APPENDIX C – RELIABILITY UPGRADE OF SERVICE ENTRANCE EQUIPMENT DRAFT DEFINITION REPORT CLIFTON FLOOD PUMPING STATION – AUGUST 2010

~~4.3.2 Recommendations~~

~~The existing exterior service entrance is new and in good condition and serves the needs of the station.~~

~~Refurbishing (Option1) or replacing (Option 2) the existing ITE breakers does not resolve the lack of adequate clearance in front of the equipment or the unprotected cable between the splitter and each ITE feeder breaker. Accordingly we recommend that the existing four ITE breakers be removed and that a new 600 Amp CDP type panel be installed in the location shown on Figure 2-3. The single line diagram of the refurbished station is shown on Figure 2-2.~~

~~4.3.3 Capital Cost Estimate~~

~~The various cost estimate options for this station are summarized in Table 6 with a detailed breakdown shown in Tables 4.3.1 to 4.3.3. The recommended option to upgrade this station would be Option #3 at an estimated cost of $41,500.00.~~

4.4 CLIFTON FLOOD PUMP STATION

4.4.1 General

Clifton has a separate sewage lift pumping station and flood pumping station on the same property. The flood pumping station consists of four 250HP flood pumps and a 10HP dewatering pump. The electrical installation with the exception of the service entrance equipment appears to be original.

This station contains an old Winnipeg Hydro service vault located in the southwest corner of the building. A 5kV Manitoba Hydro service feeders entering into the old Winnipeg Hydro vault and terminates to a bank of floor mounted transformers. This vault contains three 2400V to 600V, 333kVA single phase transformers connected in a wye/delta configuration. The secondary side of the transformers terminate to a 600V delta bus. The delta bus provides individual 600V, 3 ph,

3-wire, services to each of the four flood pumps 400A ITE breakers and to a 60A ITE Clampmatic fused disconnect switch. (Refer to Photographs 3-3 to 3-7).

The four 400A ITE breakers are located on the stations interior southwest wall. These breakers are of a different construction to the other stations breakers and they appear to be of a younger generation. (Refer to Photographs 3-12 to 3-14).

The four resistance type reduced voltage starters (RVS) are also original and are floor mounted up against the southwest wall next to their corresponding ITE breaker. There is insufficient clearance in front of these RVS to meet the CEC requirements for 1 m clear working space in front of the RVS. The door to the RVS cannot fully open due to the pumps being mounted too close. (Refer to Photographs 3-9 and 3-11).

A 60A splitter is feed from the 60A ITE Clampmatic fused disconnect switch. This splitter feeds three 30A ITE Clampmatic fused disconnect switch and a voltage-monitoring panel. The power monitoring equipment consists of an ABB model SSAC-WVM011AL relay. (Refer to Photographs 3-22 and 3-23).

This station also contains a second 120/240V Manitoba Hydro service. This service is overhead and enters the building on the northwest corner and connects to a 200A JR Stephenson main breaker and a 200A, 12 circuit, 120/240V distribution panel. (Refer to Photographs 3-17 to 3-21).

4.4.2 Recommendations

The existing interior service entrance vault equipment configuration has been phased out from a number of other stations. This station is one of a few that still contains this type of installation. We recommend that the existing service equipment be removed and replaced with an exterior, Hydro owned, pad mounted transformer.

For the 600V distribution equipment, refurbishing (Option1) or replacing (Option 2) the existing ITE breakers would involve retaining the 600V delta bus and this would not resolve the lack of

adequate clearance in front of the reduced voltage starters. Accordingly we recommend that the existing four ITE breakers be removed and that a new 1200 Amp CDP type panel c/w a main breaker and Hydro CT cabinet sections. We have provided three options for upgrading the Hydro service and the stations 600V distribution equipment. Figures 3-3a to 3-3c show the different installation location options for all the equipment. Each option relocates all the existing RVS to a position where the 1 m clear working space can be attained. The corresponding single line diagram options of the refurbished station are shown on Figure 3-2a to 3-2c.

This station currently has two services. We recommend that the second 120/240V service be removed and relocate the loads to the 600V service via a new 30kVA transformer.

- Option 3A includes an outdoor, Manitoba Hydro owned, pad mounted transformer in front of the station on the north side of the property. The former transformer vault becomes a room for housing the relocated RVS and the new CDP. No significant architectural/structural upgrade is required to the vault level.
- Option 3B includes the existing vault being significantly modified to allow a new outdoor pad mounted transformer to be located over the existing primary cables. The remaining transformer vault becomes a room for housing the relocated RVS and the new CDP.
- Option 3C includes an outdoor, Manitoba Hydro owned, pad mounted transformer and a new pedestal distribution enclosure in front of the station on the north side of the property. The former transformer vault becomes a room for housing the relocated RVS and the new CDP. No significant architectural/structural upgrade is required to the vault level. This option also allows the site to have one service to feed both the flood pumping station and the flood pumping station.

4.4.3 Capital Cost Estimate

The various cost estimate options for this station are summarized in Table 6 with a detailed breakdown shown in Tables 4.4.1 to 4.4.3c. Each of the three new options for relocating the Hydro service was reviewed with Hydro, KGS and the City of Winnipeg on July 16, 2010 at the

site. Option 3A and 3C were the two favoured options. It was confirmed that Option 3B would not be feasible as the existing primary cable are not reusable. The recommended option to upgrade this station would be option 3A in addition to a new Hydro service at an estimated cost of $153,400.00. If the city would like to expand the scope of this site and reduce the number of Hydro services, option 3C is recommended at an estimated cost of $156,700.00.

~~4.5 COCKBURN FLOOD PUMP STATION~~

~~4.5.1 General~~

~~Cockburn flood pump station is a combination station and has a sewage lift pumping facility in the same building. The flood pump station component consists of three pumps each with a different capacity. The motor sizes are 250HP, 200 HP, and 150 HP. The electrical installation with the exception of the service entrance equipment appears to have had changes or upgrades through the life of the station.~~

~~This station contains an old Winnipeg Hydro service vault located in the southeast corner of the building. A 5kV Manitoba Hydro service feeders entering into the old Winnipeg Hydro vault and terminates to a bank of floor mounted transformers. This vault contains three 2400V to 600V, 250kVA single phase transformers connected in a wye/delta configuration. The secondary side of the transformers terminate to a 600V delta bus. The delta bus provides individual 600V, 3 ph, 3-wire, services to each of the three flood pump feeder breakers. (Refer to Photographs 4-2 and 4-4).~~

~~The three flood pump feeder breakers are mounted on the stations south interior wall. There is only one ITE feeder breaker in this station. The other two feeder breakers appear to have been upgraded to the existing Westinghouse units over 30 years ago.~~

~~The three resistance type reduced voltage starters (RVS) are also original and are floor mounted in the middle of the station. There is no clearance issue in front of the RVS in this station. (Refer to Photograph 4-6).~~

24X36

FROM HYDRO
4.16kV SERVICE

OUTDOOR METER

4160V
600/347V

3x1ø @ 333kVA
2400:600V CONNECTED IN WYE
4.8%Z

LOCAL VAULT (CofW)

DELTA BUS:
_V, _A, 3ø, _W

60A
60A
MAKE: ITE BULLDOG CLAMPMATIC
MODEL: F-352

SPLITTER
MAKE: _
MODEL: _

600V, 100A, 3ø, 3W

30A
30A
MAKE: ITE BULLDOG CLAMPMATIC
MODEL: F-351
SEAL

30A
30A
MAKE: ITE BULLDOG CLAMPMATIC
MODEL: F-351
EXHAUST FAN

30A
L1 L2 L3
VOLTAGE MONITOR MODULE
MAKE: SSAC
MODEL: WVMD11AL
600V POWER MONITORING ENCLOSURE

30A
30A
MAKE: ITE BULLDOG CLAMPMATIC
MODEL: F-351

MAGNETIC STARTER
MAKE: AB
MODEL: BUL709-SIZE 1
SN: 709BACIA

10 HP
DEWATERING PUMP P5

FRAME: 400A
TRIP: 400A
MAKE: ITE
MODEL: ET5745
IR: _
SN: _

400A

REDUCED VOLTAGE STARTER
MAKE: AB
MODEL: BUL746
SN: 10501C

250 HP
PUMP P4

FRAME: 400A
TRIP: 400A
MAKE: ITE
MODEL: ET5745
IR: _
SN: _

400A

REDUCED VOLTAGE STARTER
MAKE: AB
MODEL: BUL746
SN: 10501C

250 HP
PUMP P3

FRAME: 400A
TRIP: 400A
MAKE: ITE
MODEL: ET5745
IR: _
SN: _

400A

REDUCED VOLTAGE STARTER
MAKE: AB
MODEL: BUL746
SN: 10501C

250 HP
PUMP P2

FRAME: 400A
TRIP: 400A
MAKE: ITE
MODEL: ET5745
IR: _
SN: _

400A

REDUCED VOLTAGE STARTER
MAKE: AB
MODEL: BUL746
SN: 10501C

250 HP
PUMP P1

NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN OBTAINED FROM DATA COLLECTED BY CITY OF WINNIPEG WATER AND WASTE AND KGS GROUP ON JUNE 2, 2009 AND IS BELIEVED TO BE ACCURATE. SOME INFORMATION ON THE EQUIPMENT SUCH AS INTERRUPTING CAPABILITIES AND MODEL NUMBERS ARE NOT ALWAYS AVAILABLE.

O/H SERVICE
FROM HYDRO

M

200A

FRAME: 200A
TRIP: 200A
MAKE: J.R. STEVENSON LTD.
MODEL: _
IR: _
SN: _

DP-1
MAKE: JR STEPHENSON LTD
MODEL: NLAB
200A, 120/240V,
1ø, 3W, _kA

12 CIRCUIT

MAKE: JR STEPHENSON LTD
MODEL: NLAB
70A, 120/240V,
1ø, 3W, _kA

12 CIRCUIT

HEATER PANEL

1 / _ EXISTING SINGLE LINE DIAGRAM
SCALE: N.T.S.

KGS GROUP CONSULTING ENGINEERS

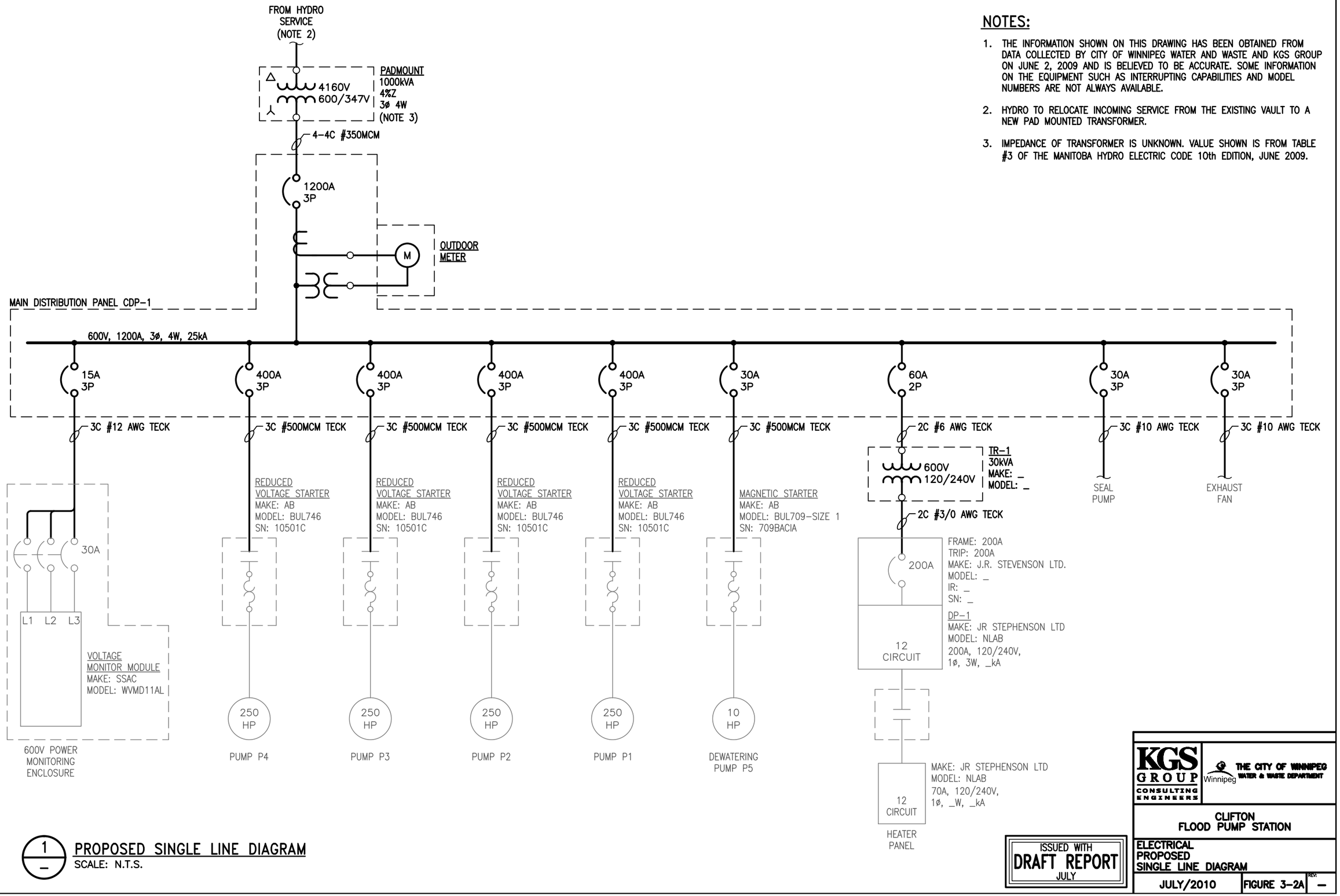
THE CITY OF WINNIPEG
Winnipeg WATER & WASTE DEPARTMENT

CLIFTON
FLOOD PUMP STATION

ELECTRICAL
EXISTING
SINGLE LINE DIAGRAM

ISSUED WITH
DRAFT REPORT
JULY

JUNE/2009 | FIGURE 3-1 | REV: _



NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN OBTAINED FROM DATA COLLECTED BY CITY OF WINNIPEG WATER AND WASTE AND KGS GROUP ON JUNE 2, 2009 AND IS BELIEVED TO BE ACCURATE. SOME INFORMATION ON THE EQUIPMENT SUCH AS INTERRUPTING CAPABILITIES AND MODEL NUMBERS ARE NOT ALWAYS AVAILABLE.
2. HYDRO TO RELOCATE INCOMING SERVICE FROM THE EXISTING VAULT TO A NEW PAD MOUNTED TRANSFORMER.
3. IMPEDANCE OF TRANSFORMER IS UNKNOWN. VALUE SHOWN IS FROM TABLE #3 OF THE MANITOBA HYDRO ELECTRIC CODE 10th EDITION, JUNE 2009.

1 — PROPOSED SINGLE LINE DIAGRAM
SCALE: N.T.S.

ISSUED WITH DRAFT REPORT JULY

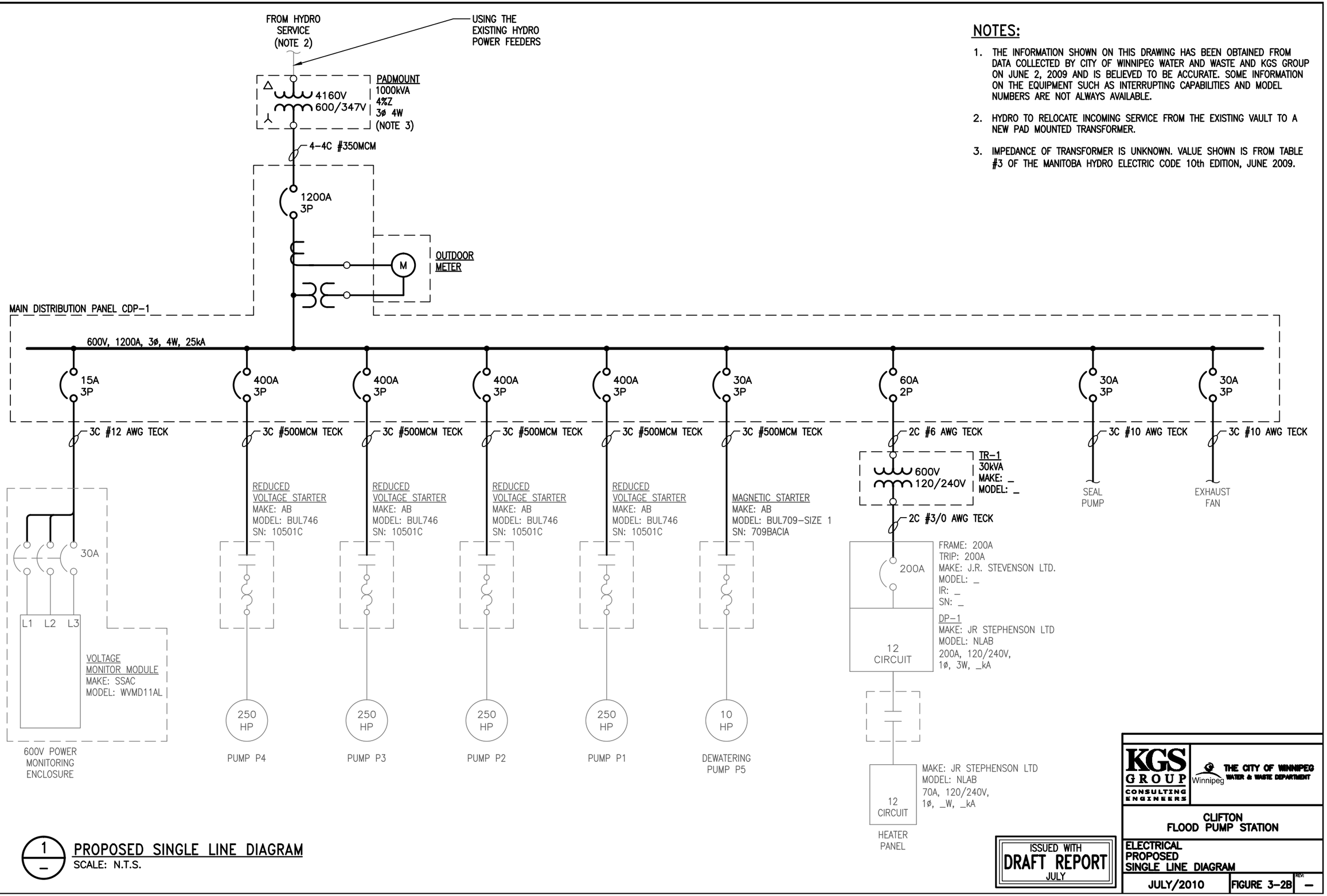
KGS GROUP CONSULTING ENGINEERS

THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT

CLIFTON FLOOD PUMP STATION

ELECTRICAL
PROPOSED
SINGLE LINE DIAGRAM

JULY/2010 | FIGURE 3-2A | REV: —



NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN OBTAINED FROM DATA COLLECTED BY CITY OF WINNIPEG WATER AND WASTE AND KGS GROUP ON JUNE 2, 2009 AND IS BELIEVED TO BE ACCURATE. SOME INFORMATION ON THE EQUIPMENT SUCH AS INTERRUPTING CAPABILITIES AND MODEL NUMBERS ARE NOT ALWAYS AVAILABLE.
2. HYDRO TO RELOCATE INCOMING SERVICE FROM THE EXISTING VAULT TO A NEW PAD MOUNTED TRANSFORMER.
3. IMPEDANCE OF TRANSFORMER IS UNKNOWN. VALUE SHOWN IS FROM TABLE #3 OF THE MANITOBA HYDRO ELECTRIC CODE 10th EDITION, JUNE 2009.

1 — PROPOSED SINGLE LINE DIAGRAM
SCALE: N.T.S.

ISSUED WITH DRAFT REPORT JULY

KGS GROUP CONSULTING ENGINEERS

THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT

CLIFTON
FLOOD PUMP STATION

ELECTRICAL
PROPOSED
SINGLE LINE DIAGRAM

JULY/2010 | FIGURE 3-2B | REV: —

FROM HYDRO SERVICE (NOTE 2)

PADMOUNT
1000kVA
4%Z
3ø 4W
4160V
600/347V

4-4C #350MCM

METERING CABINET

OUTDOOR METER

EXTERIOR WALL MOUNTED DISTRIBUTION ENCLOSURE

FRAME: 1200A
TRIP: 1200A
1200A
3P

4-4C #350MCM

MAIN DISTRIBUTION PANEL CDP-1

600V, 1200A, 3ø, 4W, 25kA

15A 3P	400A 3P	400A 3P	400A 3P	400A 3P	30A 3P	60A 2P	30A 3P	30A 3P
3C #12 AWG TECK	3C #500MCM TECK	3C #500MCM TECK	3C #500MCM TECK	3C #500MCM TECK	3C #500MCM TECK	2C #6 AWG TECK	3C #10 AWG TECK	3C #10 AWG TECK
30A L1 L2 L3 VOLTAGE MONITOR MODULE MAKE: SSAC MODEL: WVMD11AL 600V POWER MONITORING ENCLOSURE	REDUCED VOLTAGE STARTER MAKE: AB MODEL: BUL746 SN: 10501C 250 HP PUMP P4	REDUCED VOLTAGE STARTER MAKE: AB MODEL: BUL746 SN: 10501C 250 HP PUMP P3	REDUCED VOLTAGE STARTER MAKE: AB MODEL: BUL746 SN: 10501C 250 HP PUMP P2	REDUCED VOLTAGE STARTER MAKE: AB MODEL: BUL746 SN: 10501C 250 HP PUMP P1	MAGNETIC STARTER MAKE: AB MODEL: BUL709-SIZE 1 SN: 709BACIA 10 HP DEWATERING PUMP P5	TR-1 30kVA MAKE: _ MODEL: _ 600V 120/240V 2C #3/0 AWG TECK 200A FRAME: 200A TRIP: 200A MAKE: J.R. STEVENSON LTD. MODEL: _ IR: _ SN: _ DP-1 MAKE: JR STEPHENSON LTD MODEL: NLAB 200A, 120/240V, 1ø, 3W, _kA 12 CIRCUIT MAKE: JR STEPHENSON LTD MODEL: NLAB 70A, 120/240V, 1ø, _W, _kA 12 CIRCUIT HEATER PANEL	SEAL PUMP	EXHAUST FAN

NOTES:

1. THE INFORMATION SHOWN ON THIS DRAWING HAS BEEN OBTAINED FROM DATA COLLECTED BY CITY OF WINNIPEG WATER AND WASTE AND KGS GROUP ON JUNE 2, 2009 AND IS BELIEVED TO BE ACCURATE. SOME INFORMATION ON THE EQUIPMENT SUCH AS INTERRUPTING CAPABILITIES AND MODEL NUMBERS ARE NOT ALWAYS AVAILABLE.
2. HYDRO TO RELOCATE INCOMING SERVICE FROM THE EXISTING VAULT TO A NEW PAD MOUNTED TRANSFORMER.
3. IMPEDANCE OF TRANSFORMER IS UNKNOWN. VALUE SHOWN IS FROM TABLE #3 OF THE MANITOBA HYDRO ELECTRIC CODE 10th EDITION, JUNE 2009.

1 / – PROPOSED SINGLE LINE DIAGRAM
SCALE: N.T.S.

ISSUED WITH DRAFT REPORT JULY

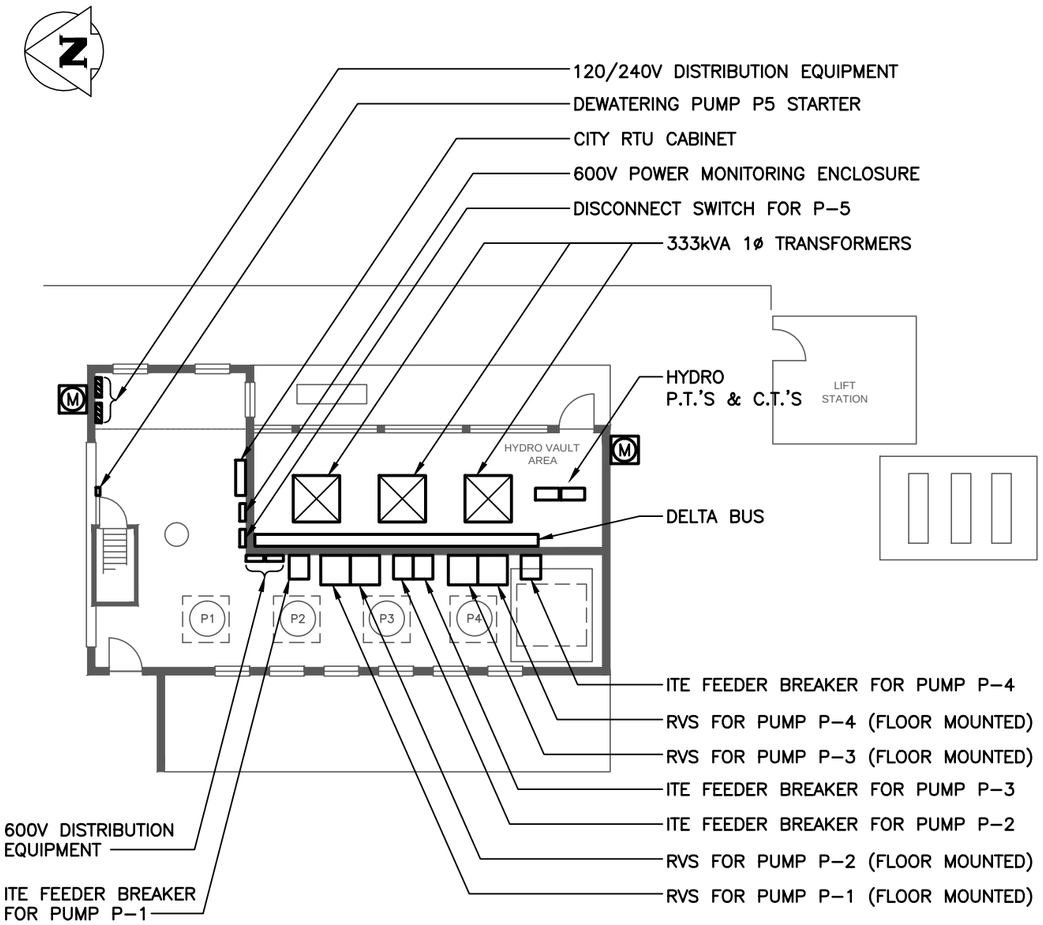
KGS GROUP CONSULTING ENGINEERS

THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT

CLIFTON
FLOOD PUMP STATION

ELECTRICAL
PROPOSED
SINGLE LINE DIAGRAM

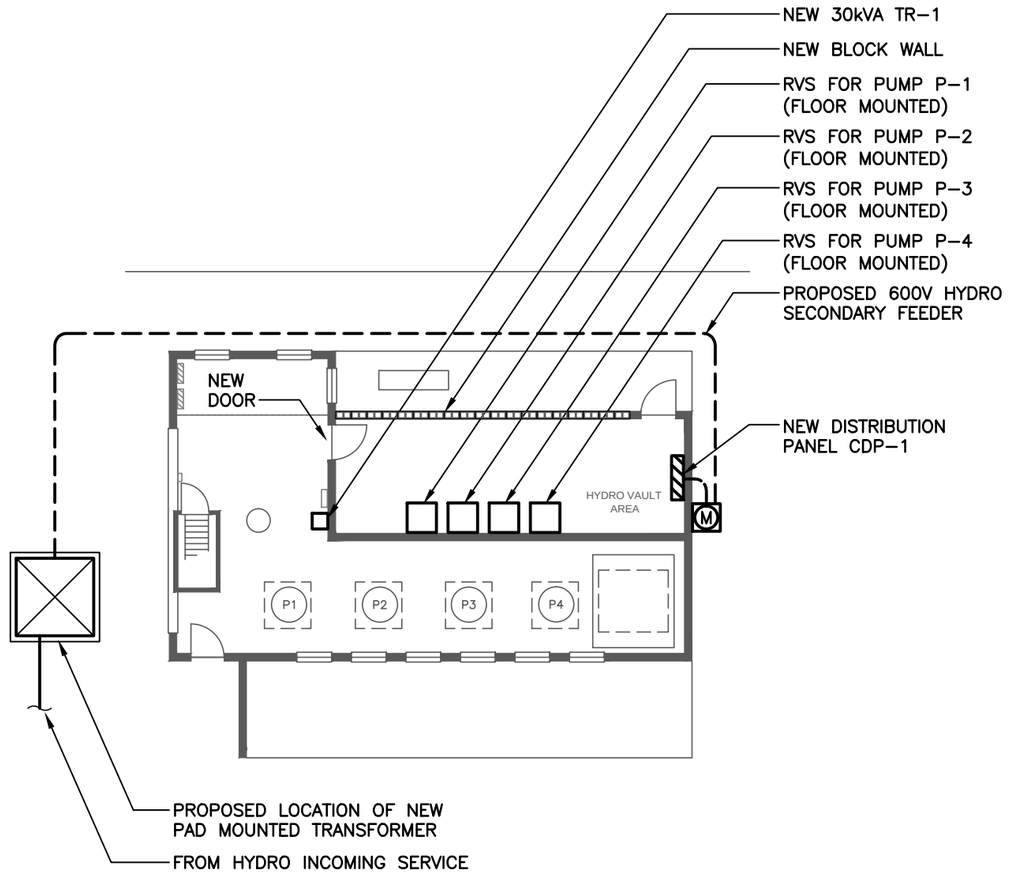
JULY/2010 | FIGURE 3-2C | REV: –



1 — EXISTING PLAN

1 0 1 2 3 4 5m

Scale: 1:150 Metric



2 — PROPOSED PLAN

1 0 1 2 3 4 5m

Scale: 1:150 Metric

NOTES:

1. –

ISSUED WITH DRAFT REPORT JULY

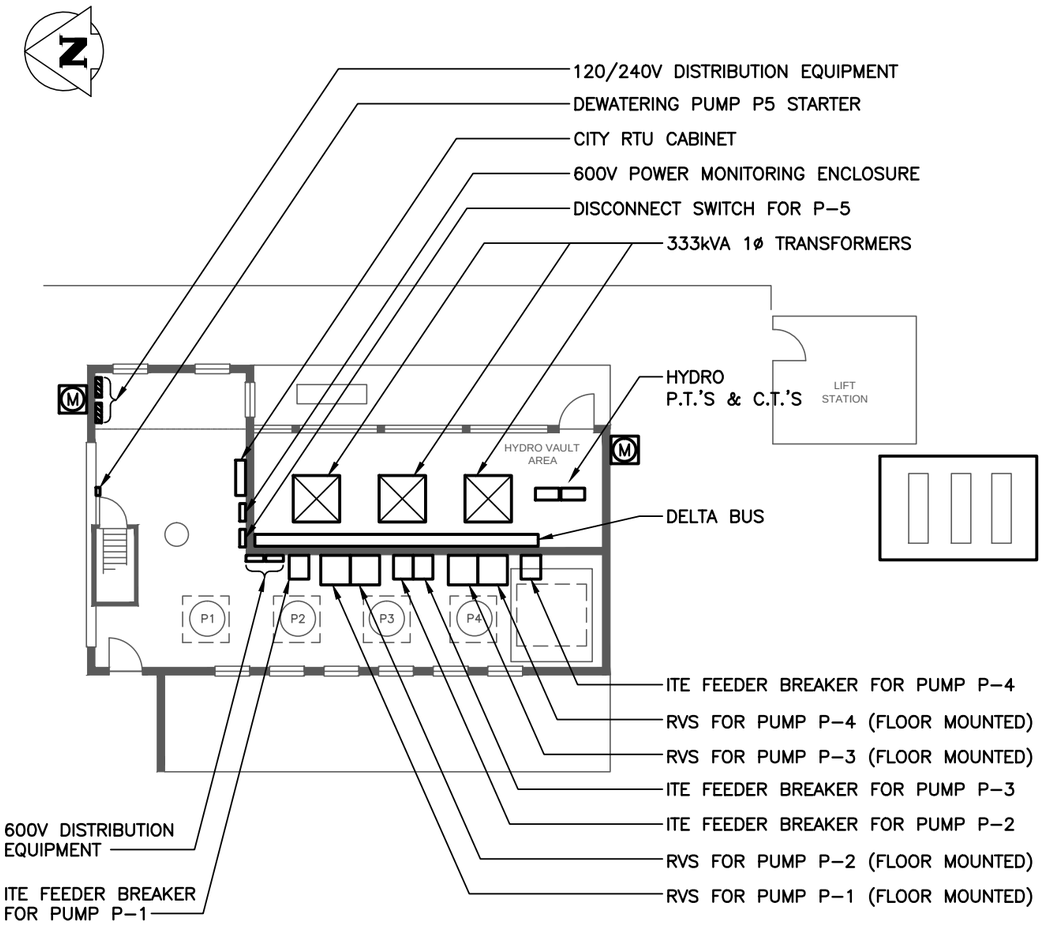
KGS GROUP CONSULTING ENGINEERS

THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT

CLIFTON FLOOD PUMP STATION

ELECTRICAL
EXISTING & PROPOSED PLANS (OPTION A)

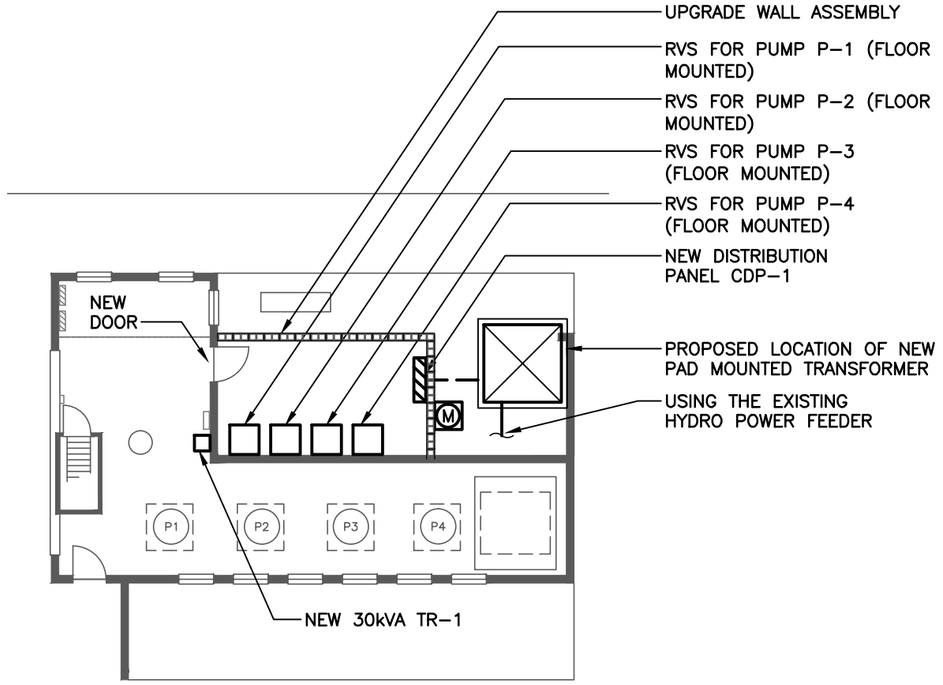
JULY/2010 | FIGURE 3-3A | REV: –



1 — EXISTING PLAN

1 0 1 2 3 4 5m

Scale: 1:150 Metric



2 — PROPOSED PLAN

1 0 1 2 3 4 5m

Scale: 1:150 Metric

NOTES:

1. –

ISSUED WITH DRAFT REPORT JULY

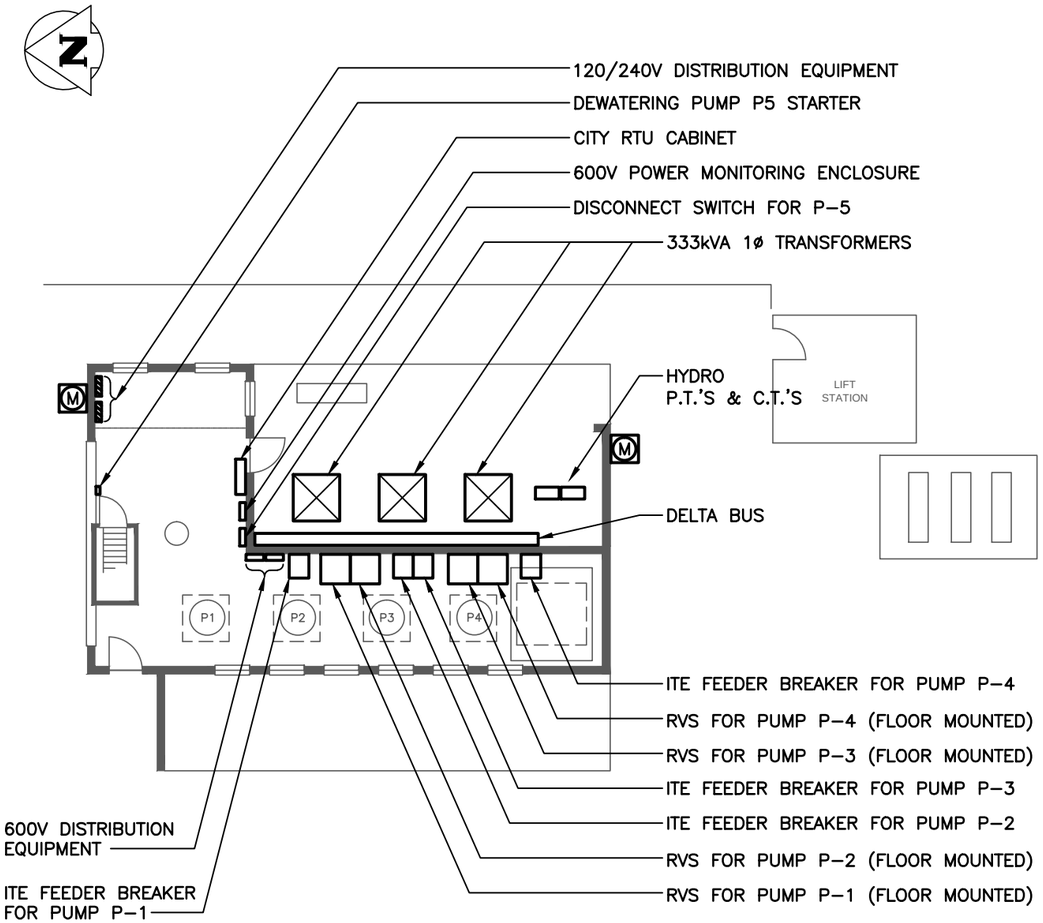
KGS GROUP CONSULTING ENGINEERS

THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT

CLIFTON
FLOOD PUMP STATION

ELECTRICAL
EXISTING & PROPOSED
PLANS (OPTION B)

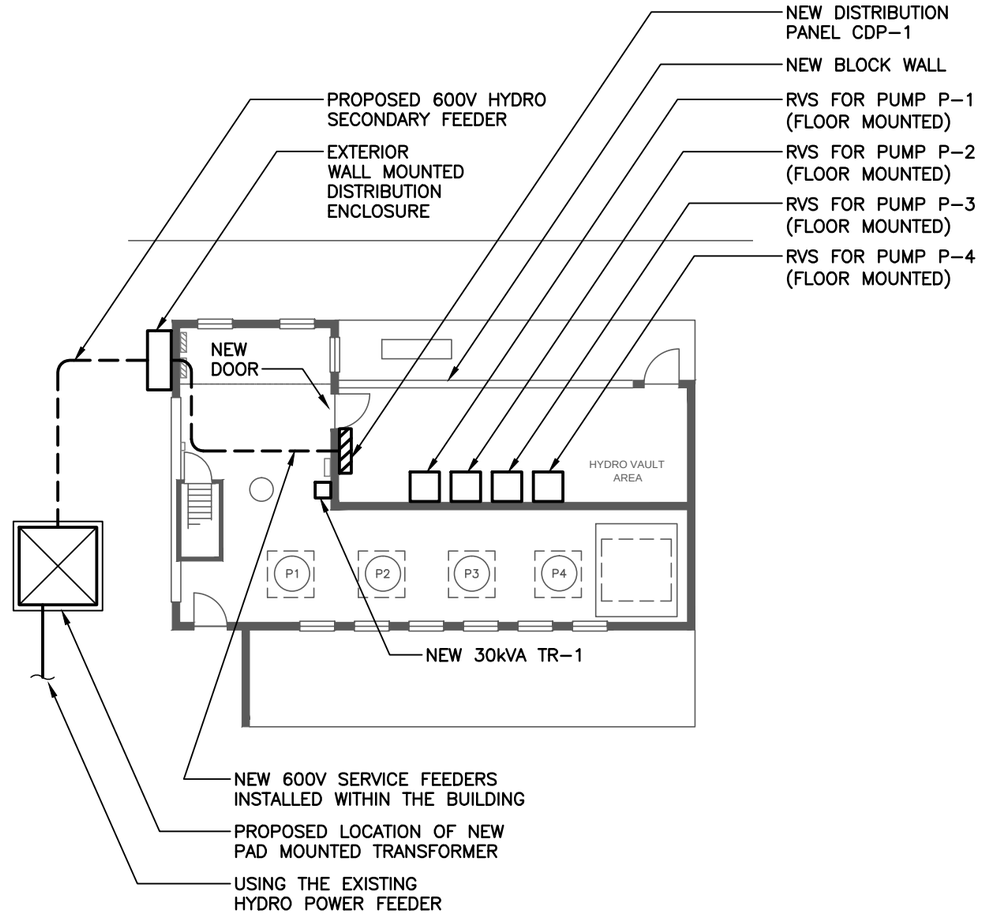
JULY/2010 | FIGURE 3-3B | REV: –



1 — EXISTING PLAN

1 0 1 2 3 4 5m

Scale: 1:150 Metric



2 — PROPOSED PLAN

1 0 1 2 3 4 5m

Scale: 1:150 Metric

NOTES:

1. –

ISSUED WITH DRAFT REPORT JULY

KGS GROUP CONSULTING ENGINEERS

THE CITY OF WINNIPEG WATER & WASTE DEPARTMENT

CLIFTON FLOOD PUMP STATION

ELECTRICAL
EXISTING & PROPOSED PLANS (OPTION C)

SEPT/2009 | FIGURE 3–3C | REV: –

Photograph: 3-1
Description: North Elevation of the pump station
Date: June 2, 2009

Photograph: 3-2
Description: 120/240V Hydro service meter mounted on the north side of the station.
Date: June 2, 2009

Photograph: 3-3
Description: West elevation of the pump station
Date: June 2, 2009

Photograph: 3-4
Description: Southwest entry into the hydro service vault.
Date: June 2, 2009

Photograph: 3-5
Description: 2400V/600V, 333kVA single phase transformers within the vault.
Date: May 4, 2010

Photograph: 3-6
Description: Hydro service metering CT's and PT's within the vault.
Date: May 4, 2010

Photograph: 3-7
Description: 2400V/600V, 333kVA single phase transformers connected to the 600V delta bus.
Date: May 4, 2010

Photograph: 3-8
Description: View looking south along the east wall
Date: June 2, 2009

Photograph: 3-9
Description: View showing limited space between the soft starter and the pumps.
Date: June 2, 2009

Photograph: 3-10
Description: 60A 600V distribution and one ITE flood pump feeder breaker.
Date: June 2, 2009

Photograph: 3-11
Description: View showing that the RVS door cannot open to its full range.
Date: June 2, 2009

Photograph: 3-12
Description: Flood pump ITE feeder breaker mounted beside its corresponding RVS
Date: June 2, 2009

Photograph: 3-13
Description: Flood pump ITE feeder breaker name plate
Date: June 2, 2009

Photograph: 3-14
Description: Two flood pump ITE feeder breakers mounted beside their corresponding RVS cabinets
Date: June 2, 2009

Photograph: 3-15
Description: View of the northwest portion of the station, with 120/240V distribution.
Date: June 2, 2009

Photograph: 3-16
Description: RTU cabinet and power monitoring panel
Date: June 2, 2009

Photograph: 3-17
Description: 120/240V distribution equipment on mounted north wall of the station
Date: June 2, 2009

Photograph: 3-18
Description: Main 200A breaker for the 120/240V distribution equipment
Date: June 2, 2009

Photograph: 3-19
Description: 120/240V 12 circuit distribution panel
Date: June 2, 2009

Photograph: 3-20
Description: 120/240V heater distribution panel and thermostat control contact cabinet
Date: June 2, 2009

Photograph: 3-21
Description: 120/240V heater distribution panel
Date: June 2, 2009

Photograph: 3-22
Description: 600V power monitoring equipment
Date: June 2, 2009

Photograph: 3-23
Description: 600V distribution and power monitoring cabinet
Date: June 2, 2009