MEMORANDUM

URBAN systems

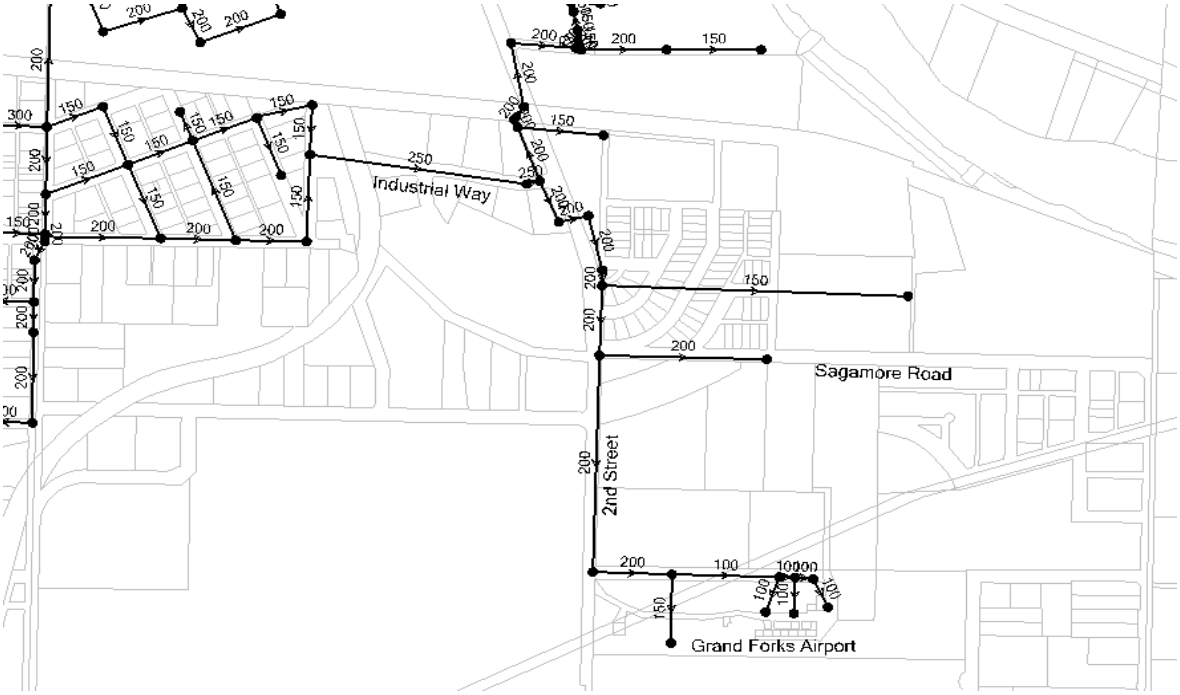
Date:	May 24, 2017
To:	Dolores Sheets, Manager of Development & Engineering, City of Grand Forks
cc:	Scott Shepherd, Urban Systems
From:	Jason Barta
File:	0788.0019.17
Subject:	Improved Water Supply to the Airport for Fire Safety

The City of Grand Forks is pursuing grant application (2017 Gas Tax Strategic Priorities Fund) funding to assist in the construction of water system upgrades to improve the fire flow availability of their water system at the Grand Forks Airport.

Water is supplied to the Airport and surrounding area by a 200mm diameter watermain along 2nd Street. There are also 150mm and 100mm diameter watermains at the airport site itself. Since the airport area is supplied only by a single main (i.e. there is no looping), the available fire flow of the system is limited by the watermain size. The single supply main also increases supply risk, as a watermain break between the Airport and Industrial Way would leave the entire area without water.

This memo will investigate potential improvements to the system from a supply and capacity standpoint. A proposed loop to the airport site via Sagamore Road will be reviewed, as well as identifying the off-site upgrades required to bring an industrial standard of fire protection to the airport site.

Figure A – Existing Water System near Airport



Analysis Criteria

Available fire flow will be calculated during maximum day demand (MDD) conditions, with a minimum residual pressure of 20 psi at each test hydrant and a maximum watermain velocity of 3.5 meters/second.

The analysis was run with the largest well pump offline, per best engineering practices.

A fire flow of 205 L/s has been assumed as the industrial level of fire protection for this memo, consistent with the Risk Assessment work performed by Urban Systems in 2014.

Analysis – Results

The industrial of area of Grand Forks lays is bound by the Kettle River on the west, north and east side. There are two main watermains feeding water into the area: a 300mm diameter watermain at the bridge crossing near 68th Avenue, and a 300mm diameter submerged watermain crossing at 1st Street.

The diameter of the distribution mains fed by these two trunks varies in size. The two watermain trunks meet at the intersection of Industrial Way and 2nd Street, where the existing available fire flow is 150 L/s, which is less than the target fire flow of 205 L/s for the airport area.

Since the properties with the highest (industrial) fire flow requirement are located adjacent to 2nd Street and 68th Avenue, it makes the most sense to upgrade the 2nd Street watermain from the River crossing to the airport site, to improve fire flow availability.

Analysis with the City's hydraulic water model indicated the following upgrades to provide the minimum required fire flow to the airport area:

- Upgrade the existing 200mm 2nd street watermain to 250mm, from Industrial Way to the Kettle River Crossing at 1st Street;
- Upgrade the existing 2nd Street watermain to 300mm, from Industrial Way to Birch Road;
- Upgrade the Birch Road watermain to 300mm diameter;
- Upgrade the Sagamore Road watermain to 250mm diameter;
- Construct a new 200mm watermain loop from Birch Road to Sagamore Road; and
- Provide two additional fire hydrants in the vicinity of the airport for better coverage.

The proposed upgrades are shown in **Figure 1**, attached to this memorandum.

The estimated capital cost for these upgrades is $**2,480,000**, and a detailed breakdown is attached at the end of this document.

Conclusions and Recommendations

The upgrades shown on Figure 1 will be sufficient to provide an industrial level of fire flow (205 L/s) to the airport area. It should be noted that any single fire hydrant can only provide 60-80 L/s of flow due to pipe diameters and internal friction losses. The available fire flows stated in this memo relate to the capacity in the watermain, and not the hydrants themselves.

Should you have any questions, please contact the undersigned.

URBAN SYSTEMS LTD.

Jason Barta, B.Sc.
Municipal Infrastructure Analyst
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Reviewed by:

Scott Shepherd, AScT.
Project Manager

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Cost Estimate - Offsite Upgrades
Grand Forks Airport Fire Flow Improvements

Project Description

USL Job No.	0788.0019.17
Date	5/24/2017
Prepared by:	J.Barta
Checked by:	S.Shepherd
See Figure	1

Estimate assumes a half road (4m wide) restoration
250mm watermain - Kettle River to Industrial Way
300mm watermain - Industrial Way
300mm watermain - Birch Road
250mm watermain - Sagamore Road
200mm watermain loop - Sagamore to Airport (east of 2nd Street)
Two new hydrant assemblies at airport

ITEM	DESCRIPTION	QTY	UNIT	$/UNIT	EXTENDED
	Mobilization & Demobilization	1	LS	$80,000	$80,000
	Insurance and Bonding	1	LS	$25,000	$25,000
	200mm watermain	350	m	$300	$105,000
	250mm watermain	950	m	$350	$332,500
	300mm watermain	950	m	$400	$380,000
	Abandon existing watermain	2250	m	$50	$112,500
	75mm thickness - asphalt restoration	9000	sq.m	$36	$324,000
	100mm thickness - base course gravel	9000	sq.m	$15	$135,000
	350mm thickness - subbase course gravel	9000	sq.m	$22	$198,000
	Reconnect existing watermain service	15	ea	$2,000	$30,000
	Fire hydrant assembly (complete)	2	ea	$6,000	$12,000
	Tie-in to existing watermains	7	ea	$5,000	$35,000
				subtotal	$1,769,000
				Contingency and Engineering (40%)	$707,600
				total	$2,476,600
				rounded total	$2,480,000

Notes: Estimates do not include land acquisition costs
Cost estimate prepared without geotech or survey. Complete field investigations to refine estimate.
Watermain costs include a 10% allowance for fittings

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CITY OF GRAND FORKS

AUGUST 2013
1:2,500

AIRPORT FIRE FLOW IMPROVEMENTS

FIGURE
1

Legend

Existing Watermains
- 100mm and smaller
- 150mm
- 200mm
- 250mm
- 300mm
- 350mm

Watermain Upgrades
- 200mm
- 250mm
- 300mm

Proposed 200mm watermain loop through industrial lands (right-of-way required)

Tie-in to existing 300mm watermain

Tie-in to existing watermain (typical)

Reconnect existing hydrants and services to new main (typical)

Grand Forks Airport

Kettle River

Highway 3

Sand Creek Road

Coronation Place

Industrial Park Way

Industrial Drive

Sagamore Avenue

Richmond Avenue

1st Street

2nd Street

3rd Street

4th Street

5th Street

6th Street

Riverside Drive

63th Avenue

64th Avenue

72nd Avenue

None

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