

To City of Hamilton Page 1

**Residential Drainage Assistance (RDA) Program**  
 Subject East 37<sup>th</sup> Street, Seventh Ave., East 36<sup>th</sup> Street and Fennell Avenue

Date May 25, 2022 Project Number 60656489

**1. Scope of Study**

The City of Hamilton requested that AECOM complete a review of flooding concerns of the rear yards on the block bounded by East 37<sup>th</sup> Street, Seventh Ave, East 36<sup>th</sup> Street and Fennell Avenue. This block of homes will be described as the Study Area (**Fig. 1**). The review will be completed under the Residential Drainage Assistance Program.



**Fig.1 Study Area**

The residents, within the Study Area, have raised concerns about the amount of storm runoff from rainfalls or snow melts that is ponding within the rear yard. The ponding has limited the use of their property because of the soggy conditions created by a lack of drainage from the rear yards.



**Fig 1A Aerial View of Study Area**

The City of Hamilton initiated this study:

- To assess the causes of the drainage issues;
- To determine if there were any mitigation measures that could be put in place to alleviate some of the flooding concerns; and/ or
- To determine if a drainage outlet solution could be put in place to eliminate or reduce the flooding concerns.

## **2. Background Information**

To better assess the flooding issues, AECOM completed a number of background reviews. AECOM's survey team completed a visual and topographic survey of the properties within the Study Area. In addition, a background review of available City of Hamilton Inspection Reports and Drawings was completed to identify existing storm and sanitary sewers in the area and to determine the depth of rock within the study area. Finally, a review of the City of Hamilton Drainage Design Guidelines was completed to verify City standards.

### **2.1. Existing Conditions**

The homes within the Study Area are part of a mature subdivision. The majority of the lots within the Study Area have garages, fences, decks, shrubs, trees or other built structures that make access to the rear yards difficult. These features also hinder a conventional drainage system or neighbourhood rear yard drainage swales. The rear yards within the Study Area are lower in elevation than the front yards and there is no apparent drainage outlet from the rear yards to the front yards.

### **2.2. Topographic Survey**

In November 2021, AECOM's topographic survey team visited the Study Area and completed a topographic survey (**Fig. 2**) of the rear yard to identify existing conditions. The survey team also took a series of photographs to show rear yard features (gates, fences, shrubs, etc.) that may not be identified on the topographic survey. The attached Fig. 2 is a graphical representation of the survey results. In general, the survey team noted the following:

- The topography of the area (slope of the yards) generally drains from south to north;
- Each of the individual lots have independent grading issues;
- The rear yards of the properties are lower in elevation than the municipal street elevation. There are no side yard swales that would allow any of the rear yards to drain to the streets and therefore any storm runoff is trapped in the rear yards; and
- There are no consistent swales that would allow storm runoff to drain along the property lines to a common outlet point or to the municipal outlet.



**Fig 2. Topographic Survey of the Rear Yards**

**2.3. Background Information Review- Drawings, Reports**

AECOM reviewed the "Inspection Reports" and Engineering drawings received from the City of Hamilton from Sept 1991 for East 37<sup>th</sup> Street. These reports were prepared during the installation of the combined storm sewer on East 37<sup>th</sup> Street and East 36<sup>th</sup> Street.

The intent of the Inspection Reports review was to determine if the local bedrock elevation in the area would be an issue with preparing options to alleviate the drainage issue. The Inspection Reports noted that rock was encountered within the construction project but the elevations were not noted on the Engineering drawings. However, there were indications that the bedrock level was approximately 188.9 to 192.3m in elevation from the Inspection Reports. The elevation of the existing 750mm storm sewer on East 37<sup>th</sup> Street is at elevation 188.00(+/-).

**2.4. City of Hamilton Drainage Design Guidelines**

In newer subdivisions, the grading of residential lots is governed by the City of Hamilton's "Engineering Guidelines for Servicing Lands under Development Applications". Section 2.5.2 of

the Guidelines outlines the "Design Criteria" that must be followed to prepare residential lots for ready for house construction.

Drainage from rear yards is normally directed from the back of the yards to side yard swales (running along the side property line) which would convey storm runoff to the municipal street and then to the municipal catchbasin (storm sewer) system.

The intent of the guidelines is to ensure that each residential lot is independently drained thereby reducing the risk of rear yard flooding issues. Unfortunately, the age of this subdivision pre-dates the current Engineering Guidelines and the existing lot grading does not comply with the current specifications.

### **3. Recommended Option**

#### **3.1. Design Considerations**

Subsequent to the topographic survey, the design team reviewed the following:

1. The existing drainage patterns within the rear yards;
2. Options are available to collect storm runoff; and
3. Options for storm runoff be conveyed to the municipal storm sewer system.

#### **3.2. Drainage Options**

After reviewing the topographic survey information, the inspection reports and the restrictions within the rear and side yards, the following solution/measures were considered to help alleviate some of the drainage issues. The proposed solution will not eliminate soggy back yards or minor flooding issues but is intended to provide an outlet for storm runoff.

##### **3.2.1. Option 1 Soak Away Pits**

The option reviewed (**Fig. 3**) would include the installation of a rear yard soak away pits in some or all the back yards within the Study Area. The rear yard drainage pits would be designed to capture a volume of storm runoff equal to 25mm of water covering the rear yard. The approximate size and location of the soak away pits are described on Fig.3.

It should be noted that, as shown in Fig 3, not all rear yards have soak away pits. The location of the soak away pits were located in rear yards where access to rear yards from the street or from the neighbour's property is possible. There are several rear yards where access is limited or not possible to install a soak away pit.

The construction of individual drainage pits would have the following benefits:

- Since the pits would be constructed on the individual resident's property, the timing of construction could be arranged by each of the residents.
- The pits can be placed and orientated to minimize damage existing properties (trees, building, etc);
- After construction the residents would have full use of their rear yards; and
- The soak away pits would provide for storage of stormwater underground, for most local storms, thereby decreasing the time for yards to return to normal usage

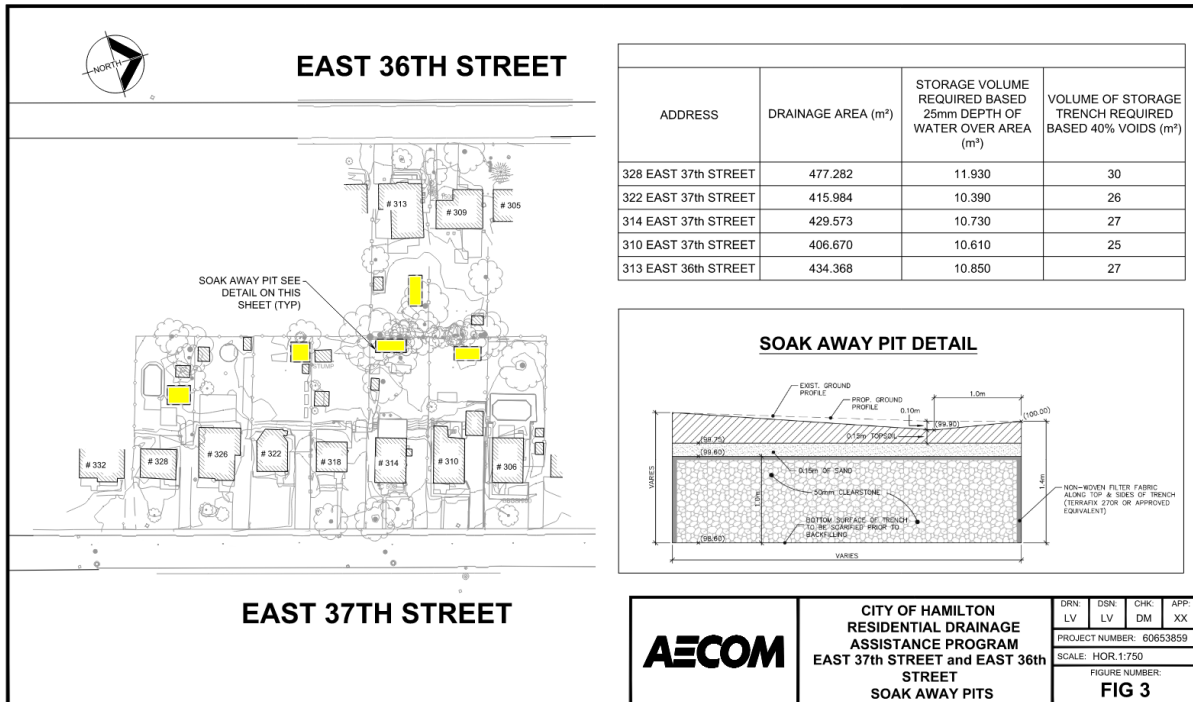


Fig. 3– Individual Soak Away Pits

**3.2.1.1. Difficulties**

After a review of the back yards within the Study Area, it is apparent that it will be very difficult to construct soak away pits in all locations. As noted previously, the Study Area is part a mature subdivision. As such there are numerous, gardens, trees, fences pools, deck, etc that hinder a consistent or common solution very difficult. The installation of some soak away pits would require the co-operation of the various residents so that access to the rear yards could be reached from the neighbour’s property.

**3.2.1.2. Benefits**

- Since the pit would be constructed on the individual resident’s property, the timing of construction could be arranged by the residents.
- The soak away pits can be placed and orientated to minimize damage existing properties (trees, building, etc);
- After construction, the residents would have full use of their rear yards; and
- The drainage pits would provide for storage of stormwater underground, for most local storms, thereby decreasing the time for yards to return to normal usage.

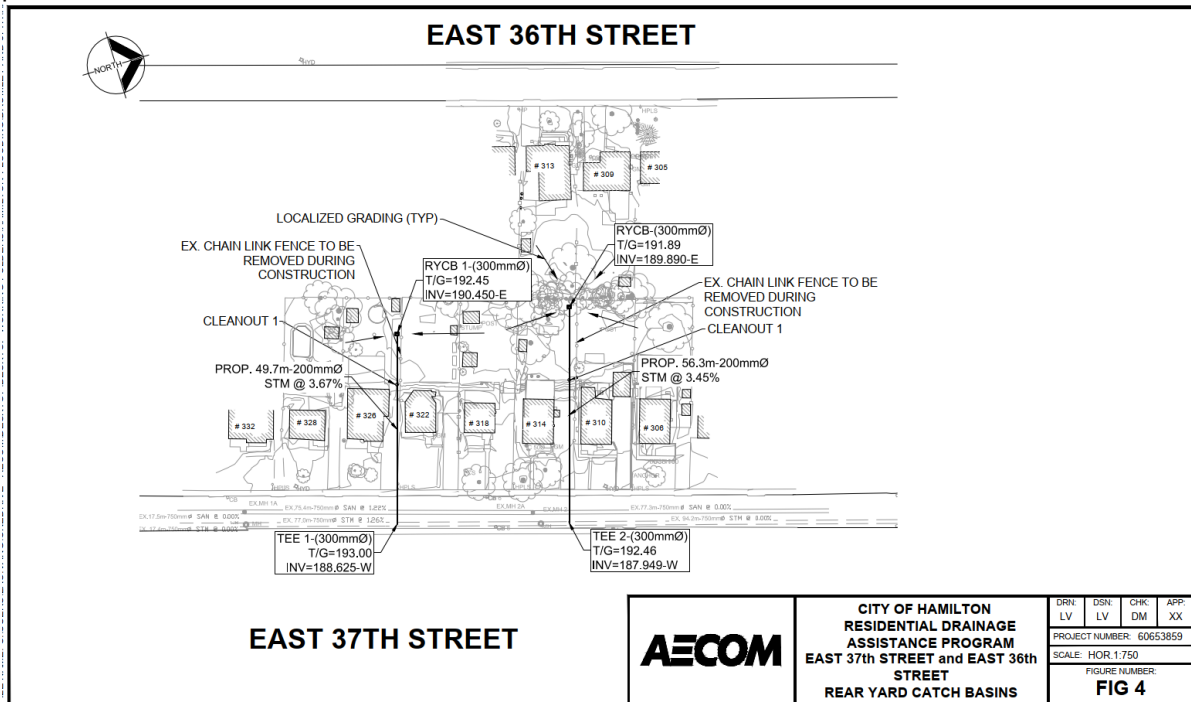
**3.2.1.3. Costs**

The anticipated total cost of the installation of the rear yard soak away pits is approx.\$7,000.00 to \$10,000.00 per lot. The final costs for the construction of the soak away pits will depend on the ability of the approved contractor to gain access to the rear yard. As noted previously, the timing and construction soak away pit can be arranged by the individual residents. As noted previously, the installation of rear yard soak away pits in some of the lots could be very difficult, result in a great deal of disruption to the properties and could be very expensive.

The reader should note that the cost listed is an estimate only and the final costs will vary when the residents.

### 3.2.2.Option 2 Rear Yard Catchbasins and Grading

Another option to reduce or eliminate the rear yard flooding in the Study Area is the installation of rear yard catchbasins (**Fig.4**) and the construction of rear yard swales. The installation of rear yard catchbasins require a direct connection from the storm sewer in the municipal street to the rear yards of the property or properties. Within the Study Area, the ability to have a direct connection from the street to the rear yards is limited because of the existing garages, pools, patios in the area.



**Fig.4 Rear Yard Catchbasins**

As illustrated in Fig. 4, two connections are required from the rear yards to the storm sewer. These connections can be made at 326 and 314 East 37<sup>th</sup> Street. The storm sewer connection would be connected to a rear yard catchbasin. The local neighbourhood rear yards would have to be re-graded to provide swales that would capture and convey storm runoff to the rear yard catchbasin.

#### 3.2.2.1. Difficulties

After a review of the back yards within the Study Area, it is apparent that it will be very difficult to construct connections from the street to the rear yards. The introduction of drainage swales will reduce some of the use of the back yards. There should be an agreement among the neighbours to protect and maintain the swale in a good working condition. As noted previously, the Study Area is part a mature subdivision. As such there are numerous, gardens, trees, fences pools, deck, etc that hinder a consistent or common solution very difficult.

#### **3.2.2.2. Benefits**

- The catchbasin system would provide a year-round outlet for the flooding. By maintaining the swale in proper working order, the outlet will continue to function during summer rain events and winter thaws.
- The catchbasins can be placed and orientated to minimize damage existing properties (trees, building, etc);
- After construction, the residents would have almost full use of their rear yards.

#### **3.2.2.3. Costs**

The anticipated total cost of the installation of the rear yard catch basin is approx. \$44,500.00 for work within the municipal Right of Way and \$59,000.00 for work on the private side. The final costs for the construction of the rear yard catchbasin will depend on the ability of the approved contractor to gain access to the rear yard with their equipment due to buildings, fences, landscaping, and other obstructions. As noted previously, the timing and construction of the rear yard catchbasin can be arranged by the individual residents.

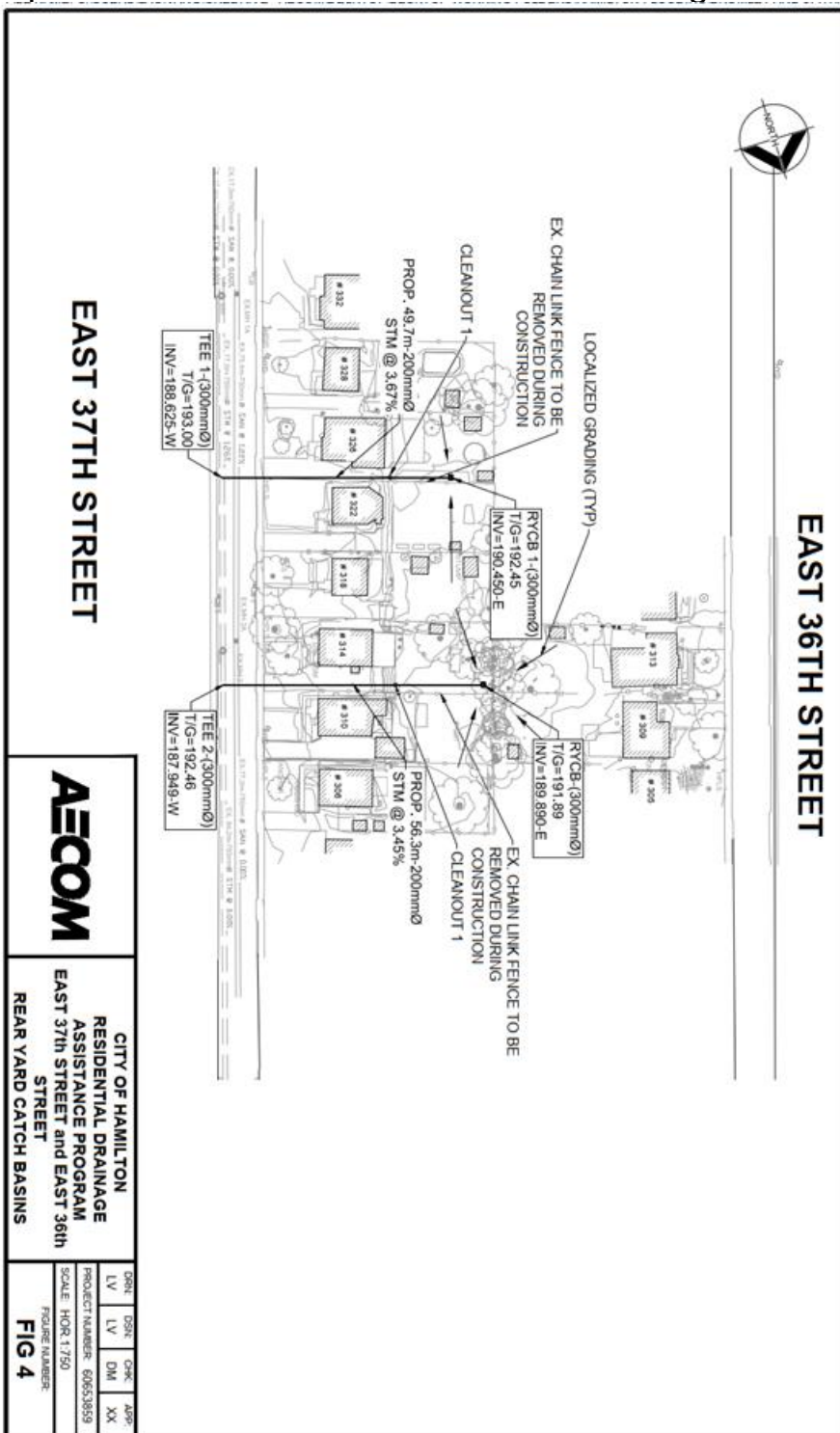
### **3.3. Recommended Option and Costs**

#### **3.3.1.Recommendation**

The recommended solution to reduce the chronic flooding issues (**Fig. 4**) is the installation of the rear yard catchbasin systems and the rear yard regrading. Although this solution will have an impact on the rear yards, the catchbasins would provide a permanent solution to the flooding issue. This solution should include an agreement among the neighbours to ensure that the drainage swales/grading is not interfered/damaged and the overall drainage design can continue to work in the future.

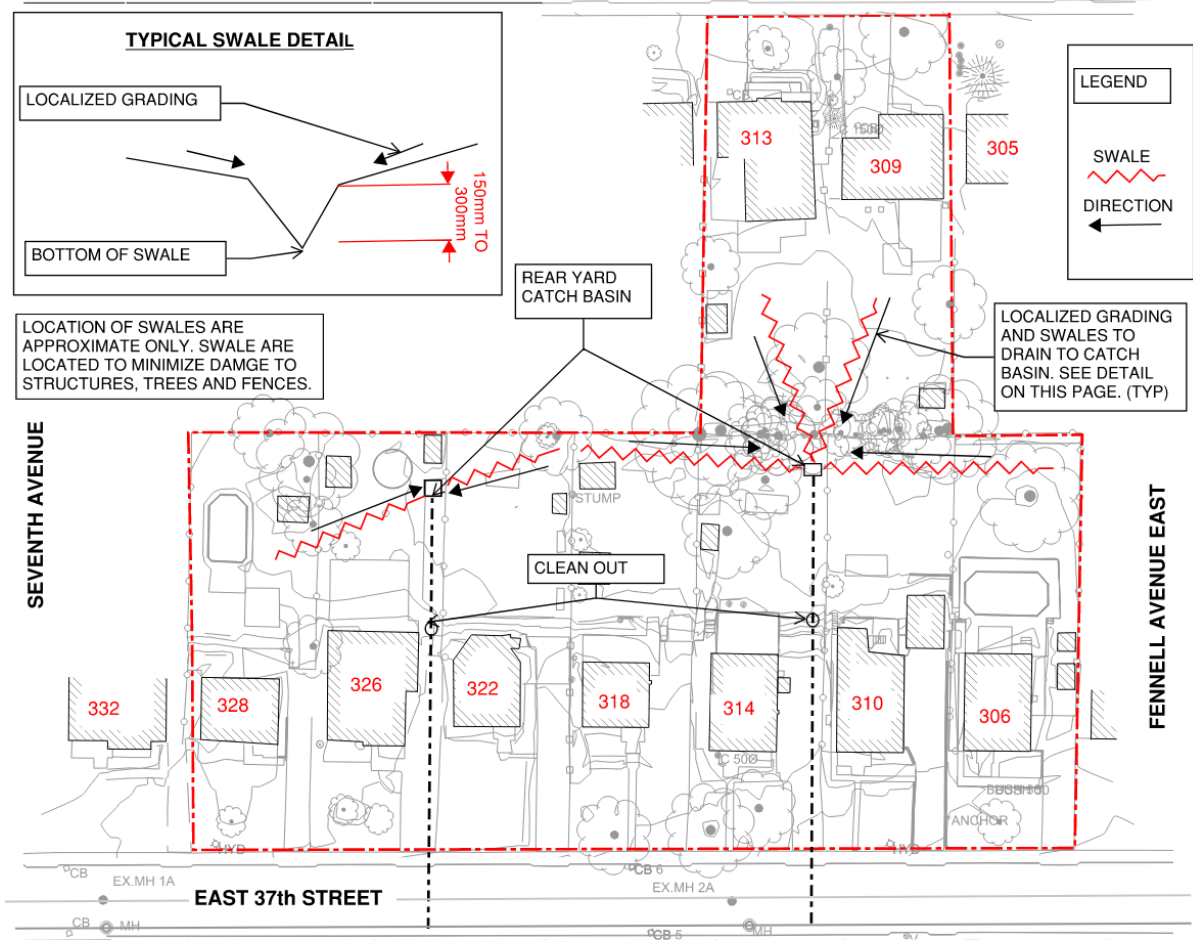
Should this recommendations be approved and finalized, it is assumed that the cost of the infrastructure (subject to tendering) will be shared among the proponents of this study.

Option 2 Rear Yard Catchbasin and Grading





EAST 36th STREET



# City of Hamilton Rear Yard Flooding Review

25-May-22

East 37th Street, Seventh Ave., East 36th Street and Fennell Avenue

## Option 2 Rear Yard Catchbasin

### Public Work

The work within the Roadway Right of Way will include:

- Removal and replacement of asphalt and granular roadbase, curbs and sidewalks
- Excavation and backfill of sewer for connection to the existing storm sewer
- Connection of storm sewer lateral to the existing storm sewer
- Supply and installation of the storm sewer lateral to the property line
- Restoration of all damaged areas during construction
- Traffic Control
- All work and materials to meet the specifications of the City of Hamilton

Removal			Qty	Total
Excavator	Hr	\$250.00	10.0	\$2,500.00
Truck	Hr	\$100.00	10.0	\$1,000.00
Loader	Hr	\$175.00	10.0	\$1,750.00
Compactor	Hr	\$150.00	10.0	\$1,500.00
Labor	Hr	\$75.00	10.0	\$750.00
Foreman	Hr	\$100.00	10.0	\$1,000.00
Pick up	Hr	\$50.00	10.0	\$500.00
		Sub total		\$9,000.00
Replacement				
Excavator	Hr	\$250.00	10.0	\$2,500.00
Truck	Hr	\$100.00	10.0	\$1,000.00
Loader	Hr	\$175.00	10.0	\$1,750.00
Compactor	Hr	\$150.00	10.0	\$1,500.00
Labor	Hr	\$75.00	10.0	\$750.00
Foreman	Hr	\$100.00	10.0	\$1,000.00
Pick up	Hr	\$50.00	10.0	\$500.00
Traffic Control	LS	\$100.00	10.0	\$1,000.00
		Sub total		\$10,000.00
Pipe and Connections	LS	\$2,000.00	2.0	\$4,000.00
Sewer	M	\$150.00	20.0	\$3,000.00
Curb	m	\$100.00	10.0	\$1,000.00
SW	m2	\$100.00	4.0	\$400.00
Granular	t	\$80.00	134.4	\$10,752.00
Asphalt	t	\$300.00	20.0	\$6,000.00
		Sub total		\$25,152.00
				Total
				\$44,152.00

## Private Side

The work within the private property will include:

- Removal and replacement of asphalt and granular driveway
- Removal and replacement of fences
- Excavation and backfill of sewer for connection to the City storm lateral connection
- Supply and installation of the storm sewer lateral from the property line to the rear yards
- Supply and installation of the rear yard catchbasins
- Restoration of all damaged areas during construction
- All work and materials to meet the specifications of the City of Hamilton

### Excavation and receiving pits

Pits	ea	\$2,000.00	2	\$4,000.00
Installation of Pipe	m	\$250.00	80	\$20,000.00
Rear Yard CB	ea	\$2,000.00	2	\$4,000.00
Concrete removal	m2	\$50.00		\$0.00
Shed removal and replacement	ls	\$1.00		\$0.00
Removal of Fencing	m	\$50.00	50	\$2,500.00
Removal of Trees	ea	\$5,000.00		\$0.00
Regrading	LS	\$2.00	3000	\$6,000.00
Restoration	m2	\$20.00	200	\$4,000.00
Fence Replacement	m	\$50.00	50	\$2,500.00
Driveway replacement	ea	\$8,000.00	2	\$16,000.00
				\$59,000.00
			Total	\$103,152.00