

City of Kingston

**RECONSTRUCTION AND
REALIGNMENT OF
ALMA AND BALACLAVA STREETS**

STORM DRAINAGE REPORT

August 2006



CITY OF KINGSTON

**RECONSTRUCTION AND REALIGNMENT OF ALMA AND
BALACLAVA STREETS**

STORM DRAINAGE REPORT

TSH Project No. 14-150060

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STREETS
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**CITY OF KINGSTON
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STORM DRAINAGE REPORT**

1. INTRODUCTION

Alma and Balaclava Streets border two sides of McBurney Park, near the downtown core in the City of Kingston. The Study Area is shown below in **Figure 1**.

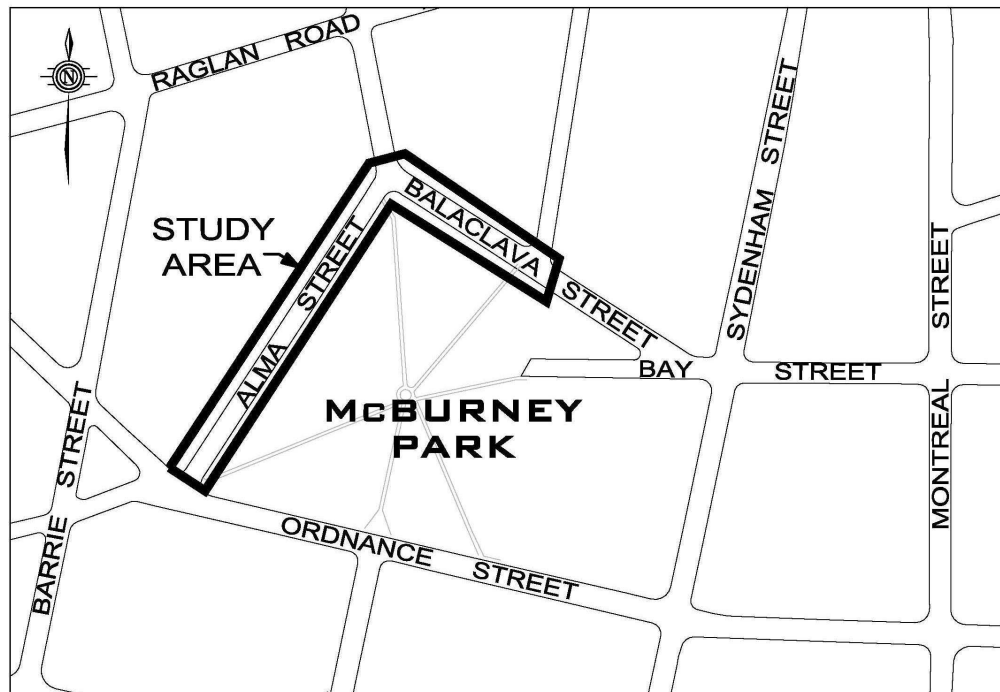


Figure 1: Study Area

This study is being undertaken as part of a Schedule B Municipal Class Environmental Assessment for the Reconstruction and Realignment of Alma and Balaclava Streets. Several alternatives are being considered for Alma Street as part of the Environmental Assessment:

- Option A: Do Nothing
- Option D: REPLACE INFRASTRUCTURE & RECONSTRUCT ALMA STREET- as a narrow two-way street with no parking
- Option E: REPLACE INFRASTRUCTURE & RECONSTRUCT ALMA STREET- as a northerly one-way street with parking
- Option F: REPLACE INFRASTRUCTURE & RECONSTRUCT ALMA STREET- as a southerly one-way street with parking

All of the options under consideration for Alma Street will either retain the status quo or decrease the width of the road. All of the alternatives except Do Nothing include reconstructing Balaclava Street in its original location.

The purpose of this report is to document existing drainage characteristics of the study area and recommend improvements. To this end, the following is discussed:

- The City of Kingston's strategy with regards to combined sewers
- Topography and surface drainage in the study area
- Location, age and condition of stormwater, combined and sanitary infrastructure on Alma and Balaclava Streets
- Finally, recommendations are made for improvements to the storm drainage system.

2. BACKGROUND

The City commissioned a Water Pollution Control Planning Study which was completed by CH2M Hill in 1992. This report recommended sewer separation projects only “where dictated by local capacity requirements”; projects resulting in additional storm run-off to Lake Ontario were “discouraged since this led to additional stormwater treatment requirements”. The specific recommendation for Alma, Balaclava and Redan Streets was “...affects inner harbour...recommend to leave as combined sewers”.

An update to the Water Pollution Control Planning Study was completed by XCG in 2000. The report does not present any new recommendation regarding sewer separation on Alma and Balaclava Streets and does not appear to provide any further analysis or to disagree with the original recommendation for that area. It does note that in general, improving CSO facilities is more cost-effective than separating and treating stormwater.

3. EXISTING CONDITIONS

Topography in the study area is fairly flat, generally dropping off toward the north and east toward the Cataraqui River.

Alma and Balaclava Streets are served by a mix of sanitary sewers, storm sewers and combined sewers which drain both stormwater and sanitary sewage. **Figure 2** shows existing sewers and flow directions. Minor storm flows from both streets eventually discharge east of the study area to the trunk sewer running along the Cataraqui River. Combined flow discharges to the River Street Pumping Station, from which it is pumped across the River and from there to the Ravensview Sewage Treatment Plant.

Alma Street

Alma Street is bordered by McBurney Park to the east and by tightly spaced, urban residential housing to the west. Front yards on Alma Street are small. Most of the front roof downspouts (approximately 80%) on Alma Street are directed to front lawns. Almost all of these have been directed onto vegetated lawns or gardens in accordance with best stormwater management practices. Backyard drainage on Alma Street is westward, away from the street.

A portion of McBurney Park (about a quarter of the total park area) drains toward Alma. Most of the Park drains east/southeast.

Alma has a normal crown and is relatively flat. The grade drops off very gradually at the north and south ends.

Historical records indicate that watermain and sewer were first constructed on Alma Street in 1893 (Bazely & Moorhead, 2003). Drawings were not available for the 1893 construction. The northerly portion of 225 mm diameter clay tile combined sewer on Alma, about 51 m long and terminating at the Alma Street / Patrick Street intersection, appears to date from 1916 (a sketch reproduced from Microfilm was provided by the City). A single catchbasin on the east side of Alma Street drains to this combined sewer.

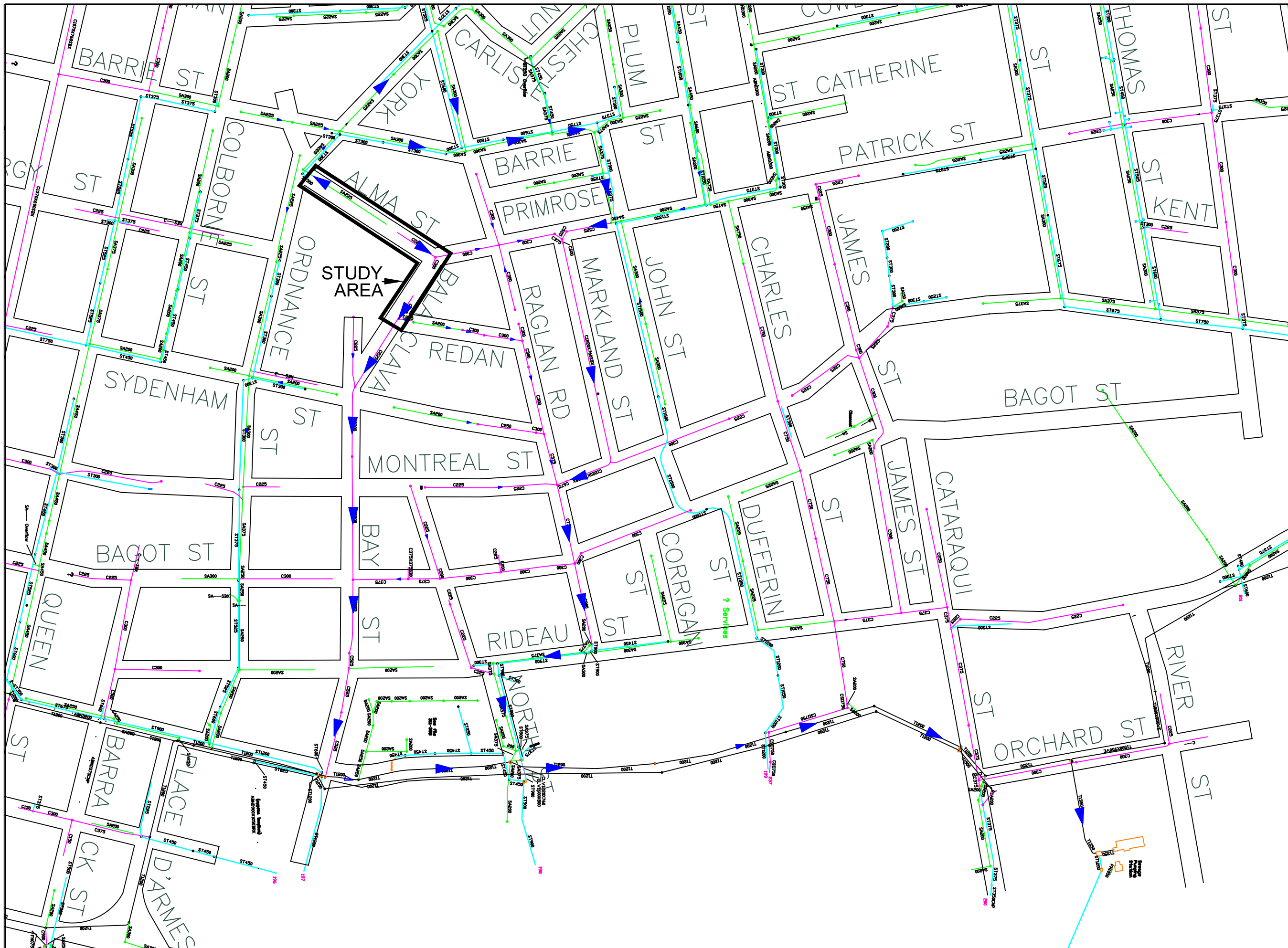
A separate 225 mm diameter clay tile sanitary sewer serves the southern 115 m of Alma Street. It appears that the northernmost 29 metres of this sanitary sewer was reconstructed in 1917 (a sketch reproduced from Microfilm was provided by the City). One catchbasin sits in line with this sewer on the west side of Alma Street, but does not appear to be connected, or at any rate is now blocked.

A 300mm storm sewer stub of unknown length extends northward on Alma Street from a maintenance hole at the corner of Alma and Ordnance Street. From here drainage is northerly, via a 300mm storm sewer on Ordnance Street.

Balaclava Street

Balaclava Street is bordered by McBurney Park to the south and by urban residential homes to the north. Homes are less closely spaced than those on Alma Street.

Most of the front roof downspouts on Balaclava Street are directed to front lawns. Balaclava Street backyard drainage is to the north and northeast, away from the street.



No.	DATE	BY	ISSUES / REVISIONS
1			

LEGEND

- C900 - COMBINED SEWER
- SA375 - SANITARY SEWER
- ST900 - STORM SEWER
- T1200 - TRUNK SEWER

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Whitby, Ontario
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CLIENT:
CITY OF KINGSTON

PROJECT:
RECONSTRUCTION AND REALIGNMENT OF ALMA AND BALACLAVA STREETS

DRAWING:
FIGURE 2: STORMWATER FLOW DIRECTIONS

DRAWN BY:	CHECKED BY:	PROJECT No.:
DESIGNED BY:	APPROVED BY:	14-150060
SCALE:	DATE:	DRAWING No.:
1:4000	AUGUST 2006	FIG.2

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The northwest corner of McBurney Park drains toward Balaclava Street, but most of the Park drains east/southeast.

Balaclava Street has a normal crown and slopes gradually eastward.

Historical records indicate that watermain and sewer were first constructed on Balaclava Street in 1893 (Bazely & Moorhead, 2003). Drawings were not available for the 1893 construction.

Combined sewer was reconstructed on Balaclava Street in 1928 from Redan Street to Sydenham Street (approximately 100 m of 225 mm diameter clay tile). There are no available records of the portion of combined sewer west of Redan Street on Balaclava Street; this may be the original 1893 sewer.

There are currently no catchbasins on Balaclava Street from Alma Street to just north of the intersection of Balaclava with Bay Street. This catchbasin and catchbasins at the northwest and southwest corners of the Bay Street / Sydenham Street intersection contribute to the combined sewer that runs down Bay south of Sydenham.

Sydenham Street

Sydenham Street between Ordnance Street and Balaclava Street (see **Figure 1**) is briefly discussed here because of its potential future relationship to Balaclava Street infrastructure. Should the City ever decide to separate the combined sewer on Balaclava Street into a sanitary and a storm sewer, new storm sewer on Balaclava could be linked to the existing storm sewer infrastructure on Sydenham Street.

Sydenham Street has a west-to-east crossfall. It slopes very gradually south and in a major storm, would carry flows from Balaclava Street and Bay Street south toward Ordnance Street.

Sydenham Street has separate sanitary and storm sewer systems. Both appear to have been constructed in 1996. The sanitary sewer terminates approximately 100 m north of the Sydenham / Ordnance Street intersection. The storm sewer on this block is shorter, terminating approximately 60 m north of the Sydenham / Ordnance intersection. There are four catchbasins along the south side of Sydenham Street between Bay Street and Ordnance Street.

4. CONCLUSIONS & RECOMMENDATIONS

Many of the existing sewers on Alma and Balaclava Streets appear to date from 1916 or 1917. The oldest were constructed in 1893. It is safe to assume that sewers of this age have condition issues and require replacement. Utilities Kingston has indicated that they intend to replace sewers and watermain on Alma and Balaclava Streets.

The anticipated work should not result in any significant increase in stormwater flows. Sizing of replacement sewers can take this into account. It will be important at the detail design stage that the stormwater management practises implemented as part of the reconstruction of Alma and Balaclava Streets consider the downstream conveyance system. A Certificate of Approval for the storm sewer design will be required from the Ministry of Environment Ontario prior to the reconstruction. Analysis will have to show adequate capacity in the downstream system for runoff generated on Alma and Balaclava Streets.

Deep catchbasin sumps should be incorporated into the reconstruction of Alma and Balaclava Streets to trap sediment and reduce peak runoff.

Despite recommendations in the Pollution Control Plan, Utilities Kingston has indicated that they prefer to separate combined sewers on Alma and Balaclava Streets. Opportunities to remove some flow from the combined system and direct it to the stormwater system are discussed below.

Alma Street

Alma Street currently is served by a sanitary sewer at its south end and a combined sewer at its north end. Storm drainage from much of Alma Street should be directed to an extension of the existing 300 mm diameter storm sewer at the corner of Alma and Ordnance Street.

Alma Street will not contribute a significant amount of drainage to the storm sewer on Ordnance Street and therefore the change described here is not expected to create problems in the downstream storm sewer. Care should be taken during detail design to ensure an adequate depth relative to footing drains.

Balaclava Street

An opportunity exists to extend the storm sewer on Sydenham Street northward, to pick up drainage currently addressed by three catchbasins on Bay and Balaclava contributing to the Bay Street combined sewer.

A connection to the storm sewer on Sydenham Street would require trench excavation on Sydenham Street and would therefore not be undertaken as part of this project. Since there is a long-term goal to separate the combined sewer on Balaclava Street, a new separate storm should be constructed now and temporarily connected to the combined sewer at the eastern project limit (i.e. at the Balaclava / Redan intersection).

5. REFERENCES

1. Bazely, Susan M. & Moorhead, Earl, Cataraqui Archaeological Research Foundation, Stage 1 Archaeological Assessment, McBurney Park, Upper Burial Ground, Kingston, Ontario, 2003.
2. CH2M HILL Engineering, City of Kingston Pollution Control Planning Study (not dated, possibly 1992).
3. XCG Consultants, City of Kingston Pollution Control Plan Update Project Report, November 6, 2000.

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