacity and fuel type.

Government Publication Date: 1970-Mar 2007

TSSA Variances for Abandonment of Underground Storage Tanks: Provincial VAR

The TSSA, Under the Liquid Fuels Handling Code and the Fuel Oil Code, all underground storage tanks must be removed within two years of disuse. If removal of a tank is not feasible, you may apply to seek a variance from this code requirement. This is a list of all variances granted for abandoned tanks.

Government Publication Date: Current to Jun 2013

Waste Disposal Sites - MOE CA Inventory: Provincial WDS

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of known open (active or inactive) and closed disposal sites in the Province of Ontario. Active sites maintain a Certificate of Approval, are approved to receive and are receiving waste. Inactive sites maintain Certificate(s) of Approval but are not receiving waste. Closed sites are not receiving waste. The data contained within this database was compiled from the MOE's Certificate of Approval database. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number. All new Environmental Compliance Approvals handed out after Oct 31, 2011 for Waste Disposal Sites will still be found in this database.

Government Publication Date: 1970-Feb 2014

Waste Disposal Sites - MOE 1991 Historical Approval Inventory: Provincial WDSH

In June 1991, the Ontario Ministry of Environment, Waste Management Branch, published the "June 1991 Waste Disposal Site Inventory", of all known active and closed waste disposal sites as of October 30st, 1990. For each "active" site as of October 31st 1990, information is provided on site location, site/CA number, waste type, site status and site classification. For each "closed" site as of October 31st 1990, information is provided on site location, site/CA number, closure date and site classification. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number.

Government Publication Date: Up to Oct 1990*

Water Well Information System: Provincial WWIS

This database describes locations and characteristics of water wells found within Ontario in accordance with Regulation 903. It includes such information as coordinates, construction date, well depth, primary and secondary use, pump rate, static water level, well status, etc. Also included are detailed stratigraphy information, approximate depth to bedrock and the approximate depth to the water table.

Government Publication Date: 1955-May 2013

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries". All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and were included as reference.

APPENDIX C

Site Photographs



Photograph 1: View of the western-most portion of the Site at the intersection with Wilmot Line, looking southeast.



Photograph 2: General view of the western portion of the Site, east of Wilmot Line, looking east.



Photograph 3: General view of the western portion of the Site, looking west.



Photograph 4: View of agricultural land and electrical utility corridor located north of the western portion of the Site.



Photograph 5: General view of the Waterloo Landfill (Gate# 1 area), located south of the Site.



Photograph 6: General view of the Site and Westside Market Place (Plaza), looking northeast.



Photograph 7: General view of the water pond located south of the western portion of the Site, looking northwest.



Photograph 8: View of the roundabout located at the intersection of Erb Street West and Erbsville Road / Ira Needles Boulevard, looking southwest.



Photograph 9: Canadian Tire service station, located on the north side of the Site at Erbsville Road, looking west.



Photograph 10: General view of the central portion of the Site, east of Erbsville Road / Ira Needles Boulevard, looking east.



Photograph 11: View of Beechwood Centre (Plaza), located north of the Site at Fischer Hallman Road, looking northwest.



Photograph 12: General view of the Site at the intersection of Erb Street and Fischer Hallman Road, looking southeast.

At Golder Associates we strive to be the most respected global company providing consulting, design, and construction services in earth, environment, and related areas of energy. Employee owned since our formation in 1960, our focus, unique culture and operating environment offer opportunities and the freedom to excel, which attracts the leading specialists in our fields. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees who operate from offices located throughout Africa, Asia, Australasia, Europe, North America, and South America.

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Ltd.
6925 Century Avenue, Suite #100
Mississauga, Ontario, L5N 7K2
Canada
T: +1 (905) 567 4444

Golder Associates

APPENDIX K

Air Quality Assessment

May 2017

BACKGROUND AIR QUALITY REPORT

Erb Street Corridor, Fischer-Hallman Road to Wilmot Line, Waterloo, Ontario

Submitted to:
Walterfedy
675 Queen Street South
Suite 111
Kitchener, ON
N2M 1A1

REPORT

Report Number: 13-1186-0383

Distribution:

E-copy - Walterfedy
E-copy - Golder Associates Ltd.

Golder Associates

Table of Contents

1.0 INTRODUCTION **1**

2.0 METHODOLOGY **2**

3.0 BACKGROUND AIR QUALITY **3**

3.1 Contaminants 3

3.2 Applicable Guidelines 3

3.3 Monitoring Data 4

3.3.1 Particulate Matter (SPM, PM_{10} and $PM_{2.5}$) 5

3.3.2 NO_X and NO_2 Concentrations 6

3.4 Industrial Emission Sources 8

4.0 PROJECT IMPACTS **9**

5.0 CONCLUSIONS **10**

6.0 REFERENCES **11**

TABLES

Table 1: Ontario and Canadian Regulatory Air Quality Objectives and Criteria 4

Table 2: Kitchener Ambient Monitoring Parameters 4

Table 3: Air Quality Monitoring from Kitchener Station (61502) 5

Table 4: Emission Totals for Industry in Waterloo, Ontario 8

FIGURES

Figure 1: Monitored Fine Particulate Matter ($PM_{2.5}$) from Kitchener Station 6

Figure 2: Monitored Nitrogen Dioxide (NO_2) from Kitchener Station 7

1.0 INTRODUCTION

Walterfedy retained Golder Associates Ltd. (Golder) to conduct a qualitative air quality assessment for the proposed Erb Street Widening & Corridor Study, Fischer-Hallman Road to Wilmot Line in the Region of Waterloo (the Project). This assessment was conducted to support the Class Environmental Assessment (EA), schedule C, for the Project. As the project is classified as Class C, only a qualitative assessment of air quality is required.

The primary goal of the air quality assessment is to provide a qualitative assessment of the air quality impacts resulting from the anticipated widening of Erb Street from Fischer-Hallman Road to Wilmot Line from three lanes to four lanes. Existing air quality data will be compared to relevant federal and provincial standards and guidelines. Using the available background air quality data, a qualitative assessment was prepared to discuss the following:

- existing background air quality in the vicinity of the Erb Street;
- the contribution of emissions from the existing road to background air quality;
- the potential impacts of the proposed road widening on local air quality; and
- the effects of any potential impacts that arise as a result of the proposed road widening.

2.0 METHODOLOGY

Based on Golder's experience with air quality impacts associated with transportation corridors, the primary contaminants of concern from an air quality perspective include particulate matter (including PM_{10} and $PM_{2.5}$), and nitrogen oxides (NO_X). In addition, changes in greenhouse gases emissions must be addressed. The methodology outlined in Ministry of Transportation Guidance Document *"Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions for Provincial Transportation Projects, June 2012",* was followed, where applicable.

The air quality assessment includes two main tasks, namely characterizing the existing conditions and assessing the net effects of the project on air quality. This assessment will be limited to the operational phase of the roadway (i.e. routine traffic) and will not address air quality impacts related to the construction activities to complete the expansion work. It is assumed that emissions from construction operations will be managed through best management practices for construction operations and monitoring and mitigation requirements will be considered as part of the special provisions that are typically written to the construction tender documents.

3.0 BACKGROUND AIR QUALITY

3.1 Contaminants

The assessment of background air quality is focused on criteria air contaminants (CACs), compounds that are expected to be emitted from the Project, for which relevant air quality criteria exist, and which are generally accepted as indicative of changing air quality. These compounds result from fuel combustion, brake wear, tire wear and fugitive dust released from roadways due to the movement of vehicles. The indicator compounds include:

- particulate matter, including suspended particulate matter (SPM), particles nominally smaller than 10 micrometres (µm) in diameter (PM_{10}), and particles nominally smaller than 2.5 µm in diameter ($PM_{2.5}$); and
- nitrogen dioxides (NOx) (expressed as nitrogen dioxide [NO_2]).

Although CACs typically include sulphur dioxide, carbon monoxide, ammonia and volatile organic compounds (VOCs), these emissions are considered as insignificant for transportation projects, therefore were not included in the assessment (MTO, 2012).

3.2 Applicable Guidelines

The air quality criteria used for assessing the air quality effects of the Project include the Ontario criteria, and federal standards and objectives where provincial guidelines are not available. The Ministry of the Environment and Climate Change (MOECC) has issued guidelines related to ambient air concentrations, which are summarized in *Ontario's Ambient Air Quality Criteria* (MOECC, 2012). There are two sets of federal objectives and criteria: the Canadian Ambient Air Quality Standards (CAAQSs) (formerly National Ambient Air Quality Standards (NAAQS)), and the National Ambient Air Quality Objectives (NAAQOs).

The NAAQOs are benchmarks that can be used to facilitate air quality management on a regional scale, and provide goals for outdoor air quality that protect public health, the environment, or aesthetic properties of the environment (CCME, 1999b). The federal government has established the following levels of NAAQOs (Health Canada, 1994):

- the maximum Desirable level defines the long-term goal for air quality and provides a basis for an anti-degradation policy for unpolluted parts of the country and for the continuing development of control technology; and
- the maximum Acceptable level is intended to provide adequate protection against adverse effects on soil, water, vegetation, materials, animals, visibility, personal comfort, and well-being.

The CAAQSs have been developed under the Canadian Environmental Protection Act, and include standards for $PM_{2.5}$ and ozone that must be achieved by 2020. There are two phase in dates, 2015 and 2020 (Government of Canada, 2013).

A summary of the applicable Ontario and federal objectives and criteria are listed in Table 1.

Table 1: Ontario and Canadian Regulatory Air Quality Objectives and Criteria

Substance	Averaging Period	Ontario Ambient Air Quality Guidelines[a]	Canadian Ambient Air Quality Standards[b]	National Ambient Air Quality Standards and Objectives[c]	
				Desirable	Acceptable
SPM[d] (µg/m^3)	24-Hour	120	—	—	120
	Annual	60[e]	—	60	70
PM_{10} (µg/m^3)	24-Hour	50[f]	—	—	—
$PM_{2.5}$ (µg/m^3)	24-Hour	30[g]	28/27	—	—
	Annual	—	10/8.8	—	—
NO_2 (µg/m^3)	1-Hour	400	—	—	400
	24-Hour	200	—	—	200
	Annual	—	—	60	100

(a) MOECC, 2012.
(b) CAAQS published in the Canada Gazette Volume 147, No. 21 - May 25, 2013. The standards will be phased in in 2015 and 2020, with both numbers shown in the table. The larger (first) value represents the CAAQS for 2015.
(c) CCME, 1999
(d) SPM in Ontario is defined as Suspended Particulate Matter (<44 µm diameter).
(e) Geometric Mean Value.
(f) Interim Ambient Air Quality Criteria (AAQC).
(g) Compliance is based on the 98th percentile of the annual monitored data averaged over three years of measurements.
— = No guideline available.

3.3 Monitoring Data

In Ontario, regional air quality is monitored through a network of air quality monitoring stations operated by the MOECC and Environment Canada National Air Pollution Surveillance Network (NAPS). Existing air quality was characterized using background air concentrations from monitoring data sources in the Project area. The station identified as being most relevant to the Project is located in Kitchener. This air monitoring data represent the combined effect of emissions from sources near each of the monitoring station, as well as the effect of emissions transported into the region. Details of this station are provided in Table 2.

Table 2: Kitchener Ambient Monitoring Parameters

Station Name	NAPS Station ID	MOECC Station ID	Monitoring Period Available			Distance from Project
			NO	NO_2	$PM_{2.5}$	
Kitchener	61502	26060	2000-2012	2000-2012	2000-2012	4 kilometres

The 90th percentile of the available monitoring data is typically considered a conservative estimate of background air quality (CEA Agency and CNSC, 2009). The mean of the 90th percentile of the measured concentrations were used to represent background air quality for parameters with shorter averaging periods (i.e., 1-hour and 24-hour). The overall annual background values were based on the average of the available data. For all compounds, the background concentrations are below the relevant criteria (Table 3).

Table 3: Air Quality Monitoring from Kitchener Station (61502)

Criteria Air Contaminant	Averaging Period	Background Concentration [µg/m³]	Regulatory Criteria [µg/m³]	% of AAQC
SPM	24-Hour	72.00	120	60%
	Annual	29.13	60	49%
PM_{10}	24-Hour	36.00	50	72%
$PM_{2.5}$	24-Hour	18.00	27	67%
	Annual	7.28	8.8	83%
NO_X (reported as NO_2)	1-Hour	39.50	400	10%
	24-Hour	45.14	200	23%
	Annual	18.75	60	31%

Note: All values, with the exception of annual averages are based on 90th percentile.

3.3.1 Particulate Matter (SPM, PM_{10} and $PM_{2.5}$)

Particulate emissions occur due to anthoropogenic activities, such as agricultural, industrial and transportation sources, as well as natural sources. Particulate matter is classified based on its aerodynamic particle size, primarily due to the different health effects that can be associated with the particles of different diameters. Fine particulate matter ($PM_{2.5}$) is of primary concern related as they can penetrate deep into the respiratory system and cause health impacts (MOECC, 2014). In Ontario, these emissions have been demonstrating a steady decline since 2003 (MOECC, 2014).

For the Project area, there are no monitoring data available for SPM and PM_{10}. However, an estimate of the background SPM and PM_{10} concentrations can be determined from the available $PM_{2.5}$ monitoring data. Fine particulate matter (i.e., $PM_{2.5}$) is a subset of PM_{10}, and PM_{10} is a subset of SPM. Therefore, it is reasonable to assume that the ambient concentrations of SPM will be greater than corresponding PM_{10} levels, and PM_{10} concentrations will be greater than the corresponding levels of $PM_{2.5}$. The overall levels of $PM_{2.5}$ in Canada were found to be about 50% of the PM_{10} concentrations and about 25% of the SPM concentrations (Canadian Environmental Protection Act/FPAC, 1988). By applying this ratio it was possible to estimate the background SPM and PM_{10} concentrations for the region.

For 24-hour $PM_{2.5}$, measurements meet the pending CAAQS values of 27 µg/m³ (2020 phase in date). The annual average $PM_{2.5}$ values are below the pending CAAQS of 8.8 µg/m³ (2020 phase in date).

Larger particles (i.e., SPM) can result in nuisance effects, such as soiling or visibility and, therefore, must be taken into consideration as part of the study. All derived SPM and PM_{10} values are below the relevant Ontario ambient air quality criteria and NAAQOs.

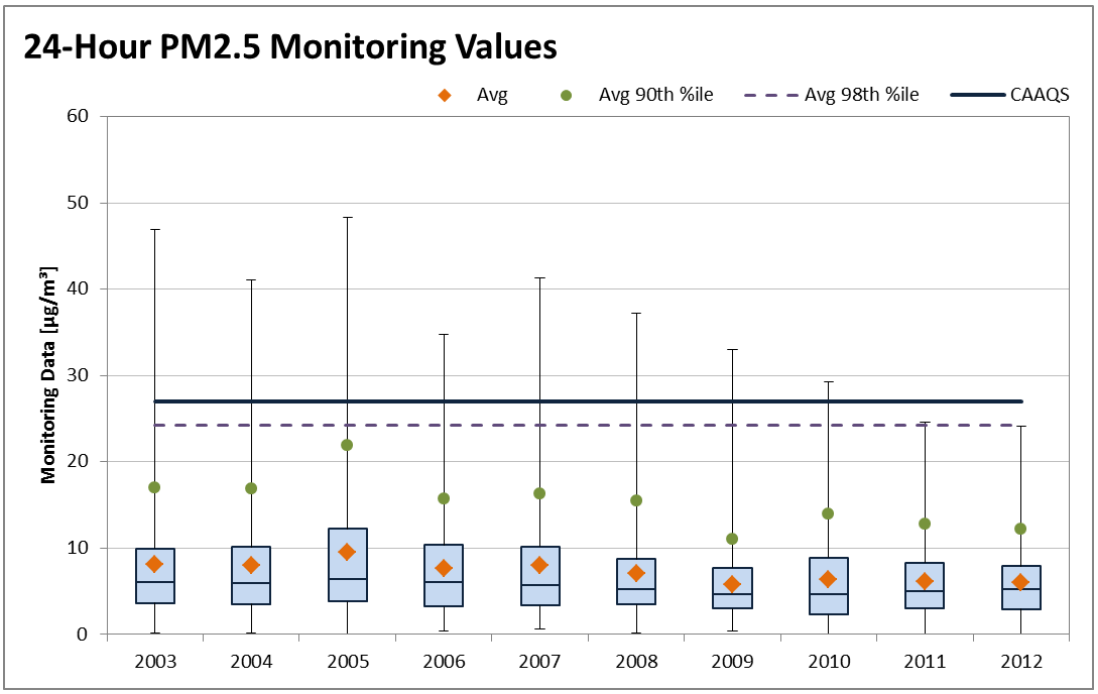
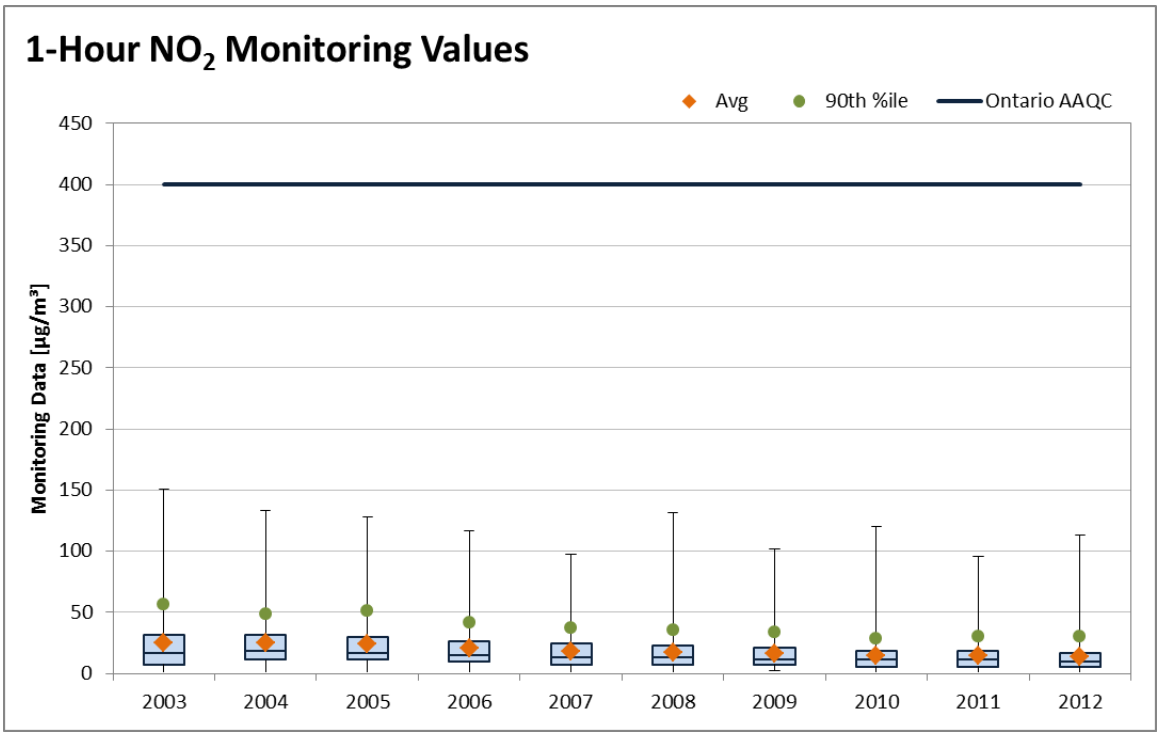


Figure 1: Monitored Fine Particulate Matter ($PM_{2.5}$) from Kitchener Station

3.3.2 NO_X and NO_2 Concentrations

NO_X is emitted in two primary forms: nitric oxide (NO) and NO_2. NO reacts with ozone in the atmosphere to create NO_2. The primary source of NO_X in the region is the combustion of fossil fuels. Emissions of NO_X result from the operation of stationary equipment such as incinerators, boilers, and generators, as well as the operation of mobile sources such as vehicles, haul trucks, and other equipment.

The presence of NO_2 in the atmosphere has known health effects (e.g., lung irritation) and environmental effects (e.g., acid precipitation, ground-level ozone formation) (MOECC, 2014). As a result, regulatory guideline levels are based on NO_2 emissions and concentrations. Emissions of NO_2 in Ontario have shown a steady decline from 2002 (MOECC, 2014). Between 2003 and 2012, no exceedances of the 1-hour or 24-hour Ambient Air Quality Criteria (AAQC) for NO_2 were recorded (Figure 2 and Figure 3).



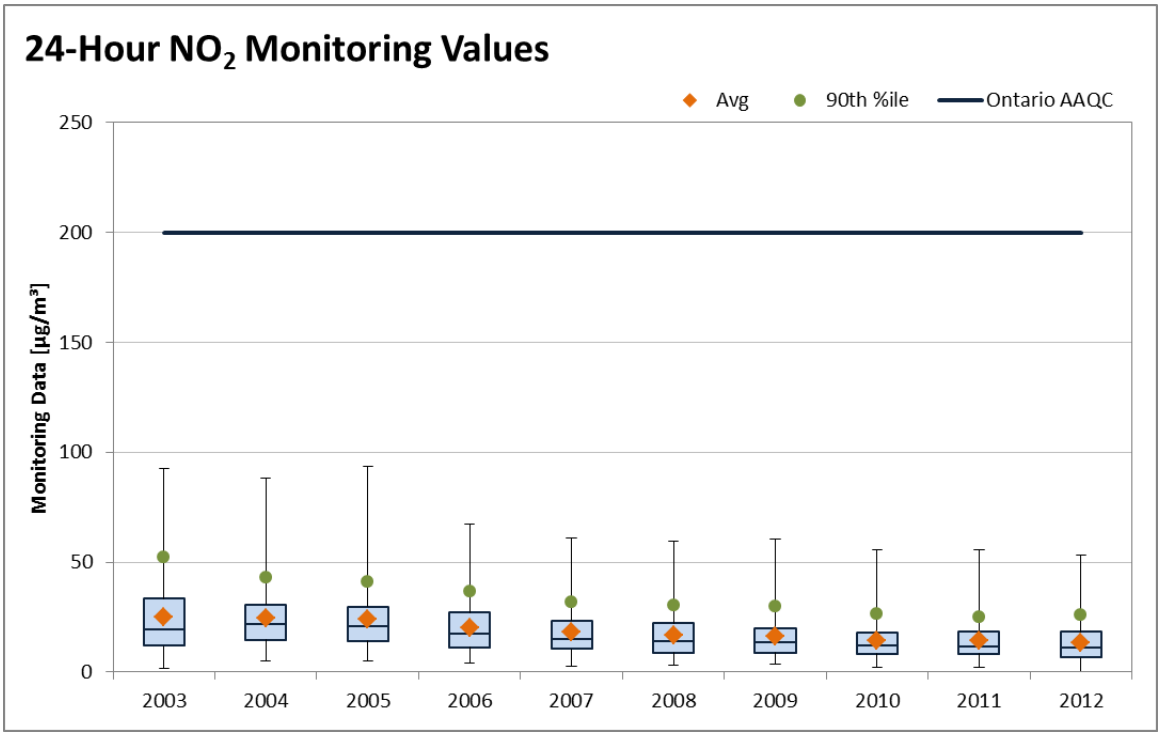


Figure 2: Monitored Nitrogen Dioxide (NO_2) from Kitchener Station

3.4 Industrial Emission Sources

Within the city of Waterloo, there are four industrial Facilities from various sectors that reported to the National Pollutant Release Inventory in 2012 for the indicator compounds (Environment Canada, 2013c). These emissions contribute to the local air quality and the consideration of cumulative effects. These sources are minor contributors of indicator compounds when compared to provincial totals (Table 4).

Table 4: Emission Totals for Industry in Waterloo, Ontario

Company Name	NO_X	PM	PM_{10}	$PM_{2.5}$
Toromont Energy Ltd.	63	—	<1	<1
Strudex LP	—	—	<1	—
Region of Waterloo, Waste Management Division	—	30	21	3
Pillers Fine Foods, A Div of PBOLP	—	—	1	1
Waterloo Total Emissions	**63**	**30**	**24**	**4**
Ontario Total Emissions	**72410**	**32275**	**18497**	**10008**
% of Waterloo Emissions to Ontario Total	**<1%**	**<1%**	**<1%**	**<1%**

Note: "—" indicates the substance was not reported for that facility

4.0 PROJECT IMPACTS

For the purposes of this assessment, emissions from vehicular traffic were the only emission sources considered. Based on the West Waterloo Commercial Centre Transport Impact Study Report (Stantec, 2014), the road expansion is necessary to alleviated projected traffic growth along the corridor due to the development of new residential and employment areas. It is anticipated that during peak periods traffic in the area will increase by approximately 10% across the Project area. The proposed road expansion will take this growth into account and the air quality impact of the increased traffic will be minimized by the improved traffic flows and reduced queuing times at intersections.

Studies by the US EPA have found that roadways generally influence air quality within a few hundred metres downwind from a heavily travelled road. The actual distance varies by location, time of day, year and prevailing meteorology, topography and traffic patterns (US EPA, 2014). Concentrations will dissipate rapidly from the road source, therefore it is expected that this Project will have a negligible impact on regional air quality.

5.0 CONCLUSIONS

Based on the existing monitoring data in the Project area, the levels of particulate matter and NO_X are shown to be below the current standards and guidelines. Roadways typically only have a very localised influence on air quality and predicted concentrations decline within a very short distance from the road edge. The project itself is therefore anticipated to be a relatively minor source when compared to other larger sources within the area, therefore the impact on overall air quality in the region is expected to be negligible.

6.0 REFERENCES

Canadian Council of Ministers of the Environment (CCME) (1999). *Canadian National Ambient Air Quality Objectives: Process and Status*. Available at ceqg-rcqe.ccme.ca/download/en/133/. Retrieved November 6, 2014.

CEPA/FPAC Working Group on Air Quality Objectives and Guidelines (1998). *National Ambient Air Quality Objectives for Particulate Matter. Part 1: Science Assessment Document*, ISBN 0-662-63486-1

Environment Canada 2013c. NPRI Online Data Search. Available at http://ec.gc.ca/inrp-npri/donnees-data/index.cfm?do=query&lang=en. Retrieved November 6, 2014.

Government of Canada (2013). Canada Gazette Vol 147, 21. Available at http://ec.gc.ca/lcpe-cepa/eng/orders/OrderDetail.cfm?intOrder=532. Retrieved November 6, 2014.

MOECC (2012). Ontario's Ambient Air Quality Criteria, PIBS #6570e01. Standards Development Branch, Ontario Ministry of the Environment.

MOECC (2014). *Air Quality Ontario - Report for 2012*. Available at http://www.airqualityontario.com/press/publications.php. Retrieved November 6, 2014.

MOECC (2014b). GHG Online Data Search http://www.ene.gov.on.ca/environment/en/resources/collection/data_downloads/index.htm#GHG. Retrieved November 6, 2014.

MTO (2012). *Ministry of Transportation Environmental Standards and Practices: Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects.*

Region of Waterloo (2010). *Regional Official Plant, as approved, with modification on Dec. 22, 2010.*

US EPA (2014). Near Roadway Air Pollution and Health, downloaded from (http://www.epa.gov/otaq/nearroadway.htm), accessed November 5, 2014.

Report Signature Page

GOLDER ASSOCIATES LTD.



Katherine Armstrong, M.Sc.
Air Quality Specialist



Sean Capstick, P.Eng.
Principal

KSA/FSC/ng

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.

\\golder.gds\gal\cambridge\active\2013 projects\1186 construction services\13-1186-0383 - walterfedy - erb st - waterloo\air quality\report\final\13-1186-0383-r-rev0 24may2017 walterfedy erb st background aq report.docx

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

Africa	+ 27 11 254 4800
Asia	+ 86 21 6258 5522
Australasia	+ 61 3 8862 3500
Europe	+ 44 1628 851851
North America	+ 1 800 275 3281
South America	+ 56 2 2616 2000

solutions@golder.com
www.golder.com

Golder Associates Ltd.
210 Sheldon Drive
Cambridge, Ontario N1T 1A8
Canada
T: +1 (519) 620 1222

Golder Associates

APPENDIX L

Evaluation Matrix

Region of Waterloo

Erb Street Reconsruction
Wilmot Line to Fischer-Hallman Road
Evaluation Matrix

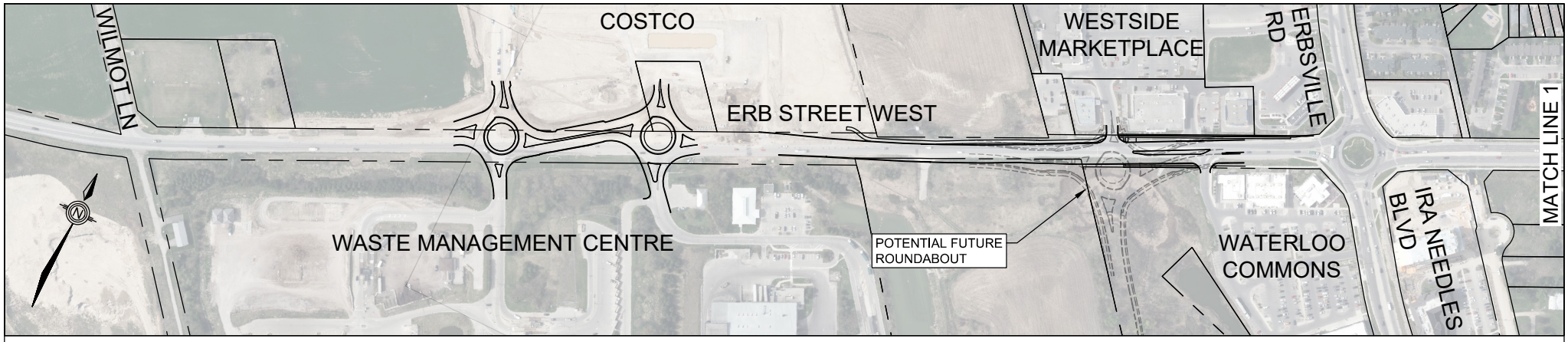
WALTERFEDY

	Evaluation Criteria	Do Nothing Baseline	Widen to 4 lanes west of Ira Needles, maintain existing lane configuration elsewhere, urbanize, and add active transportation facilities Alternative 1	Widen to four travel lanes, urbanize, and add active transportation facilities Alternative 2A	Widen to four travel lanes, urbanize, and add active transportation facilities, including multi-use trail Alternative 2B	Widen to four travel lanes, urbanize, and add active transportation facilities, including segregated bike lanes Alternative 2C
Technical	Traffic Performance	Sufficient capacity east of Ira Needles. Lacking capacity for future development west of Ira Needles.	Sufficient capacity for existing and future projected traffic.	Exceeds capacity required for existing and future projected traffic.	Exceeds capacity required for existing and future projected traffic.	Exceeds capacity required for existing and future projected traffic.
	Road network continuity	No continuity between existing & future 4-lane sections of Erb.	The 3-lane section of Erb Street requires merging of traffic between sections of 4-lane roadway.	Maintains 4 lanes throughout	Maintains 4 lanes throughout	Maintains 4 lanes throughout
	Transit Service Impacts	Erb Street remains servicable	Erb Street remains servicable	Added lane minimizes traffic impacts at bus stops.	Added lane minimizes traffic impacts at bus stops.	Added lane minimizes traffic impacts at bus stops.
	Cycling/Walking Impacts	Lack of continuity for cycling and pedestrian facilities.	Provides continuity for cycling and walking infrastructure, but no separation for cyclists	Provides continuity for cycling and walking infrastructure, but no separation for cyclists	Provides continuity for cycling and walking infrastructure	Provides continuity for cycling and walking infrastructure
	Summary					
Natural Environment	Natural Area Impact	No change to impacts	Minimal impacts to natural environment	Minimal impacts to natural environment	Minimal impacts to natural environment	Minimal impacts to natural environment
	Air Quality Impact	No change to impacts	Minimal impacts to air quality	Minimal impacts to air quality	Minimal impacts to air quality	Minimal impacts to air quality
	Stormwater Impact	No change to impacts	Improvements to be made to stormwater collection	Improvements to be made to stormwater collection	Improvements to be made to stormwater collection	Improvements to be made to stormwater collection
	Summary					
Social/ Cultural	Heritage/Cultural Landscape Impacts	No anticipated impacts	No anticipated impacts	No anticipated impacts	No anticipated impacts	No anticipated impacts
	Noise Impacts	No change in noise levels	No change in noise levels	No change in noise levels	No change in noise levels	No change in noise levels
	Summary					
Economic/Financial	Capital Cost	Minimal capital cost	Lowest capital cost	Some additional capital cost	Some additional capital cost	Some additional capital cost
	Operating & Maintenance Cost	Ongoing maintenance required	Maintenance improvements	Maintenance improvements	Maintenance improvements	Maintenance improvements
	Property Acquisition	None required	Some widening at Hydro One lands	Some widening at Hydro One lands, other minor widenings required	Some widening at Hydro One lands, other minor widenings required	Some widening at Hydro One lands, other minor widenings required
	Summary					
Overall Evaluation						

Legend: Most Preferred → → → → Least Preferred

APPENDIX M

Recommended Design Alternative 2C (Modified)



- EXISTING 2 LANES (RURAL)
- EXISTING ON-ROAD CYCLING LANES

- EXISTING 4 LANES
- EXISTING ON-ROAD CYCLING LANES
- EXISTING MULTI-USE TRAIL (NORTH SIDE)

- PROPOSED WIDENING FROM EXISTING 2 LANES TO 4 LANES
- ON-ROAD CYCLING LANES
- PROPOSED MULTI-USE TRAIL (NORTH SIDE)

- EXISTING 4 LANES
- EXISTING ON-ROAD CYCLING LANES
- EXISTING SIDEWALKS



- EXISTING 4 LANES
- EXISTING ON-ROAD CYCLING LANES
- EXISTING SIDEWALKS
- RESURFACE OR RECONSTRUCT EXISTING ROAD & SIDEWALKS AS REQUIRED

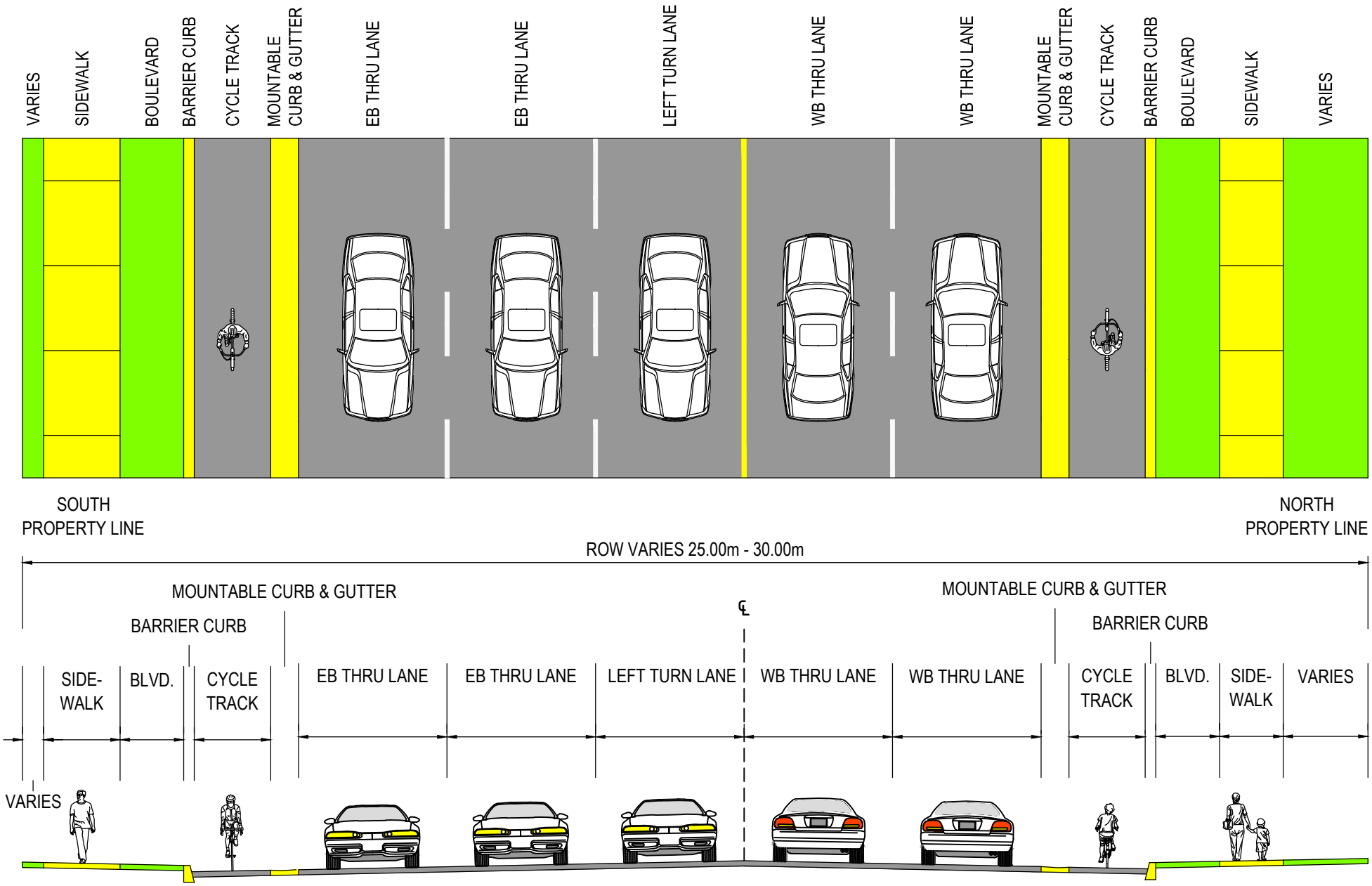
- PROPOSED WIDENING FROM EXISTING THREE LANES TO FOUR LANES
- PROPOSED CYCLE TRACKS
- EXISTING SIDEWALK (NORTH SIDE)
- PROPOSED SIDEWALK (SOUTH SIDE)
- REMOVE RIGHT-TURN ENTRANCE LANE NORTH SIDE AT KITCHENER-WATERLOO BILINGUAL SCHOOL

- RECONSTRUCT EXISTING 4 LANES & SIDEWALKS AS REQUIRED & ADD PROPOSED LEFT TURN LANE (FIFTH LANE)
- PROPOSED CYCLE TRACKS

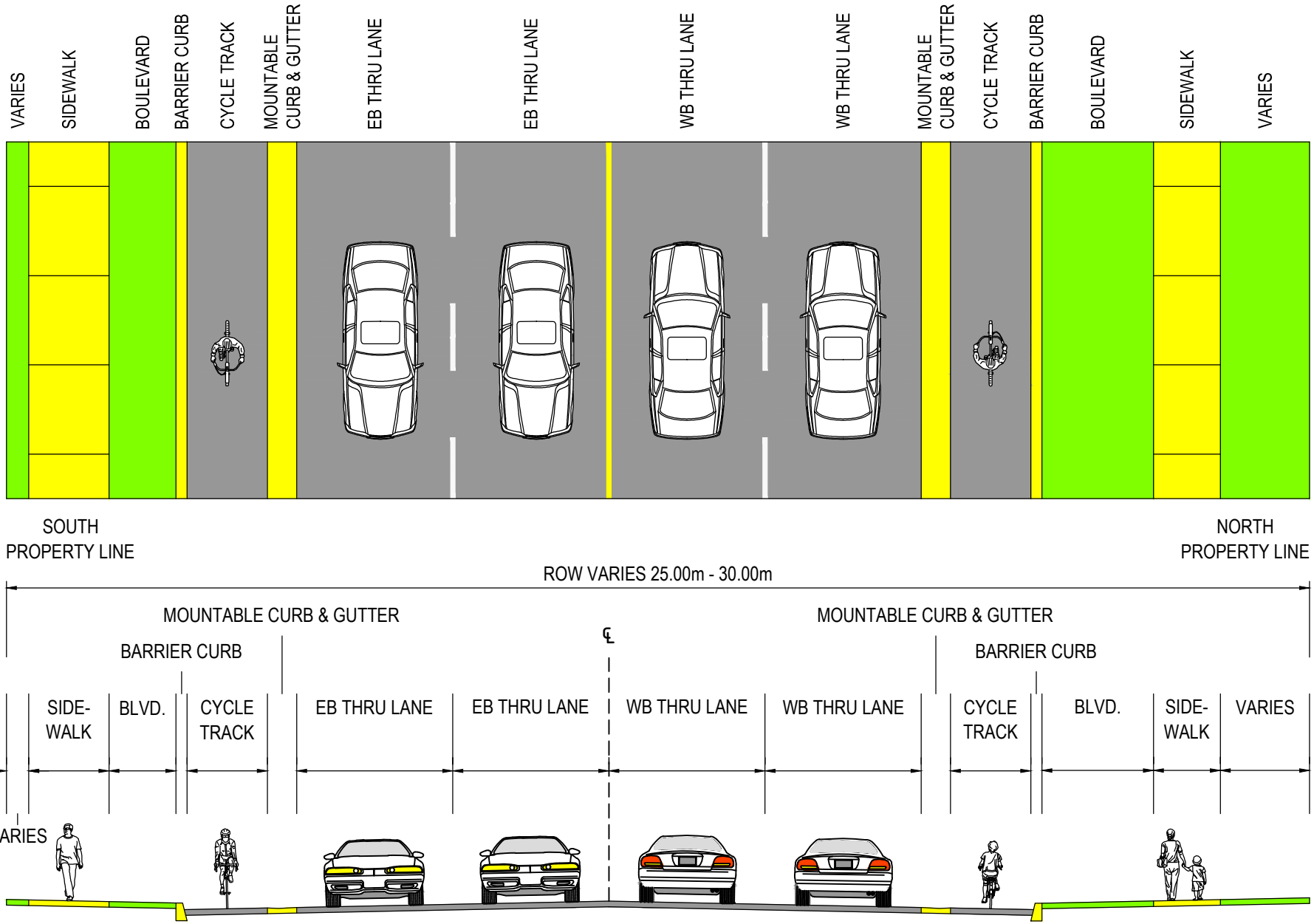
RECOMMENDED DESIGN ALTERNATIVE 2C (MODIFIED) - PLAN VIEW

APPENDIX N

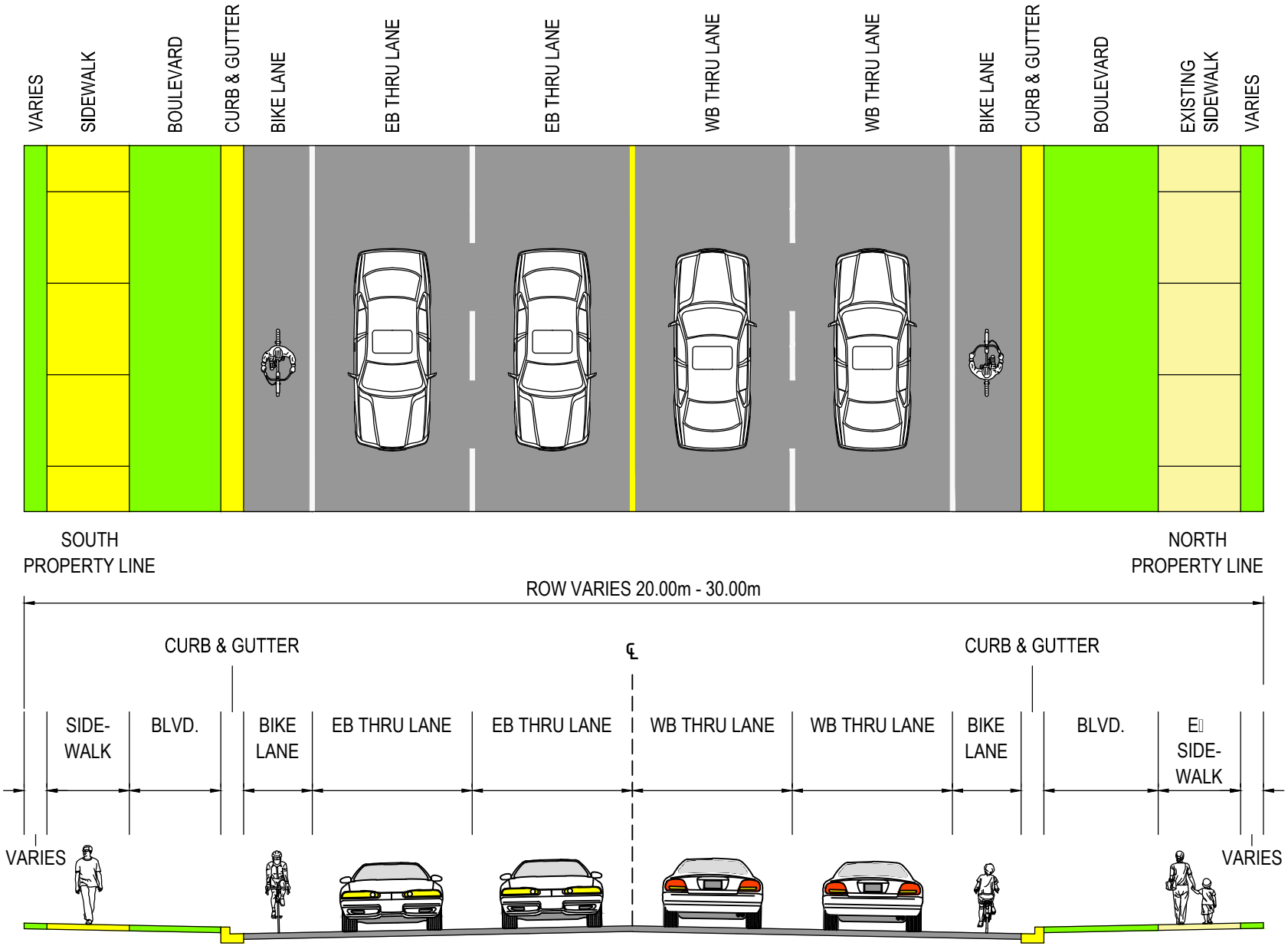
Typical Cross-Sections and Preliminary Plans of Recommended Design Alternative 2C (Modified)



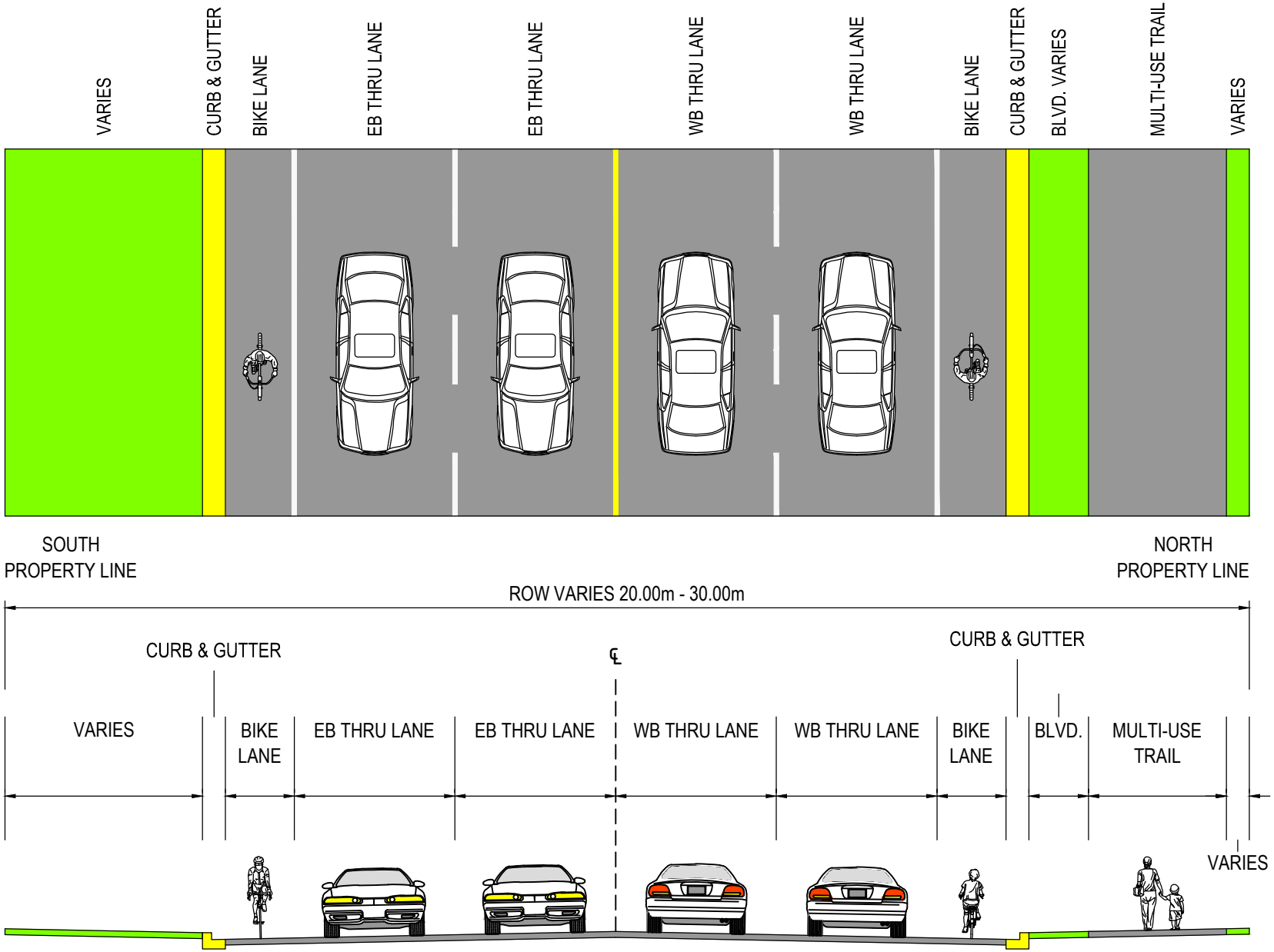
FISCHER-HALLMAN ROAD TO BEECHWOOD DRIVE/GATEVIEW DRIVE
TYPICAL SECTION



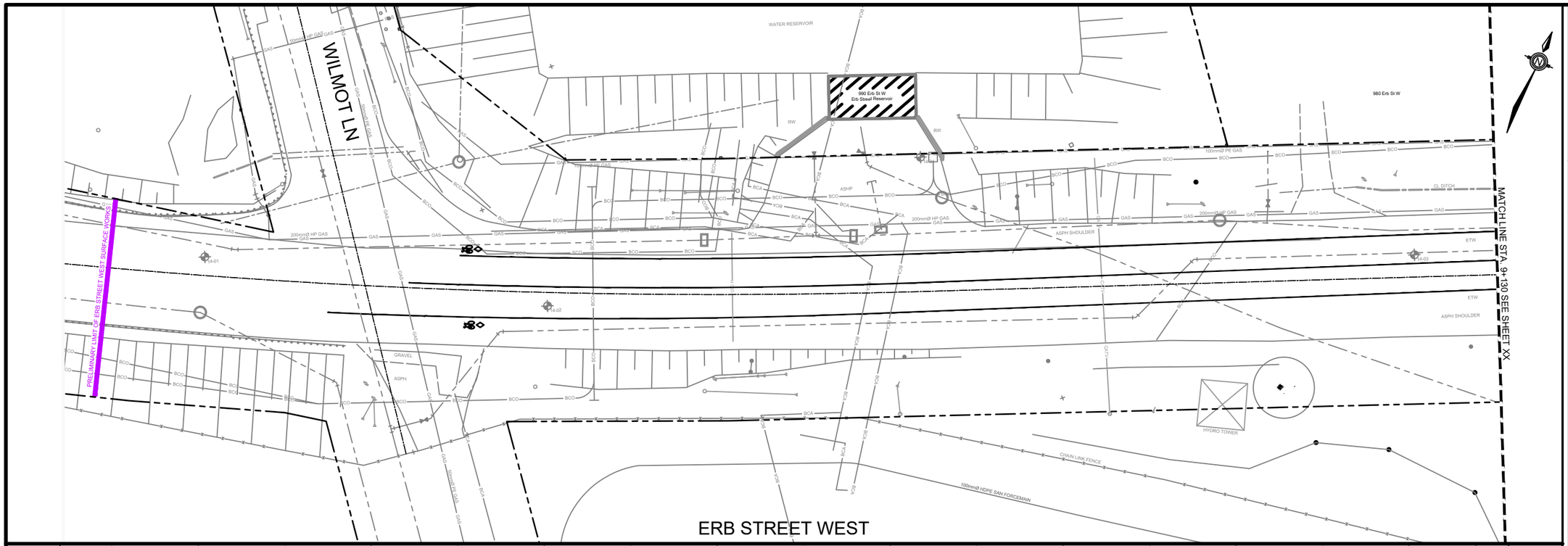
BEECHWOOD DRIVE/GATEVIEW DRIVE TO ERBSVILLE COURT
TYPICAL SECTION



ERBSVILLE COURT TO TRAFFIC SIGNALS AT WESTSIDE MARKETPLACE ENTRANCE TYPICAL SECTION



TRAFFIC SIGNALS AT WESTSIDE MARKETPLACE ENTRANCE TO ROUNDABOUT AT GATE 1 REGION WASTE MANAGEMENT CENTRE / WEST WATERLOO COMMERCIAL CENTRE (COSTCO) ENTRANCE TYPICAL SECTION



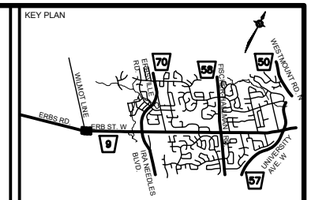
405 404 403 402 401 400 399 398 397 396 395

EXISTING \ ELEVATION

PROPOSED \ ELEVATION

STATION

KEY PLAN



DISCLAIMER:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

WALTERFEDY

Region of Waterloo

CONTROLLING B.M.
WA-43 670087
ELEV. 402.030m
SEE DESCRIPTION ON INDEX PAGE

FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE

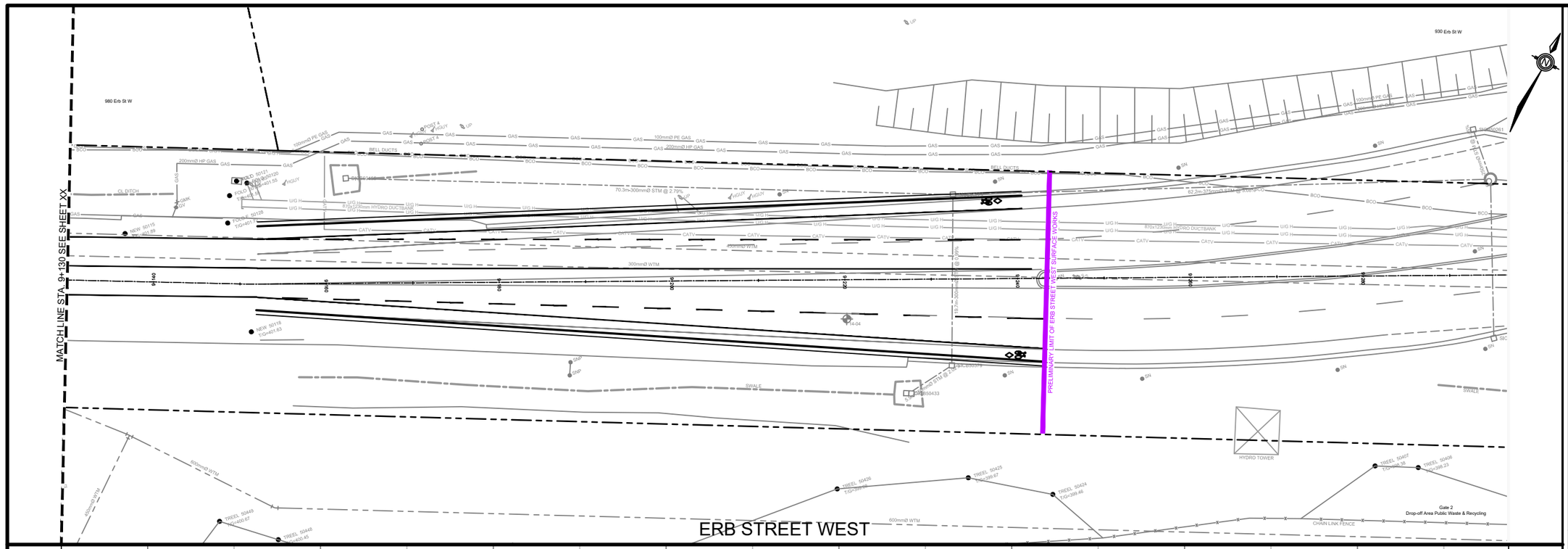
ERB STREET WIDENING & CORRIDOR STUDY FISCHER-HALLMAN ROAD TO WILMOT LINE

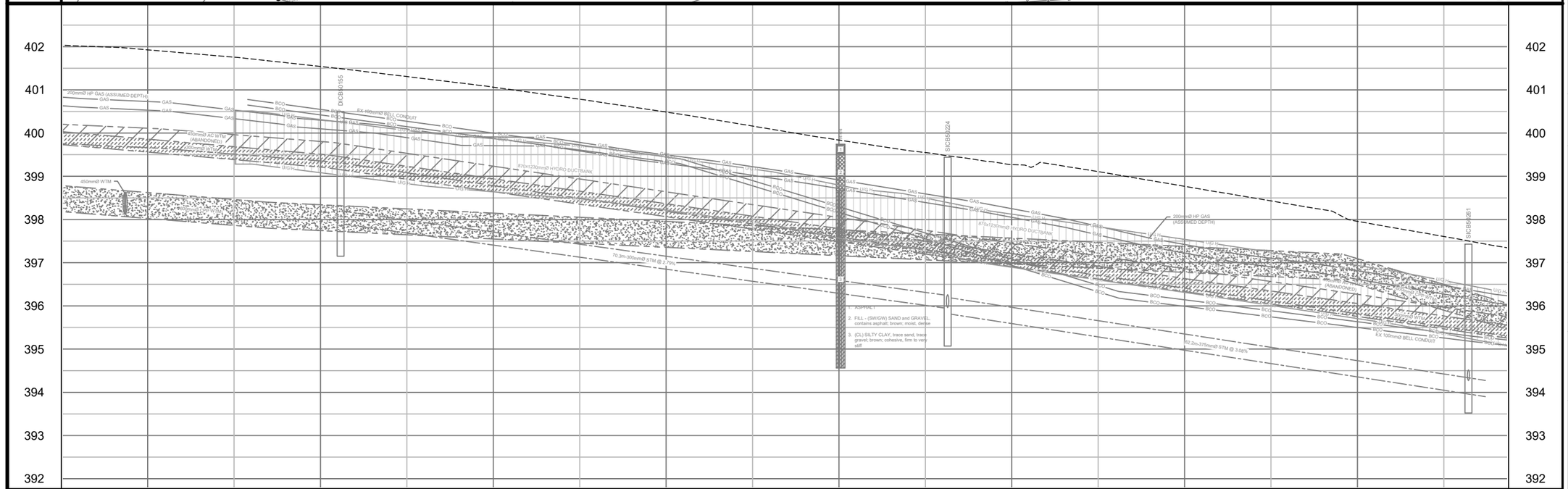
ERB STREET WEST RECONSTRUCTION STA. 8+965 TO STA. 9+130

DRAWN BY: MJV	CONTRACT No. 201X-XXX
CHECKED BY:	FILE No.
DATE: FEB/2017	DRAWING No.
SCALE HOR. 1:250 VERT. 1:50	SHEET 1 OF 14

CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PLOT FILES\2014-0114-05 PNP ERB.DWG

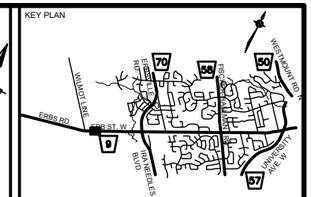
ROW-2017





STATION	9+140	9+150	9+160	9+170	9+180	9+190	9+200	9+210	9+220	9+230	9+240	9+250	9+260	9+270	9+280	9+290
PROPOSED ELEVATION																
EXISTING ELEVATION	401.93	401.76	401.54	401.31	401.06	400.78	400.49	400.16	399.84	399.55	399.27	399.11	398.77	398.43	397.96	397.61

KEY PLAN



DISCLAIMER:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

WALTERFEDY

Region of Waterloo

CONTROLLING B.M.
WA-43 670087
ELEV. 402.030m
SEE DESCRIPTION ON INDEX PAGE

FIELD BOOK No.

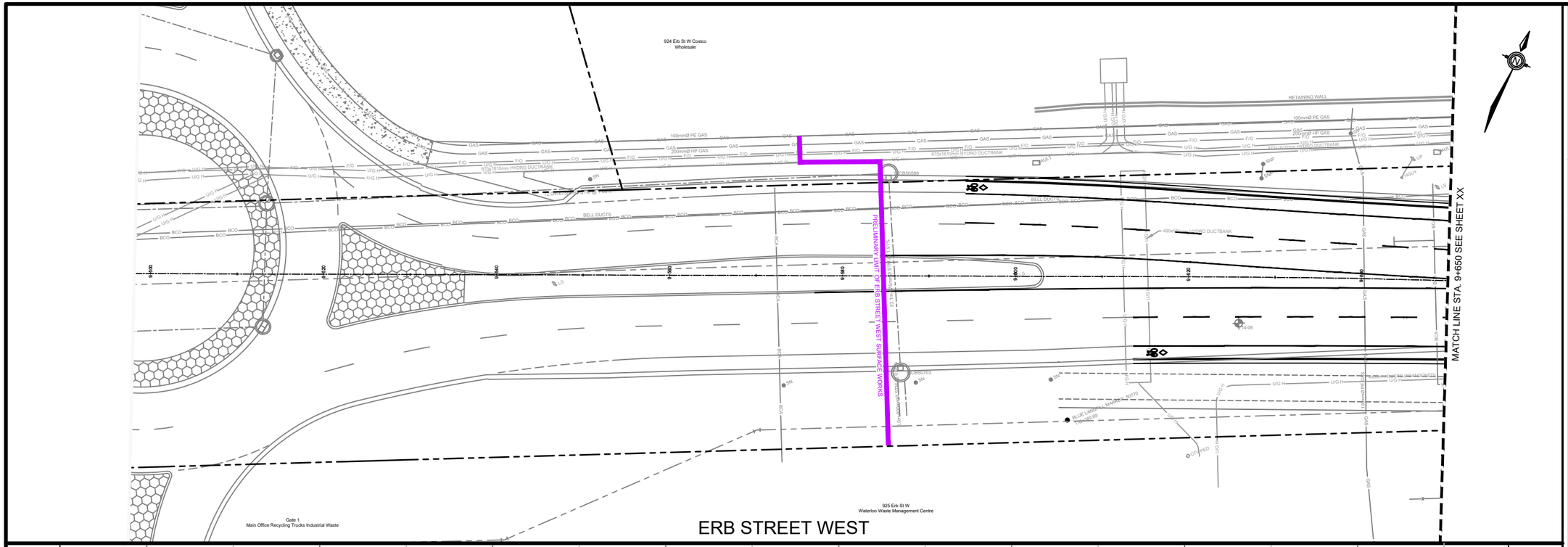
No.	ISSUE/REVISION	BY	DATE

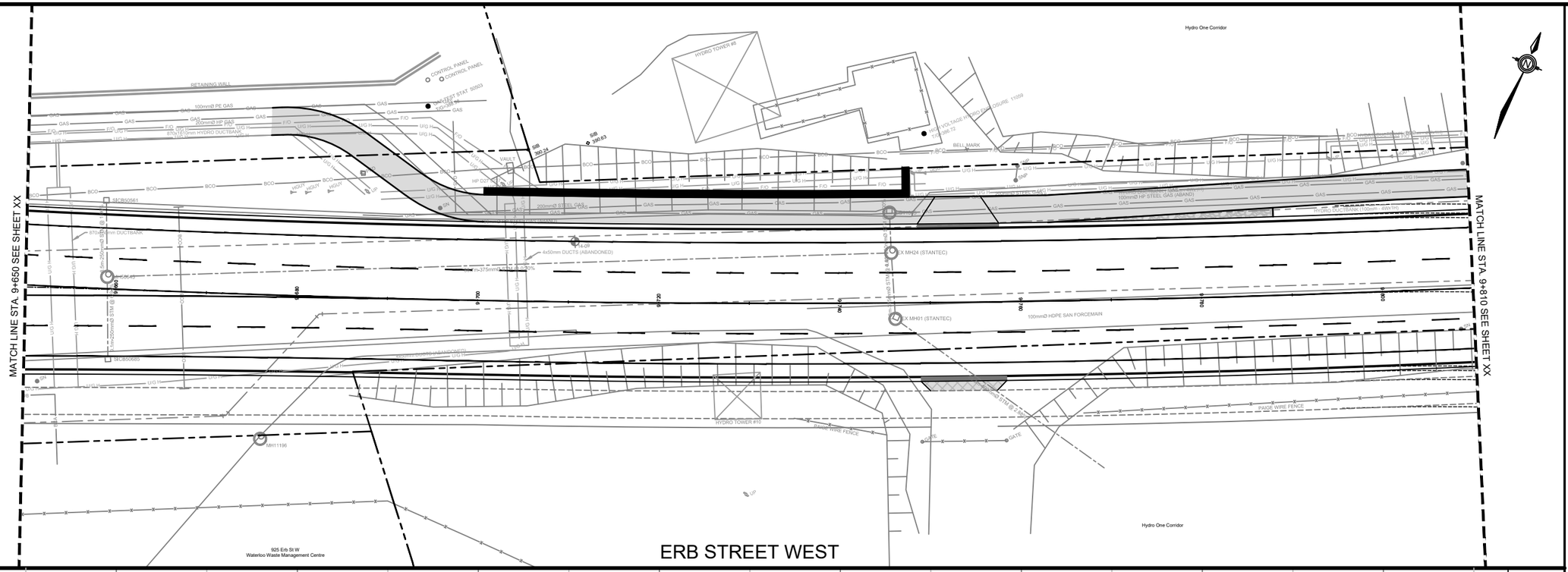
ERB STREET
WIDENING & CORRIDOR STUDY
FISCHER-HALLMAN ROAD TO
WILMOT LINE

ERB STREET WEST
RECONSTRUCTION
STA. 9+130 TO STA. 9+295

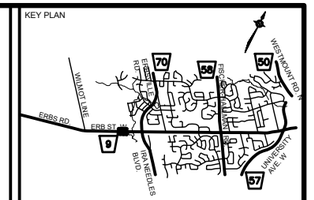
DRAWN BY: MJV	CONTRACT No. 201X-XXX
CHECKED BY:	FILE No.
DATE: FEB/2017	DRAWING No.
SCALE HOR. 1:250 VERT. 1:50	SHEET 2 OF 14
CADD FILE: P:\2014\01140\05\06-DWGS\CIVIL\PLOT FILES\2014-0114-05 PNP ERB.DWG	

MOW-2017


924 Erb St W Costco Wholesale
925 Erb St W Waterloo Waste Management Centre
Gate 1 Main Office Recycling Trucks Industrial Waste
PRELIMINARY LIMIT OF ERB STREET WEST SURFACE WORKS
MATCH LINE STA. 9+650 SEE SHEET XX
ERB STREET WEST
100mmØ PE GAS
200mmØ HP GAS
870x1610mm HYDRO DUCTBANK
BELL DUCTS
RETAINING WALL
CBS0589
CBS0506
MH-08
MH-09
MH-10
MH-11
MH-12
MH-13
MH-14
MH-15
MH-16
MH-17
MH-18
MH-19
MH-20
MH-21
MH-22
MH-23
MH-24
MH-25
MH-26
MH-27
MH-28
MH-29
MH-30
MH-31
MH-32
MH-33
MH-34
MH-35
MH-36
MH-37
MH-38
MH-39
MH-40
MH-41
MH-42
MH-43
MH-44
MH-45
MH-46
MH-47



KEY PLAN



DISCLAIMER:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

WALTERFEDY

Region of Waterloo

CONTROLLING B.M.
WA-43 670087
ELEV. 402.030m
SEE DESCRIPTION ON INDEX PAGE

FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE

ERB STREET WIDENING & CORRIDOR STUDY FISCHER-HALLMAN ROAD TO WILMOT LINE

ERB STREET WEST RECONSTRUCTION STA. 9+650 TO STA. 9+810

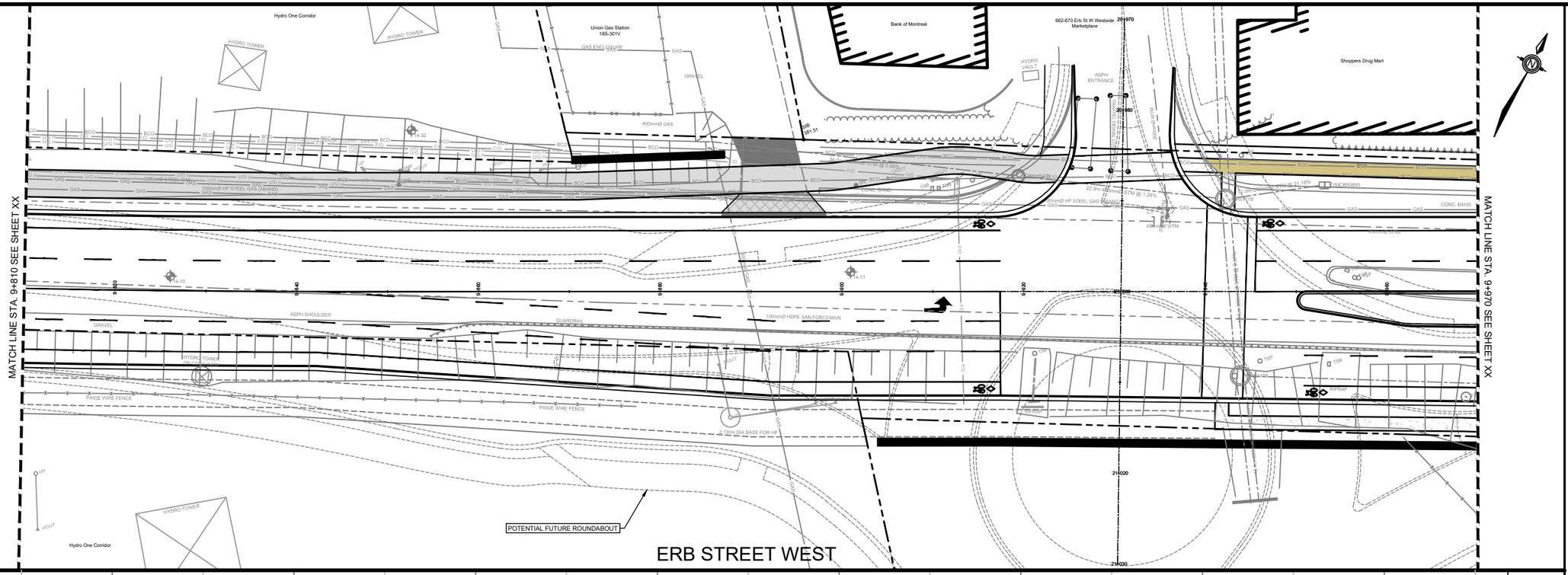
DRAWN BY: MJV	CONTRACT No. 201X-XXX
CHECKED BY:	FILE No.
DATE: FEB/2017	DRAWING No.
SCALE HOR. 1:250 VERT. 1:50	SHEET 4 OF 14

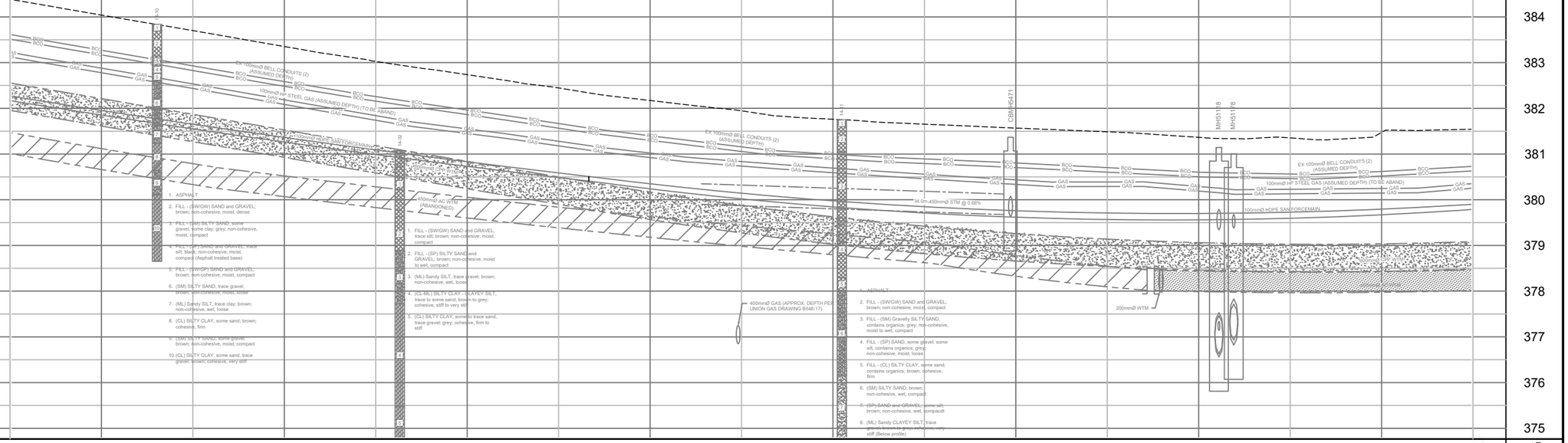
CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PLOT FILES\2014-0114-05 PNP ERB.DWG

STATION	PROPOSED ELEVATION	EXISTING ELEVATION
9+650		389.13
9+660		388.94
9+670		388.75
9+680		388.52
9+690		388.26
9+700		388.00
9+710		387.70
9+720		387.39
9+730		387.06
9+740		386.73
9+750		386.40
9+760		386.07
9+770		385.74
9+780		385.41
9+790		385.07
9+800		384.73
9+810		384.39

391 390 389 388 387 386 385 384 383 382 381

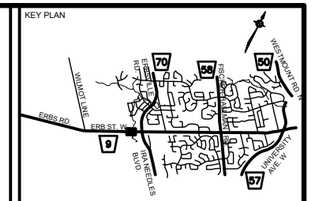
ROW-2017





STATION	9+810	9+820	9+830	9+840	9+850	9+860	9+870	9+880	9+890	9+900	9+910	9+920	9+930	9+940	9+950	9+960	9+970
PROPOSED ELEVATION																	
EXISTING ELEVATION	384.39	384.04	383.70	383.35	383.03	382.74	382.45	382.17	381.95	381.76	381.65	381.57	381.49	381.36	381.35	381.47	381.54

KEY PLAN



DISCLAIMER:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

WALTERFEDY

Region of Waterloo

CONTROLLING B.M.
WA-43 670087
ELEV. 402.030m
SEE DESCRIPTION ON INDEX PAGE

FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE

ERB STREET
WIDENING & CORRIDOR STUDY
FISCHER-HALLMAN ROAD TO WILMOT LINE

ERB STREET WEST
RECONSTRUCTION
STA. 9+810 TO STA. 9+970

DRAWN BY: MJV	CONTRACT No. 201X-XXX
CHECKED BY:	FILE No.
DATE: FEB/2017	DRAWING No.
SCALE HOR. 1:250 VERT. 1:50	SHEET 5 OF 14
CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PLOT FILES\2014-0114-05 PNP ERB.DWG	

©ROW-2017

MATCH LINE STA. 9+990 SEE SHEET XX

MATCH LINE STA. 10+135 SEE SHEET XX

ERB STREET WEST

PRELIMINARY LIMIT OF ERB STREET WEST SURFACE WORKS

POTENTIAL FUTURE ROUNDABOUT

Shoppers Drug Mart

652-658 Erb St W

Royal Bank of Canada

Canadian Tire Gas+

656 Erb St W

Starbucks

651 Erb St W

The Beer Store

Waterloo Commons

The Pita Pit

Dentistry on Erb

Boston Pizza

21+970

21+980

22+020

22+030

ASPH ENTRANCE

35.0m-200mmØ SAN @ 0.00%

100mmØ HP STEEL GAS (ABAND)

100mmØ HDPE SAN FORCEMAIN

GUARDRAIL

STA-300mmØ STM @ 1.06%

450mmØ WTM

200mmØ WTM

100mmØ HDPE SAN FORCEMAIN (ABANDONED)

64.8m-300mmØ STM @ 2.10%

17.2m-200mmØ STM @ 0.00%

50mmØ PE GAS

SWK

BELL PED

HYDRO MH

MH/CB

SICB5934

SICB5943

SICB5542

MH5041

MH5924

CB51007

CB51067

MH51136

MH55079

MH51037

EX 100mmØ BELL CONDUITS (2) (ASSUMED DEPTH)

EX 100mmØ HP STEEL GAS (ASSUMED DEPTH) (TO BE ABAND)

EX 100mmØ BELL CONDUITS (2) (ASSUMED DEPTH)

100mmØ HDPE SAN FORCEMAIN

200mmØ WTM

100mmØ HDPE SAN FORCEMAIN (ABANDONED)

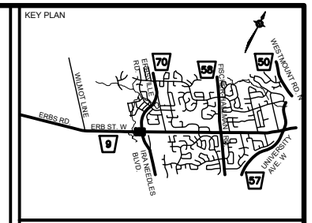
1. ASPHALT
2. FILL - (SW/GW) SAND and GRAVEL; brown, non-cohesive, moist, very dense to compact
3. FILL - (SM) SILTY SAND, some gravel, contains organics; brown; non-cohesive, moist, compact
4. FILL - (CL) SILTY CLAY, some sand; some to trace gravel, contains organics; brownish grey; cohesive, stiff to firm
5. (SP) SAND and GRAVEL, trace silt; brown; non-cohesive, wet, loose
6. (SM) SILTY SAND, trace clay, trace gravel; brown; non-cohesive, wet, loose
7. (ML) Sandy SILT, trace clay; brown; non-cohesive, compact

1. ASPHALT
2. FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, dense
3. FILL - (SW) SILTY SAND, trace clay, contains organics; brown; non-cohesive, moist, loose
4. FILL - (CL) SILTY CLAY, trace sand; trace gravel, contains organics; brown; cohesive, soft
5. (CL) SILTY CLAY, trace sand, trace gravel; brown to grey; cohesive, stiff to very stiff

386
385
384
383
382
381
380
379
378
377
376

STATION	9+990	9+990	10+000	10+010	10+020	10+030	10+040	10+050	10+060	10+070	10+080	10+090	10+100	10+110	10+120	10+130
PROPOSED ELEVATION																
EXISTING ELEVATION	381.61	381.71	381.84	381.98	382.14	382.21	382.42	382.66	382.91	383.16	383.39	383.62	383.85	384.11	384.56	384.79

KEY PLAN



DISCLAIMER:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

WALTERFEDY

Region of Waterloo

CONTROLLING B.M.
WA-43 670087
ELEV. 402.030m
SEE DESCRIPTION ON INDEX PAGE

FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE

ERB STREET WIDENING & CORRIDOR STUDY FISCHER-HALLMAN ROAD TO WILMOT LINE

ERB STREET WEST RECONSTRUCTION STA. 9+990 TO STA. 10+135

DRAWN BY: MJV

CONTRACT No. 201X-XXX

CHECKED BY:

FILE No.

DATE: FEB/2017

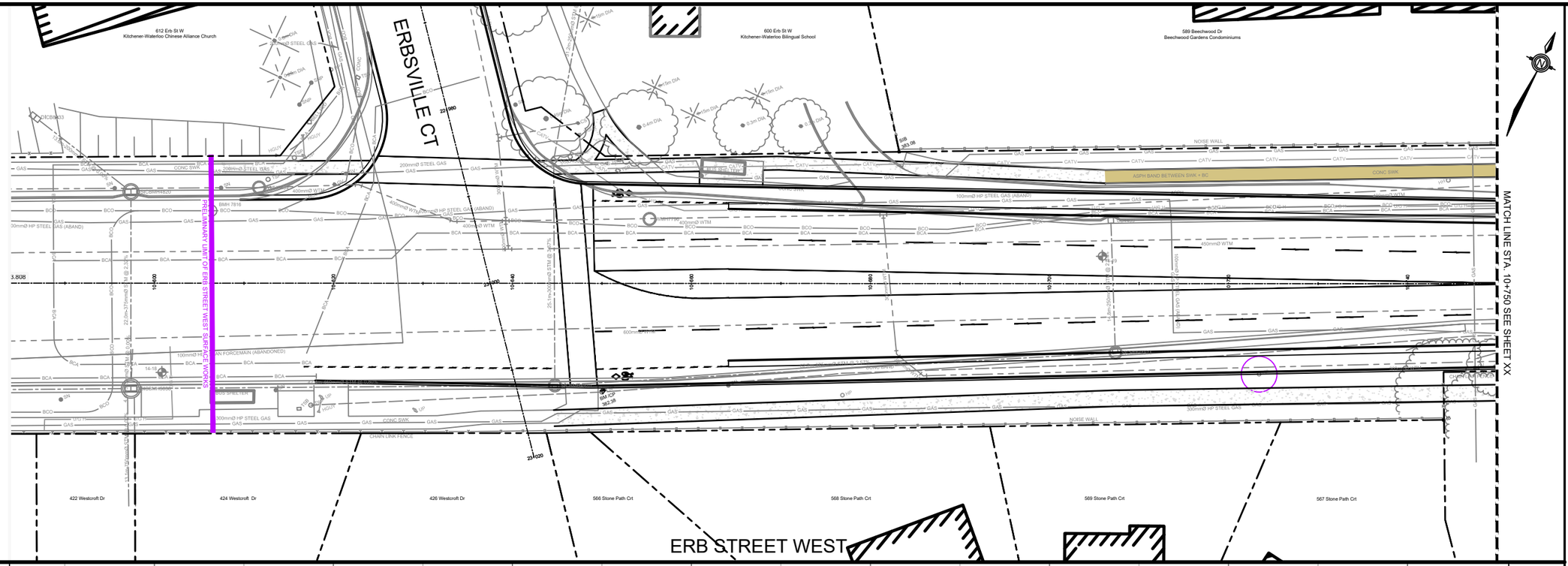
DRAWING No.

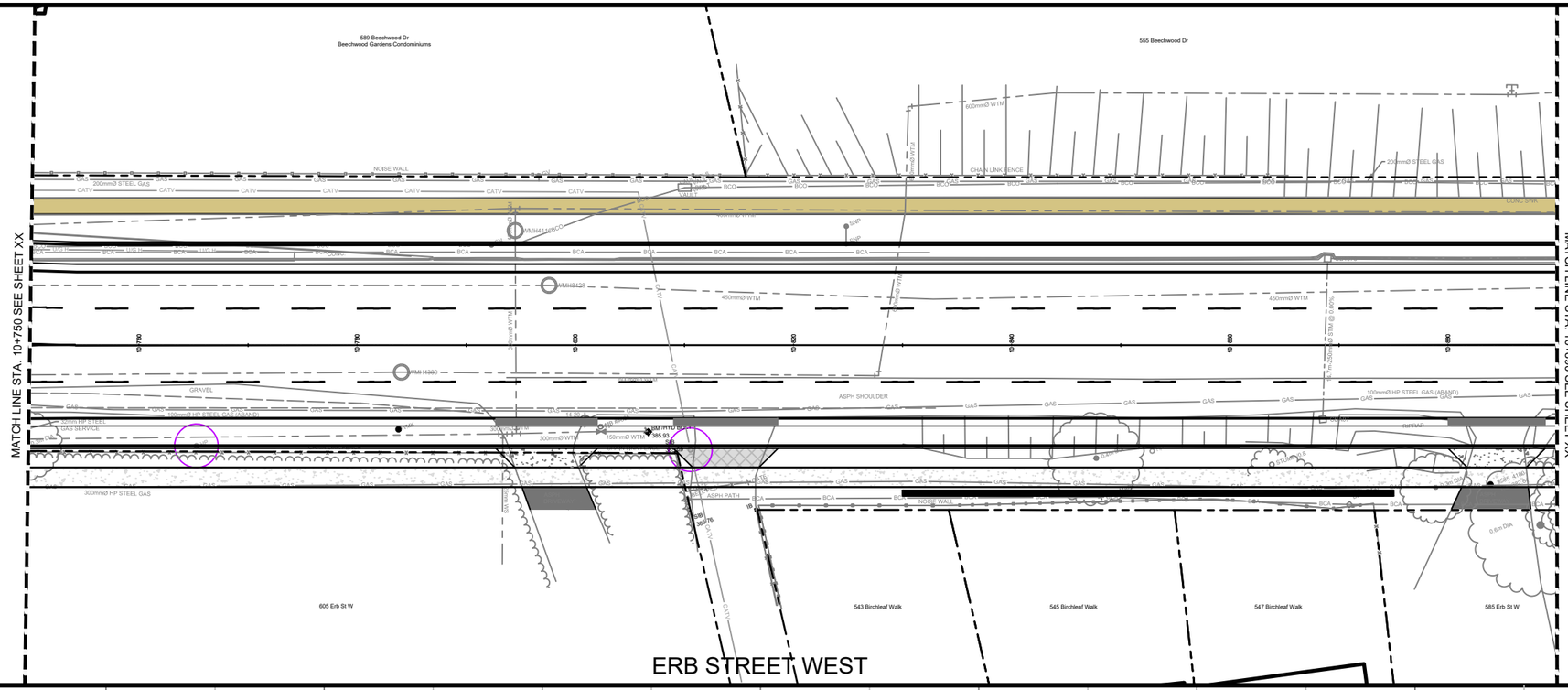
SCALE HOR. 1:250 VERT. 1:50

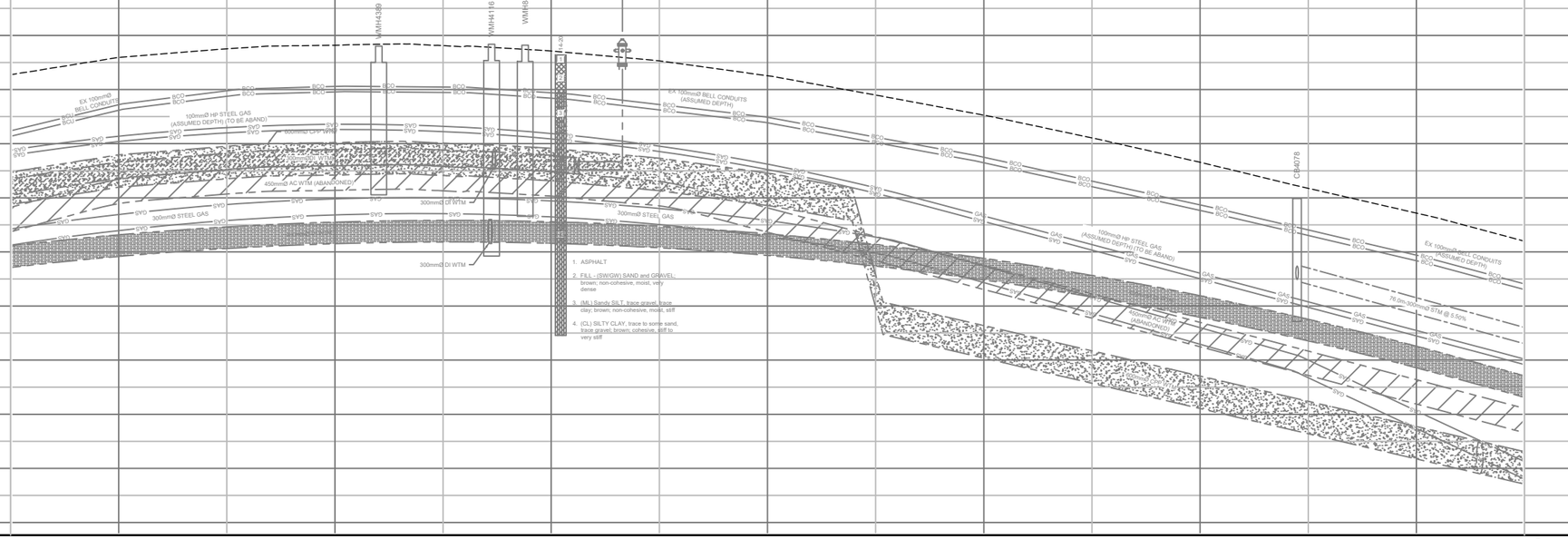
SHEET 6 OF 14

CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PLOT FILES\2014-0114-05 PNP ERB.DWG

ROW-2017

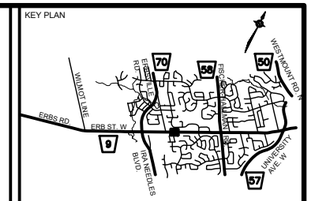

612 Erb St W
Kitchener-Waterloo Chinese Alliance Church
600 Erb St W
Kitchener-Waterloo Bilingual School
589 Beechwood Dr
Beechwood Gardens Condominiums
ERBSVILLE CT
ERB STREET WEST
MATCH LINE STA. 10+750 SEE SHEET XX
PRELIMINARY LIMIT OF ERB STREET WEST SURFACE WORKS
422 Westcroft Dr
424 Westcroft Dr
426 Westcroft Dr
566 Stone Path Crt
568 Stone Path Crt
569 Stone Path Crt
567 Stone Path Crt
CHAIN LINK FENCE
NOISE WALL
CONC SWK
ASPH BAND BETWEEN SWK + BC
100mmØ HP STEEL GAS (ABAND)
400mmØ WTM
600mmØ WTM
300mmØ HP STEEL GAS
SBMH 7816
SBMH 7795
SBMH 7796
SICBMH 5920
SICBMH 6036
SICBMH 6070
SICBMH 6971
VMH 8634
VMH 7915
SWM 7916
SWM 7917
SWM 7918
SWM 7919
SWM 7920
SWM 7921
SWM 7922
SWM 7923
SWM 7924
SWM 7925
SWM 7926
SWM 7927
SWM 7928
SWM 7929
SWM 7930
SWM 7931
SWM 7932
SWM 7933
SWM 7934
SWM





STATION	PROPOSED ELEVATION	EXISTING ELEVATION
10+750		385.27
10+760		385.59
10+770		385.75
10+780		385.82
10+790		385.81
10+800		385.71
10+810		385.53
10+820		385.26
10+830		384.90
10+840		384.53
10+850		384.11
10+860		383.66
10+870		383.18
10+880		382.72
10+890		382.20

KEY PLAN



DISCLAIMER:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

WALTERFEDY

Region of Waterloo

CONTROLLING B.M.
WA-43 670087
ELEV. 402.030m
SEE DESCRIPTION ON INDEX PAGE

FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE

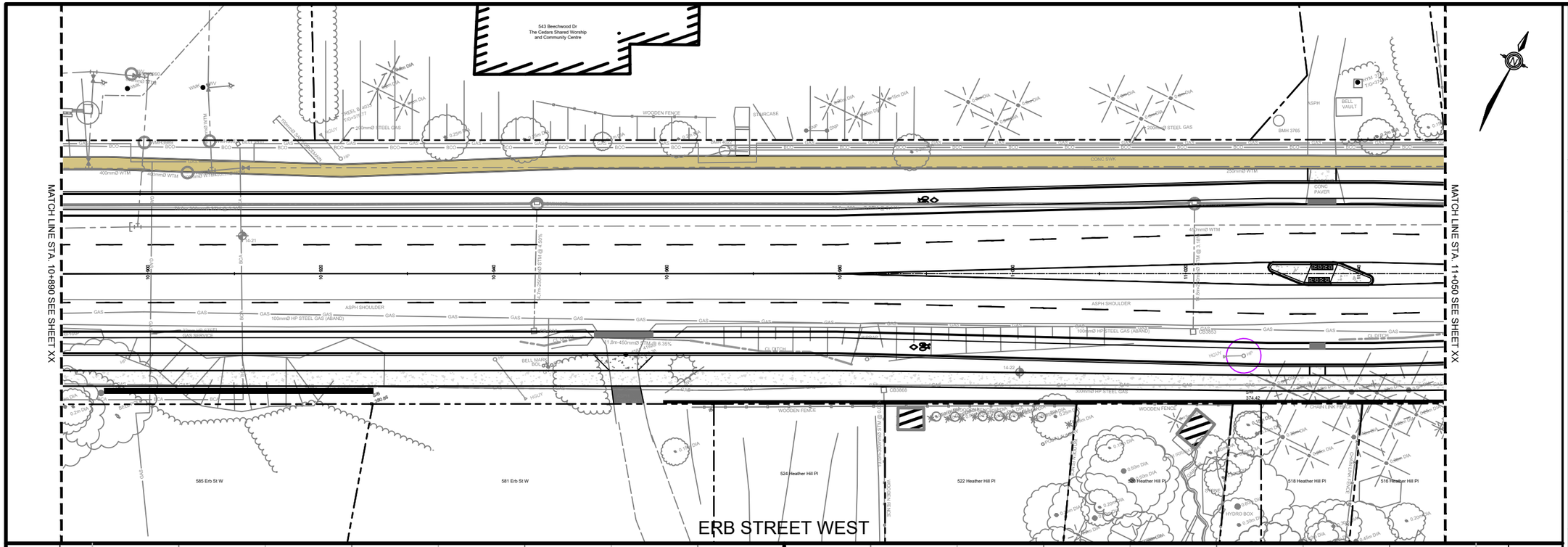
ERB STREET WIDENING & CORRIDOR STUDY FISCHER-HALLMAN ROAD TO WILMOT LINE

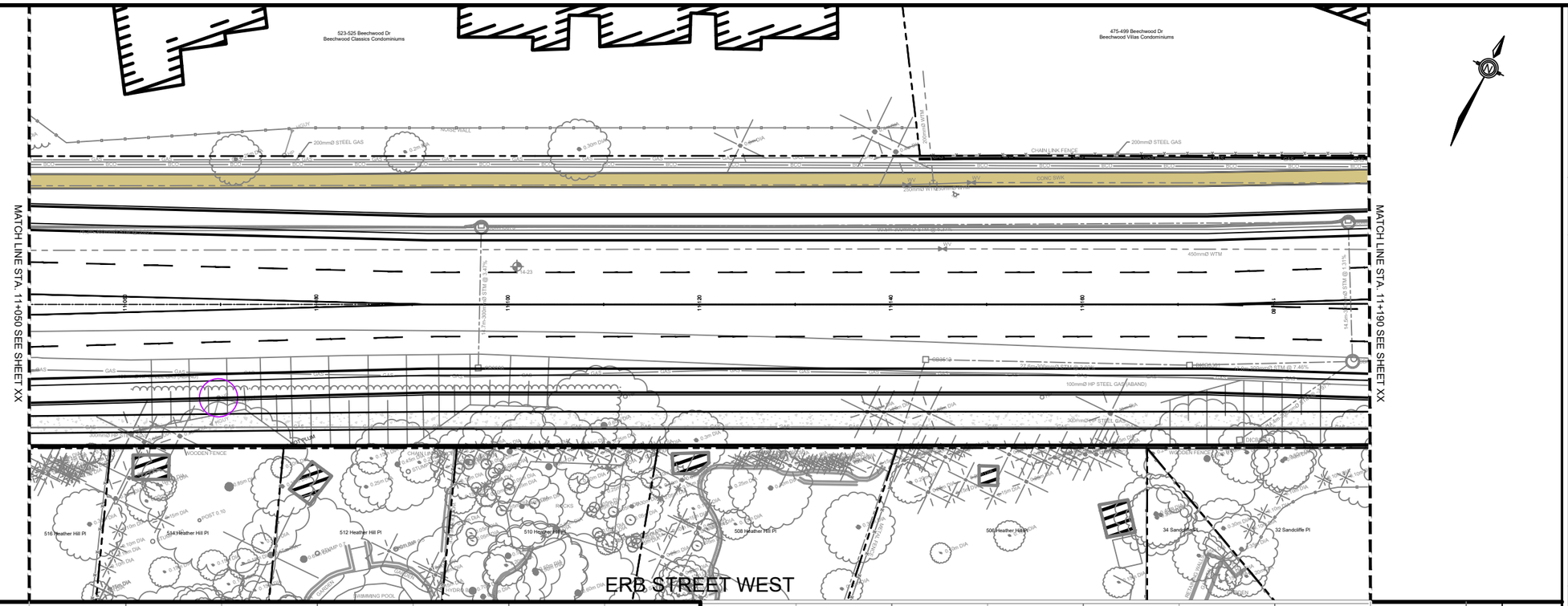
ERB STREET WEST RECONSTRUCTION STA. 10+750 TO STA. 10+890

DRAWN BY: MJV	CONTRACT No. 201X-XXX
CHECKED BY:	FILE No.
DATE: FEB/2017	DRAWING No.
SCALE HOR. 1:250 VERT. 1:50	SHEET 8 OF 14

CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PLOT FILES\2014-0114-05 PNP ERB.DWG

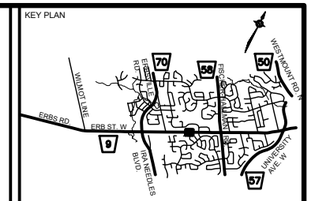
ROW-2017


543 Beechwood Dr
The Cedars Shared Worship and Community Centre
MATCH LINE STA. 10+890 SEE SHEET XX
MATCH LINE STA. 11+050 SEE SHEET XX
ERB STREET WEST
585 Erb St W
581 Erb St W
524 Heather Hill Pl
522 Heather Hill Pl
518 Heather Hill Pl
516 Heather Hill Pl
WOODEN FENCE
CONC SWK
ASPH SHOULDER
CONC PAVER
1.8m-450mmØ STM @ 6.35%
76.0m-300mmØ STM @ 5.14%
76.0m-300mmØ STM @ 5.95%
100mmØ HP STEEL GAS (ABAND)
300mmØ HP STEEL GAS
250mmØ PVC WTM
400mmØ WTM
450mmØ DI WTM
CB3868
CB3803
CBMH 4047
CBMH 3826
BMH 4022
BMH 3765
HYDRO BOX
BELL VAULT
GAS SERVICE
BELL MARKER
EX 100mmØ BELL CONDUITS (ASSUMED DEPTH)
EX 100mmØ TELEPHONE CONDUIT (ASSUMED DEPTH)
EX 100mmØ BELL CONDUIT (ASSUMED DEPTH)
EX 100mmØ TELEPHONE CONDUIT (ASSUMED DEPTH) (TO BE ABAND)
EX PRV CHAMBER
WMH 3869
WMH 3868
WMH 3847
WMH 3848
WMH 3850
WMH 3851
WMH 3852
WMH 3853
WMH 3854
WMH 3855
WMH 3856
WMH 3857
WMH 3858
WMH 3859
WMH 3860
WMH 3861
WMH 3862
WMH 3863
WMH 3864
WMH 3865
WMH 3866
WMH 3867
WMH 3870
WMH 3871
WMH 3872
WMH 3873
WMH 3874
WMH 3875
WMH 3876
WMH 3877
WMH 3878
WMH 3879
WMH 3880
WMH 3881
WMH 3882
WMH 3883
WMH 3884
WMH 3885
WMH 3886
WMH 3887
WMH 3888
WMH 3889
WMH



STATION	PROPOSED ELEVATION	EXISTING ELEVATION
11+050		373.66
11+060		373.18
11+070		372.67
11+080		372.12
11+090		371.56
11+100		371.00
11+110		370.44
11+120		369.85
11+130		369.25
11+140		368.65
11+150		368.05
11+160		367.49
11+170		366.92
11+180		366.36
11+190		365.80

KEY PLAN



DISCLAIMER:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

WALTERFEDY

Region of Waterloo

CONTROLLING B.M.
WA-43 670087
ELEV. 402.030m
SEE DESCRIPTION ON INDEX PAGE

FIELD BOOK No.

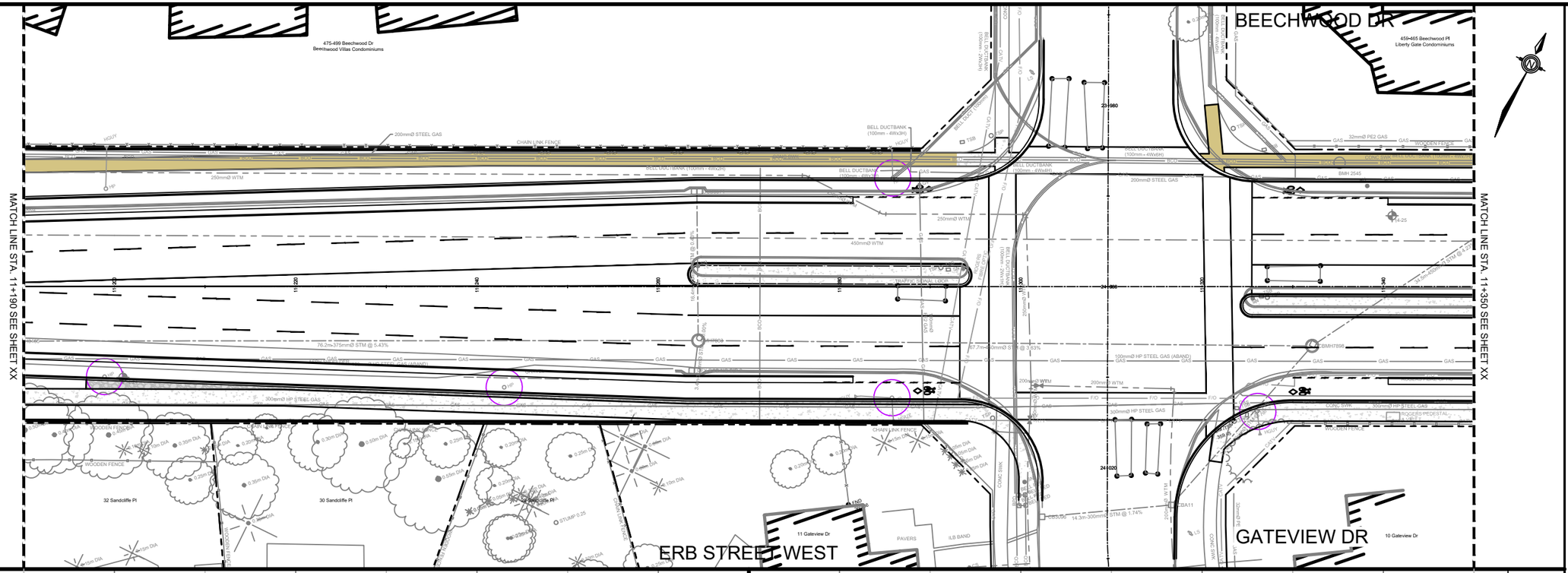
No.	ISSUE/REVISION	BY	DATE

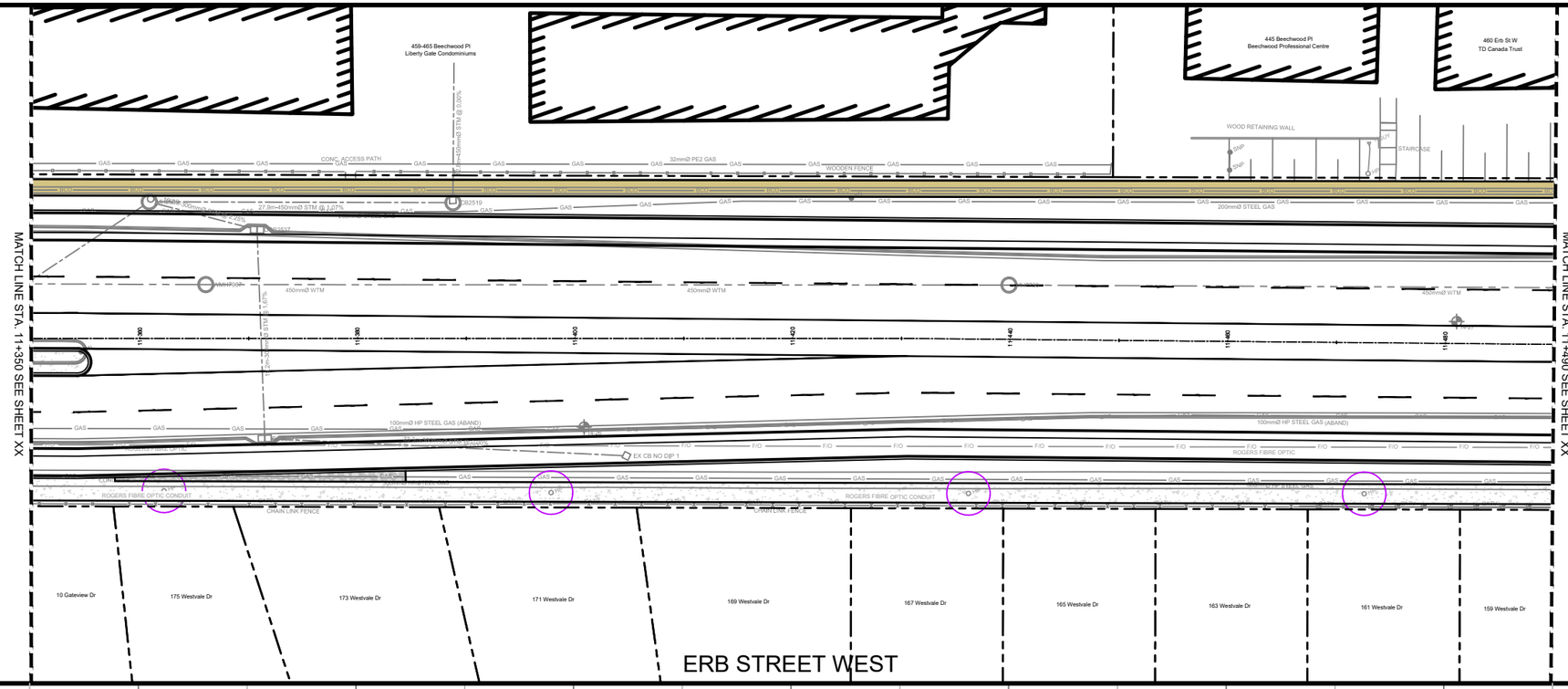
ERB STREET WIDENING & CORRIDOR STUDY FISCHER-HALLMAN ROAD TO WILMOT LINE

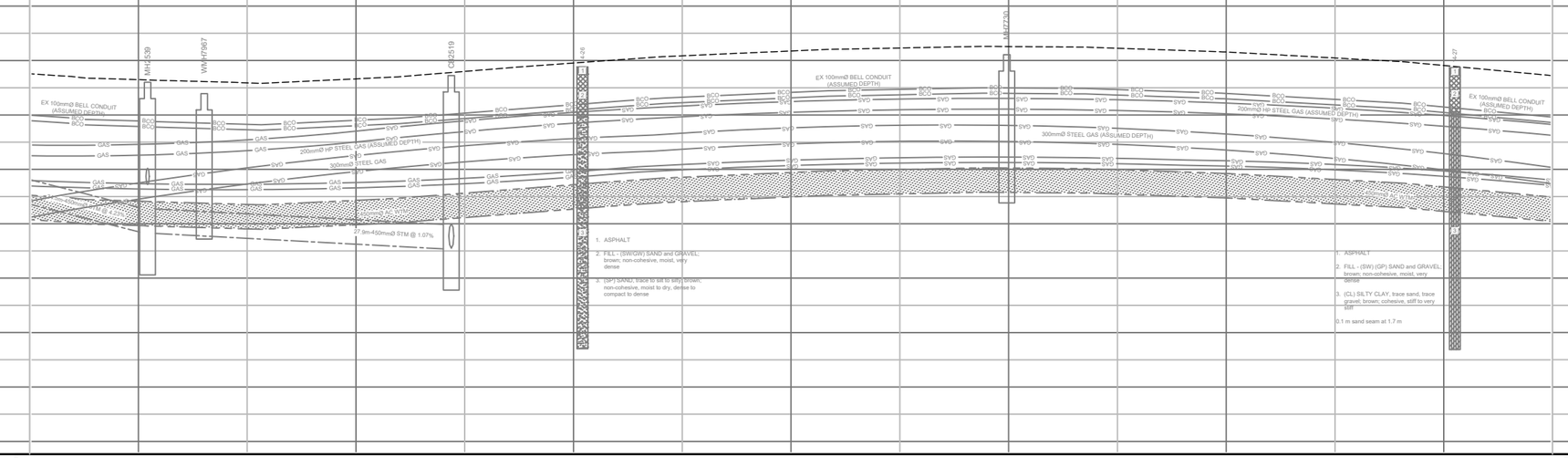
ERB STREET WEST RECONSTRUCTION STA. 11+050 TO STA. 11+190

DRAWN BY: MJV
CONTRACT No. 201X-XXX
CHECKED BY:
FILE No.
DATE: FEB/2017
DRAWING No.
SCALE HOR. 1:250 VERT. 1:50
SHEET 10 OF 14
CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PLOT FILES\2014-0114-05 PNP ERB.DWG

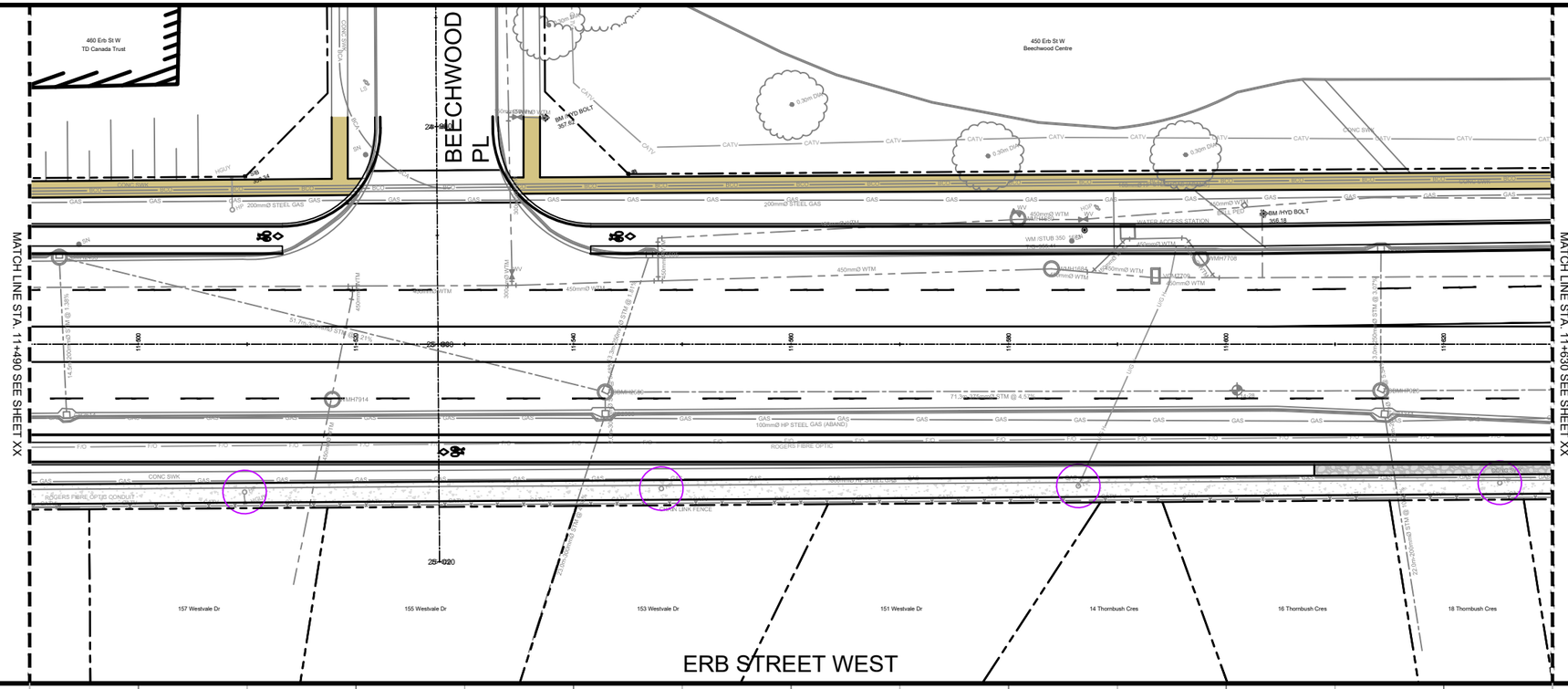
ROW-2017

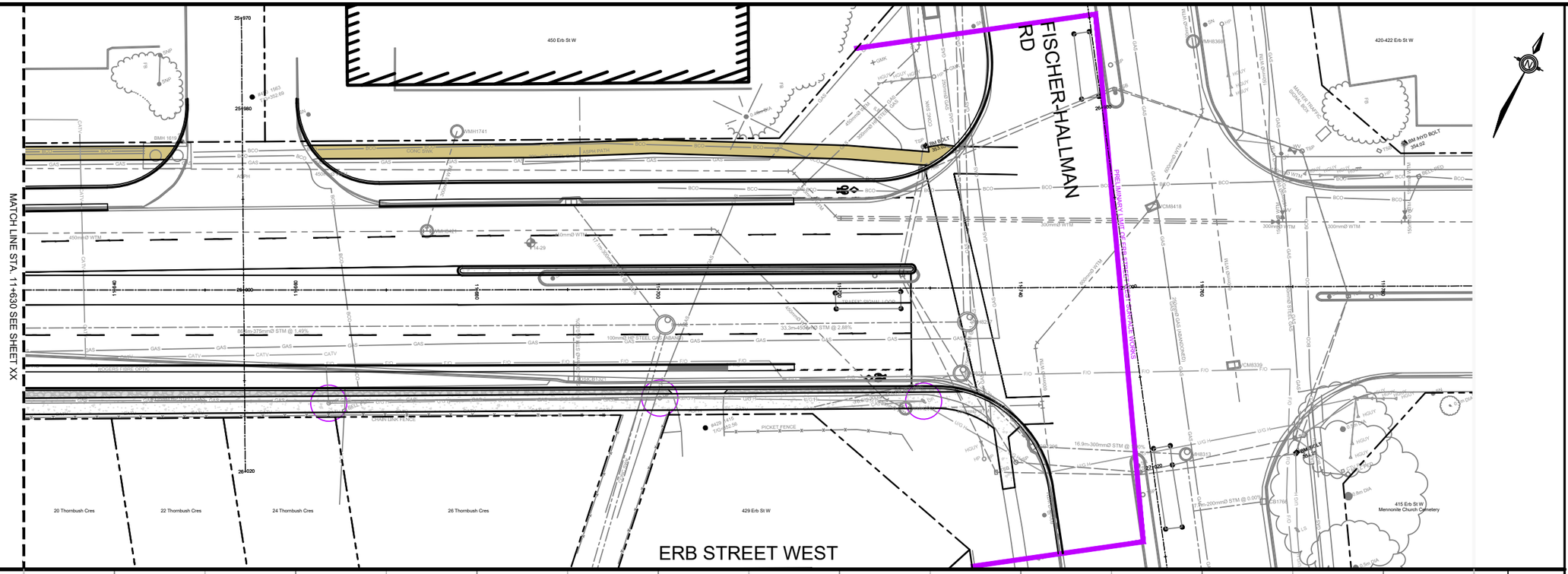

BEECHWOOD DR
ERB STREET WEST
GATEVIEW DR
MATCH LINE STA. 11+190 SEE SHEET XX
MATCH LINE STA. 11+350 SEE SHEET XX
475-499 Beechwood Dr
Beechwood Villas Condominiums
459-465 Beechwood Pl
Liberty Gate Condominiums
32 Sandcliffe Pl
30 Sandcliffe Pl
11 Gateview Dr
10 Gateview Dr
200mmØ STEEL GAS
CHAIN LINK FENCE
250mmØ WTM
BELL DUCTBANK (100mm - 4Wx3H)
BELL DUCTBANK (100mm - 4Wx2H)
BELL DUCTBANK (100mm - 4Wx4H)
76.2m-375mmØ STM @ 5.43%
67.7m-450mmØ STM @ 3.83%
14.3m-300mmØ STM @ 1.74%
300mmØ HP STEEL GAS
100mmØ HP STEEL GAS (ABAND)
WOODEN FENCE
CONC SWK
ASPH
PAVERS
ILB.BAND
ROGERS PEDESTAL
HGAY
HGAW
TSB
CBMH7898
MH7883
CBMH7896
MH7895
MH7894
MH7893
MH7892
MH7891
MH7890
MH7889
MH7888
MH7887
MH7886
MH7885
MH7884
CBCB11
23+980
24+000
24+020
24+040
24+060
24+080
24+100
24+120
24+140
24+160
24+180
24+200
24+220
24+240
24+260
24+280
24+300
24+320
24+340
24+360
24+380
24+400
24+420
24+440
24+460
24+480
24+500
24+520
24+540
24+560
24+580
24+600
24+620
24+640
24+660
24+680
24+700
24+720
24+740
24+760
24+780

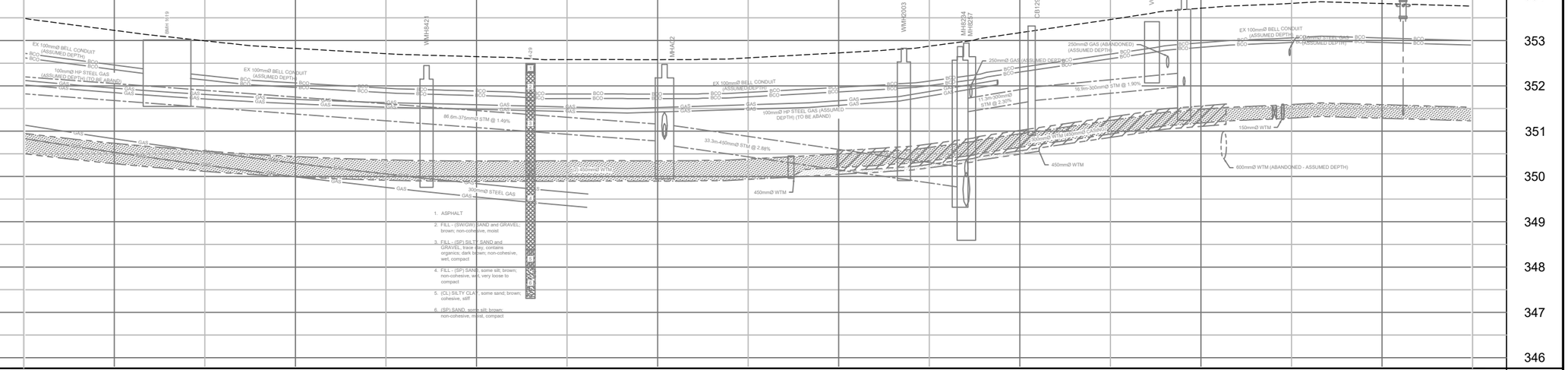

459-465 Beechwood Pl
Liberty Gate Condominiums
445 Beechwood Pl
Beechwood Professional Centre
460 Erb St W
TD Canada Trust
MATCH LINE STA. 11+350 SEE SHEET XX
MATCH LINE STA. 11+490 SEE SHEET XX
CONC. ACCESS PATH
WOODEN FENCE
WOOD RETAINING WALL
STAIRCASE
32mmØ PE2 GAS
200mmØ STEEL GAS
450mmØ WTM
100mmØ HP STEEL GAS (ABAND)
ROGERS FIBRE OPTIC
ROGERS FIBRE OPTIC CONDUIT
CHAIN LINK FENCE
EX CB NO DIP 1
10 Gateview Dr
175 Westvale Dr
173 Westvale Dr
171 Westvale Dr
169 Westvale Dr
167 Westvale Dr
165 Westvale Dr
163 Westvale Dr
161 Westvale Dr
159 Westvale Dr
ERB STREET WEST


MH1538
MH7567
CB2519
MH7426
MH7270
EX 100mmØ BELL CONDUIT (ASSUMED DEPTH)
200mmØ HP STEEL GAS (ASSUMED DEPTH)
300mmØ STEEL GAS
27.9m-450mmØ STM @ 1.07%
1. ASPHALT
2. FILL - (SW/GW) SAND and GRAVEL; brown, non-cohesive, moist, very dense
3. (SP) SAND, trace to silt to silty; brown; non-cohesive, moist to dry, dense to compact to dense
1. ASPHALT
2. FILL - (SW) (GP) SAND and GRAVEL; brown; non-cohesive, moist, very dense
3. (CL) SILTY CLAY, trace sand, trace gravel; brown; cohesive, stiff to very stiff
0.1 m sand seam at 1.7 m

| | | |

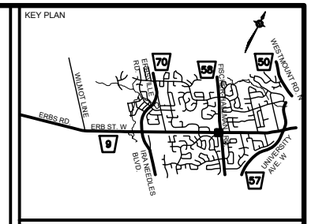

460 Erb St W
TD Canada Trust
450 Erb St W
Beechwood Centre
BEECHWOOD PL
MATCH LINE STA. 11+490 SEE SHEET XX
MATCH LINE STA. 11+630 SEE SHEET XX
ERB STREET WEST
157 Westvale Dr
155 Westvale Dr
153 Westvale Dr
151 Westvale Dr
14 Thornbush Cres
16 Thornbush Cres
18 Thornbush Cres
25-930
25-940
25-920
BM HYD BOLT
397.68
BM HYD BOLT
396.18
MMH7914
MMH7908
MMH7906
MMH7708
MMH7707
MMH7705
MMH7704
MMH7702
MMH7701
MMH7700
MMH7699
MMH7698
MMH7697
MMH7696
MMH7695
MMH7694
MMH7693
MMH7692
MMH7691
MMH7690
MMH7689
MMH7688
MMH7687
MMH7686
MMH7685
MMH7684
MMH7683
MMH7682
MMH7681
MMH7680
MMH7679
MMH7678
MMH7677
MMH7676
MMH7675
MMH7674
MMH7673
MMH7672
MMH7671
MMH7670
MMH7669
MMH7668
MMH7667
MMH7666
MMH7665
MMH7664
MMH7663





STATION	PROPOSED ELEVATION	EXISTING ELEVATION
11+630		353.49
11+640		353.22
11+650		352.99
11+660		352.83
11+670		352.71
11+680		352.65
11+690		352.58
11+700		352.58
11+710		352.62
11+720		352.73
11+730		352.88
11+740		353.17
11+750		353.46
11+760		353.71
11+770		353.82
11+780		353.82
11+790		353.76

KEY PLAN



DISCLAIMER:
THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWERS, AND OTHER UNDERGROUND AND ABOVE GROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

WALTERFEDY

Region of Waterloo

CONTROLLING B.M.
WA-43 670087
ELEV. 402.030m
SEE DESCRIPTION ON INDEX PAGE

FIELD BOOK No.

No.	ISSUE/REVISION	BY	DATE

ERB STREET WIDENING & CORRIDOR STUDY FISCHER-HALLMAN ROAD TO WILMOT LINE

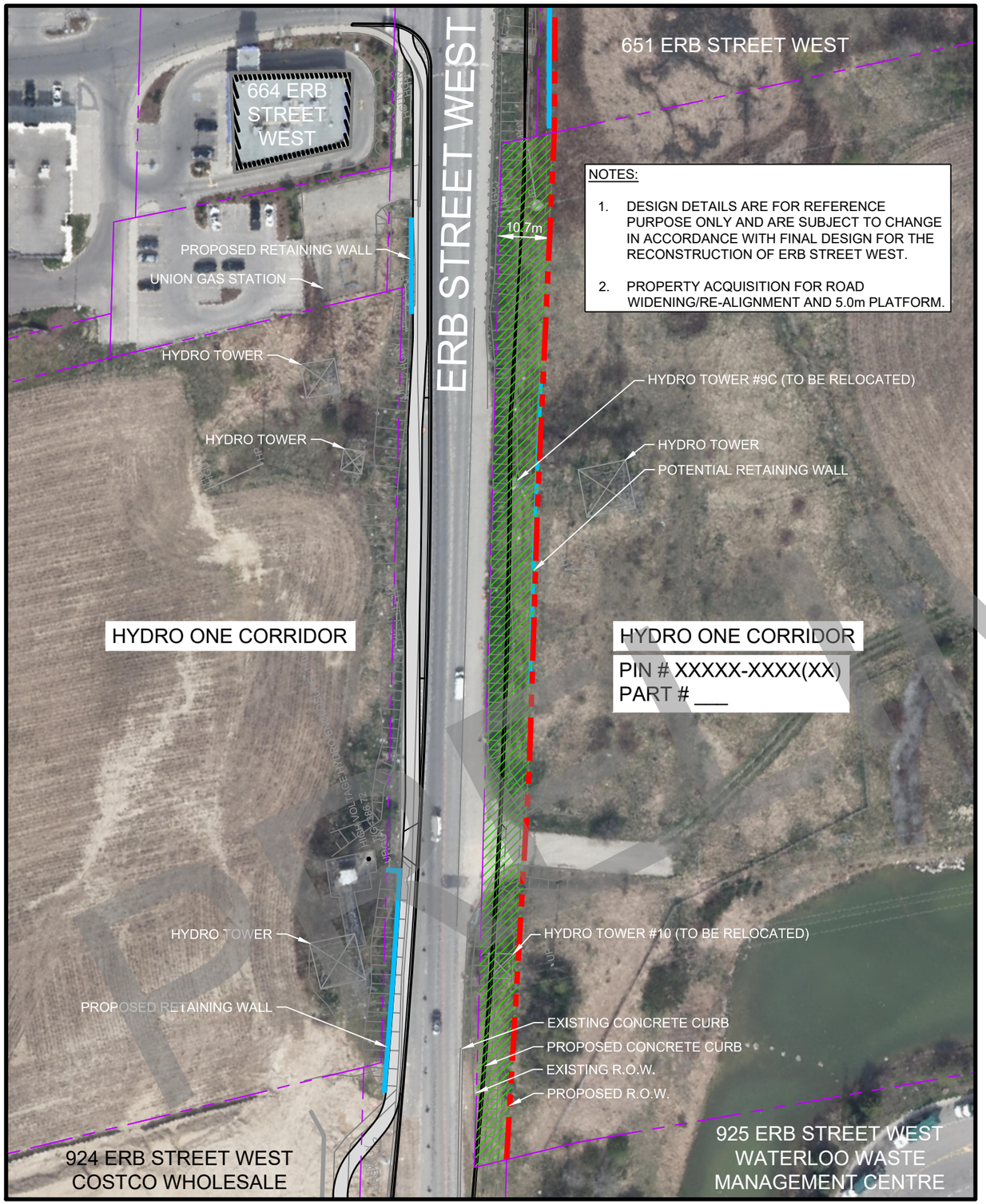
ERB STREET WEST RECONSTRUCTION STA. 11+630 TO STA. 11+790

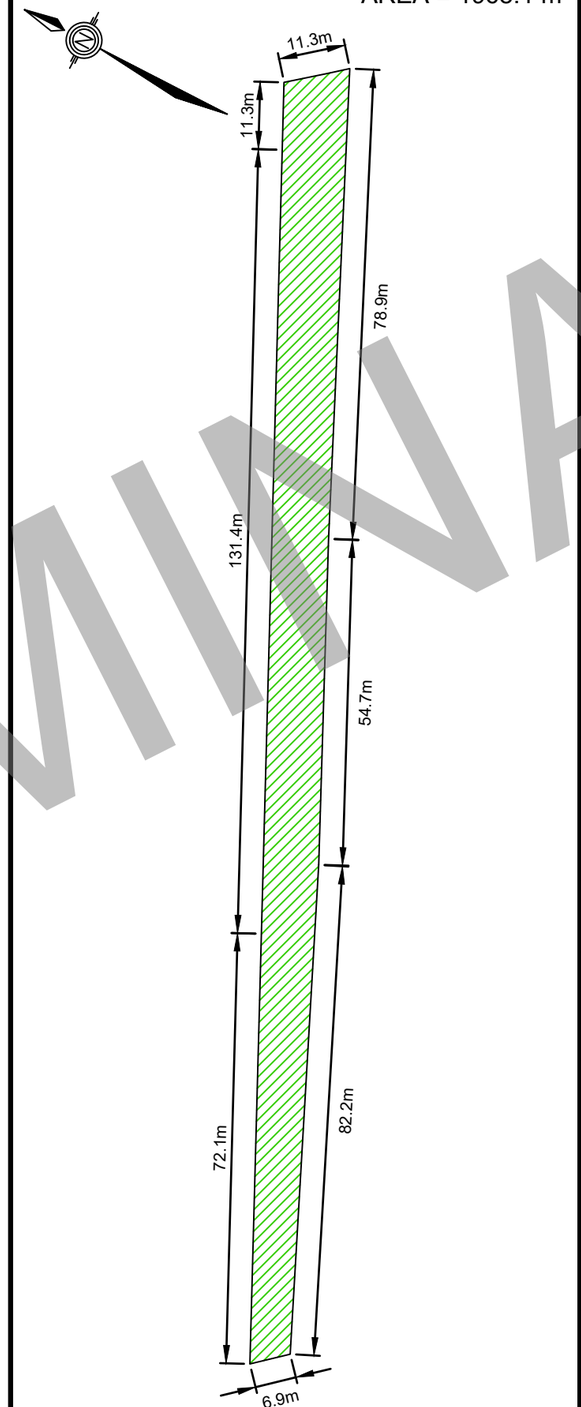
DRAWN BY: MJV	CONTRACT No. 201X-XXX
CHECKED BY:	FILE No.
DATE: FEB/2017	DRAWING No.
SCALE HOR. 1:250 VERT. 1:50	SHEET 14 OF 14
CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PLOT FILES\2014-0114-05 PNP ERB.DWG	

©GWP 2017

APPENDIX O

Preliminary Property Impact Plans





PROPERTY ACQUISITION DETAIL

DIMENSIONS ARE APPROXIMATE SCALE 1:1000

LEGEND

- HP — EXISTING HYDRO POLE
- EXISTING R.O.W. / PROPERTY LINE
- PROPOSED R.O.W. / PROPERTY LINE
- PROPOSED FEE SIMPLE ACQUISITION
- PROPOSED RETAINING WALL

WALTERFEDY

Region of Waterloo

No.	ISSUE/REVISION	BY	DATE

ERB STREET IMPROVEMENTS FISCHER-HALLMAN ROAD TO WEST WATERLOO COMMERCIAL CENTRE

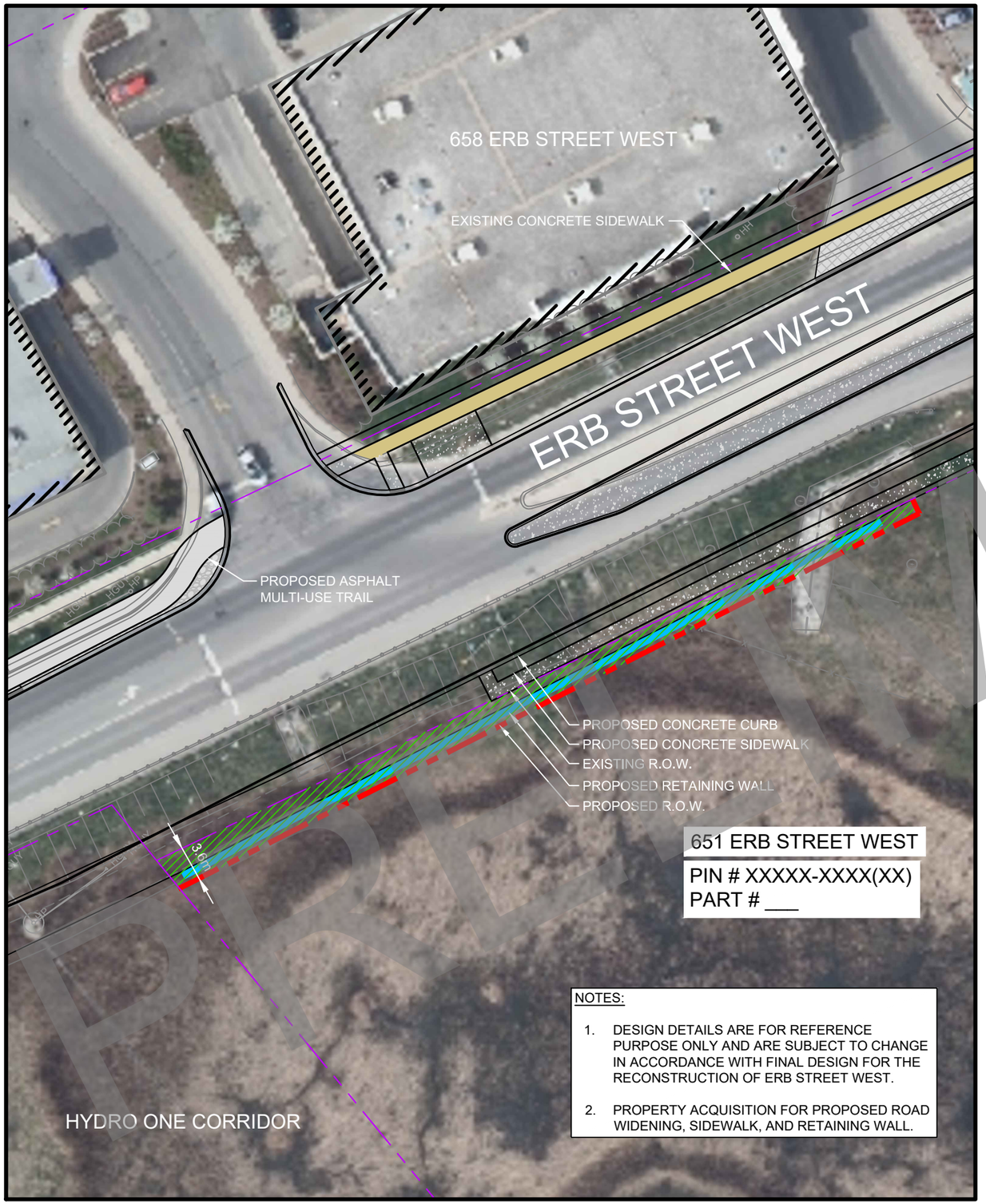
HYDRO ONE CORRIDOR

PROPERTY IMPACT PLANS

SCALE	CONTRACT No.	SHEET
1:1000	201#-####	1 OF 3

CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PROPERTY IMPACT PLANS\2014-0114-05 PIP.DWG

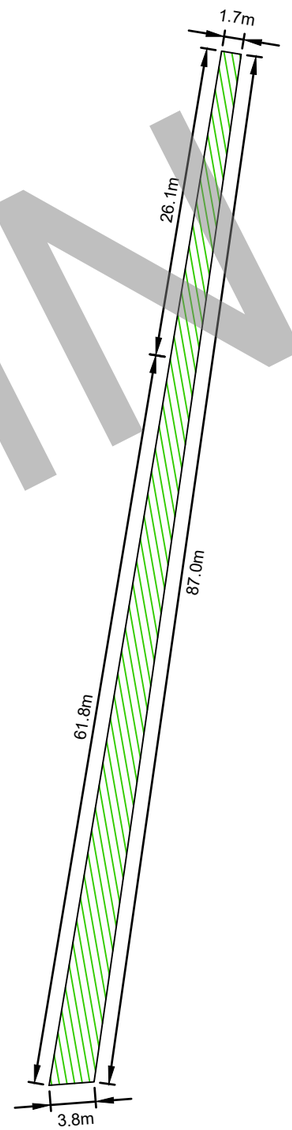
PRELIMINARY



NOTES:

1. DESIGN DETAILS ARE FOR REFERENCE PURPOSE ONLY AND ARE SUBJECT TO CHANGE IN ACCORDANCE WITH FINAL DESIGN FOR THE RECONSTRUCTION OF ERB STREET WEST.
2. PROPERTY ACQUISITION FOR PROPOSED ROAD WIDENING, SIDEWALK, AND RETAINING WALL.

AREA = 233.5 m^2



PROPERTY ACQUISITION DETAIL

DIMENSIONS ARE APPROXIMATE SCALE 1:500

LEGEND

- EXISTING HYDRO POLE
- EXISTING R.O.W. / PROPERTY LINE
- PROPOSED R.O.W. / PROPERTY LINE
- PROPOSED FEE SIMPLE ACQUISITION
- PROPOSED RETAINING WALL

WALTERFEDY

Region of Waterloo

No.	ISSUE/REVISION	BY	DATE

ERB STREET IMPROVEMENTS FISCHER-HALLMAN ROAD TO WEST WATERLOO COMMERCIAL CENTRE

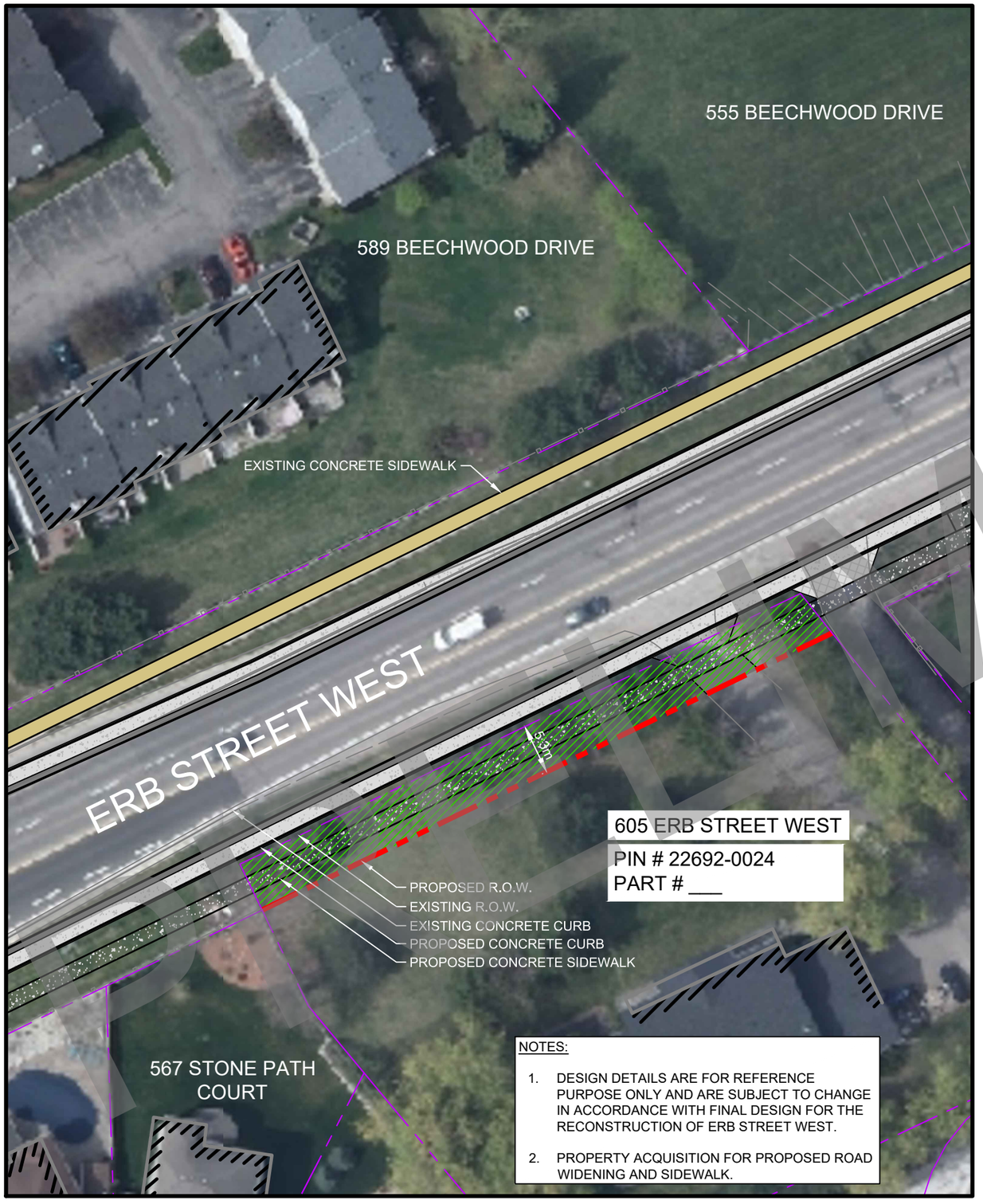
651 ERB STREET WEST

PROPERTY IMPACT PLANS

SCALE	CONTRACT No.	SHEET
1:500	201#-####	2 OF 3

CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PROPERTY IMPACT PLANS\2014-0114-05 PIP.DWG

PRELIMINARY



NOTES:

1. DESIGN DETAILS ARE FOR REFERENCE PURPOSE ONLY AND ARE SUBJECT TO CHANGE IN ACCORDANCE WITH FINAL DESIGN FOR THE RECONSTRUCTION OF ERB STREET WEST.
2. PROPERTY ACQUISITION FOR PROPOSED ROAD WIDENING AND SIDEWALK.

AREA = 348.3 m^2



PROPERTY ACQUISITION DETAIL

DIMENSIONS ARE APPROXIMATE SCALE 1:500

LEGEND

- HP — EXISTING HYDRO POLE
- EXISTING R.O.W. / PROPERTY LINE
- PROPOSED R.O.W. / PROPERTY LINE
- PROPOSED FEE SIMPLE ACQUISITION

PRELIMINARY

WALTERFEDY

Region of Waterloo

No.	ISSUE/REVISION	BY	DATE

ERB STREET IMPROVEMENTS FISCHER-HALLMAN ROAD TO WEST WATERLOO COMMERCIAL CENTRE

605 ERB STREET WEST

PROPERTY IMPACT PLANS

SCALE	CONTRACT No.	SHEET
1:500	201#-####	3 OF 3

CADD FILE: P:\2014\0114\05\06-DWGS\CIVIL\PROPERTY IMPACT PLANS\2014-0114-05 PIP.DWG