APPENDIX B – GATE CHAMBER CONCEPT DESIGN REPORT RUBY AND AUBREY LOCATIONS – EXISTING CONDITION ASSESSMENTS FOR THE CITY OF WINNIPEG WATER AND WASTE DEPARTMENT BY MMM GROUP LTD. 5514130-000.101

4.0 RUBY

4.1 Gate Chamber Information

Gate Chamber Name:	Ruby
Year of Construction:	1969
Location of Station:	Intersection of Ruby Street and Palmerston Avenue
Sewer Type:	2440 mm Diameter Storm Relief Sewer (2440 SRS)
Sluice Gate:	Rectangular 2740 mm wide x 2130 mm high
Rim Elevation to Downstream Invert:	10.546 m
Chamber Construction:	Cast-in-Place Concrete
Date of Inspection:	November 28, 2014
Inspected By:	Edmund Ho, P.Eng. and Bob Bowles, EIT
Inspecting Firm:	MMM Group Limited (MMM)
Client:	City of Winnipeg – Water and Waste Department

4.2 Observations

4.2.1 General

The Ruby gate chamber is a conventional two-cell gate chamber with a positive sluice gate in the downstream chamber and a 350 mm wide slot for stop logs in the upstream chamber. The top of the roof is approximately 250 mm below grade except for manhole and hatch. The chamber is constructed of cast-in-place concrete with galvanized steel hatch covers and frames. There is an outfall in the upstream chamber from a weir in an adjacent combined sewer. The sluice gate is operated by a gate lift located on a concrete mid-level floor inside the chamber with an operating shaft that extends to the surface. Piping to dewater the upstream side to the downstream side has been added to the chamber. At the time of inspection there was over 3 m of water in the chamber and as a result some components were inaccessible.

4.2.2 Site Safety

The inspection was carried out by Bob Bowles, EIT, and Edmund Ho, P.Eng., on November 28, 2014 with assistance from the COW collections crew. MMM's inspectors have been trained in confined space entry, fall protection, first aid and were fitted and trained in the use of respirators. All work was carried out in accordance with the Safe Work Plan submitted under separate cover. No incidents, near misses or hazard IDs were recorded at the site.

4.2.3 Site Conditions

The site is located on the boulevard of Ruby Street on the northwest corner of the intersection with Palmerston Avenue. The existing chamber is in a grassed space and is recessed 250 mm below grade except for openings. There is a large tree immediately north of the existing chamber which it is assumed the City would like to preserve. The site is also located adjacent to private houses so working hours may affect the construction schedule. Records show that corrugated metal pipe sections of the SRS have slip joints packed with asbestos rope.

4.2.4 Gate Condition

The downstream chamber contains a 2740 mm wide x 2130 mm high steel gate supported by a wall thimble and gate guides. The gate stem feeds through a steel stem guide immediately below the intermediate concrete floor to a gate lift located inside the chamber. Drawings show an operating shaft extending from the gate lift to the surface of the chamber. However, this was not present at the time of inspection. Some components were not visible during inspection. The functionality of the gate was not checked during inspection because leaks would not be visible. COW collections workers stated the gate had been operating properly.

Severe corrosion was present on the gate stem guide, and therefore this component should be replaced.

Component	Condition	Notes
Gate	Fair	Rusted with scaling and some section loss, limited access during inspection.
Thimble	Unknown	Not accessible during inspection.
Gate Guides	Unknown	Not accessible during inspection.
Gate Stem	Good	
Stem Guide	Poor	Significant section loss, requires replacement.
Gate Lift	Fair	Rusted with some section loss. Operating shaft not present during inspection.

4.2.5 Chamber Condition

The chambers are cast-in-place concrete with galvanized steel appurtenances. During the inspection high water limited access to some components with some areas inaccessible. Piping for submersible pumps has been added to the chamber and concrete has spalled where openings in the chamber roof were cut for conduits. The round manhole opening of the upstream chamber has been replaced with a rectangular hatch by saw-cutting through the previous roof slab. This saw-cutting has resulted in several spalls around the bottom edge of the opening, and leaves the ends of some reinforcing exposed. The roof slab may require replacing in the long-term due to durability issues. The galvanized safety cage in the upstream chamber has been removed, apparently to facilitate the installation submersible pump piping. This is acceptable by current standards. A 4.5 m high air vent shown on drawings was not observed on site. It is assumed the chamber is adequately vented through the manhole opening however this should be confirmed.

Component	Condition	Notes
Structural Concrete	Fair	Limited access. Spalling and exposed rebar around opening in roof slab.
Galvanized Steel Hatches and Frames	Good	
Galvanized Steel Ladders and Safety Cages	Good	Safety cage in upstream chamber has been removed.
Air Vent	Missing	Air vent not present.
Existing SRS	Unknown	SRS not accessible.

4.2.6 Pumps and Electrical

The Ruby Street gate chamber currently does not have a permanent chamber pump installed. It was noted by the COW that they rent a submersible pump for this site. This particular pump was rated for 0.076 m^3/s (1200 USgpm) and does not properly dewater the chamber within a 24 hour or 48 hour period. Recorded data for COW storm flow rates on this gate chamber were

not able to be obtained. To determine if a pump was required and sizing an estimated volume of water in the upstream piping while the James Avenue gauge reads 3.35 m (11-ft) was calculated. Volume at this location was approximated at 20,000 m³ (5,283,441 US gallons). It is recommended that a submersible dewatering pump be provided for this site. A dewatering period of 24 hour and 48 hour were prescribed by the COW. For this site a 24 hour period is not practicable and a 48 hour period was selected. This results in a required pumping capacity of approximately 0.116 m³/s (1800 to 1850 USgpm). The pump during operation may be required to pass solids and it is recommended that a solids handling pump be selected, screening may be required. This will result in a probable pump discharge connection size of 200 mm (8-in) but is dependent on pump type and manufacture. The final physical characteristics of pump selection during detailed design should be based off probable solids sizes which can enter into the piping system in discussion with COW operations. The new pump for economics and availability should be run from a 600v/3-ph power source. It is recommended that where practicable a common pump type and size be selected for all gate chamber sites. Dependent upon the final pump selection and design head for this site the pumping curve for the pumps used at other sites noted within this report may still be suitable.

A suitable control system is necessary for the pump; a typical float type system is recommended with an above grade mounted control panel having hand/off/auto feature. The control panel should facilitate automation of the pump and provide minimal monitoring of pump operation, control circuit, and high water level. Due to the very minor incremental cost of remote monitoring of the panel-trouble or alarm conditions, common trouble alarm should be provided even if it is not connected at this time. Monitoring and manual operation of the pump from above grade will aid in maintenance and avoid unnecessary entry into the gate chamber to determine operating condition of the pump.

Replacement of the discharge piping and components should also be performed. Valve extensions brought to grade elevation are recommended for any diversion valve. This will allow operation from outside of the chambers avoiding unnecessary entry into the chamber. During the detailed design process this should be reviewed to ensure the feasibility.

Manitoba Hydro existing electrical service is 100A/120/240V/1phase. We recommend that new 200A/600V/3phase/4wire service to be provided to the site.

Component	Condition	Notes
Submersible Pump	Existing - Unknown	Provide new simplex submersible pump c/w control panel, floats, and guide rail assembly. Pump to provide 1800GPM at design head conditions. Remove existing pump and controls. Estimated Cost $46,500
Discharge Piping and Valve	N/A	Provide new pump discharge piping, rails, appurtenances, and downstream flapper gate. Provide valve operator extensions. Estimated Cost: $15,000
Electrical and Controls	N/A	Demolish existing control panel and provide new weatherproof, vandal-resistant outdoor enclosure c/w service entrance rated breaker, starter, controls and metering. Re-use existing feeder from to be demolished control panel to Manitoba Hydro. Manitoba Hydro to replace existing electrical service with new to suit new installation. Estimated Cost $35,000.

4.3 Proposed Upgrades

The parts of the chamber that were visible and accessible were in overall good condition. Spalls around openings from earlier chamber upgrades should be repaired with grout in order to maintain adequate cover to reinforcing steel for long-term durability. The stem guide of the existing sluice gate is severely corroded and should be replaced. The condition below the waterline at the time of inspection is unknown and it is possible that there may be maintenance repairs required.

As part of the RFP the feasibility of installing a flap gate was assessed. Placing a new chamber cell upstream of the existing chamber would disrupt the aesthetics of the boulevard. For this reason it is proposed to place a new three cell chamber towards the outfall of the SRS. MMM proposes placing the new chamber in the parking lot of the Robert A. Steen Community Club resulting in some property acquisition. The chamber would be built complete with a new flap gate, sluice gate and pump-out. The existing chamber would be abandoned with the sluice gate removed.

A site plan and conceptual drawing is included in Appendix B of this report.

The total estimated cost of these works including expected engineering fees and taxes is: $1,889,000. A breakdown of the cost is included in Section 4.5 below.

4.4 Conclusions and Recommendations

MMM, through this inspection, does not warrant that the design complies with current codes or standards.

The existing chamber is functional, although there is visible corrosion to several gate components. Because of site constraints, in order to install a flap gate it is preferable to locate it in a separate chamber several meters upstream of the existing chamber.

4.5 Class-3 Cost Estimate

Item	Description	Unit	Unit Price	Construct Separate Three Cell Chamber	
				Quantity	Price
1	Construction of New Chamber				
1-1	Excavation, Shoring and Backfill	m^3	$600.00	800	$480,000.00
1-2	Cast-In-Place Concrete	m^3	$2,500.00	165	$412,500.00
1-3	Supply and Install Flap Gate	LS	$221,400.00	1	$221,400.00
1-4	Supply and Install Sluice Gate	LS	$309,400.00	1	$309,400.00
2	Surface Restoration and Landscaping	LS	$55,000.00	1	$55,000.00
3	Mechanical/Electrical Upgrades				
3-1	Supply and Install New Submersible Pump, Automation and Controls	LS	$46,500.00	1	$46,500.00
3-2	Supply and Install Discharge Piping and Valve	LS	$15,000.00	1	$15,000.00
3-3	Power Supply and Control for the New Submersible Pump	LS	$35,000.00	1	$35,000.00
	Total Construction				**$1,574,800.00**
	Engineering Fees (10%)				**$157,000.00**
	City Fees (10%)				**$157,000.00**
			Total		**$1,888,800.00**
			Rounded =		$1,889,000.00

Additonal Price Options

Item	Description	Unit	Unit Price	Construct Separate Three Cell Chamber	
				Quantity	Price
4	Credit for Not Installing Permanent Pumps				
4-1	Less Supply and Install New Submersible Pump, Automation and	LS	-$46,500.00	1	-$46,500.00
4-2	Less Supply and Install Discharge Piping and Valve	LS	-$15,000.00	1	-$15,000.00
4-3	Less Power Supply and Control for the New Submersible Pump	LS	-$35,000.00	1	-$35,000.00
	Total Credit with No Permanent Pumps				**-$96,500.00**
	Total Credit incl 10% Eng + 10% City Fees				**-$115,800.00**
			Total with No New Permanent Pumps (Rounded)		**$1,773,000.00**

4.6 Photographs

Photograph No. 1

Overall site looking south (towards outfall)

Photograph No. 2

Existing site looking north (towards upstream)

Photograph No. 3

Opening to upstream chamber, spalls and exposed reinforcing

Photograph No. 4

Upstream chamber, ladder safety cage removed

Photograph No. 5

450 mm combined sewer outfall

Photograph No. 6

Gate lift, operating shaft not present

Photograph No. 7

Flap outlet for pumps from upstream chamber

Photograph No. 8

Severe corrosion on gate stem guide

Photograph No. 9

Positive sluice gate

5.0 AUBREY

5.1 Gate Chamber Information

Gate Chamber Name:	Aubrey
Year of Construction:	1969
Location of Station:	Intersection of Aubrey Street and Palmerston Avenue
Sewer Type:	2900 mm Diameter Storm Relief Sewer (2900 SRS)
Sluice Gate:	Rectangular 2740 mm wide x 2130 mm high
Rim Elevation to Downstream Invert:	11.000 m
Chamber Construction:	Cast-in-Place Concrete
Date of Inspection:	November 28, 2014
Inspected By:	Edmund Ho, P.Eng. and Bob Bowles, EIT
Inspecting Firm:	MMM Group Limited (MMM)
Client:	City of Winnipeg – Water and Waste Department

5.2 Observations

5.2.1 General

The Aubrey gate chamber is a conventional two-cell gate chamber with a positive sluice gate in the downstream chamber and a 350 mm wide slot for stop logs in the upstream chamber. The chamber is constructed of cast-in-place concrete with galvanized steel hatch covers and frames. The sluice gate is operated by a gate lift located on a mid-level concrete floor inside the chamber with an operating shaft that extends to the surface. Piping for submersible pumps to dewater the upstream cell to the downstream cell has been added to the chamber. At the time of inspection there was over 3 m of water in the chamber and as a result some components were inaccessible.

5.2.2 Site Safety

The inspection was carried out by Bob Bowles, EIT, and Edmund Ho, P.Eng., on November 28, 2014 with assistance from the COW collections crew. MMM's inspectors have been trained in confined space entry, fall protection, first aid and were fitted and trained in the use of respirators. All work was carried out in accordance with the Safe Work Plan submitted under separate cover. No incidents, near misses or hazard IDs were recorded at the site.

5.2.3 Site Conditions

The site is located on the river-side of the intersection of Aubrey Street and Palmerston Avenue. There are trees north of the chamber which may interfere with construction. Removing the existing upstream chamber cell would help reduce the overall footprint of the upgrades. Hydro pole guy wires are anchored immediately north of the existing chamber which will have to be relocated to allow new construction. The site is also adjacent to a private home so working hours may affect the construction schedule. Records show that corrugated metal pipe sections of the SRS have slip joints packed with asbestos rope.

5.2.4 Gate Condition

The downstream chamber contains a 2740 mm wide x 2130 mm high steel gate supported by a wall thimble and gate guides. The gate stem feeds through a steel stem guide immediately below the intermediate concrete floor to a gate lift located inside the chamber. Drawings show an operating shaft extending from the gate lift to the surface of the chamber, however this was not present at the time of inspection. Some components were not visible during inspection. The concrete has exhibited minor differential movement along a horizontal construction joint in the lower section of the upstream cell. The functionality of the gate was not checked during

inspection because leaks would not be visible. COW collections workers stated the gate had been operating properly.

Component	Condition	Notes
Gate	Fair	Rusted with scaling and some section loss, limited access during inspection.
Thimble	Unknown	Not accessible during inspection.
Gate Guides	Unknown	Not accessible during inspection.
Gate Stem	Good	
Stem Guide	Fair	Rusted with some section loss.
Gate Lift	Fair	Rusted with some section loss. Operating shaft not present during inspection.

5.2.5 Chamber Condition

The chambers are cast-in-place concrete with galvanized steel appurtenances. During the inspection high water limited access to some components with some areas inaccessible. Piping for submersible pumps has been added to the chamber. The galvanized safety cage in the upstream chamber has been altered to facilitate the installation submersible pump piping which is acceptable. The cage is also damaged near the bottom of the chamber such that it interferes with the climbing circle, and therefore this should be repaired. In the upstream cell at the construction joint located approximately mid-height there is slight differential movement of the concrete made visible by some feathering of the concrete. No other cracks or visible deflections were noted.

Component	Condition	Notes
Structural Concrete	Fair	Limited access. Differential movement around mid-level construction joint in upstream cell.
Galvanized Steel Hatches and Frames	Good	
Galvanized Steel Ladders and Safety Cages	Fair	Safety cage in upstream cell has been modified to facilitate discharge piping, which is acceptable. Cage in upstream cell is damaged near bottom and interferes with climbing circle.
Air Vent	Good	
Existing SRS	Unknown	SRS not accessible.

5.2.6 Pumps and Electrical

The Aubrey Street gate chamber currently does not have a permanent chamber pump installed. It was noted by the COW that they rent a submersible pump for this site. This particular pump was rated for 0.076 m^3/s (1200 USgpm) and does not properly dewater the chamber within a 24 hour or 48 hour period. Recorded data for COW storm flow rates on this gate chamber were not able to be obtained. To determine if a pump was required and sizing an estimated volume of water in the upstream piping while the James Avenue gauge reads 3.35 m

(11-ft) was calculated. Volume at this location was approximated at 15,000 m^3 (3,962,581 US gallons). It is recommended that a submersible dewatering pump be provided for this site. A dewatering period of 24 hour and 48 hour were prescribed by the COW. For this site a 24 hour period is not practicable and a 48 hour period was selected. This results in a required pumping capacity of approximately 0.087 m^3/s (1400 USgpm). The pump during operation may be required to pass solids and it is recommended that a solids handling pump be selected, screening may be required. This will result in a probable pump discharge connection size of 200 mm (8-in) but is dependent on pump type and manufacture. The final physical characteristics of pump selection during detailed design should be based off probable solids sizes which can enter into the piping system in discussion with COW operations. The new pump for economics and availability should be run from a 600v/3-ph power source. It is recommended that where practicable a common pump type and size be selected for all gate chamber sites. Dependent upon the final pump selection and design head for this site the pumping curve for the pumps used at other sites noted within this report may still be suitable.

A suitable control system is necessary for the pump; a typical float type system is recommended with an above grade mounted control panel having hand/off/auto feature. The control panel should facilitate automation of the pump and provide minimal monitoring of pump operation, control circuit, and high water level. Due to the very minor incremental cost of remote monitoring of the panel-trouble or alarm conditions, common trouble alarm should be provided even if it is not connected at this time. Monitoring and manual operation of the pump from above grade will aid in maintenance and avoid unnecessary entry into the gate chamber to determine operating condition of the pump.

Replacement of the discharge piping and components should also be performed. Valve extensions brought to grade elevation are recommended for any diversion valve. This will allow operation from outside of the chambers avoiding unnecessary entry into the chamber. During the detailed design process this should be reviewed to ensure the feasibility.

Manitoba Hydro existing electrical service is 200A/347/600V/3phase, no upgrade is required for this service.

Component	Condition	Notes
Submersible Pump	Existing - Unknown	Provide new simplex submersible pump c/w control panel, floats, and guide rail assembly. Pump to provide 1400GPM at design head conditions. Remove existing pump and controls. Estimated Cost $46,500
Discharge Piping and Valve	N/A	Provide new pump discharge piping, rails, appurtenances, and downstream flapper gate. Provide valve operator extensions. Estimated Cost: $15,000
Electrical and Controls	N/A	Demolish existing control panel and provide new weatherproof, vandal-resistant outdoor enclosure c/w service entrance rated breaker, starter, controls and metering. Save existing Hydro service for re-use. Estimated Cost $20,000.

5.3 Proposed Upgrades

The parts of the chamber that were visible and accessible were in overall good condition. The condition below the waterline at the time of inspection is unknown and it is possible that there may be maintenance repairs required.

As part of the RFP the feasibility of installing a flap gate was assessed. It is preferred to minimize the impact on the surrounding area however excavation will likely result in the loss of at least one tree. The existing upstream cell will become redundant and may be removed to reduce the overall footprint of the upgrades at an increased construction cost. A separate chamber cell for pump-out is proposed to be placed upstream of the flap-gate chamber.

Due to the age of the existing steel positive gate it is recommended to replace the gate, frame, stem and other appurtenances. A new surface-mounted gate operator would be installed.

A site plan and conceptual drawing is included in Appendix B of this report.

The total estimated cost of these works including expected engineering fees and taxes is: $1,819,000. A breakdown of the cost is included in Section 5.5 below.

5.4 Conclusions and Recommendations

MMM, through this inspection, does not warrant that the design complies with current codes or standards.

The existing chamber is functional, although there is visible corrosion to several gate components. A flap-gate cell and pump-out could be installed on the upstream side of the existing chamber.

5.5 Class-3 Cost Estimate

Item	Description	Unit	Unit Price	Add Two Cells to Existing Chamber	
				Quantity	Price
1	Construction of New Chamber				
1-1	Excavation, Shoring and Backfill	m^3	$600.00	815	$489,000.00
1-2	Cast-In-Place Concrete	m^3	$2,500.00	130	$325,000.00
1-3	Supply and Install Flap Gate	LS	$260,300.00	1	$260,300.00
1-4	Supply and Install Sluice Gate	LS	$309,400.00	1	$309,400.00
2	Surface Restoration and Landscaping	LS	$50,000.00	1	$50,000.00
3	Mechanical/Electrical Upgrades				
3-1	Supply and Install New Submersible Pump, Automation and Controls	LS	$46,500.00	1	$46,500.00
3-2	Supply and Install Discharge Piping and Valve	LS	$15,000.00	1	$15,000.00
3-3	Power Supply and Control for the New Submersible Pump	LS	$20,000.00	1	$20,000.00
	Total Construction				**$1,515,200.00**
	Engineering Fees (10%)				**$152,000.00**
	City Fees (10%)				**$152,000.00**
			Total		**$1,819,200.00**
			Rounded =		$1,819,000.00

Additonal Price Options

Item	Description	Unit	Unit Price	Add Two Cells to Existing Chamber	
				Quantity	Price
4	Credit for Not Installing Permanent Pumps				
4-1	Less Supply and Install New Submersible Pump, Automation and	LS	-$46,500.00	1	-$46,500.00
4-2	Less Supply and Discharge Piping and Valve	LS	-$15,000.00	1	-$15,000.00
4-3	Less Power Supply and Control for the New Submersible Pump	LS	-$20,000.00	1	-$20,000.00
	Total Credit with No Permanent Pumps				**-$81,500.00**
	Total Credit incl 10% Eng + 10% City Fees				**-$97,800.00**
5	Credit for Not Replacing Existing Sluice				
5-1	Less Supply and Install Sluice Gate	LS	-$309,400.00	1	-$309,400.00
	Total Credit No Sluice Replacement				**-$309,400.00**
	Total Credit incl 10% Eng + 10% City Fees				**-$371,300.00**

Total with No New Permanent Pumps (Rounded)	**$1,721,000.00**
Total with No Sluice Replacement (Rounded)	**$1,448,000.00**
Total with No New Permanent Pumps AND No New Sluice Replacement (Rounded)	**$1,350,000.00**

5.6 Photographs

Photograph No. 1

Overall site looking northwest

Photograph No. 2

Existing site looking south (towards outfall)

Photograph No. 3

Chamber roof looking east

Photograph No. 4

Upstream chamber cell, damage to safety cage near bottom of chamber

Photograph No. 5

Underside of upstream chamber galvanized hatch covers

Photograph No. 6

Cracks in construction joint in upstream chamber cell

Photograph No. 7

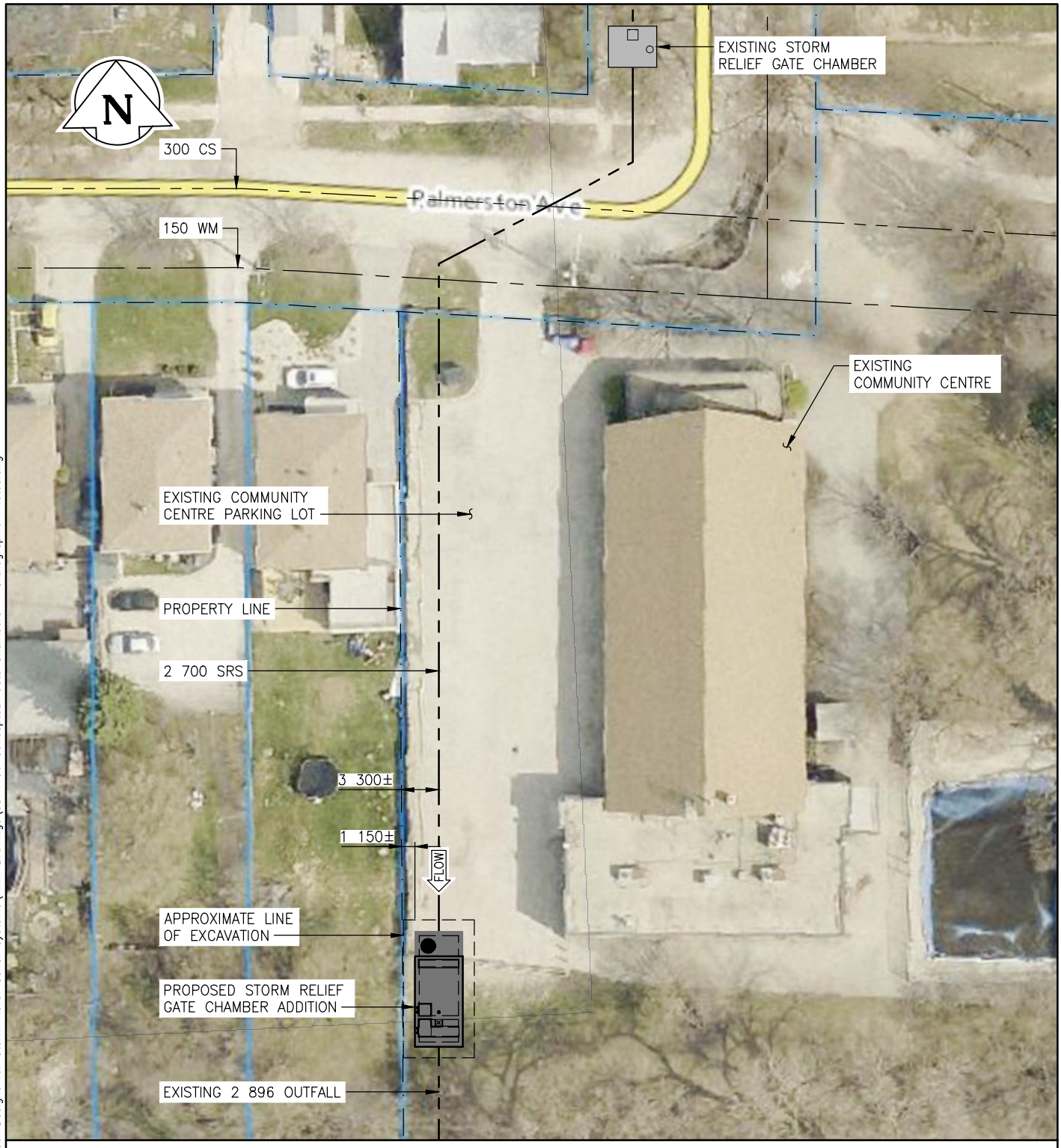
Downstream chamber cell from above

Photograph No. 8

Gate lift

Photograph No. 9

Positive sluice gate



LOCATION PLAN

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NOTES

1. METRIC DRAWING. WHOLE NUMBERS INDICATE MILLIMETRES. DECIMALIZED NUMBERS INDICATE METRES. DO NOT SCALE DRAWING.
2. DIMENSIONS TO EXISTING UTILITIES, SERVICES AND PROPERTY LINES ARE ASSUMED AND MUST BE VERIFIED.
3. OTHER UTILITIES AND UNDERGROUND STRUCTURES NOT SHOWN.

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CONCEPTUAL GATE CHAMBER DESIGNS FOR STORM RELIEF SEWER SYSTEMS

RUBY STREET STORM RELIEF GATE CHAMBER LOCATION PLAN

SCALE:	DATE:	DWG. No.
AS NOTED	15 03 30	FIGURE 4.01

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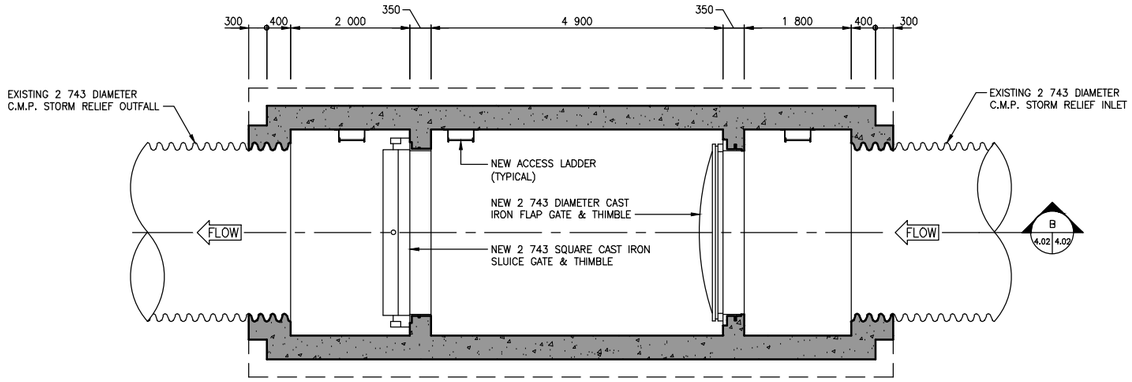

SECTION A
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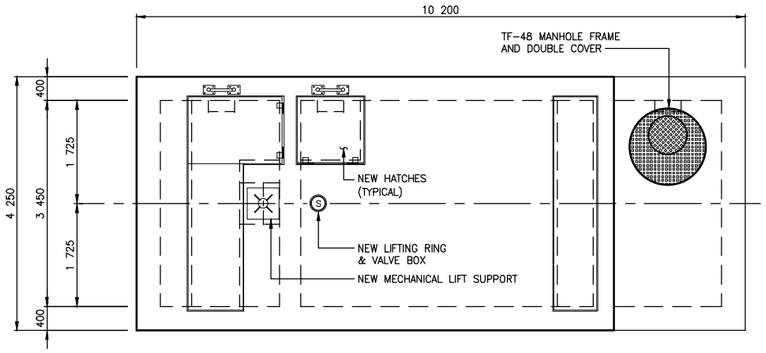

PLAN
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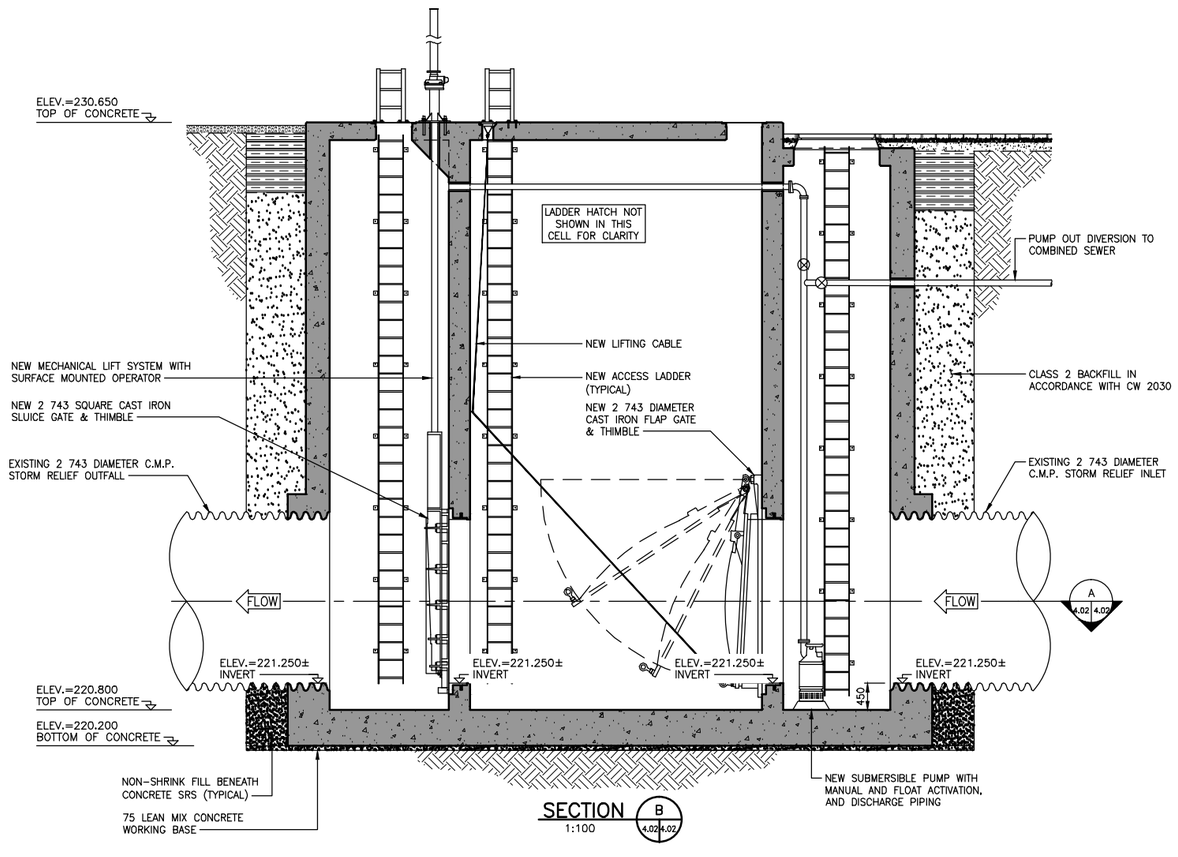

SECTION B
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NOTES

1. METRIC DRAWING. WHOLE NUMBERS INDICATE MILLIMETRES. DECIMALIZED NUMBERS INDICATE METRES. DO NOT SCALE DRAWING.
2. SEE FIGURE 4.01 FOR LOCATION PLAN.
3. THE TOP OF CONCRETE ELEVATION SHOWN IS BASED ON 1997 FLOOD WATER ELEVATION PLUS 1.22 METRES. THE TOP OF CONCRETE ELEVATION SHALL BE THE GREATER OF 1997 FLOOD WATER ELEVATION PLUS 1.22 METRES OR THE EXISTING GROUND ELEVATION. A TOPOGRAPHIC SURVEY IS REQUIRED TO VERIFY THE EXISTING GROUND ELEVATION.
5. CONCRETE BENCHING (NOT SHOWN), MUST BE PROVIDED IN ALL NEW CELLS AFTER INSTALLATION OF NEW GATES.
6. OTHER UTILITIES AND UNDERGROUND STRUCTURES NOT SHOWN.

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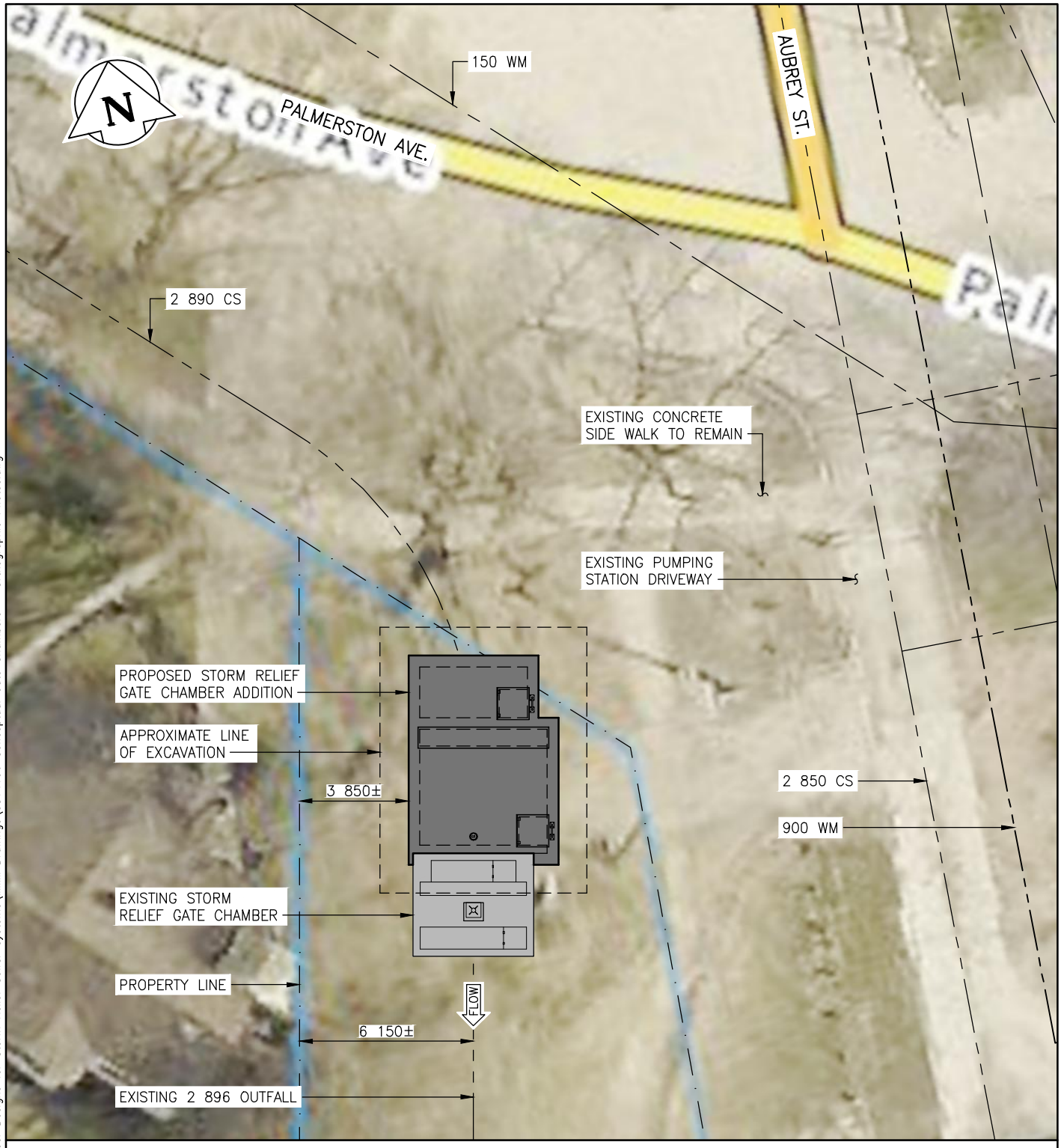
CONCEPTUAL GATE CHAMBER DESIGNS FOR STORM RELIEF SEWER SYSTEMS

RUBY STREET STORM RELIEF GATE CHAMBER CONCRETE DETAILS

SCALE:	DATE:	DWG. No.
AS NOTED	15 03 30	FIGURE 4.02



LOCATION PLAN

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NOTES

1. METRIC DRAWING. WHOLE NUMBERS INDICATE MILLIMETRES. DECIMALIZED NUMBERS INDICATE METRES. DO NOT SCALE DRAWING.
2. DIMENSIONS TO EXISTING UTILITIES, SERVICES AND PROPERTY LINES ARE ASSUMED AND MUST BE VERIFIED.
3. OTHER UTILITIES AND UNDERGROUND STRUCTURES NOT SHOWN.

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CONCEPTUAL GATE CHAMBER DESIGNS FOR STORM RELIEF SEWER SYSTEMS

AUBREY STREET STORM RELIEF GATE CHAMBER LOCATION PLAN

SCALE:	DATE:	DWG. No.
AS NOTED	15 03 30	FIGURE 5.01

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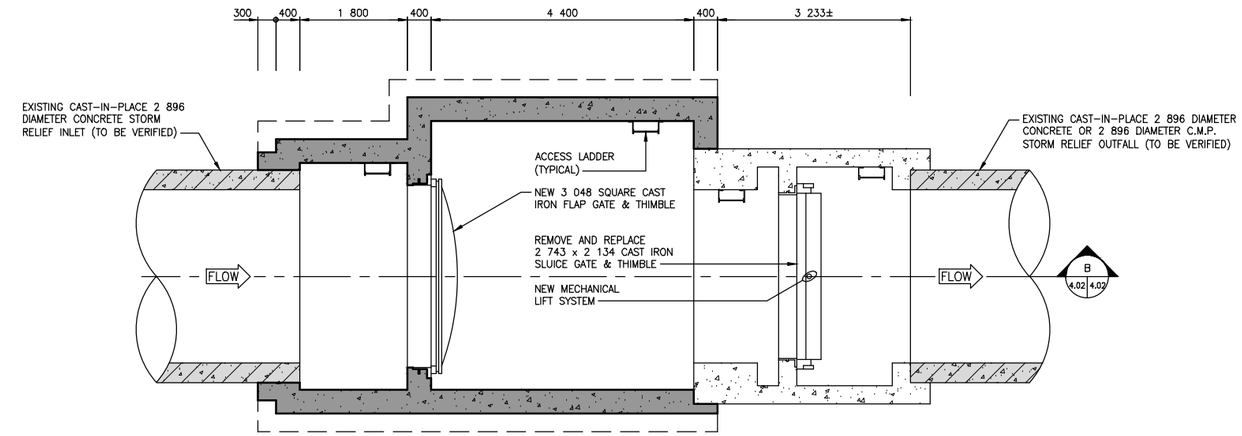
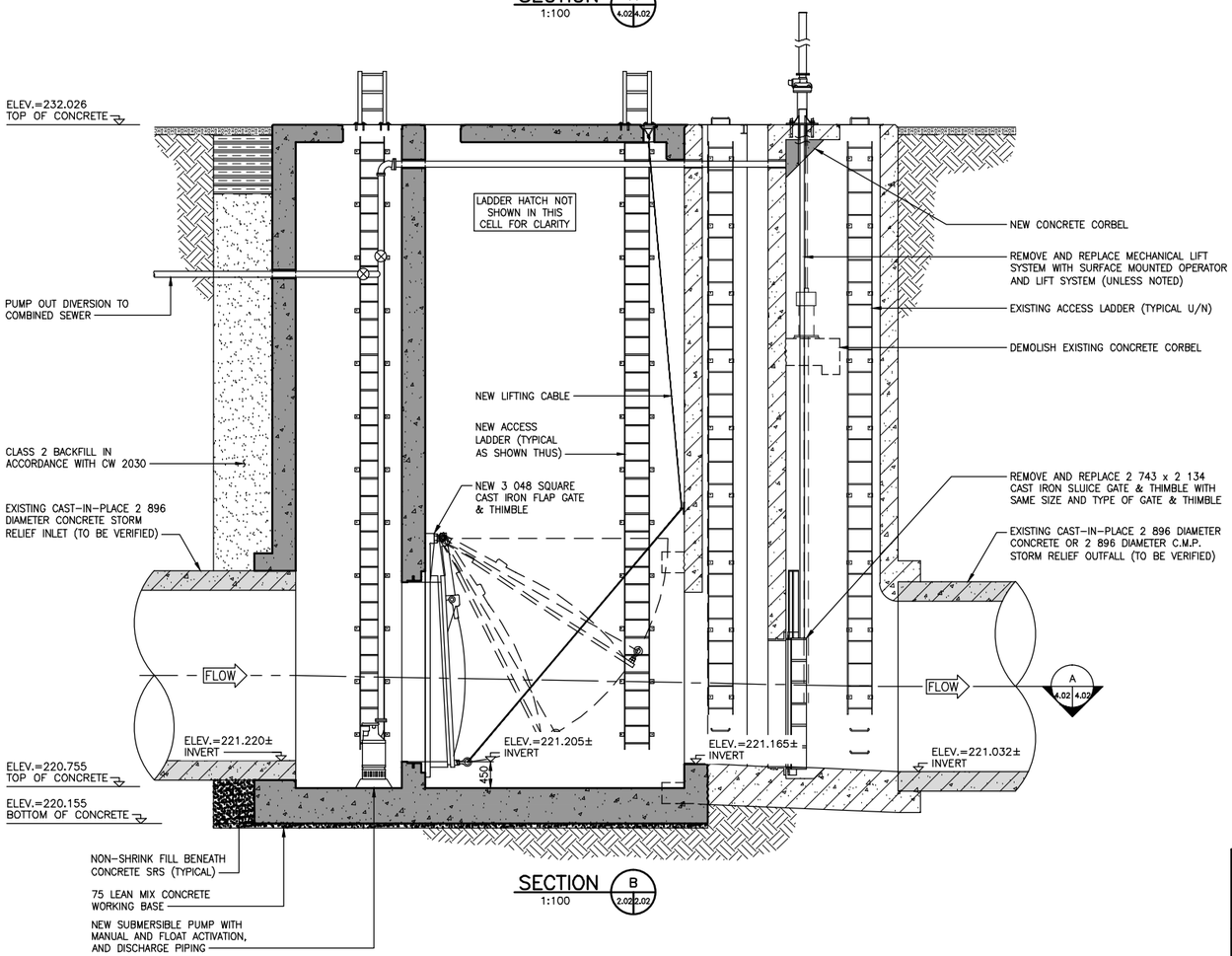


SECTION A
1:100



SECTION B
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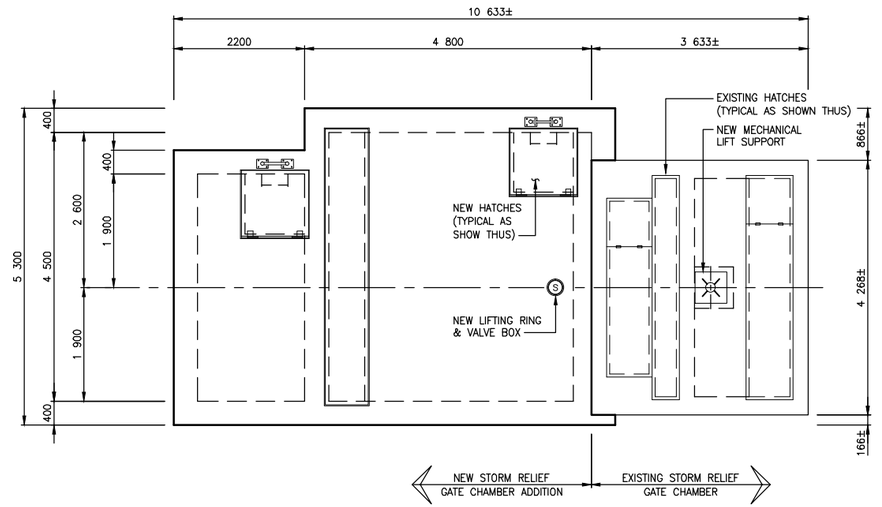

PLAN
1:100

NOTES

1. METRIC DRAWING. WHOLE NUMBERS INDICATE MILLIMETRES. DECIMALIZED NUMBERS INDICATE METRES. DO NOT SCALE DRAWING.
2. SEE FIGURE 5.01 FOR LOCATION PLAN.
3. DIMENSIONS AND GEOMETRY OF EXISTING STORM RELIEF GATE CHAMBER WERE DERIVED FROM THE ORIGINAL c1969 DRAWINGS.
4. ELEVATION DATUM (0.00') ASSUMED TO EQUAL 727.57' A.M.S.L. (JAMES AVE. PUMPING STATION). ALL ELEVATIONS FROM ORIGINAL c.1969 DRAWINGS WERE THEN HARD CONVERTED TO METRES (MULTIPLIED BY 0.3048).
5. CONCRETE BENCHING (NOT SHOWN), MUST BE PROVIDED IN ALL NEW CELLS AFTER INSTALLATION OF NEW GATES.
6. OTHER UTILITIES AND UNDERGROUND STRUCTURES NOT SHOWN.

THE CITY OF WINNIPEG
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CONCEPTUAL GATE CHAMBER DESIGNS FOR STORM RELIEF SEWER SYSTEMS

AUBREY STREET STORM RELIEF GATE CHAMBER CONCRETE DETAILS

SCALE:	DATE:	DWG. No.
AS NOTED	15 03 30	FIGURE 5.02

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