D'Arcy Wastewater Pumping Station Load Shedding Upgrades – Preliminary Design Report

FILE: 734 -2100120700-REP-C0001-02
2022-06-16T00:00:00

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June 17, 2022
Date

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EXECUTIVE SUMMARY

The City of Winnipeg (City) retained Tetra Tech Canada Inc. (Tetra Tech) to provide engineering services for the preliminary design of the D'Arcy Wastewater Pumping Station Load Shedding Upgrade located at the Fort Garry Bridge.

Wastewater from the City's Southwest Sewer Catchment is currently routed across the Red River via the D'Arcy Wastewater Pump Station, originally constructed in 1977 and upgraded in 1998. The D'Arcy station directs wastewater flow to a twin 800mm and 700mm diameter HDPE inverted siphon gravity river crossing located between the twin Bishop Grandin bridges. Flow is then routed via the Bishop Grandin trunk and the St. Mary's trunk to the South End Sewage Treatment Plant (the South End Water Pollution Control Centre "SEWPCC"). During a combination of wet weather flow conditions and high levels in the Red River, and a loss of pumping capacity at SEWPCC, there is a risk of flooding SEWPCC and putting the gravity wastewater sewer system at risk for surcharge and basement flooding. The City has identified several emergency load shedding locations where wastewater could be diverted to waterways to protect the public health and the system from widespread flooding and flood damages. Due to its location near the Red River, the D'Arcy station has been identified as one of the potential locations for emergency load shedding.

Three base options have been considered and evaluated to provide for emergency load shedding to the Red River from the D'Arcy Wastewater Pumping Station. Option 1 would include a connection to the interior existing pump station piping from which the load shedding forcemain would extend to the river. Option 2 would require a connection to the existing 500mm diameter forcemain exterior to the existing pump station from which the proposed load shedding forcemain would extend to the river. Option 3 includes a connection to the existing 500mm diameter forcemain exterior to the pump station and a forcemain that will run to the existing siphon / outfall chamber. Option 3 would utilise the existing outfall chamber and outfall piping to the river. As part of a routing options review and evaluation process conducted with the City, the selected option involves connecting the proposed load shedding forcemain to the existing piping inside the pump station and aiming the proposed forcemain from the east side of the pump station directly to the river.

The reconfiguration of the piping within the pump station requires the installation of 500mm diameter knife gate valves with one for the existing forcemain and the other for the proposed forcemain. When load shedding is required, the knife gate valve on the existing forcemain will be closed and the one on the proposed forcemain will be opened. The valves are to be operated manually and are to be fully closed or opened. This report includes spatial and operational analysis for reconfiguring the piping and valving inside the pump station to accommodate the proposed forcemain.

Hydraulic models (PCSWMM) were created to analyse and evaluate each of the proposed routing options and to determine flows and velocities at various forcemain sizes to determine performance. A 750mm diameter HDPE DR17 forcemain was selected. Further hydraulic analysis was completed using the 750mm diameter forcemain to compare the current and proposed operation of the pump station. The use of the load shedding forcemain will result in less flow being pumped from the wet well. Under the existing scenario the small length of forcemain discharges to a manhole with no backwater to add to the static head. The design conditions for the load shedding forcemain includes the river being at flood protection level, therefore increasing the static head and decreasing the flow rate.

Options for the forcemain discharge at the river are also discussed with a focus on operation and maintenance. Historically, the City has placed flap gates / check valves within a chamber to protect them from ice and to allow access for steaming if frozen. The routing option selected involves placing a flap gate and headwall / wing walls at the river above the normal summer water level.

The cost estimated (Class 3) to complete the reconfiguration within the pump station and to install the 750mm diameter forcemain and discharge works is **$1,114,700**.

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1.0 INTRODUCTION

The City of Winnipeg (City) retained Tetra Tech Canada Inc. (Tetra Tech) to provide engineering services for the preliminary design of the D'Arcy Wastewater Pumping Station Load Shedding Upgrade located at the Fort Garry Bridge. The D'Arcy station has been identified as one of the potential locations for emergency load shedding because of its proximity to the Red River. The load shedding system will be a new forcemain to divert wastewater to the Red River, designed to work during high river levels. Modifications to the existing pump station will be required to accommodate a second forcemain. This preliminary design report explores different options for the alignment of the load shedding forcemain as well as valve and piping configurations interior and exterior to the existing pump station building. These options have been evaluated for constructability, maintenance and minimizing impact on existing infrastructure as part of a review and evaluation process conducted with the City.

The selected option involves connecting the proposed load shedding forcemain to the existing piping inside the pump station and aiming the proposed forcemain from the east side of the pump station directly to the river. This report includes spatial and operational analysis for reconfiguring the piping and valving inside the pump station to accommodate the proposed forcemain. It also provides analysis on the selected size of the load shedding forcemain (750mm diameter) and a hydraulic comparison on the current and proposed operation of the pump station. Options for the forcemain discharge at the river are also discussed with a focus on operation and maintenance practicability.

2.0 BACKGROUND INFORMATION

The Southwest Sewer Catchment collects wastewater flow from 3300 hectares in southwest Winnipeg. All flow is currently routed across the Red River via the D'Arcy Wastewater Pumping Station, originally constructed in 1977 and upgraded in 1998. The D'Arcy station directs wastewater flow to a twin 800mm and 700mm diameter HDPE inverted siphon gravity river crossing located between the twin Bishop Grandin bridges. Flow is then routed via the Bishop Grandin trunk and the St. Mary's trunk to SEWPCC.

The Southwest Sewer Catchment has undergone a significant amount of growth since the mid 1970's, with substantial development in the area with the Waverley West Neighborhoods which includes MHRC's (Manitoba Housing and Renewal Corporation) Bridgewater development and Ladco's South Point and Prairie Point developments. One of the more noteworthy upgrades to the sewer system has been the installation of a 750mmØ interceptor sewer off the 1350mmØ interceptor sewer on Bishop Grandin Boulevard to service northern neighborhoods of the Waverley West development. There has also been a 600mmØ interceptor sewer installed to service the southern portion of the Waverley West area, which increases in diameter until it connects with the 1200mmØ sewer at Kirkbridge Drive / Killarney Avenue and Pembina Highway. Ultimately these upgrades allowed development to occur in both the northern and southern portions of Waverley West simultaneously.

Figure 2-1: D'Arcy Wastewater Pumping Station

The D'Arcy Pumping Station is an integral component of the sewer system in the southwest of Winnipeg. The D'Arcy Wastewater Pumping Station conveys all wastewater from southwest Winnipeg across the Red River for treatment at SEWPCC. During a combination of wet weather flow conditions and high levels in the Red River, and loss of pumping capacity at SEWPCC, there is a risk of flooding SEWPCC and putting the gravity wastewater sewer system at risk for surcharge and basement flooding. The City has identified several emergency load shedding locations where wastewater could be diverted to waterways to protect the system from widespread flooding and flood damages.

Due to its location near the Red River, the D'Arcy station has been identified as one of the potential locations for emergency load shedding. The load shedding system will be a new forcemain to divert wastewater to the Red River, designed to work during high river levels. Modifications to the pump station will be required to accommodate the load shedding forcemain. Site constraints include the 1650mm Branch Two Aqueduct and 600 mm St. Vital Feedermain river crossings located north of the wastewater siphon, the proximity of Hydro transmission towers, the approach embankments of Bishop Grandin Boulevard and the twin Bishop Grandin river bridges, and an active transportation path crossing underneath the bridges. Different options for the load shedding forcemain have been evaluated for constructability, maintenance and minimizing impact on existing infrastructure as part of a routing options review and evaluation process conducted with the City.

The Southwest Sewer Catchment Regional Upgrades work is currently underway, the results of which may include a recommendation for a second river crossing and other possible upgrades to the existing infrastructure within the sewer catchment. An additional crossing may offer some relief at the D'Arcy Pump Station and should ultimately be considered in the design for the proposed forcemain and outfall for the work considered herein. The preliminary design presented herein for emergency load shedding to be implemented at the D'Arcy Pump Station is strategic in terms of protecting the existing system and users, regardless of the findings for the Southwest Sewer Catchment Regional Upgrades.

3.0 ROUTING OPTIONS

Three base options have been considered and evaluated to provide for emergency load shedding to the Red River from the D'Arcy Wastewater Pumping Station. Option 1 would include a connection from the interior existing pump station piping from which the load shedding forcemain would extend to the river (Figure 3.1). Option 2 would require a connection from the existing 500mm diameter forcemain exterior to the existing pump station from which the proposed load shedding forcemain would extend to the river. This option would mean the valves and other appurtenances would have to be installed outside the existing station, preferably within a chamber. Option 3 includes a connection to the existing 500mm diameter forcemain exterior to the pump station and a forcemain that will run to the existing siphon / outfall chamber. Option 3 will utilise the existing outfall chamber and outfall piping to the river.

All three options and their respective derivatives have been evaluated using criteria prescribed by the City. The list of criteria explored included: (1) the alignment of the load shedding forcemain, (2) the outlet structure configuration, (3) the use of the existing siphon / outfall chamber, (4) hydraulic constraints, (5) geotechnical considerations, (6) constructability, (7) schedule, (8) maintenance and operations considerations, (9) sustainability, (10) cost, (11) risk and opportunities, (12) impact on existing infrastructure, (13) regulations / permitting requirements, and (14) environmental considerations. The advantages and disadvantages of each of the three options will also be discussed and have been considered in the evaluation process.

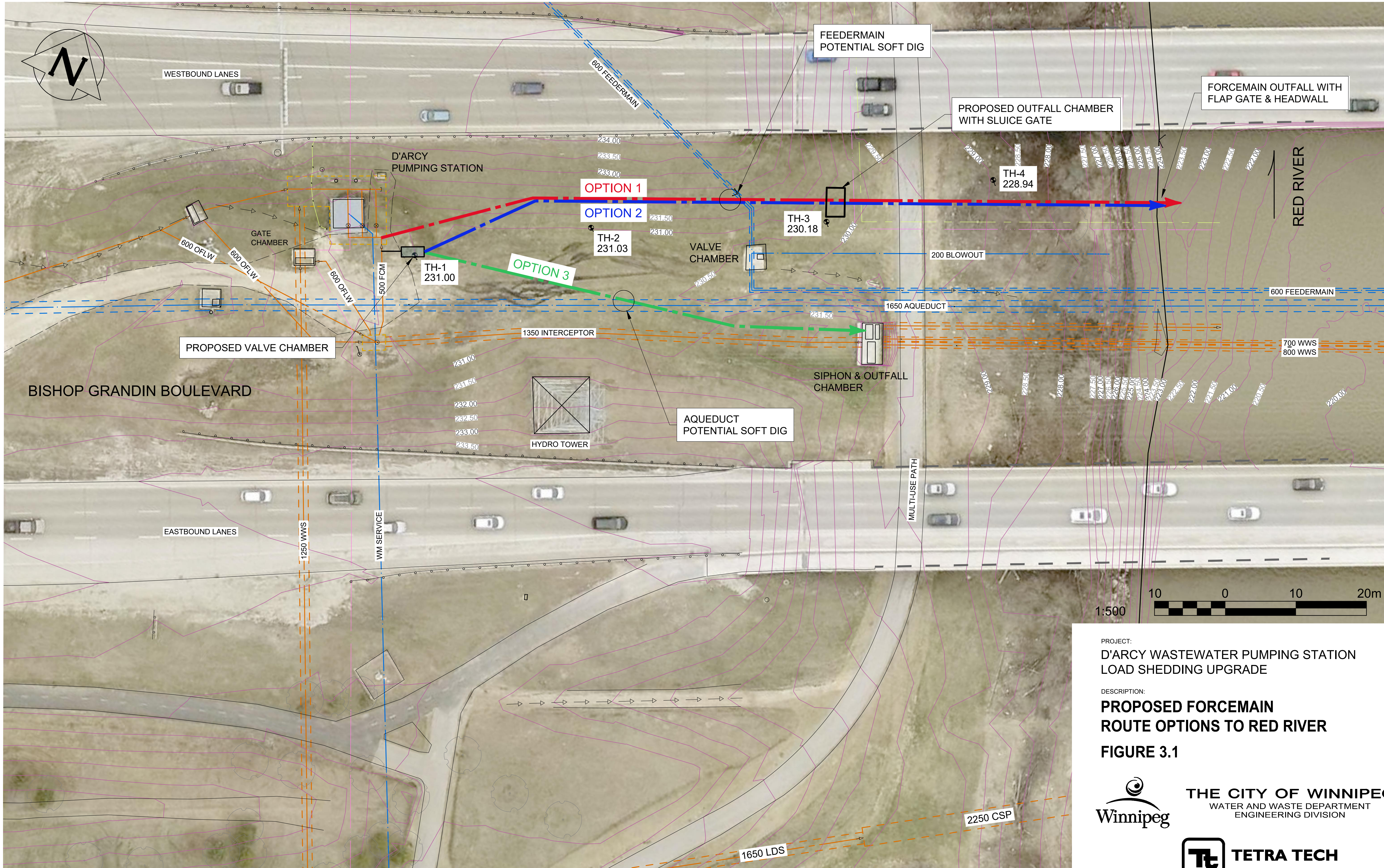
The following sections will summarise the results of the evaluation process for all the alignment options considered and will explain how Option 1 was the preferred option selected in the Routing Options Review Workshop with the City.

3.1 Option 1 – Connection Interior of Existing Pump Station

Option 1 requires a connection from the interior existing pump station piping from which the load shedding forcemain would extend to the river. Once the forcemain exits the lift station, it can be aligned to a proposed outfall chamber just west of the existing active transportation path or it can extend directly to the Red River. Option 1A explores the possibility of using an outfall chamber with a sluice gate / flap gate, and an outfall pipe that extends from the proposed chamber to the river. Option 1B looks at extending the load shedding forcemain all the way to the river without a chamber. A flap gate would be utilized in place of the sluice gate.

3.1.1 Option 1A – Connection Interior of Existing Pump Station with Outfall Chamber

The proposed load shedding forcemain will be connected to the piping within the pump station in the motor room (above the pump room). The existing flow meter will stay in place and the existing gate valve downstream of the flow meter can be removed (Figure 3.2). Two knife gate valves were proposed to allow flow to either the existing 500mm diameter AC (asbestos cement) forcemain south of the pump station or to the proposed load shedding forcemain to the east toward the river. The knife gate valves have a relatively small profile and would allow clearance with the ceiling. Chain falls could be considered as the handwheels would be too high if valves were placed at the level of the existing forcemain. The selection of Option 1 as the preferred alternative yielded further investigation into the interior configuration of the lift station with different valve types. This analysis is further explored in Section 6.1.



PROJECT:

D'ARCY WASTEWATER PUMPING STATION
LOAD SHEDDING UPGRADE

DESCRIPTION:

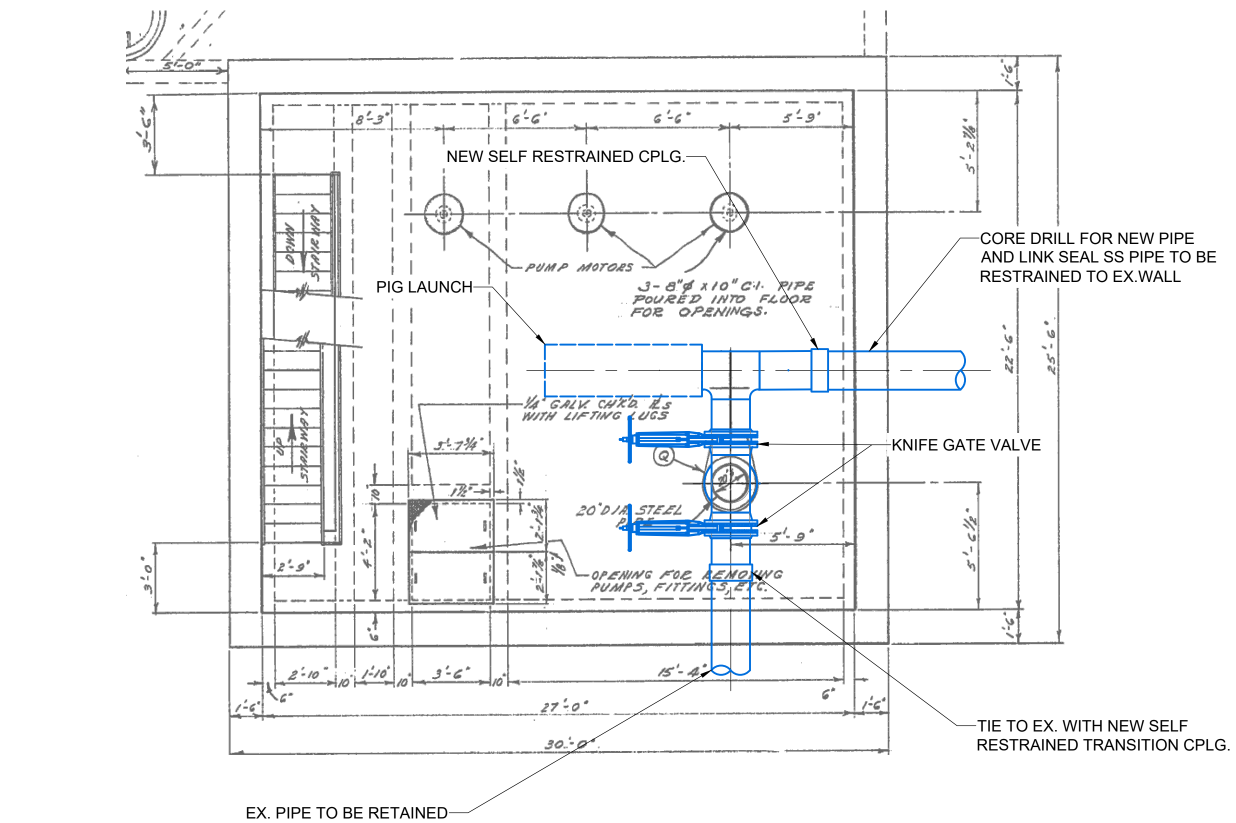
PROPOSED FORCEMAIN ROUTE OPTIONS TO RED RIVER

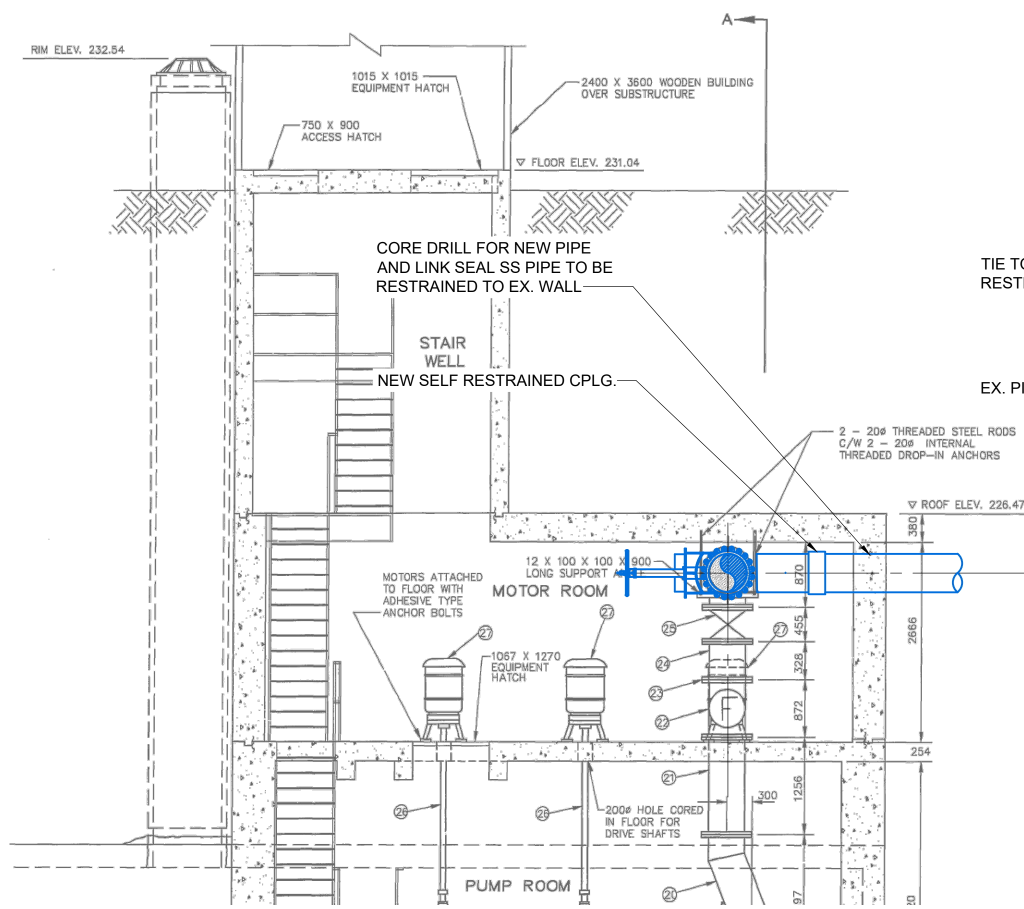
FIGURE 3.1

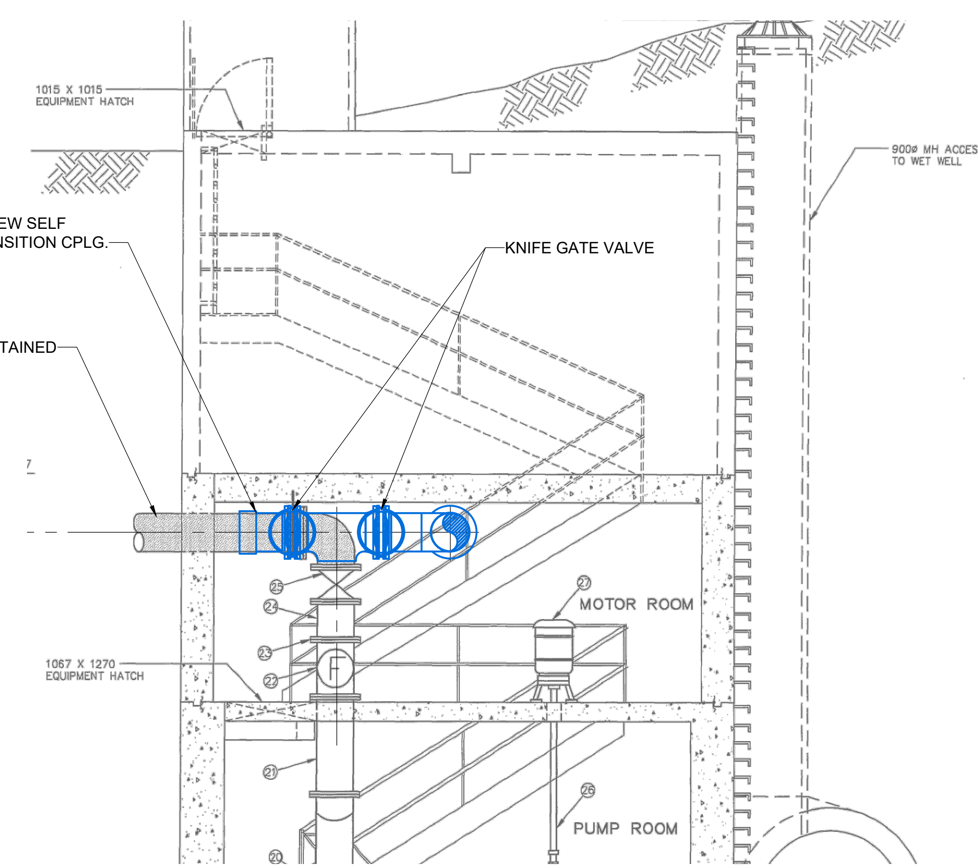
Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT
ENGINEERING DIVISION

TETRA TECH







PROJECT:

D'ARCY WASTEWATER PUMPING STATION
LOAD SHEDDING UPGRADE

DESCRIPTION:

PUMP STATION MODIFICATION
KNIFE GATE VALVE CONFIGURATION

FIGURE 3.2

Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT
ENGINEERING DIVISION

TETRA TECH

The proposed load shedding forcemain would exit the pump station from the east wall and would continue to a proposed outfall chamber with a flap gate and / or sluice gate (the City typically uses a flap gate as well as a sluice gate with outfall chambers). The sluice gate would remain closed until an event occurs that precipitates the use of this forcemain. From the outfall chamber a gravity flow outfall pipe would be used to convey flows to the river.

3.1.2 Option 1B – Connection Interior of Existing Pump Station with Flap Gate

Option 1B would require the same alterations to the pump station interior as Option 1A. However, instead of an outfall chamber with a sluice gate / flap gate, the load shedding forcemain would extend to the river and a flap gate would be installed to prevent backflow from the river.

Table 3-1: Assessment of Option 1A and Option 1B

Assessment Criteria	Option 1A	Option 1B
Alignment	Pump station interior to outfall chamber; gravity flow outfall to river.	Pump station interior to river.
Outlet Structure	Outfall chamber with sluice gate and outfall pipe to river.	Flap gate at river (no chamber).
Exist. Siphon / Outfall Chamber	N/A	N/A
Hydraulic Constraints	Amount of flow that can be conveyed by emergent situation with all three existing pumps running; size of load shedding forcemain did not impact flow conveyance heavily (see Section 7.0); backwater set at Flood Protection Level of 231.63m (supplied by City).	Amount of flow that can be conveyed by emergent situation with all three existing pumps running; size of load shedding forcemain did not impact flow conveyance heavily (see Section 7.0); backwater set at Flood Protection Level of 231.63m (supplied by City).
Geotechnical Considerations	Clay soils are present and will make pipe installation easier.	Clay soils are present and will make pipe installation easier.
Constructability	Pump station interior can be reconfigured to accommodate load shedding forcemain, valves and required appurtenances; forcemain can be installed using horizontal directional drilling or microtunneling to cross under the existing 600mmØ feedermain.	Pump station interior can be reconfigured to accommodate load shedding forcemain, valves and required appurtenances; forcemain can be installed using horizontal directional drilling or microtunneling to cross under the existing 600mmØ feedermain.
Schedule	Winter construction recommended as the river will be low and frozen; possibly avoid fish and bird habitat restrictions in winter.	Winter construction recommended as the river will be low and frozen; possibly avoid fish and bird habitat restrictions in winter.
Maintenance & Operations	A swab launch can be installed at interior of pump station; access to forcemain and outfall can occur from outfall chamber; valves and gates would have to be opened both at the pump station and at the chamber.	A swab launch can be installed at interior of pump station; valves would have to be opened at the pump station only.
Sustainability	Require maintenance and inspection so components work under emergent conditions.	Require maintenance and inspection so components work under emergent conditions.
Cost	$680,000	$590,000
Risk & Opportunity	**Risks**: Pumping wastewater directly to the Red River when CSOs are to be decreased; crossing the existing 600mmØ diameter feedermain.	**Risks**: Pumping wastewater directly to the Red River when CSOs are to be decreased; crossing the existing 600mmØ diameter feedermain.

Assessment Criteria	Option 1A	Option 1B
	Opportunities: Allow SEWPCC to return to normal operating conditions by diverting flows; decrease surcharge in the upstream gravity system and decrease basement flooding extreme conditions.	**Opportunities**: Allow SEWPCC to return to normal operating conditions by diverting flows; decrease surcharge in the upstream gravity system and decrease basement flooding extreme conditions.
Impact on Existing Infrastructure	Crossing the 600mmØ feedermain could have some impact, but a soft dig that confirms location and depth will aid in mitigating impacts; reconfiguration of piping within the existing pump station; pump station service would be suspended (with flows diverted) while load shedding forcemain is connected at the pump station and while work is completed within the pump station.	Crossing the 600mmØ feedermain could have some impact, but a soft dig that confirms location and depth will aid in mitigating impacts; reconfiguration of piping within the existing pump station; pump station service would be suspended (with flows diverted) while load shedding forcemain is connected at the pump station and while work is completed within the pump station.
Regulation / Permit Requirements	Request for Review (DFO) for Mapleleaf Mussels; review if NOA for SEWPCC is required (MB Conservation and Climate); Waterways Permit (Winnipeg); potential Minor Work Order (Transport Canada)	Request for Review (DFO) for Mapleleaf Mussels; review if NOA for SEWPCC is required (MB Conservation and Climate); Waterways Permit (Winnipeg); potential Minor Work Order (Transport Canada)
Environmental Considerations	Mapleleaf Mussels as a threatened species; timing of construction requires consideration for fish habitat and migratory bird nesting; erosion control if trees and vegetation are removed.	Mapleleaf Mussels as a threatened species; timing of construction requires consideration for fish habitat and migratory bird nesting; erosion control if trees and vegetation are removed.

The advantages of Option 1B are shared with those of Option 1A and include the following:

- The clay soils along the alignment of the proposed load shedding forcemain make trenchless installation of the pipe highly feasible.
- The spatial requirements for the reconfiguration of the piping and appurtenances within the pump station to accommodate the proposed load shedding forcemain can be met.
- A Request for Review (DFO) is required for Mapleleaf Mussels, it is not anticipated that they will be at this location in the Red River based on previous work in the area.
- Emergency load shedding can be attained at the D'Arcy Pump Station which will allow SEWPCC to return to normal operating conditions and will decrease surcharge in the upstream system.

The main disadvantage of both Option 1A and Option 1B is that the forcemain alignment necessitates the need to cross the existing 600mm diameter feedermain.

3.2 Option 2 – Connection at Existing 500mm Diameter Forcemain

Option 2 would be used if it was not possible to connect to the piping and install the necessary appurtenances inside the pump station to allow the load shedding forcemain to function. Option 2 would require a connection to the existing 500mm diameter forcemain exterior to the lift station. Once the forcemain exits the chamber, it can be aligned to a proposed outfall chamber just west of the existing active transportation path or it can extend directly to the Red River as in Option1. Option 2A uses an outfall chamber with a sluice gate / flap gate, and an outfall pipe that extends from the proposed chamber to the river. Option 2B has the load shedding forcemain extending all the way to the river without a chamber and utilizes a flap gate.

3.2.1 Option 2A – Connection at Existing 500mm Diameter Forcemain with Outfall Chamber

The proposed load shedding forcemain would be connected to the existing 500mm diameter AC forcemain outside the pump station just south of the structure. A chamber is proposed to house the necessary valves and appurtenances (i.e. tee, gate valves, clean-out, air valve) around the connection point. While a chamber is not necessarily required for these items, the large diameters/size and number of items that would have to be accessed would mean a chamber would be effectual.

The proposed load shedding forcemain would be connected to the existing forcemain with a tee. A gate valve on the existing and proposed forcemains would allow the wastewater to be diverted to the load shedding forcemain. An air valve and a clean-out for the proposed forcemain would also be installed. The proposed forcemain would leave the chamber and would continue to a proposed outfall chamber. The sluice gate / flap gate at the outfall chamber would have to be opened when the load shedding forcemain is needed.

3.2.2 Option 2B – Connection at Existing 500mm Diameter Forcemain with Flap Gate

Option 2B would require the same connection (and appurtenances) to the 500mm diameter AC forcemain as Option 2A. Instead of an outfall chamber with a sluice gate / flap gate, the load shedding forcemain would extend to the river and a flap gate would be installed to prevent backflow from the river.

Table 3-2: Assessment of Option 2A and Option 2B

Assessment Criteria	Option 2A	Option 2B
Alignment	Existing 500mmØ forcemain to outfall chamber; gravity flow outfall to river.	Existing 500mmØ forcemain to river.
Outlet Structure	Outfall chamber with sluice gate and outfall pipe to river.	Flap gate at river (no chamber).
Exist. Siphon / Outfall Chamber	N/A	N/A
Hydraulic Constraints	Amount of flow that can be conveyed by emergent situation with all three existing pumps running; size of load shedding forcemain did not impact flow conveyance heavily (see Section 7.0); backwater set at Flood Protection Level of 231.63m (supplied by City).	Amount of flow that can be conveyed by emergent situation with all three existing pumps running; size of load shedding forcemain did not impact flow conveyance heavily (see Section 7.0); backwater set at Flood Protection Level of 231.63m (supplied by City).
Geotechnical Considerations	Clay soils are present and will make pipe installation easier.	Clay soils are present and will make pipe installation easier.
Constructability	Open cut to install tee and valves on existing 500mmØ forcemain exterior to pump station; appurtenances can be installed in a chamber for easy access to all gate valves and air valve as well as clean-out; handling of existing 500mmØ AC pipe during construction will require safety protocols.	Open cut to install tee and valves on existing 500mmØ forcemain exterior to pump station; appurtenances can be installed in a chamber for easy access to all gate valves and air valve as well as clean-out; handling of existing 500mmØ AC pipe during construction will require safety protocols.
Schedule	Winter construction recommended as the river will be low and frozen; possibly avoid fish and bird habitat restrictions in winter.	Winter construction recommended as the river will be low and frozen; possibly avoid fish and bird habitat restrictions in winter.

Assessment Criteria	Option 2A	Option 2B
Maintenance & Operations	A clean-out can be installed on the proposed forcemain; access to forcemain and outfall can occur from outfall chamber; valves and gates would have to be opened both at proposed chamber at forcemain connection and at the outfall chamber.	A clean-out can be installed on the proposed forcemain; valves would have to be opened at the proposed chamber at forcemain connection.
Sustainability	Require maintenance and inspection so components work under emergent conditions.	Require maintenance and inspection so components work under emergent conditions.
Cost	$850,000	$760,000
Risk & Opportunity	**Risks**: Pumping wastewater directly to the Red River when CSOs are to be decreased; crossing the existing 600mmØ diameter feedermain; tie-in to existing AC forcemain. **Opportunities**: Allow SEWPCC to return to normal operating conditions by diverting flows; decrease surcharge in the upstream gravity system and decrease basement flooding extreme conditions.	**Risks**: Pumping wastewater directly to the Red River when CSOs are to be decreased; crossing the existing 600mmØ diameter feedermain; tie-in to existing AC forcemain. **Opportunities**: Allow SEWPCC to return to normal operating conditions by diverting flows; decrease surcharge in the upstream gravity system and decrease basement flooding extreme conditions.
Impact on Existing Infrastructure	Crossing the 600mmØ feedermain could have some impact, but a soft dig that confirms location and depth will aid in mitigating impacts; connecting to existing 500mmØ forcemain; pump station service would be suspended (with flows diverted) while load shedding forcemain is connected at the existing forcemain.	Crossing the 600mmØ feedermain could have some impact, but a soft dig that confirms location and depth will aid in mitigating impacts; connecting to existing 500mmØ forcemain; pump station service would be suspended (with flows diverted) while load shedding forcemain is connected at the existing forcemain.
Regulation / Permit Requirements	Request for Review (DFO) for Mapleleaf Mussels; review if NOA for SEWPCC is required (MB Conservation and Climate); Waterways Permit (Winnipeg); potential Minor Work Order (Transport Canada).	Request for Review (DFO) for Mapleleaf Mussels; review if NOA for SEWPCC is required (MB Conservation and Climate); Waterways Permit (Winnipeg); potential Minor Work Order (Transport Canada).
Environmental Considerations	Mapleleaf Mussels as a threatened species; timing of construction requires consideration for fish habitat and migratory bird nesting; erosion control if trees and vegetation are removed.	Mapleleaf Mussels as a threatened species; timing of construction requires consideration for fish habitat and migratory bird nesting; erosion control if trees and vegetation are removed.

The advantages of Option 2B are shared with those of Option 2A and include the following:

- The clay soils along the alignment of the proposed load shedding forcemain make trenchless installation of the pipe highly feasible.
- A Request for Review (DFO) is required for Mapleleaf Mussels, it is not anticipated that they will be at this location in the Red River based on previous work in the area.
- Emergency load shedding can be attained at the D'Arcy Pump Station which will allow the SEWPCC to return to normal operating conditions and will decrease surcharge in the upstream system.

The main disadvantage of both Option 2A and Option 2B is that the forcemain alignment necessitates the need to cross the existing 600mm diameter feedermain. Additionally, these options will require a connection to the existing 500mm diameter AC forcemain which will require specific safety protocols during construction.

3.3 Option 3 – Connection at Existing 500mm Diameter Forcemain Using Existing Siphon / Outfall Chamber

Option 3 was considered to investigate the possibility of using the existing siphon / outfall chamber situated between the 1350mm diameter interceptor and the 1650mm diameter aqueduct. The siphon / outfall chamber is divided into two sections. The first allows wastewater from the 1350mm diameter interceptor to enter the chamber and then flow under the Red River via a 700mm diameter and an 800mm diameter interceptor (i.e. siphons). There is a flap gate between the siphon section and the second section, the outfall portion. If wastewater flows exceed those that can be conveyed by the siphons or if the siphons need to be closed, the level in the siphon chamber will rise until the flap gate is opened allowing the wastewater into the outfall section of the chamber. The outfall section allows wastewater to flow to the Red River via a 900mm diameter outfall pipe when the sluice gate in the outfall chamber is opened.

Option 3 requires the same connection and appurtenances as Option 2 for connecting to the existing 500mm diameter forcemain. However, the alignment of load shedding forcemain once it leaves the proposed chamber at the forcemain connection location will require a crossing of the 1650mm diameter aqueduct. Further, shafts will have to be placed between the aqueduct and 1350mm diameter interceptor to facilitate installation of the load shedding forcemain. The proposed load shedding forcemain would be connected to the existing siphon / outfall chamber (to the outfall section) and would terminate at that location. From the existing outfall section, the existing 900mm diameter outfall would be used to discharge the wastewater to the river.

This option could have also investigated connecting the proposed load shedding forcemain with the existing pump station. However, the connection scenario in the pump station would not have varied from that of Option 1 and the alignment of the load shedding forcemain would have been the essentially the same. The 1650mm diameter aqueduct would still require crossing, and the alignment would still have followed the path between the aqueduct and the 1350mm diameter interceptor.

Option 3 was not selected because of the need to cross the 1650mm diameter aqueduct and the close vicinity of construction to the aqueduct and the 1350mm diameter interceptor, even though the existing siphon / outfall chamber could be used, and no construction would occur at the river. The risks of constructing in proximity to such large diameter pipes that provide a significant level of service were considered to be too high.

Table 3-3: Assessment of Option 3

Assessment Criteria	Option 3
Alignment	Existing 500mmØ forcemain to existing siphon/outfall chamber; existing gravity flow outfall to river.
Outlet Structure	N/A
Exist. Siphon / Outfall Chamber	Connect to existing chamber to utilize outfall section and existing outfall pipe to river.
Hydraulic Constraints	Amount of flow that can be conveyed by emergent situation with all three existing pumps running; size of load shedding forcemain did not impact flow conveyance heavily (see Section 7.0); backwater set at Flood Protection Level of 231.63m (supplied by City).
Geotechnical Considerations	Clay soils are present and will make pipe installation easier.
Constructability	Open cut to install tee and valves on existing 500mmØ forcemain exterior to pump station; appurtenances can be installed in a chamber for easy access to all gate valves and air valve as well as clean-out; handling of existing 500mmØ AC pipe during construction will require safety protocols.

Assessment Criteria	Option 3
Schedule	Winter construction is less relevant (but recommended to avoid rain and snow melt) as work would terminate at the existing siphon / outfall chamber.
Maintenance & Operations	A clean-out can be installed on the proposed forcemain; access to forcemain and outfall can occur from existing siphon / outfall chamber; valves and gates would have to be opened both at proposed chamber at forcemain connection and at siphon / outfall chamber.
Sustainability	Require maintenance and inspection so components work under emergent conditions.
Cost	$620,000
Risk & Opportunity	**Risks**: Pumping wastewater directly to the Red River when CSOs are to be decreased; tie-in to existing AC forcemain; crossing the existing 1650mmØ diameter aqueduct and constructing in close proximity to aqueduct and 1350mmØ interceptor. **Opportunities**: Allow SEWPCC to return to normal operating conditions by diverting flows; decrease surcharge in the upstream gravity system and decrease basement flooding extreme conditions.
Impact on Existing Infrastructure	Crossing the 1650mmØ aqueduct could have some impact, but a soft dig that confirms location and depth will aid in mitigating impacts; constructing in close proximity to aqueduct and 1350mmØ interceptor could have impacts; connecting to existing 500mmØ forcemain; pump station service would be suspended (with flows diverted) while load shedding forcemain is connected at the existing forcemain.
Regulation / Permit Requirements	Request for Review (DFO) for Mapleleaf Mussels; review if NOA for SEWPCC is required (MB Conservation and Climate); Waterways Permit (Winnipeg).
Environmental Considerations	Timing of construction requires consideration migratory bird nesting.

The advantages of Option 3 include the following:

- The clay soils along the alignment of the proposed load shedding forcemain make trenchless installation of the pipe highly feasible.
- The existing siphon / outfall chamber can be used along with the existing outfall pipe, so no construction near the river is necessary.
- Emergency load shedding can be attained at the D'Arcy Pump Station which will allow the SEWPCC to return to normal operating conditions and will decrease surcharge in the upstream system.

The main disadvantages of Option 3 are that the forcemain alignment means crossing the existing 1650mm diameter aqueduct as well as working adjacent to the aqueduct and the 1350mm diameter interceptor. Additionally, the connection to the existing 500mm diameter AC forcemain will require specific safety protocols during construction.

3.4 Options Evaluation

The options described in the previous sections were scored in each of the Assessment Criteria categories (Table 3.4). Scores were assigned from 1 to 10 with 10 being the most favourable condition. Each category of the Assessment Criteria was assigned a weight, with greater weights being associated with the more significant criteria in the list. The weight is multiplied by the score and the summation represents the weighted score out of a possible 2350 points. Each option was then ranked based on the summation.

Option 1B is the top ranked option, which corresponds with the City's preference for a flap gate on the load shedding forcemain at the river instead of an additional outfall chamber with a sluice gate / flap gate. Given that the weighted scores were so close between Option 1A and Option 1B, and the inherent subjectivity in the scoring process, the selection of either Option 1A or Option 1B could be considered.

Table 3.4 indicates the scores associated with each option and their ranking. An explanation of the scoring strategy follows for each of the criteria listed in Table 3.4.

Table 3-4: Weighted Scores for Options

Assessment Criteria		Option 1A		Option 1B		Option 2A		Option 2B		Option 3	
	Weight	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Alignment	20	8	160	8	160	5	100	5	100	2	40
Outlet Structure	10	8	80	6	60	8	80	6	60	10	100
Exist. Siphon / Outfall Chamber	10	10	100	10	100	10	100	10	100	10	100
Hydraulic Constraints	20	6	120	6	120	6	120	6	120	6	120
Geotechnical Considerations	20	8	160	8	160	8	160	8	160	8	160
Constructability	30	9	270	8	240	7	210	6	180	2	60
Schedule	10	8	80	8	80	8	80	8	80	8	80
Maintenance & Operations	10	8	80	8	80	6	60	4	40	6	60
Sustainability	5	5	25	5	25	5	25	5	25	5	25
Cost	30	8	240	10	300	6	180	7	210	9	270
Risk & Opportunity	30	8	240	8	240	6	180	6	180	4	120
Impact on Existing Infrastructure	20	7	140	7	140	6	120	6	120	3	60
Regulation / Permit Requirements	10	5	50	5	50	5	50	5	50	8	80
Environmental Considerations	10	5	50	5	50	5	50	5	50	8	80
SUM (Max Weighted Score 2350)	235		1795		1805		1515		1475		1355
RANK			2		1		3		4		5

Alignment – Option 1A and Option 1B were scored the same as they follow the same alignment; Option 2A and Option 2B were scored on the same premise; Option 1 received higher scores than Option 2 because the connection for the load shedding forcemain was within the pump station and not the 500mm diameter AC forcemain; Option 3 received a low score because of the alignment between the aqueduct and interceptor.

Outlet Structure – Option 1A and Option 2A received higher scores than Option 1B and Option 2B because the outfall chamber with sluice gate was thought to be advantageous in terms of access over a flap gate where the pipe terminates at the river. This category did not apply to Option 3, so a score of 10 was assigned.

Existing Siphon / Outfall Chamber – A score of 10 was assigned to Option 1 and Option 2 as the category did not apply; a score of 10 was applied to Option 3 for use of the existing chamber.

Hydraulic Constraints – The results of the hydraulic analysis were very similar over all options in terms of sizing of the load shedding forcemain (Section 7.0); the flood protection level of 231.63 was applied across all options; each option received the same score.

Geotechnical Considerations – The same geotechnical conditions were considered to apply for each option with respect to the information available (prior to the geotechnical report for this project being completed); each option received the same score.

Constructability - Option 1A and 1B were scored closely with an additional point to Option 1A for the proposed outfall chamber which would mean less construction works at the river; Option 2A and 2B were scored on the same premise; Option 1 received higher scores than Option 2 because the connection for the load shedding forcemain was within the pump station and not the 500mm diameter AC forcemain; Option 3 received a low score because of the alignment between the aqueduct and interceptor.

Schedule – All options were scored equally as work is consistently recommended in winter months.

Maintenance & Operations – Initially, assessment of Option 1A and Option 1B were scored in favour of Option 1A with the proposed outfall chamber. The chamber access point was considered a benefit in terms of maintenance and operations. The City indicated at the Routing Options Review Meeting (Aug 13, 2021) that the additional chamber would be an additional maintenance item for the City, and that opening the sluice gate at the chamber would have to occur in an emergency situation in addition to opening / closing valves in the pump station. As a result, the score for Option 1B was adjusted to match that of Option 1A. The scores for Option 2 and Option 3 are less than Option 1 because of the additional chamber for valves and appurtenances off the existing 500mm diameter forcemain.

Sustainability - All options were scored equally as maintenance would have to be carried out consistently regardless of the options selected so that the valves, piping and appurtenances are in working order when needed during and emergency event.

Cost – Scores were applied based on a Class 4 (-30% to 60%) estimate for each option in terms of capital cost.

Risks & Opportunities – The risks / opportunities were essentially the same for Option 1A and Option 1B. Option 2A and Option 2B also have similar risk / opportunities but there is additional risk in terms of connecting to the 500mm diameter AC forcemain, so the score was less than for Option 1. The score for Option 3 was less than both Option 1 and Option 2 because of the risks of crossing the aqueduct and constructing in close proximity to the aqueduct and interceptor.

Impact on Existing Infrastructure – Impacts in terms of crossing the feedermain and re-configuring inside the pump station to allow for the load shedding forcemain are the same for Option 1A and Option 1B. Option 2 was scored less than Option 1 because of the need to tie-in to the 500mm diameter AC forcemain. Option 3 received the lowest score because of the tie-in at the existing forcemain and the need to break into the existing siphon / outfall chamber.

Regulations / Permitting Requirements – Options 3 received a higher score than Option 1 or Option 2 because there would be less requirements as no construction would happen at the river with Option 3.

Environmental Considerations - Options 3 received a higher score than Option 1 or Option 2 because there would be less requirements as no construction would happen at the river with Option 3.

4.0 FIELD INVESTIGATIONS

4.1 Soft Digging

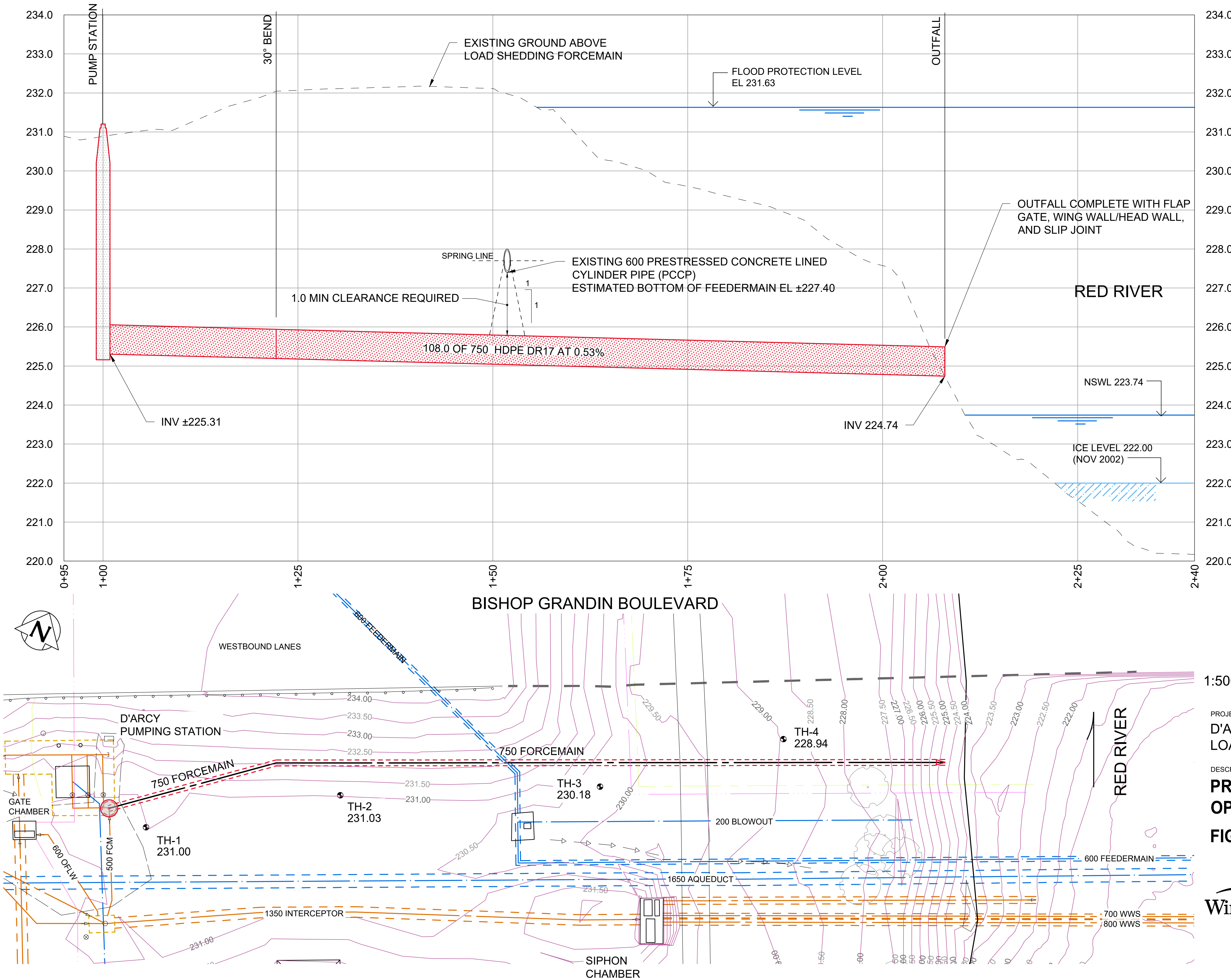
Once the routing options were evaluated and Option 1B was selected, a soft dig of the City's 600mm diameter Prestressed Concrete Lined Cylinder Pipe (PCCP) feedermain was coordinated. The soft dig was conducted on September 15, 2021 at which time it was determined that the top of the feedermain is at an elevation of 228.20m. A conservative estimate of the feedermain invert, assuming this could be the bell that has been measured may result in the invert being at ±227.40m (with a ±800mm bell OD). A profile of the proposed load shedding forcemain is indicated in Figure 4.1 and shows the clearance with the 600mm diameter feedermain.

Before construction a protocol should be developed to protect the 600mm diameter feedermain from loading. This will initially include soft digging to verify location and depth of pipe by the contractor. The feedermain should not be subject to loads from vehicles or material stockpiles, excessive vibration or impact loading. The protocol should include avoiding driving equipment along the pipe, and only crossing in a perpendicular direction as well as not parking vehicles or stockpiling near the pipe. A loading assessment can also be completed to determine a potential threshold for loading before failure.

The soft dig occurred within the embankment of the westbound Fort Garry Bridge on the west side of the Red River where the proposed load shedding forcemain would cross the existing 600mm diameter feedermain. The elevation of the top of the feedermain was measured approximately 1m north of the anticipated crossing with the forcemain. The ground conditions were found to be hard and compacted with firm clay. Granular material was encountered near the 600mm diameter feedermain. Once the feedermain was located and the elevation measured, the excavated material was replaced with sand.

4.2 Geotechnical Investigation

A geotechnical investigation and report was completed by Dyregrov Robinson Inc at the D'Arcy Wastewater Pumping Station site. The investigation included four test holes between the existing pump station and the Red River, generally following the alignment of the proposed load shedding forcemain. The report indicated the subsurface conditions are suitable for trenchless installation of the 750mm diameter HDPE forcemain. Details that should be considered during installation are discussed in the geotechnical report. Also indicated are the results of the riverbank stability analysis, with a recommendation for the slope to be a minimum of 3H:1V at the outfall. Additionally, the report indicates the proposed location for an outfall chamber west of the existing active transportation path is acceptable based on the riverbank stability analysis completed. However, the preferred option is to run the load shedding forcemain directly to the river without an outfall chamber, so the analysis considering the location of the outfall chamber can be re-visited if a chamber is contemplated at a later time.



10 0 10 20m

1:500

PROJECT:

D'ARCY WASTEWATER PUMPING STATION
LOAD SHEDDING UPGRADE

DESCRIPTION:

PROPOSED FORCEMAIN
OPTION 1 PLAN/PROFILE

FIGURE 4.1

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT
ENGINEERING DIVISION

TETRA TECH

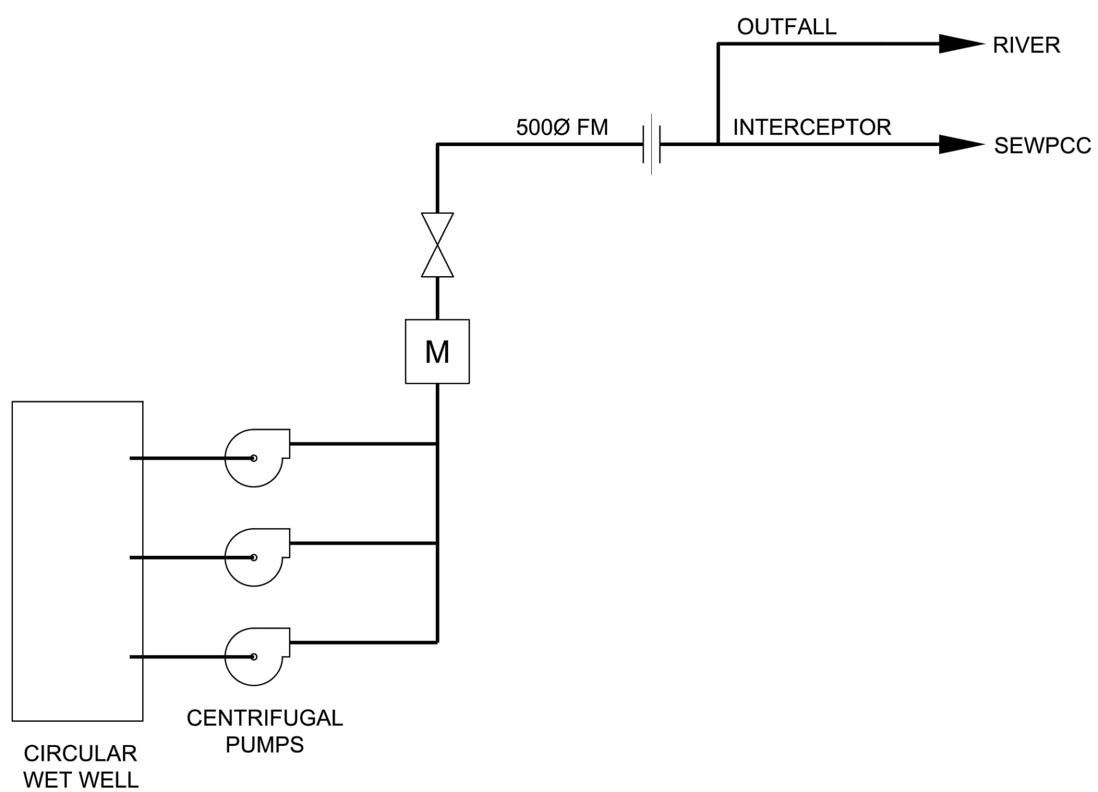
5.0 EXISTING AND PROPOSED PROCESS FLOW

Wastewater flows from the Southwest Sewer Catchment enter the D'Arcy Pump Station via the Fort Gary West Interceptor and the Fort Garry South Interceptor. A 2100mm diameter circular wet well stores the wastewater until one of three centrifugal pumps start. The pumps are located in the lowest level of the pump station (pump room). They pump to a common header pipe that reaches the vertical 500mm diameter steel pipe that conveys flows upward to the motor room. The wastewater moves through a flow meter and is conveyed through the south wall of the pump station to the 500mm diameter AC forcemain that discharges to a manhole approximately 14m to the south. From there wastewater is conveyed through a 1350mm diameter interceptor to the existing siphon chamber and from the siphon chamber under the river through an 800mm diameter and a 700mm diameter siphon. Figure 5.1 includes a schematic indicating the paths through which wastewater is conveyed.

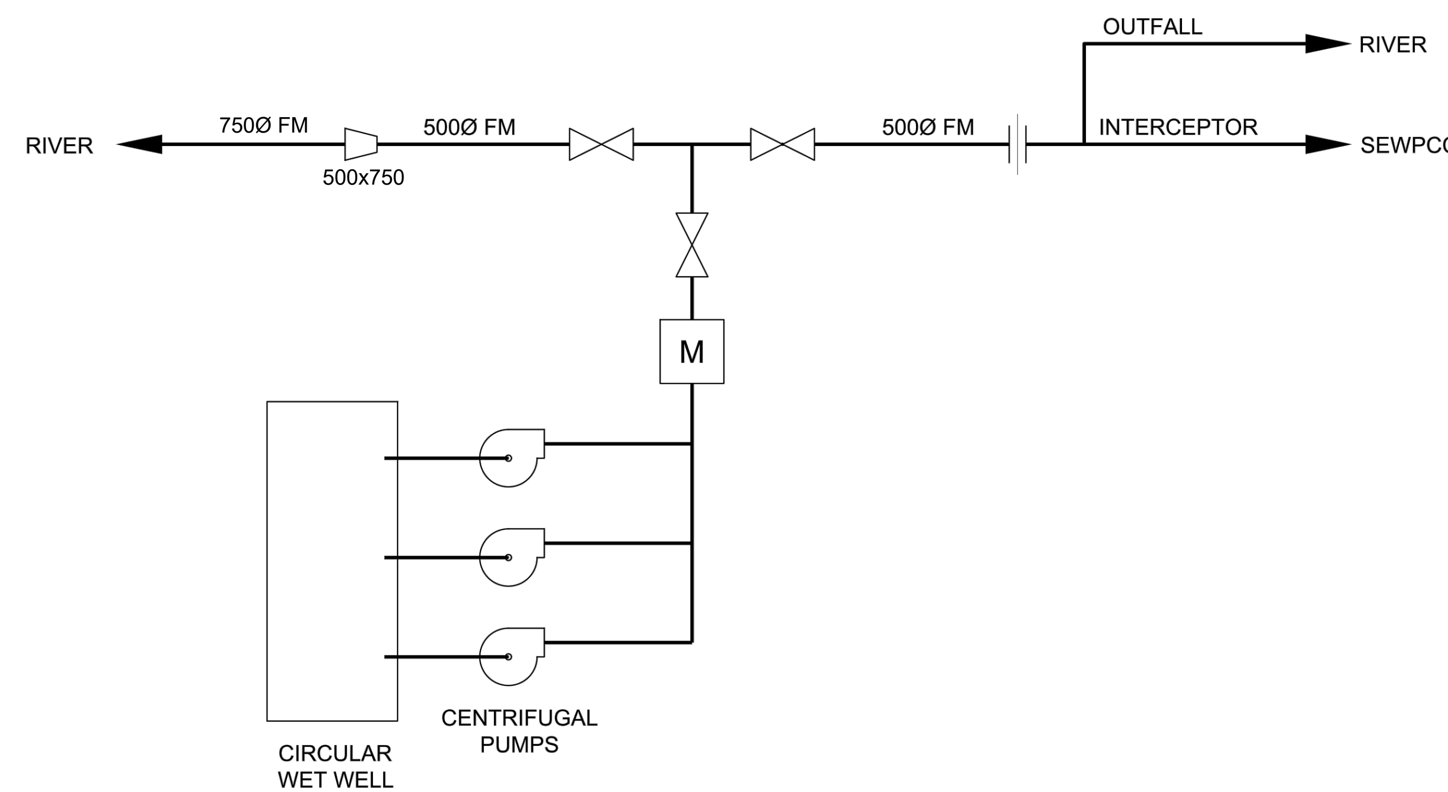
The addition of a load shedding forcemain to the existing pump station would mean the piping downstream of the flow meter in the motor room would be modified to include two alternate routes for wastewater flows. The first would be the existing route to the south of the pump station and the alternate would be the load shedding forcemain directed east from the pump station to the river. Valves would be added to the interior piping configuration to direct wastewater in either direction.

The load shedding forcemain is intended to be used when wastewater flows at the South End Water Pollution Control Centre exceed 200MLD or the river level at the South Perimeter Bridge is above 229.5m (the outfall for the treatment plant is near the bridge). The protocol for load shedding includes doing so at the Cockburn Pumping Station, Baltimore Pump Station, and Mager Pump Station prior to the D'Arcy Pump Station. If the load shedding at these other pump stations serve to improve the situation at SEWPCC, then load shedding would not be needed at the D'Arcy Pump Station. If load shedding at these three pump stations and the D'Arcy Pump Station do not reduce the flows to SEWPCC adequately, then load shedding would also occur at Bishop Grandin and the Seine River (Appendix A).

When the flows at SEWPCC fall below 150MLD, then the load shedding protocols can cease. The order in which this occurs would be the reverse to when they are implemented.



EXISTING PUMPING SYSTEM



PROPOSED PUMPING SYSTEM

PROJECT:

D'ARCY WASTEWATER PUMPING STATION
LOAD SHEDDING UPGRADE

DESCRIPTION:

PUMPING SYSTEM
FLOW DIAGRAMS

FIGURE 5.1

Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT
ENGINEERING DIVISION

TETRA TECH

6.0 PUMP STATION MODIFICATIONS

Originally the D'Arcy Wastewater Pump Station was constructed with only hatches as means of entry. Later a superstructure was added that allows the pumps station to be accessed by doorways instead of hatches. Below the entry level at ground elevation there is a stair well that leads to a motor room which holds the pump motors, a flow meter, a valve and other appurtenances. These pieces of equipment are 500mm diameter to match the discharge pipe exiting the pump station and the existing AC forcemain diameter.

At the siphon chamber, an outfall chamber was added adjacent to the siphon chamber with a flap gate. When the flap gate is opened wastewater from the siphon chamber can enter the outfall chamber and be discharged to the river via a 900mm diameter outfall. Additionally, an overflow that allows wastewater to bypass the pump station was constructed from the Fort Garry West Interceptor to discharge to the same discharge manhole leading to the 1350mm diameter interceptor and to the siphon chamber. Another additional overflow was installed from the Fort Garry South Interceptor to the same discharge manhole.

6.1 Modifications for Proposed Load Shedding Forcemain

In order to accommodate the addition of the load shedding forcemain from the existing pump station to the Red River, valves that can direct the wastewater flows to either the existing forcemain leading to the siphons, or to the proposed load shedding forcemain need to be installed within the existing building. Figure 3.2 indicates the use of 500mm diameter knife gate valves with one for the existing forcemain and the other for the proposed forcemain. The existing 500mm diameter flow meter and gate valve will remain in place. The gate valve can be used to close flows off completely if the pump station is shut down. Under normal conditions the knife gate valve for the existing 500mm diameter forcemain will be open while the one for the proposed forcemain will be closed. The proposed load shedding forcemain is sized at 750mm diameter (Section 7.0, Sub-section Forcemain Diameter) and will be that size once exiting the pump station. Within the pump station, the proposed forcemain will be 500mm diameter to match existing components and to meet spatial constraints.

When load shedding is required, the knife gate valve on the exiting forcemain will be closed and the one on the proposed forcemain will be opened. The valves are to be operated manually and are to be fully closed or opened. Knife gate valves are not intended for throttling and should not be operated under such conditions. They do however have a smaller profile than gate valves and can fit within the dimensions of the existing pump station building at the existing centreline for the forcemain. The knife gate valves should be bonneted to contain any wastewater that falls from the gate as the valve is opened. The proposed forcemain for load shedding will convey wastewater through a tee that will direct flows to the east toward the river. Outside the structure the proposed forcemain will transition from a 500mm diameter stainless steel (SCH40) pipe to a 750mm diameter HDPE (DR17) pipe. Restraints will be designed for the thrust at the expansion from 500mm diameter to 750mm diameter.

Relative to gate valves, knife gate valves are lighter and easier to operate. They are good for wastewater applications because the blades are sharp. They are meant to be operated in a fully open or fully closed position. If left partially open (i.e. throttling), the disc and seat can erode, and potentially will not close and seat correctly. Gate valves are larger and require more force and generally take more time to open and close. Gate valves are also capable of handling flows in both directions (which is not typical of wastewater pump stations) and are meant to be operated in a fully open or closed position (*Process Industry Forum, BM Engineering Supplies and NTGD Valve Company Ltd*). Knife gate valves and gate valves are similar in terms of durability and life cycle. Gate valves are usually made cast iron and are less costly than knife valves typically made of stainless steel.

Figure 6.1 indicates how the pump station pipe works would have to be reconfigured if gate valves were used. It illustrates against the use of standard gate valves. In order to gain the clearances necessary to use gate valves a specialty wye would have to be fabricated that would accommodate one leg toward the south wall (existing forcemain) and one toward the east wall (proposed forcemain). The specialty wye is drawn to indicate the issues of such a configuration and may not be possible to fabricate (Figure 6.1a and Figure 6.1b). The gate valves that control the flow to either the existing or proposed forcemains would be installed off the specialty wye at an angle, which then becomes difficult to support. Also access to open and close the valves may be awkward for the operator.

Alternately, if the centreline of the existing forcemain was maintained, and gate valves were again used off the existing and proposed forcemains, spatial accommodation becomes an issue. A 500mm diameter gate valve would not fit along the existing centreline alignment for the forcemain and would conflict with the existing ceiling (Figure 6.1c). Additionally, if it were attempted to use a lower centreline for the proposed forcemain that could accommodate a gate valve, there would not be enough space to fit a tee along with the existing gate valve off the vertical portion of piping above the flow meter, even with a short radius bend to the existing forcemain.

A three way plug valve was considered because it would mean the use of only one valve to direct wastewater to either the existing forcemain or the load shedding forcemain. This valve would also allow flows to be throttled. The three way plug valve is not currently manufactured at 500mm diameter, and the possibility of a special order is unlikely as the molds to cast the 500mm diameter valve body would have to be designed and created.

An air release valve could be installed either in the pump station or on the exterior forcemain. The proposed profile for the load shedding forcemain is down slope to the river with no high points (Figure 4.1), and the total length of the forcemain is relatively short at ±108m. Typically, air release valves or combination air valves are used at high points along the pressure pipe to allow trapped air to be released, or over long horizontal runs of pressure pipe. Air valves or combination air valves are not required as per these criteria in this application, but if preferred as an additional level of operational protection, may be utilized. If installed within the pump station, accommodation for a drain line from the air release valve to the wet well would be required, which will be difficult to route given the layout of the station. Locating the air valve exterior to the pump station would be preferable.

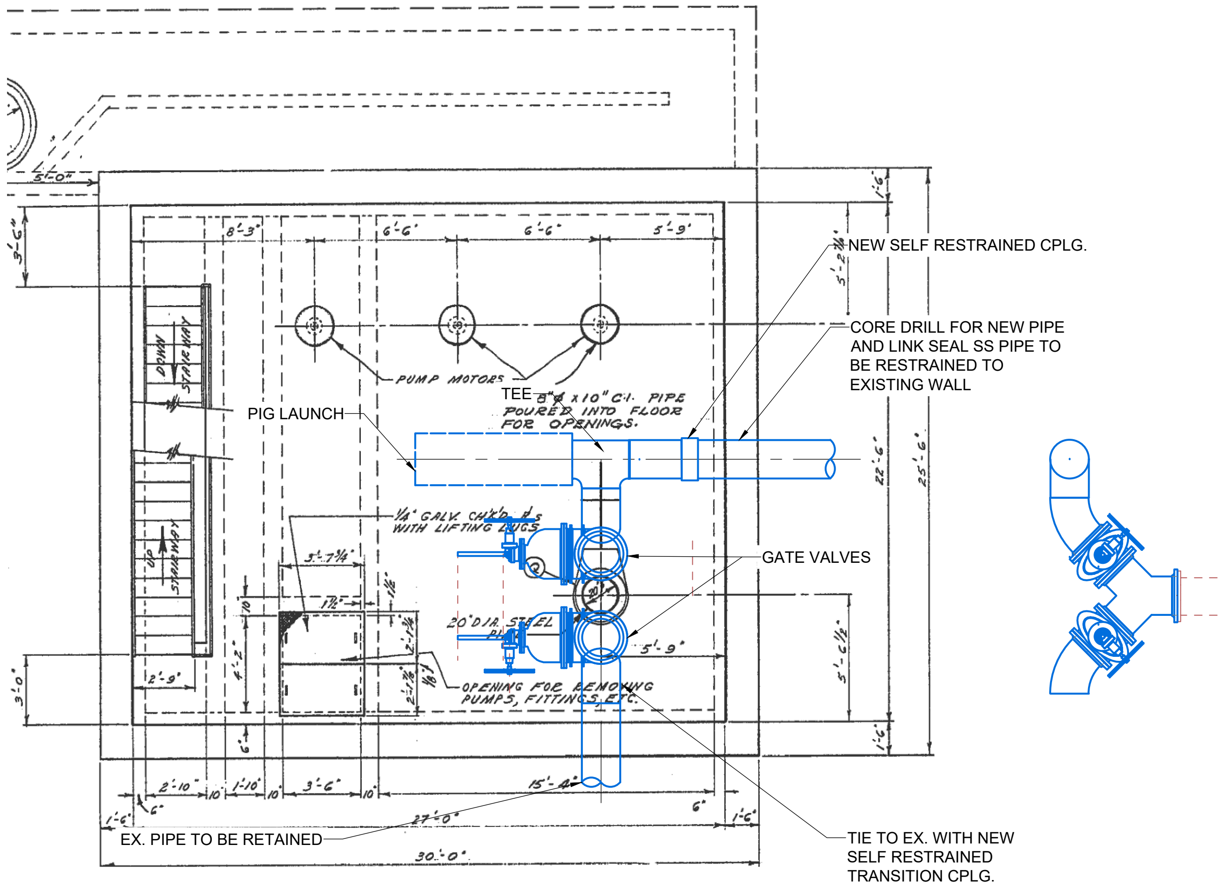


FIG 6.1A - PLAN VIEW, GATE VALVES, WITH SPECIALTY WYE

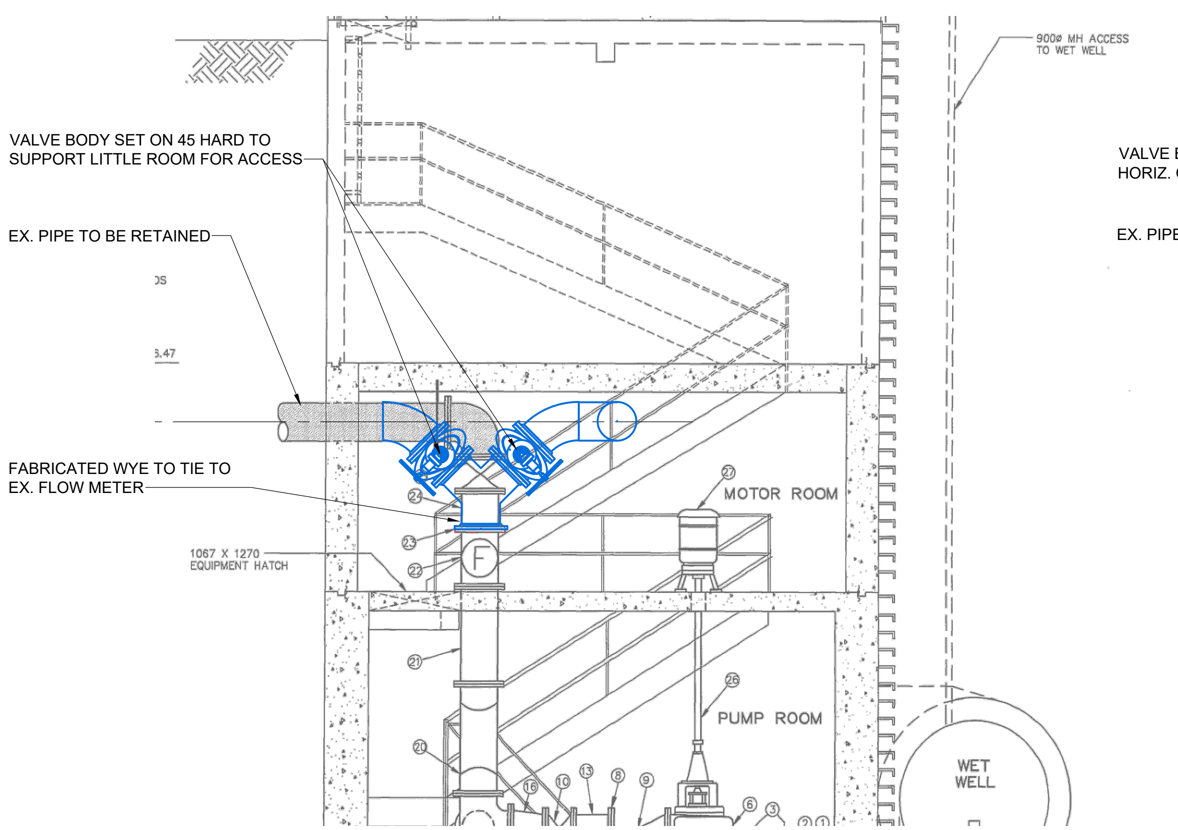


FIG 6.1B - SECTION VIEW, GATE VALVES, WITH SPECIALTY WYE

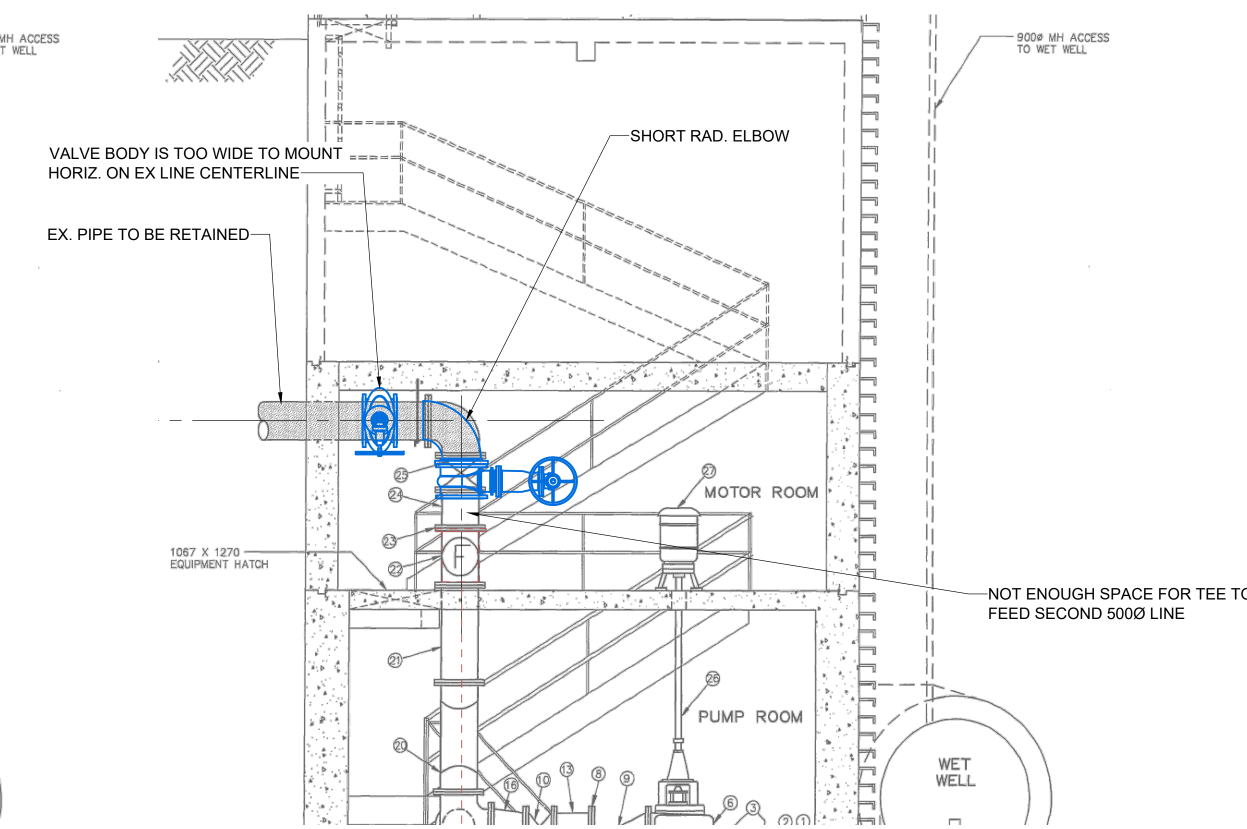


FIG 6.1C - SECTION VIEW, GATE VALVES, AND TEE

PROJECT:
D'ARCY WASTEWATER PUMPING STATION
LOAD SHEDDING UPGRADE

DESCRIPTION:
PUMP STATION MODIFICATION
GATE VALVE CONFIGURATION

FIGURE 6.1

Winnipeg

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT
ENGINEERING DIVISION

TETRA TECH

7.0 LOAD SHEDDING FORCEMAIN

In order to determine the size of the load shedding forcemain, a model was developed using the pump curve (Appendix B) for the Ingersoll-Dresser 14MN16A pump. The design point for the pump was 378L/s at 10.7m (15.2psi).

The forcemain sizing was done with all three of the pumps within the lift station operating. Given the critical situation that would be occurring at the SEWPCC, and that the D'Arcy Pump Station would be the fourth to have load shedding measures implemented, the City may want to shed at the fastest rate possible. While all three pumps operating would be rare, so would a situation where load shedding was required. Therefore, sizes of forcemain ranging from 500mm diameter to 900mm diameter were checked for flows and velocities using a model developed in PCSWMM 2021. Table 7.1 summarizes the results for each routing option presented in Section 3.0.

Table 7-1: Hydraulic Performance of Load Shedding Forcemain for Various Sizes

Routing Option	1A	1B	2A	2B	3
Forcemain Size					
500 mm HDPE DR17	3.63 m/s (565 L/s)	3.21 m/s (523 L/s)	3.62 m/s (563 L/s)	3.19 m/s (511 L/s)	3.61 m/s (561 L/s)
600 mm HDPE DR17	2.75 m/s (616 L/s)	2.62 m/s (588 L/s)	2.72 m/s (609 L/s)	2.60 m/s (582 L/s)	2.72 m/s (609 L/s)
700 mm HDPE DR17	2.09 m/s (638 L/s)	2.05 m/s (625 L/s)	2.06 m/s (628 L/s)	2.02 m/s (616 L/s)	2.06 m/s (629 L/s)
800 mm HDPE DR17	1.67 m/s (647 L/s)	1.66 m/s (641 L/s)	1.65 m/s (637 L/s)	1.63 m/s (631 L/s)	1.65 m/s (638 L/s)
900 mm HDPE DR17	1.30 m/s (653 L/s)	1.30 m/s (652 L/s)	1.28 m/s (642 L/s)	1.27 m/s (640 L/s)	1.28 m/s (643 L/s)
Gravity Outfall					
900 mm RCP	0.9 - 1.0 m/s	N/A	0.9 - 1.0 m/s	N/A	0.9 - 1.0 m/s

The following criteria was used to compare the forcemain performance:

- **Velocity (in forcemain)** – Minimum velocity of 0.91 m/s (3 ft/s) is used to achieve self cleaning velocity and the maximum velocity accepted is 3.0 m/s. However, given that the load shedding forcemain would only be used rarely, these typical criteria were not considered essential. The forcemain would likely be cleaned and possibly inspected after use given that it would have to be ready in case of another urgent event, so the minimum is not as crucial as with a forcemain under normal service conditions. Also, it would have been acceptable to go past the normal maximum of 3.0m/s to accept a smaller diameter forcemain, if the flows were acceptable. Again, this was only considered acceptable given the infrequent use of the forcemain.
- **Flowrate** – No criteria was in place as the flowrate as it is driven by the new system curve and will only be able to be increased or decreased by changing the size of the pipe. Based on the historic flow rates of the station the three pumps produce around 820 L/s and 580 L/s with 2 pumps. Since the emergency load shedding forcemain is longer than the existing forcemain the flowrates possible will be less due to the increased length and headlosses. A flow rate of 580 L/s with 3 pumps running was considered the minimum flowrate for the forcemain.

The 700mm diameter forcemain was selected because the flow rate it conveys is not significantly less than those of the larger diameter forcemains evaluated. Additionally, the velocities for the 700mm diameter size are within the acceptable range. The selected Option 1B, with the forcemain extending from the pump station and discharging at the river will allow for approximately 625L/s to be discharged to the river at 2.05m/s.

Routing Option Observations

Comparing the five routing options considered resulted in the following observations:

- Scenarios where the forcemain discharges to an outfall chamber (1A, 2A, and 3) behave almost identically. This is due to the differences in headloss relative to the small changes in the forcemain between the options are minimal compared to the total headloss of the system. Options 2A and 3 have marginally higher headloss (lower velocity/flowrate) because they connect to the forcemain outside of the pump station.
- Similarly, the options where the forcemain discharges directly to the river (1B and 2B) behave almost identically with 2B having slightly lower velocity and flowrate due to the increase in headlosses associated with connecting outside of the pump station.
- Routing Option A (with outfall chamber) had higher velocity and flowrates compared to Option B (river discharge) for smaller forcemain diameters and similar values for the larger diameter. The gravity outfall was consistently a 900mm diameter pipe and as forcemain diameters increase the headlosses would decrease. The larger diameter forcemains would produce little difference in headloss relative to the gravity outfall, so the flows and velocities become very similar across all options.

Forcemain Diameter

With the selection of the 700mm HDPE DR17 forcemain and Option 1B, further research was done into the selection of valves and appurtenances. In order to make sure these items are more readily available for construction or potential replacement in the future, the forcemain was adjusted to the standardised size of 750mm diameter. The detailed modeling analysis that follows uses the 750mm HDPE DR17 forcemain size. The velocity and flow that would be achieved with a 750mm diameter forcemain under consistent conditions for Options 1B as in Table 7.1 are 620L/s and 1.78m/s, respectively.

7.1 PCSWMM Model Development

Hydraulic models were created for each of the proposed routing options and analysed at various forcemain sizes to evaluate hydraulic performance. The following attributes were used in the models:

- All models were run with a constant wastewater elevation in the lift station of 220.59m (1 m depth), although in reality the depth will change based on the incoming flowrate but the small variation in the head will not affect the pump rates significantly.
- The river stage was set to 231.63 m which is the Flood Protection Level provided by the City at the Fort Garry Bridge.
- Actual inside diameters were used for all forcemain pipes (eg. 500mmØ HDPE DR17 pipe has I.D. of 439.9 mm).
- Minor losses for all bends, reducers, valves, and other appurtenances in the lift station were considered.

Once the 750mm diameter forcemain size was determined, and a more detailed level of analysis was undertaken, the following was applied:

- A storage curve was developed based on the geometry of the 2100mm diameter wet well instead of using a constant wastewater elevation in the wet well.
- Diurnal curves were developed to simulate wastewater inflow over time to the pump station.

7.1.1 Diurnal Curve Development

The City provided flow rate data along with pump ON/OFF times for the month of August 2020 and January 2021. Wastewater inflows to the pump station were determined using the changes in the wet well volume over each time step and the recorded data from the flow meter. Using the inflow, a diurnal flow pattern was developed by averaging the flows for each day and each time step in August 2020. The diurnal curves are indicated in Figure 7.1 with an average daily wastewater flow of 248.6L/s. Periods with rainfall and the following 3 hour wet-dry period was excluded from the analysis to avoid the influence of wet-weather inflow and infiltration.

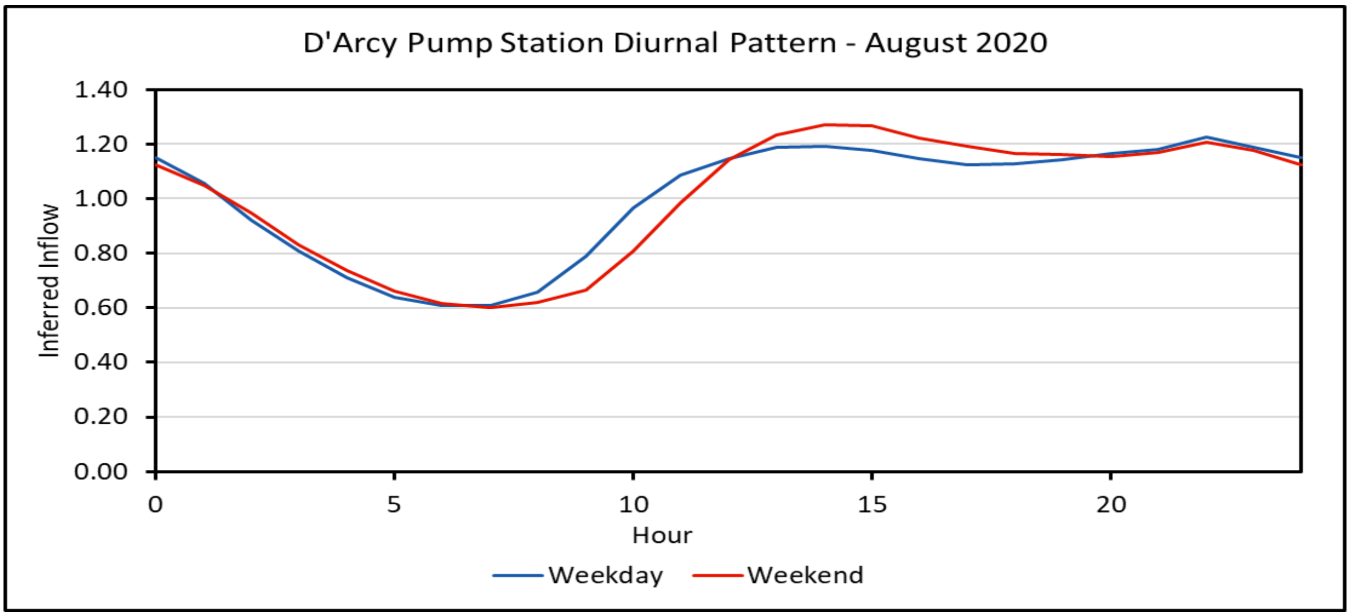


Figure 7-1: Diurnal Pattern at D'Arcy Pump Station

The data from August 2020 was compared with the winter data from January 2021 to see that there were no significant differences in the dry weather flows. This simply provided a level of comfort that the diurnal pattern does not include significant wet weather influences.

7.2 Pump Station Performance

7.2.1 Existing Pump Station and Forcemain Performance

The City provided 6-hour interval flow data for the D'Arcy Pump Station which was used to establish the operating points indicated in the following Table 7.2. These historic data points represent the pump flows observed when 1 pump, 2 pumps and 3 pumps were operating.

Table 7-2: Observed Operating Points

# of Pumps	Historic Operating Points
1 pump	330 L/s
2 pumps	580 L/s
3 pumps	820 L/s

System head curves were established using the existing configuration of the pump station and the existing 500mm diameter forcemain. The existing forcemain is only 13.8m in length before it discharges to a downstream manhole where flows are picked-up by the 1350mm diameter interceptor. A system head curve has been established for 1 pump, 2 pumps and 3 pumps operating simultaneously. Figure 7.2 indicates the system head curves for each of these pump run scenarios and pump curves for each. The intersection between the system head curve and pump curve for 1 pump, 2 pumps and 3 pumps operating closely approximate the observed operating flows in Table 7.2.

Using the data provided by the City for August 2020 and January 2021, the pump starts per hour and the average run times for each start under average dry weather flow conditions were determined (Table 7.3). For each hour of the day (ie. hour 1, hour 2 to hour 23 and hour 24) over the month the pump starts were totaled and then averaged. To get the pump start per hour, that average was divided by the number of days in the month (ie. 31 days). In both months it appears that a pump is running for most of the hour. The active wet well volume is 34cu.m., and with an average wastewater inflow of 248.6L/s, the wet well will fill in just over two minutes, resulting in the pumps running for a large portion of an hour.

Table 7-3: Pumps Starts and Run Times (Existing)

Description	August 2020	January 2021
Pump Starts per hour	4.8	5.5
Average Runtime Per Start (min)	9.23	9.47

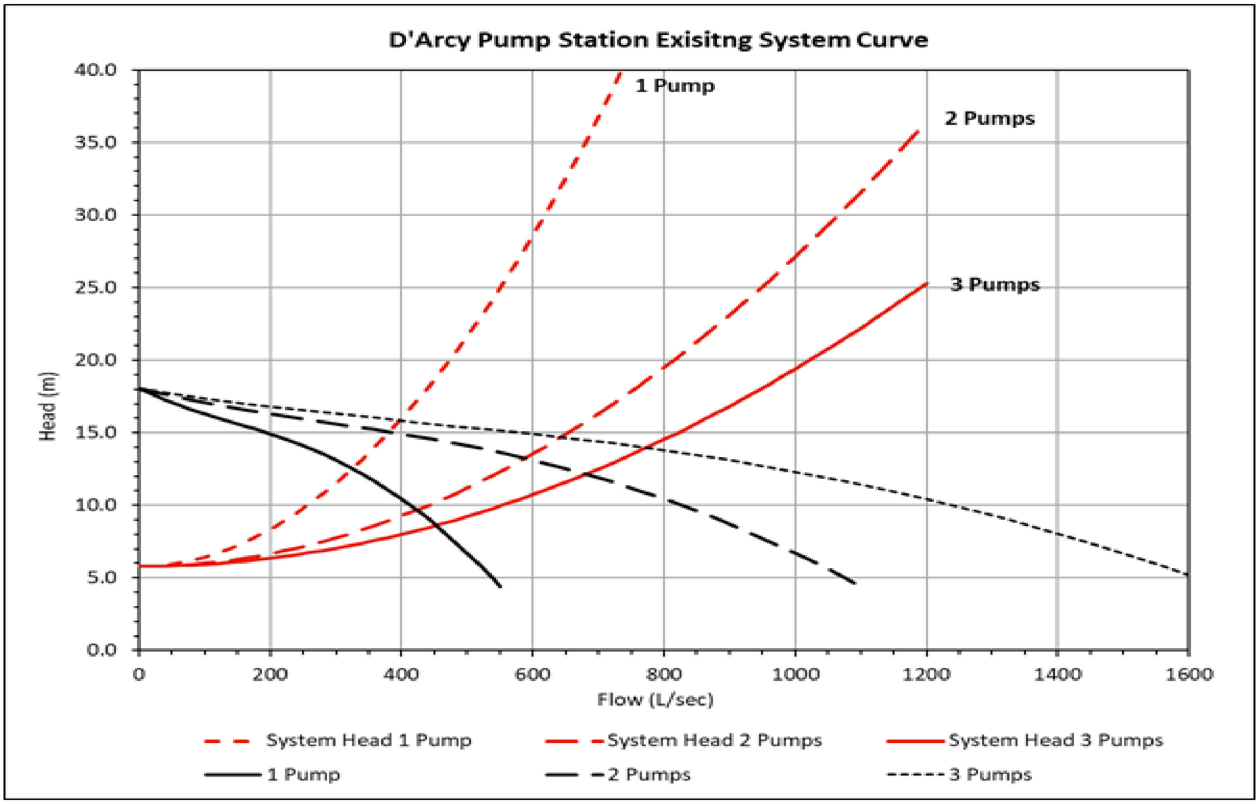


Figure 7-2: Existing System Head Curves

7.2.2 Load Shedding Pump Station and Forcemain Performance

When the model developed for the analysis of the load shedding forcemain is run with 1 pump, 2 pumps and 3 pumps operating, the flows indicated in Table 7.4 can be conveyed using the proposed 750mm diameter HDPE DR17 forcemain.

Table 7-4: Modeled Operating Points

# of Pumps	Operating Points
1 pump	257 L/s
2 pumps	446 L/s
3 pumps	620 L/s

The system head curves developed using the proposed load shedding forcemain accounted for 108m of 750mm diameter forcemain instead of 13.8m of 500mm diameter forcemain, A system head curve has been established for 1 pump, 2 pumps and 3 pumps operating simultaneously and is indicated in Figure 7.3. These system head curves are developed with the pumps operating against a river elevation at 231.63m (Flood Protection Level), resulting in a relatively high static head.

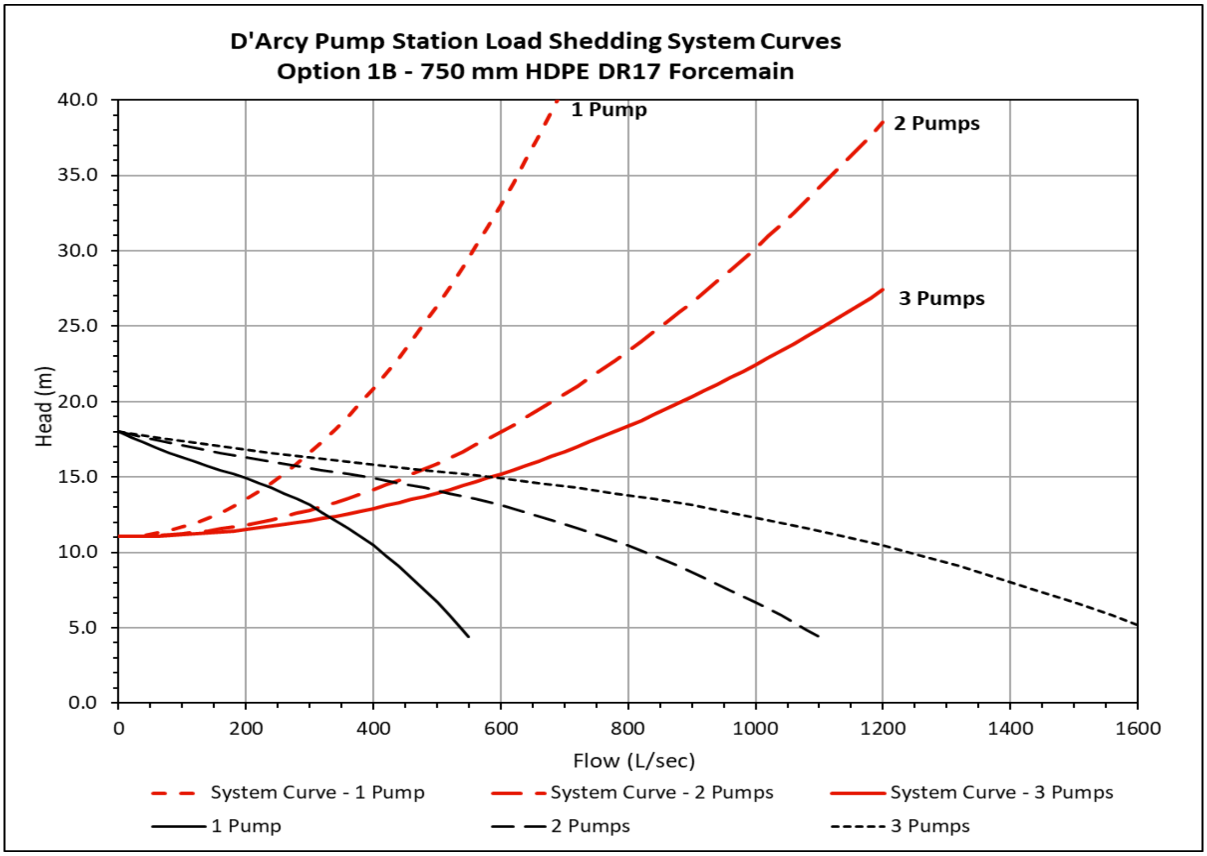


Figure 7-3: Proposed Load Shedding Forcemain System Head Curves

Using the diurnal curves to simulate wastewater inflows it was determined that pump starts are just below 2 per hour, but the pump runs for most of the hour (Table 7.5). Given the wet well volume and average wastewater inflow, the wet well does fill very quickly. Under the load shedding scenario the pumps operate at a lesser flow than under existing conditions (i.e. increased head due to high river levels), and will take longer to empty the active volume of the wet well.

Table 7-5: Pumps Starts and Run Times (Proposed)

Description	Load Shedding Forcemain
Pump Starts per hour	1.79
Average Runtime Per Start (min)	30.0

7.2.3 Performance Comparison

Figure 7.4 indicates the difference in the system head curves between the existing condition with only a 13.8m length of 500mm diameter forcemain and the proposed scenario with 108m length of 750mm diameter forcemain. The increased diameter of the proposed forcemain produces less headloss than the existing forcemain regardless of the increase in length. The controlling factor is the static head introduced when completing the analysis with the load shedding forcemain. Under conditions where the load shedding forcemain is used the river is at an elevation of 231.63m (flood protection level). Under the existing scenario the small length of forcemain discharges to a manhole with no backwater to add to the static head. Therefore, with the static head from the high river level, the system curve moves back along the pump curve resulting in a lower pump rate. This occurs in all pumping scenarios (I pump, 2 pumps or 3 pumps running).

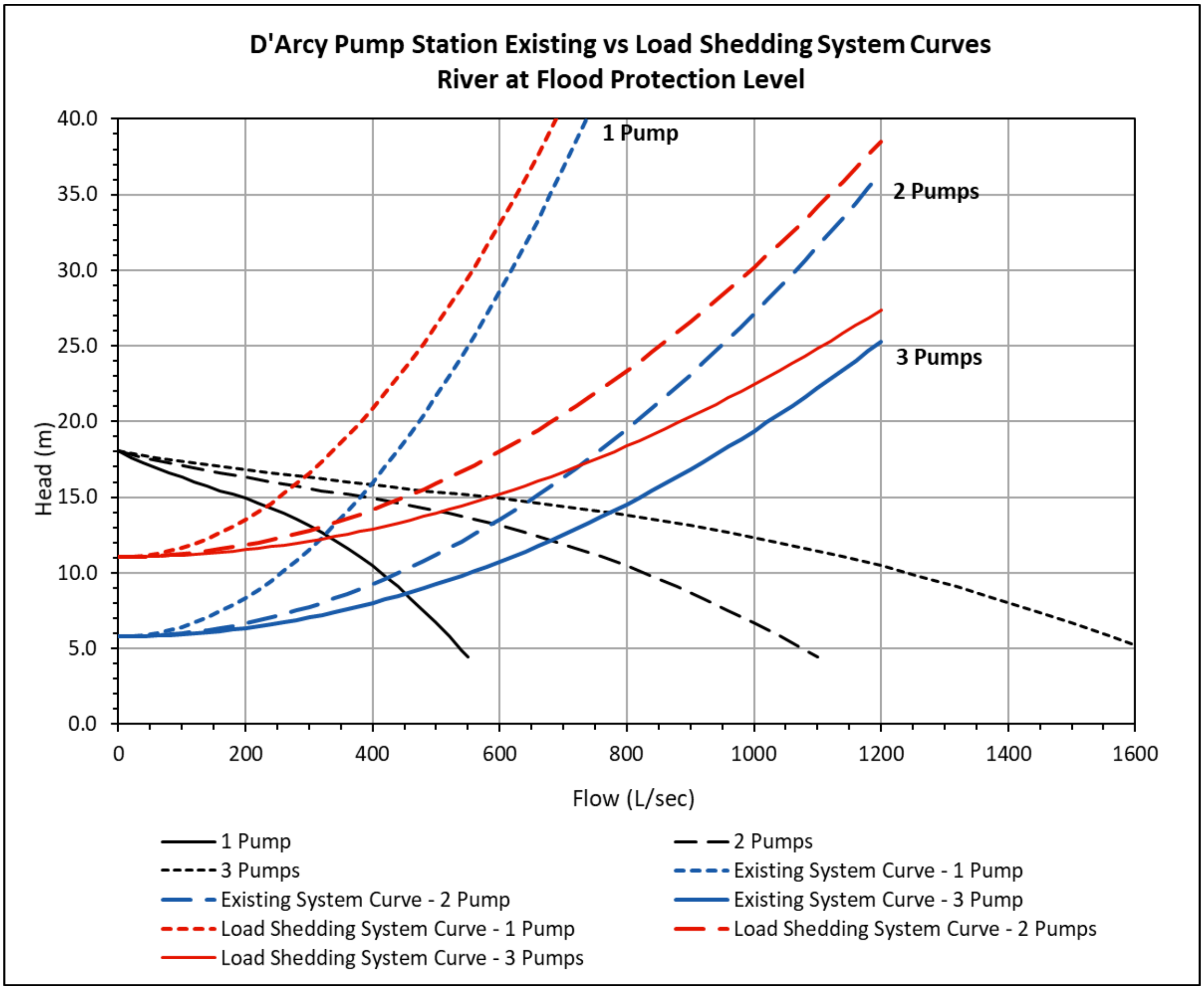


Figure 7-4: Comparison of System Head Curves

The 750mm diameter load shedding forcemain has been sized with the river at flood protection level. If the river is at a lower elevation, the system head curves for the load shedding scenario will all move forward along the pump curve resulting in higher pump rates. The outfall elevation is above the normal summer water level as indicated in Figure 4.1, so the differences in the system curves shown in Figure 7.5 are due to the characteristics of the existing forcemain versus the proposed load shedding forcemain (i.e. diameter, length, material).

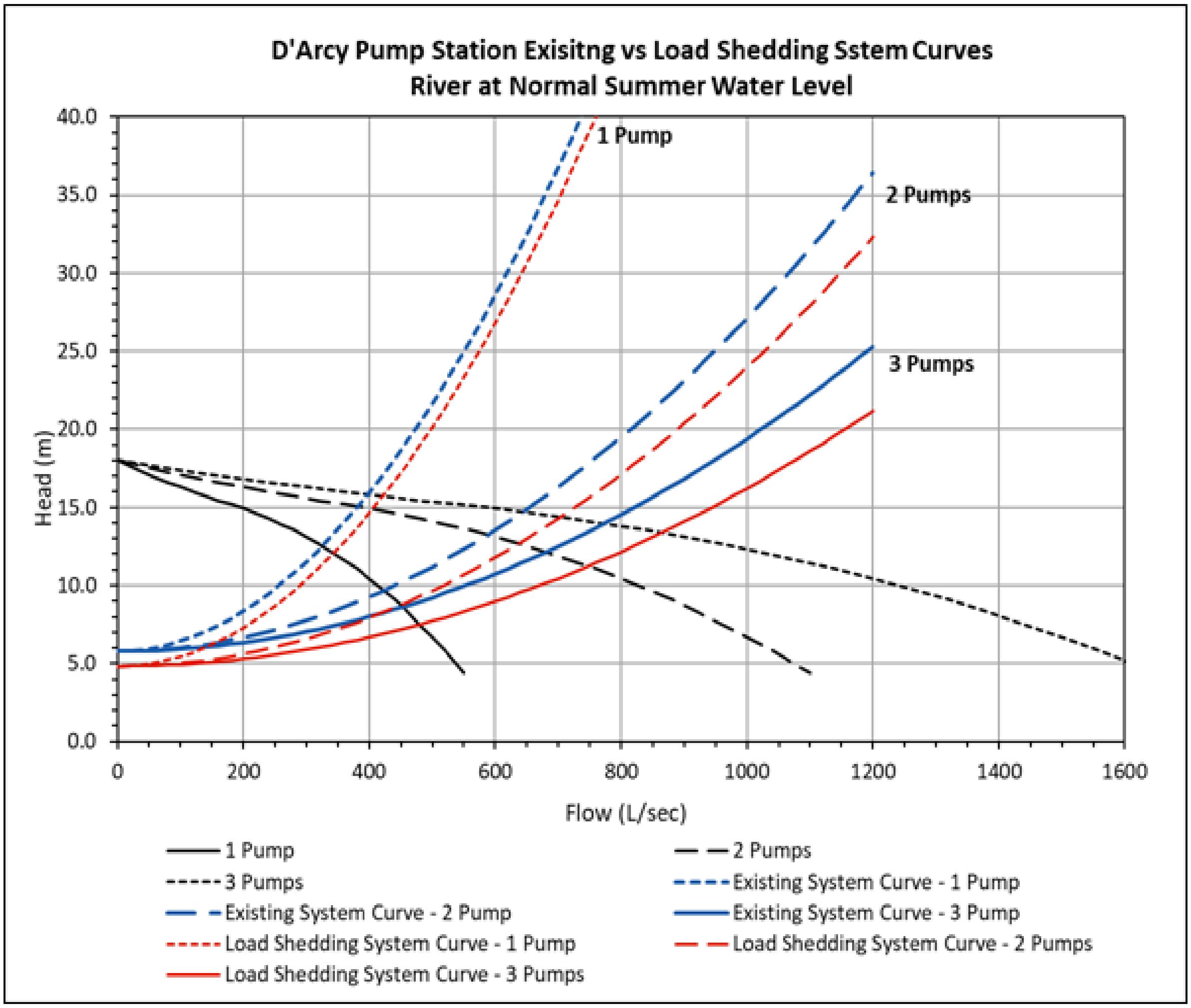


Figure 7-5: Comparison of System Head Curves (Normal Summer Water Level)

7.2.4 Rainfall Influence

August 2020 was selected to analyse pump station operations under rainfall influence because it had the largest amount of rain (55.9mm) as well as the largest individual rainstorm (24.6mm) in the year, while having a good dry period prior to a rainfall event. The dry period is important because we can see the immediate effect of the rainfall on pump operations without influence from previous wet weather flow. There is more rain in June 2020, however, it does not have the significant dry period August experienced.

Table 7-6: August 14th Storm Event Pump Starts and Run Times

Description	No. Pump Starts	Pump Starts per Hour	Total Run Time (mins)	Average Run Time per Start (mins)
Pump 1	20	1.39	476	23.8
Pump 2	19	1.32	358	18.8
Pump 3	20	1.39	250	12.5

Comparing this data to that of the existing pump station performance under dry weather conditions (Table 7.3), the pump starts per hours significantly increase while the duration of the average run time per start decreases. Additionally, the August 14th storm increase flows to the pump station enough to trigger two pumps running concurrently 20 times over the 14.2-hour storm duration. Only one pump runs under the dry weather conditions indicated in August 2020.

The relatively small storm event of August 14th with 24.6mm of rain approximates a 1.5-year storm event. The peak inflow to the pump station during this storm was approximately 620L/s. This flow is what the pump station can achieve with 3 pumps running when using the proposed load shedding forcemain. If a larger storm is encountered during a load shedding operation, the existing outfall chamber may need to be employed via overflows to the existing 1350mm diameter interceptor. It's possible that pumping and load shedding to the river from other upstream locations would also be needed. A detailed modeling analysis of the upstream collection system at various storm events with trials on which gates need to be opened or closed would have to be conducted to determine a scenario that could accommodate larger storm event and load shedding simultaneously.

8.0 OUTFALL OPTIONS

The option selected during the routing options evaluation was Option 1B where the load shedding forcemain extends from the interior of the existing pump station to the Red River with a flap gate to prevent backflow from the river. The City preferred not to add another chamber to the site or introduce another gate that had to be manually opened and closed, so the option with the flap gate at the river was selected.

There are some considerations with respect to operation and maintenance with using a flap gate at the river. The river will freeze and even with wing walls, ice movement can cause damage to the flap gate. Historically, the City has placed flap gates / check valves within a chamber to protect them from ice and to allow access for steaming if frozen. It is also likely that freezing and / or debris will eventually cause the flap gate to not seat of close properly.

Some options aside from a flap gate at the river or a chamber with a sluice may include the following:

- **Flap gate in manhole** – A manhole can be placed upstream of the river, east of the existing active transportation path to house the flap gate. This would allow access for steaming in case the flap gate is frozen in place when needed. From the manhole a section of CSP would be used to convey flows to the river. The area where the CSP daylights will require riprap, and a bar screen for the CSP opening. If the CSP outfall is also frozen, it too can be steamed from within the manhole. Additionally, it would be easier to replace a section of the CSP exposed near the river than a portion of the HDPE forcemain.
- **Check valve in manhole** – As an alternative to the flap gate a Tideflex check valve can be used. They do not freeze or rust and require little maintenance or repair, and they are good for wastewater applications because the valve seals around debris. Less than 1psi of back pressure will close the valve. The check valve can be placed in a manhole near the river and a CSP outfall can extend to the river from the manhole.
- **Check valve at river** – A Tideflex check valve could also be used at the river instead of inside a manhole. They do not freeze and are not affected by UV.
- **No manhole or check valve** – If the City does not select to use a manhole, the forcemain could directly discharge to the river without a flap gate or check valve. The transition between the HDPE DR17 forcemain and a CSP outfall pipe would be required just before the pipe daylights at the river. The CSP is easier to replace where exposed when damaged than the HDPE. It is recommended that this transition be designed with a concrete collar at 1.5 of the larger pipe OD. The existing outfall is a 900mm diameter Class V RCP. A 900mm diameter CSP can be used for the load shedding forcemain as well and will accommodate overlap with the 750mm diameter forcemain within the concrete collar.

9.0 PERMITTING

The City requires a Waterway Permit for construction activities within 106.7 m of the normal summer water level on the Red River (Waterway By-law No. 5888/92). The permit application must include a site plan, design drawings, and associated fees.

Wastewater flows from the D'Arcy Pump Station are conveyed across the Red River via two siphons and are ultimately delivered to the SEWPCC for treatment. With the option of load shedding wastewater to the Red River from the D'Arcy Pump Station, a Notice of Alteration (NOA) to the SEWPCC Environment Act Licence (EAL No. 2716 RR) may be required. Consultation with Manitoba Conservation and Climate will be carried out to determine if an NOA is required during the detailed design phase of this project.

The Red River provides fish habitat for a number of species including the mapleleaf mussel (*Quadrula quadrula*), a Schedule 1 Threatened species under the federal *Species at Risk Act* (SARA). The Red River is also considered a Navigable Waterway as per the Canadian Navigable Waters Act. As such, the following permitting requirements should be considered:

- The submission of a Request for Review by Fisheries and Oceans Canada (DFO) including an application to investigate the river for the presence of mapleleaf mussel which will require a permit under SARA. Pending results of the Request for Review and field investigation, an Application for Project Authorization including mussel relocation or compensation may be required.
- Communication with Transport Canada is recommended but it is expected that the proposed outfall would be under a *minor work order*. Requirements of the order should be included in tender documents and fulfilled by the contractor prior to or during construction. These measures would address public safety including notification, signage, lighting etc.

10.0 COST ESTIMATES

The estimate for D'Arcy Pump Station to accommodate the modifications required for the proposed load shedding forcemain are indicated in Table 10.1. Also included is the cost of the 750mm diameter forcemain extending to the river with a flap gate and headwall / wingwall at the discharge location.

Table 10-1: Summary of Class 3 Cost Estimates

Item	Preliminary Capital Construction Estimate
Pump Station Modifications – includes 2 knife gate valves, stainless steel piping, couplings, swab launch, miscellaneous appurtenances	$195,100
Forcemain – 750mmØ FM, air valve, flap gate and headwall / wingwall, riprap	$282,600
Subtotal	$477,700
General Requirements – includes mob/demob, submittals, etc. (20%)	$100,000
Contractor Costs – profits, overhead, bond (15%)	$70,000
Permitting and Testing (10%)	$50,000
Temporary Works – bypass (10%)	$50,000
Commissioning	$50,000
Subtotal	$797,700
Engineering & Contingency (40%)	$317,000
TOTAL	**$1,114,700**

If it is decided that a manhole to house the flap gate upstream of the river is better for operation and maintenance purposes, then an additional $100,000 would be required for the specialized manhole, and the riprap and finishing at the discharge location at the river.

11.0 RECOMMENDATIONS

Tetra Tech recommends the following with respect to the upgrade of the D'Arcy Wastewater Pumping Station and the addition of load shedding to its current operations:

1. Implement Option 1B which involves configuring the existing pump station to accommodate a load shedding forcemain that will discharge to the Red River. Option 1B includes the use of a flap gate headwall/wingwall at the discharge to the river.

2. Use knife gate valves within the existing pump station to manually open and close to direct wastewater flows to the existing forcemain or the proposed load shedding forcemain. The knife gate valves should be installed with bonnets to avoid exposure to wastewater during opening/closing.

3. Conduct 3D laser scanning to confirm that all proposed valves and appurtenances can be accommodated within the existing pump station.

4. Use a 750mm diameter HDPE DR17 forcemain exterior to the pump station. Proposed piping and appurtenances within the pump station will be 500mm diameter.

5. The City consider potential operational and maintenance benefits (during winter months) of using a manhole to house the proposed flap gate upstream of the river.

6. Coordination with the City to develop a tie-in procedure within the pump station as service to the station will need to be suspended. A plan to bypass wastewater flows will be necessary.

7. Confirm riverbank stability requirements with geotechnical investigation and report.

8. Confirm Waterways permit requirements and the potential need for an NOA to the SEWPCC Environment Act Licence. Complete Request for Review by Fisheries and Oceans Canada (DFO) and engage with Transport Canada on expected *minor work order*.

12.0 CLOSURE

We trust this proposal/document meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

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IM/ac

APPENDIX A

CITY OF WINNIPEG LOAD SHEDDING DOCUMENTS

Water and Waste Department • Service des eaux et des déchets

March 11, 2019

Client File No.: 1069.10
Our File No(s): 020-08-09-18-01
020-17-08-11-00
020-17-08-11-0N

Manitoba Sustainable Development
Environmental Compliance and Enforcement Branch
1007 Century Street
Winnipeg, MB R3H 04W

Attention: Ms. Yvonne Hawryliuk, Provincial Manager – Environment Officer

Dear Ms. Hawryliuk:

RE: SEWPCC COLLECTION SYSTEM – POTENTIAL LOAD SHEDDING PROCEDURES DURING SEVERE FLOOD STAGE ENVIRONMENT ACT LICENCE NO. 2716RR

This is to advise you of the potential load shedding procedures the City may have to implement for the South End Sewage Treatment Plant (SEWPCC) wastewater collection system catchment area during the 2019 spring flood. Load shedding is a temporary measure to protect public health by minimizing the risk of flooding the SEWPCC and reducing the potential for basement flooding in the wastewater collection system.

1.0 BACKGROUND

The SEWPCC and its associated sewer infrastructure collect and treat wastewater from the south end of the city. During normal dry weather conditions, sewer flows are conveyed to the SEWPCC for treatment and subsequently discharged via an outfall to the Red River. Under wet weather operation, the interceptor system conveys a minimum of 2.75 time’s dry weather flow to the SEWPCC for primary and/or secondary treatment and disinfection. During severe wet weather conditions, infiltration and inflow into the collection system can increase the hydraulic load on the pipe system. The severe wet weather events can produce significant flows, as high as 5 time’s dry weather flow.

During extreme river flood conditions, such as occurred in 1997, water levels in the Red River can rise to very high levels which limit the capacity of SEWPCC to pass all flows without flooding the plant. High river levels also prevent the activation of emergency overflows in the collection system which results in increased risk of basement flooding during rain events.

2.0 RISK ASSESSMENT

In 2011, the City engaged Stantec Inc. to evaluate operational risks that occur during high river events and assess options to protect public health by reducing the potential for basement flooding and maximizing effluent treatment at the SEWPCC. The study evaluated the collection system responses under a range of high river levels, rainfall events and risk scenarios. The study concluded:

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- In order to limit the risk of basement flooding, it is important to preserve conveyance and storage capacity in the interceptor system. As such, it is prudent to operate the collection system under free-flow gravity conditions; that is, avoid surcharge conditions. Prior modelling of the interceptor system has shown this to be approximately 260 MLD.
- Given the response times required to initiate and realize the benefits of load shedding procedures plus the risk of a pump failure or power failure at the SEWPCC, the trigger inflow at SEWPCC was determined to be 200 MLD. With inflows above 200 MLD there is an elevated risk of extensive basement flooding in the South catchment area (such as St. Vital area).
- There is a need to be proactive since flows to the SEWPCC can rise quickly during a rain event. Modelling has shown that with saturated ground conditions a significant, although typical, spring rainfall of 7 mm/hr for 3 hours will cause the flows at the SEWPCC to rise above 200 MLD within hours.
- When the Red River level reaches 229.5 m at the SEWPCC outfall, the emergency overflow for the south end interceptor, which is located at the intersection of St. Mary's Road and Britannica Road, does not provide the necessary hydraulic relief to the collection system in the event of a pump or power failure at the SEWPCC.
- During high river levels, a series of load shedding activities should be implemented to proactively manage the potential for surcharging the collection system and consequently increase available storage capacity. Load shedding means dilute wastewater will be directed to the river from the collection system.

3.0 LOAD SHEDDING PROCEDURES

When the Red River level reaches 229.5 m at the SEWPCC outfall and inflows to the SEWPCC reach 200 MLD, the following load shedding procedures will be implemented in sequential order:

1. Load shedding will occur at Mager Drive Lift Station. As Mager also pumps flows from Baltimore Lift Station and Cockburn Lift Station, these stations will also be shed. These activities are anticipated to reduce flows in the collection system by about 40 MLD. Activation time to shed at Mager is approximately 45 minutes and it consists of the shutting down of the 3 lift stations and allowing sewer levels to rise to levels which enable the 3 flood pumping stations to discharge to the river; unless wet weather is severe (i.e. heavy rain), a noticeable reduction in flows to the SEWPCC should be observed within a few hours. As flows to the SEWPCC drop below 150 MLD we will begin to reactivate the 3 lift stations.
2. If the flows at the SEWPCC continue to rise and surpass 200 MLD again, load shedding will occur at the D 'Arcy Lift Station, located on the West bank of the Red River near the Fort Garry Bridge. Under this operating scenario it is likely that the D'Arcy Pumping Station Lift Station will reach pumping capacity resulting in an increased risk of basement flooding on the west side of the Red River. Therefore, temporary pumping will also be used at the Glengarry manhole (located at Glengarry Drive and Darcy Drive) to shed additional sewer flows from the collection system. Activation time to shed at D'Arcy, which consists of the setting up of temporary pumps at the Glengarry manhole, is approximately 4 hours.

3. If the flows at the SEWPCC continue to rise above 200 MLD again, load shedding will occur using temporary pumps installed at the manhole located east of the intersection of Bishop Grandin Blvd and St. Anne's Road on the west side of the Seine River. This scenario will temporarily divert sewer flows into the Seine River. Activation time to shed at this location, which consists of the setting up temporary pumps at the manhole and to discharge to the river, is approximately 45 minutes.
4. If the flows at the SEWPCC continue to rise above 200 MLD again, load shedding will occur via the Storm Pump at the Windsor Park Lift Station, located at Cottonwood Road and Autumnwood Drive (945 Cottonwood Road). This scenario will temporarily divert sewer flows into the Seine River. Activation time to shed at this location, which consists of the activation of the storm pump to discharge to the river, is approximately 45 minutes.

Load shedding activates will begin to cease when flows to the SEWPCC have stabilized below 150 MLD and the immediate risk of further wet weather has ended. Sewer flows will be brought back online into the collection system in the reverse sequence that shedding was initiated.

The above noted load shedding locations may have to be altered if unforeseen sources of high extraneous inflow and infiltration are observed within the collection system. In addition, we have investigated the possibility of diverting Windsor Park Lift Station flows to the North End Water Pollution Control Centre (NEWPCC) (as per normal winter operation) but determined this option is not feasible due to the high risk of basement flooding in the Mission sewer district.

Load shedding protocols were developed to minimize environmental impacts to the Red and Seine Rivers by:

- Limiting to the extent possible load shedding activities to the existing combined sewer districts (Mager, Baltimore, and Cockburn);
- Prioritizing load shedding to the Red River which has significantly higher flows and dilution capacity compared to smaller watercourses.
- Carefully monitoring river conditions, sewer flows, and weather conditions to ensure that load shedding is implemented under stringent criteria and be limited to the shortest duration possible.

The expected impacts on the Red River and Seine River water quality from potential load shedding are not expected to be discernible due to the extremely high flows and large dilution that occurs during a flood.

We trust the foregoing provides you with adequate background and rationale for the potential load shedding that may have to be implemented during the upcoming spring flood season. If you have any questions on this matter or require any additional information, please contact Ms. Susan Lambert, P. Eng. at 204-986-2304 or by email at slambert@winnipeg.ca.

Yours truly,

Chris Carroll, P. Eng., MBA
Manager of Wastewater Services Division

GK/xx

c: Tracey Braun, M.Sc., Manitoba Sustainable Development (email)
Donna Smiley, Manitoba Sustainable Development (email)
Yvonne Hawryliuk, MSc, Manitoba Sustainable Development (email)
M.L. Geer, CPA, CA, Water and Waste Department (email)
R. Grosselle, Water and Waste Department (email)
G.K. Patton, P. Eng., Water and Waste Department (email)
Susan Lambert, P. Eng., Water and Waste Department (email)
D. E. Griffin, P. Eng., Water and Waste Department (email)
Swarna Jayakody, P. Eng. Water and Waste Department (email)
Terry Josephson, P. Eng. Water and Waste Department (email)

N:\Flood 2019\Load Shedding\Letter

SEWPCC Flood Protection – Load Shedding

General Information

Contact List

- The following people are to be notified when load shedding is started, stopped or any changes are made to the load shedding process

1. Wastewater Treatment OIC	refer to the OIC standby list weekly email
2. Wastewater Collection OIC	refer to the OIC standby list weekly email
3. McPhillips Control Center Operator	scada@winnipeg.ca |204-986-7948
4. Supervisor of Regional Collection	eweiske@winnipeg.ca
5. Superintendent of Collection Systems	eweiske@winnipeg.ca
6. SEWPCC Plant Supervisor	swestover@winnipeg.ca
7. Field Services Operations Engineer	slambert@winnipeg.ca
8. Wastewater Engineer	tjosephson@winnipeg.ca
9. Manager of Wastewater Services	ccarroll@winnipeg.ca

Distributed Control System (DCS) Alarm

- The DCS alarm will trigger a Group 7 alarm
  125AC08 FL>200 ML/D CALL WWTP OIC
  when flows to the SEWPCC are greater than 200 MLD for a minimum of 5 minutes.
- The DCS alarm will reset once flows drop below 200 MLD.
- The DCS will produce another alarm every 4 hours that the flow to the SEWPCC remains above 200 MLD.

River Level

- The river level to look at is the South Perimeter Bridge Level at the following websites:
- http://wwdsvpcg.ad.cityofwpg.org:81/legacy/historical/current_riverlevels.txt
- https://winnipeg.ca/waterandwaste/drainageFlooding/riverlevels/current.asp
- Look to see if the Geodetic value is above 229.50 m.

SEWPCC Current Flow

- http://192.168.3.181/pic/historical/spring_tags.cgi

Load Shedding Procedure

- Load shedding will start if the river level is above 229.50 m at the South Perimeter Bridge and flows to the SEWPCC exceed 200 MLD.
- Load shedding will be done individually in the following order adding each additional step if flows at SEWPCC are not stabilizing.
  - Step 1: Cockburn, Baltimore and Mager
  - Step 2: D'Arcy (Glengarry Manhole)
  - Step 3: Bishop Grandin and Seine River (Manhole)
- Once flows are below 150 MLD load shedding step(s) will be stopped individually and in reverse order of activation to maintain flows below 150 MLD.

Responsibilities

NEWPCC Shift Staff

- When the Group 7 Alarm stating that flows at the SEWPCC are greater than 200 MLD is received at the NEWPCC, call the Wastewater Treatment OIC and inform them that the SEWPCC is receiving flows greater than 200 MLD (leaving a message is not adequate – keep calling the individual until you speak to them directly).
- Every time the alarm is received, call the Wastewater Treatment OIC, even if the alarm is received multiple times per shift.

Wastewater Treatment OIC

- If load shedding has not been started and a Group 7 Alarm stating that flows to the SEWPCC are greater than 200 MLD is received:
    1. Determine if the river level at the South Perimeter Bridge is greater than 229.50 m (Geodetic Metric) (available at the link on the previous page).

    2. If it is greater than 229.50 m, call the McPhillips Control Center Operator to let them know to follow the Load Shedding Procedure (leaving a message is not adequate – keep calling the individual until you speak to them directly).

    3. After receiving a call back from the McPhillips Control Center Operator confirming load shedding has been started; email the individuals on the contact list and provide them with an overview of why load shedding was started. At a minimum the following shall be included: the flow rate to the SEWPCC, the river level at the South Perimeter Bridge, the time flow rate and river level measurements were taken, the time and location the Wastewater Collections standby crew was dispatched and the time load shedding started.

- If load shedding has been started:
    1. Monitor the river level and flow to SEWPCC

    2. If the flow continues to climb above 200MLD call the McPhillips Control Center Operator to let them know that the flows to the SEWPCC have not stabilized so that further load shedding can be started (leaving a message is not adequate – keep calling the individuals until you speak to them directly). After receiving a call back from the McPhillips Control Center Operator confirming further load shedding has been started; email the individuals on the contact list and provide them with an overview of why further load shedding was started. At a minimum the following shall be included: The flow rate to the SEWPCC, the river level at the South Perimeter Bridge, the time flow rate and river level measurements were taken, the time and location the Wastewater Collections standby crew was dispatched and the time further load shedding started.

    3. If the flow to the plant drops below 150 MLD or the river level drops below 229.50 m, call the McPhillips Control Center Operator to let them know that flows are below 150 MLD or that the river level is below 229.50 m and that load shedding can be stopped at "Step 1 or Step 2 or Step 3" (leaving a message is not adequate – keep calling the individuals until you speak to them directly). After receiving a call back from the

McPhillips Control Center Operator confirming load shedding has been stopped at “Step 1 or Step 2 or Step 3”; email the individuals on the contact list and provide them with an overview of why load shedding was stopped. At a minimum the following shall be included: The flow rate to the SEWPCC, the river level at the South Perimeter Bridge, the time flow rate and river level measurements were taken, the time and location the Wastewater Collections standby crew was dispatched and the time load shedding stopped.

4. Continue to monitor the river level and flow to the SEWPCC and let the McPhillips Control Center Operator know of any changes in the flow to the SEWPCC

- On Wednesdays, ensure the incoming Wastewater Treatment OIC is aware of the current load shedding situation

McPhillips Control Center Operator

- If load shedding has not been started and a call is received from the Wastewater Treatment OIC stating load shedding needs to be started:
  1. The McPhillips Control Center Operator will call the Wastewater Collection standby crew and inform them to follow the Load Shedding Procedure.

  2. The McPhillips Control Center Operator will call the Wastewater Treatment OIC to let them know the time load shedding started (i.e. the flood pumps have started discharging wastewater to the river) to confirm with them that load shedding has been started. In addition, the McPhillips Control Center Operator will let the Wastewater Treatment OIC know the time the Wastewater Collections standby crew was dispatched.

- If load shedding has been started and a call is received from the Wastewater Treatment OIC stating further load shedding is required:
  1. The McPhillips Control Center Operator will call the Wastewater Collection standby crew and inform them to follow the Load Shedding Procedure.

  2. The McPhillips Control Center Operator will call the Wastewater Treatment OIC to let them know the time further load shedding started (i.e. the flood pumps have started discharging wastewater to the river or wastewater is being shed from the collection system via a manhole) to confirm with them that the further load shedding has been started. In addition, the McPhillips Control Center Operator will let the Wastewater Treatment OIC know the time the Wastewater Collections standby crew was dispatched.

- If load shedding has been started and a call is received from the Wastewater Treatment OIC stating load shedding can be stopped:
  1. If a call is received from the Wastewater Treatment OIC stating that the flow is below 150 MLD or the river level is below 229.50 m, the McPhillips Control Center Operator calls the Wastewater Collection standby crew and informs them which load shedding step(s) can be stopped.

  2. The McPhillips Control Center Operator will call the Wastewater Treatment OIC to let them know the time load shedding was stopped (i.e. the flood pumps have stopped discharging wastewater to the river or wastewater has stopped being shed from the

collection system via a manhole). In addition, the McPhillips Control Center Operator will let the Wastewater Treatment OIC know the time the Wastewater Collections standby crew was dispatched.

SEWPCC Flood Protection – Load Shedding – Wastewater Collections

General Information

Responsibilities

McPhillips Control Center Operator

- If load shedding has not been started and a call is received from the Wastewater Treatment OIC stating load shedding needs to be started:

  The McPhillips Control Center Operator will call the Wastewater Collection standby crew and inform three (3) individuals to follow the Load Shedding Procedure found in this SOP.

  The McPhillips Control Center Operator will use SCADA to determine if the flood pump at each station is discharging wastewater to the river. If the flood pump(s) have not started, the McPhillips Control Center Operator will call the wastewater collection standby crew and tell them to go back to those station(s) to investigate why the flood pump(s) have not started.

  The McPhillips Control Center Operator will use SCADA to record the time the flood pump turned on for each station. The McPhillips Control Center Operator needs to contact the Wastewater Treatment OIC to tell them the time the Wastewater Collections crew was dispatched to Cockburn, Baltimore and Mager lift station and the time the flood pump turned on at each station.

- If load shedding has been started and a call is received from the Wastewater Treatment OIC stating further load shedding is required:

  The McPhillips Control Center Operator will call the Wastewater Collection standby crew and inform another 2 person crew to follow either step 2 or step 3 in the Load Shedding Procedure found in this SOP (whichever the McPhillips Control Center Operator requires).

  After receiving a call back from the Wastewater Collection standby crew lead, the McPhillips Control Center Operator needs to contact the Wastewater Treatment OIC to tell them the time the crew was dispatched and the time the temporary pump started discharging to the river.

- If load shedding has been started and a call is received from the Wastewater Treatment OIC stating load shedding can be stopped:

  If a call is received from the Wastewater Treatment OIC stating that the flow is below 150 MLD or the river level is below 229.50 m, the McPhillips Control Center Operator calls the last Wastewater Collection standby crew which was dispatched and informs them that load shedding can be stopped.

If the Wastewater Treatment OIC calls again stating that another load shedding location can be stopped; the McPhillips Control Center Operator will call the next crew that was dispatched last and informs them that load shedding can be stopped.

Tell the Wastewater Collection crews that stopped load shedding to come back to McPhillips only if the Wastewater Treatment OIC tells you it is okay to do so. Otherwise, tell the crews to stay on site in case load shedding is needed again.

Wastewater Collection Standby Crew

- If load shedding has not been started and a call is received from the McPhillips Control Center Operator stating load shedding needs to be started:

  The wastewater collections standby crew (3 individuals) will follow the 1st step in the Load Shedding Procedure found in this SOP.

- If load shedding has been started and a call is received from the McPhillips Control Center Operator stating further load shedding needs to be started:

  The wastewater collections standby crew will send another two (2) individuals to follow either step 2 or step 3 in the Load Shedding Procedure (whichever the McPhillips Control Center Operator requires)

- If load shedding has been started and a call is received from the McPhillips Control Center Operator stating load shedding can be stopped:

  Stop load shedding at your specific location.

  Call the McPhillips Control Center Operator once wastewater has stopped discharging to the river or land drainage sewer (Glengarry). Stay on site until the McPhillips Control Center Operator calls and says it is okay to come back to McPhillips.

Load Shedding Procedure

1. Cockburn, Baltimore and Mager

   - Drive to Cockburn lift station and turn off the lift pumps.

   - Next, drive to Baltimore lift station and turn off the lift pumps.

   - Drive to Mager lift station and turn off the lift pumps. Stay on site at Mager.

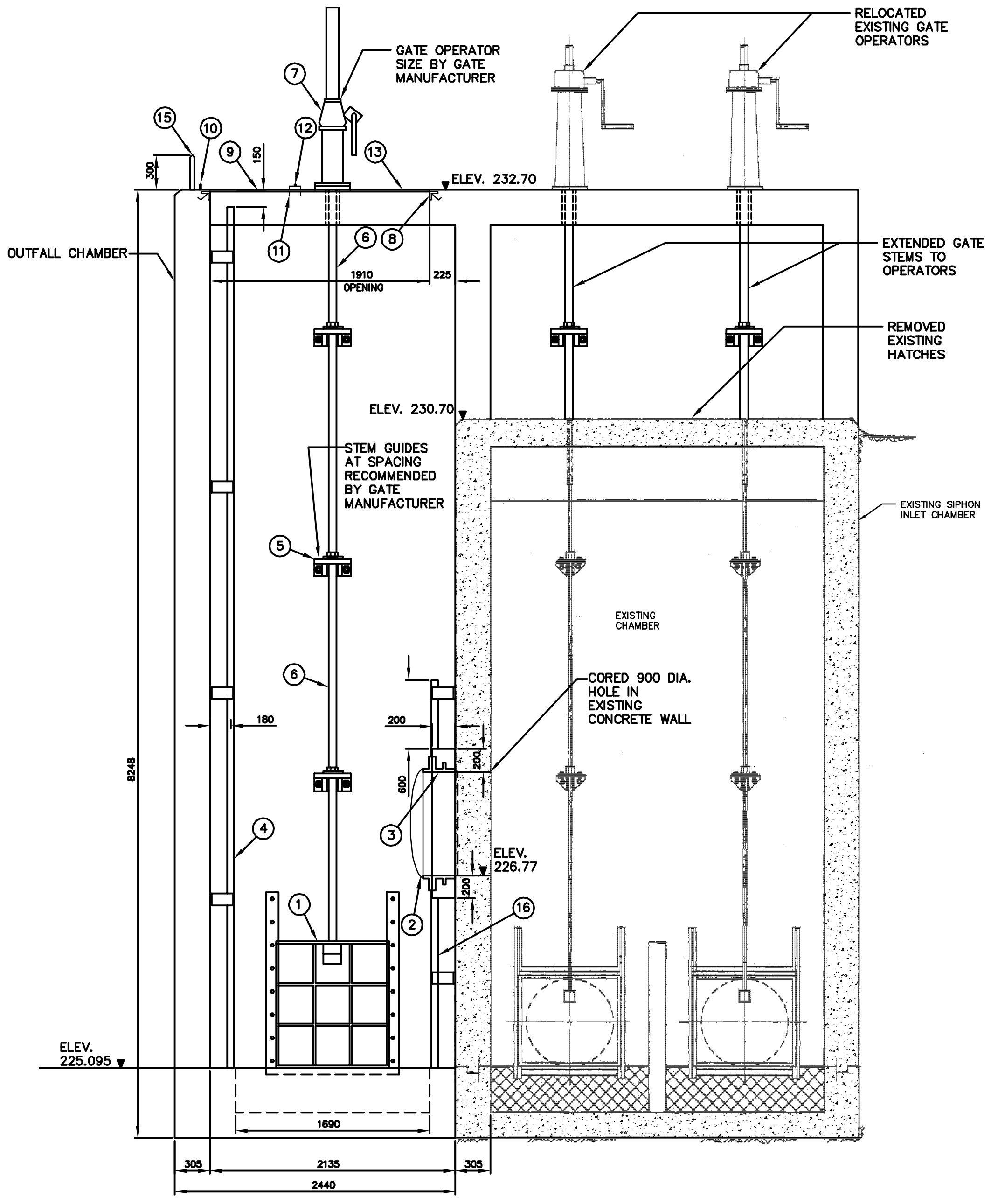
   - The McPhillips Control Center Operator will be using SCADA to determine if the flood pump at each station is discharging wastewater to the river. If flood pump(s) have not started, the McPhillips Control Center Operator will call you and tell you to go back to those station(s) to investigate why the flood pump(s) have not started.

2. D’Arcy (Glengarry)

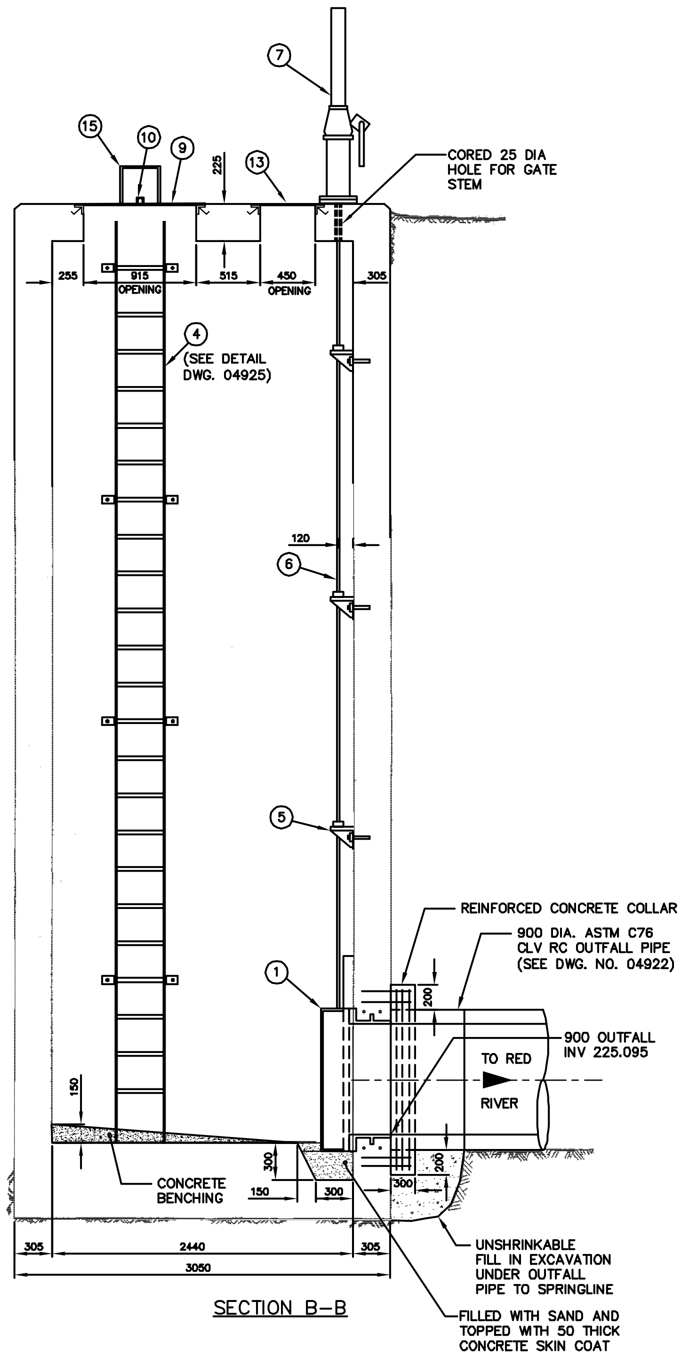
- The key for the Glengarry temporary pump will be with the pump.
- Drive to the Glengarry manhole (shown in the map below) and turn on the temporary pump.
- Once the temporary pump is discharging to the land drainage sewer call the McPhillips Control Center Operator to let them know.
- Stay on site and monitor.
- DO NOT turn off the lift pumps at D’Arcy lift station.

3. Bishop Grandin and Seine River

- The key for the Bishop Grandin and Seine River temporary pump will be with the pump.
- Drive to the manhole (shown in the map below) and turn on the temporary pump.
- Once the temporary pump is discharging to the river call the McPhillips Control Center Operator to let them know.
- Stay on site and monitor.



SECTION A–A



SECTION B–B

THIS DRAWING CONTAINS A RASTER IMAGE
FILENAME:
04927_687SEC.tif

LIST OF MATERIALS

NO.	DESCRIPTION	LENGTH	QUANTITY
1.	900X900 STAINLESS STEEL SLUICE GATE FONTAINE SERIES 20 MODEL 204 C/W MODEL F–2 STAINLESS STEEL WALL THIMBLE		1
2.	900ø ARMTEC MODEL 20C CI FLAP GATE WITH BRONZE SEATING FACES		1
3.	900ø CI ROUND FLANGE ROUND OPENING ARMTEC TYPE "F" WALL THIMBLE		1
4.	FABRICATED GALVANIZED STEEL LADDER (RUNGS @ 300 O.C.)	7785	1
5.	STAINLESS STEEL STEM GUIDE C/W UHMWPE BUSHING		AS REQ'D
6.	SOLID ROUND STAINLESS STEEL VALVE STEM	AS REQ'D	1
7.	PEDESTAL MOUNTED GATE OPERATOR C/W STEM COVER AND POSITION INDICATOR (FONTAINE TYPE MNEP)		1
8.	ALUMINUM ANGLE EXTRUSION (DIE #670826) FRAME C/W CONC. ANCHORS @ 300 O.C.	AS REQ'D	2
9.	10 THICK ALUMINUM TREAD PLATE COVER C/W 3 THICK X 32 WIDE NEOPRENE GASKET BONDED TO ANGLE FRAME	AS REQ'D	1
10.	50 X 38 X 10 ALUMINUM BAR C/W 15ø HOLE FOR PADLOCK		1
11.	100 X 64 X 6 ALUMINUM SUPPORT CHANNEL	915	1
12.	19ø CONTINUOUS ALUMINUM HINGE C/W 10ø REMOVABLE STAINLESS STEEL PIN	1005	1
13.	10 THICK ALUMINUM TREAD PLATE COVER C/W 3 THICK X 32 WIDE NEOPRENE GASKET BONDED TO ANGLE FRAME AND 8ø X 20 LONG FLAT HEAD SCREWS @ 450 O.C. MAX.	AS REQ'D	2
14.	12ø ALUMINUM ROD LIFTING HANDLE		1
15.	FABRICATED ALUMINUM HANDHOLD C/W 12ø X 140 LONG ANCHOR BOLTS	300	1
16.	FABRICATED STEEL LADDER		1

NOTES:

- SEE DRAWING 04920 FOR CHAMBER LOCATION
- ALL ALUMINUM MATERIAL 6351–T6
- ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE TREATED WITH TWO COATS OF ALKALI RESISTANT BITUMINOUS PAINT
- ALL UNIDENTIFIED NUTS, BOLTS AND ANCHORS TYPE 316 STAINLESS STEEL
- SEE DRAWING NO. 04928 AND 04929 FOR REINFORCING

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE: 2004 01 01

RECORD DRAWING
WATER AND WASTE DEPARTMENT

B.M. ELEV.
FIELD BOOK #:
POSTED TO LBIS

NO.	REVISIONS	DATE	BY
1	REVISED TO RECORD DWG.	08.06.02	CJH/WKT

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	TW
DRAWN BY	WKT	APPROVED BY	
HOR. SCALE	1:30	RELEASED FOR CONSTRUCTION	
VERTICAL			
DATE	2001 08 16	DATE	

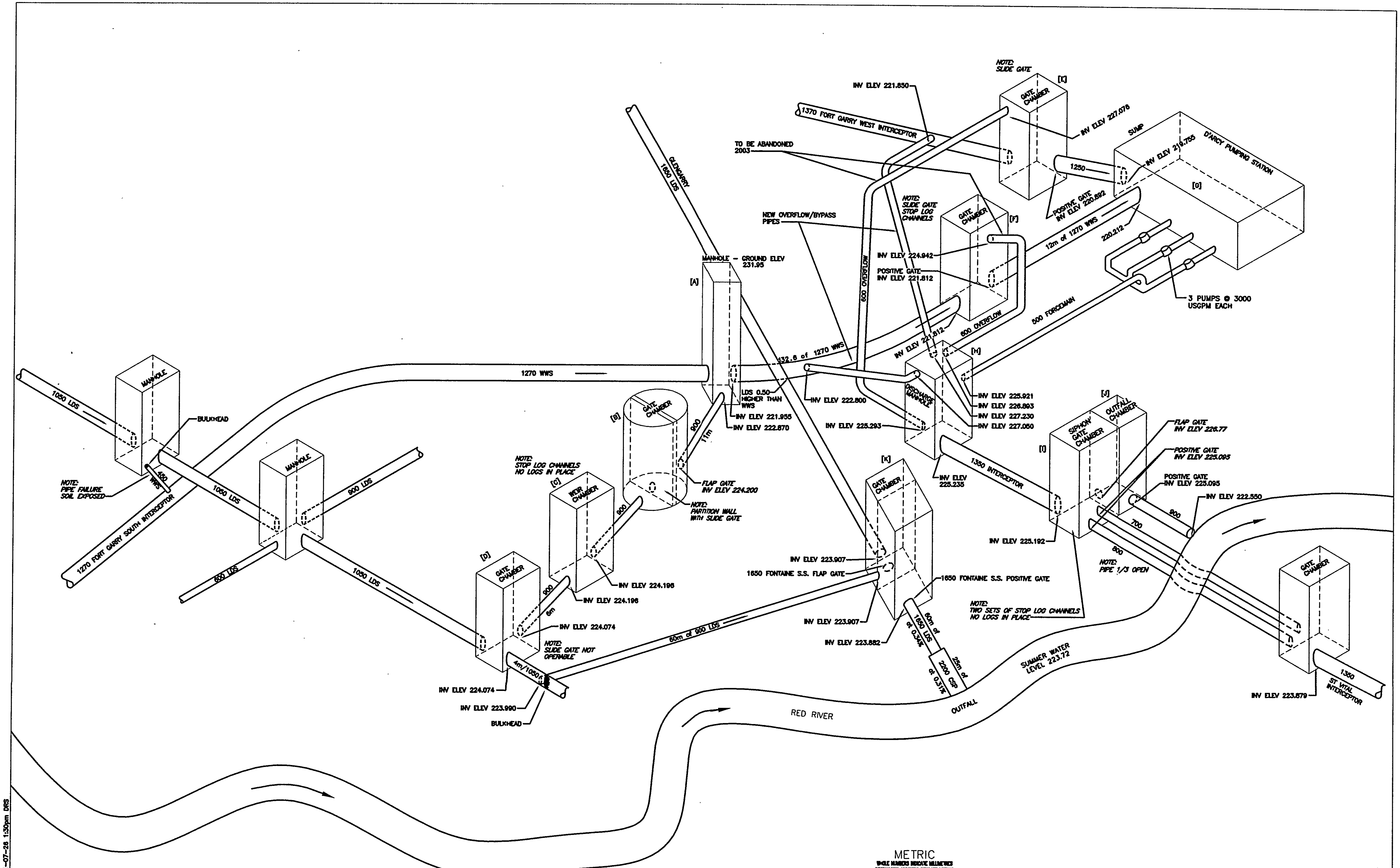
ENGINEER'S SEAL
ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

TENDER NO. 0695–2001
AUTOCADR2000: 04927.dwg
PLOT DATE: 2008 06 03

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING
OUTFALL CHAMBER
SECTION VIEWS

SHEET 8 OF 11
CITY DRAWING NUMBER
04927



METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

Finance No. 0000, AG 00/00

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPR. U/G STRUCTURES COMMITTEE | DATE

B.M. ELEV.

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

NO.	REVISIONS	DATE	BY

UMA Engineering Ltd.
• Consulting • Engineering • Construction • Management Services

DESIGNED BY	-	CHECKED BY	
DRAWN BY	DRS	APPROVED BY	
HOR. SCALE:	-	RELEASED FOR CONSTRUCTION	
VERTICAL:	-		
DATE		DATE	

ENGINEER'S SEAL

CONSULTANT DRAWING NO. 00
41-02-D265-067-01

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

FORT GARRY INTERCEPTORS
SCHEMATIC
THATCHER TO RIVER CROSSING

SHEET - OF -
CITY DRAWING NUMBER
1105-A
REV -

PLOT SCALE: 1=1.0
FILE: ISOMETRIC SCHEMATIC.DWG 2001-07-26 1:30pm DRS

APPENDIX B

D'ARCY PUMPING STATION – PUMP DATA

D'Arcy

Ingersoll-Dresser Pumps

PUMP DATASHEET

Tag No. : 25722	Pump type: 14MN16A
Customer ref : POWER + MINE SUPPLY	Curve : P-S000467B
IDP ref : S-000467	Stages : 1
Service : SEWAGE	

OPERATING CONDITIONS

Flow	378.5 l/s
Flow/CQ(1.00	-
Normal Flow	-
Head	10.67 m
Head/CH(1.00	-
NPSH Available	8.10 m
Adjusted NPSH	
Suct Press Max	0. kPa

MATERIALS

Mat'l Column : IDP - 10

OTHER REQUIREMENTS

Speed Set : 1177. rpm
Driver sizing : Rated Power

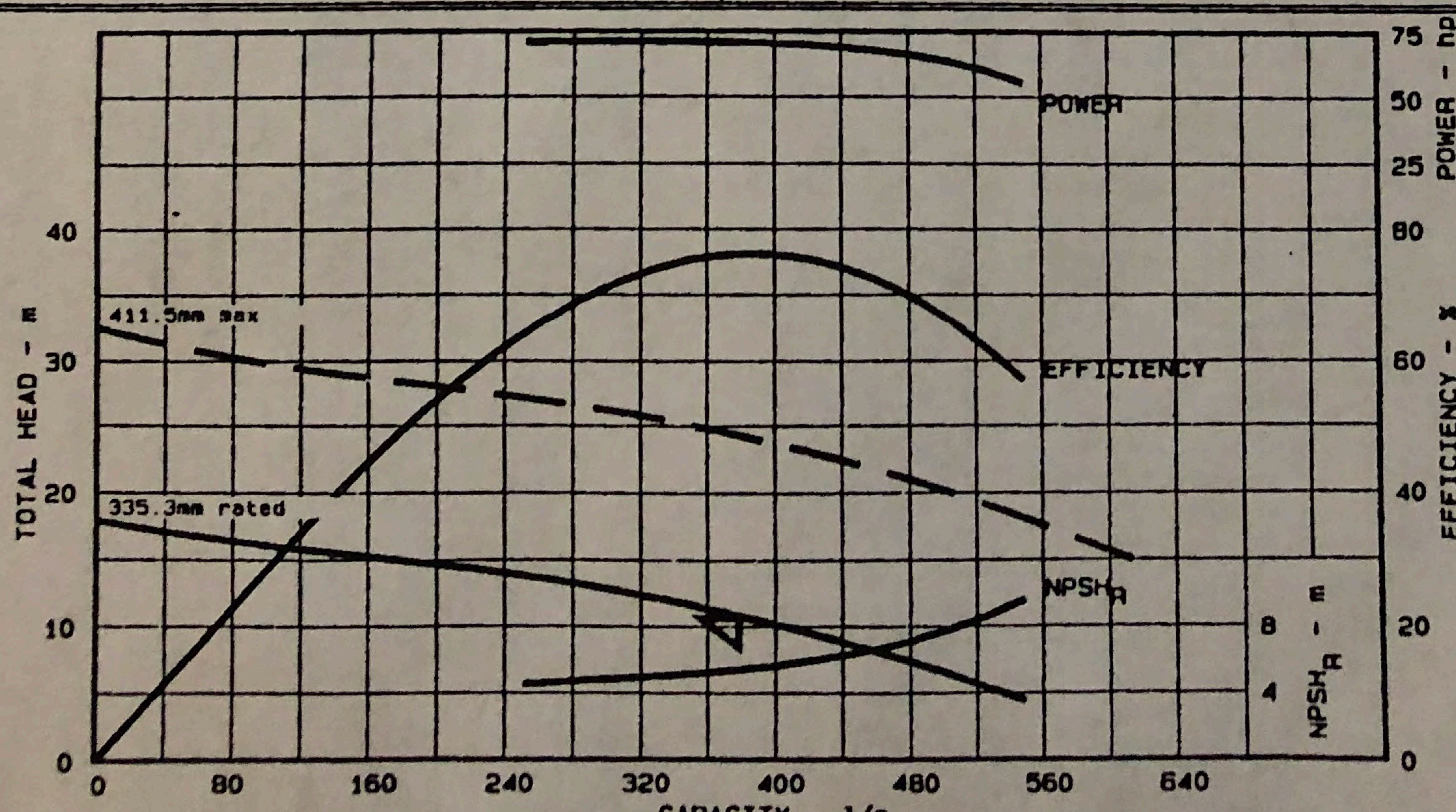
LIQUID

Liquid	Other
Pumping Temp	16. °C
Specific Grav	1.000
Viscosity	-

PERFORMANCE

Hydraulic Power	53.0 hp
Speed	1177 rpm
Efficiency	76.3 %
Includ. factor	1.00
NPSH Required	5.42 m
Rated Power	69.5 hp
Maximum Power	70.4 hp
Driver Power	75.0 hp
Casing Pressure	174. kPa
(based on shut off, cut dia.)	
Allowable	345. kPa
Hydro Pressure	448. kPa

Impeller diameter	
- Rated	335.3 mm
- Maximum	411.5 mm
- Minimum	335.3 mm
Suct. Spec Spd	11450.
Min. Contin. Flow	251.3 l/s
Head Max (cut dia)	17.7 m
Flow at BEP	386.0 l/s
Flow as % of BEP	98. %
Eff at Normal Flow	-
CutDia/DiaMax	81.5 %
Rise to Shutoff	66.2 %
HD/HD Max Dia	44.1 %

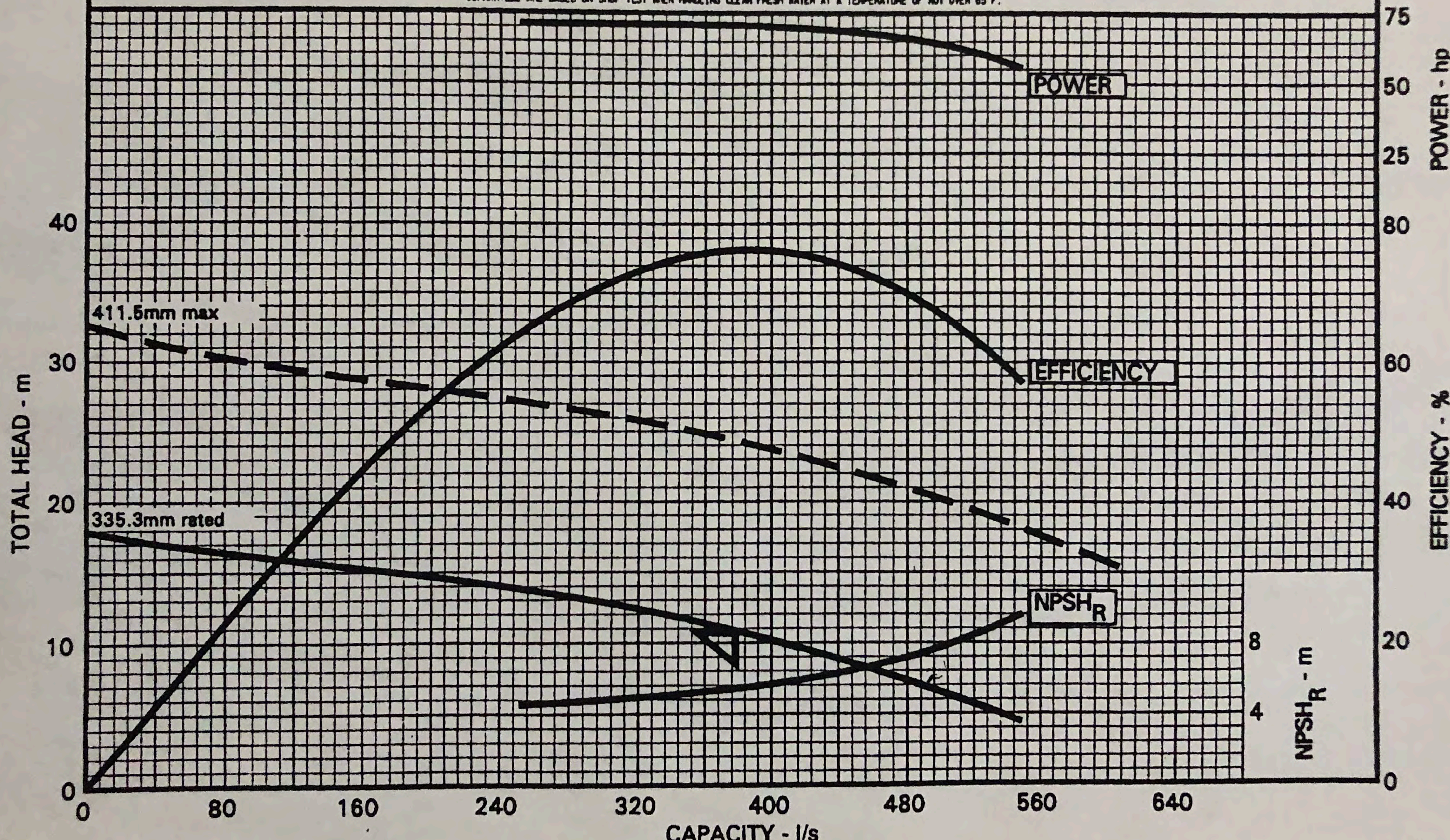


Customer	: POWER + MINE SUPPLY	Pump	: 14MN16A
Item No	: 25722	Stages	: 1
Service	: SEWAGE	Curve	: P-S000467B
IDP Ref	: S-000467		
Date	: Oct 28, 1997		

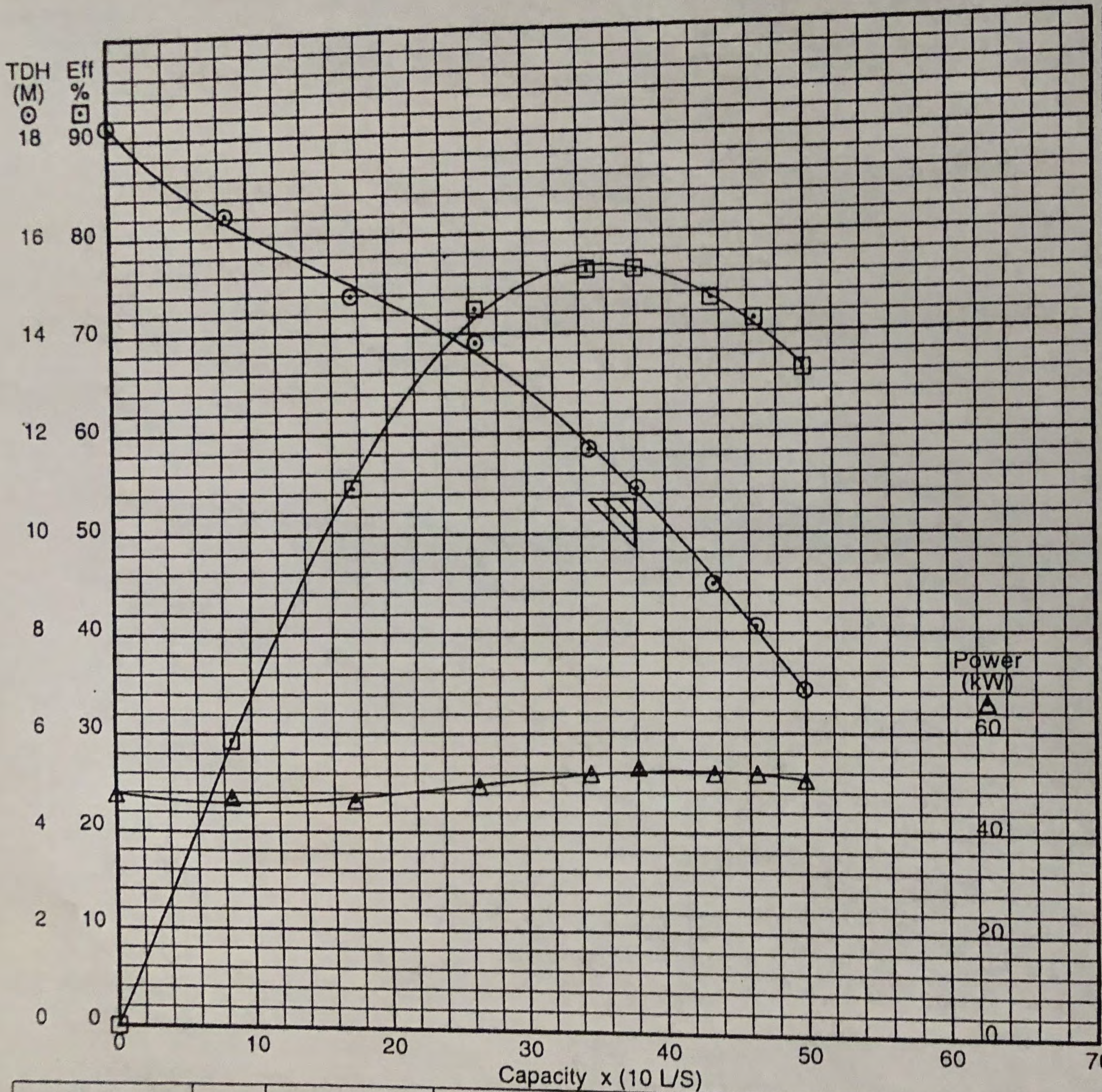
Ingersoll-Dresser Pumps

Flow (l/s)	: 378.	SG	: 1.00
Head (m)	: 10.7	RPM	: 1177

CURVES ARE APPROXIMATE. PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS. CAPACITY, HEAD, AND EFFICIENCY. GUARANTEES ARE BASED ON SHOP TEST WHEN HANDLING CLEAR FRESH WATER AT A TEMPERATURE OF NOT OVER 65 F.



D'Arcy



INGERSOLL-DRESSER PUMP COMPANY

PUMP TEST DATA

RPM	L/S	TDH	kW	Eff
1186	0.0	18.5	48.6	0.0
1186	86.0	16.7	48.0	29.3
1186	176.1	15.0	47.4	54.6
1186	266.3	14.0	50.5	72.4
1185	348.1	11.8	52.9	76.3
1184	382.5	11.0	54.1	76.4
1184	436.6	9.1	52.9	73.4
1184	467.6	8.2	52.9	71.3
1185	502.6	7.0	51.7	66.3

I CERTIFY THAT WITHIN THE ACCURACY OF THE TEST INSTRUMENTATION, THIS TEST REPRESENTS THE PERFORMANCE OF 14MNV16 PUMP 9712MS000467-1

David A. Hame

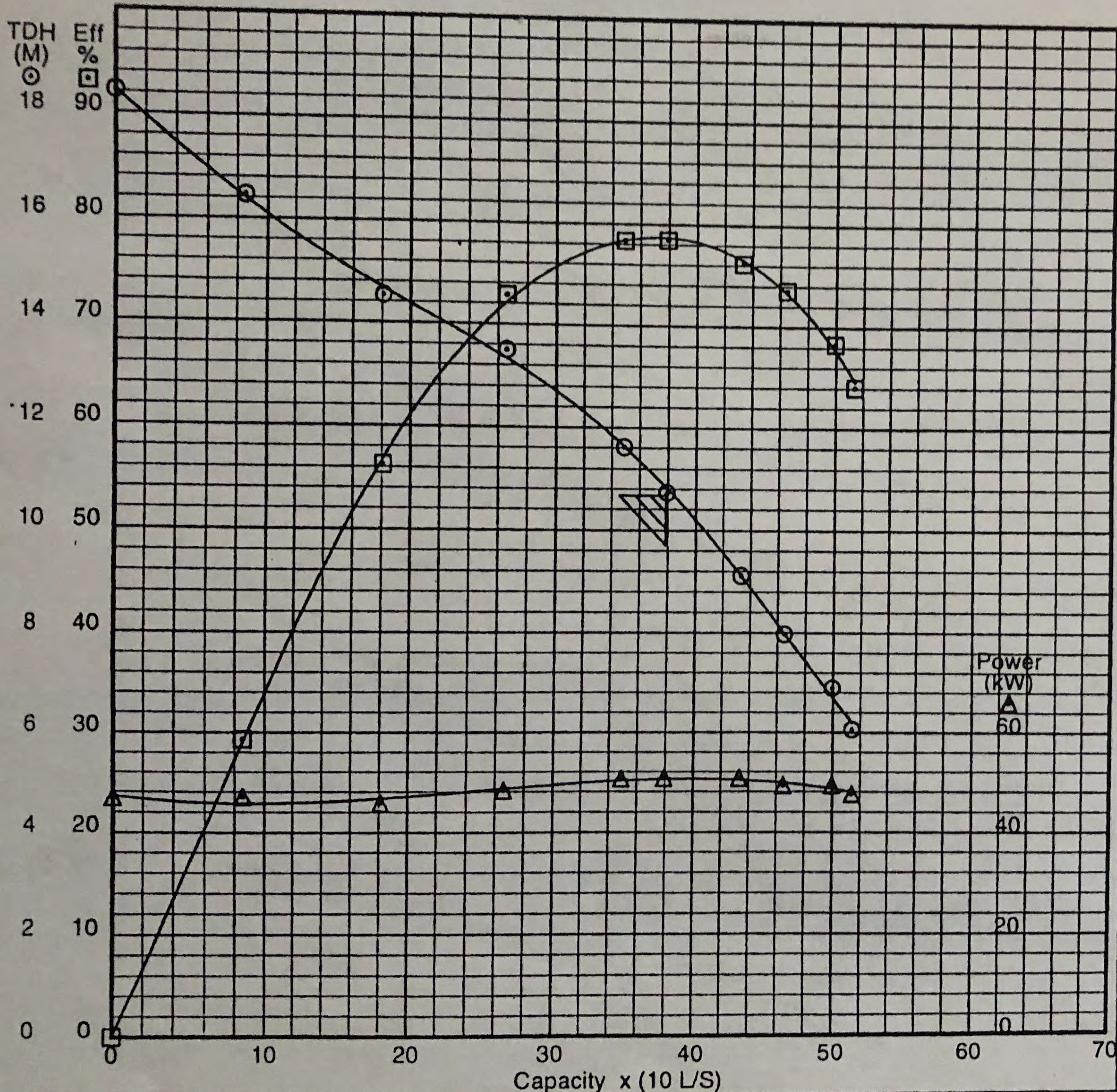
D'Arcy

SP.GR.: 1.000

CASING DATA		
A278 CL30	SIS-3	-
MATERIAL	FINISH	TONGUE

IMPELLER DATA		
1.5% NI A48 CL35	1A	-
MATERIAL	FINISH	DISC. TIPS
UB5017A	A-22	13.38"
PATT. NO.	COMB. NO.	DIA

PUMP	STAGES	ORDER NO.	SERIAL NO.	DATE	TEST	APPROVED	TEST DRIVER	VENTURI	PLOTTER		CURVE NO.
14MNV16	1	S-000467	9712MS000467-1	06JAN98	SPA	DAH	100H/1200R,#26	12x9,#45	1177	T	000467-1A



INGERSOLL-DRESSER PUMP COMPANY

PUMP TEST DATA

RPM	L/S	TDH	kW	Eff
1187	0.0	18.8	48.0	0.0
1186	86.0	16.7	48.0	29.3
1186	182.3	14.7	46.8	56.2
1185	267.7	13.7	49.3	72.8
1185	351.2	11.8	51.7	78.4
1184	381.5	10.9	51.7	78.5
1184	435.7	9.2	51.7	76.2
1186	468.4	8.1	50.5	73.6
1186	503.4	7.0	50.5	68.3
1186	517.9	6.1	48.6	64.1

I CERTIFY THAT WITHIN THE ACCURACY OF THE TEST INSTRUMENTATION, THIS TEST REPRESENTS THE PERFORMANCE OF 14MNV16 PUMP 9712MS000467-2

Daniel A. Dame

SP.GR.: 1.000

D'Arcy

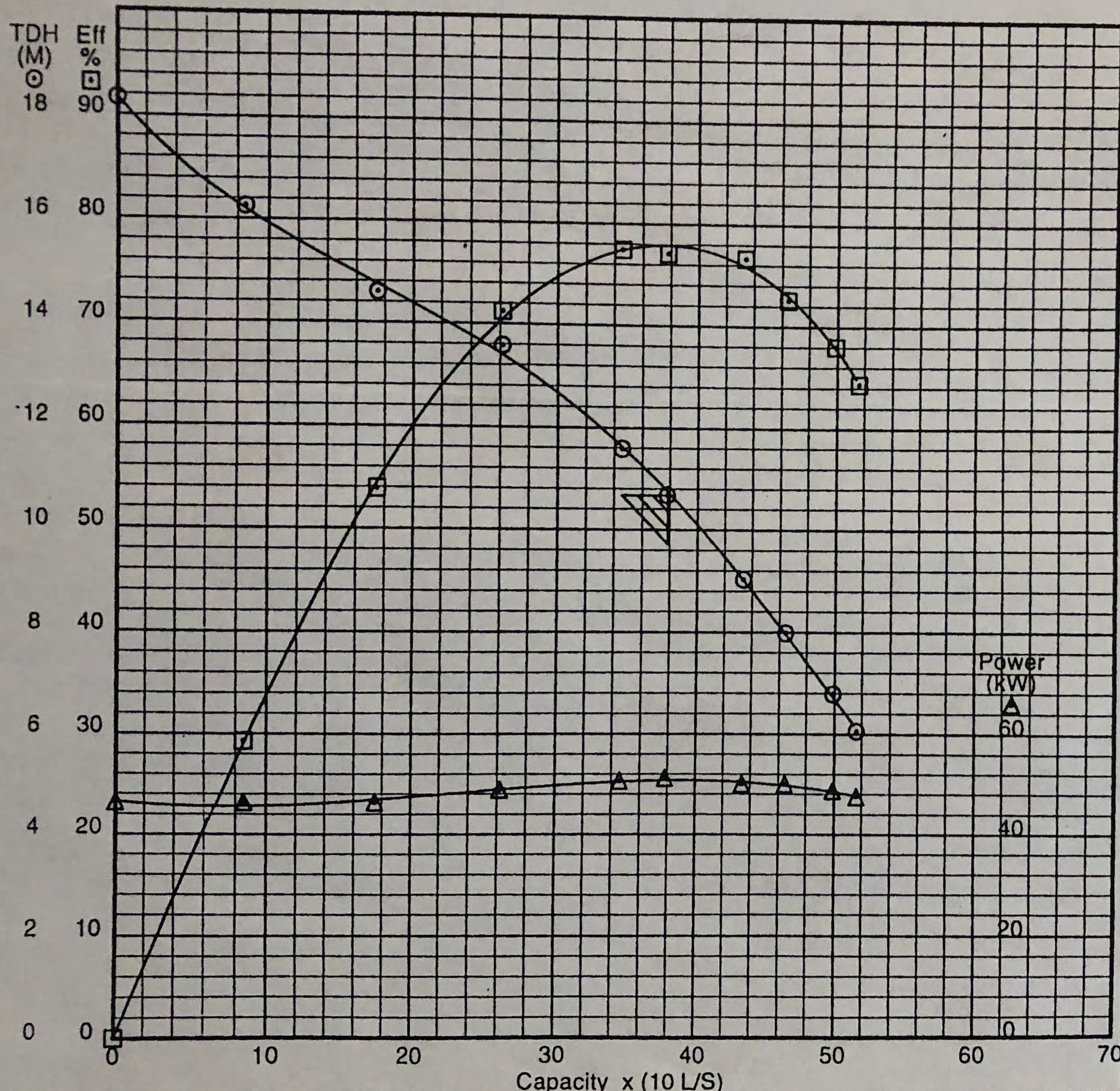
CASING DATA		
A278 CL30	SIS-3	-
MATERIAL	FINISH	TONGUE

IMPELLER DATA		
1.5% NI A48 CL35	1A	-
MATERIAL	FINISH	DISC. TIPS
UB5017A	A-22	13.38"
PATT. NO.	COMB. NO.	DIA

14MNV16	1	S-000467	9712MS000467-2	06JAN98	SPB	DAH	100H/1200R,#26	12x9,#45	1177	T-S000467-2A
PUMP	STAGES	ORDER NO	SERIAL NO	DATE	TEST	APPROVED	TEST DRIVER	VENTURI	PLOTTED	CURVE NO

INGERSOLL-DRESSER PUMP COMPANY
PUMP TEST DATA

RPM	L/S	TDH	kW	Eff
1186	0.0	18.6	47.4	0.0
1186	86.0	16.5	47.4	29.3
1186	176.1	14.8	47.4	53.9
1185	263.5	13.8	49.9	71.2
1185	348.1	11.7	51.7	77.4
1185	380.5	10.8	52.3	77.1
1185	436.6	9.2	51.1	76.6
1185	467.6	8.1	51.1	72.6
1186	502.6	6.9	49.9	68.0
1186	520.0	6.1	48.6	64.4



I CERTIFY THAT WITHIN THE ACCURACY OF THE TEST INSTRUMENTATION, THIS TEST REPRESENTS THE PERFORMANCE OF 14MNV16 PUMP 9712MS000467-3

David A. Hause

D'Arcy

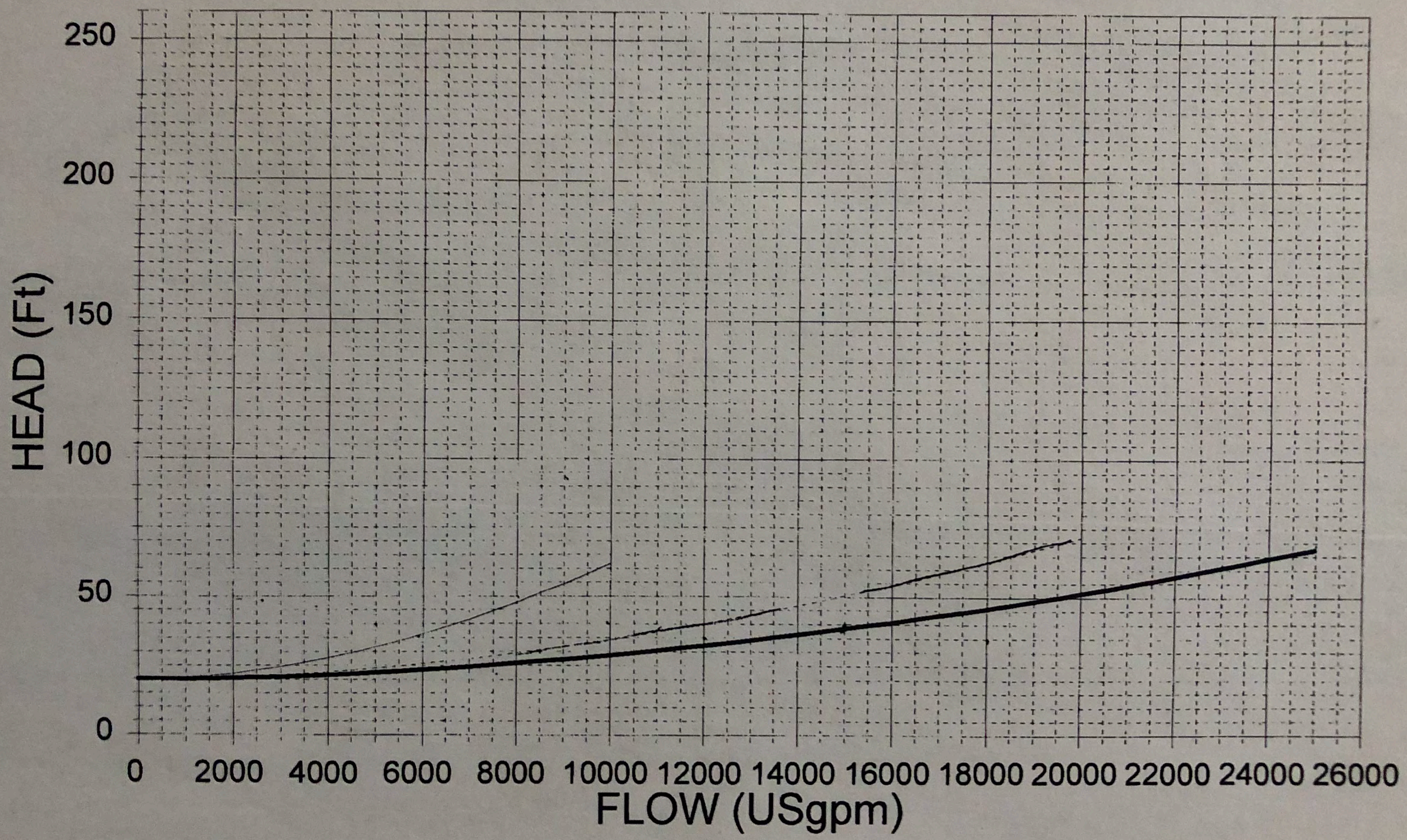
SP.GR.: 1.000

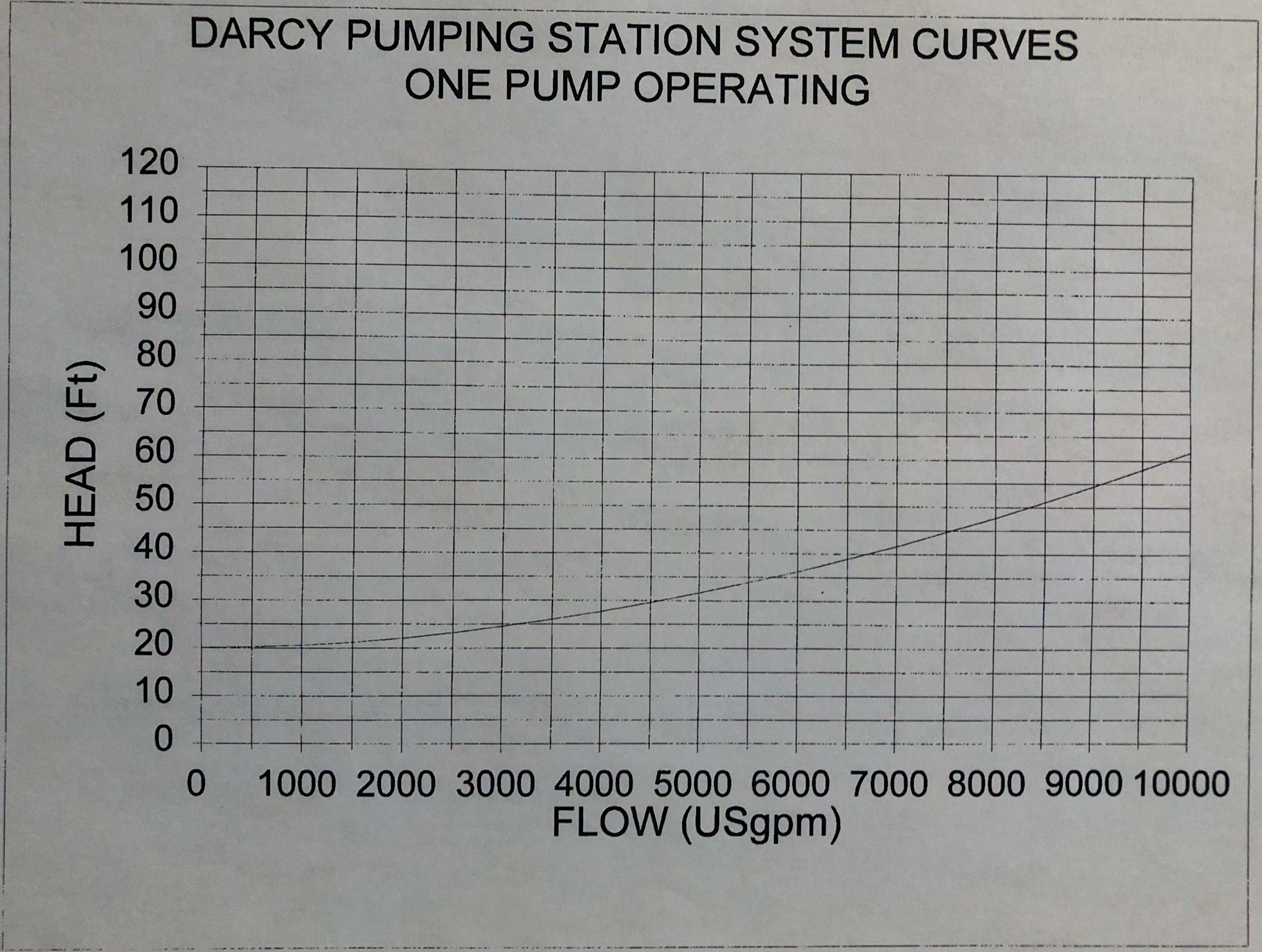
CASING DATA		
A278 CL30	SIS-3	-
MATERIAL	FINISH	TONGUE

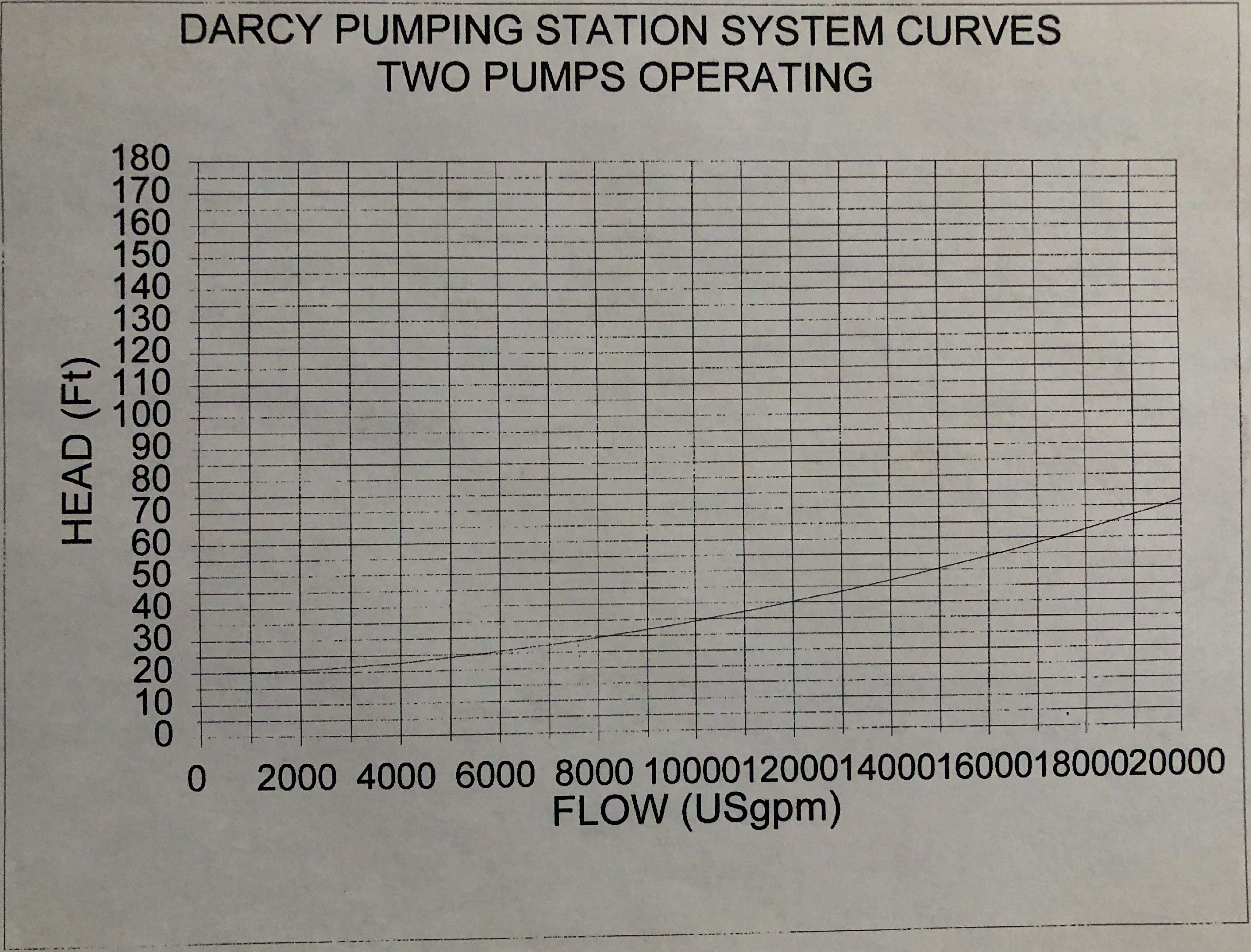
IMPELLER DATA		
1.5% NI A48 CL35	1A	-
MATERIAL	FINISH	DISC. TIPS
UB5017A	A-22	13.38"
PATT. NO.	COMB. NO.	DIA

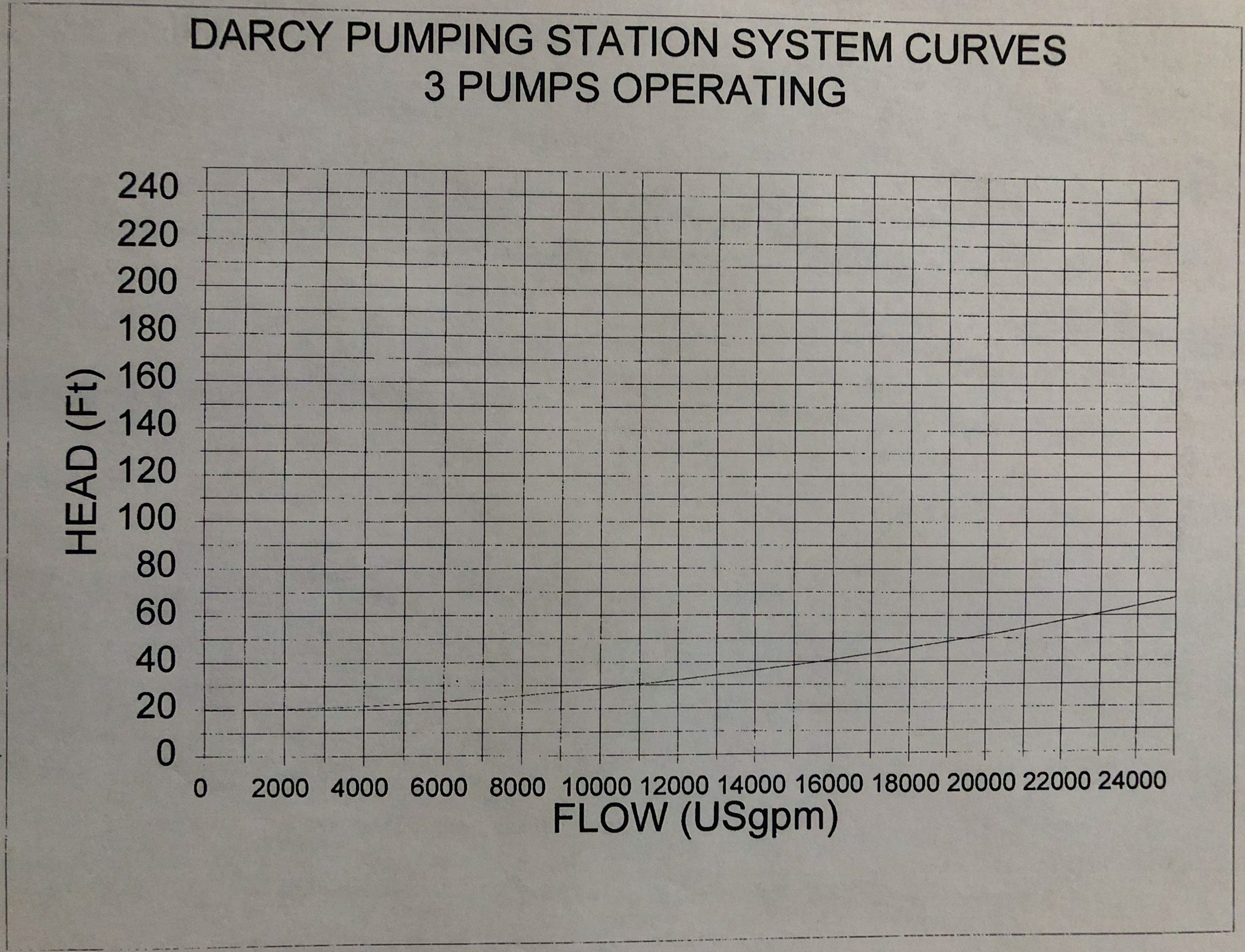
14MNV16	1	S-000467	9712MS000467-3	06JAN98	SPC	DAH	100H/1200R,#26	12x9,#45	1177	T-S000467-3A
PUMP	STAGES	ORDER NO.	SERIAL NO.	DATE	TEST	APPROVED	TEST DRIVER	VENTURI	PLOTTER	CURVE NO.

DARCY PUMPING STATION
SYSTEM CURVES



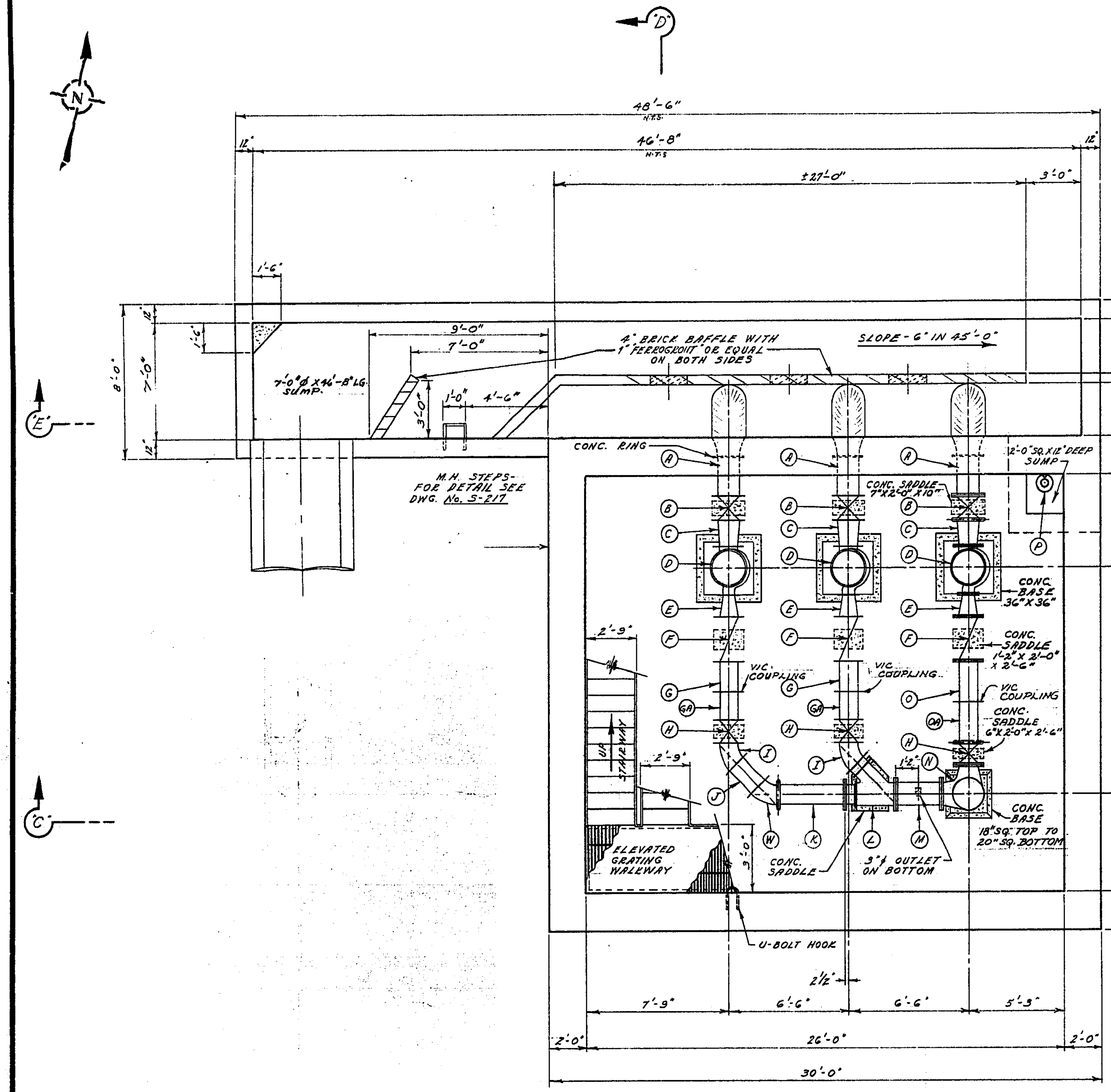

DARCY PUMPING STATION SYSTEM CURVES
ONE PUMP OPERATING
HEAD (Ft)
120
110
100
90
80
70
60
50
40
30
20
10
0
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
FLOW (USgpm)

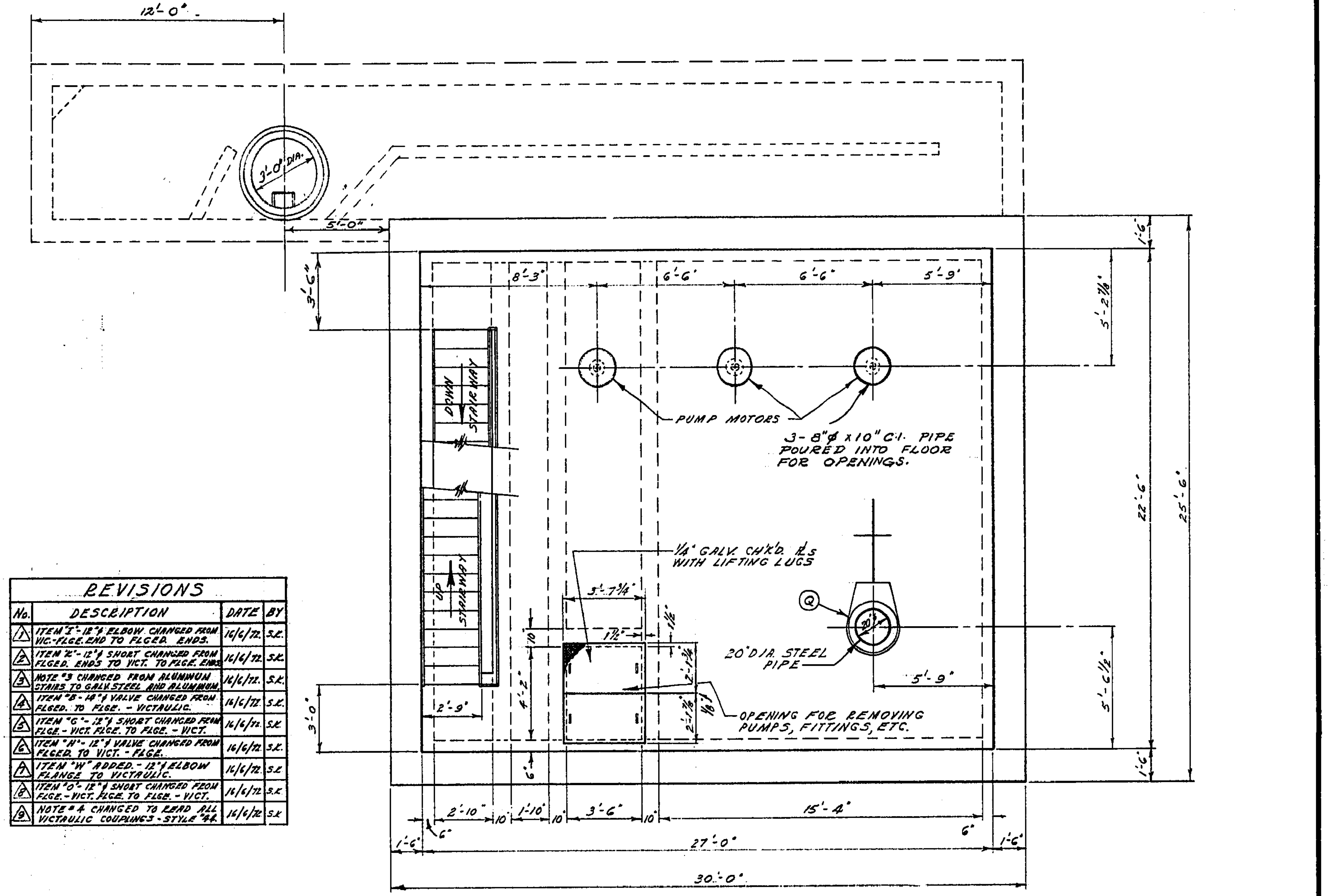

DARCY PUMPING STATION SYSTEM CURVES
TWO PUMPS OPERATING
HEAD (Ft)
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
FLOW (USgpm)


DARCY PUMPING STATION SYSTEM CURVES
3 PUMPS OPERATING
HEAD (Ft)
240
220
200
180
160
140
120
100
80
60
40
20
0
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
22000
24000
FLOW (USgpm)

APPENDIX C

CITY OF WINNIPEG RECORD DRAWINGS

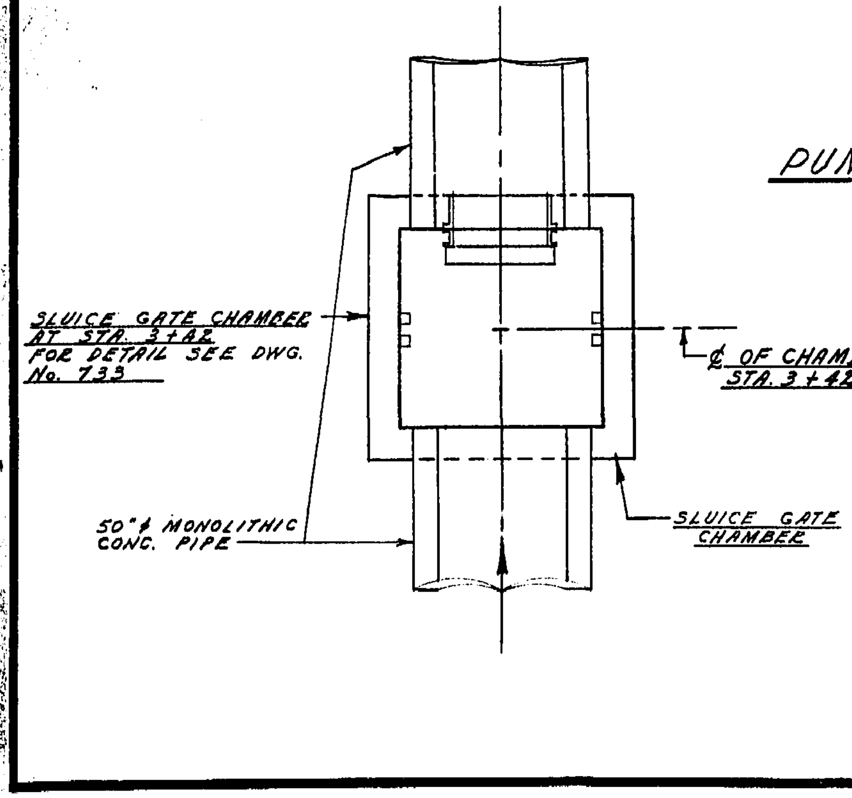




SEC. "B" - "B"
PUMP MOTOR ROOM FLOOR PLAN

No.	DESCRIPTION	DATE	BY
1	ITEM "I" - 12"ϕ ELBOW CHANGED FROM VIC.-FLGE. END TO FLGED. ENDS.	16/6/72.	S.K.
2	ITEM "K" - 12"ϕ SHORT CHANGED FROM FLGED. ENDS TO VICT. TO FLGE. ENDS	16/6/72.	S.K.
3	NOTE #3 CHANGED FROM ALUMINUM STAIRS TO GALV. STEEL AND ALUMINUM.	16/6/72.	S.K.
4	ITEM "B" - 14"ϕ VALVE CHANGED FROM FLGED. TO FLGE. - VICTAULIC.	16/6/72.	S.K.
5	ITEM "G" - 12"ϕ SHORT CHANGED FROM FLGE. - VICT. FLGE. TO FLGE. - VICT.	16/6/72.	S.K.
6	ITEM "H" - 12"ϕ VALVE CHANGED FROM FLGED. TO VICT. - FLGE.	16/6/72.	S.K.
7	ITEM "W" ADDED. - 12"ϕ ELBOW FLANGE TO VICTAULIC.	16/6/72.	S.K.
8	ITEM "O" - 12"ϕ SHORT CHANGED FROM FLGE. - VICT. FLGE. TO FLGE. - VICT.	16/6/72.	S.K.
9	NOTE #4 CHANGED TO READ ALL VICTAULIC COUPLINGS - STYLE #44.	16/6/72.	S.K.

Table: REVISIONS



SEC. "A" - "A"
PUMP ROOM AND SUMP FLOOR PLAN

NOTE:

1. ITEM "P" - SUMP PUMP SPECIFICATIONS - CAPACITY - 15 U.S.G.P.M. H.P. - 1/3, VOLTS - 115, 1,750 R.P.M. AND SINGLE PHASE.
2. ▲ - ITEM "D" TO BE SUPPLIED BY THE CITY OF WINNIPEG.
3. FOR DETAIL OF SEC. "C", "D" AND "E" SEE DWG. No. 738
4. FOR DETAIL OF SUMP SEE DWG. S-366

LIST OF FITTINGS

REV.	ITEM	DESCRIPTION	LENGTH	QUANTITY
	A	14"ϕ C.I. SHORT WITH CONC. RING (FLARE TO FLANGE)	4'-0"	3
4	B	14"ϕ GATE VALVE (FLANGE TO FLANGE)	1'-3"	3
	C	14"x12" C.I. ECCENTRIC REDUCER (FLANGE TO VICTAULIC FLANGE)	1'-4"	3
	▲ D	8"x12"x13.8" MONARCH PUMP - "CV" SERIES 12"ϕ SUCTION, 8"ϕ DISCHARGE AND 13.8" IMPELLER	2'-6"	3
	E	8"x12" C.I. ECCENTRIC INCREASER FLANGED.	1'-2"	3
	F	12"ϕ CHECK VALVE FLANGED.	2'-2"	3
5	G	12"ϕ C.I. SHORT (FLANGE TO VICTAULIC)	1'-6 3/4"	2
	GA	12"ϕ C.I. SHORT (VICTAULIC TO FLANGE)	1'-6 3/4"	2
6	H	12"ϕ GATE VALVE (FLANGED TO FLANGE)	1'-2"	3
1	I	12"ϕ - 45° C.I. ELBOW (VICTAULIC FLG TO FLG)	(0'-7 1/2") 1'-3"	2
	J	12"ϕ C.I. SHORT FLANGED.	1'-7 3/8"	1
2	K	12"ϕ C.I. SHORT (VICTAULIC TO FLANGE).	3'-7 1/4"	1
	L	14"x12"x12" C.I. REDUCING WYE FLANGED. 12"ϕ BRANCH - 2'-3" LONG.	2'-9"	1
	M	14"ϕ C.I. SHORT FLANGED WITH 3"ϕ TAPPED HOLE IN ONE SIDE. (WITH 3"ϕ BRASS PLUG INSTALLED IN HOLE)	2'-5 1/4"	1
	N	20"x14"x12" - 90° SPECIAL C.I. REDUCING, BASE ELBOW. (DOUBLE BRANCH) (20"ϕ VICTAULIC + 14"+12" FLANGE)	1'-6"	1
8	O	12"ϕ C.I. SHORT (FLANGE TO VICTAULIC	2'-1 7/8"	1
	OA	12"ϕ C.I. SHORT (VICTAULIC TO FLANGE)	2'-1 7/8"	1
	P	SUBMERSIBLE SUMP PUMP - "MONARCH MACHINERY LTD." MODEL No. 44 OR APPROVED EQUAL	—	1
	Q	20"ϕ BONNETLESS KNIFE GATE VALVE "DEZURIK" OR APPROVED EQUAL.	0'-4"	1
7	W	12"ϕ - 45° C.I. ELBOW (FLANGE TO VICTAULIC)	(0'-7 1/2") 1'-3"	1

NOTES
(THESE NOTES APPLY TO ALL PUMPING STATION DWGS.)

2. ALL MISC. IRON WORKS HOT GALVANIZED AFTER FABRICATION.
3. (Rev. 3) ALL STAIRWAYS AND LANDINGS ARE GALV. STEEL CONSTRUCTION STANDARD GALV. STEEL PIPE HANDRAILS AS SHOWN. THE EXCEPTION ARE THE REMOVABLE STAIRS IN THE PUMP ROOM WHICH SHALL BE OF ALUMINUM CONSTRUCTION.
4. (Rev. 9) ALL VICTAULIC COUPLINGS STYLE #44.
   ALL VICTAULIC FLANGES STYLE #341.
5. REFER TO APPROVED MANUFACTURER'S DRAWING No. SK530A FOR DETAIL OF "MONARCH MACHINERY LTD." - CV SERIES 8x12x13.8 PUMPS.
6. (A) - LETTERS WITHIN CIRCLES REFER TO FITTINGS IN "LIST OF FITTINGS" TABLE.
7. 1/8" CLEARANCE PROVIDED FOR GASKETS BETWEEN FITTINGS.
8. A SHORT LENGTH OF PIPE (4'-0" OR LESS) SHALL BE INSTALLED ADJACENT TO ALL CAST IRON OR RIGID FITTINGS.

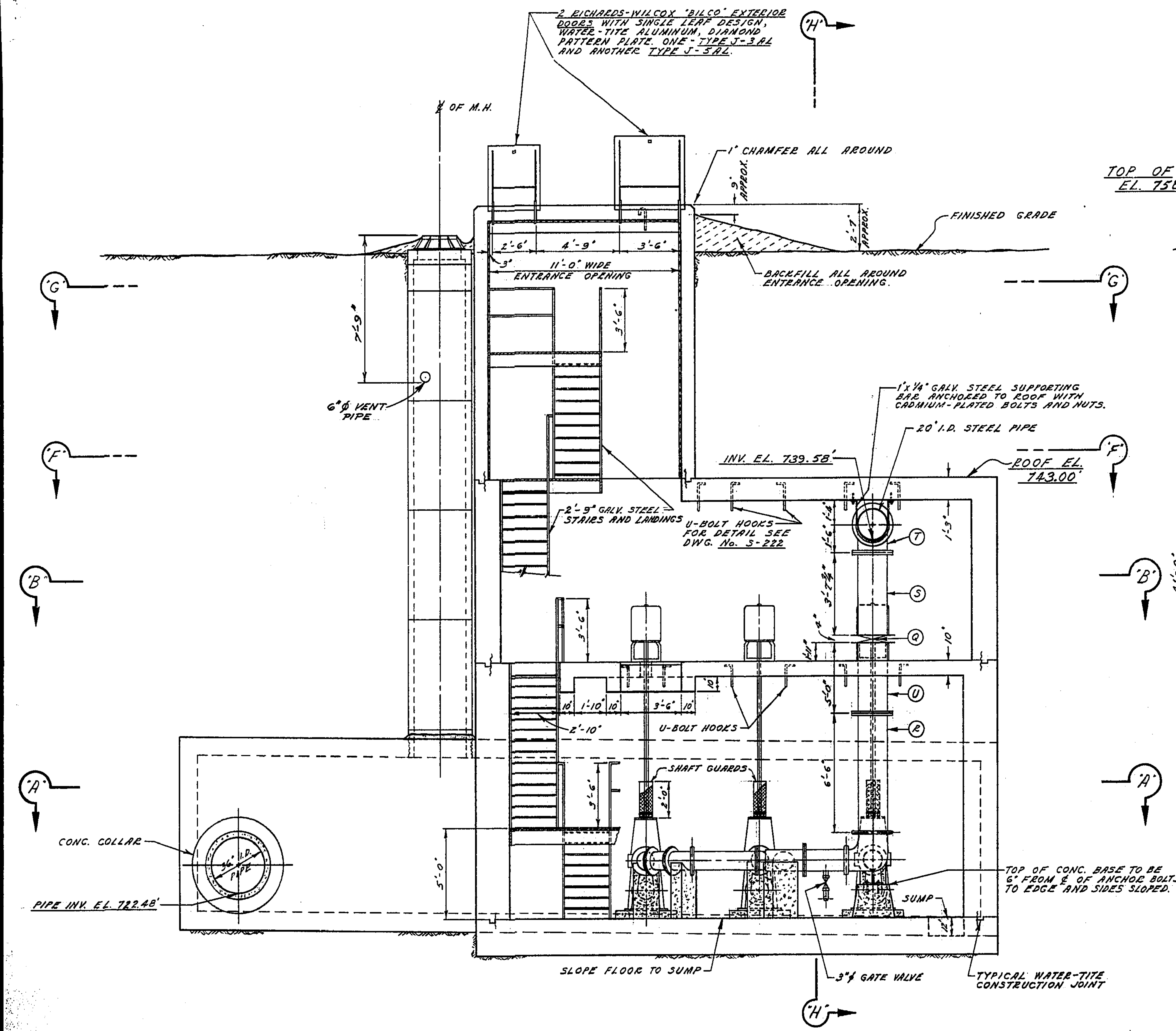
A.C. Mackey

SURVEYED & PLAN CHECKED
BY
APPROVED AS BUILT
BY D. Scott
V. Dumore Dec 12/73

PROVINCE OF MANITOBA A.C. MACKEY REGISTERED ENGINEER

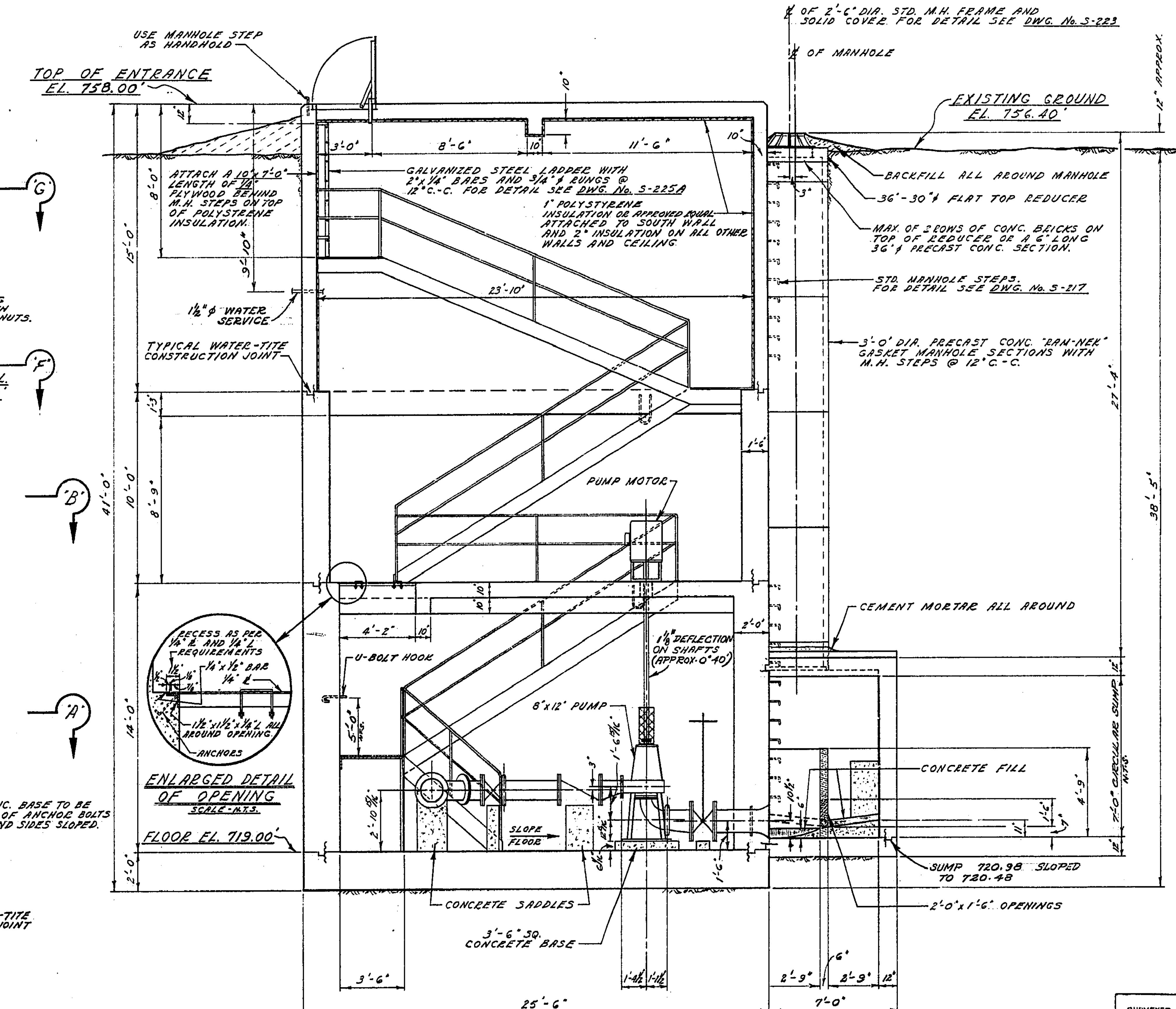
THE METROPOLITAN CORPORATION OF GREATER WINNIPEG WATERWORKS & WASTE DISPOSAL DIVISION A. PENMAN — DIRECTOR	SEWAGE DISPOSAL DEPT. D'ARCY PUMPING STATION FLOOR PLANS	DES. S.K. CH'K'D. A.V. DRN. S.K. DATE 14 APR. 72 ENG. DES. R.M. Tuling ENG. OPER. [illegible] APPROVED [illegible]	SCALES 1/4" = 1'-0"	DRAWING NO. 737

MICROFILMED NOV 76



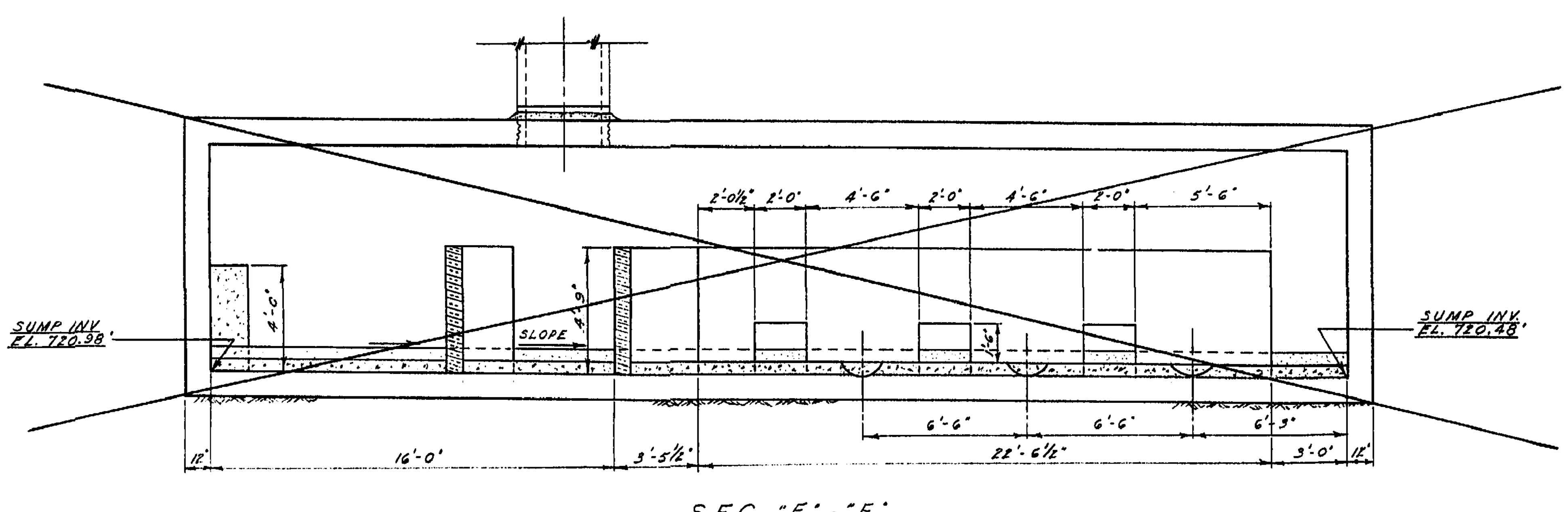
SEC. "C" - "C"

(LONGITUDINAL SECTION LOOKING NORTH)



SEC. "D" - "D"

(CROSS-SECTION LOOKING WEST)



SEC. "E" - "E"

(LONG. SECTION THRU SUMP)

NOTE

1. 1/8" TO 1/4" CLEARANCE PROVIDED FOR GASKETS OF JOINTS ON 20" I.D. STEEL FORCEMAIN.
2. 20"ϕ VICTAULIC COUPLINGS WILL BE STYLE #44.
3. FOR DETAIL OF SEC. "A" AND "B" SEE DWG. No. 737 FOR DETAIL OF SEC. "F" AND "G" SEE DWG. No. 739

ADDITIONAL LIST OF FITTINGS

ITEM	DESCRIPTION	LENGTH	QUANTITY
Q	20"ϕ BONNETLESS KNIFE GATE VALVE. "DeZURIK" OR APPROVED EQUAL. (ADAPTABLE TO FLANGE JOINTS)	0'-4"	1
R	20" I.D. STEEL SHORT. (VICTAULIC TO FLANGE)	6'-6"	1
S	20" I.D. STEEL SHORT FLANGED.	3'-7 3/4"	1
T	20"ϕ - 90° C.I. ELBOW FLANGED.	1'-6"	1
U	20" I.D. STEEL SHORT FLANGED.	5'-0"	1

SURVEYED & PLAN CHECKED BY ___ APPROVED AS BUILT BY D. S. Dec 12/73

PROVINCE OF MANITOBA A.C. MACKEY REGISTERED ENGINEER

REVISIONS

No.	DESCRIPTION	DATE	BY
1	ITEM "V" - 20" STEEL SHORT DELETED.	13/4/72	S.K.

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG

WATERWORKS & WASTE DISPOSAL DIVISION

A. PENMAN — DIRECTOR

SEWAGE DISPOSAL DEPT.

D'ARCY PUMPING STATION

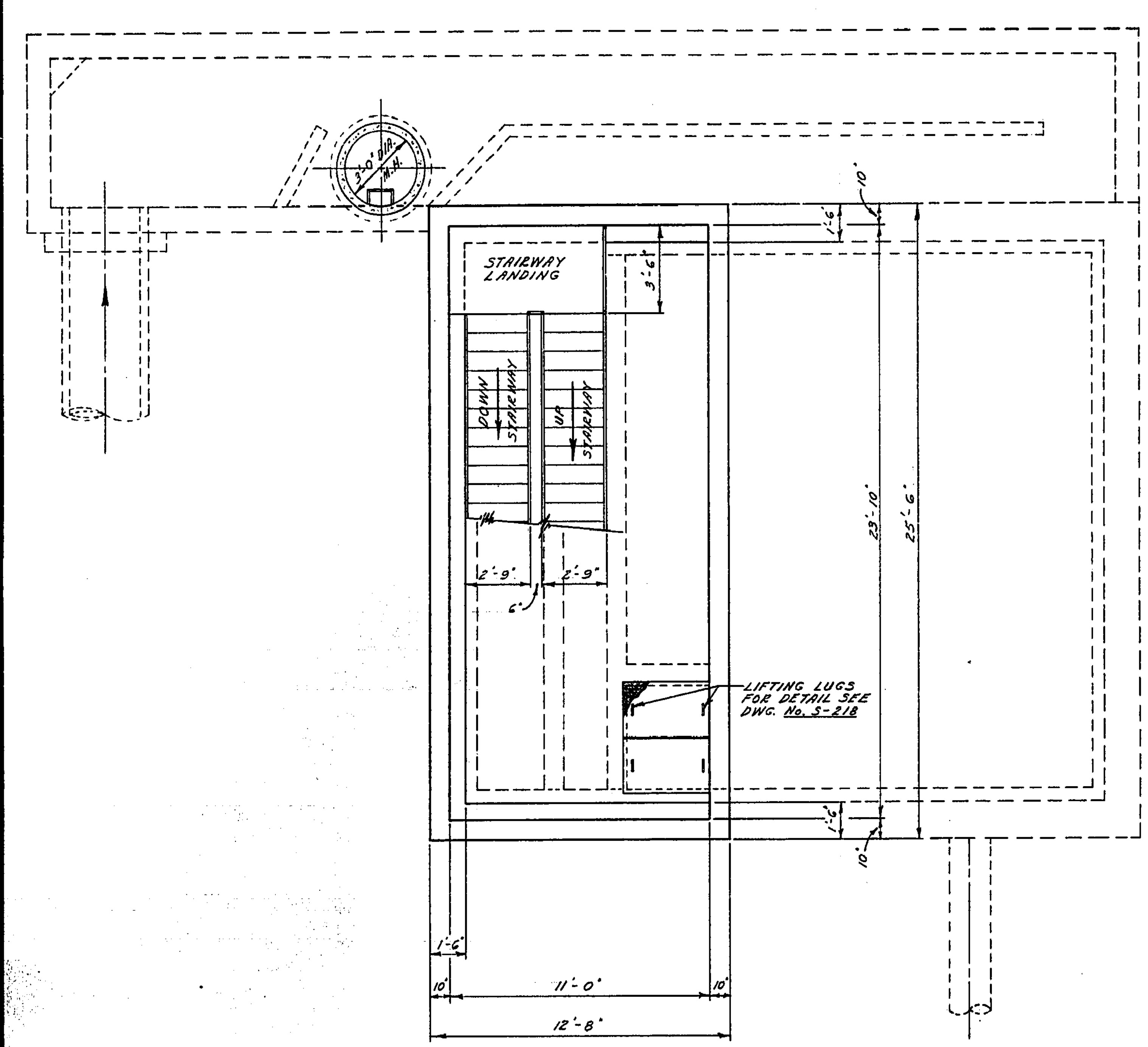
SEC. "C", "D" AND "E" DETAILS OF SUBSTRUCTURE SECTIONS AND SUMP

DES. · CH'K'D · DRN. S.K. · DATE FEB. 10/72 · ENG. DES. · ENG. OPER. · APPROVED

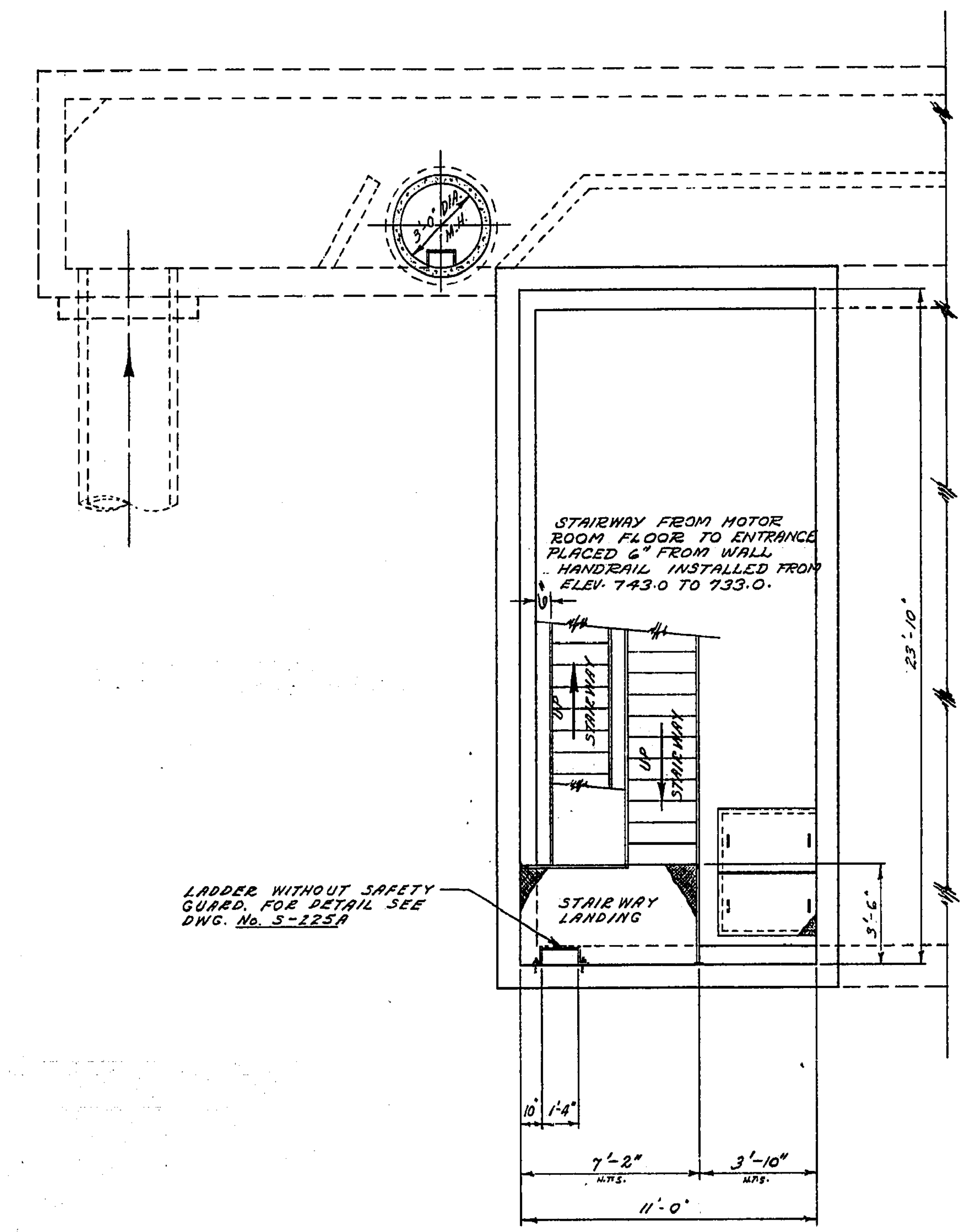
SCALES: 1/4" = 1'-0"

DRAWING NO. 738

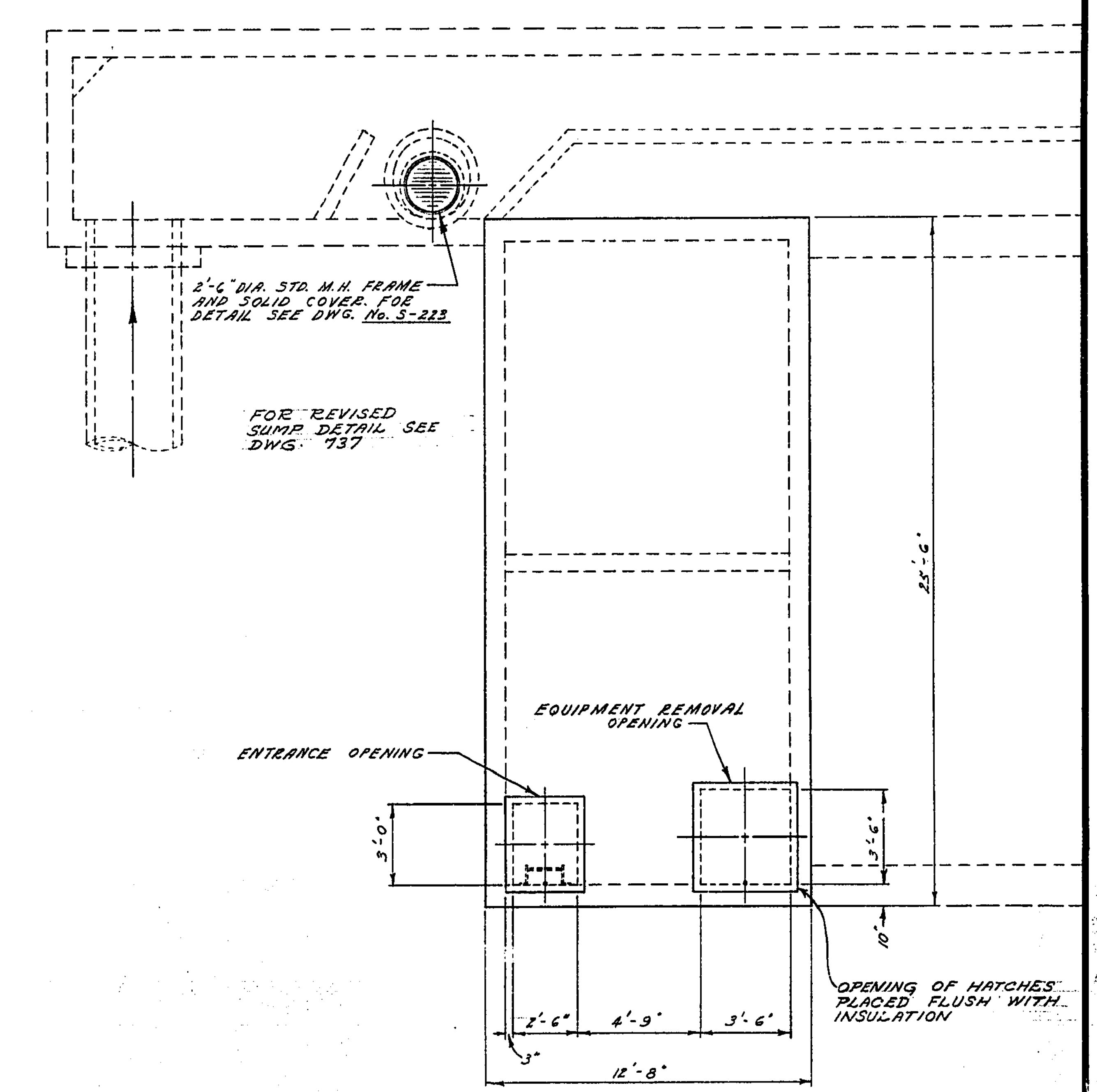
MICROFILMED NOV 76



SEC. 'F'-'F'



SEC. 'G'-'G'
STAIRWAY AND ENTRANCE PLATFORM



ROOF PLAN
GROUND SURFACE

NOTE:

1. ALL STAIRS SHALL HAVE GALV. STEEL NON-SLIP TREADS AND LANDINGS AND 1½" ϕ GALV. STEEL PIPE HANDRAILS WITH THE EXCEPTION OF THE REMOVABLE STAIRS ON PUMP ROOM FLOOR WHICH SHALL BE ALUMINUM.

SURVEYED & PLAN CHECKED
BY
APPROVED AS BUILT
BY D. Scott
V. Dumore Dec 12/73

PROVINCE OF MANITOBA
A. C. MACKEY
REGISTERED ENGINEER

REVISIONS			
No.	DESCRIPTION	DATE	BY
1	NOTE CHANGED FROM ALUMINUM STAIRS TO GALV. STEEL + ALUMINUM	15/6/72.	S.K.

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG
WATERWORKS & WASTE DISPOSAL DIVISION
A. PENMAN — DIRECTOR

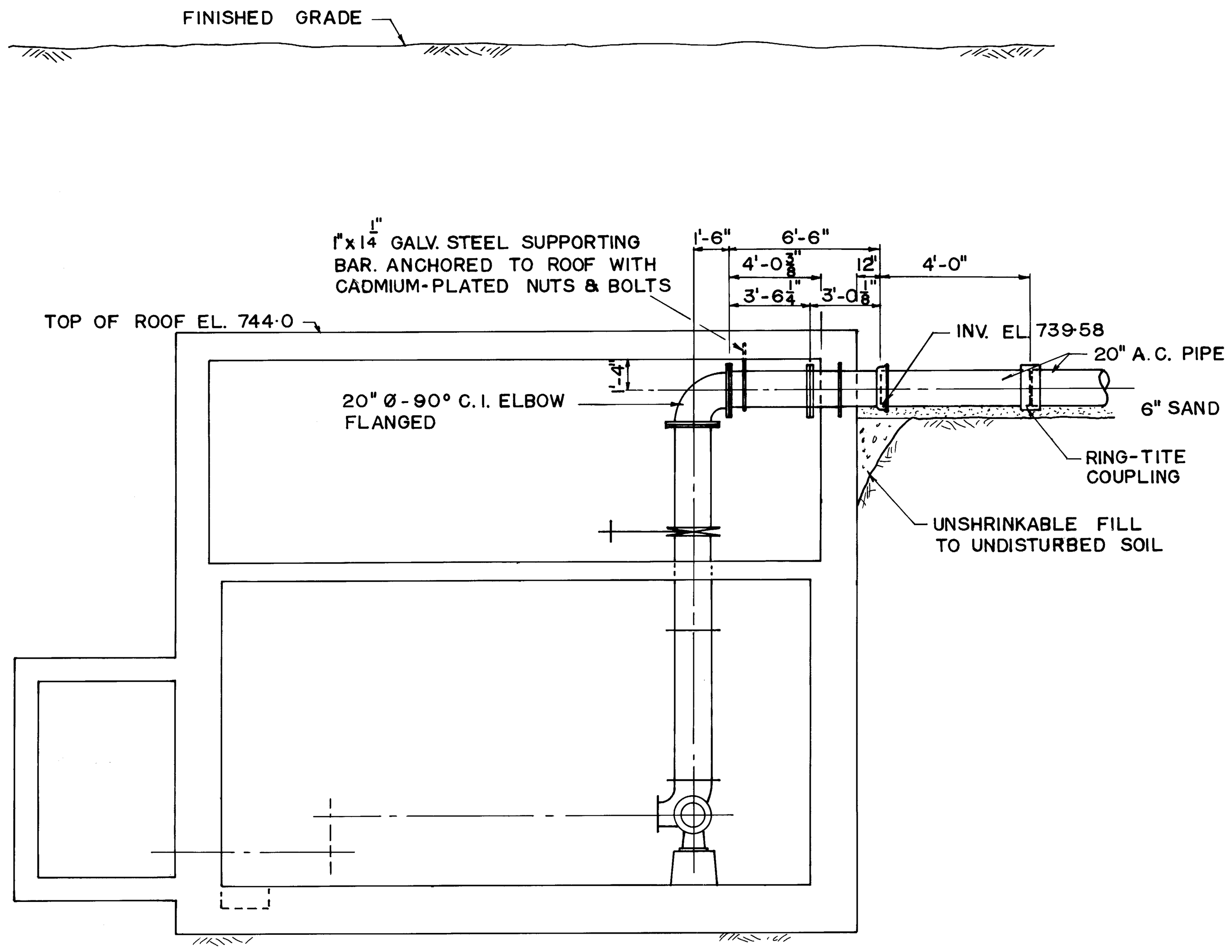
SEWAGE DISPOSAL DEPT.
D'ARCY PUMPING STATION
SEC. "F" AND "G"
DETAILS OF ENTRANCE ROOF AND PLATFORM

DES. CH'K'D.
DRN. S.K. DATE APR. 18/72.
ENG. DES.
ENG. OPER.
APPROVED

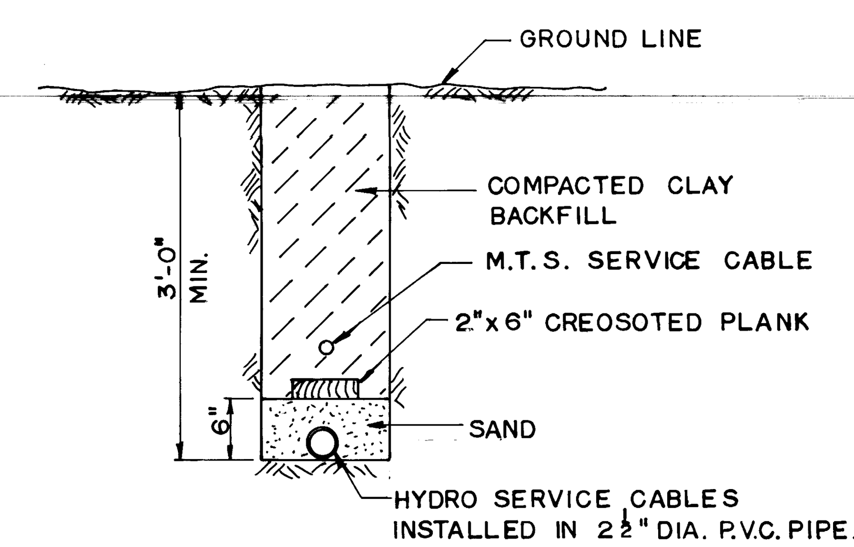
SCALES
1/4" = 1'-0"

DRAWING NO.
739

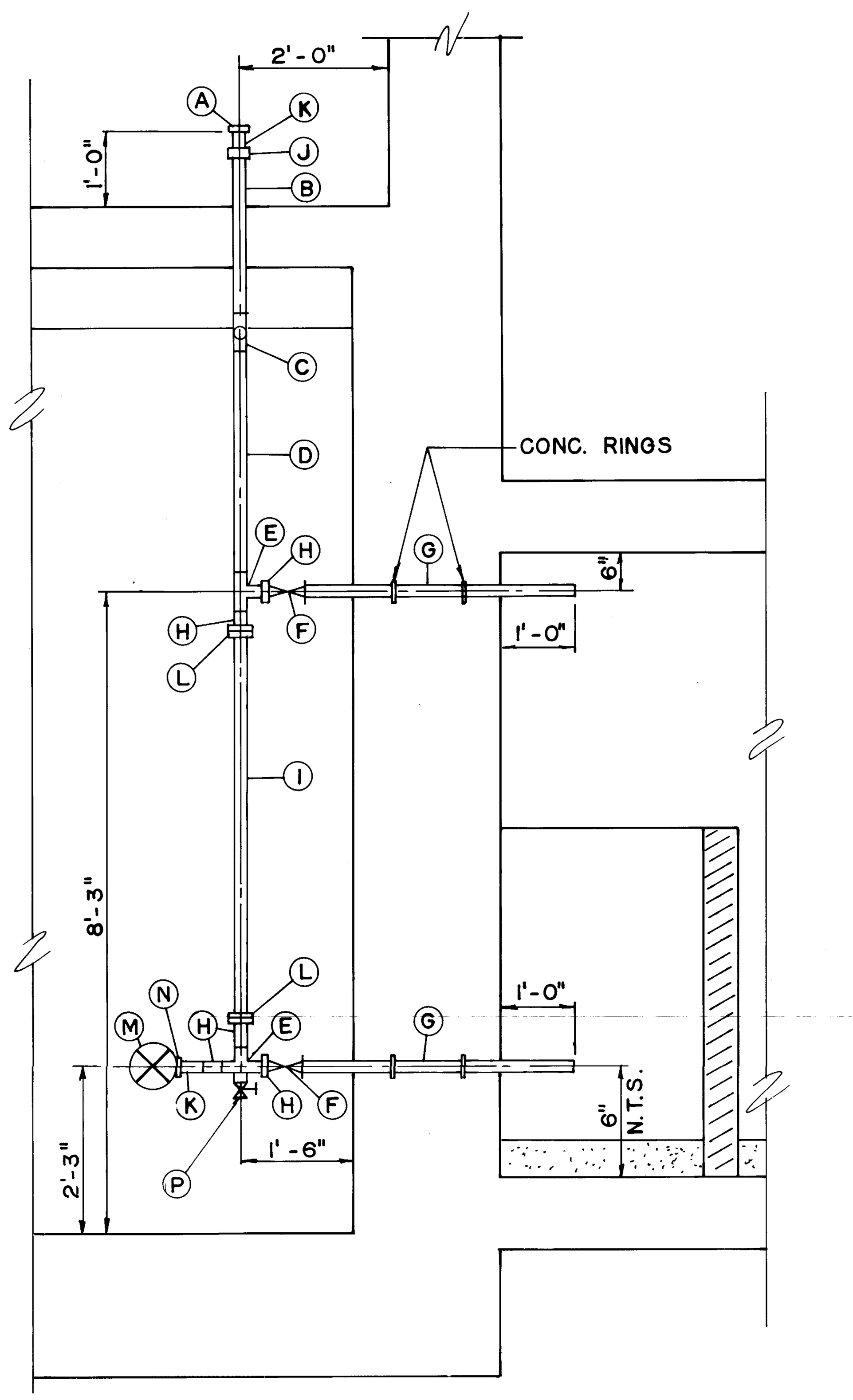
MICROFILMED NOV 76



SECTION H-H



TRENCH BEDDING DETAIL FOR HYDRO AND M.T.S. CABLES



SUMP LEVEL INDICATOR TUBING

LIST OF FITTINGS

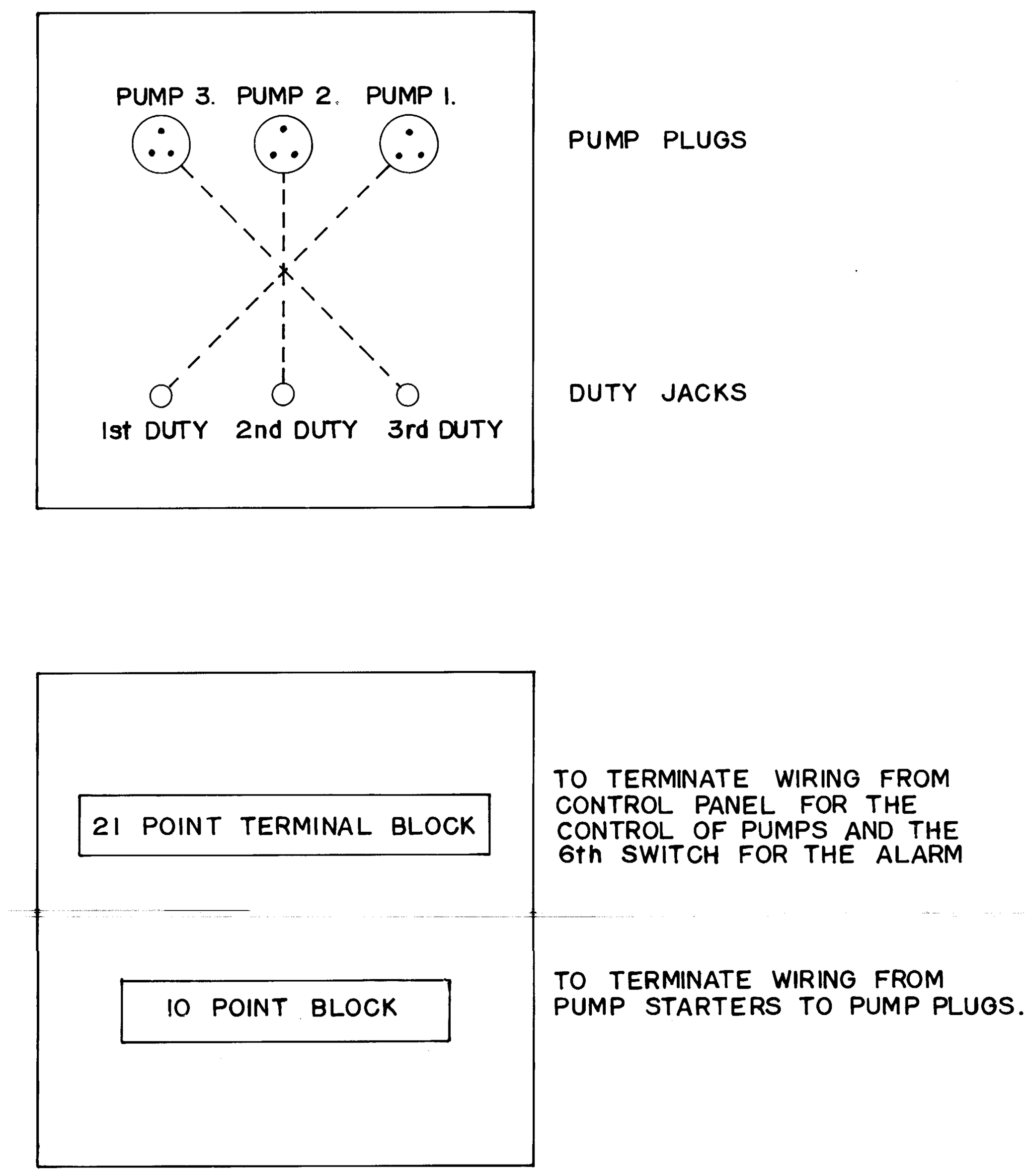
ITEM	DESCRIPTION	QTY
A	2" P.V.C. SCREWED CAP	1
B	2" P.V.C. PIPE (SOCKET TO SOCKET) 2'-4" LG.	1
C	2"- 90° P.V.C. SOCKET TYPE ELBOW	2
D	2" P.V.C. PIPE SOCKET 3'-9" LG.	1
E	2"x2"x2" P.V.C. SOCKET TYPE TEE	2
F	2" P.V.C. DIAPHRAGM VALVE (SOCKET TO SOCKET)	2
G	2" P.V.C. PIPE PLAIN ENDS, APPROX. 4'-6" LG.	2
H	2" P.V.C. PIPE NIPPLE (SOCKET TO SOCKET)	5
I	2" I.D. CAST ACRYLIC TRANSPARENT TUBE AS MANUFACTURED BY JOHNSON INDUSTRIAL PLASTICS' PRODUCT CODE No 1030 OR APPROVED EQUAL	1
J	ADAPTOR (SOCKET TO SCREW)	2
K	NIPPLE (SCREWED)	2
L	UNION (SOCKET)	2
M	FISHER LEVEL Tx (4-20mA = 0-150W.C.)	1
N	3" P.V.C. FLANGE	1
P	½" FLUSHING CONNECTION	1

NOTE:
1. ALL P.V.C. PIPE & FITTINGS SHALL BE SCHEDULE 80.
2. ALL P.V.C. PIPE, FITTINGS & VALVES SHALL BE AS MANUFACTURED BY "CABOT PIPING SYSTEMS".
3. ALL ADHESIVES SHALL BE AS RECOMMENDED BY THE PLASTIC PIPE SUPPLIERS OR AS RECOMMENDED BY "3M COMPANY".

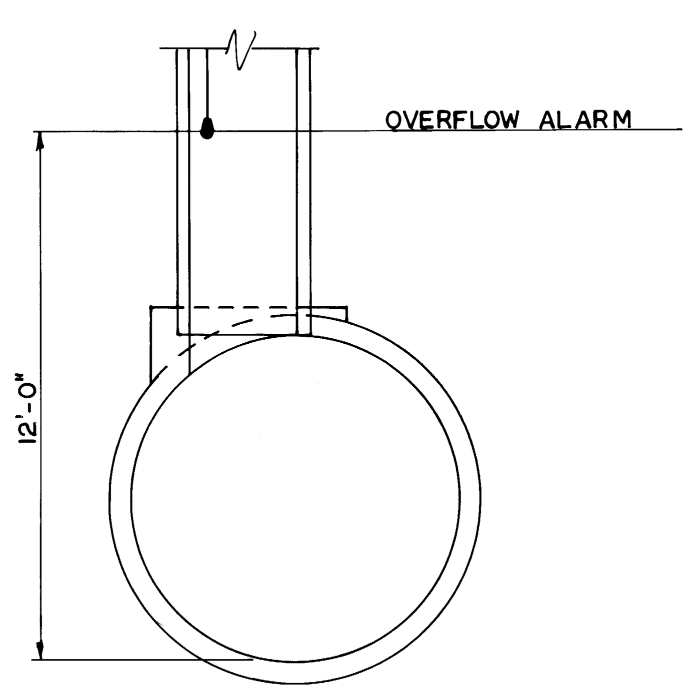
DUTY SETTINGS

REFERENCED - TRANSMITTER ℄

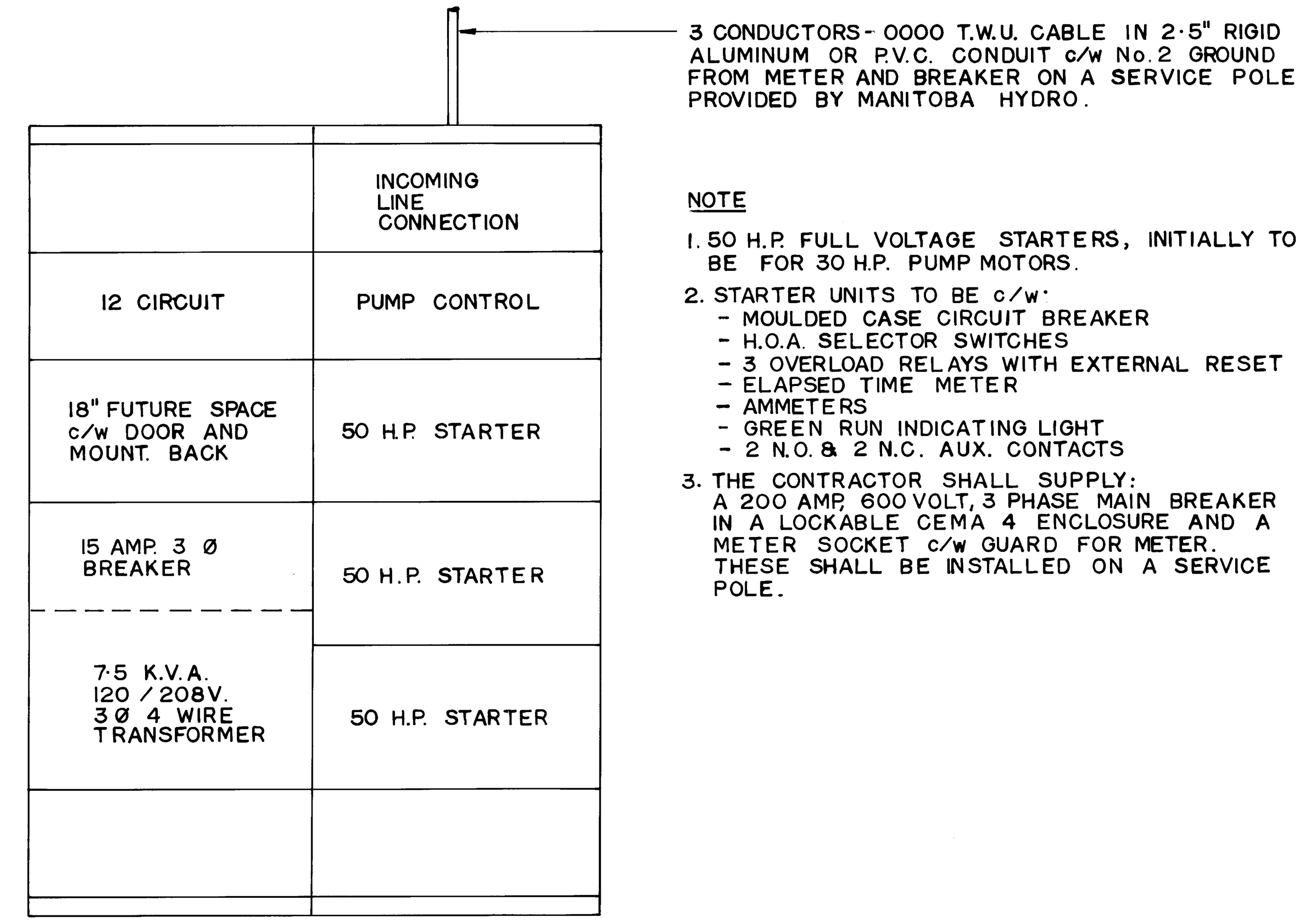
DUTY - 1 - ON - 48"
" - 2 - " - 54"
" - 3 - " - 60"
DUTY - 1 - OFF - 18"
" - 2 - " - 24"
" - 3 - " - 30"



PUMP CONTROL PANEL



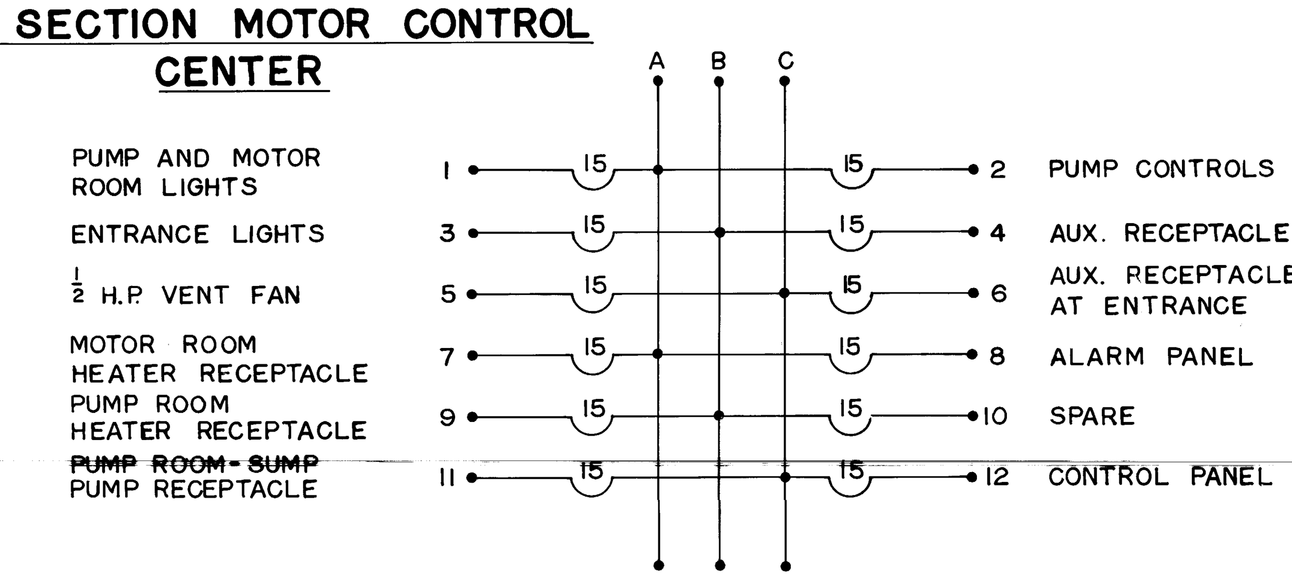
OVERFLOW ALARM SET-UP



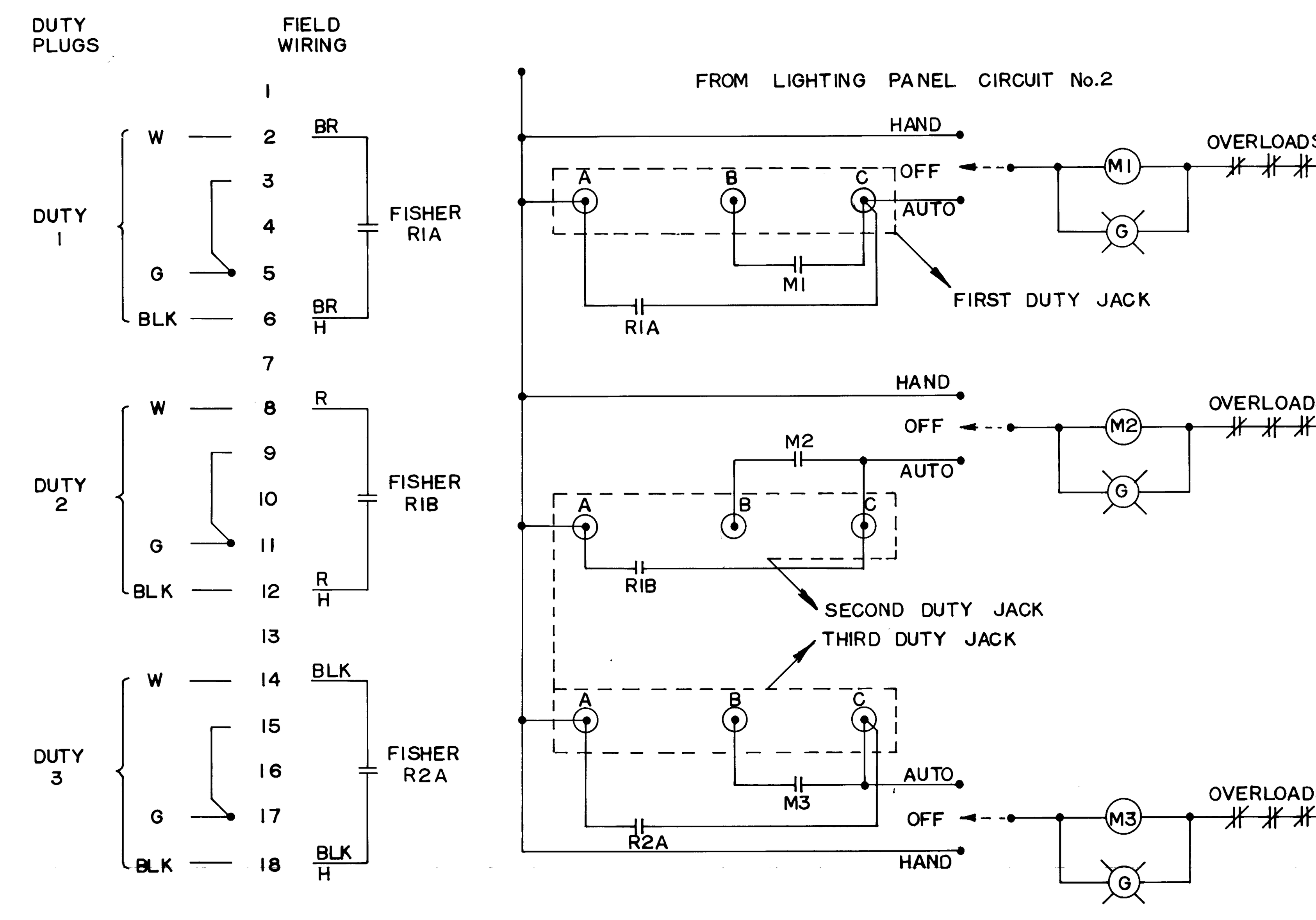
2 - SECTION MOTOR CONTROL CENTER

NOTE

1. 50 H.P. FULL VOLTAGE STARTERS, INITIALLY TO BE FOR 30 H.P. PUMP MOTORS.
2. STARTER UNITS TO BE c/w:
   - MOULDED CASE CIRCUIT BREAKER
   - H.O.A. SELECTOR SWITCHES
   - 3 OVERLOAD RELAYS WITH EXTERNAL RESET
   - ELAPSED TIME METER
   - AMMETERS
   - GREEN RUN INDICATING LIGHT
   - 2 N.O. & 2 N.C. AUX. CONTACTS
3. THE CONTRACTOR SHALL SUPPLY: A 200 AMP, 600 VOLT, 3 PHASE MAIN BREAKER IN A LOCKABLE CEMA 4 ENCLOSURE AND A METER SOCKET c/w GUARD FOR METER. THESE SHALL BE INSTALLED ON A SERVICE POLE.



LIGHTING PANEL INDEX



LIFT PUMPS CONTROL SCHEMATIC

file # SP10150

NO.	REVISIONS	DATE	APP.
5	REDRAWN. "FLYGT" FLOAT CONTROL SET UP REMOVED. LEVEL Tx ADDED	80-12	
4	FLOAT SETTINGS REVISED	72-10	
3	LIFT PUMP SCHEMATIC REV'D FROM 1 TO 2 SETS OF STOPS	72-10	
2	ONE ADDIT'L "FLYGT" FLOAT ADDED HEIGHTS REVISED	72-10	
1	LIGHTING PANEL INDEX 8 & 9 REVISED TO 9 & 11	72-10	

ENGINEER'S SEAL

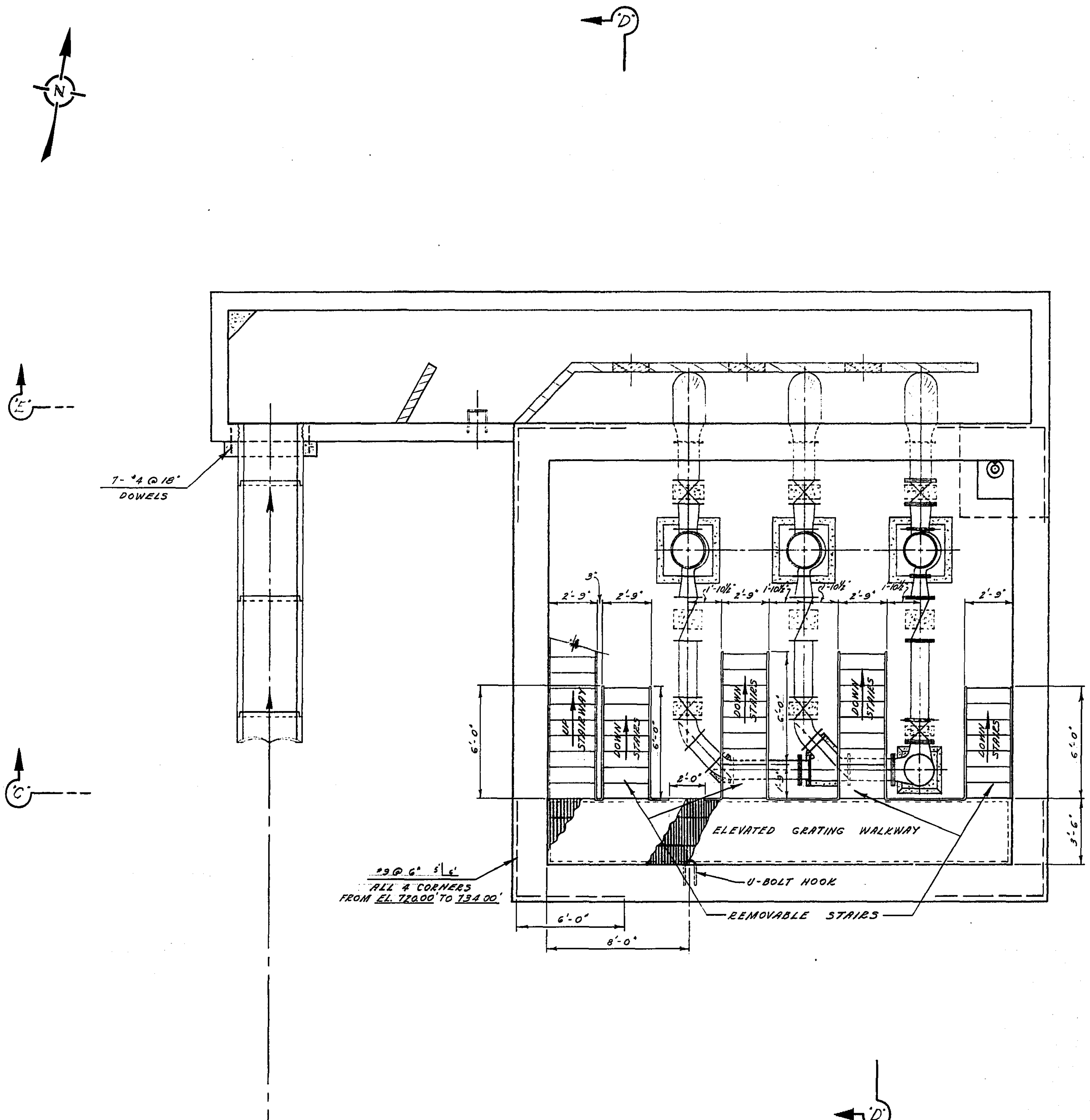
DESIGNED BY: S K	DRAWN BY: S K
CHECKED BY: A.C.M.	DATE: 72 04 24
APPROVED BY: R.C.S.	DATE:

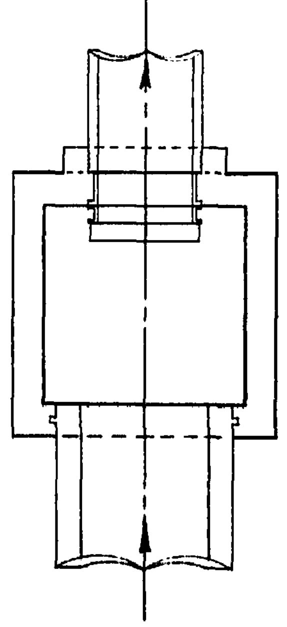
THE CITY OF WINNIPEG
WORKS & OPERATIONS DEPARTMENT

D'ARCY PUMPING STATION SEC. "H", ELECTRICAL DIAGRAMS AND SUMP LEVEL INDICATOR.

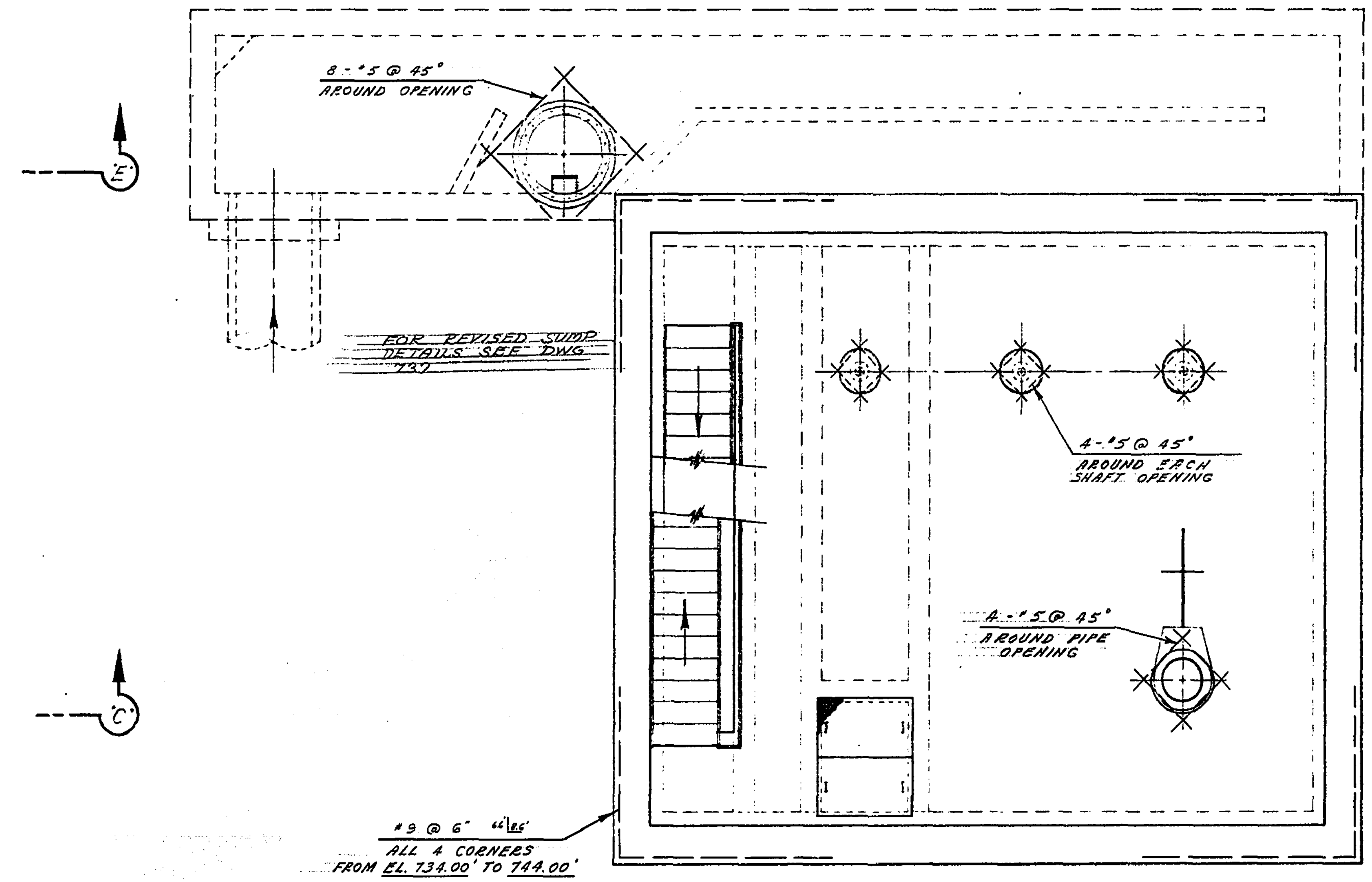
RELEASED FOR CONSTRUCTION: DATE:

SCALE: DRAWING NO.: 740





SEC. "A" - "A"
PUMP ROOM AND SUMP FLOOR PLAN



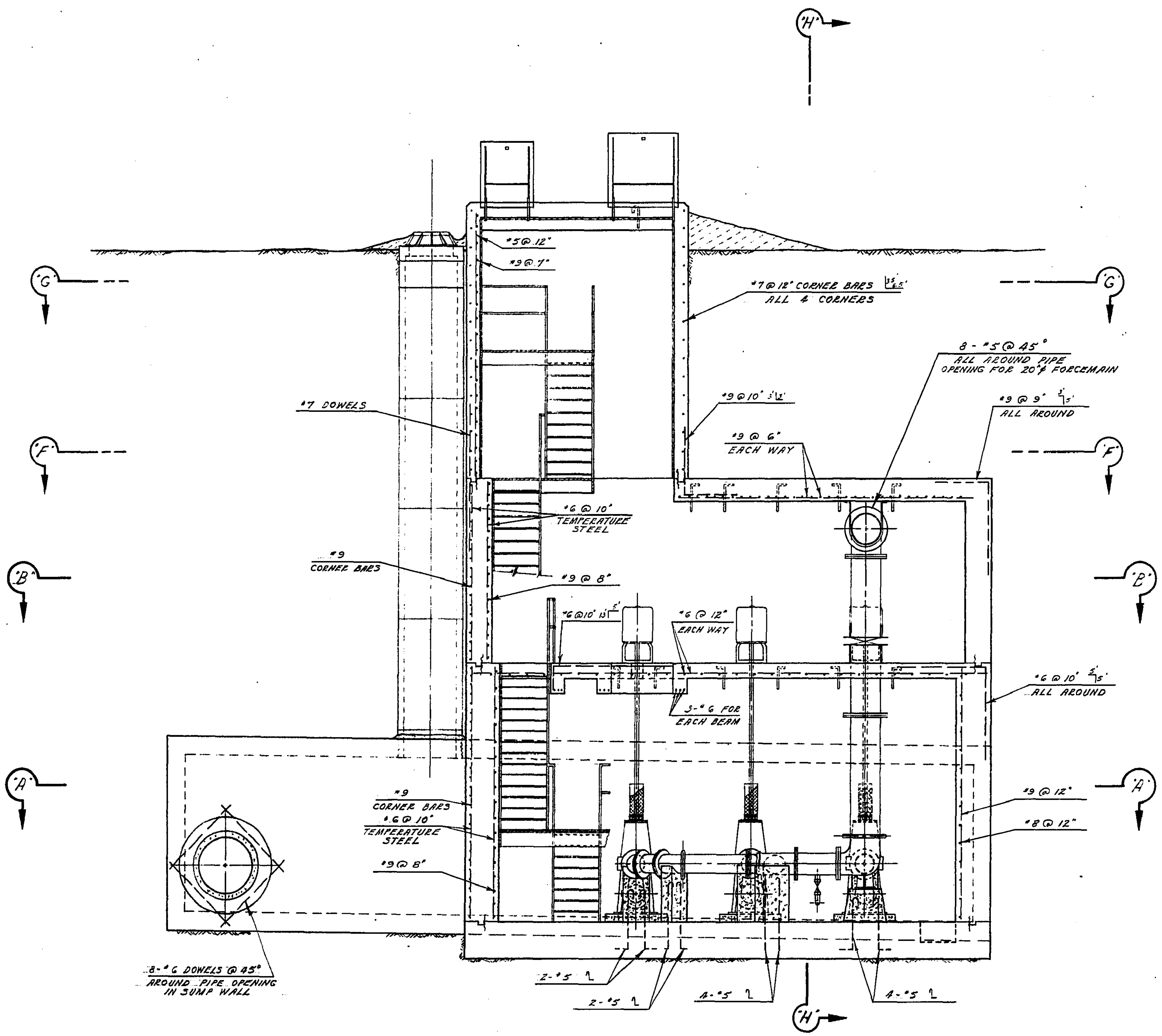
SEC. "B" - "B"
PUMP MOTOR ROOM FLOOR PLAN

NOTE:
1. THE 4 STAIRS ATTACHED TO THE ELEVATED WALKWAY ON THE PUMP ROOM FLOOR SHALL BE REMOVABLE FROM WALKWAY.

V. DUMORE DEC 12/73

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG **WATERWORKS & WASTE DISPOSAL DIVISION** A. PENMAN — DIRECTOR	SEWAGE DISPOSAL DEPT. D'ARCY PUMPING STATION DETAIL OF ELEVATED WALKWAY ON PUMP ROOM FLOOR AND REINFORCING	DES. CH'K'D. DRN. S.K. DATE APRIL 27/72 ENG. DES. ENG. OPER. APPROVED	SCALES 1/4" = 1'-0" DRAWING NO. 741

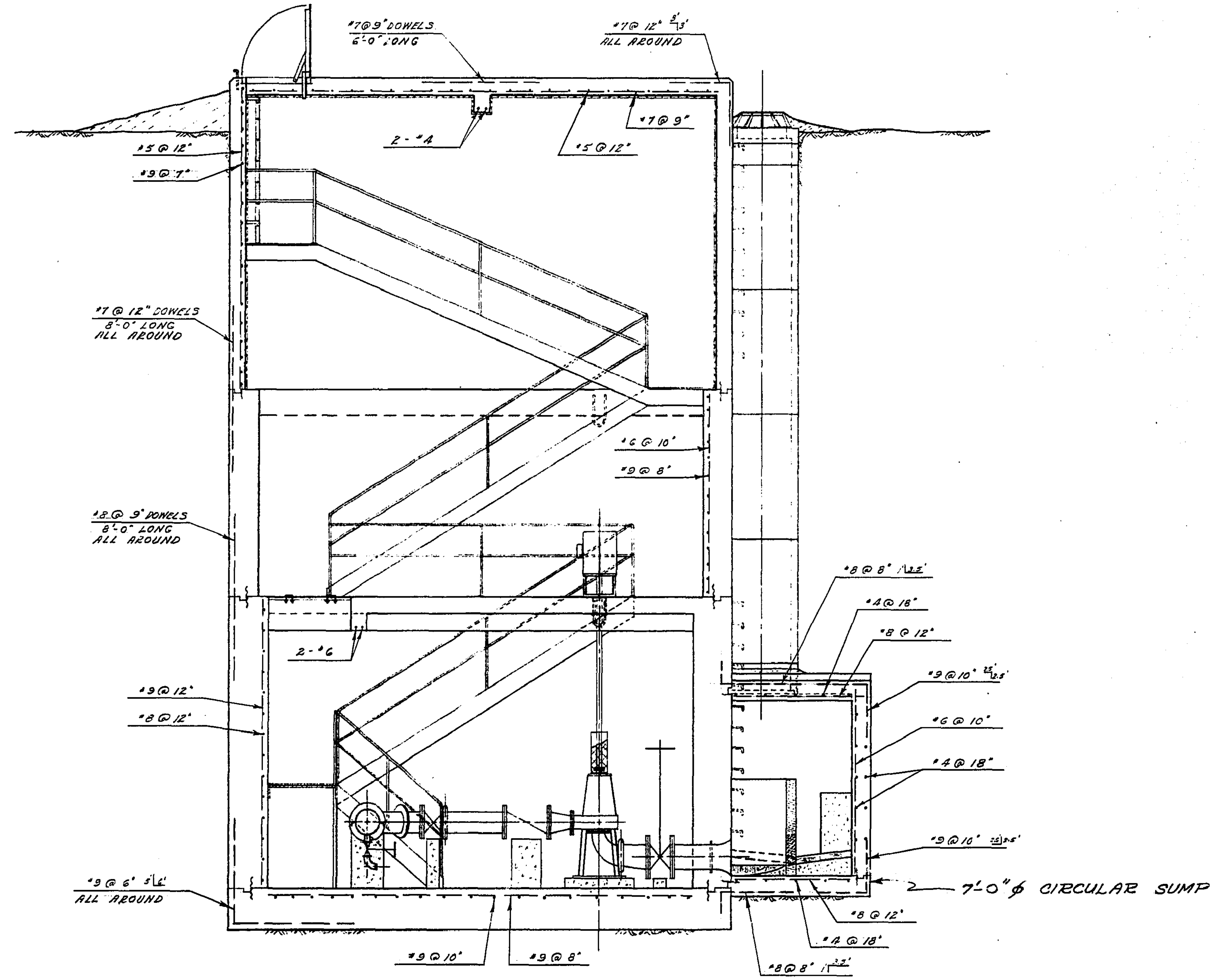
MICROFILMED NOV



SEC. "C"-"C"

(LONGITUDINAL SECTION LOOKING NORTH)

SCALE - 1/4"-1'-0"



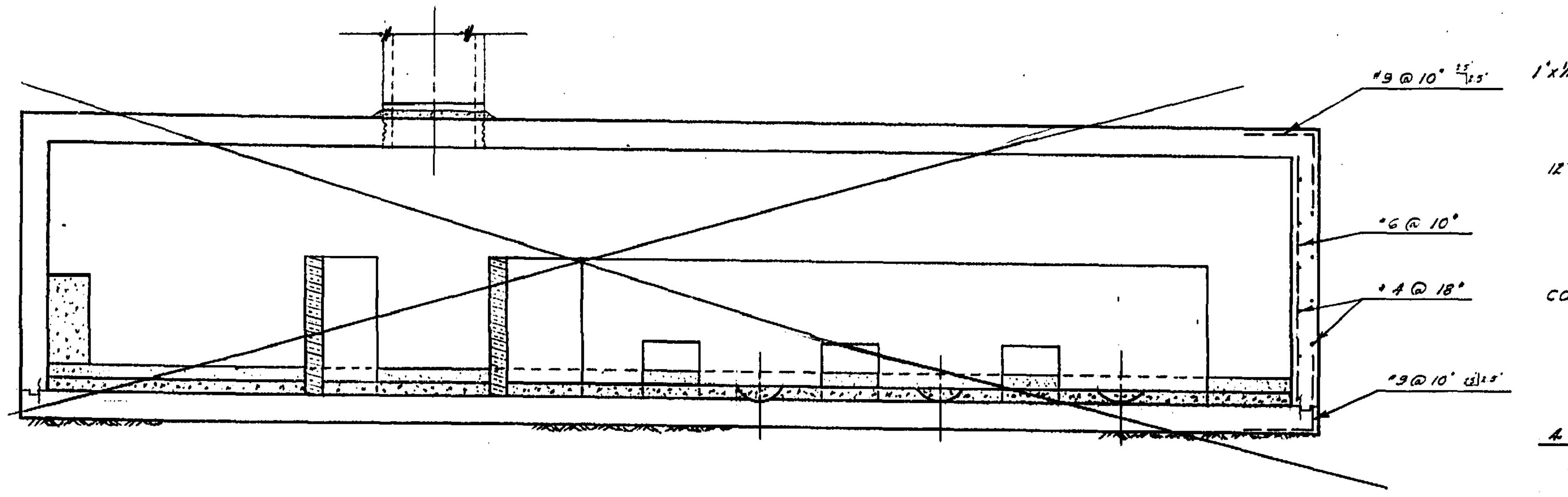
SEC. "D"-"D"

(CROSS-SECTION LOOKING WEST)

SCALE - 1/4"-1'-0"

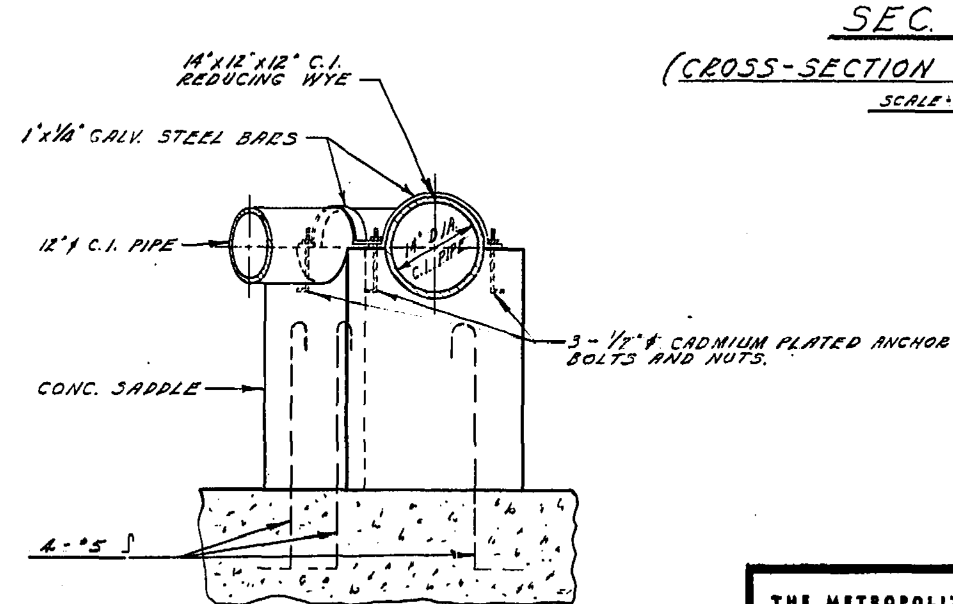
NOTES

1. 1" MIN. CLEARANCE FROM SURFACE OF INSIDE WALLS TO REINF. BARS IS REQUIRED.
2. 2" MIN. CLEARANCE FROM SURFACE OF SLAB TO REINF. BARS IS REQUIRED FOR ALL OTHER AREAS.
3. TIE BARS ARE NOT SHOWN. REINF. FIRM SHALL SELECT AND SHOW APPROPRIATE BARS ON DRAWINGS TO BE SUBMITTED FOR APPROVAL.
4. HIGH CHAIRS TO SUIT SHALL BE SUPPLIED WHEREVER THEY ARE REQUIRED. HIGH CHAIRS SHALL BE MADE OF GALV. STEEL OR P.V.C. MATERIAL.
5. PLACE 2-#5 REINF. BARS IN EACH VALVE SADDLE.



SEC. "E"-"E"

(LONG. SECTION THRU SUMP)



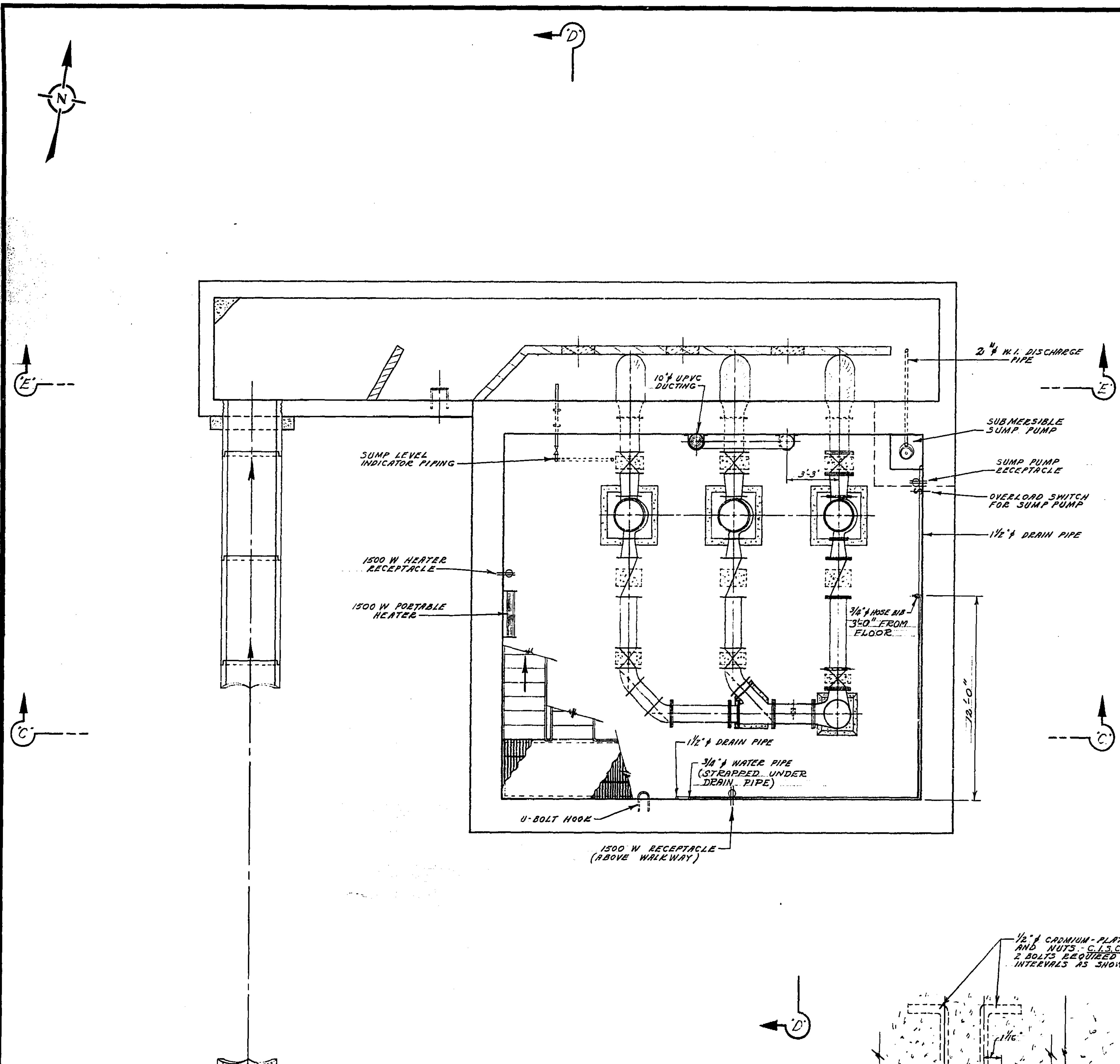
DETAIL OF ANCHORING FOR 14"x12"x12" WYE

SCALE - N.T.S.

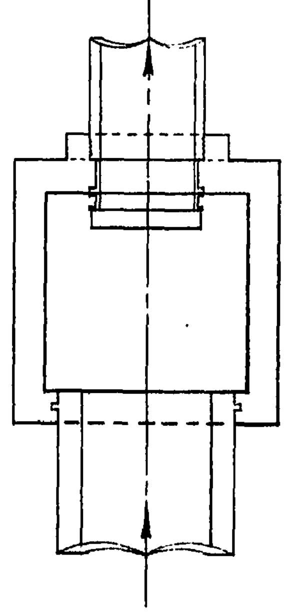
D. Scott
J. Dumore DEC 12/73

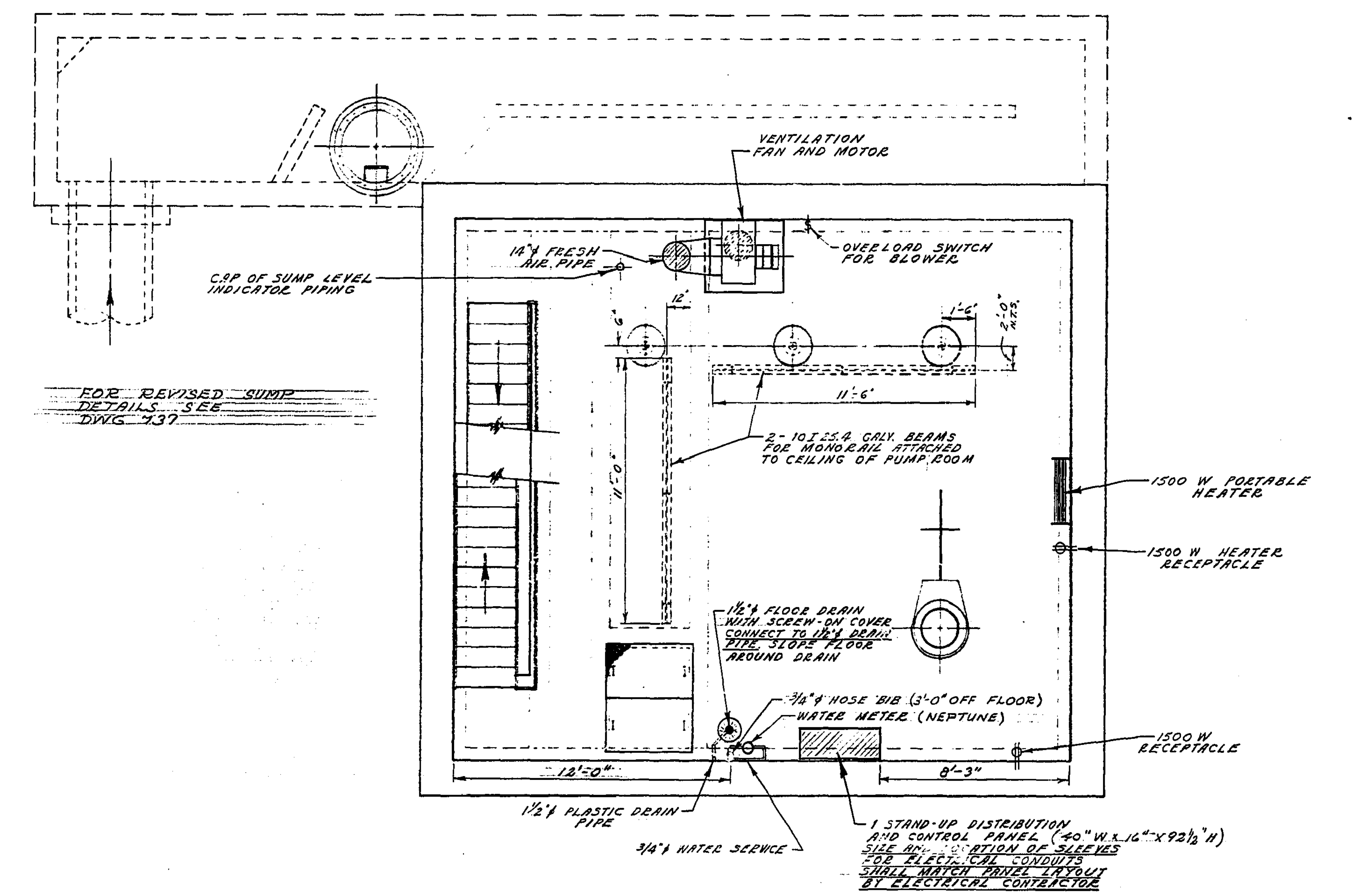
THE METROPOLITAN CORPORATION OF GREATER WINNIPEG WATERWORKS & WASTE DISPOSAL DIVISION A. PENMAN — DIRECTOR	SEWAGE DISPOSAL DEPT. D'ARCY PUMPING STATION DETAIL OF REINFORCING	DES. CH'K'D. DRN. DATE 20 APR /72 ENG. DES. ENG. OPER. APPROVED	SCALES AS NOTED DRAWING NO. 742

MICROFILMED

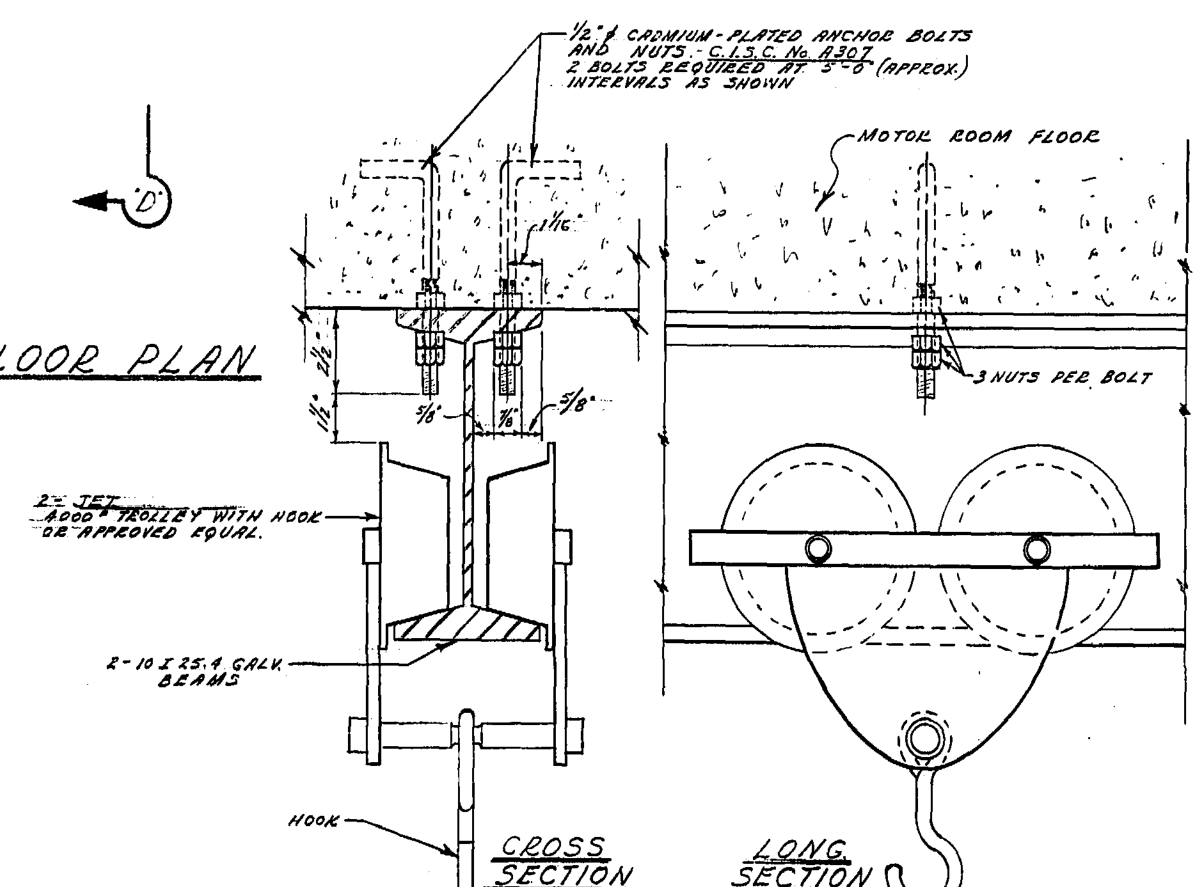


SEC. "A" - "A"
PUMP ROOM AND SUMP FLOOR PLAN
SCALE - 1/4" - 1'-0"





SEC. "B" - "B"
PUMP MOTOR ROOM FLOOR PLAN
SCALE - 1/4" - 1'-0"



DETAIL OF MONORAIL INSTALLATION
SCALE - 3" - 1'-0"

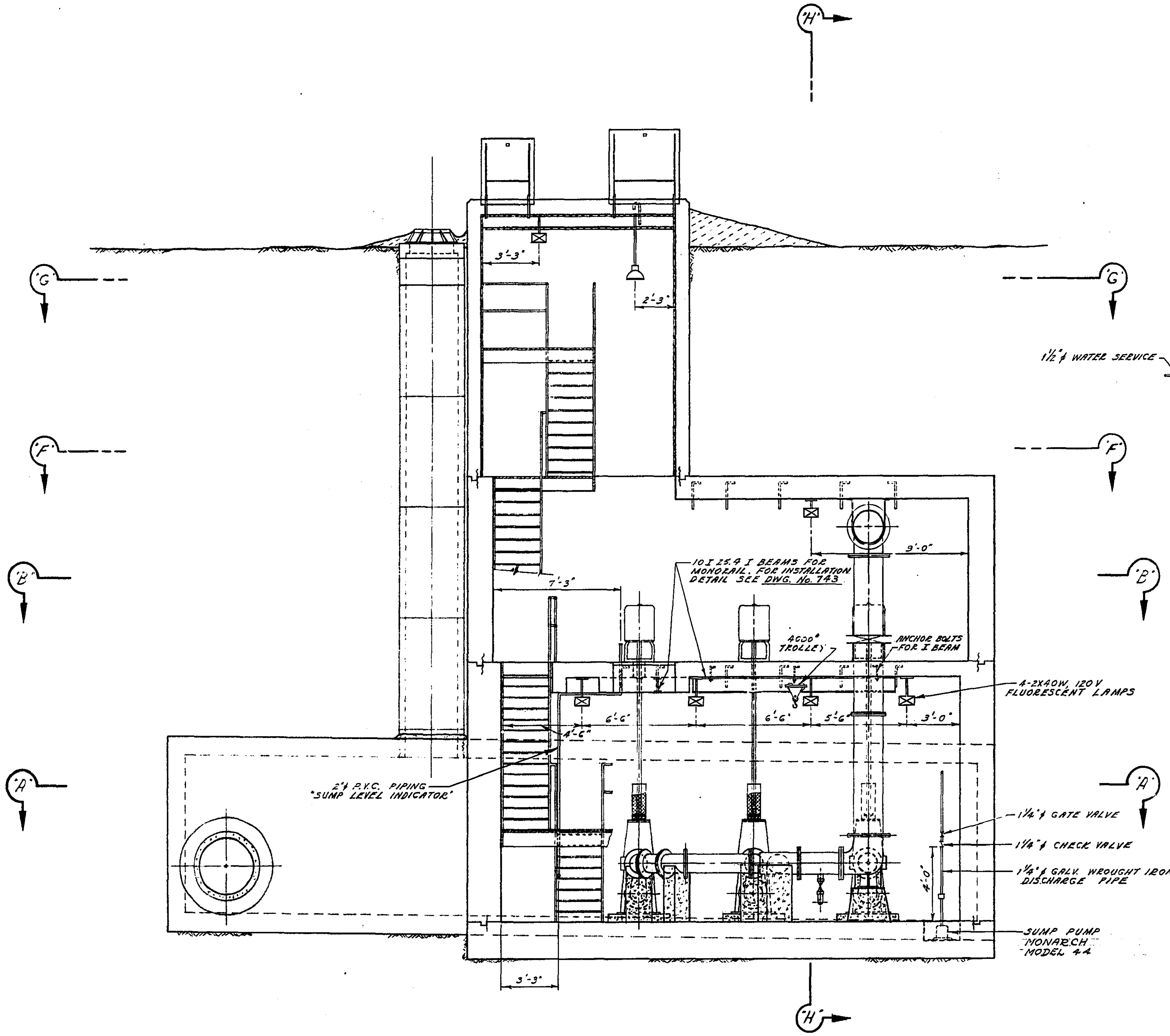
NOTE:

THE PORTABLE HEATERS SHALL BE "CARTER" MODEL No HAH1 X 5M1, C/W HAH1 THERMOSTAT KIT OR APPROVED EQUAL.

SURVEYED & PLAN CHECKED
D. Scott
V. Dumore Dec 12/73

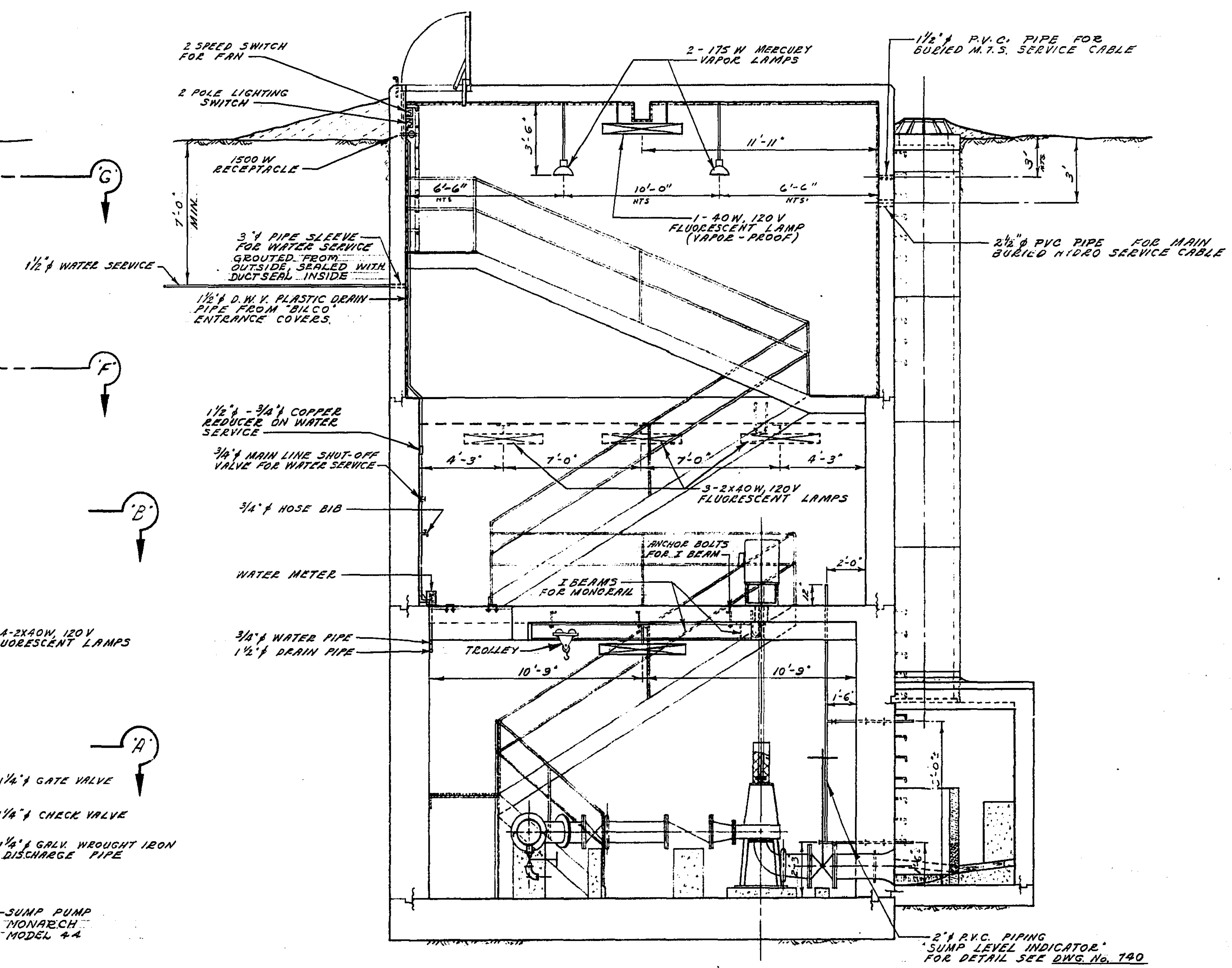
PROVINCE OF MANITOBA
MACKEY

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG WATERWORKS & WASTE DISPOSAL DIVISION A. PENMAN — DIRECTOR	SEWAGE DISPOSAL DEPT. D'ARCY PUMPING STATION VENTILATION ELECTRICAL, MISC PIPING AND MONORAILS	DES. S.K. CH'K'D. A.V. DRN. S.K. DATE 21 JUNE 72. ENG. DES. ENG. OPER. APPROVED	SCALES AS NOTED DRAWING NO. 743 6



SEC. "C" - "C"

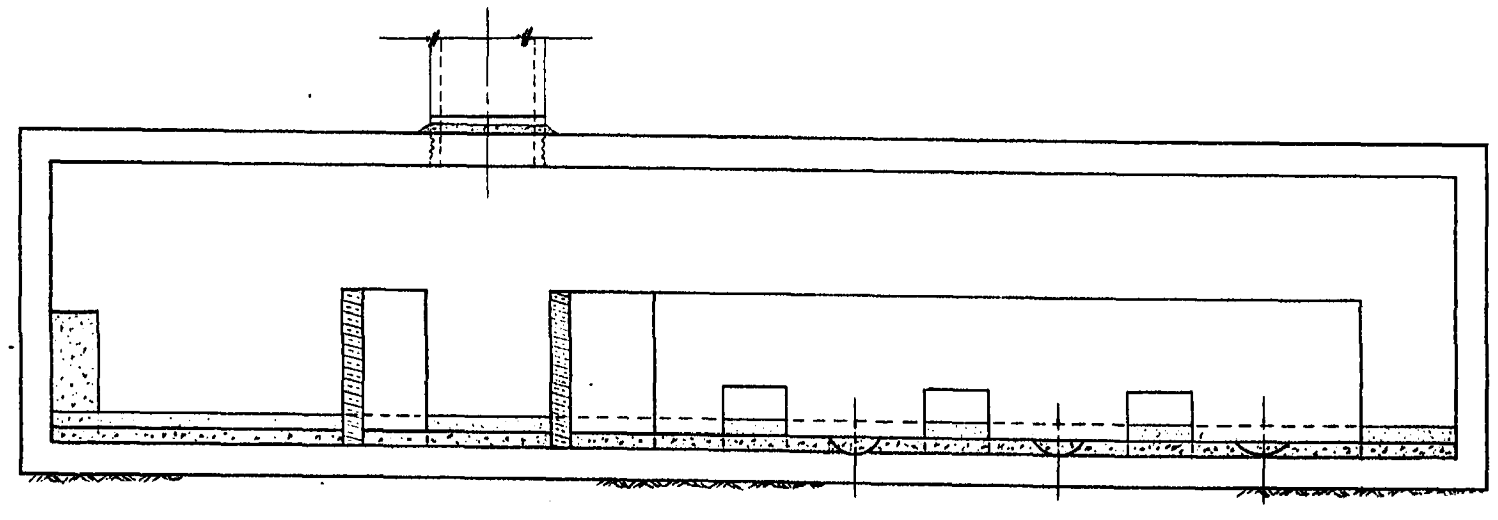
(LONGITUDINAL SECTION LOOKING NORTH)



SEC. "D" - "D"

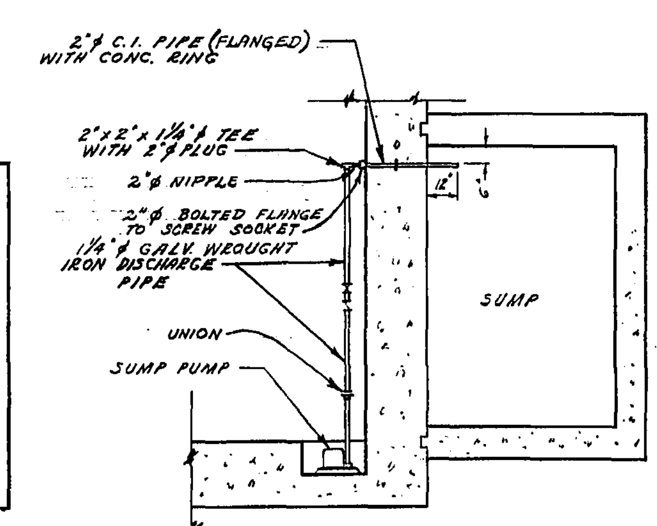
(CROSS-SECTION LOOKING WEST)

NOTE: THE FLUORESCENT LAMP NEAR THE STATION ENTRANCE SHALL BE VAPOR-PROOF. THE REMAINDER ARE NOT VAPOR-PROOF.



SEC. "E" - "E"

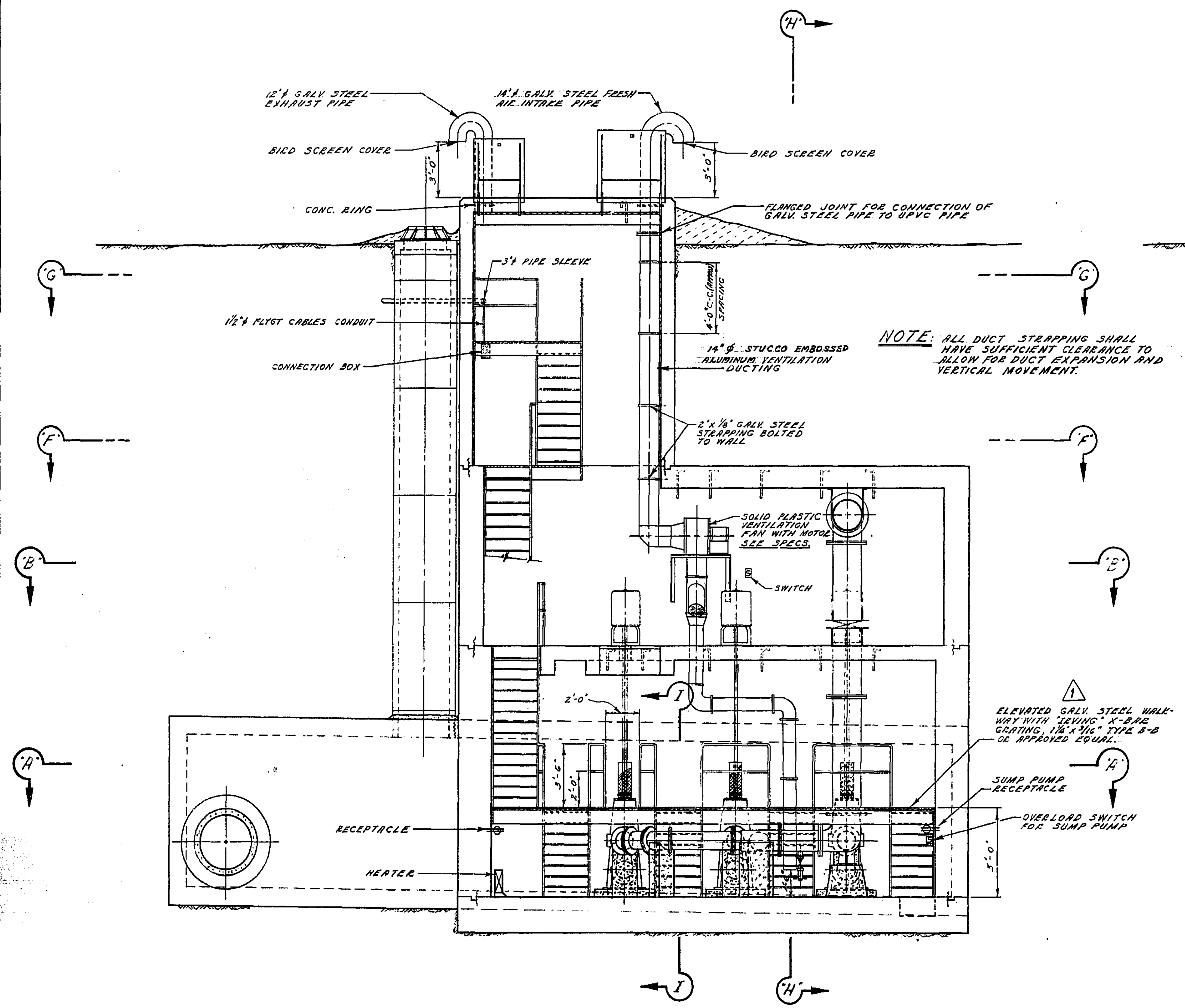
(LONG. SECTION THRU SUMP)



DETAIL OF SUMP PUMP DISCHARGE PIPING

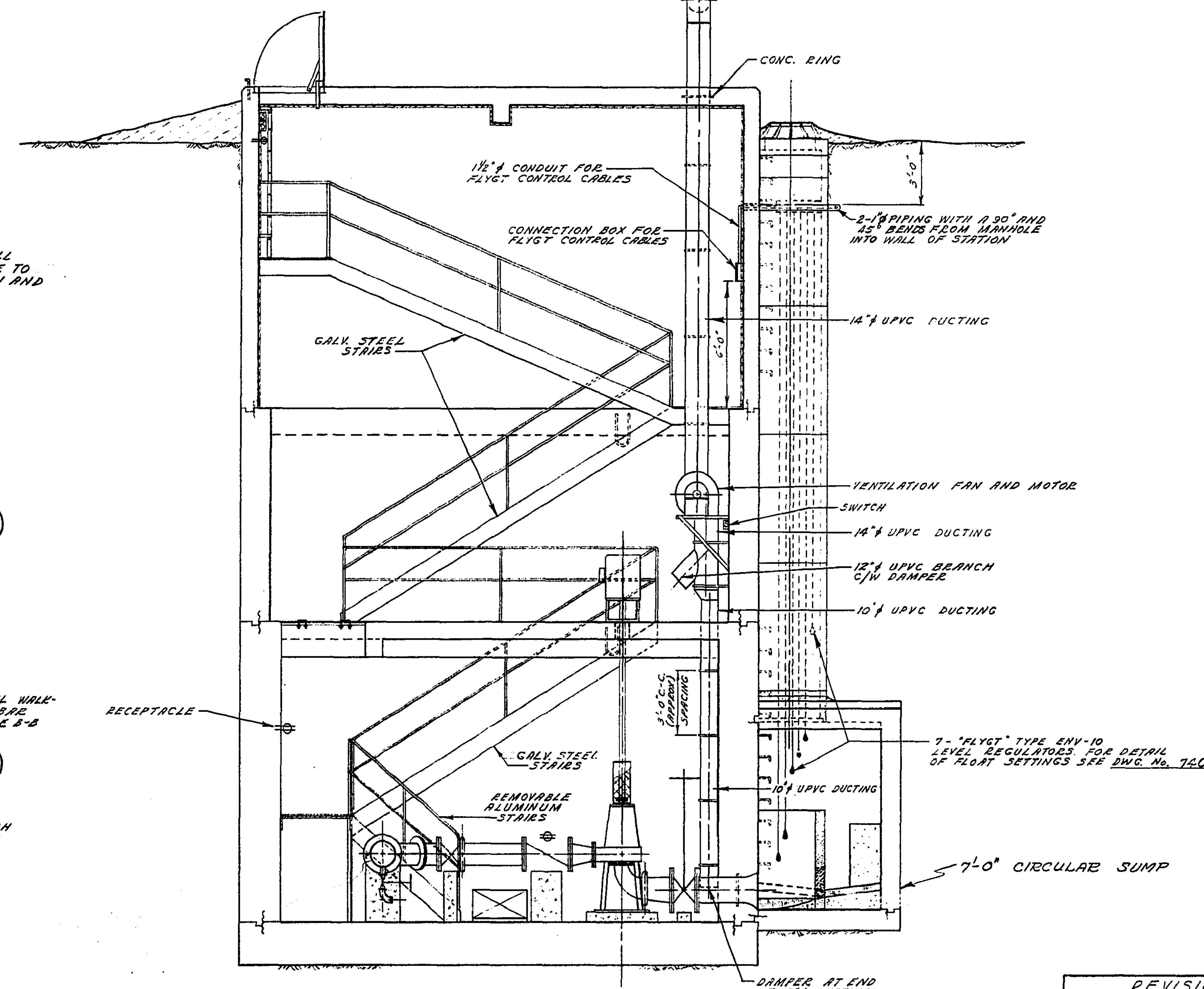
S. Scott
DUMORE Dec 12/73

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG **WATERWORKS & WASTE DISPOSAL DIVISION** A. PENMAN — DIRECTOR	SEWAGE DISPOSAL DEPT. D'ARCY PUMPING STATION ELECTRICAL, MISC. PIPING AND MONORAILS	DES. CH'K'D. DRN. S.K. DATE 1 JUNE 72 ENG. DES. ENG. OPER. APPROVED	SCALES 1/4" = 1'-0" DRAWING NO. **744**



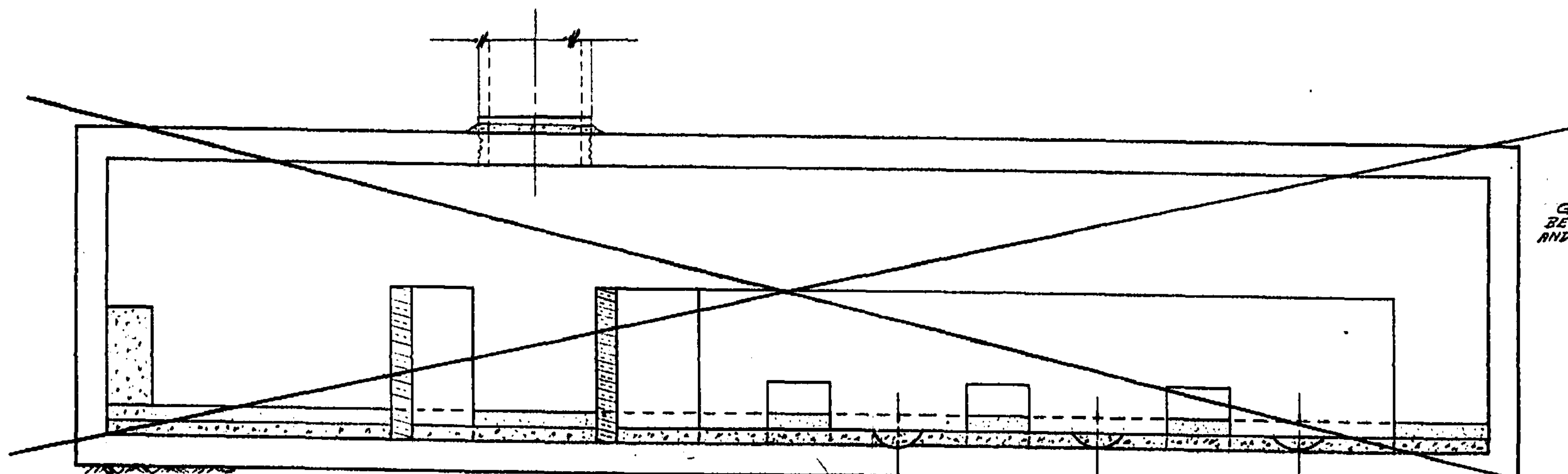
NOTE: ALL DUCT STRAPPING SHALL HAVE SUFFICIENT CLEARANCE TO ALLOW FOR DUCT EXPANSION AND VERTICAL MOVEMENT.

SEC. 'C'-'C'
(LONGITUDINAL SECTION LOOKING NORTH)

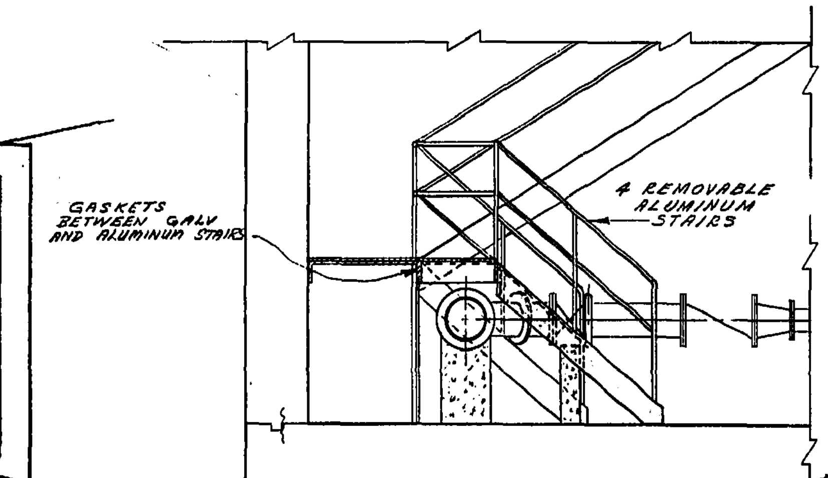


SEC. 'D'-'D'
(CROSS-SECTION LOOKING WEST)

REVISIONS			
No.	DESCRIPTION	DATE	BY
1	GRATING FOR WALKWAY CHANGED FROM ALUMINUM TO GALV. STEEL	15/6/72	S.K.



SEC. 'E'-'E'
(LONG. SECTION THRU SUMP)



SEC. 'I'-'I'

NOTE:
THE REMOVABLE JOINT OF THE STAIRS TO BE AT THE ELEVATED WALKWAY. (USE BOLTS OR OTHER METHODS TO ATTACH STAIRS TO WALKWAY FOR EASE IN REMOVAL)

NOTES

1. ALL MISC. METAL WORK OTHER THAN ALUMINUM METAL WORK TO BE HOT DIPPED GALVANIZED AFTER FABRICATION.
2. ALL SLEEVES TO BE CAULKED TO EACH FACE WITH "DUCTSEAL" OR AN APPROVED EQUAL.
3. VENTILATION DUCTS, WATER SERVICE PIPING AND ALL OTHER MISC. PIPING TO BE STRAPPED TO WALL OR CEILING AT 6'-0" INTERVALS OR AS NOTED AND WHEREVER NECESSARY.

D. Scott
Dumore Dec 12/7?

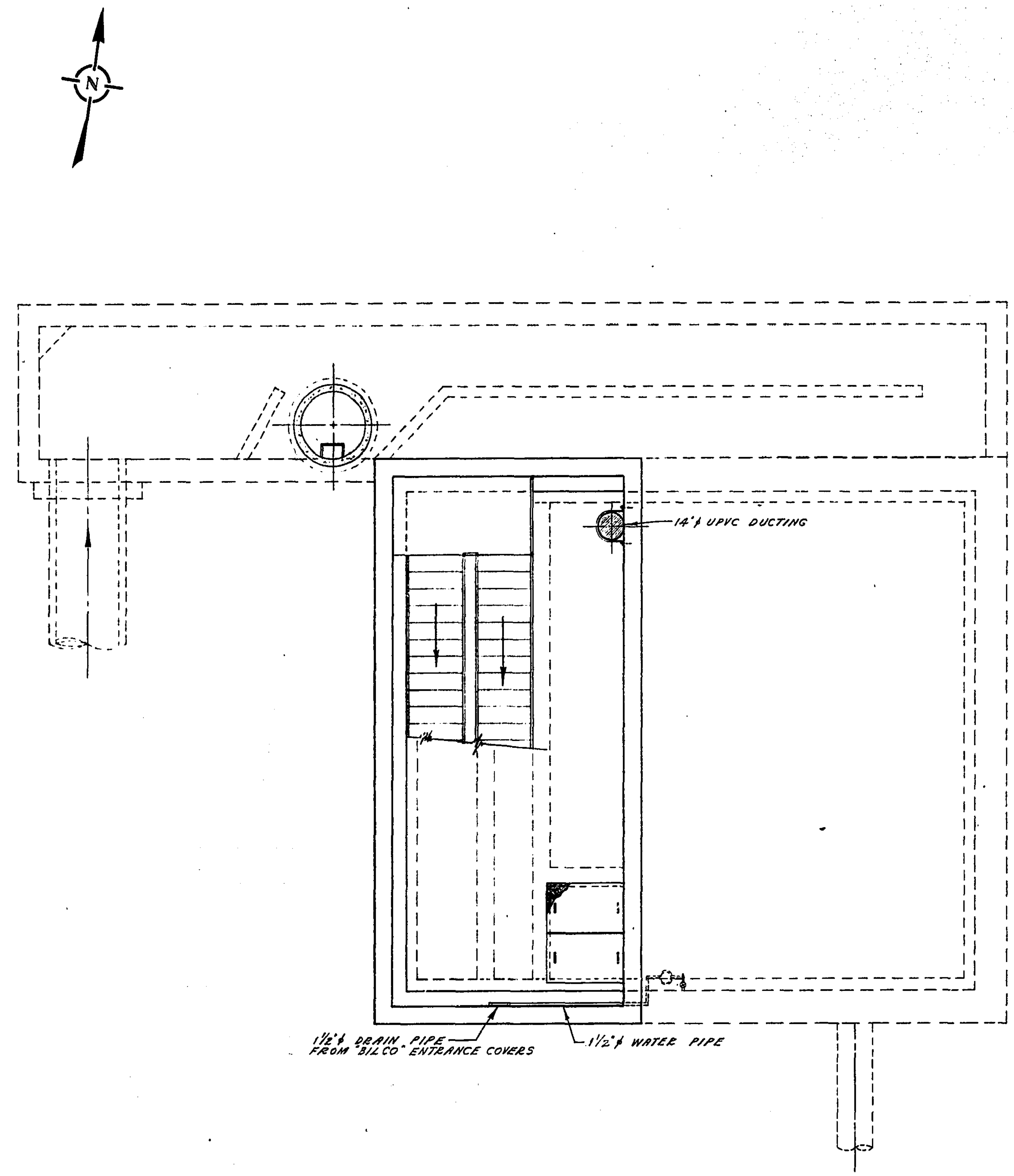
THE METROPOLITAN CORPORATION OF GREATER WINNIPEG
WATERWORKS & WASTE DISPOSAL DIVISION
A. PENMAN — DIRECTOR

SEWAGE DISPOSAL DEPT.
D'ARCY PUMPING STATION
VENTILATION, ELECTRICAL, WALKWAY AND LEVEL REGULATORS

DES. S.K. CH'K'D
DRN. S.K. DATE 1 JUNE 72
ENG. DES.
ENG. OPER.
APPROVED

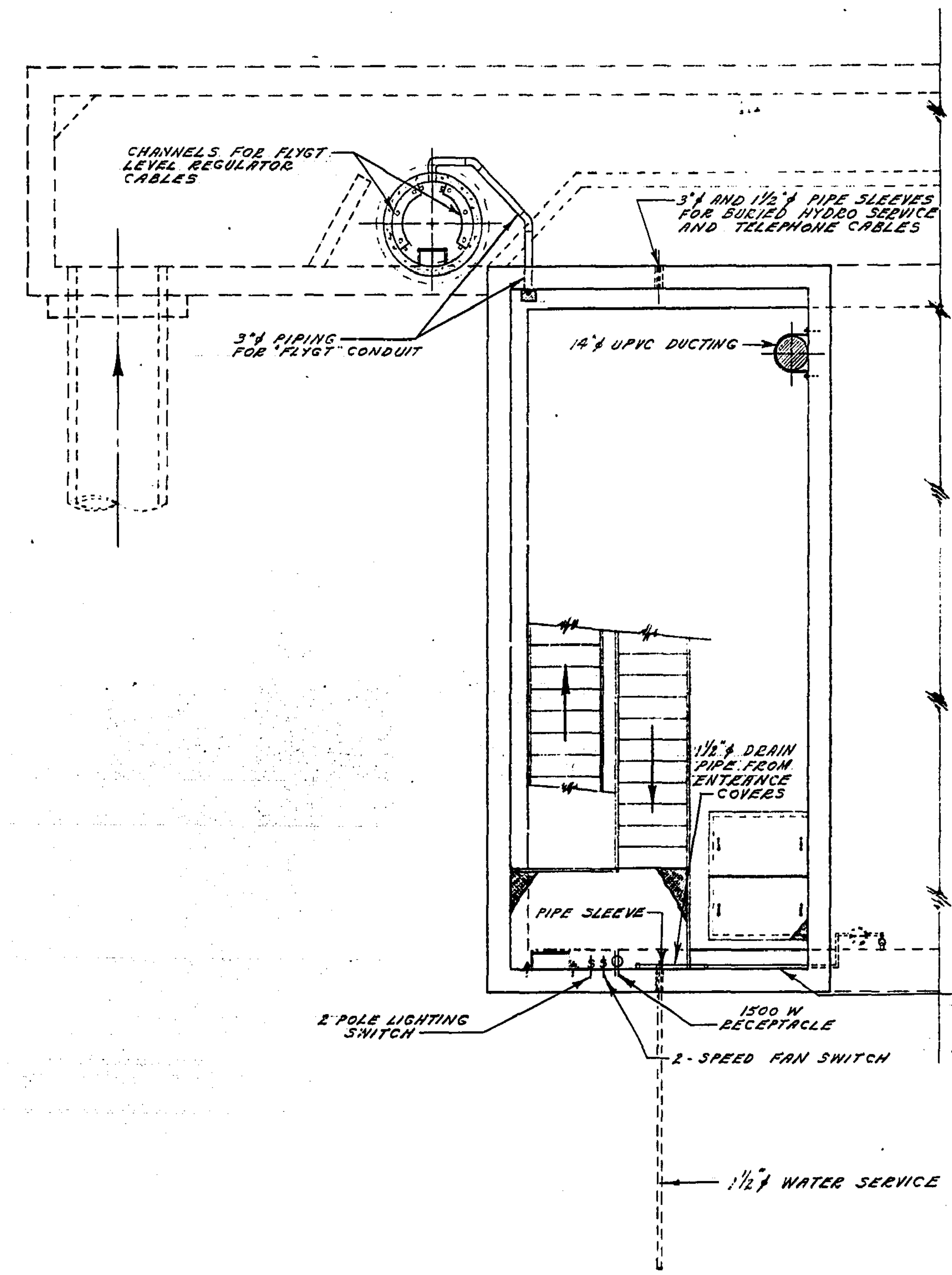
SCALES 1/4" = 1'-0"
DRAWING NO. 745

MICROFILMED NO.



SEC. 'F'-'F'

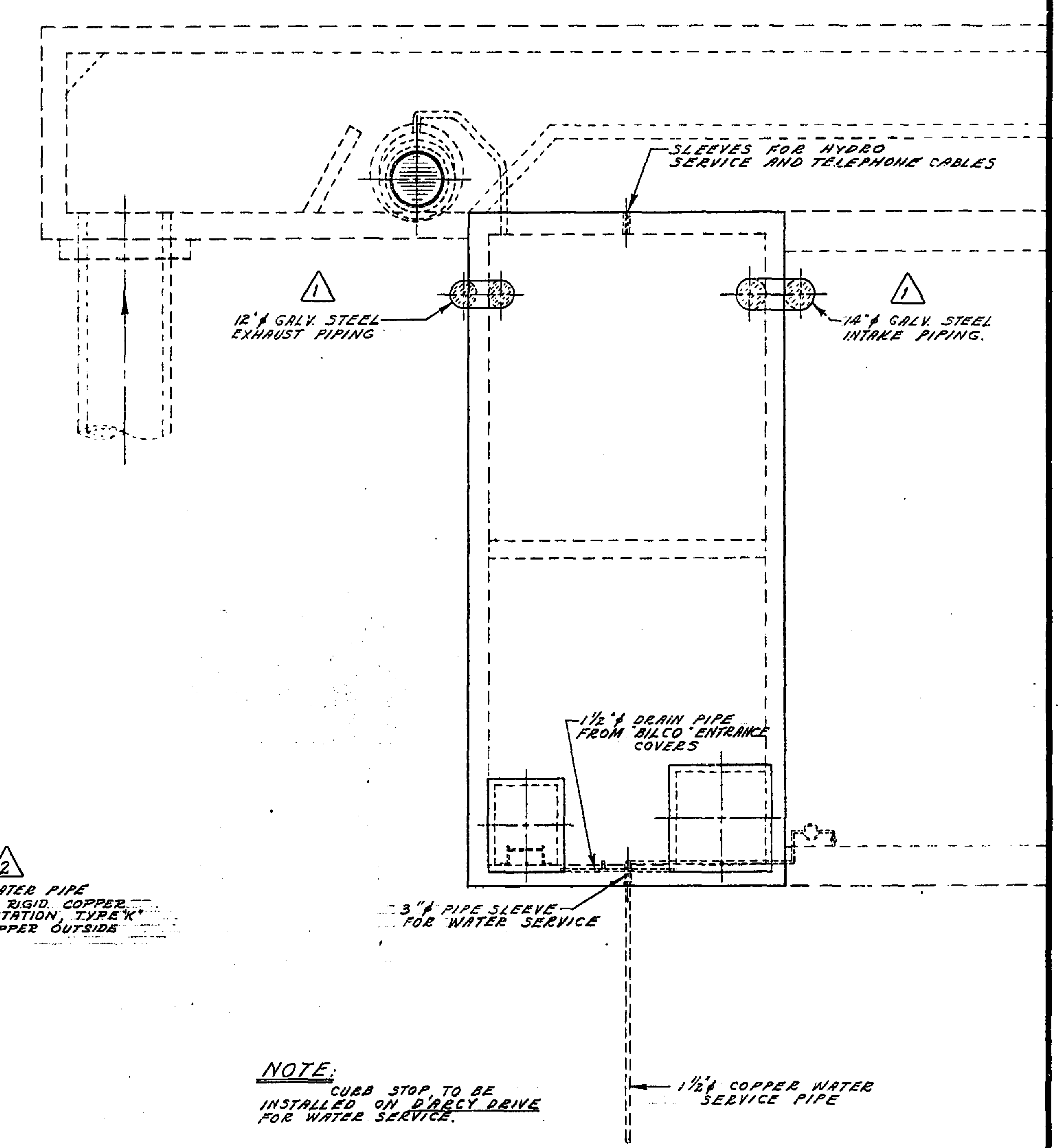
SCALE-¼"=1'-0"



SEC. 'G'-'G'

STAIRWAY AND ENTRANCE PLATFORM

SCALE-¼"=1'-0"

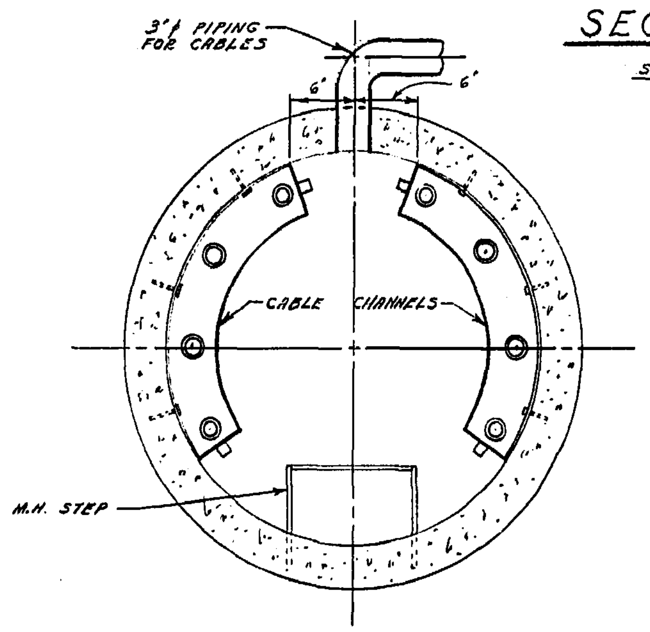


NOTE:
CURB STOP TO BE INSTALLED ON D'ARCY DRIVE FOR WATER SERVICE.

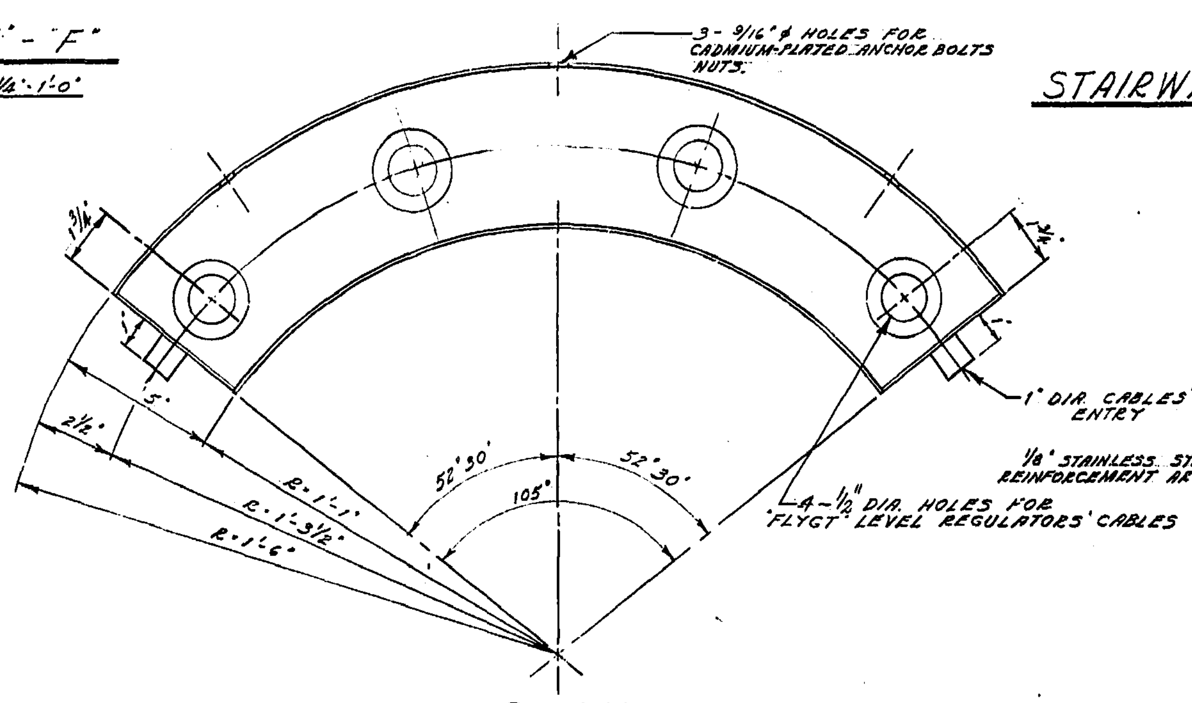
ROOF PLAN

GROUND SURFACE

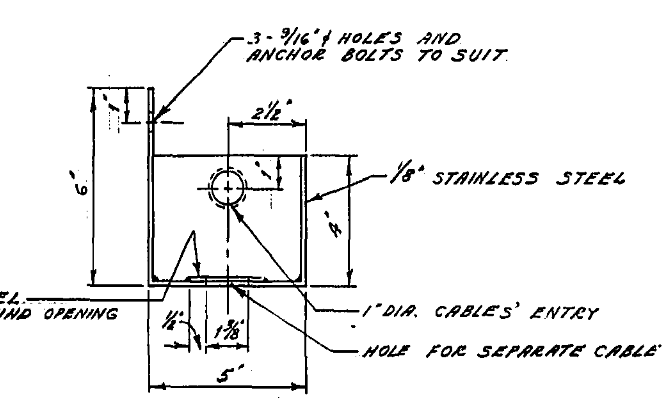
SCALE-¼"=1'-0"



CABLE CHANNELS SETUP IN SUMP MANHOLE



PLAN



CROSS-SECTION

DETAIL OF "FLYGT" CABLE CHANNEL - 2 REQUIRED

SCALE=3"=1'-0"

NOTE:

1. 6 SQUEEZE CONNECTORS ARE REQUIRED FOR "FLYGT" LEVEL REGULATORS. TYPE ENV-10.
2. CABLE CHANNELS TO BE FABRICATED OF STAINLESS STEEL.

REVISIONS			
No.	DESCRIPTION	DATE	BY
1	12"⌀ + 14"⌀ EXHAUST + INTAKE PIPING CHANGED TO STEEL FROM UPVC.	15/6/72.	S.K.
2	¾"⌀ WATER SERVICE CHANGED TO 1½"⌀.	15/6/72	S.K.

SURVEYED & ...

L. Dumont Dec 12/73

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG

WATERWORKS & WASTE DISPOSAL DIVISION

A. PENMAN — DIRECTOR

SEWAGE DISPOSAL DEPT.

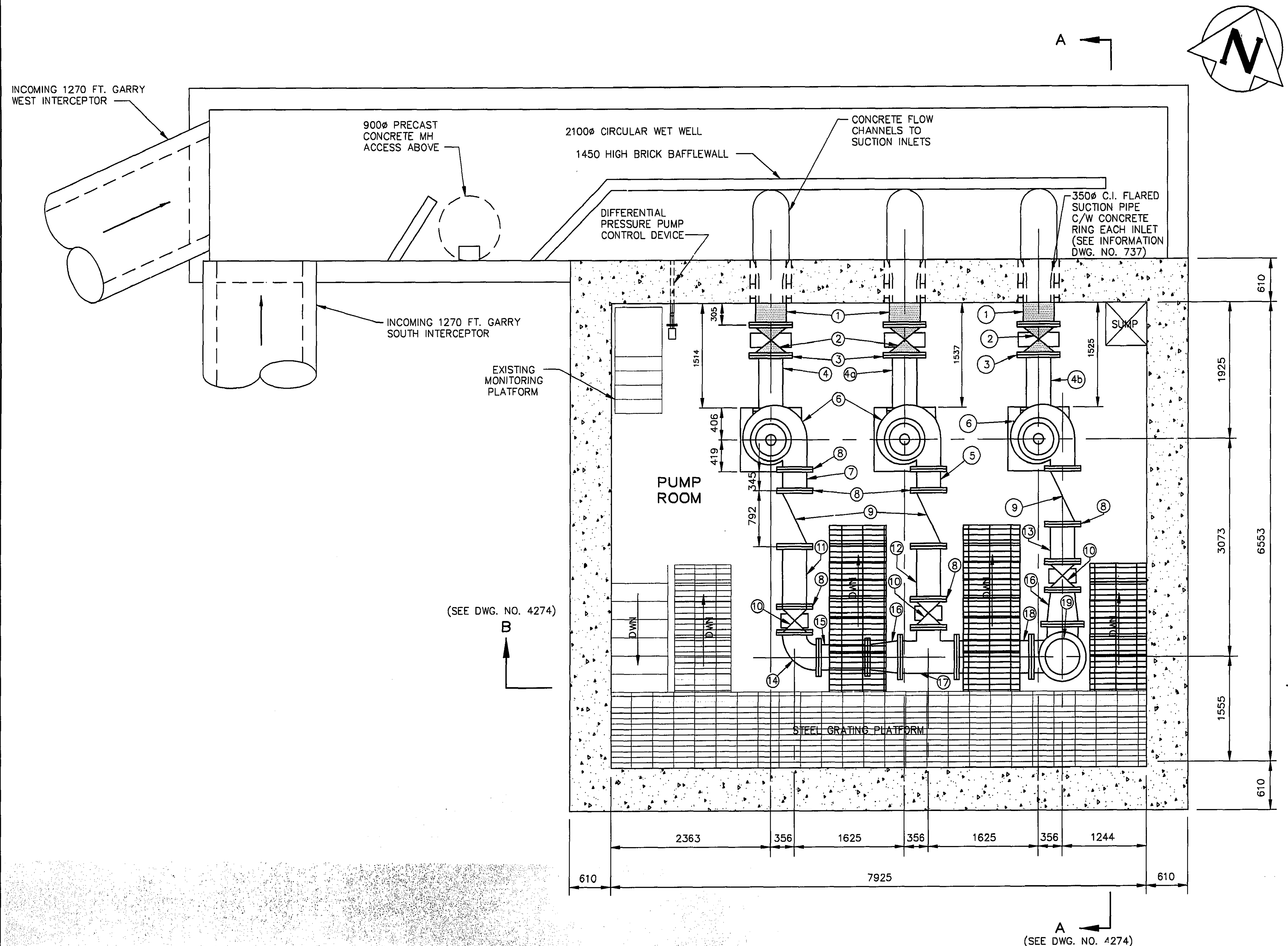
D'ARCY PUMPING STATION

LEVEL REGULATORS, CABLE CHANNELS, ELECTRICAL AND MISC PIPING

DES. — CH'K'D —
DRN. S.K. DATE 1 JUNE 72.
ENG. DES. —
ENG. OPER. —
APPROVED —

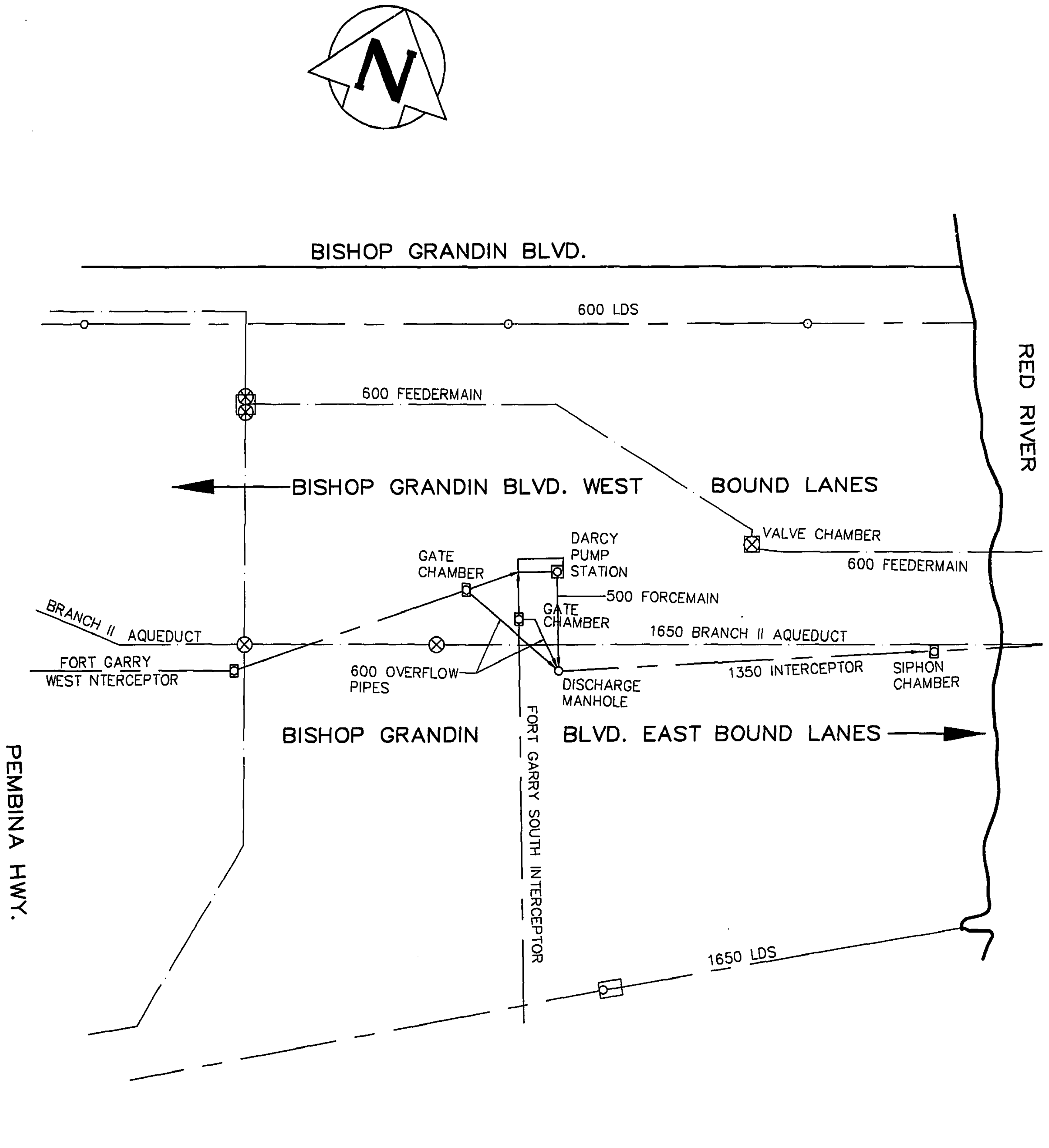
SCALES: AS NOTED

DRAWING NO. 746



PLAN VIEW PUMP ROOM

SCALE 1:40



SITE PLAN

SCALE 1:500

AS-CONSTRUCTED

99.06.11

CONTRACT ADMINISTRATION | DRAFTING & GRAPHIC SERVICES | DATE

WATER AND WASTE DEPARTMENT

LIST OF MATERIALS

ITEM	DESCRIPTION	LENGTH	QUANTITY	ITEM	DESCRIPTION	LENGTH	QUANTITY
1	350ø INLET PIPE	915	3	26	HOLLOW STEEL DRIVE SHAFT	–	3
2	350ø GATE VALVE (RISING STEM) C/W HANDWHEEL (FLXFL)	385	3	27	600V, 1200RPM, 75HP, TEFC, VERTICAL MOUNT WESTINGHOUSE ELECTRIC MOTOR	–	3
3	350ø "UNIFLANGE"	–	6				
4	350ø FILLER PIPE (PEXPE)	828	1				
4a	350ø FILLER PIPE (PEXPE)	847	1				
4b	350ø FILLER PIPE (PEXPE)	840	1				
5	350ø FILLER PIPE (PE X FL)	322	1				
6	INGERSOLL-DRESSER 14MNVI6FR-7L CENTRIFUGAL PUMP	–	3				
7	350ø FILLER PIPE (PEXPE)	345	1				
8	350ø "UNI-FLANGE"	–	6				
9	350ø BALL CHECK VALVE (FLXFL)	792	3				
10	350ø GATE VALVE (RISING STEM) C/W HANDWHEEL (FLXFL)	400	3				
11	350ø FILLER PIPE (PEXFL)	786	1				
12	350ø FILLER PIPE (PEXFL)	743	1				
13	350ø FILLER PIPE (PEXFL)	571	1				
14	350ø 90° ELBOW (FLXFL)	–	1				
15	350ø FILLER PIPE (FLXFL)	723	1				
16	450ø X 350ø CONCENTRIC REDUCER (FLXFL)	486	2				
17	450ø X 450ø X 350ø REDUCING TEE (FLXFLXFL)	–	1				
18	450ø FILLER PIPE (FLXFL)	1103	1				
19	500ø X 450ø X 450ø SIDE OUTLET 90° ELBOW C/W BASE (FLXFLXFL)	–	1				
20	500ø FABRICATED OFFSET FILLER PIPE (FLXFL)	1597	1				
21	500ø FILLER PIPE (FLXFL)	1256	1				
22	500ø ROSEMOUNT FLOWMETER	872	1				
23	500ø "UNI-FLANGE"	–	1				
24	500ø FILLER PIPE (FLXPE)	328	1				
25	500ø GATE VALVE (NON-RISING STEM) (FLXFL)	455	1				

NOTES:

1. LENGTHS SHOWN FOR PIPING ARE FACE TO FACE AND DO NOT INCLUDE GASKET THICKNESS.
2. GASKETS ARE 3 mm THICK, FULL FACED, CLOTH INSERTED RUBBER.
3. ALL FLANGE NUTS AND BOLTS ARE HIGH STRENGTH STEEL.
4. EXISTING PIPING REUSED SHOWN THUS:
5. ALL PIPE SCHEDULE 80 STEEL.
6. ALL FLANGED FITTINGS CONFORM TO AWWA C110
7. ALL FLANGES WELDED INSIDE AND OUT IN ACCORDANCE WITH AWWA C-207 CLASS D
8. ALL WELDED JOINTS ON STEEL PIPE AND FITTINGS ARE FULL PENETRATION BUTT TYPE WELDS.
9. ALL ANCHOR BOLTS NOT SPECIFICALLY IDENTIFIED ARE TYPE 316 SS KWIK BOLT STUD ANCHOR
10. BONDING AGENT IS ACRYL-STIX

B.M. ELEV.

POSTED TO LBIS

NO.	REVISIONS	DATE	BY
1	AS-CONSTRUCTED	99/05	GMZ

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	
DRAWN BY	MBD	APPROVED BY	
HOR. SCALE	AS NOTED	RELEASED FOR CONSTRUCTION	
VERTICAL			
DATE	1997 11 03	DATE	

ENGINEER'S SEAL
PROVINCE OF MANITOBA
ORIGINAL STAMPED BY
R.D. LOUDFOOT P.ENG.
98/01/19
REGISTERED PROFESSIONAL ENGINEER

PD 98-007
PLOT DATE: 1998 01 12
AUTOCADR12: O:\DRAWINGS\WASTEWTR\SEWPUMP\04273

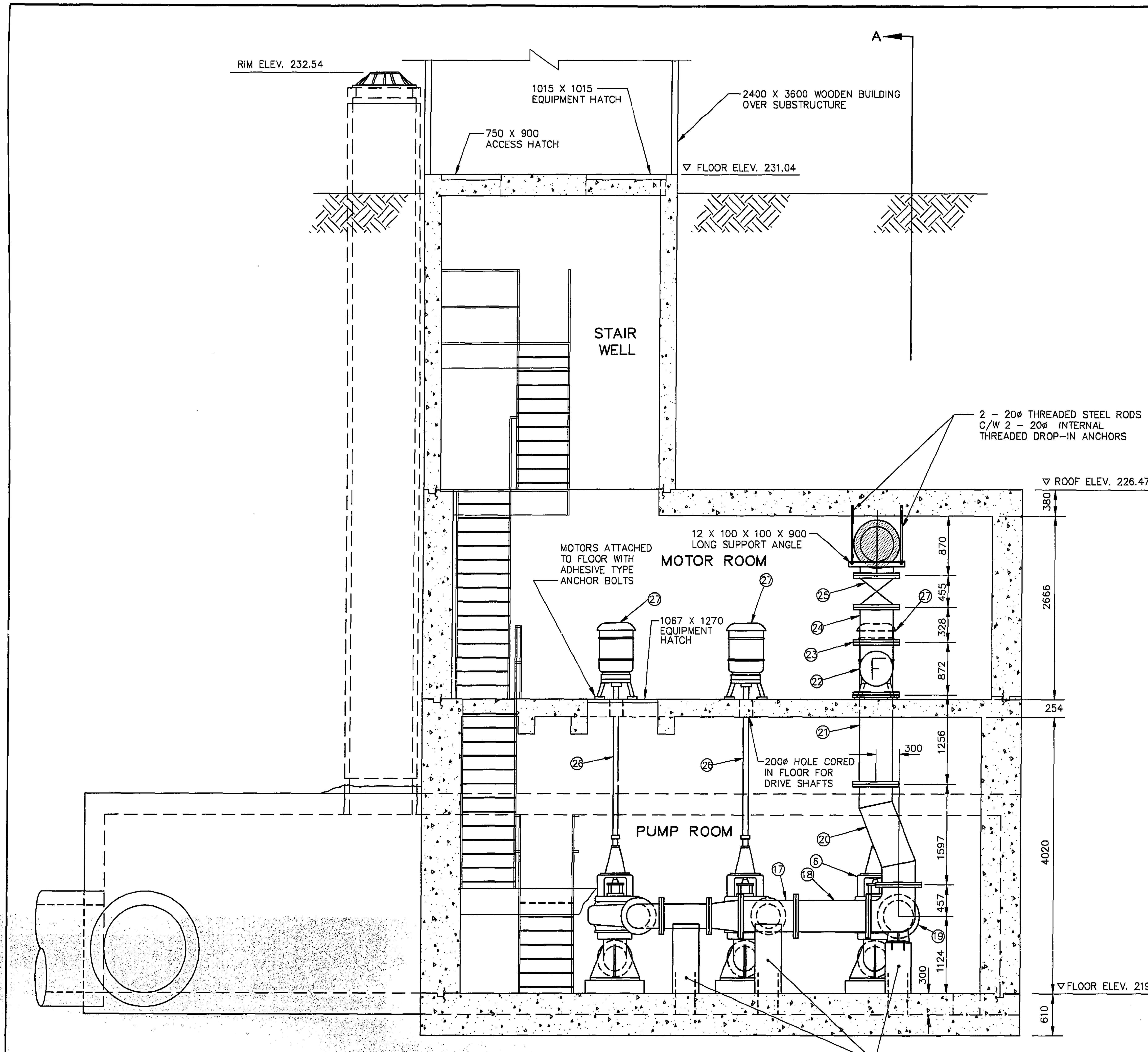
THE CITY OF WINNIPEG
WORKS AND OPERATIONS DIVISION
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION PUMP REPLACEMENT

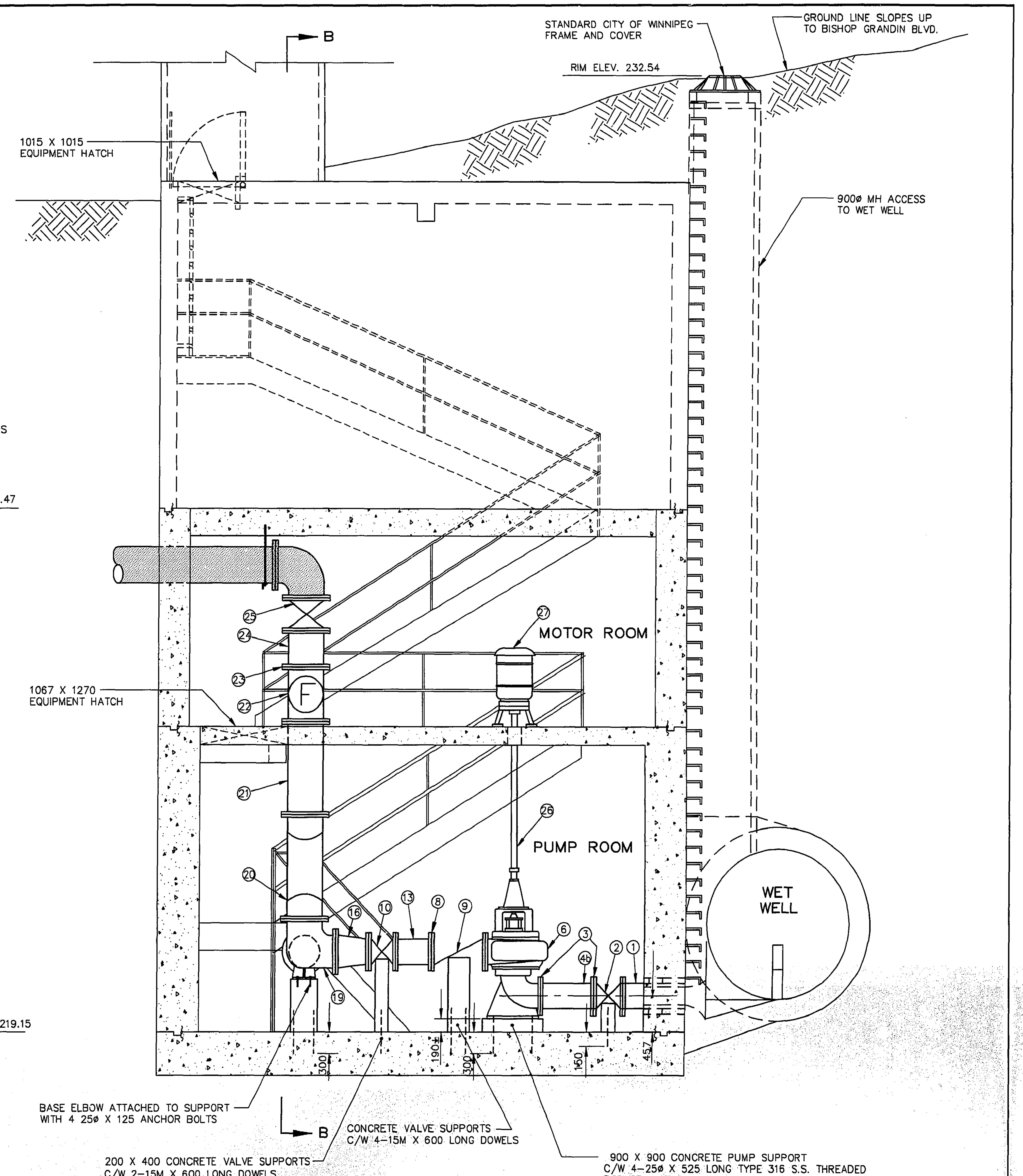
SITE PLAN AND PUMP ROOM FLOOR PLAN

SHEET 1 OF 2

CITY DRAWING NUMBER 4273



SECTION B–B



SECTION A–A

LIST OF MATERIALS

ITEM	DESCRIPTION	LENGTH	QUANTITY
1	350ø INLET PIPE	915	3
2	350ø GATE VALVE (RISING STEM) C/W HANDWHEEL (FLXFL)	385	3
3	350ø "UNIFLANGE"	–	6
4	350ø FILLER PIPE (PEXPE)	828	1
4a	350ø FILLER PIPE (PEXPE)	847	1
4b	350ø FILLER PIPE (PEXPE)	840	1
5	350ø FILLER PIPE (PEXFL)	322	3
6	INGERSOLL–DRESSER 14MNVI6FR–7L CENTRIFUGAL PUMP	–	3
7	350ø FILLER PIPE (PEXFL)	345	3
8	350ø "UNI–FLANGE"	–	6
9	350ø BALL CHECK VALVE (FLXFL)	792	3
10	350ø GATE VALVE (RISING STEM) C/W HANDWHEEL (FLXFL)	400	3
11	350ø FILLER PIPE (PEXFL)	786	1
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13	350ø FILLER PIPE (PEXFL)	571	1
14	350ø 90° ELBOW (FLXFL)	–	1
15	350ø FILLER PIPE (FLXFL)	723	1
16	450ø X 350ø CONCENTRIC REDUCER (FLXFL)	485	2
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19	500ø X 450ø X 450ø SIDE OUTLET 90° ELBOW C/W BASE (FLXFLXFL)	–	1
20	500ø FABRICATED OFFSET FILLER PIPE (FLXFL)	1597	1
21	500ø FILLER PIPE (FLXFL)	1256	1
22	500ø ROSEMOUNT FLOWMETER	872	1
23	500ø "UNI–FLANGE"	–	1
24	500ø FILLER PIPE (FLXPE)	328	1
25	500ø GATE VALVE (NON–RISING STEM) (FLXFL)	455	1
26	HOLLOW STEEL DRIVE SHAFT	–	3
27	600V, 1200RPM, 75HP, TEFC, VERTICAL MOUNT WESTINGHOUSE ELECTRIC MOTOR	–	3

NOTES:

1. LENGTHS SHOWN FOR PIPING ARE FACE TO FACE AND DO NOT INCLUDE GASKET THICKNESS.
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9. ALL ANCHOR BOLTS NOT SPECIFICALLY IDENTIFIED ARE TYPE 316 SS KWIK BOLT STUD ANCHOR
10. BONDING AGENT IS ACRYL–STIX

AS–CONSTRUCTED

99.06.11

CONTRACT ADMINISTRATION | DRAFTING & GRAPHIC SERVICES | DATE

WATER AND WASTE DEPARTMENT

B.M. ELEV.			
POSTED TO LBIS			
1	AS–CONSTRUCTED	05/99	GMZ
NO.	REVISIONS	DATE	BY

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	
DRAWN BY	MBD	APPROVED BY	
HOR. SCALE	1:40	RELEASED FOR CONSTRUCTION	
VERTICAL			
DATE	1997 11 04	DATE	

ENGINEER'S SEAL
PROVINCE OF MANITOBA
ORIGINAL STAMPED BY
R.D. LOUDFOOT P.ENG.
98/01/19
REGISTERED PROFESSIONAL ENGINEER

PD 98–007
PLOT DATE: 1998 01 13
AUTOCADR12: O:\DRAWINGS\WASTEWTR\SEWPUMP\DARCY1

THE CITY OF WINNIPEG
WORKS AND OPERATIONS DIVISION
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION PUMP REPLACEMENT

SECTION VIEWS

SHEET 2 OF 2

CITY DRAWING NUMBER 4274

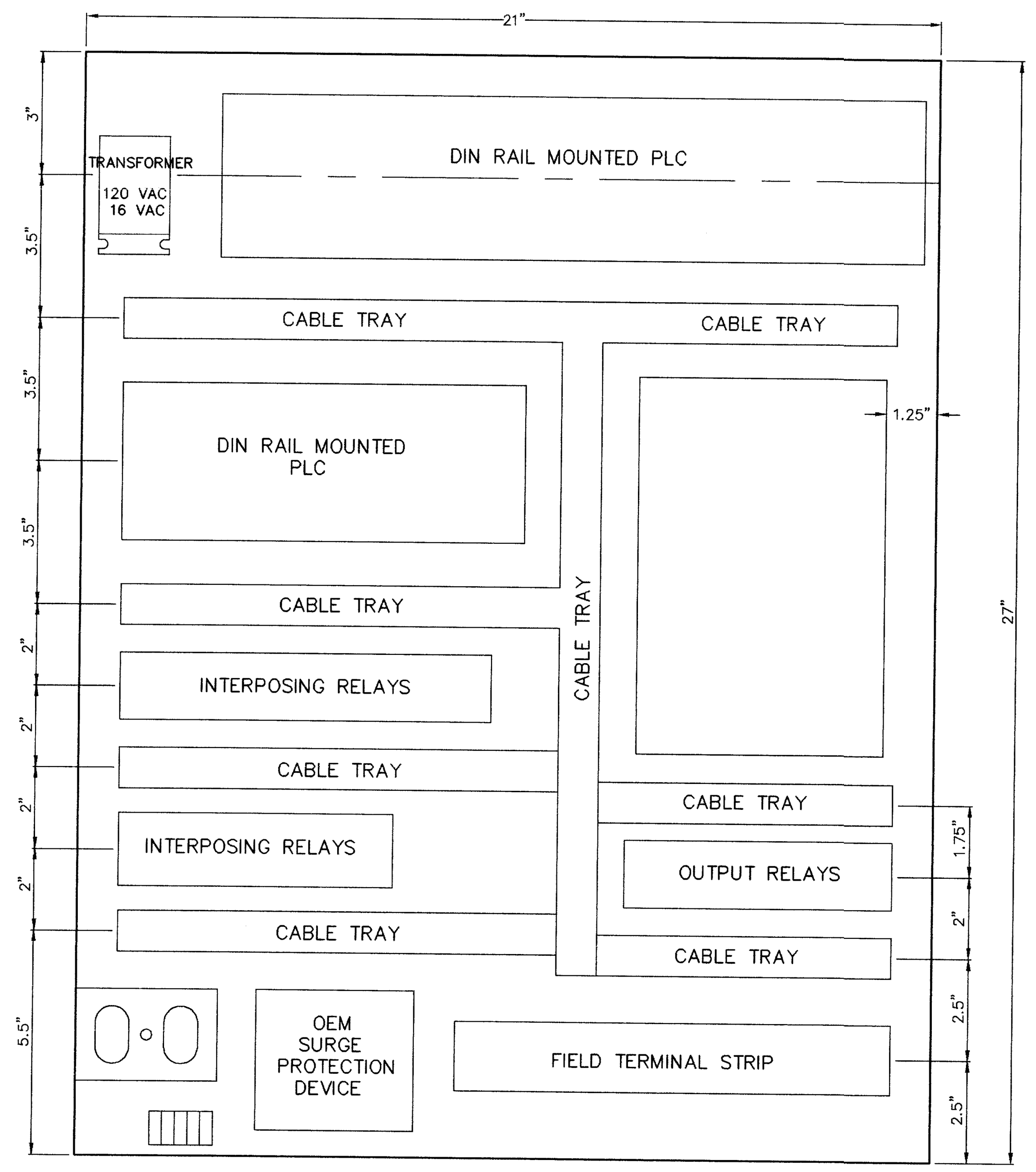
ALARM WIRING TEMPLATE

		PLC ADDRESS	
ALARM INPUT 1	LOCKOUT	10001	BLUE
ALARM INPUT 2	OVERFLOW	10002	BLUE/WHITE
ALARM INPUT 3	STATION FLOOD	10003	BLUE/RED
ALARM INPUT 4	LOW INSTR. AIR	10004	BLUE/BLACK
ALARM INPUT 5	LOW TEMP.	10005	RED
ALARM INPUT 6	LOSS OF SEAL WATER	10006	RED/BLACK
ALARM INPUT 7	GENERATOR RUN	10007	RED/WHITE
ALARM INPUT 8	POWER FAILURE	10008	ORANGE
ALARM INPUT 9	FLOOD STATION HIGH WET WELL	10009	ORANGE/RED
ALARM INPUT 10	FLOOD STATION FLOOD	10010	ORANGE/BLACK
ALARM INPUT 11	GENERATOR FAIL	10011	BLACK
ALARM INPUT 12	WET WELL UPPER	10012	BLACK/WHITE
ALARM INPUT 13	COM/PUMP FAILURE	10013	BLACK/RED
ALARM INPUT 14			GREEN
ALARM INPUT 15			GREEN/BLACK
ALARM INPUT 16			GREEN/WHITE

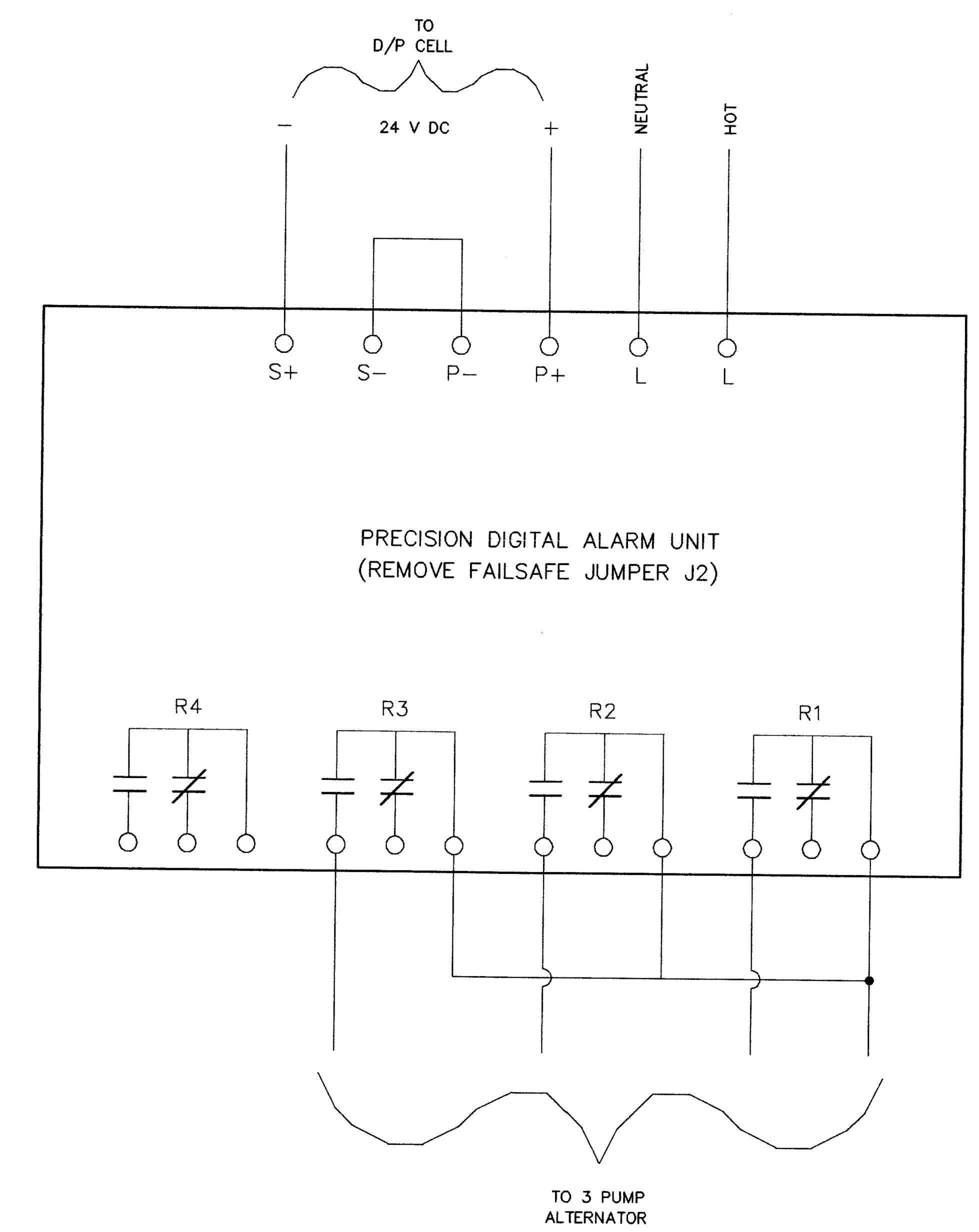
Any other types of alarms are to be wired to alarm inputs 14 through 16. Otherwise call the Metershop for further instructions.

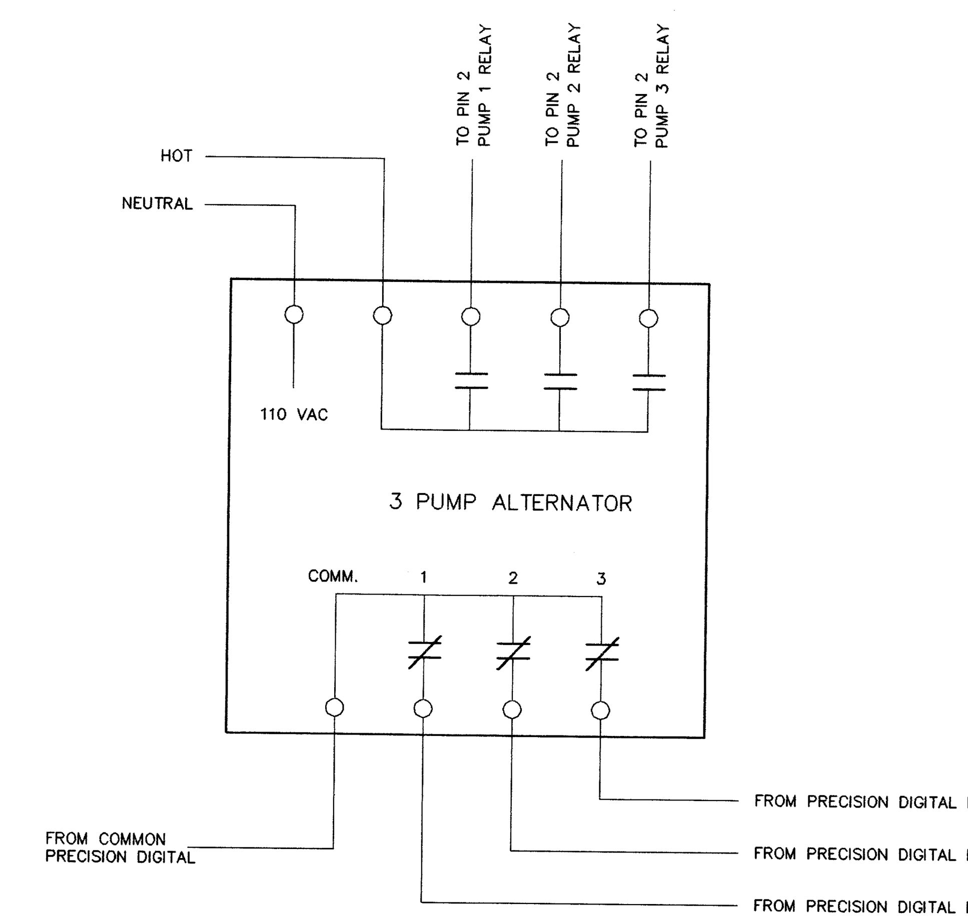
ANALOG WIRING		PLC ADDRESS
INPUT 1	LIFT LEVEL	30001
INPUT 2	FLOOD LEVEL	30002
INPUT 3	FLOW	30003

BACK PANEL LAYOUT

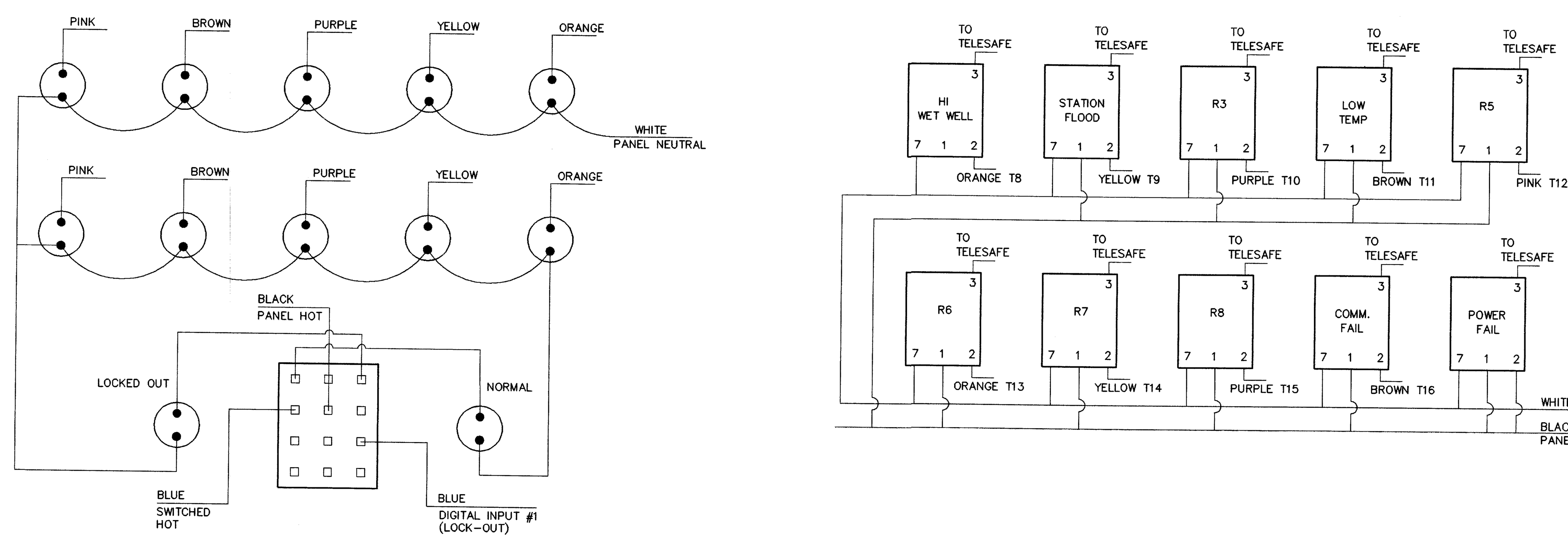


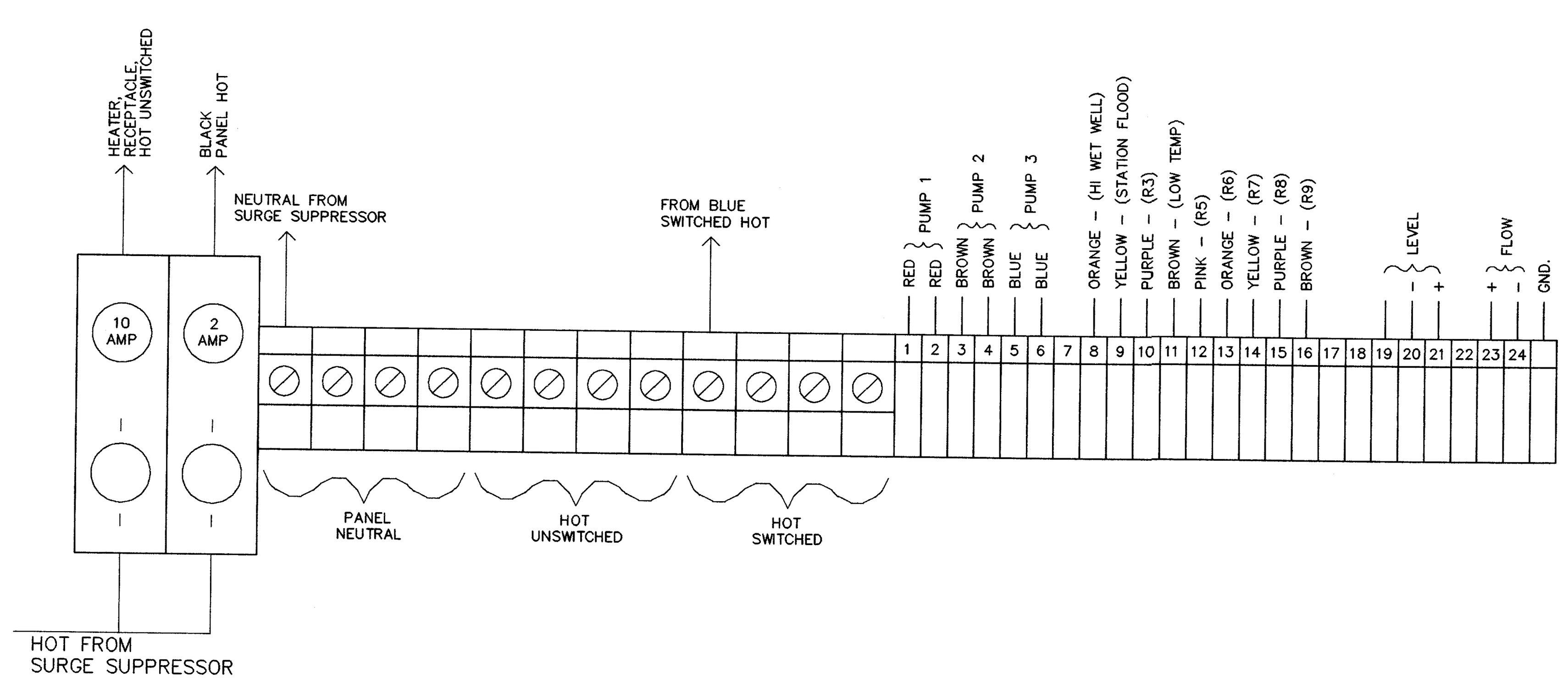
ELECTRICAL DISTRIBUTION LAYOUT



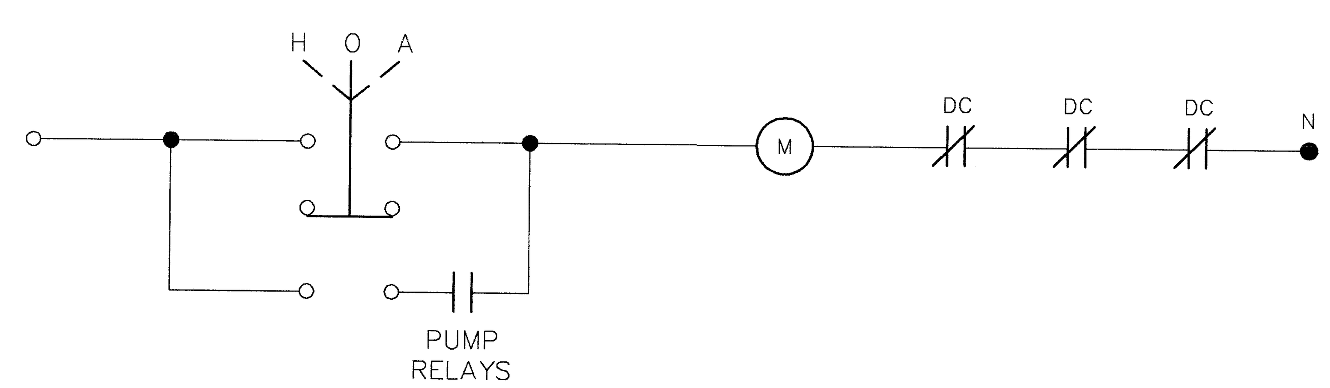


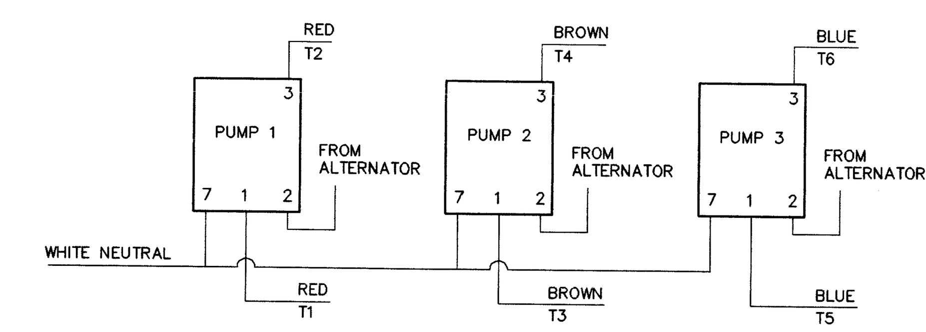
WIRING DIAGRAM





TYPICAL MOTOR STARTER





B.M. ELEV.	FIELD BOOK #
POSTED TO LBIS	

NO.	REVISIONS	DATE	BY

CITY OF WINNIPEG WATER AND WASTE ENGINEERING DIVISION

DESIGNED BY	BS	CHECKED BY	BS
DRAWN BY	TM	APPROVED BY	
HOR. SCALE VERTICAL	N.T.S.	RELEASED FOR CONSTRUCTION	
DATE	1998 02 27	DATE	

ENGINEER'S SEAL

PLOT DATE: 1998 02 27

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

DARCY LIFT STATION

ELECTRICAL AND CONTROL

SHEET OF

CITY DRAWING NUMBER 4317

O:\DRAWINGS\WASTEWTR\SEWPUMP\04317.DWG

O:\DRAWINGS\WASTEWTR\SEWPUMP\4317 Wed Mar 04 09:21:08 1998

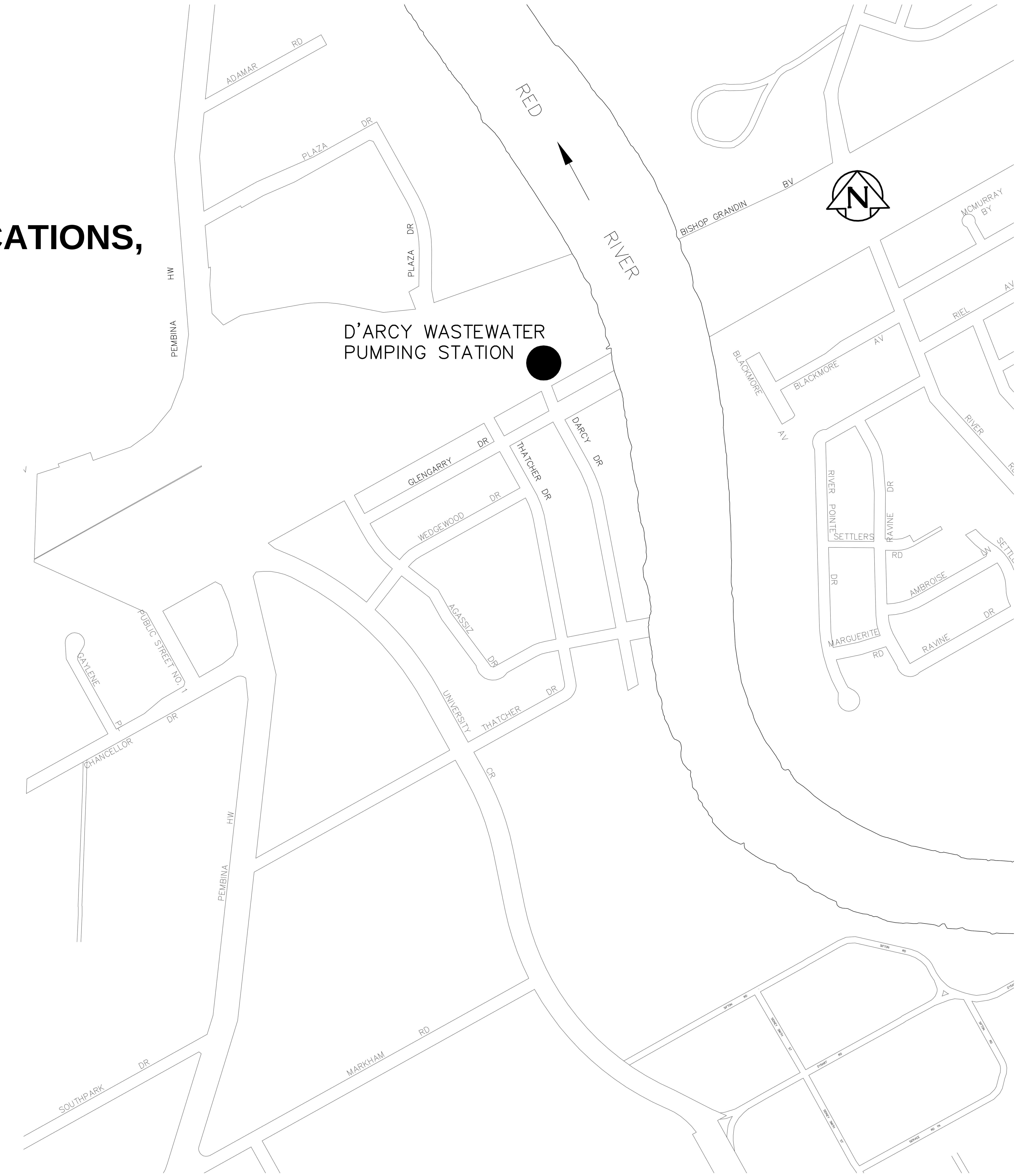
THE CITY OF WINNIPEG

Winnipeg

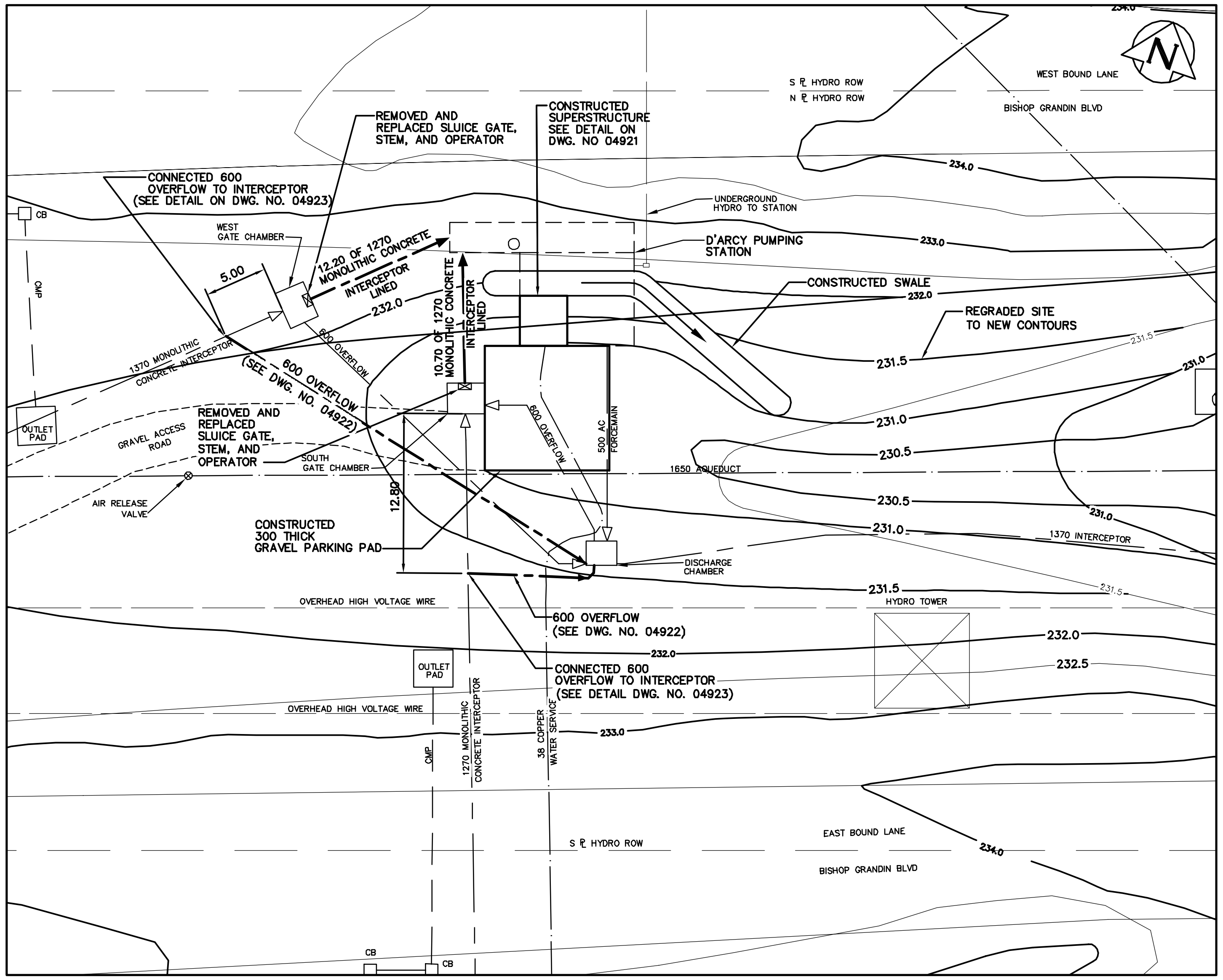
WATER AND WASTE DEPARTMENT
ENGINEERING DIVISION

D'ARCY WASTEWATER PUMPING STATION
BUILDING CONSTRUCTION, GATE CHAMBER MODIFICATIONS, OUTFALL CONSTRUCTION, AND SITE GRADING

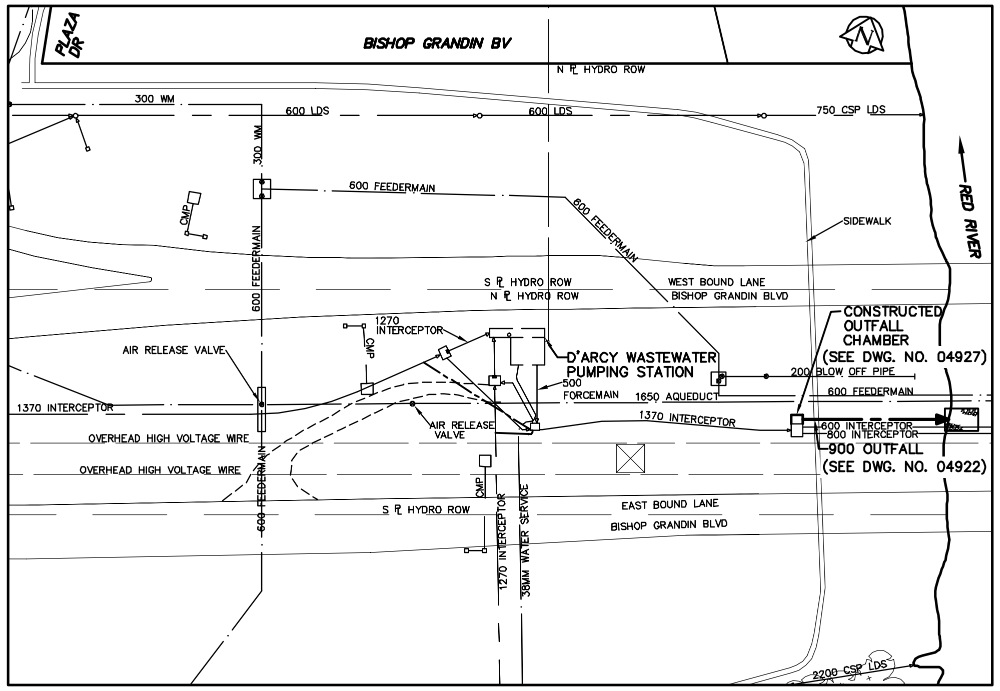
TENDER NO. 0695-2001



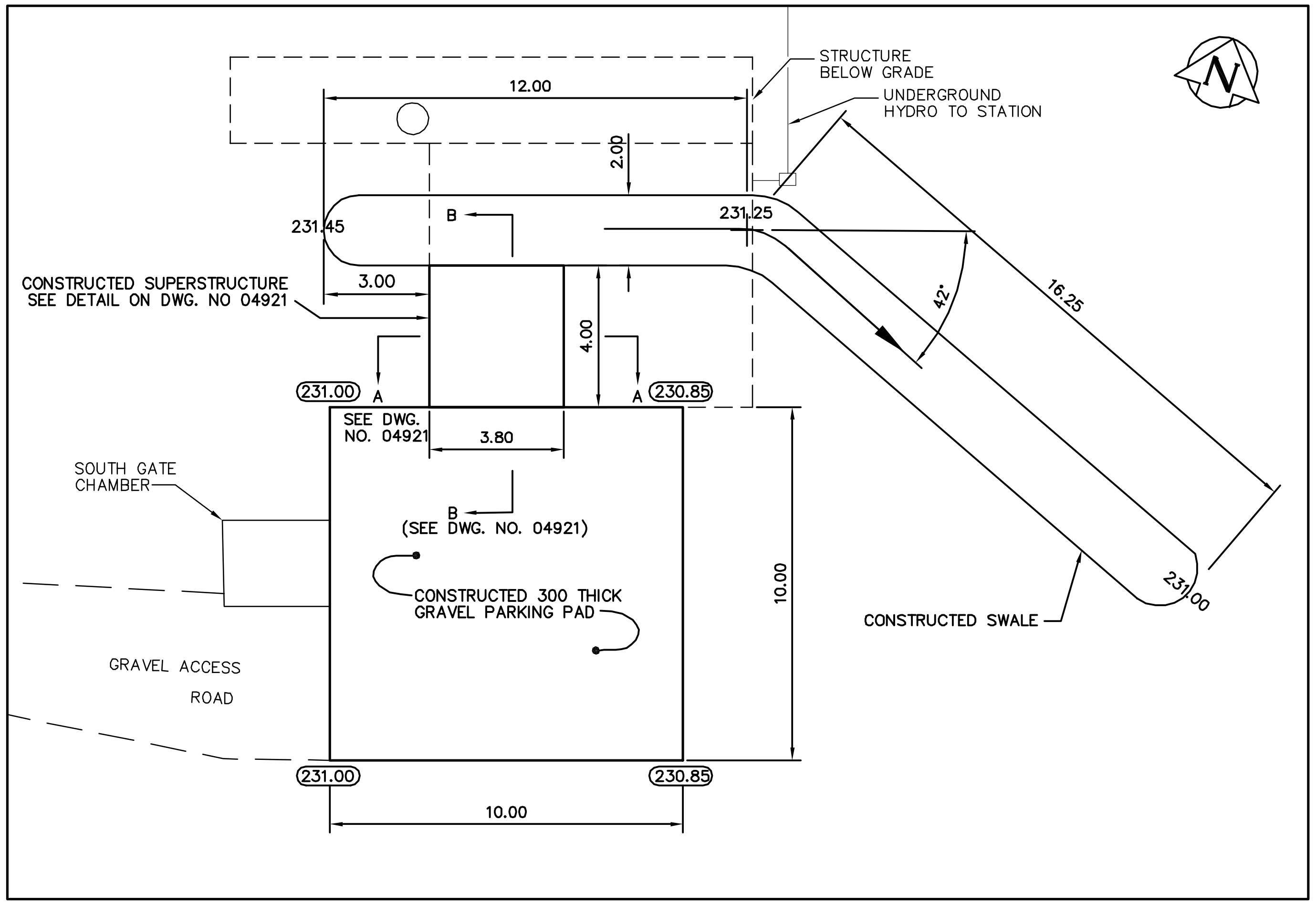
1	04920	LOCATION AND SITE PLANS
2	04921	SUPERSTRUCTURE ELEVATIONS AND DETAILS
3	04922	OVERFLOWS AND OUTFALL – PLAN AND PROFILE
4	04923	PIPE CONNECTION DETAILS
5	04924	WEST GATE CHAMBER MODIFICATIONS
6	04925	SOUTH GATE CHAMBER MODIFICATIONS
7	04926	OUTFALL CHAMBER PLAN VIEWS
8	04927	OUTFALL CHAMBER SECTION VIEWS
9	04928	OUTFALL CHAMBER STRUCTURAL PLANS AND DETAILS
10	04929	OUTFALL CHAMBER REINFORCING DETAILS
11	04930	SUCTION PIPING MODIFICATIONS



SITE PLAN
SCALE 1:250



LOCATION PLAN
SCALE 1:1000



D'ARCY PUMPING STATION, SWALE, AND PARKING PAD
PLAN VIEW
SCALE 1:10

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE FOR D'ARCY WASTEWATER PUMPING STATION WORK: 2005 07 12

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE FOR OUTFALL AND GATE CHAMBER WORK: 2004 01 01

RECORD DRAWING
WATER AND WASTE DEPARTMENT

B.M. ELEV.	FIELD BOOK #:		
POSTED TO LBIS			
1 REVISED TO RECORD DWG.	08.05.30	CJH/WKT	
NO. REVISIONS	DATE	BY	

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	TW
DRAWN BY	WKT	APPROVED BY	
HOR. SCALE	AS	RELEASED FOR CONSTRUCTION	
VERTICAL	SHOWN		
DATE	2001 08 16	DATE	

ENGINEER'S SEAL
ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

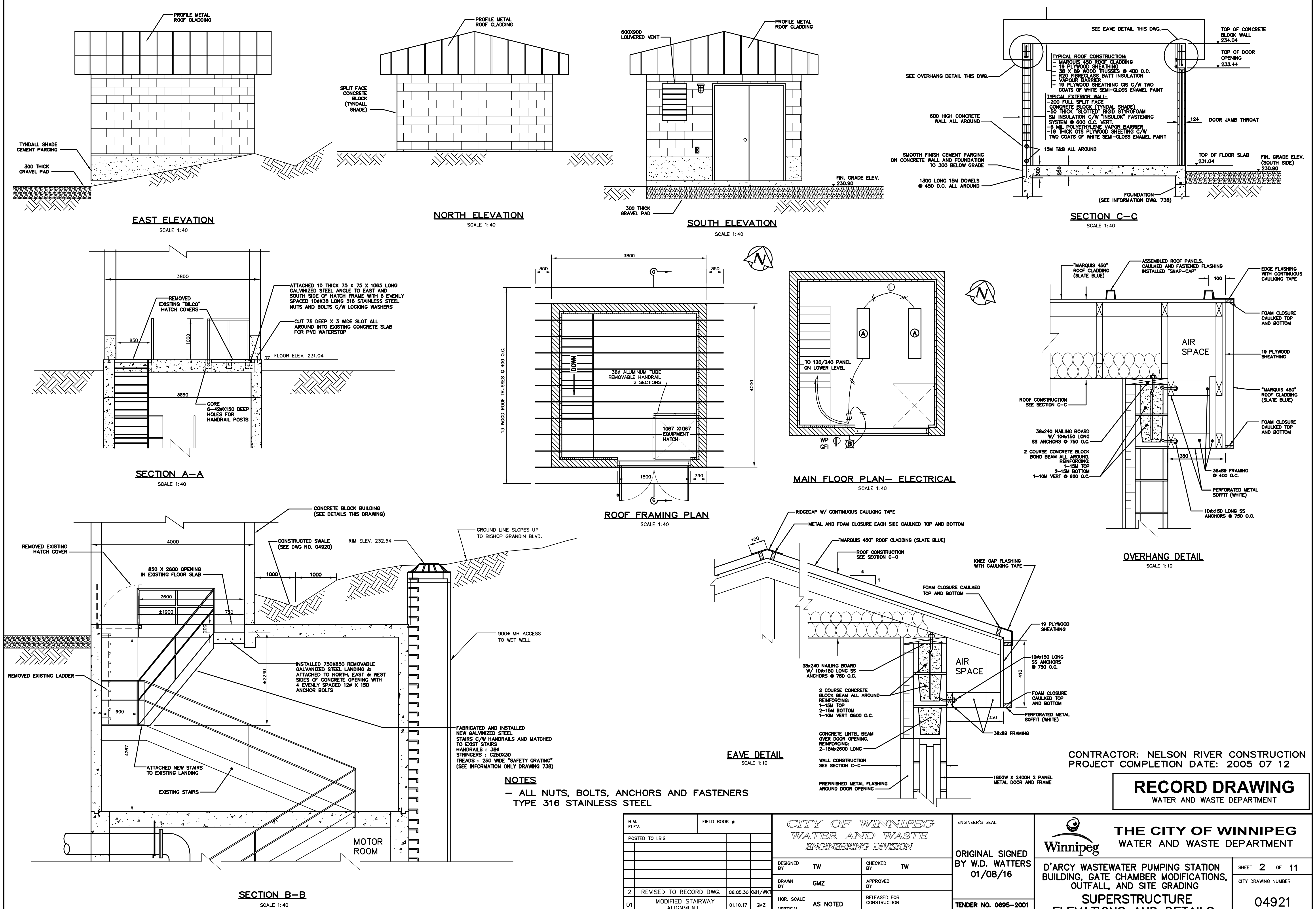
TENDER NO. 0695-2001
AUTOCADR2000: 04920.dwg
PLOT DATE: 2008 06 03

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING

LOCATION AND SITE PLANS

SHEET 1 OF 11
CITY DRAWING NUMBER
04920



NOTES

- ALL NUTS, BOLTS, ANCHORS AND FASTENERS TYPE 316 STAINLESS STEEL

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE: 2005 07 12

RECORD DRAWING
WATER AND WASTE DEPARTMENT

B.M. ELEV.	FIELD BOOK #:		
POSTED TO LBIS			
2	REVISED TO RECORD DWG.	08.05.30	CJH/WKT
01	MODIFIED STAIRWAY ALIGNMENT	01.10.17	GMZ
NO.	REVISIONS	DATE	BY

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	TW
DRAWN BY	GMZ	APPROVED BY	
HOR. SCALE / VERTICAL	AS NOTED	RELEASED FOR CONSTRUCTION	
DATE	2001 08 16	DATE	

ENGINEER'S SEAL

ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

TENDER NO. 0695-2001
AUTOCADR2000: 04921.dwg
PLOT DATE: 2008 06 03

Winnipeg

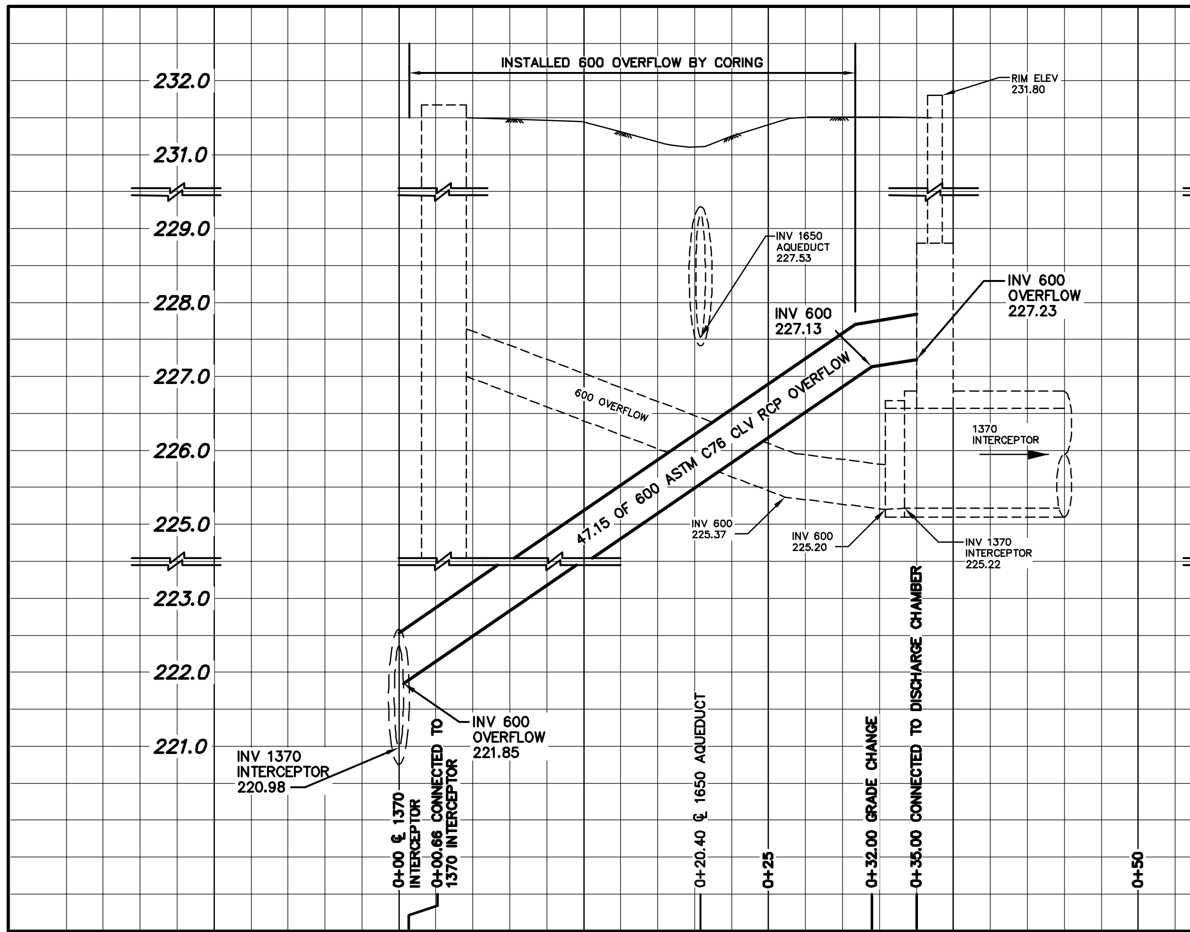
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

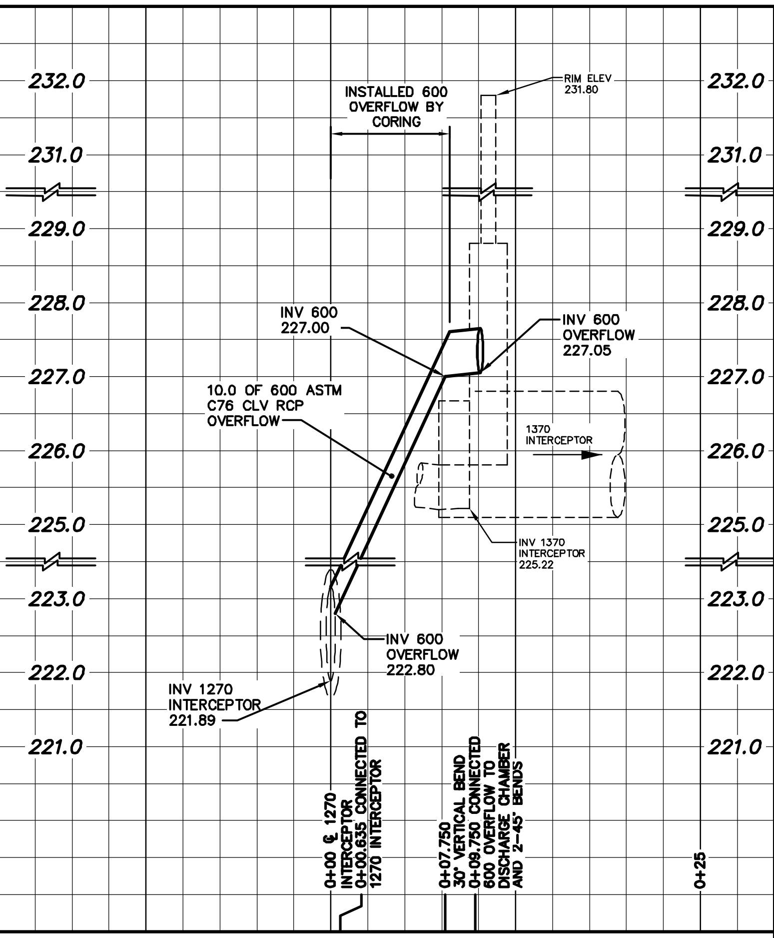
D'ARCY WASTEWATER PUMPING STATION
BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING

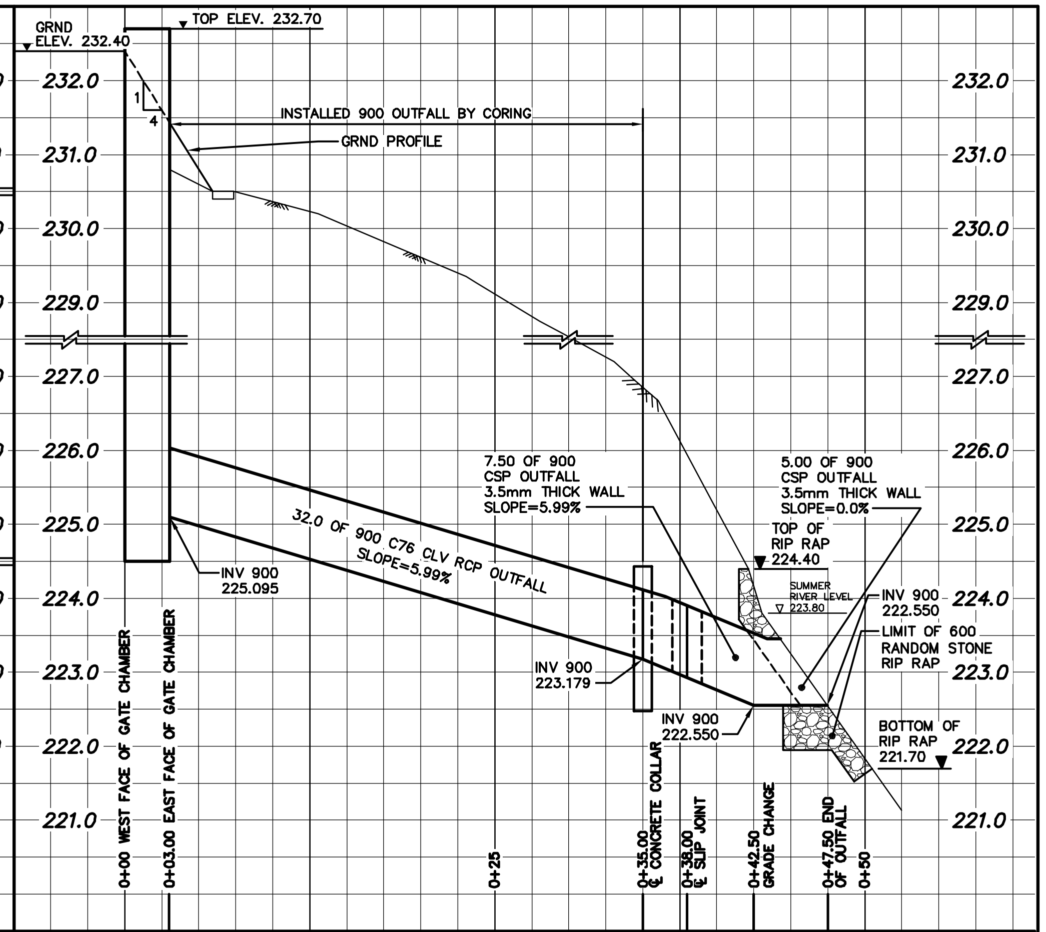
SUPERSTRUCTURE
ELEVATIONS AND DETAILS

SHEET 2 OF 11

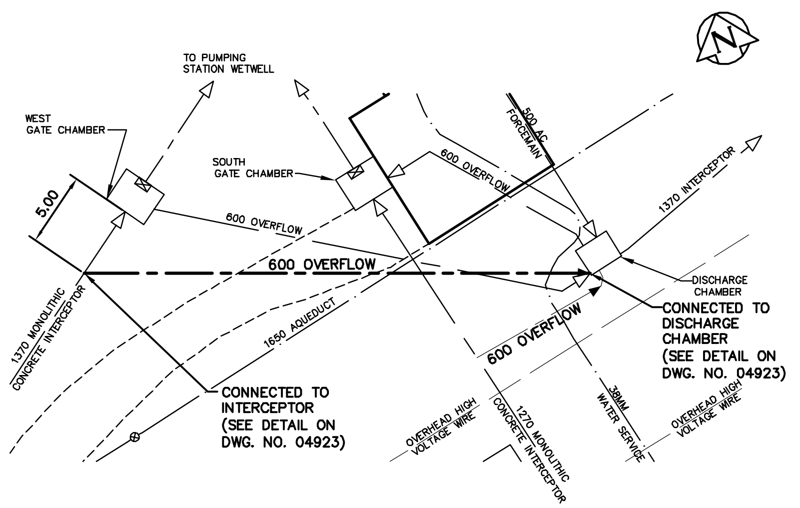
CITY DRAWING NUMBER
04921



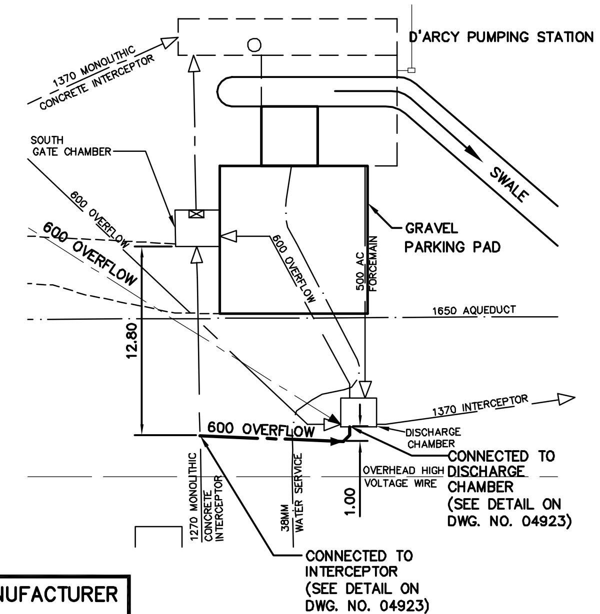




NOTE: CHAINAGE ALONG ℄ OF 600 OVERFLOW PIPE

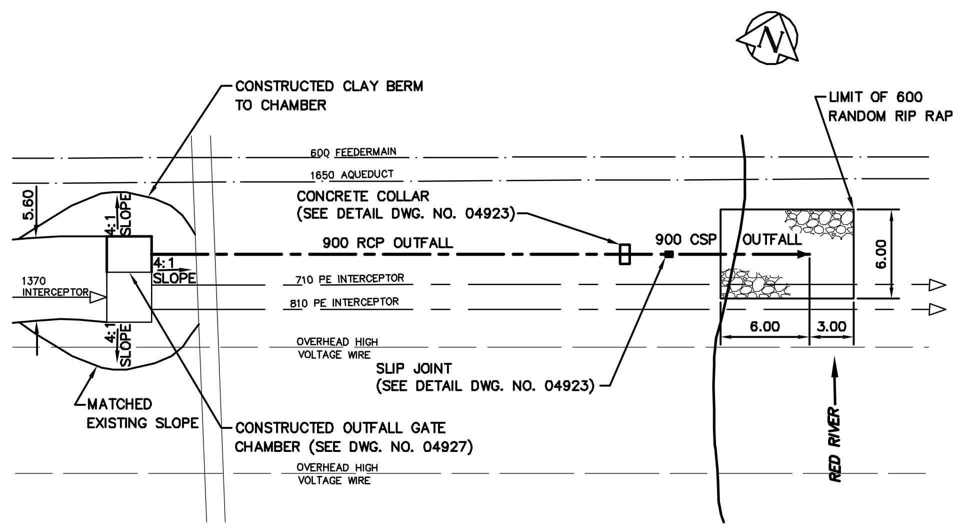


NOTE: CHAINAGE ALONG ℄ OF 600 OVERFLOW PIPE



NO MATERIAL MANUFACTURER INFORMATION AVAILABLE

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE FOR D'ARCY WASTEWATER PUMPING STATION WORK: 2005 07 12



CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE FOR OUTFALL AND GATE CHAMBER WORK: 2004 01 01

RECORD DRAWING
WATER AND WASTE DEPARTMENT

B.M. ELEV.		FIELD BOOK #:	
POSTED TO LBIS			
1	REVISED TO RECORD DWG.	08.05.30	CJH/WKT
NO.	REVISIONS	DATE	BY

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	TW
DRAWN BY	WKT	APPROVED BY	
HOR. SCALE	1:250	RELEASED FOR CONSTRUCTION	
VERTICAL	1:50		
DATE	2001 08 16	DATE	

ENGINEER'S SEAL

ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

TENDER NO. 0695-2001
AUTOCADR2000: 04922.dwg
PLOT DATE: 2008 06 03

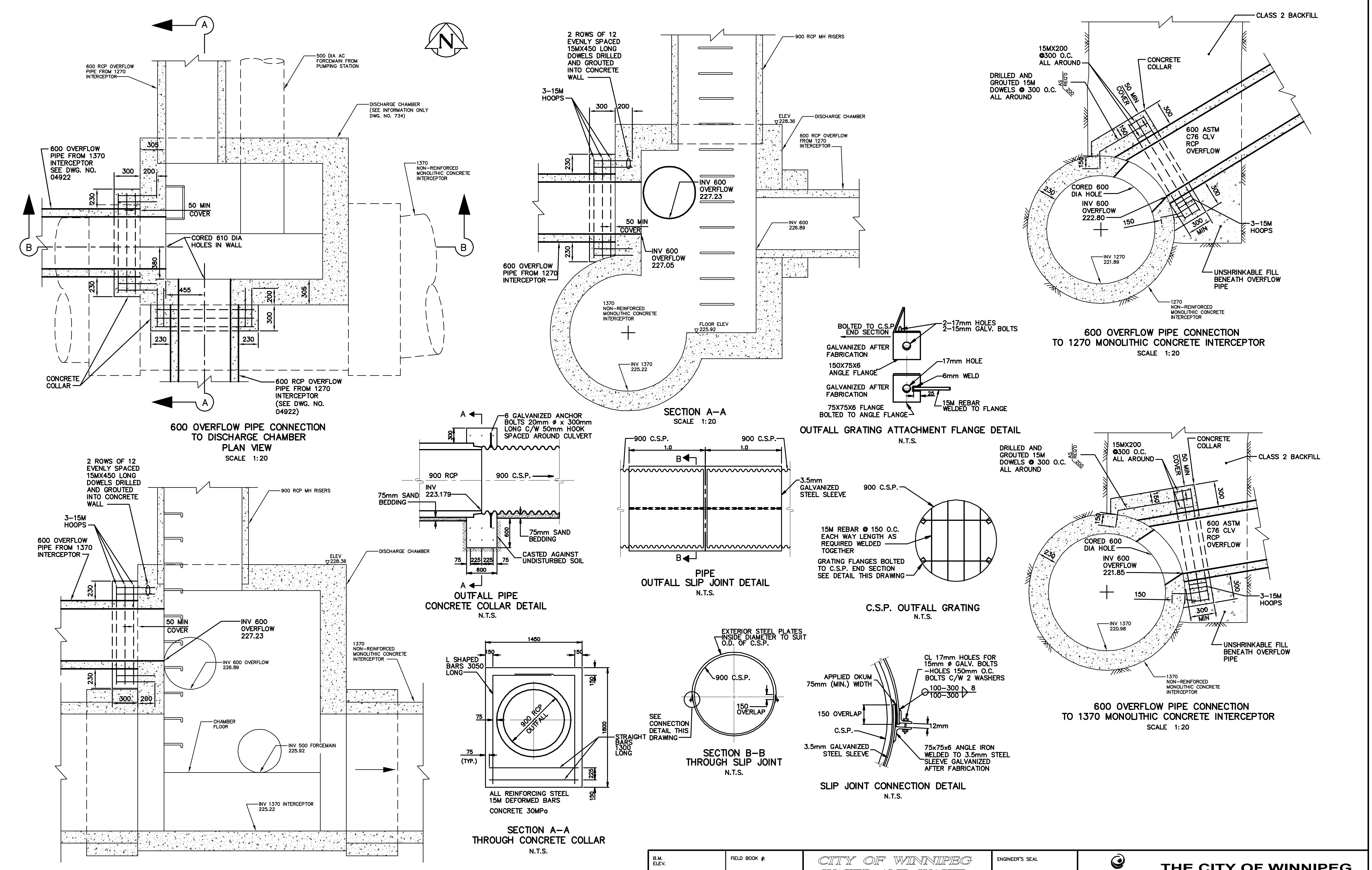
Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING

OVERFLOWS AND OUTFALL PLAN AND PROFILE

SHEET 3 OF 11

CITY DRAWING NUMBER 04922



SECTION B–B
SCALE 1:20

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE:
D'ARCY PUMPING STATION WORK 2005 07 12
OUTFALL & GATE CHAMBER WORK 2004 01 01

RECORD DRAWING
WATER AND WASTE DEPARTMENT

B.M. ELEV.	FIELD BOOK #:		
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1	REVISED TO RECORD DWG.	08.05.30	CJH/WKT
NO.	REVISIONS	DATE	BY

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	TW
DRAWN BY	WKT	APPROVED BY	
HOR. SCALE	AS	RELEASED FOR CONSTRUCTION	
VERTICAL	SHOWN		
DATE	2001 08 16	DATE	

ENGINEER'S SEAL
ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

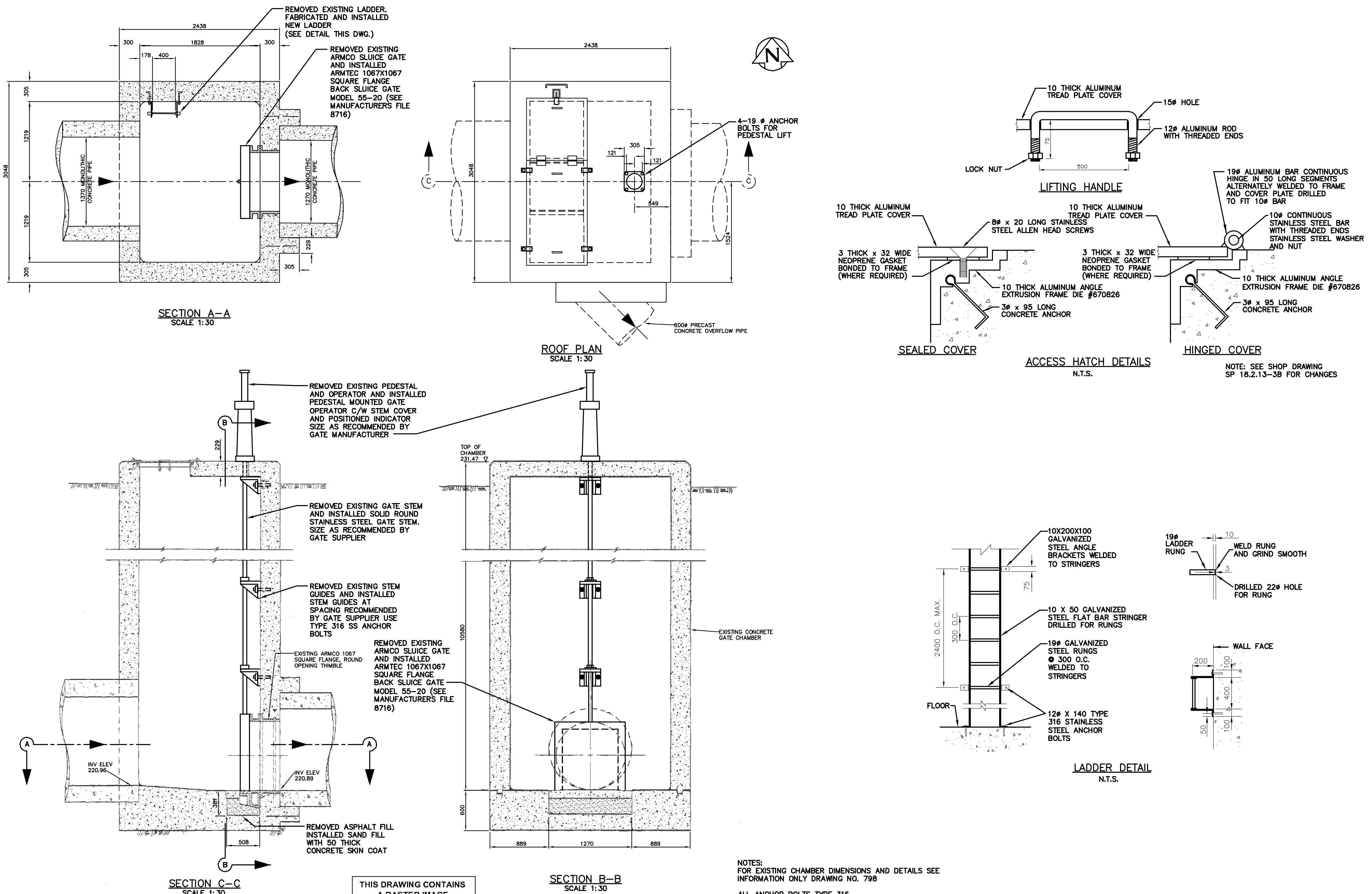
TENDER NO. 0695-2001
AUTOCADR2000: 04923.dwg
PLOT DATE: 2008 06 03

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING

PIPE CONNECTION DETAILS

SHEET 4 OF 11
CITY DRAWING NUMBER
04923



THIS DRAWING CONTAINS A RASTER IMAGE
FILENAME:
04924_798SECEE.tif

NOTES:
FOR EXISTING CHAMBER DIMENSIONS AND DETAILS SEE INFORMATION ONLY DRAWING NO. 798

ALL ANCHOR BOLTS TYPE 316 STAINLESS STEEL

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE: 2005 07 12

RECORD DRAWING
WATER AND WASTE DEPARTMENT

NO.	REVISIONS	DATE	BY
1	REVISED TO RECORD DWG.	08.06.02	CJH/WKT

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CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	TW
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HOR. SCALE	AS SHOWN	RELEASED FOR CONSTRUCTION	
VERTICAL			
DATE	2001 08 16	DATE	

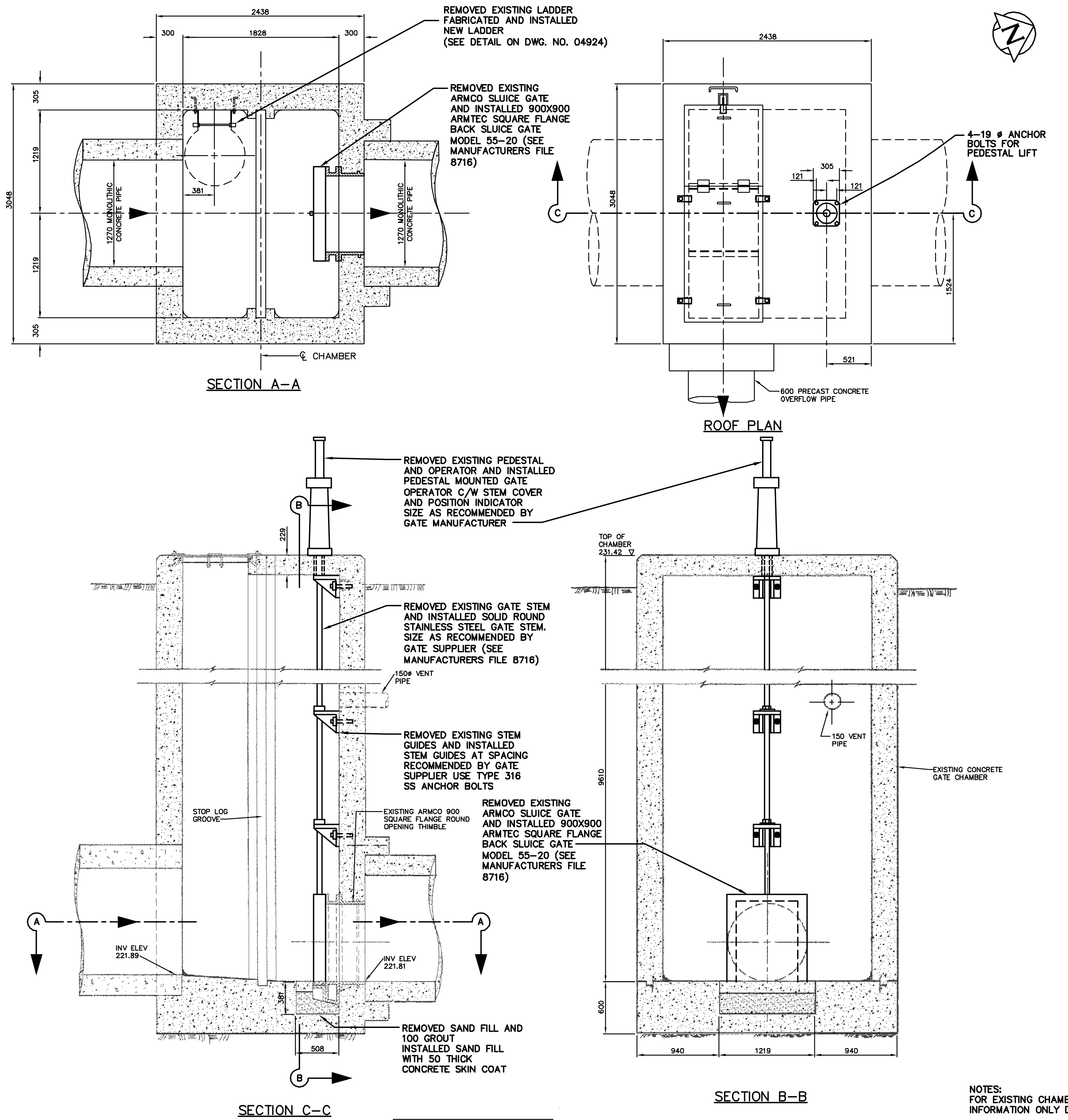
ENGINEER'S SEAL
ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

TENDER NO. 0695-2001
AUTOCADR2000: 04924.dwg
PLOT DATE: 2008 06 03

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING
WEST
GATE CHAMBER MODIFICATIONS

SHEET 5 OF 11
CITY DRAWING NUMBER
04924



NOTES:
FOR EXISTING CHAMBER DIMENSIONS AND DETAILS SEE INFORMATION ONLY DRAWING NO. 733

ALL ANCHOR BOLTS TYPE 316 STAINLESS STEEL

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CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE: 2005 07 12

RECORD DRAWING
WATER AND WASTE DEPARTMENT

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WATER AND WASTE
ENGINEERING DIVISION

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HOR. SCALE	1:30	RELEASED FOR CONSTRUCTION	
VERTICAL			
DATE	2001 08 16	DATE	

ENGINEER'S SEAL

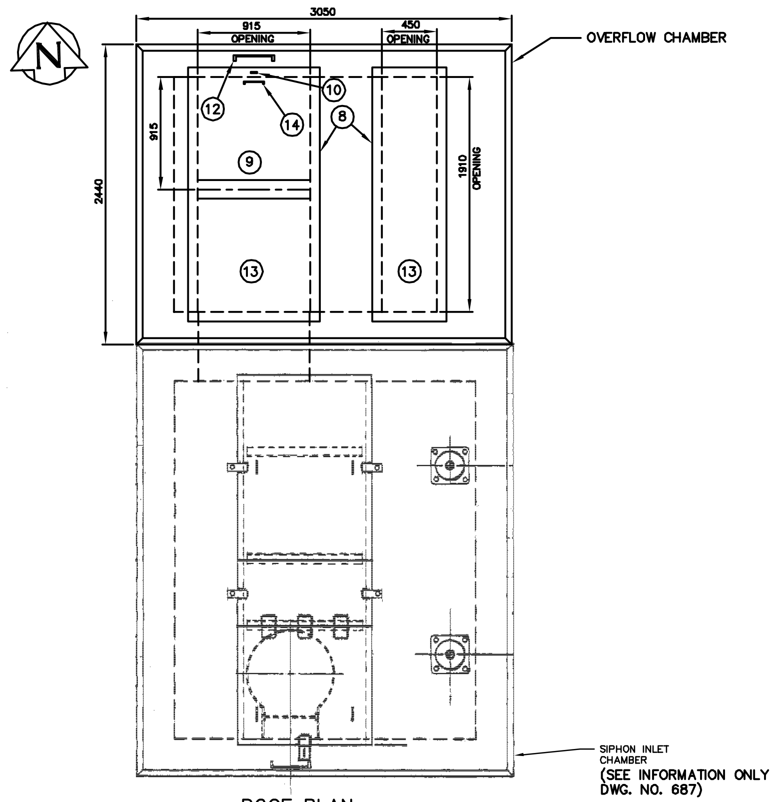
ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

TENDER NO. 0695–2001
AUTOCADR2000: 04925.dwg
PLOT DATE: 2008 06 03

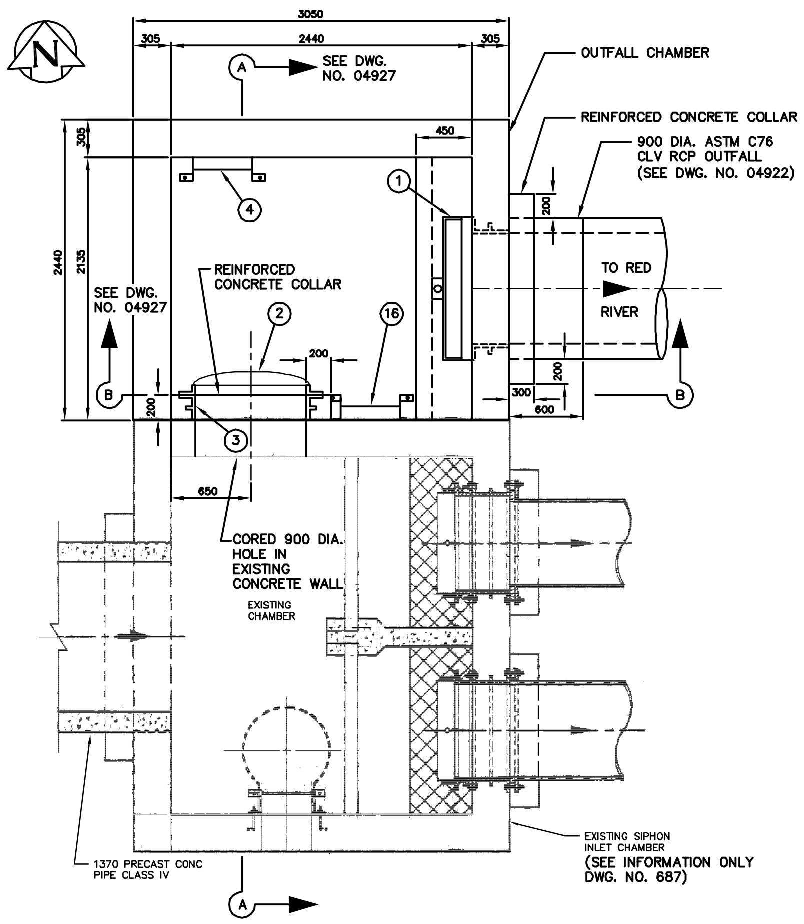
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING
SOUTH
GATE CHAMBER MODIFICATIONS

SHEET 6 OF 11
CITY DRAWING NUMBER
04925



ROOF PLAN



PLAN VIEW ELEV 227.20

LIST OF MATERIALS

NO.	DESCRIPTION	LENGTH	QUANTITY
1.	900X900 STAINLESS STEEL SLUICE GATE FONTAINE SERIES 20 MODEL 204 C/W MODEL F–2 STAINLESS STEEL WALL THIMBLE		1
2.	900ø ARMTEC MODEL 20C CI FLAP GATE WITH BRONZE SEATING FACES		1
3.	900ø CI ROUND FLANGE ROUND OPENING ARMTEC TYPE "F" WALL THIMBLE		1
4.	FABRICATED GALVANIZED STEEL LADDER (RUNGS @ 300 O.C.)	7785	1
5.	STAINLESS STEEL STEM GUIDE C/W UHMWPE BUSHING		AS REQ'D
6.	SOLID ROUND STAINLESS STEEL VALVE STEM	AS REQ'D	1
7.	PEDESTAL MOUNTED GATE OPERATOR C/W STEM COVER AND POSITION INDICATOR (FONTAINE TYPE MNEP)		1
8.	ALUMINUM ANGLE EXTRUSION (DIE #670826) FRAME C/W CONC. ANCHORS @ 300 O.C.	AS REQ'D	2
9.	10 THICK ALUMINUM TREAD PLATE COVER C/W 3 THICK X 32 WIDE NEOPRENE GASKET BONDED TO ANGLE FRAME	AS REQ'D	1
10.	50 X 38 X 10 ALUMINUM BAR C/W 15ø HOLE FOR PADLOCK		1
11.	100 X 64 X 6 ALUMINUM SUPPORT CHANNEL	915	1
12.	19ø CONTINUOUS ALUMINUM HINGE C/W 10ø REMOVABLE STAINLESS STEEL PIN	1005	1
13.	10 THICK ALUMINUM TREAD PLATE COVER C/W 3 THICK X 32 WIDE NEOPRENE GASKET BONDED TO ANGLE FRAME AND 8ø X 20 LONG FLAT HEAD SCREWS @ 450 O.C. MAX.	AS REQ'D	2
	12ø ALUMINUM ROD LIFTING HANDLE		1
	FABRICATED ALUMINUM HANDHOLD C/W 12ø X 140 LONG ANCHOR BOLTS	300	1
	FABRICATED STEEL LADDER		1

NOTES:

- SEE DRAWING 04920 FOR CHAMBER LOCATION
- ALL ALUMINUM MATERIAL 6351–T6
- ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE TREATED WITH TWO COATS OF ALKALI RESISTANT BITUMINOUS PAINT
- ALL UNIDENTIFIED NUTS, BOLTS AND ANCHORS TYPE 316 STAINLESS STEEL

THIS DRAWING CONTAINS A RASTER IMAGE FILENAME: 04926_687SEC.tif

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE: 2004 01 01

RECORD DRAWING
WATER AND WASTE DEPARTMENT

B.M. ELEV.
FIELD BOOK #:
POSTED TO LBIS

NO.	REVISIONS	DATE	BY
1	REVISED TO RECORD DWG.	08.04.14	CJH

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY TW — CHECKED BY TW
DRAWN BY WKT — APPROVED BY
HOR. SCALE 1:30 — RELEASED FOR CONSTRUCTION
VERTICAL
DATE 2001 08 16 — DATE

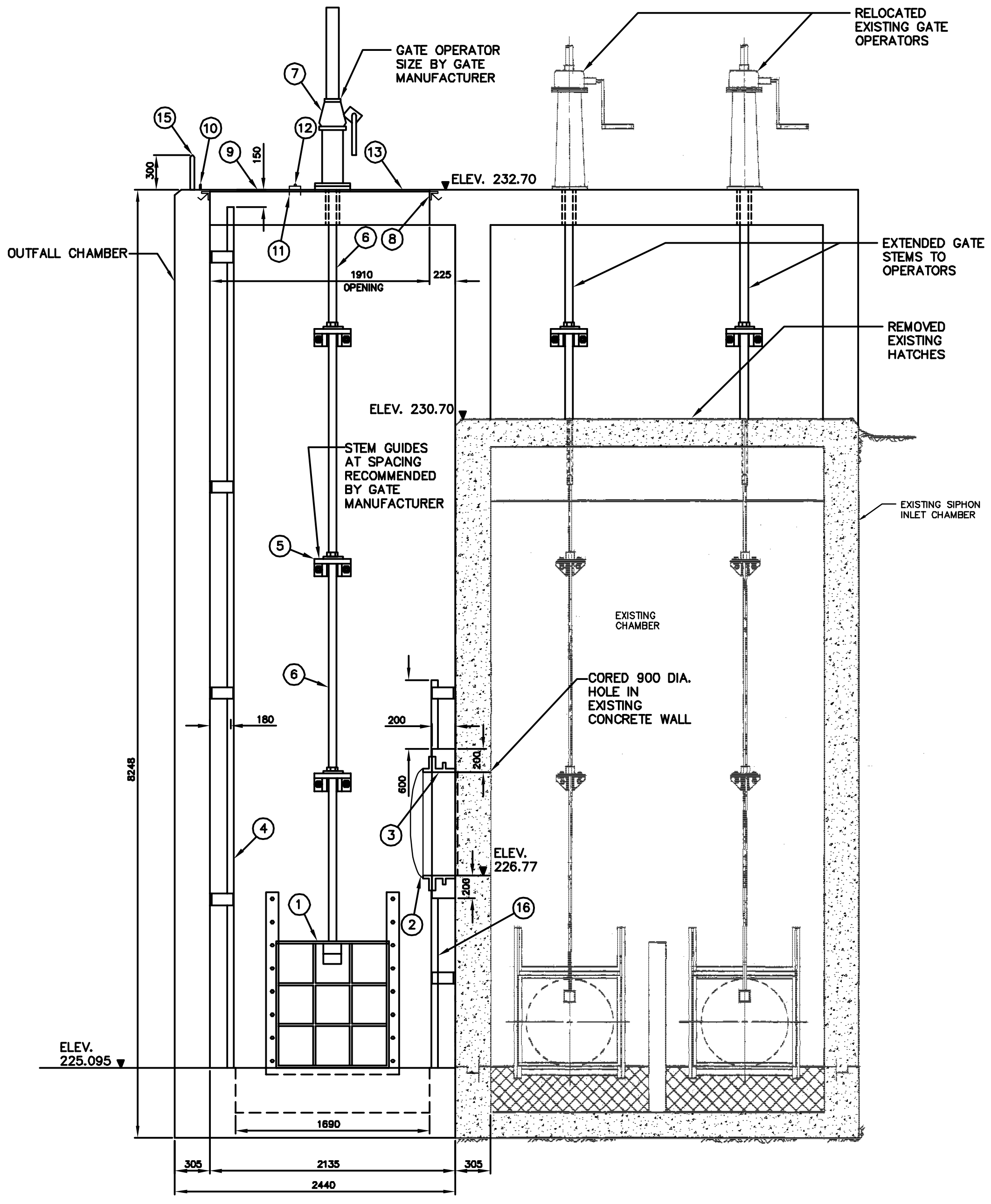
ENGINEER'S SEAL
ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

TENDER NO. 0695–2001
AUTOCADR2000: 04926.dwg
PLOT DATE: 2008 06 03

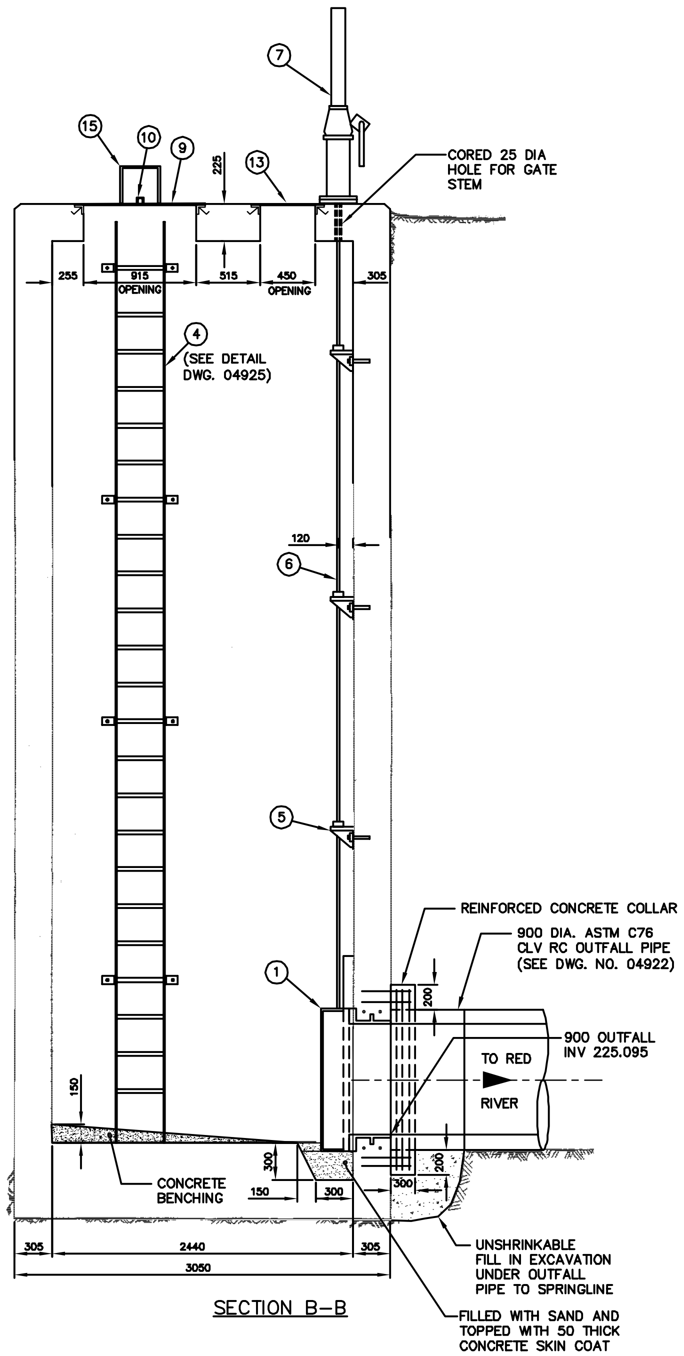
Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING
OUTFALL CHAMBER
PLAN VIEWS

SHEET 7 OF 11
CITY DRAWING NUMBER
04926



SECTION A–A



SECTION B–B

LIST OF MATERIALS

NO.	DESCRIPTION	LENGTH	QUANTITY
1.	900X900 STAINLESS STEEL SLUICE GATE FONTAINE SERIES 20 MODEL 204 C/W MODEL F–2 STAINLESS STEEL WALL THIMBLE		1
2.	900ø ARMTEC MODEL 20C CI FLAP GATE WITH BRONZE SEATING FACES		1
3.	900ø CI ROUND FLANGE ROUND OPENING ARMTEC TYPE "F" WALL THIMBLE		1
4.	FABRICATED GALVANIZED STEEL LADDER (RUNGS @ 300 O.C.)	7785	1
5.	STAINLESS STEEL STEM GUIDE C/W UHMWPE BUSHING		AS REQ'D
6.	SOLID ROUND STAINLESS STEEL VALVE STEM	AS REQ'D	1
7.	PEDESTAL MOUNTED GATE OPERATOR C/W STEM COVER AND POSITION INDICATOR (FONTAINE TYPE MNEP)		1
8.	ALUMINUM ANGLE EXTRUSION (DIE #670826) FRAME C/W CONC. ANCHORS @ 300 O.C.	AS REQ'D	2
9.	10 THICK ALUMINUM TREAD PLATE COVER C/W 3 THICK X 32 WIDE NEOPRENE GASKET BONDED TO ANGLE FRAME	AS REQ'D	1
10.	50 X 38 X 10 ALUMINUM BAR C/W 15ø HOLE FOR PADLOCK		1
11.	100 X 64 X 6 ALUMINUM SUPPORT CHANNEL	915	1
12.	19ø CONTINUOUS ALUMINUM HINGE C/W 10ø REMOVABLE STAINLESS STEEL PIN	1005	1
13.	10 THICK ALUMINUM TREAD PLATE COVER C/W 3 THICK X 32 WIDE NEOPRENE GASKET BONDED TO ANGLE FRAME AND 8ø X 20 LONG FLAT HEAD SCREWS @ 450 O.C. MAX.	AS REQ'D	2
14.	12ø ALUMINUM ROD LIFTING HANDLE		1
15.	FABRICATED ALUMINUM HANDHOLD C/W 12ø X 140 LONG ANCHOR BOLTS	300	1
16.	FABRICATED STEEL LADDER		1

NOTES:

- SEE DRAWING 04920 FOR CHAMBER LOCATION
- ALL ALUMINUM MATERIAL 6351–T6
- ALL ALUMINUM SURFACES IN CONTACT WITH CONCRETE TREATED WITH TWO COATS OF ALKALI RESISTANT BITUMINOUS PAINT
- ALL UNIDENTIFIED NUTS, BOLTS AND ANCHORS TYPE 316 STAINLESS STEEL
- SEE DRAWING NO. 04928 AND 04929 FOR REINFORCING

THIS DRAWING CONTAINS
A RASTER IMAGE
FILENAME:
04927_687SEC.tif

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE: 2004 01 01

RECORD DRAWING
WATER AND WASTE DEPARTMENT

B.M. ELEV. — FIELD BOOK #:
POSTED TO LBIS

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1	REVISED TO RECORD DWG.	08.06.02	CJH/WKT

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	TW	CHECKED BY	TW
DRAWN BY	WKT	APPROVED BY	
HOR. SCALE	1:30	RELEASED FOR CONSTRUCTION	
VERTICAL			
DATE	2001 08 16	DATE	

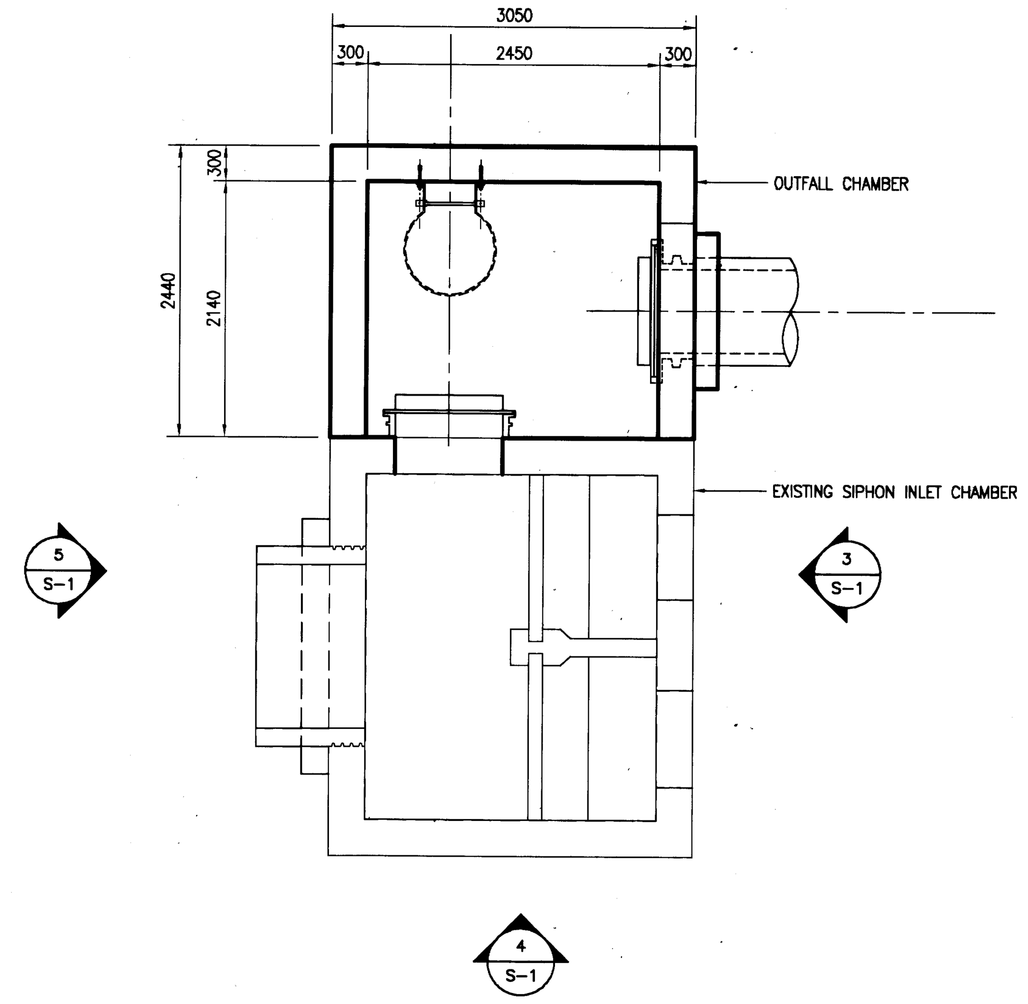
ENGINEER'S SEAL
ORIGINAL SIGNED
BY W.D. WATTERS
01/08/16

TENDER NO. 0695–2001
AUTOCADR2000: 04927.dwg
PLOT DATE: 2008 06 03

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION
BUILDING, GATE CHAMBER MODIFICATIONS,
OUTFALL, AND SITE GRADING
OUTFALL CHAMBER
SECTION VIEWS

SHEET 8 OF 11
CITY DRAWING NUMBER
04927



1 S-1 FLOOR PLAN
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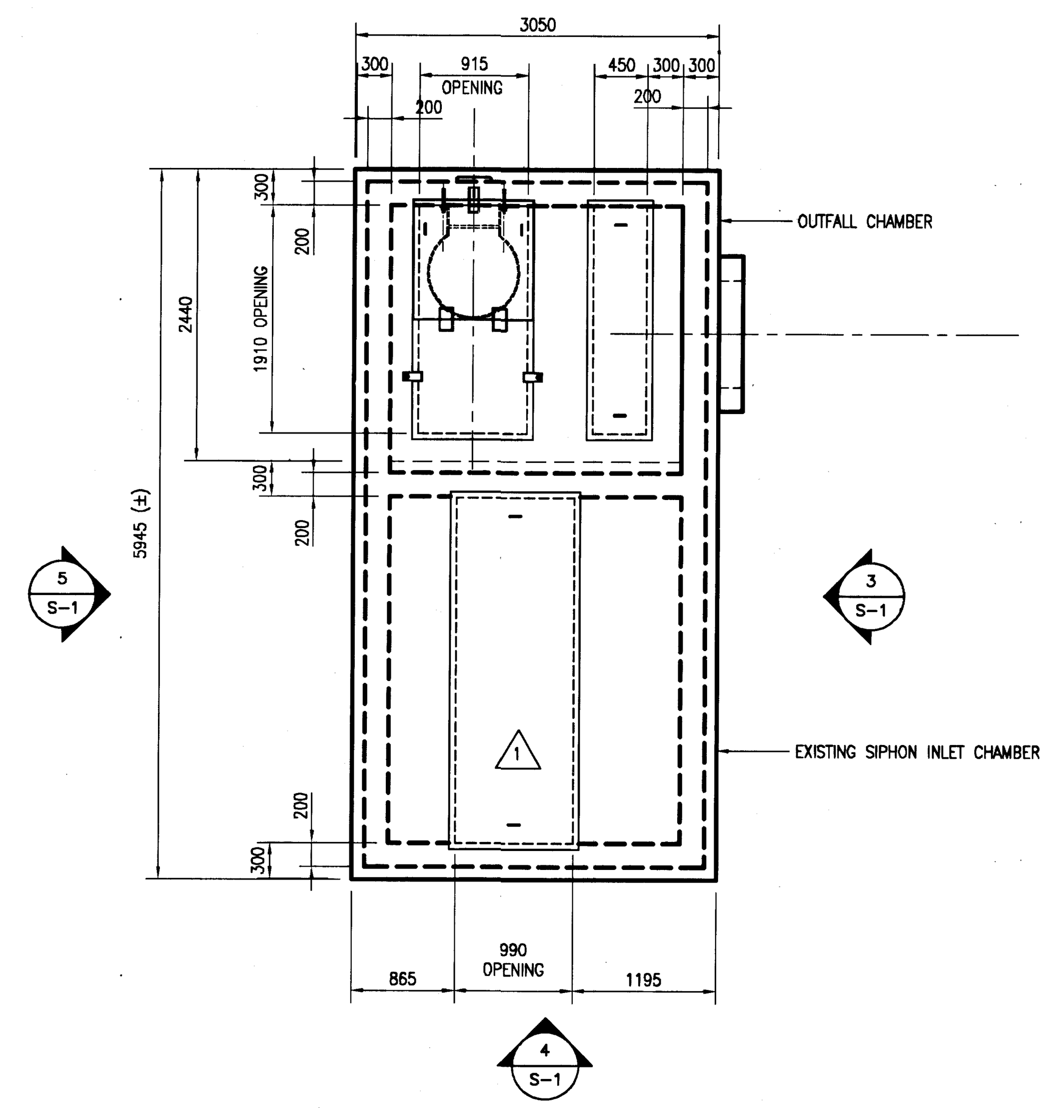
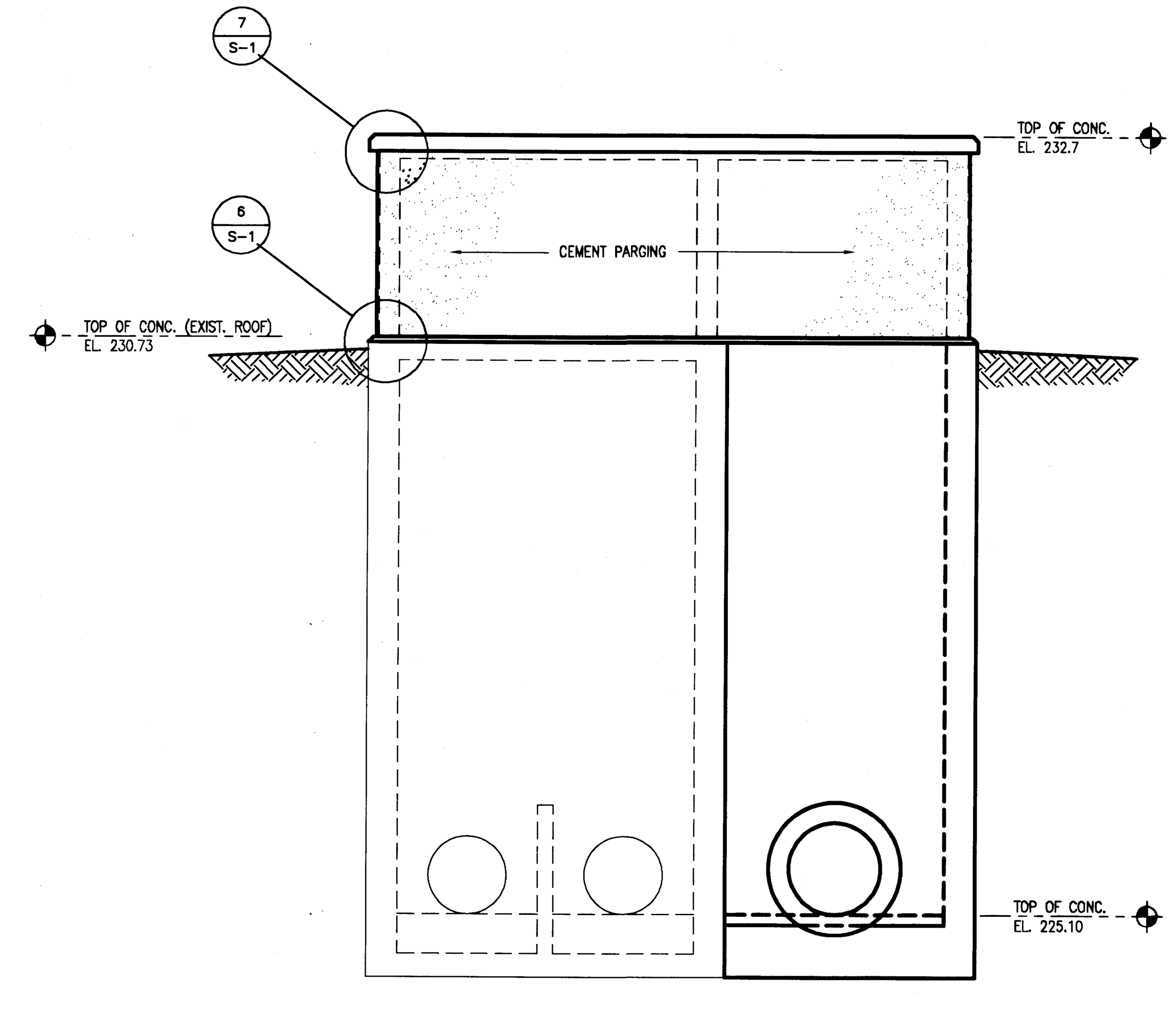
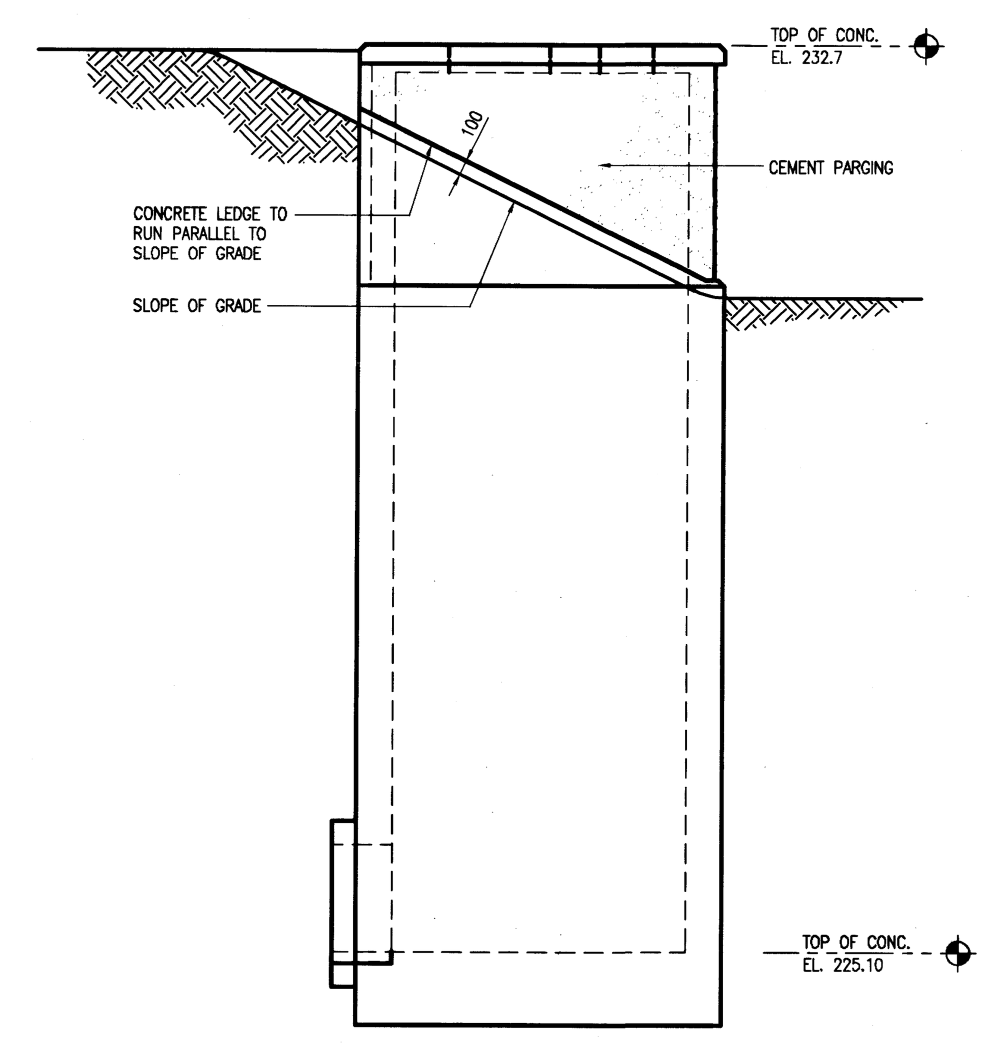


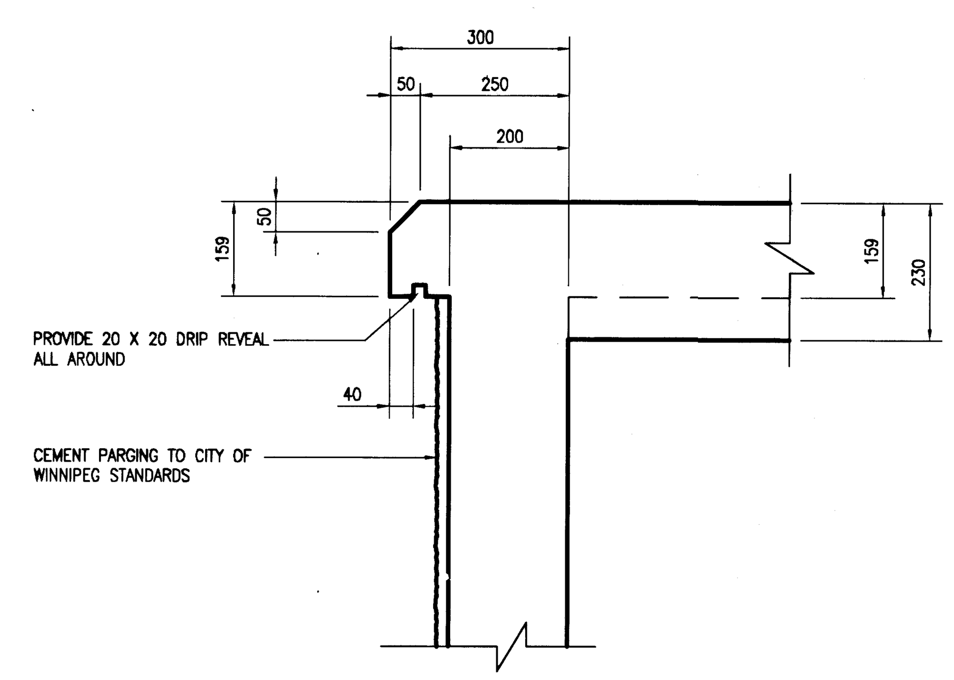
2 S-1 TOP VIEW
SCALE: 1:50



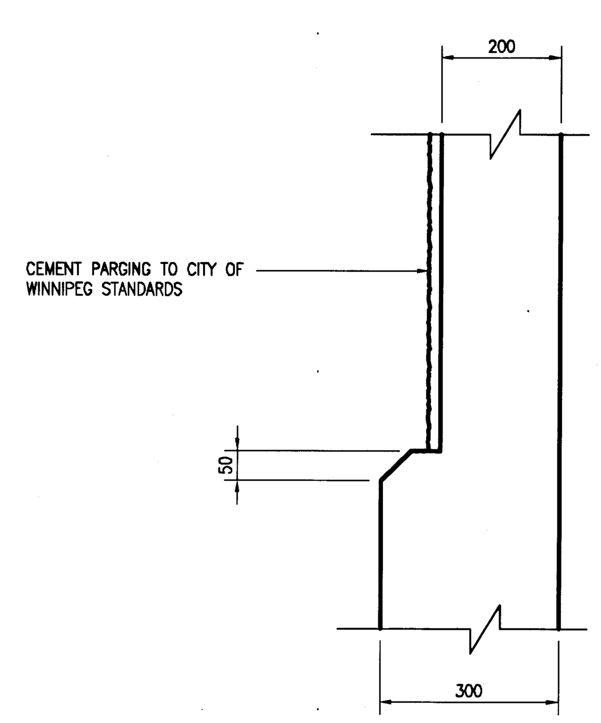
3 S-1 ELEVATION
SCALE: 1:50



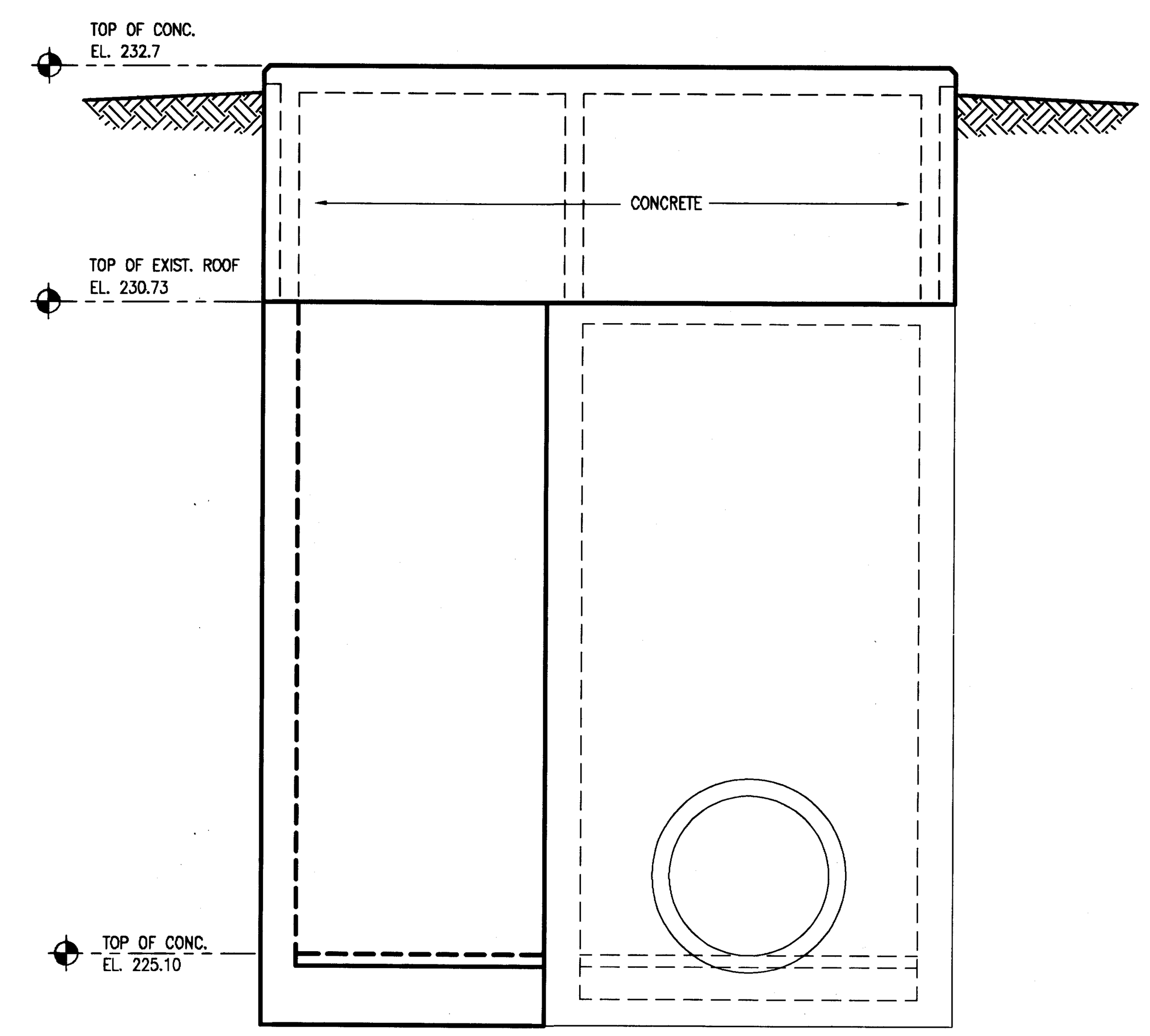
4 S-1 ELEVATION (OPPOSITE SIDE SIMILAR)
SCALE: 1:50



7 S-1 DETAIL
SCALE: 1:10



6 S-1 DETAIL
SCALE: 1:10



5 S-1 ELEVATION
SCALE: 1:50

D.H. ROBBINS ENGINEERING
CONSULTING STRUCTURAL ENGINEERS
3-430 River Avenue, Winnipeg, Manitoba, R3L 0C6
DHRE DRAWING NO. 01401-03-S1

B.M. ELEV.		FIELD BOOK #	
POSTED TO LBIS			
–	ISSUED AS BUILT	04/11/09	
1	ACCESS HATCH ADDED	01/12/12	
–	ISSUED FOR TENDER	01/08/13	
NO.	REVISIONS	DATE	BY

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	DHR	CHECKED BY	TW
DRAWN BY	DLL	APPROVED BY	
HOR. SCALE	1:30	RELEASED FOR CONSTRUCTION	
VERTICAL			
DATE	2000 08 11	DATE	

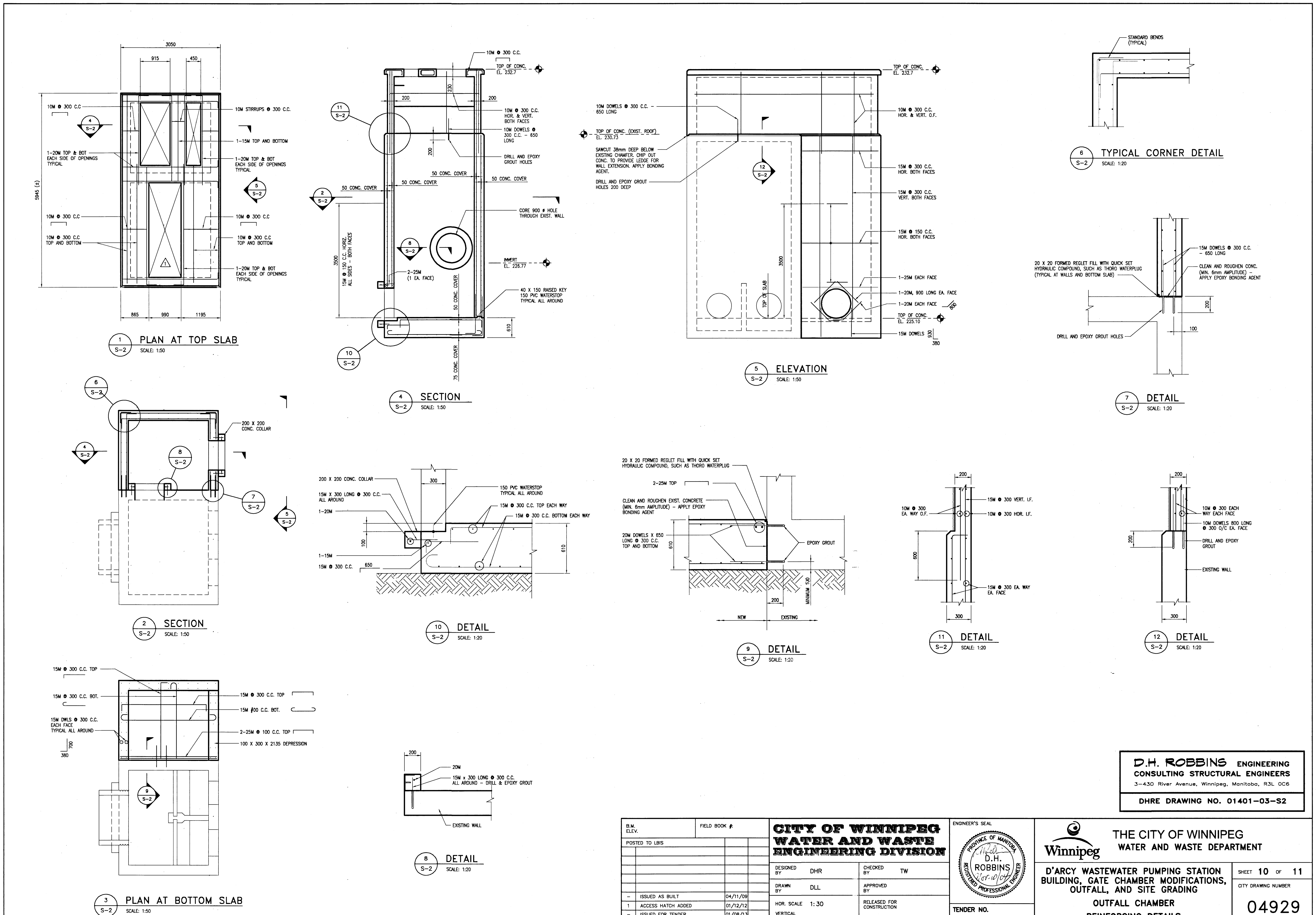
ENGINEER'S SEAL
PROVINCE OF MANITOBA
D.H. ROBBINS
REGISTERED PROFESSIONAL ENGINEER

TENDER NO.
AUTOCADR14: DARCY_687.dwg
PLOT DATE:

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION
BUILDING, GATE CHAMBER MODIFICATIONS,
OUTFALL, AND SITE GRADING
OUTFALL CHAMBER
STRUCTURAL PLANS AND DETAILS

SHEET 9 OF 11
CITY DRAWING NUMBER
04928



D.H. ROBBINS ENGINEERING
CONSULTING STRUCTURAL ENGINEERS
3-430 River Avenue, Winnipeg, Manitoba, R3L 0C6
DHRE DRAWING NO. 01401-03-S2

B.M. ELEV.	FIELD BOOK #		
POSTED TO LBIS			
–	ISSUED AS BUILT	04/11/09	
1	ACCESS HATCH ADDED	01/12/12	
–	ISSUED FOR TENDER	01/08/13	
NO.	REVISIONS	DATE	BY

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY	DHR	CHECKED BY	TW
DRAWN BY	DLL	APPROVED BY	
HOR. SCALE	1:30	RELEASED FOR CONSTRUCTION	
VERTICAL			
DATE	2000 08 11	DATE	

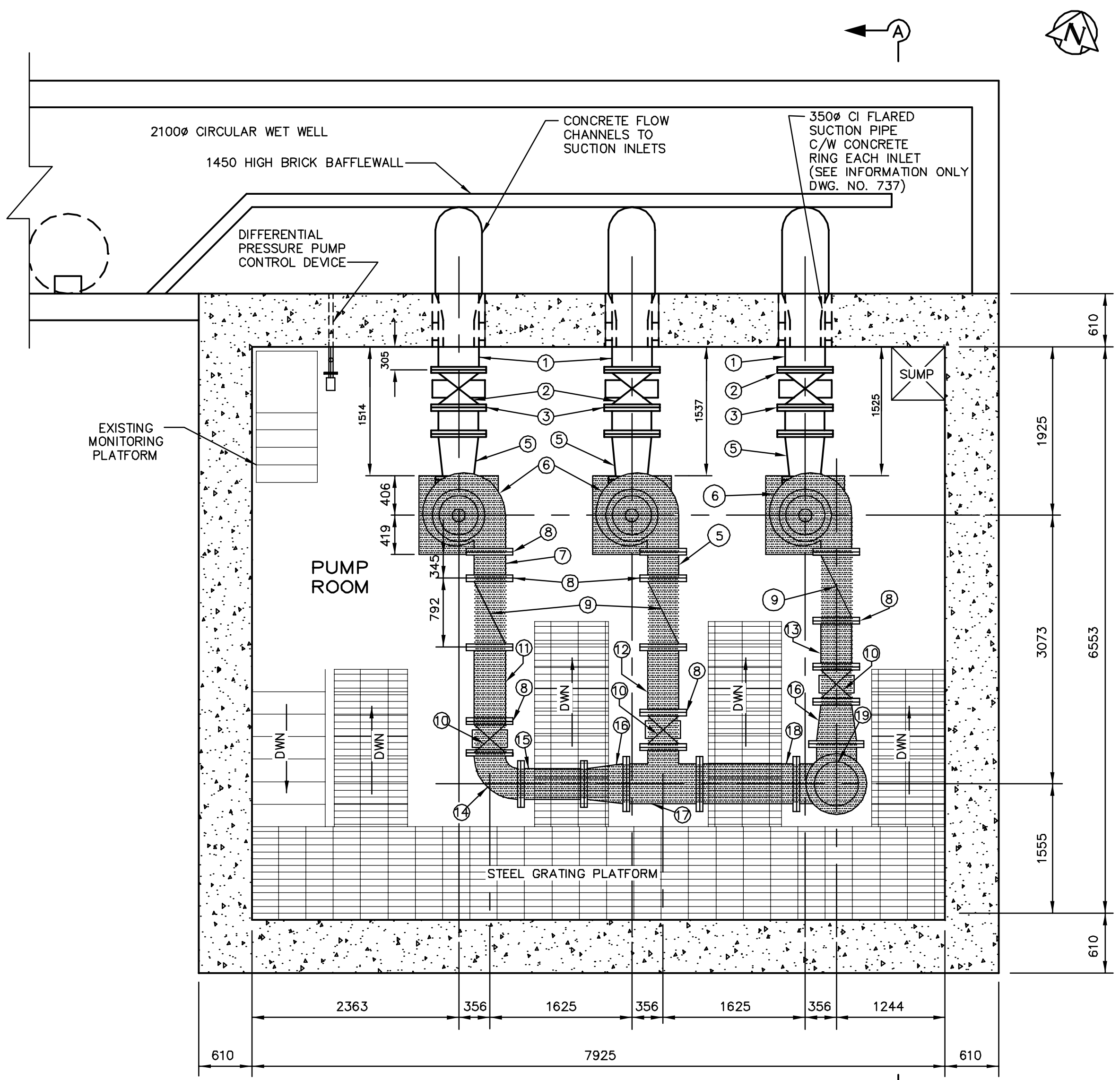
ENGINEER'S SEAL
PROVINCE OF MANITOBA
D.H. ROBBINS
REGISTERED PROFESSIONAL ENGINEER

TENDER NO.
AUTOCADR14: DARCY_687.dwg
PLOT DATE:

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

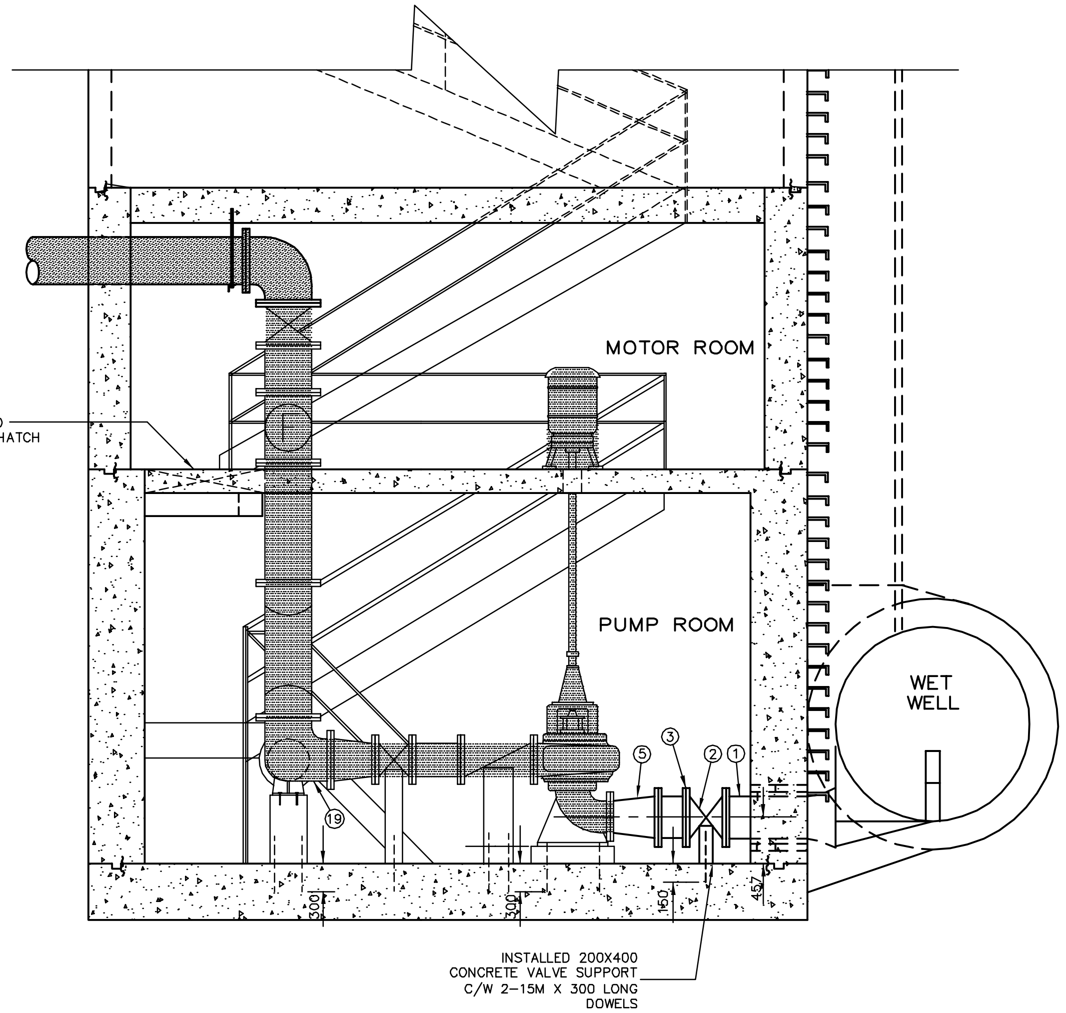
D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING
OUTFALL CHAMBER
REINFORCING DETAILS

SHEET 10 OF 11
CITY DRAWING NUMBER
04929



PLAN VIEW PUMP ROOM

SCALE 1:40



SECTION A–A

LIST OF MATERIALS								
ITEM	DESCRIPTION	LENGTH	QUANTITY	ITEM	DESCRIPTION	LENGTH	QUANTITY
1	450ø INLET PIPE C/W LINK SEAL (PEXFL)	915	3	26	HOLLOW STEEL DRIVE SHAFT	–	3
2	450ø GATE VALVE (RISING STEM) C/W HANDWHEEL (FLXFL)	385	3	27	600V, 1200RPM, 75HP, TEFC, VERTICAL MOUNT WESTINGHOUSE ELECTRIC MOTOR	–	3
3	450ø "UNIFLANGE" OR APPROVED EQUAL	–	6				
4	450ø FILLER PIPE (PEXPE)	300±	1				
5	450X350 CONCENTRIC REDUCER (FLXFL)	482	1				
6	INGERSOLL-DRESSER 14MNVI6FR-7L CENTRIFUGAL PUMP	–	3				
7	350ø FILLER PIPE (PEXPE)	345	1				
8	350ø "UNI-FLANGE"	–	6				
9	350ø BALL CHECK VALVE (FLXFL)	792	3				
10	350ø GATE VALVE (RISING STEM) C/W HANDWHEEL (FLXFL)	400	3				
11	350ø FILLER PIPE (PEXFL)	786	1				
12	350ø FILLER PIPE (PEXFL)	743	1				
13	350ø FILLER PIPE (PEXFL)	571	1				
14	350ø 90° ELBOW (FLXFL)	–	1				
15	350ø FILLER PIPE (FLXFL)	723	1				
16	450ø X 350ø CONCENTRIC REDUCER (FLXFL)	486	2				
17	450ø X 450ø X 350ø REDUCING TEE (FLXFLXFL)	–	1				
18	450ø FILLER PIPE (FLXFL)	1103	1				
19	500ø X 450ø X 450ø SIDE OUTLET 90° ELBOW C/W BASE (FLXFLXFL)	–	1				
20	500ø FABRICATED OFFSET FILLER PIPE (FLXFL)	1597	1				
21	500ø FILLER PIPE (FLXFL)	1256	1				
22	500ø ROSEMOUNT FLOW METER	872	1				
23	500ø "UNI-FLANGE"	–	1				
24	500ø FILLER PIPE (FLXPE)	328	1				
25	500ø GATE VALVE (NON-RISING STEM) (FLXFL)	455	1				

NOTES:

1. LENGTHS SHOWN FOR PIPING ARE FACE TO FACE AND DO NOT INCLUDE GASKET THICKNESS.
2. GASKETS 3 mm THICK, FULL FACED, CLOTH INSERTED RUBBER.
3. ALL FLANGE NUTS AND BOLTS HIGH STRENGTH STEEL.
4. EXISTING PIPING SHOWN THUS:
5. ALL STEEL PIPE SCHEDULE 80 STEEL.
6. ALL FLANGED FITTINGS CONFORM TO AWWA C110
7. ALL FLANGES WELDED INSIDE AND OUT IN ACCORDANCE WITH AWWA C-207 CLASS D
8. ALL WELDED JOINTS ON STEEL PIPE AND FITTINGS FULL PENETRATION BUTT TYPE WELDS.
9. ALL ANCHOR BOLTS TYPE 316 SS KWIK BOLT STUD ANCHOR
10. BONDING AGENT IS ACRYL-STIX

CONTRACTOR: NELSON RIVER CONSTRUCTION
PROJECT COMPLETION DATE: 2005 07 12

RECORD DRAWING
WATER AND WASTE DEPARTMENT

B.M. ELEV. | FIELD BOOK #: | POSTED TO LBIS

NO.	REVISIONS	DATE	BY
1	REVISED TO RECORD DWG.	08.06.02	CJH/WKT

CITY OF WINNIPEG
WATER AND WASTE
ENGINEERING DIVISION

DESIGNED BY: TW | CHECKED BY: TW
DRAWN BY: WKT | APPROVED BY:
HOR. SCALE: 1:40 | RELEASED FOR CONSTRUCTION
VERTICAL:
DATE: 2001 08 16 | DATE:

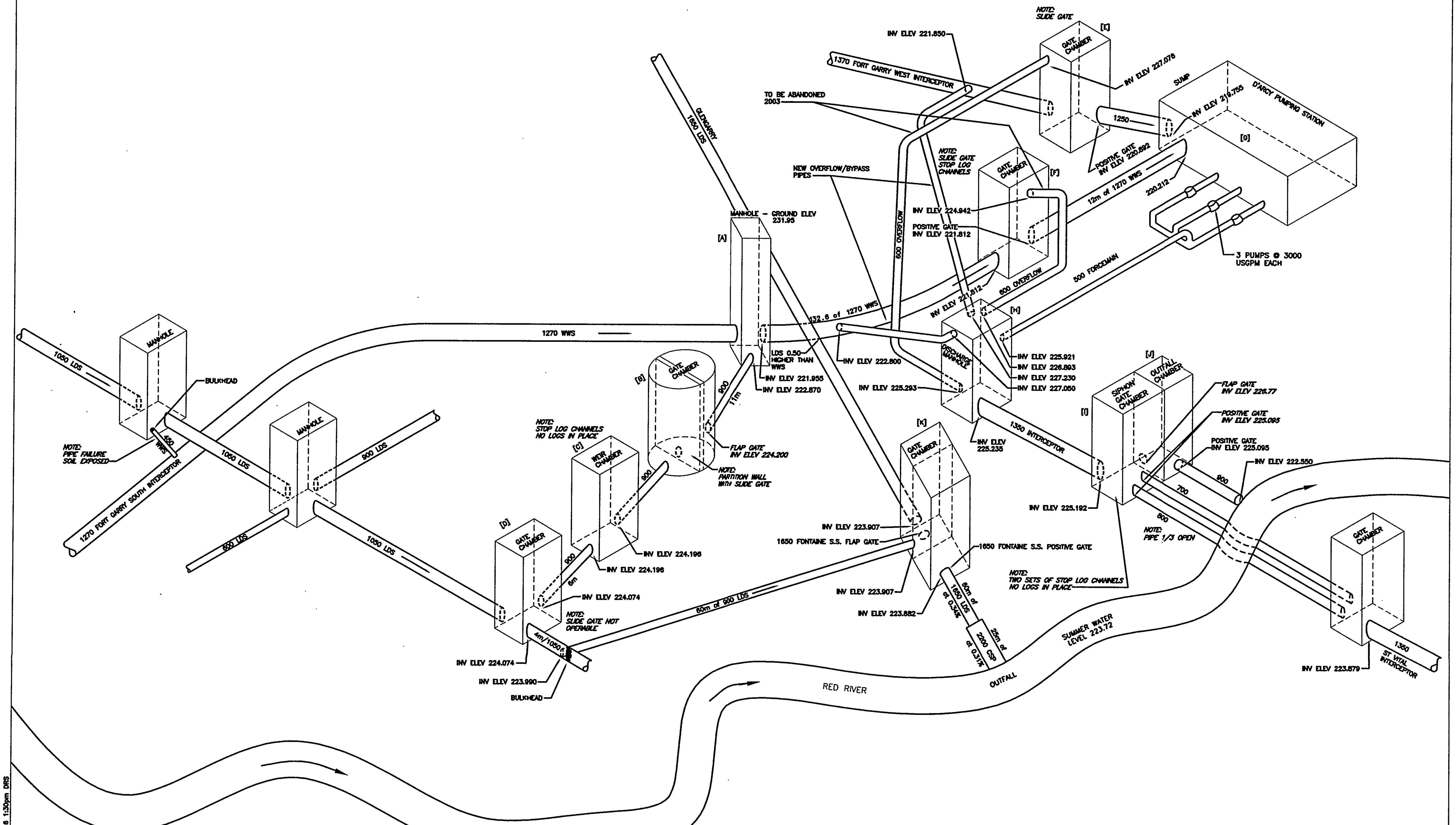
ENGINEER'S SEAL
ORIGINAL SIGNED BY W.D. WATTERS 01/08/16

TENDER NO. 0695-2001
AUTOCADR2000: 04930.dwg
PLOT DATE: 2008 06 03

Winnipeg
THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

D'ARCY WASTEWATER PUMPING STATION BUILDING, GATE CHAMBER MODIFICATIONS, OUTFALL, AND SITE GRADING
SUCTION PIPING MODIFICATIONS

SHEET 11 OF 11
CITY DRAWING NUMBER
04930



METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

Finance No. 0000, AG 00/00

LOCATION APPROVED
UNDERGROUND STRUCTURES

B.M. ELEV.

SUPR. U/G STRUCTURES COMMITTEE — DATE

NOTE:
LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE, BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

NO.	REVISIONS	DATE	BY

UMA Engineering Ltd.
• Consulting • Engineering • Construction • Management Services

DESIGNED BY	-	CHECKED BY	
DRAWN BY	DRS	APPROVED BY	
HOR. SCALE:	-	RELEASED FOR CONSTRUCTION	
VERTICAL:	-		
DATE		DATE	

ENGINEER'S SEAL

CONSULTANT DRAWING NO. 00
41-02-D265-067-01

THE CITY OF WINNIPEG
WATER AND WASTE DEPARTMENT

FORT GARRY INTERCEPTORS
SCHEMATIC
THATCHER TO RIVER CROSSING

SHEET - OF -
CITY DRAWING NUMBER
REV
1105-A -

PLOT SCALE: 1=1.0
FILE: ISOMETRIC SCHEMATIC.DWG 2001-07-26 1:30pm DRS