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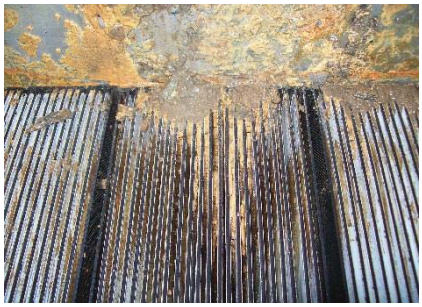

7.5.1.5 Fouling Prevention

Control of fouling and clogging in practice is generally limited to six main strategies:

1. Applying appropriate pretreatment to the feed water. Fine screen helps to eliminate the build-up of trash, hair, lint and other fibrous materials, and decrease the risk of solids accumulation.

2. Maintaining operation within the design conditions, such as HRT, SRT, MLSS, temp, BOD/COD loading, pH, DO, F/ M ratio. Sludge wasting is a key in controlling the target operating SRT (typically ≥ 15 day) in the system. Table F.1 shows some examples.

Relationship between various operating parameters and their effect on membrane fouling

Parameter	**Effect on membrane fouling**
MLSS concentration ↑ **or** ↓	Fouling potential ↑
SRT ↑ **or** ↓	Fouling potential ↑
HRT ↓	Fouling potential ↑
Temperature ↓	Viscosity ↑ **=>** membrane permeability ↓
Filamentous bacteria ↑	Viscosity ↑ **=>** membrane permeability ↓
Air scour intensity ↑	membrane permeability ↑
EPS ↑	Fouling rate ↑
SMP ↑	Fouling potential ↑

3. Employing appropriate physical or chemical cleaning protocols. For example, sodium hypochlorite and citric acid solutions are used to remove organic and inorganic foulants respectively.

4. Chemically or biochemically modifying the mixed liquor, such as addition of coagulants and powdered activated carbon (mostly in industrial effluent).

5. Reducing the flux. Particulate/colloid fouling is "reversible" in the sense that a reduction of the forward flux (through lowering of the membrane flux or solids concentration) or an increase of backwash intensity restores membrane permeability.

6. Ensure sufficient air scouring is being maintained to slough off excessive biofilm layer on the membrane surface.

7.5.1.5 MBR WWTP Fouling Control & Troubleshooting Chart

Combination of membrane physical cleaning operations as air **scouring, backwashing and relaxation** are efficient in membrane fouling control.

7.5.1.5.1 Air Scouring

Aeration generates a shear stress at the membrane surface, which provides a scouring action and reduces membrane cake fouling.

Membrane air scouring check is essential procedure for newterra MBR WWTP. Air scour has to be observed for uniformity of bubbling action all across the membrane module/cassette on regular basis. It is easy to observe through clear window in membrane tank. Operator should note any unusual patterns of air distribution. Operator has to check for:

- damage of air diffusers and if this occurs, empty the tank and fix the diffuser;
- air leakages: if this occurs, tighten up the fittings.

If there is insufficient air scouring, localized dewatering (**clogging, sludging, caking and plugging**) may occur and as a result, membrane fouling occurs.

Proper air scouring in membrane tank

Uneven aeration in membrane tank

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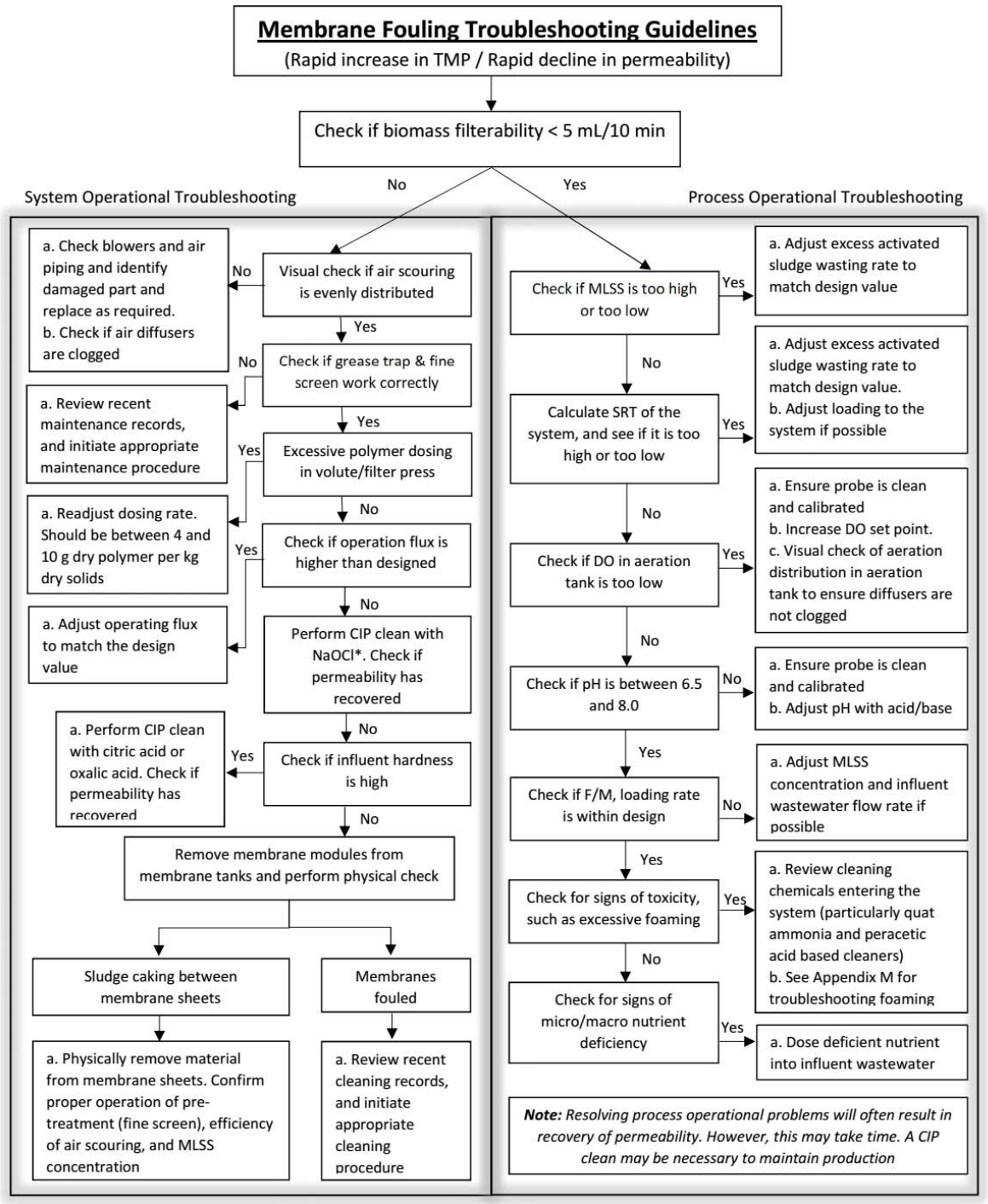

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7.5.2 MBR Alarm Trouble Shooting

Alarm Name	Alarm Location	Alarm Description	Beacon Status	Troubleshooting Recommendation	Remedy Action
PLC ALM	CP	SHUTDOWN PLC Fault	FLASH	Turn off entire system. Wait 10 seconds before restoring power.	Please contact newterra -PLC problem
PWR FAIL ALM	CP	WARNING, Power Fail	SOLID	Power has failed to the unit	Press Reset
ESTOP ALM	Panel	E-Stop	FLASH	Check all locations of E-Stop Buttons to ensure they are not pushed in.	Pull out E-Stop
TALL-201	Clarifier	Temperature alarm low low	FLASH	Check for building heater malfunction. Assess influent water temperature	Replace heater. Take action to increase influent water temperature.
B-201/ B-202 Fail	Clarifier	Blower B-201/B-202 has potentially failed	FLASH	Check blower for failure. Check breaker	Replace blower B-201/B-202.
LAHH-401	SCREEN DISCHARGE	High high level alarm in Screen Module discharge tank	FLASH	Potential discharge tank pump P-401/P-402 failure Check Breaker	Replace pump
P-401 or P-402 FAIL	SCREEN PUMP	P-401/P-402 has potentially failed	FLASH	P-401/P-402 for failure. Check Breaker	Replace pump P-401/P-402

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Alarm Name	Alarm Location	Alarm Description	Beacon Status	Troubleshooting Recommendation	Remedy Action
SCN-401 Or SCN-402 FAIL	SCREEN	Potential screen paddle wheel motor failure.	FLASH	Check screen motor for failure. Check Breaker	Replace motor
LAHH-301	EQ Tank	Level Alarm High High, EQ Tank	FLASH	Investigate if pump P-301, P-302 has failed, or system is receiving higher than design flow, or membrane is fouling.	Replace pump, divert flow, perform membrane chemical cleaning.
LALL-301	EQ TANK	Low Low Level Alarm	WARN	Check for level transmitter operation or upstream pipe obstruction or pump failure.	Clear obstruction or repair/replace faulty equipment.
P-301 or P-302 FAIL	EQ PUMP	Pump P-301 has potentially failed	FLASH	Check pump P-301 or P-302 for failure or if it is unplugged. Check Breaker	Plug in or replace pump P-301 or P-302.
PAL-301	EQ TANK	Pressure Alarm low on air inlet to EQ Tanks	FLASH	Check if blower B-301 or B-302 have failed. Check Breaker	Replace blowers if required.
LAHH-501 or LAHH-502	AERATION TANK	High High level alarm in Aeration Tank	FLASH	Check pump P-501/P-502 for failure	Replace faulty pump
LALL-501	AERATION TANK	Low Low Level Alarm	WARN	Check level in the tank and ensure Level switch or transmitter is functioning correctly.	Clear obstruction or repair/ replace faulty equipment

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Alarm Name	Alarm Location	Alarm Description	Beacon Status	Troubleshooting Recommendation	Remedy Action
PHAL-501	AERATION TANKAERATION TANK	Low pH AlarmLow low in Aeration Tank	WARN WARN	Check if caustic injection system is working and or needs refill Check if the pH probe is fouled or if the probe requires calibration. Check setpoint temperature.	Replace caustic injection system or refill. Clean pH probe. Calibrate pH probe. Adjust set point temperature.
PHAH-501	AERATION TANKAERATION TANK	High pH alarm	WARN WARN	Check if caustic injection system is malfunctioning or if PH probe is calibrated or fouled.	Replace caustic soda injection. Calibrate pH probe or clean sensor
DOAL-501	AERATION TANKAERATION TANK	Dissolved Oxygen Alarm low	WARN WARN	Investigate if there is septic smell & check the mixing pattern. If system smells septic with no uniform mixing, air diffuser might be clogged, blowers may not work or plant is overloaded. Ensure DO probe is calibrated and clean.	Increase aeration rate to maintain DO above 1.5 mg/L, or replace clogged diffuser, or change blower, or calibrate or clean DO probe. Replace caustic soda injection. Calibrate pH probe or clean sensor
P-501 or P-502 FAIL	AERATION TANK	Pump P-501 or P-502 has potentially failed	FLASH WARN	Check pump P-501 or P-502 for failure. Check Breaker	Replace pump P-501 or P-502.

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Alarm Name	Alarm Location	Alarm Description	Beacon Status	Troubleshooting Recommendation	Remedy Action
P-503 FAIL	AERATION TANK	Pump P-503 has potentially failed	FLASH FLASH	Check pump P-503 for failure. Check Breaker	Replace pump P-503
PAL-501	AERATION	Blower motor tripped off on overload Pressure	WARN FLASH FLASH	Check blower air line equipment and blower motor Check if 500 series blowers have failed	Replace faulty equipment Replace blowers if required
PAL-601 or PAL-602	MEMBRANE TANK	Pressure Alarm low on air inlet to correspondi ng Membrane Tank. Blower motor tripped off on overload	FLASH WARN	Check if blower B-601 or B-602 has failed. Check blower air line equipment and blower motor	Replace blower if required. Replace faulty equipment.
LAHH-601 or LAHH-602	MEMBRANE TANK	High High level alarm in Membrane	FLASH WARN	Check pump P-601 for failure	Replace pump P-601 Replace faulty equipment
FLT-701 or 702	PERM VFD 1 or 2	VFD Fault	FLASH WARN	Check VFD fault	Replace pump and VFD Replace faulty equipment
VTAL-701 or 702	MEMBRANE 1 or TANK 2	Low vacuum alarm on permeate line from MBR1 or MBR2	FLASH WARN	Check for vacuum leak and membrane or pump fail	Repair and replace as required

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Alarm Name	Alarm Location	Alarm Description	Beacon Status	Troubleshooting Recommendation	Remedy Action
VTAH-701 or 702	MEMBRANE 1 or TANK 2	High vacuum alarm on permeate line from MBR1 or MBR2	FLASH WARN	Check for closed valve on permeate side or check membranes for severe fouling	Open valve or clean membranes Repair and replace as required
FTAL-701 or 702	MEMBRANE 1 or TANK 2	Low permeate flow alarm on permeate line from MBR1 or MBR2	FLASH WARN	Check for closed valve or permeate pump failure Check for closed valve on permeate side or check membranes for severe fouling	Open valve or repair/ replace permeate pump Open valve or clean membranes Repair and replace as required
FTAH-701 or 702	MEMBRANE 1 or TANK 2	High permeate flow alarm on permeate line from MBR1 or MBR2	FLASH WARN	Check for vacuum leak or membrane failure and operation of permeate pump	Repair and replace as required Open valve or repair/ replace permeate pump Open valve or clean membranes
UVA-811 or 812	PERM	UV-811 or UV-812 has failed.	FLASH WARN	Check if UV lamp has failed	Change UV lamp
UVA-BOTH	PERMEATE	UV-light 811 and UV-812 have failed	FLASH WARN	Check if UV lamp has failed Check if UV lamp has failed Check if UV lamp has failed	Change UV lamp Change UV lamp Change UV lamp Repair and replace as required
BACKWASH1 or BACKWASH2 FAILED	BACKWASH PERM1 or PERM2	Backwash to TNK-601 or TNK-602 failed	FLASH WARN	Backwash did not complete – system skipped backwash	Check function of back-wash pump and valve

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Alarm Name	Alarm Location	Alarm Description	Beacon Status	Troubleshooting Recommendation	Remedy Action
P-901 FAIL	MEMBRANE PERM 1	Pump P-901 has potentially failed	FLASH WARN	Check pump P-901 for failure Check for vacuum leak or membrane failure and operation of permeate pump	Replace pump P-901 Repair and replace as required
TALL-7901	BLDG-7901	Low low Temperature alarm for building	FLASH WARN	Check if electric heaters have failed or if BLDG door is open	Repair or replace heater(s) if required. Repair and replace as required
B-7901 FAIL	AIR EXCHANGE BLDG-7901	Potential blower failure	FLASH WARN	Check motor breaker	Turn breaker on

7.5.3 MBR Process Trouble Shooting

The following **newterra MicroClear™ MBR WWTP troubleshooting guide** can be used as a quick reference. If any of the problems discussed in this section or other difficulties persist, consult **newterra** ltd.

7.5.3.1 Biological System

Condition	Possible Cause	Potential Remedies
Mixed liquor is black or dark brown	Insufficient aeration is supplied for mixed liquor and/or plant is under-loading	Increase aeration rate and keep it above 1 mg/L Waste more sludge Increase influent feed rate if required
Mixed liquor concentration is too high or too low	Sludge wasting rates are incorrect	Review operation of the activated sludge process and revise the sludge wasting rates as necessary
No mixing in tanks	Blowers failure	Check for electrical/blower failure, and replace blowers as necessary

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Condition	Possible Cause	Potential Remedies
Unpleasant odour from tanks	Mechanical/electrical failure, e.g. blower and air piping are not operating correctly	Ensure good order of mechanical/electrical components
	System is overloading	Check the maximum flow and BOD loading rate to the MBR unit to see whether it is within the limits as per design specification Check the quality and contents of the flow into the MBR unit for any abnormal or prohibited substances
Effluent quality does not meet discharge criteria	Mixed liquor characteristics are not within proper operating standards	Improve the process operating conditions of the activated sludge system (confirm operating SRT and loading is within design and no present of toxic compounds)

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7.5.3.2 Foaming

Condition	Possible Cause	Potential Remedies
Excessive foaming (white foam accumulating over the liquid surface) in aeration and/or membrane tanks	Influent inhibition/biomass toxicity occurs	Check the quality and contents of the flow into the MBR system for any abnormal or prohibited substances
	MBR system is overloading	Check the flow rates, BOD/COD loading and F:M ratio and then reduce flow/loading and/or increases MLSS concentration accordingly
	Mixed liquor characteristics are not within proper operating standards	Improve the operating conditions of the activated sludge system
	Membrane air scour system is over aerating	Review operation of the membrane scour system
	Foam control strategies are not operating correctly	Review foam removal equipment, anti-foam chemical dosing system (if applicable)
	MBR system are undergoing start-up	Remove foam and use approved defoamer as necessary (consult **newterra** Ltd);
		Control foam and ensure sprayer pump is running at all time during start-up,
		Ensure that MLSS concentration is increased, after start-up is completed

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7.5.3.3 Permeate

Condition	Possible Cause	Potential Remedies
Cloudy permeate (The permeate turbidity or TSS is above the specific setpoint)	Faulty operation of instrumentation	Confirm proper operation of control systems and instrumentation, clean, replace, recalibrate as required
	Membrane cassette sheets are damaged	Take out membranes and visually inspect the individual membrane sheets, and repair or replace the membrane sheets as necessary
	Membrane module assembly are damaged	Identify damaged part, e.g. leaking tube, pipe, O-ring, gasket, and replace as required
	Permeate piping leak	Identify the leak and repair as required, e.g. tighten connections
Lower permeate flow than expected	Mechanical equipment failure	Ensure proper operation of permeate pumps
	Incorrect operation of permeate piping and valves	Check permeate piping for leaks
High TMP and lower permeability than expected	Membrane sludging	Confirm proper operation of pretreatment Take out membranes and visually inspect the individual membrane sheet. Remove sludge material from membrane sheets**
	Mixed liquor characteristics are contributing to poor filterability	Test the filterability of the mixed liquor; review and improve operating conditions of the activated sludge system as necessary
	Desired operating flux or flowrate is higher than design	Adjust operational flux or flowrate to match the design flux or flowrate

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Condition	Possible Cause	Potential Remedies
	Membrane surface is fouled	Review recent cleaning records, and initiate appropriate cleaning procedure
	MLSS is too high, SRT is too low or insufficient dissolved oxygen in aerobic zone	Improve the characteristics of sludge by adjusting the activated sludge process operation
Uneven permeate and/or MLSS flow between membrane tanks	More recent completion of maintenance or recovery cleanings for one of the membrane tank	Review membrane cleaning records
	Uneven flow distribution to each membrane tank	Confirm proper operation of flow distribution system (pumps/control valves, etc)

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7.5.3.4 Membrane air system

Condition	Possible Cause	Potential Remedies
Uneven aeration of membrane module	Membrane diffuser clogging; Loose air piping connections	Wash or clean the diffusers Tighten pipe connections
Uneven aeration in membrane tank	Membrane diffusers or membrane modules are not level	Level the equipment
Air scour rate fails to reach the specified values	Improper operation of membrane blowers and/or air scour system, malfunctioning diffusers	Repair or replace the blowers Review and repair air piping as necessary Repair the diffusers

7.5.3.5 Membrane Cleaning

Condition	Possible Cause	Potential Remedies
Increased frequency of cleaning	Mixed liquor characteristics are contributing to poor filterability Improper operation of membrane cleaning Membrane operate at higher flux than designed	Test the filterability of the mixed liquor Review and improve operating conditions of the activated sludge system as necessary Confirm cleaning is done correctly, such as controls, cleaning cycles or durations, chemical concentration, and dosing system Review MBR flow records
Cleaning fails to recover flux, permeability of membranes	Improper operation of membrane cleaning Improper operation of permeate pumps, piping, and control valves Irrecoverable fouling of membranes	Confirm cleaning is operated correctly, such as controls, cleaning cycles or durations, and chemical concentration etc. Repair equipment as necessary Review operating history with the goal of identifying contributing factors to fouling;

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Condition	Possible Cause	Potential Remedies
		Perform membrane autopsy on membrane cassettes

7.5.3.6 Mechanical / Electrical Issues

Condition	Possible Cause	Potential Remedies
Indicator light at the control panel is on.	Air intake is blocked	Clean intake screens on blower housing Check air filter on blower for blockage
	Air discharge or vent line is blocked	Check discharge line and vent line visually or with drain cleaning equipment for obstructions
	MBR is flooded	Determine the cause of flooding, e.g., line obstruction, high flows, etc., and fix it
	Blower failed	Determine if blower failure was caused by an obstructed intake or discharge line Investigate overheating (i.e. internal thermal overload protection), short-circuiting, or other electrical failure, and mechanical failure (i.e. bearing failure) and correct it
Wastewater is backing up	Obstruction in the incoming sewer	Check the inlet pipe leading to the MBR visually or with drain-cleaning equipment
	Obstruction in the discharge piping	Check the permeate piping and later field piping visually or with drain-cleaning equipment
	Pumps failed	Check the operation of pumps as per pump manufacturer's specifications
	Flow rate to the MBR is too high	Check if the maximum flow rate to the MBR is within the limits as per design specification
Blower/pump not working	Fuse blown	Electrician to check
	Motor is overloading	Electrician to check
	Power failed	Electrician to check
System not in run mode	Kill switches are mistakenly pushed in	Ensure kill switches (on control panel/wall) are not pressed;
	Power failure/outage	Electrician to check

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7.5.4 P-201/2, 301/2, 401/2, 501/2, 553/4, 551/2 - Trouble Shooting

TROUBLESHOOTING

1. Pump fails to build head pressure:

Check for:

a. Pump not primed.

b. Incorrect pump rotation.

c. Driver speed too low.

d. Suction line restricted.

e. Driver failure.

f. Plugged or damaged impeller.

g. Pump or impeller undersized.

h. Pump cavitation.

i. Improper impeller clearance.

2. Pump fails to provide enough flow rate.

Check for:

a. System resistance too high.

b. Pump undersized.

c. Pump not primed.

d. Driver speed too low.

e. Poor suction conditions.

f. Improper impeller clearance.

3. Excessive noise or vibration during operation.

Check for:

a. Motor bearing failing.

b. Pump cavitation.

c. Improper impeller clearance.

4. Leaking mechanical seal.

Check for:

a. Improper assembly.

b. Worn or cracked seal faces.

c. Abrasive material in fluid.

d. Liquid flashing at seal faces (Fluid temperature too high).

e. Seal pressure rating too low for the service.

f. Chemical attack of seal components.

g. Seal operated dry or with a liquid having poor lubricating properties.

5. Pump gradually loses pressure and head.

Check for:

a. Increasing temperature causing cavitation or liquid vaporization.

b. Driver failure.

c. Suction lift too high.

d. Air entering suction line.

6. Motor overheating.

Check for:

a. Excessive flow and amp draw (Throttle discharge).

b. Low voltage or frequency.

c. Flow rate too low with resulting heat rise.

d. Bearing failure.

e. System temperature too high.

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7.5.5 P-701/702 Trouble Shooting

TROUBLESHOOTING

WARNING: Before making adjustments, disconnect power source and thoroughly bleed pressure from system prior to disassembly. Failure to do so could lead to electric shock or serious bodily harm.

Failure To Pump.

1. Motor will not start: Check power supply. Voltage must be ± 10% of nameplate rating when motor is in locked rotor condition. Check for faulty capacitor on 1 phase Models.
2. Motor runs and thermally kicks out: Check for excessive discharge pressure. Check for defective centrifugal switch on 1 phase Models. Increase ventilation to motor. Do not use less than #14 wire size.
3. Stator torn; possible excessive pressure: Replace stator, check pressure at discharge port.
4. Flexible joint broken; possible excessive pressure:

   Replace joint, check pressure at discharge port.
5. Wrong rotation (3 phase only): Rotation must be clockwise when facing pump from motor end. Reverse the connections of any two line leads to the motor.
6. Excessive suction lift or vacuum.

Pump Overloads.

1. Excessive discharge pressure: Check pressure at discharge port for maximum ratings given in Table 1.
2. Fluid viscosity too high: Limit fluid viscosity to 100 CP or 500 SSU.

Noisy Operation.

1. Excessive suction lift or vacuum: Maximum suction lift is 25 feet for water.
2. Suction line too small: Check pipe size. Be sure lines are free from obstructions.
3. Pump Cavitates: Pump speed is 1725 rpm. Viscosity of fluid should not exceed 100 CP or 500 SSU.
4. Flexible joint worn: Replace joint. Check pressure at discharge port.
5. Insufficient mounting: Mount to be secure to a firm base. Vibration induced noise can be reduced by using mount pads and short sections of hose on suction and discharge ports.

Seal Leakage.

1. Leakage at startup: If leakage is slight, allow pump to run several hours to let faces run in.
2. Persistent seal leakage: Faces may be cracked from freezing or thermal shock. Replace seal.

Pump Will Not Prime.

1. Air leak on suction side: Check pipe connections.

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7.5.6 P-801 Trouble Shooting

CONDITION	COMMON CAUSES
A. Pump will not start or run.	Check fuse, low voltage, overload open, open or incorrect wiring, open switch, impeller or seal bound mechanically, defective capacitor or relay when used, motor or wiring shorted. Float assembly held down. Switch defective, damaged, or out of adjustment.
B. Motor overheats and trips overload or blows fuse.	Incorrect voltage, negative head (discharge open lower than normal) impeller or seal bound mechanically, defective capacitor or relay, motor shorted.
C. Pump starts and stops too often.	Float tight on rod, check valve stuck or none installed in long distance line, overload open, level switch(s) defective, sump pit too small.
D. Pump will not shut off.	Debris under float assembly, float or float rod bound by pit sides or other, switch defective, damaged or out of adjustment.
E. Pump operates but delivers little or no water.	Check strainer housing, discharge pipe, or if check valve is used vent hole must be clear. Discharge head exceeds pump capacity. Low or incorrect voltage. Incorrect motor rotation. Capacitor defective. Incoming water containing air or causing air to enter pumping chamber.
F. Drop in head and/or capacity after a period of use.	Increased pipe friction, clogged line or check valve. Abrasive material and adverse chemicals could possibly deteriorate impeller and pump housing. Check line. Remove base and inspect.

7.5.7 B-501/502 - Trouble Shooting

PROBLEM	POSSIBLE CAUSES	SOLUTION
Knocking	1. Unit out of time. 2. Distortion due to improper mounting or pipe strains. 3. Excessive pressure differential. 4. Worn gears. 5. Worn bearings.	1. Re-time impellers 2. Check mounting alignment and relieve pipe strains. 3. Reduce to manufacturer's recommended pressure. Examine relief valve, re-set if necessary. 4. Replace timing gears. 5. Replace bearings..
Excessive blower temperature.	1. Too much oil in gear case. 2. Too low operating speed. 3. Dirty air Filter. 4. Clogged filter or muffler. 5. Excessive pressure differential. 6. Worn impeller clearances. 7. Internal contact.	1. Reduce oil level. 2. Increase blower speed. 3. Clean or replace air filter 4. Remove cause of obstruction. 5. Reduce pressure differential across the blower. 6. Replace impeller. 7. Correct clearances.
Impeller end or tip drag.	1. Insufficient assembled clearances. 2. Case or frame distortion. 3. Excessive operating pressure. 4. Excessive operating temperature.	1. Correct clearances. 2. Check mounting and pipe strain. 3. Remove cause. 4. Remove cause
Lack of volume.	1. Slipping belts. 2. Worn clearances. 3. Dirty air filter	1. Tighten belts. 2. Re-establish proper clearances. 3. Clean or replace air filter.
Excessive bearing or gear wear.	1. Improper lubrication.	1. Correct lubrication level. Replace dirty oil.
Loss of oil.	1. Headplate, gear case or drive cover vents plugged. 2. Worn Seal.	1. Clean vents. 2. Replace seals.

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7.5.8 B-301/302, B-601/602 - Trouble Shooting

Fault	Cause	Remedy	Carried out by
Motor does not start; no motor noise.	At least two power supply leads interrupted.	Eliminate interruption by fuses, terminals or power supply cables.	Electrician
Motor does not start; humming noise..	One power supply lead interrupted.	Eliminate interruption by fuses, terminals or power supply cables.	Electrician
	Impeller is jammed.	Open vacuum pump/compressor cover, remove foreign body, clean.	Service*)
		Check or correct impeller gap setting if necessary.	Service
	Impeller defective.	Replace impeller.	Service*)
	Rolling bearing on drive motor side or vacuum pump/compressor side defective.	Replace motor bearing or vacuum pump/compressor bearing.	Service*)
Protective motor switch trips when motor is switched on. Power consumption too high.	Winding short-circuit.	Have winding checked.	Electrician
	Motor overloaded. Throttling does not match specification on rating plate.	Reduce throttling.	Service*)
		Clean filters, mufflers and connection pipes if necessary.	Service*)
	Compressor is jammed.	See fault: "Motor does not start; humming noise." with cause: "Impeller is jammed.".	Service*)
Pump-motor unit does not generate any or generates insufficient pressure difference.	Leak in system.	Seal leak in the system.	Operator
	Wrong direction of rotation.	Reverse direction of rotation by interchanging two connecting leads.	Electrician
	Incorrect frequency (on pump-motor units with frequency converter).	Correct frequency.	Electrician
	Shaft seal defective.	Replace shaft seal.	Service*)
	Different density of pumped gas.	Take conversion of pressure values into account. Inquire with Service Department.	Service
	Change in blade profile due to soiling.	Clean impeller, check for wear and replace if necessary.	Service*)
Abnormal flow noises.	Flow speed too high.	Clean pipes. Use pipe with larger cross-section if necessary.	Operator
	Muffler soiled.	Clean muffler inserts, check condition and replace if necessary.	Service*)
Abnormal running noise.	Ball bearing lacking grease or defective.	Regrease or replace ball bearing.	Service*)
Compressor leaky.	Seals on muffler defective.	Check muffler seals and replace if necessary.	Service*)
	Seals in motor area defective.	Check motor seals and replace if necessary.	Service

*) Only when the maintenance manual is at hand: rectification by the operator.

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7.5.9 LT-301/501 - Trouble Shooting

1.	**Symptom**:	***Transducer fails to give output of any kind.***
	Procedure:	Isolate the problem to either the transducer or the power supply/readout. See the Quick Check Procedures (above) for this check. If it can be determined that the transducer is no longer operable, remove it from service for further analysis. If the transducer output falls within the limits described above, the fault lies somewhere else in your system.
2.	**Symptom**:	***Transducer has failed and has been removed for analysis.***
	Procedure:	Inspect the cable for physical damage. Cuts in the cable jacket can result in liquid incursion into the transducer housing, which can cause permanent damage. If operational, the cable can be repaired by using a splice kit (P/N 830) supplied by Pressure Systems. Inspect the transducer housing. It should be intact and free of corrosion. If the outer surface of the transducer is pitted, this could be an indication of galvanic corrosion caused by stray ground currents. If this is the case, the transducer will probably require replacement. If the external case exhibits none of these characteristics, carefully unscrew the nosepiece and look into the pressure sensing end of the transducer. The concentric rings of the sensing diaphragm should be visible. If they are not, it could be that residue has accumulated on the diaphragm, preventing it from responding properly to pressure changes. The transducer can be cleaned by gently swishing the transducer back and forth in a bucket of warm, soapy water until the residue softens and washes off. (See **Cleaning Your Transducer**, page 8.) ***Under no circumstances should any object or tool be used to remove residue from the sensing diaphragm or else permanent damage will be done.*** If cleaning the diaphragm does not solve the problem, the transducer should be returned to the factory for repair or replacement.
3.	**Symptom**:	***Transducer develops a negative offset and gets worse over time (actual level exceeds specified level).***
	Procedure:	This may be a sign that moisture has entered the reference (vent) tube in the cable and is inside the transducer housing. This is usually the result of not maintaining the desiccant vent filter or of operating the transducer without a desiccant filter or aneroid bellows. If caught early enough, the transducer can be saved by coiling the cable and transducer in a pan and baking it in an oven at 50°C (122°F) for a minimum of 2 hours. *Be careful that the oven temperature does not exceed 50°C (122°F)* or both the transducer and the cable can be damaged. **Alternatively**, suspend both the cable and transducer in a vertical position (with vent tube down), overnight to allow water to drain from the transducer and vent tube.

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4. **Symptom:** ***Transducer suddenly fails during or just after a nearby lightning event.***

   Procedure: This failure is usually caused by overvoltage due to ground transients resulting from a direct or indirect lightning event. These transients can travel distances of a mile or more. The transducer may be returned to the factory for repair and optional retrofit of our ***lightning protection system.*** This system carries a lifetime warranty against transducer damage due to lightning.

5. **Symptom:** ***Transducer response to pressure/level input changes becomes sluggish.***

   Procedure: This is usually a sign that the sensing end of the transducer has become fouled with residue. The transducer must be removed from service and the sensing diaphragm cleaned as described in Item 2, (warm, soapy water). If fouling persists, the transducer may be replaced with a Series 705 or Series 750 (non-fouling) transducer, which is specifically designed for trouble-free operation in a high residue environment.

6. **Symptom:** ***Output reading is within limits but "freezes" at one point.***

   Procedure: In certain environments "crust" may form over the sensing diaphragm, preventing the sensor from identifying change in level. Removing the transducer from service and cleaning it (as described in Item 2) will generally solve the problem. To combat marine growth, you might try wrapping the transducer with copper wire similar to that found in wire scouring pads for cleaning dishes. Marine growth occurs on the copper and eventually erodes the copper and drops off or the copper is manually removed during routine maintenance. Alternatively, there are various companies that will impregnate/coat the 316 stainless steel with anti-fouling chemicals of coatings. Level transducers temporarily removed from the well or sump should not be stored dry, but should be stored in a bucket of fresh water in order to prevent "crust" formation.

7. **Symptom:** ***Readings increase very slowly over time***.

   Procedure: Our cable is shipped coiled and consequently takes time to straighten when installed. Attaching a weight to the transducer (e.g., one of our sacrificial anodes) will help. To prevent cable stretch with lengths greater than 200 feet (60 m), secure the Kevlar fibers (just under the cable jacket) to your junction box or other secure object.

8. **Symptom:** ***No electrical output from your transducer.***

   Procedure: Check all electrical connections to ensure they are correct and secure. Double check your power supply or use a battery (as described previously) to ensure the transducer is getting power. If all checks OK, the problem could be a circuit board or the sensor in your transducer. The unit must be returned to the factory for evaluation. The most probable cause of this type of failure is damage to the submersible cable jacket allowing water to leak down the cable and into the transducer housing or lightning damage.

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9. **Symptom:** ***Formation of marine growth on a submersible transducer.***

   Procedure: Certain transducer construction materials, for example, 316 stainless steel, attract marine life (snails) and algae. Clean the transducer diaphragm by soaking it in a bucket of warm water with a non-aggressive cleaning solution. You can also coat the transducer with marine grease. This may be the most effective and inexpensive way to protect your transducer.

10. **Symptom:** ***Submersible transducer exhibits corrosion or pitting on body or diaphragm***

    Procedure: Dissimilar metals (for example, your transducer housing and your pump housing) in an electrolytic environment (fluid in your well) can lead to *galvanic corrosion* of the metal that is nearer the anodic end of the galvanic series. Likewise, a voltage potential between the ground wire of the transducer and the ground of other equipment in the well can lead to *galvanic corrosion*. Installation of a P/N 820 or 825 sacrificial anode will help protect your transducer from *galvanic corrosion*. Our sacrificial anodes are made of a zinc alloy that, being nearer the anodic end of the galvanic series than the 316 stainless steel or titanium housing of the transducer, will corrode before the transducer.

11. **Symptom:** ***The transducer is buried in dirt or silt and the readings seem to be erroneous.***

    Procedure: Use of a piezometer nosepiece in this application would help. This nosepiece can be easily installed in the field and features a very fine screen to keep dirt from fouling the diaphragm, but allows the diaphragm to sense moisture levels.

12. **Symptom:** ***Transducer has an offset error.***

    Procedure: Our submersible transducers perform best when the sensing end is pointing in a downward manner. Keep in mind that you can experience offset error due to the position sensitivity or orientation change of the sensor. Offset errors are more prominent in low pressure applications with the sensing end of the transducer lying flat or pointing upward.

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13. Symptom: ***I am testing a Series 700 4-20mA sensor for use with our data logger. On page A-2 of the KPSI Level and Pressure Transducers User's Manual, I see the standard 4-20mA configuration. Does the recording channel of my data logger become the mA meter?***

Procedure: Most data loggers cannot measure current (mA) directly. When this is the case a load resistor must be used to convert the current (mA) output into an appropriate voltage. If the User's Manual for your particular instrument does not illustrate a preferred method for recording current (mA) data then you should attach your transducer signal wires to your data logger in the following manner.

Transducer red wire **+** Data Logger Excitation Terminal
(The minimum excitation for a Series 700 Transducer is 9VDC)
Transducer black wire **–** Data Logger signal input (+) terminal

Attach a Load resistor between the Data Logger signal input (+) terminal and the Data Logger signal input (-) terminal.

Attach a separate piece of wire between the Data Logger signal input (-) and analog ground.

In this configuration you will turn your data logger into a milliammeter. The size of your load resistor can be calculated in the following manner.

D/0.02=R

Where:

Data logger input range = D
Full scale output of transducer = 0.02 A (20 mA)
Load Resistor Value = R

Pick an appropriate standard value

250 Ohms results in 1 to 5 VDC at 4 and 20 mADC
125 Ohms results in 0.5 to 2.5 VDC (500 to 2500 mVDC) at 4 and 20 mADC

At this point the discussion needs to address IR loss (voltage drop) in series circuits. Note that Series 700 transducers need a minimum of 9 VDC to operate correctly. When the transducer is operating correctly it will output a current which, when driven through a resistor, will generate some amount of voltage drop. If the resistor value is 250 Ohms then the voltage measured across that resistor will be 0.004 A * 250 Ohms = 1.000 VDC and 0.020 A * 250 Ohms = 5 VDC. Notice that, if the available voltage from the data logger is12 VDC then 12 VDC - 5 VDC = 7 VDC which is less than the voltage required by the transducer to operate. If this scenario were to occur the transducer would actually stop functioning correctly when its output reached 12 mADC (50% of transducer full scale range). In this case the appropriate choice for a load resistor value is 125 Ohms.

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14. Symptom: ***I have a Series 700 4-20mA transducer rated for 7.5 PSIG attached to a pressure source that is outputting 7.5 PSIG. With 20VDC being supplied I am getting 19.94 mA. I can't find the upper range allowance for the sensor, but this seems low to me. Does this mA reading fall into the acceptable range for the transducer with the settings I've specified?***

Procedure: When evaluating a transducer it is sometimes convenient to make some broad generalizations in order to rapidly determine the condition of the unit. In general, transducers that output a 4-20 mADC signal have a 16 mADC span (4 - 20 = 16). If the transducers accuracy is reported as being some percentage of its full-scale range then the following table could be used in conjunction with the instructional notations to determine whether a more detailed analysis of data quality is required.

Model	Accuracy	Accuracy in mADC
700	1.00%FS	±0.16 ma
710	0.50%FS	±0.08 ma
720	0.25%FS	±0.05 ma
730	0.10%FS	±0.016 ma
735	0.05%FS	±0.008 ma

In order to approximately determine how many milliamps a transducer should output at a given depth.

1. Determine the depth (in feet) at which the transducer is sited.
2. Divide the depth value (from step 1) by the transducer full-scale range (in feet). - Record the value.
3. Multiply the value calculated in step 2 by 16 (the transducer span in milliamps).
4. Add 4 to the product of step 3. This is the approximate value in milliamps that should be output by the transducer at its current depth.

In order to approximately determine the depth of a transducer (in feet) using a given value of milliamps.

1. Divide the full-scale range of the transducer (in feet) by 16. Record this value.
2. Subtract 4 from the milliamp output of the transducer. Record this value
3. Multiply the result of step one by the result of step 2. This is the approximate depth at which the transducer is sited.

If the resulting numbers are reasonably close to some verified value for current water depth, then the unit is functioning. In order to determine the quality of measurement, additional steps need to be performed.

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7.5.10 PH-501 - Trouble Shooting

Fault reporting and troubleshooting

Display	Description / cause	Status[1]	Mode[2]	Measured variable output[3]	Correction variable output[4]
pH/mV RANGE ↓	Input voltage too low	Error	Basic load	Fault current	-
pH/mV RANGE ↑	Input voltage too high	Error	Basic load	Fault current	-
T RANGE ↓	Measured temperature beneath measuring range	Error	Basic load	Fault current	Fault current
T RANGE ↑	Measured temperature above measuring range	Error	Basic load	Fault current	Fault current
CAL ERROR	No valid user calibration exists	Error	-	-	-
NO PROBE	If activated: pH sensor monitoring outputs: no sensor	Error	Basic load	Fault current	-
PROBE ERR	If activated: pH sensor monitoring outputs: sensor break	Error	Basic load	Fault current	-
CHECK-TIME	Control checkout time elapsed	Error	Basic load	Fault current	-
mA RANGE ↑	mA output current has an upper limit	Error	-	-	-

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Display	Description / cause	Status[1]	Mode[2]	Measured variable output[3]	Correction variable output[4]
mA RANGE ↓	mA output current has a lower limit	Error	-	-	-
LIMIT ↑	Measured variable exceeds upper set limit	Warning	-	-	-
LIMIT ↓	Measured variable falls below lower set limit	Warning	-	-	-
T LIMIT ↑	Correction variable exceeds upper set limit	Warning	-	-	-
T LIMIT ↓	Correction variable falls below lower set limit	Warning	-	-	-
LIMIT ERR	Set checkout time for monitoring the measurement variable limits has elapsed	Error	Stop	Fault current	-
TLIMITERR	Set checkout time for monitoring the correction variable limits has elapsed	Error	Stop	Fault current	Fault current
NO CAL	No valid user calibration exists	Warning	-	-	-
CONTACTIN	If activated: Power relay is activated in *'PAUSE/HOLD'*	Error	-	-	-

1 = *[Status]* Error status after occurrence of the fault (error means: alarm relay deactivates, "*" is displayed before the error message, can be acknowledged with OK)

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2 = *[Mode]* Resulting controller mode (relates to control variable and thus, as necessary, mA output)

3 = *[Measured variable output]* Consequence for the current output, if this is set as *'a measured variable output'*

4 = *[Correction variable output]* Consequence for the current output, if this is set as *'a correction variable output'*

7.5.11 MV-701/702 - Trouble Shooting

Conditions	Possibilities	Solutions
Motor does not operate	1. Is the supplied power and voltage correct? 2. Any blisters on the capacitor? 3. Are the gear trains free?	1. Checking by meter. 2. If so replace. 3. Remove motor to check.
Motor stops running	1. Is power supply short circuited? 2. Any foreign objects in flow stream?	1. Check wiring. 2. Check for obstructions.
Unable to fully open/close	1. Loose/Misaligned cam? 2. Bent valve stem? 3. Mechanical stop adjustment incorrect?	1. Adjust/Tighten using spanner. 2. Replace valve stem. 3. Check position of stops.
Valve stops operating when motor is running.	1. Gear worn out? 2. Sleeve adapter worn out or broken? 3. Broken valve stem or actuator transmission shaft?	1. Replace gear. 2. Replace sleeve adapter. 3. Replace valve stem or actuator transmission shaft.
Abnormal control for operating two or more actuators simultaneously.	1. Controlling circuit connects in tandem or parallel?	1. Please refer to the wiring diagram.
Motor overheats.	1. Is the voltage correct? 2. Is valve too tight to operate? 3. High working frequency? 4. Is motor stem or bearing binding?	1. Checking by meter. 2. Replace valve. 3. Check duty cycle. 4. Replace the binding parts.
Abnormal on/off angle on 3-phase voltage.	1. Wrong phase wiring?	1. Change phase wiring.
Occasional on/off actuator failure.	1. Simultaneous input power on/off.	1. Check if the selection switch is normal.
Vibration when valve is closed.	1. Motor brake spring fatigued or Teflon worn?	1. Replace spring or Teflon.

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8.0 SHUT DOWN

8.1 MBR Temporary Shut Down

A temporary shutdown for a few days requires continuous aeration of the biomass to keep the DO level at least 2 mg/L and continuous biomass recycle between the bioreactors.

8.2 MBR Permanent Shut Down / Winterizing

Permanent shut down is required if system operation stops for at least 2 weeks without inflow. Permanent shut down includes the following procedure:

8.2.1 Process Shut Down Procedure

- Conduct a “Backwash Now” operation on the system
- Stop influent flow into the System
- Ensure all pumps are in the “OFF” position using the HOA HMI screen
- Ensure all Blowers are in the “AUTO” position using the HOA HMI screen. This is to be done until a vacuum truck can be provided or contracted locally to clean out the tanks.
- Ensure all automated valves are in the “OFF” position using the HOA HMI screen.
- Ensure that the MBR is disabled using the HMI screen button
- Conduct all maintenance procedures on Section 7 Table – regardless of schedule time

8.2.2 Cleaning - General

- Conduct general system interior cleaning
- Open all tanks, wash out with a garden hose and Vacuum out.
- Clean all sensors and level switches

8.2.3 Membranes

- Ensure that the membrane tanks (TNK-601/602) are drained before opening the membrane tanks.
- Open TNK-601/602 doors with hand/power tools.

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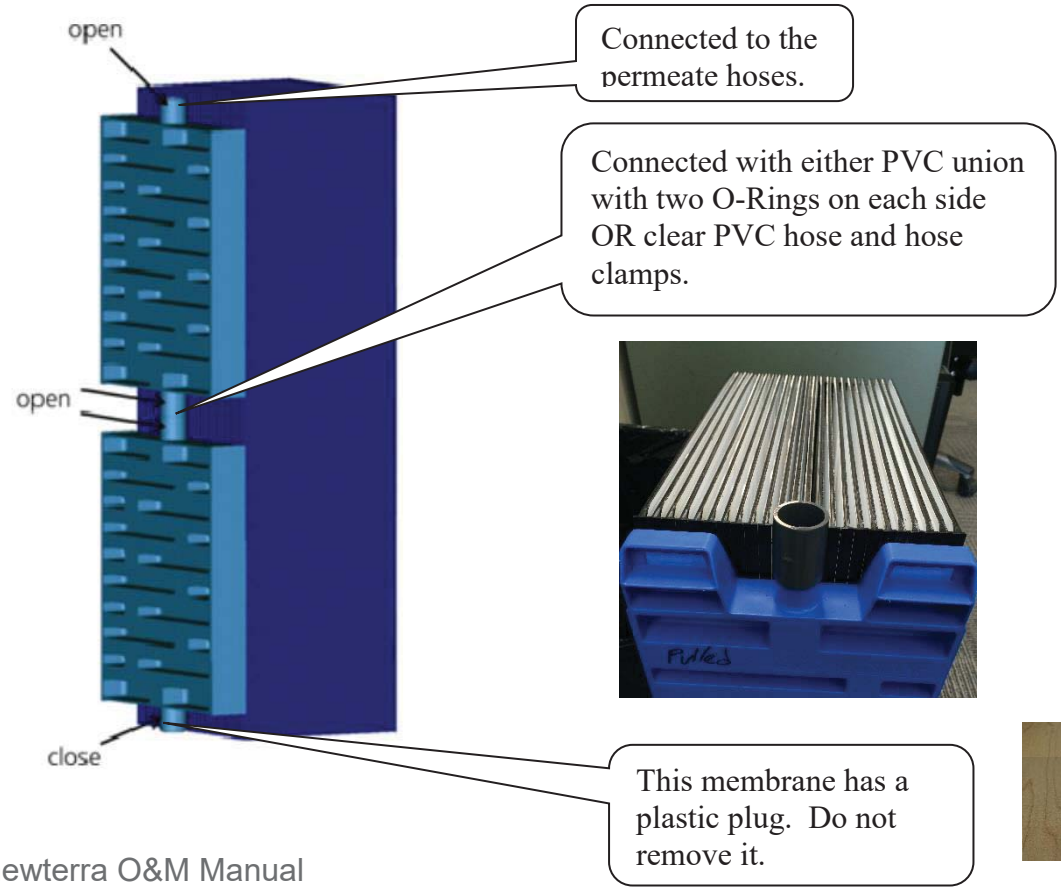
- Using a garden hose, wash the inside of the tanks and vac out any remaining waste water. **DO NOT USE A PRESSURE WASHER!**
- Disconnect the permeate hoses from the top of membrane the membrane stack.
- Remove the membranes from the membrane frame using hand tools.

- **CAUTION** – the membranes are contaminated with waste water. PPE required.
- **NOTE**. The membranes are double stacked. The bottom membrane has a plug in the bottom opening. Do not remove this plug. Note the membrane orientations for re-installation. The membranes are joined together with either a PVC union with two O-Rings on each side OR clear PVC hose and hose clamps.



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- After membranes are separated, wash with clean water. Remove the blue backing plate and gently separate the membrane plates and clean with water to remove any debris.

- Replace backing plate and let the membranes dry out.
- Shrink wrap the membrane cassettes in multiple film layers and seal the membranes cassettes with tape. Note and mark which membranes have the bottom plug in them.
- Store the preserved membrane cassettes at room temperature (never expose the membrane cassettes to frost, dust, or direct sunlight).

8.3 General Components

- Conduct all preventative maintenance as listed in Section 7.
- Drain/Vacuum Out and wash out all tanks.
- Clean and Wash out SCR-201/202
- Disassemble all PVC ball valves and drain any water inside (open and close to ensure trapped water escapes).
- Leave all valves ½ open during reinstallation
- Open all drain valves and leave open.
- Find all check valves and make sure water is not being held by valve (Wet/Dry Vac works well here).
- Drain / remove all pumps from tanks, ensure no water is left inside the pump.
- Use RV Antifreeze that is suitable for potable water systems
    - Refill any check valve

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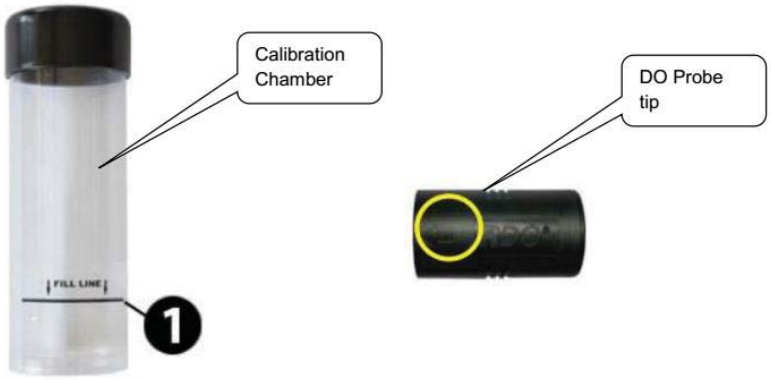
  - Dump in 2 (qty) 4-L bottles in each tank
- Remove power from system.
- Double check and ensure that there is no water left in any pipes, fittings etc. If it is not possible to remove the water fill with antifreeze.
- Drain the chemical tanks and dispose of chemicals in accordance with manufacturer's recommendations and local regulations.
- Remove pH (PH-501) and DO (DO-501) probes from TNK-501 and store with membranes in a heated area ensure probes are kept wet.

- **NOTE: Remove DO probe tip from the DO sensor (DO-501) in accordance with vendor directions in Appendix E and store in the calibration chamber with the storage cap attached with a few drops of clean water. Store with the membranes in a heated area and ensure probe tip is kept wet.**



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8.4 Blowers – B-501/502

STORAGE

Your Gardner Denver Blower was packaged at the factory with adequate protection to permit normal storage for up to six (6) months.

If the unit is to be stored under adverse conditions or for extended periods of time, the following additional measures should be taken to prevent damage.

1. Store the blower in a clean, dry, heated (if possible) area.
2. Make certain inlet and discharge air ports are tightly covered to prevent foreign material from entering the air box.
3. All exposed, non-painted surfaces should be protected against rust and corrosion.
4. Provide adequate protection to avoid accidental mechanical damage.
5. In high humidity or corrosive environments, additional measures may be required to prevent rusting of the blower internal surfaces.
6. To prevent rusting of gears, bearings, etc., the oil reservoirs may be filled with normal operating oil.

⚠ CAUTION
Before running the blower, drain the oil and replace to the proper operating level with clean, fresh lubricant.

7. Rotate the blower shaft (10 to 25 turns) weekly during storage. Inspect the blower shaft (near the shaft seal area) monthly and spray with rust inhibitor if needed.
8. For long term storage (over six (6) months), contact Gardner Denver Compressor Division Customer Service for recommendations.

REMOVING PROTECTIVE MATERIALS

The shaft extension is protected with rust inhibitor which can be removed with any standard solvent.

⚠ CAUTION
Follow the safety directions of the solvent manufacturer.

Blower inlet and outlet are temporarily capped to keep out dirt and other contaminants during shipment. These covers must be removed before start-up.

The internal surfaces of all Sutorbilt units are mist sprayed with a rust preventative to protect the machine during shipment. Remove this film upon initial startup, using any commercial safety solvent. Position the blower so that the inlet and discharge connections are in the vertical position (vertical airflow). On vertically mounted units, it will be necessary to lay the unit on its side supporting the ends of the unit so as not to restrict the port on the bottom side. Place a shallow pan on the under side of the unit. With the blower disconnected from power, spray the solvent in the top port, rotating the impellers by spinning the shaft manually. Continue this procedure until the unit is visibly clean.

⚠ WARNING
Rotating components will cause severe injury in case of personal contact. Keep hands and loose clothing away from blower inlet and discharge ports.

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8.4 Chemical Dosing Pumps – P-6101/6102/6103

1. Disconnect the pump from the mains power supply.
2. Empty the liquid end by turning the pump upside down and allowing the feed chemical to run out.
3. Flush the liquid end with a suitable medium; flush the dosing head thoroughly when using hazardous feed chemicals!

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9.0 SERVICE & SUPPORT

9.1 Commissioning and Start-up

newterra MicroClear™ MBR System's **commissioning & start-up** is the last step of the **newterra** project execution process.

As part of your order, the following on site services will be provided by experienced factory trained newterra representative:

- Includes five (5) 8-hour days of onsite startup/commissioning by one (1) factory trained newterra representative
- Includes five (5) 8-hour days of onsite training by one (1) factory trained newterra representative

9.1.1 Startup/Commissioning

Typical System Startup/Commissioning includes the following:

- Equipment checks - Electrical, mechanical, and controls
- Functional test - Equipment and control system
- Hydraulic test
- Operation during plant seeding

9.1.2 Training

On-site operator training including the following topics:

- General MBR theory & process
- Specific system instruction
    - Components
    - Controls and operating philosophy
    - Alarms and alarm troubleshooting
    - Maintenance
    - Troubleshooting
    - MBR fouling control (Biology, physical, and chemical)

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9.2 Post commissioning Services

A comprehensive range of post commissioning services are available from **newterra** beyond system design and installation. Specific services include:

- Technical support (including after-hours emergency telephone support).
- Spare parts order and delivery.
- Training program.
- Plant optimization and upgrades.
- Telemetry control and monitoring.
- Assistance in preparing system performance reports (process data monitoring & analysis).
- Preventive maintenance cleaning (including membrane cleaning).
- System audits for reviewing the performance and efficiency of all MBR subsystems..

9.2.1 Technical Support

Technical support is available to assist in troubleshooting of **newterra** MBR systems during normal working hours 8:30 am to 5:00 pm (Eastern Time Zone for **newterra** ltd.). Telephone service is available via **1.800.420.4056**.

Emergency **24/7 telephone technical support –** This will be activated upon subscribing to **newterra's** 24/7 technical support service. If a problem cannot be resolved through telephone or e-mail support, **newterra** technicians and engineers are available for site visits.

9.2.2 Spare Parts

newterra has spare parts to provide quick response to any critical system breakdown. Contact **newterra** parts department at **1.800.420.4056.**

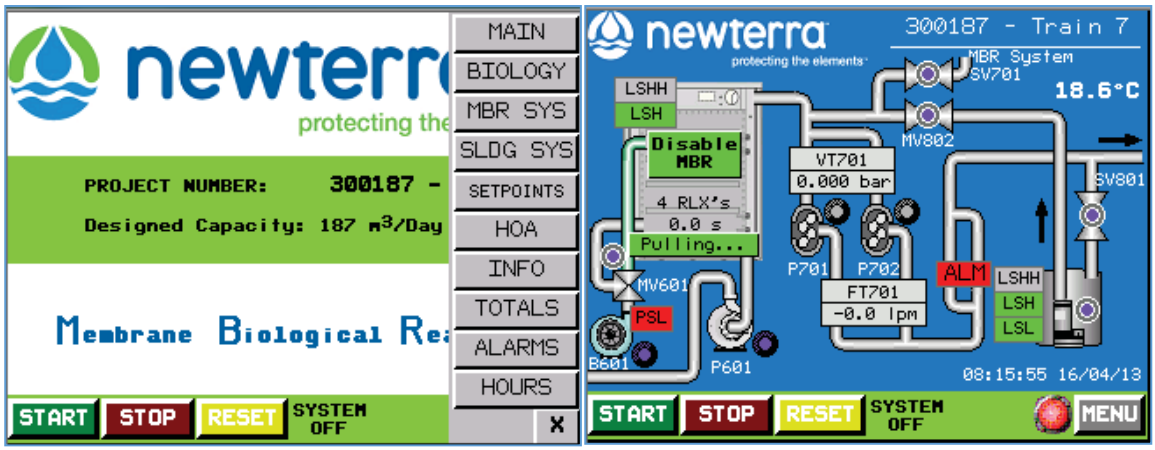
All parts and components associated with **newterra** MBR Systems are available from within service departments and manufacturing facilities of **newterra** ltd across Canada and abroad.

Potentially required spare parts are:

- membrane modules/membrane cassettes;
- parts for repair/replacement (valves, transmitters, switches, gauges, pH & DO probes, pump motors, analyzers, PLC components, fuses, etc.);
- maintenance spare parts (air blowers, air filters, pumps, immersion heaters, chemical metering pumps, etc.).

9.2.3 Assistance in telemetry control and monitoring

newterra SITE-LINK is a customized software program and hardware configuration which provides a real-time link to a treatment system via cellular modem or customer supplied internet connection using our secure Site-Link Server.



newterra Site-Link comes with the following customizable features:

- Customized P&ID layout with system status
- Start/Stop/Reset of system
- Manual control of all system components
- Data logging downloads in .csv format†
- Daily system status reports (E-Monitor)
- Alarm history including current alarm status
- Hour meters for applicable equipment
- Customization of all system set points†
- Live and historical trending
- Immediate text & email on alarm (E-Alarm)

†certain restrictions apply

The basic system requires that the customer provide a standard computer network cable to the control panel. If the customer's computer network is accessible to the internet, this system can also be monitored from any internet enabled computer. Static IP is not required but is recommended and must be provided by customer.

This system is not available if customer supplied internet connection or cellular service is not available at the site. During internet outages, reports cannot be sent and system status cannot be monitored remotely.

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9.2.4 Site visits and system audits

Site visits and system audits can be arranged at an additional cost. Contact **newterra** for all financial aspects of **newterra** initial and post-commissioning services.

During a system audit, technical reviews of the performance of all **newterra** MBR subsystems and the efficiency of the biological process can be performed. Based on the site visit and agenda discussed with the client, we can assist in:

- Maintenance coordination and scheduling, including membrane maintenance and cleaning.
- Validation of chemical dosing settings.
- MBR System inspection for the proper operation of the membrane system in accordance with the O&M manual; equipment calibration, process optimization and upgrades.
- Continued on-site operator training and coaching.

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10.0 WARRANTY

General Warranty Statement

1. **newterra** warrants and guarantees products of its manufacture against defective workmanship or material for a period of one year from the date of notice of readiness to ship.
2. This warranty is expressly and strictly limited to replacing, without charge, any part or parts which prove to **newterra**'s satisfaction upon examination, to have been defective in design, material or workmanship, and which have not been neglected, abused or misapplied, provided the buyer gives **newterra** immediate written notice upon discovery of any claimed defect.
3. During the warranty period, parts will be shipped as necessary with instructions to replace, which can be further elaborated over phone or email; visit(s) of our technician to site can be covered if there is a service agreement in place; otherwise, actual charges will be quoted to the owner at that time, if required.
4. **newterra** will also guarantee component parts manufactured by others to the extent of the guarantee made by the manufacturer of such equipment. In any case, guarantees on specific components will be extended a minimum of one year from date of notice of readiness to ship.

Warranty Exclusions

1. Warranty coverage does not include:
   - Freight, labor, travel, and living expenses associated with parts replacement
   - Normal maintenance items such as lubrication, fan belts, and cleaning of the equipment
   - System parts damaged as a result of customer changes to the system and/or PLC program without the written consent of **newterra**.
2. In the event that the customer, or any contractor employed by the customer, contracts an outside company, other than **newterra** for modification of system equipment, without knowledge of **newterra**, the warranty in that case may become null & void.
3. In the event that the customer, or any installation contractor employed by the customer, contracts outside **newterra** for installation work or erection of quoted equipment, the customer shall assume full responsibility for said contract.

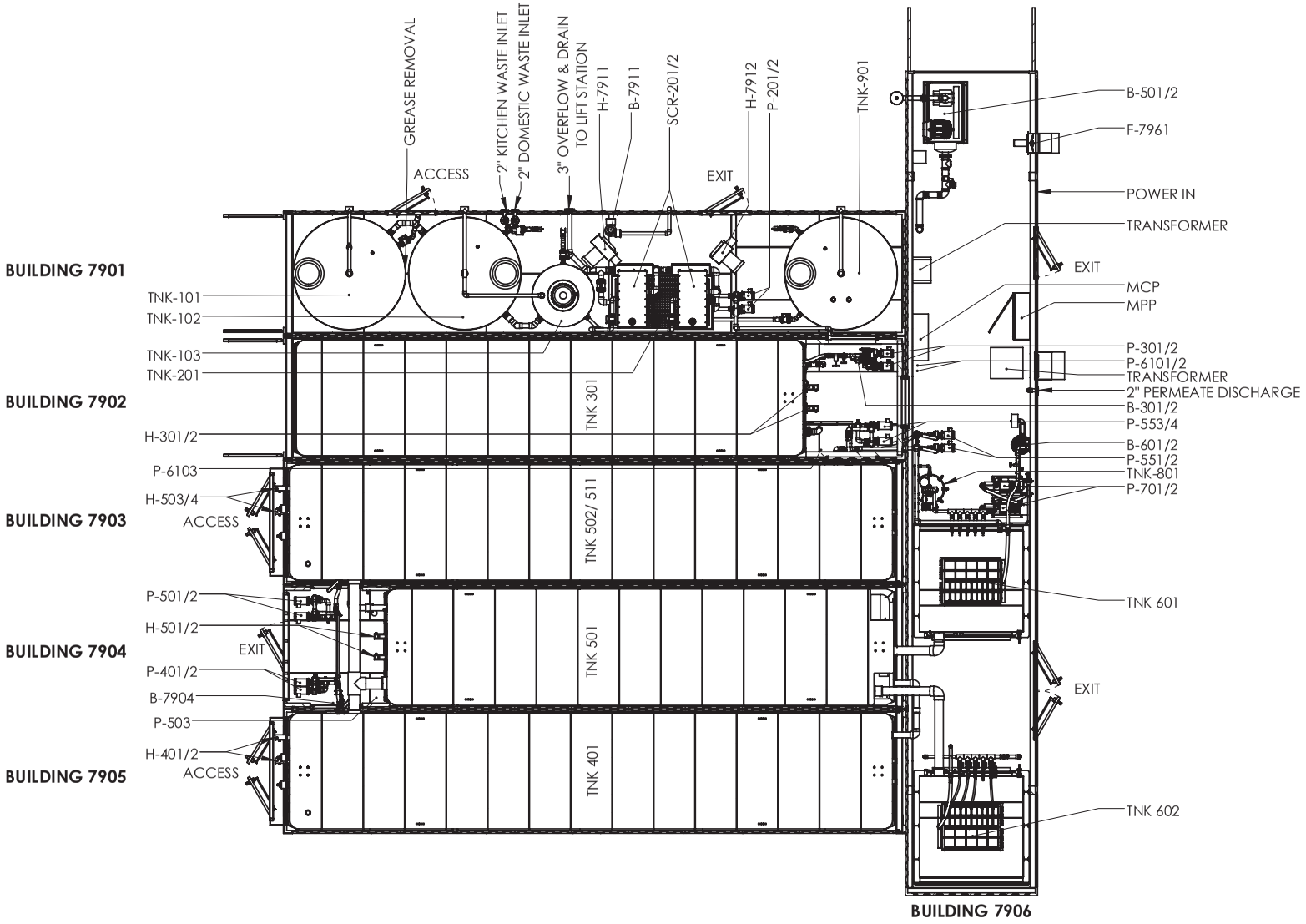
Warranty Validation and Conditions

1. **newterra** highly recommends that the system be started up by a **newterra** factory trained technician to ensure the correct installation and trouble-free startup. The startup checklist provided in the O&M manual must be completed and returned to **newterra** to validate your equipment warranty which begins on the date of shipment from the factory.
2. In the event that the system is commissioned by a certified technician that is not an employee of **newterra**, the Startup Checklist must be returned to **newterra** within 15 days of the completion of startup

newterra ltd.
1291 California Avenue, Brockville, ON K6V 5W3
(800) 420-4056 / www.newterra.com

APPENDIX A

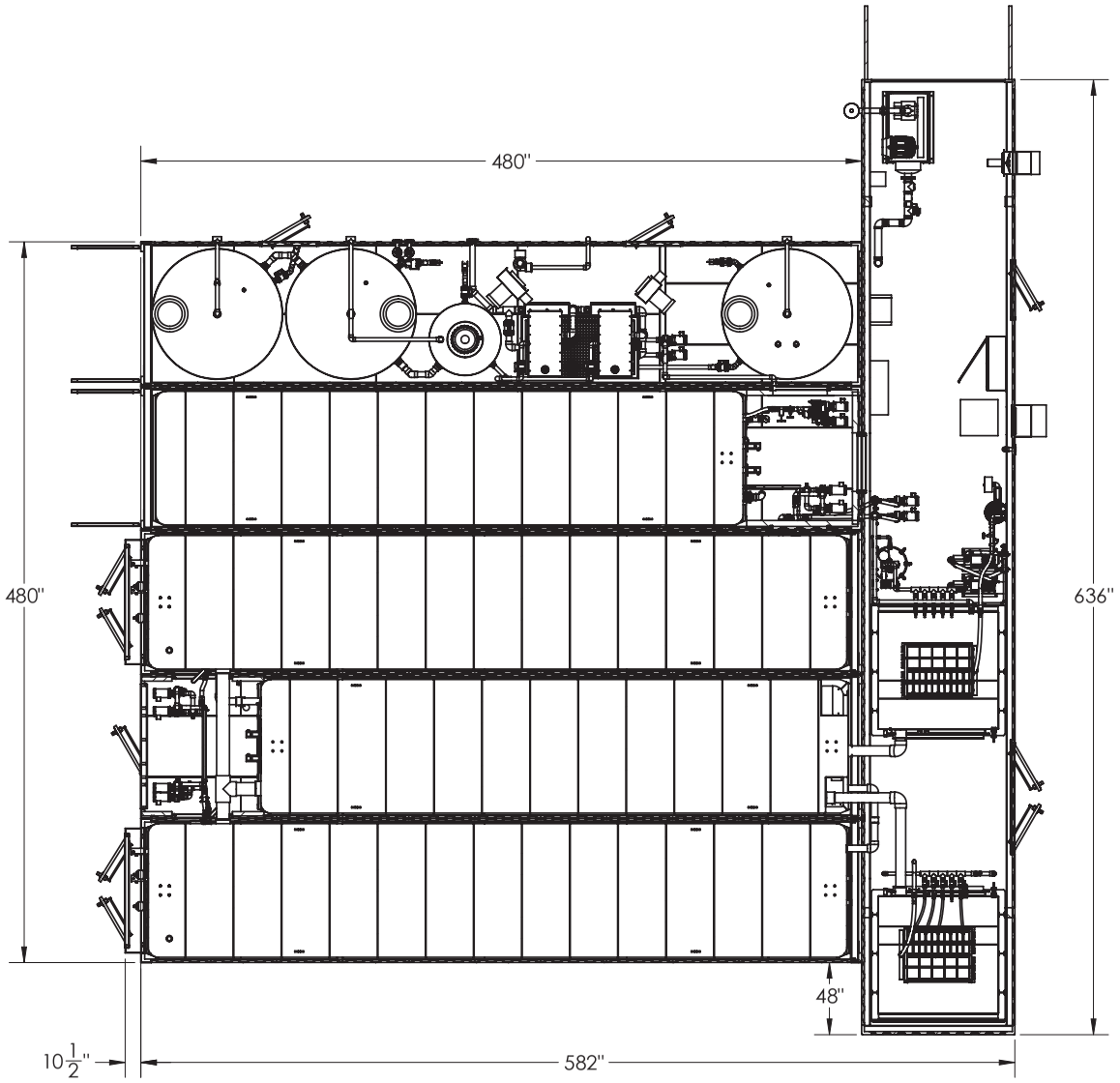
Drawings



GENERAL TOLERANCES
.XX ± 1/8 "
.XXX ± 1/16 "
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

LEVEL	DATE	BY	REVISION
C1	11/08/17	AH	AS BUILT
B1	07/06/17	GH	FOR PRODUCTION
B	06/06/17	GH	FOR PRODUCTION
A2	25/05/17	GH	REVISED LAYOUT
A	19/05/2017	GH	FOR REVIEW

DWG. NO:
PROJECT NUMBER: 1704432
TITLE: SYSTEM LAYOUT
CUSTOMER: AGNICO EAGLE
DRAWN BY: GH
DATE: 19/05/17
SHEET 1 OF 4



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.XX ± 1/8"
.XXX ± 1/16"
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

LEVEL	DATE	BY	REVISION
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B1	07/06/17	GH	FOR PRODUCTION
B	06/06/17	GH	FOR PRODUCTION
A2	25/05/17	GH	REVISED LAYOUT
A	19/05/2017	GH	FOR REVIEW

DWG. NO:

PROJECT NUMBER: 1704432

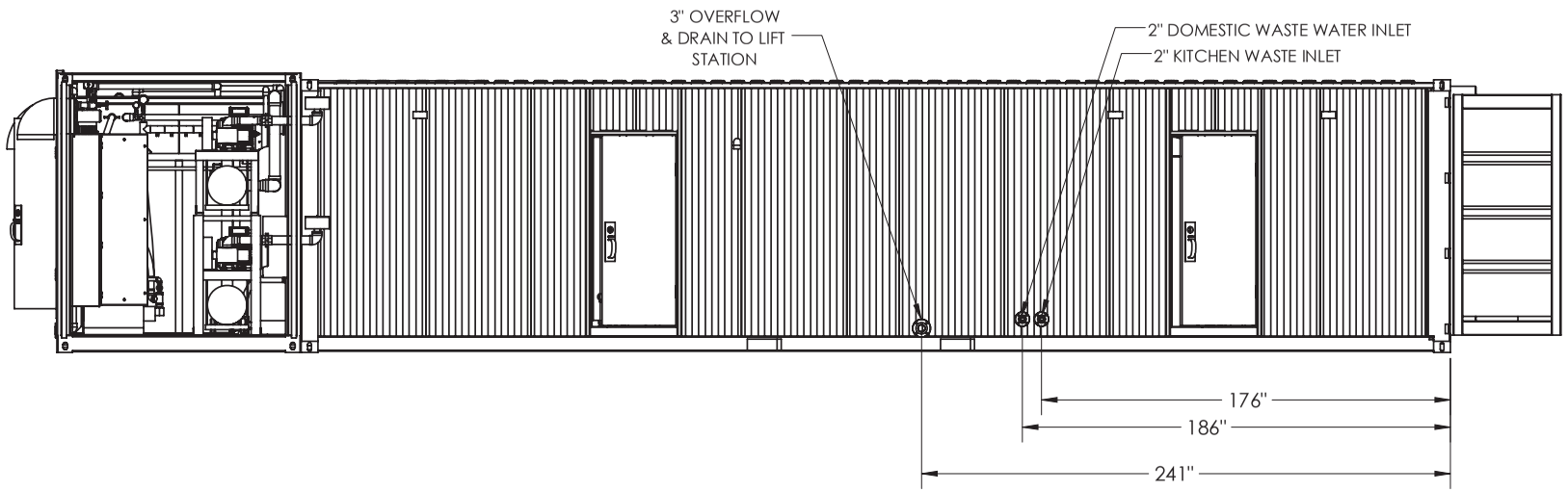
TITLE: SYSTEM LAYOUT

CUSTOMER: AGNICO EAGLE

DRAWN BY: GH

DATE: 19/05/17

SHEET 2 OF 4



GENERAL TOLERANCES
.XX ± 1/8 "
.XXX ± 1/16 "
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

LEVEL	DATE	BY	REVISION
C1	11/08/17	AH	AS BUILT
B1	07/06/17	GH	FOR PRODUCTION
B	06/08/2017	GH	FOR PRODUCTION

DWG. NO:

PROJECT NUMBER: 1704432

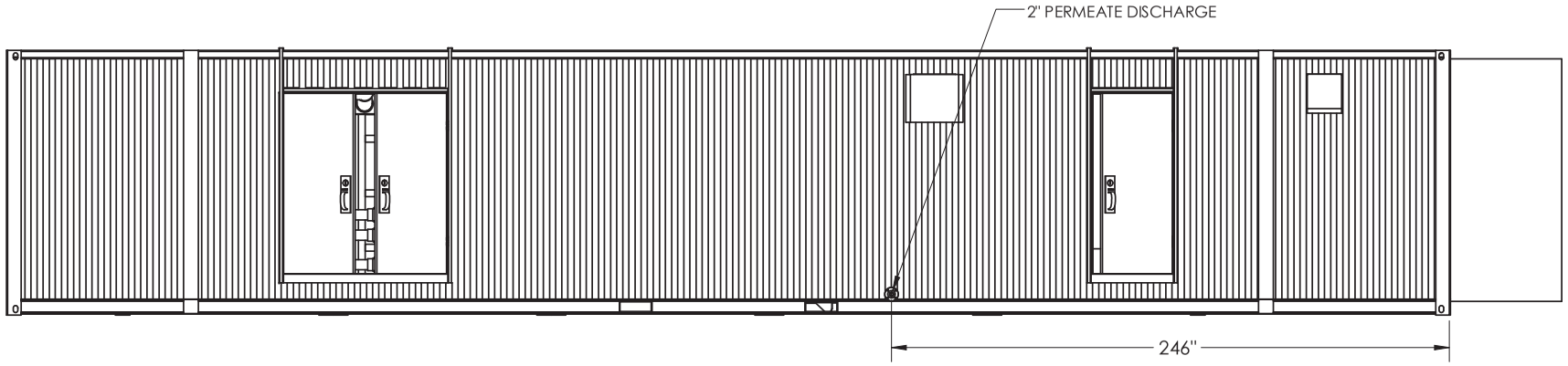
TITLE: SYSTEM LAYOUT

CUSTOMER: AGNICO EAGLE

DRAWN BY: GH

DATE: 06/06/17

SHEET 3 OF 4



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.XX ± 1/8 "
.XXX ± 1/16 "
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

LEVEL	DATE	BY	REVISION
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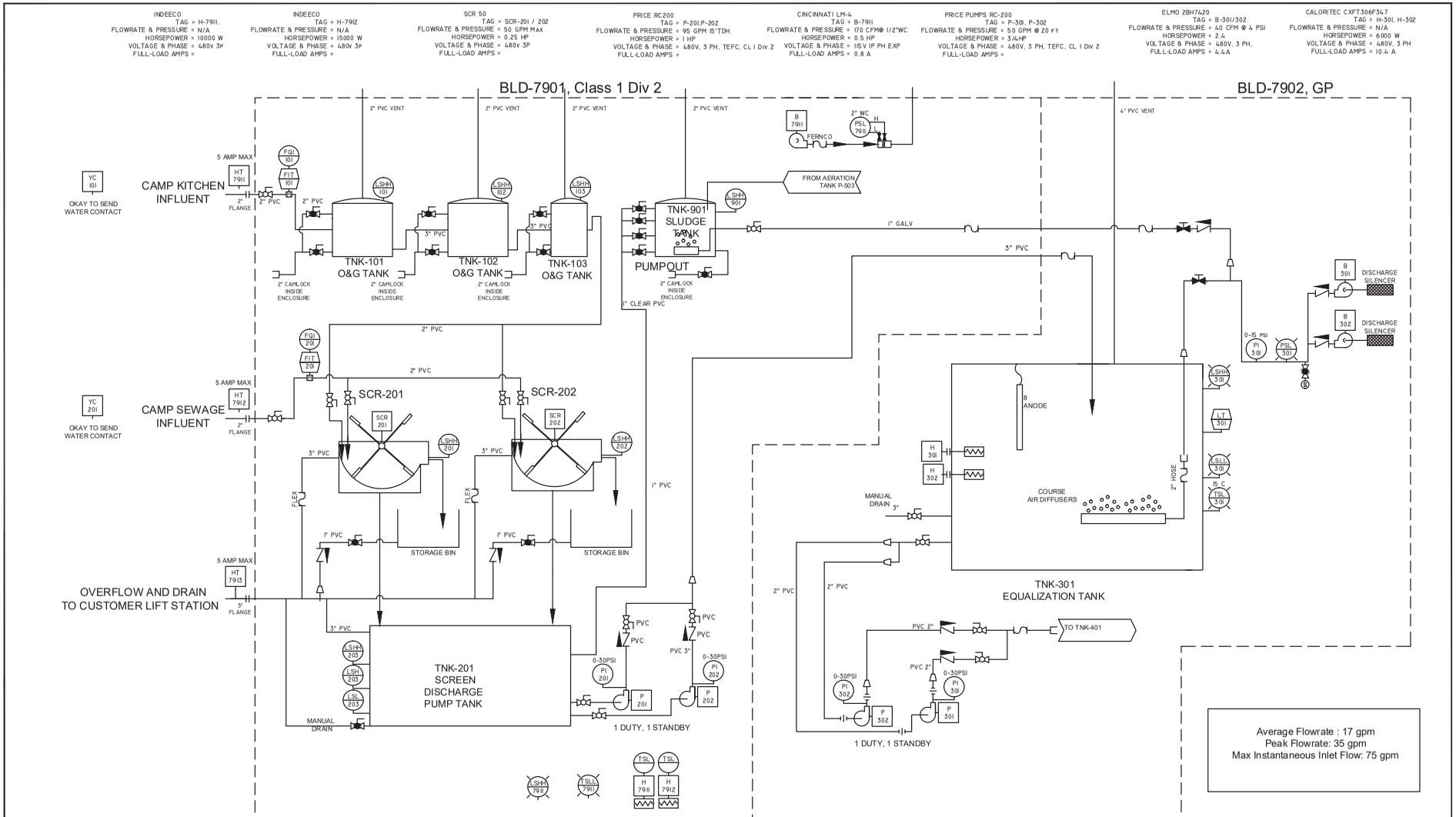
DWG. NO:
PROJECT NUMBER: 1704432
TITLE: SYSTEM LAYOUT
CUSTOMER: AGNICO EAGLE
DRAWN BY: GH
DATE: 06/06/17
SHEET 4 OF 4



NOTES

IS INPUT WIRING TO BE WIRED FOR OUTDOORS, ACCORDING CEC FOR HAZARDOUS LOCATIONS.

WIRING TO BE CLASS I DIVISION 2, AS PER THE CEC.

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LEVEL	REVISION	DATE (mm/dd/yy)	BY
C	AS-BUILT	13/08/17	JJK
B	PRODUCTION	06/06/17	JJK
A2	SUBMITTAL REVISIONS	26/05/17	JJK
A	SUBMITTAL	23/05/17	JJK

PROJECT NUMBER: 1704432

TITLE AND LOCATION: P&ID AMARUQ MINE

CUSTOMER: AGNICO EAGLE MINE

DRAWN BY: MH | DATE: | SHEET: 1 | SHEETS: 4

PRICE PUMPS RC-200
TAG = P-401,402
FLOWRATE & PRESSURE = 300 GPM @ 60 FT
HORSEPOWER = 5HP
VOLTAGE & PHASE = 480V, 3 PH, TEFC, CL I Div 2
FULL-LOAD AMPS =

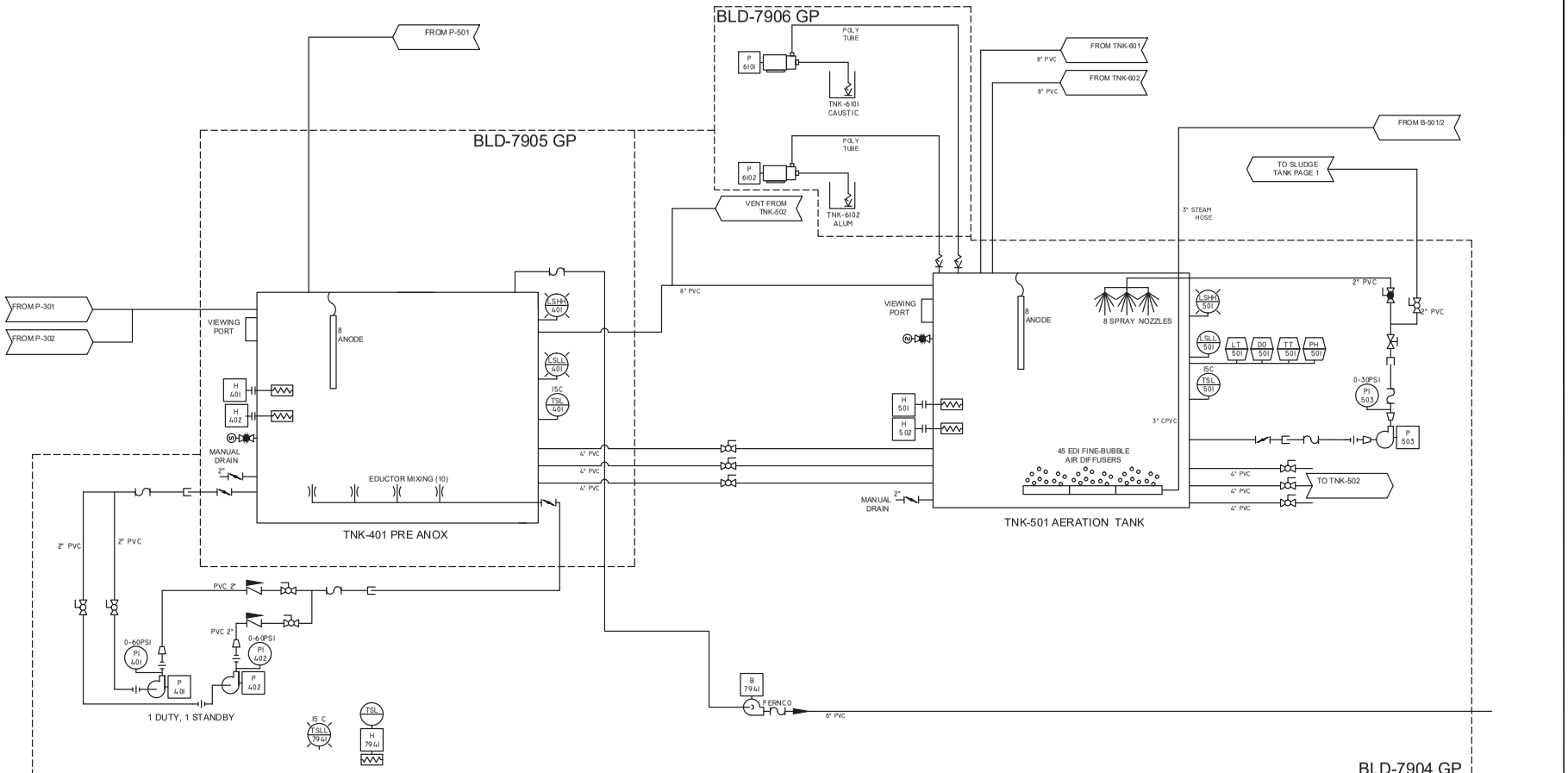
CALORITEC CXFT306F347R83
TAG = H-401,402,501,502
FLOWRATE & PRESSURE = N/A
HORSEPOWER = 6000 W
VOLTAGE & PHASE = 480V, 3 PH
FULL-LOAD AMPS = 10.4 A

CINCINNATI LM6
TAG = B-7941
FLOWRATE & PRESSURE = 700 CFM@ 2"WC
HORSEPOWER = 1.5 HP
VOLTAGE & PHASE = 480V 3P PH
FULL-LOAD AMPS =

OUELLET OAC04808BL
TAG = H-7941
FLOWRATE & PRESSURE = N/A
HORSEPOWER = 4,800 W
VOLTAGE & PHASE = 480 V, 1 PH
FULL-LOAD AMPS = 8.34

PRICE PUMPS RC-200
TAG = P-503
FLOWRATE & PRESSURE = 50 GPM @ 10 FT
HORSEPOWER = 1/4 HP
VOLTAGE & PHASE = 480V, 3 PH, TEFC, CL I Div 2
FULL-LOAD AMPS =

PROMINENT BETA 4
TAG = P-6101, 6102
FLOWRATE & PRESSURE = 3.2 GPH@58PSI
HORSEPOWER = N/A
VOLTAGE & PHASE = 120 V, 1 PH
FULL-LOAD AMPS = N/A



NOTES

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C	AS-BUILT	13/08/17	JJK
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A2	SUBMITTAL REVISIONS	26/05/17	JJK
A	SUBMITTAL	23/05/17	JJK

PROJECT NUMBER: 1704432

TITLE AND LOCATION: P&ID AMARUQ MINE

CUSTOMER: AGNICO EAGLE MINE

DRAWN BY: MH | DATE: | SHEET: 2 | SHEETS: 4

SUTORBILT 4L
TAG = B-501,B-502
FLOWRATE & PRESSURE = 487cfm @ 4.4 psi
HORSEPOWER = 15
VOLTAGE & PHASE = 480V, 3 PH, TEFC
FULL-LOAD AMPS =

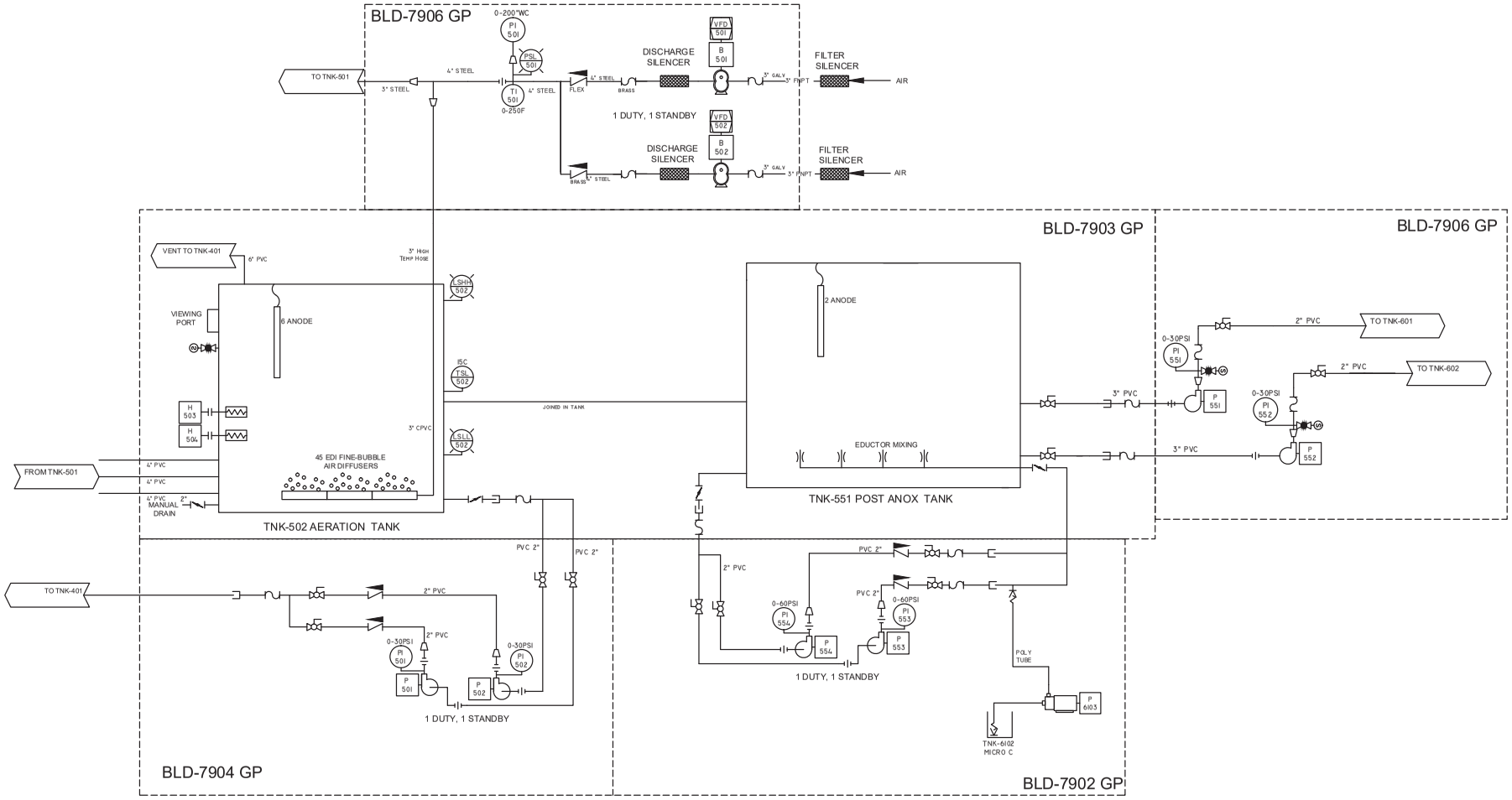
PRICE PUMPS RC-300
TAG = P-501, P-502
FLOWRATE & PRESSURE = 140GPM @ 20'
HORSEPOWER = 2 HP
VOLTAGE & PHASE = 480 V, 3 PH
FULL-LOAD AMPS =

PROMINENT BETA 4
TAG = P-6103
FLOWRATE & PRESSURE = 3.2 GPH@58PSI
HORSEPOWER = N/A
VOLTAGE & PHASE = 120 V, 1 PH
FULL-LOAD AMPS = N/A

CALORITEC CXFT306F347R83
TAG = H-503,504
FLOWRATE & PRESSURE = N/A
HORSEPOWER = 6000 W
VOLTAGE & PHASE = 480V, 3 PH
FULL-LOAD AMPS = 10.4 A

PRICE PUMPS RC-300
TAG = P-553, 554
FLOWRATE & PRESSURE = 50GPM @ 55'
HORSEPOWER = 3 HP
VOLTAGE & PHASE = 480 V, 3 PH
FULL-LOAD AMPS =

PRICE PUMPS RC-200
TAG = P-551, 552
FLOWRATE & PRESSURE = 60GPM @ 20'
HORSEPOWER = 3/4 HP
VOLTAGE & PHASE = 480 V, 3 PH
FULL-LOAD AMPS =



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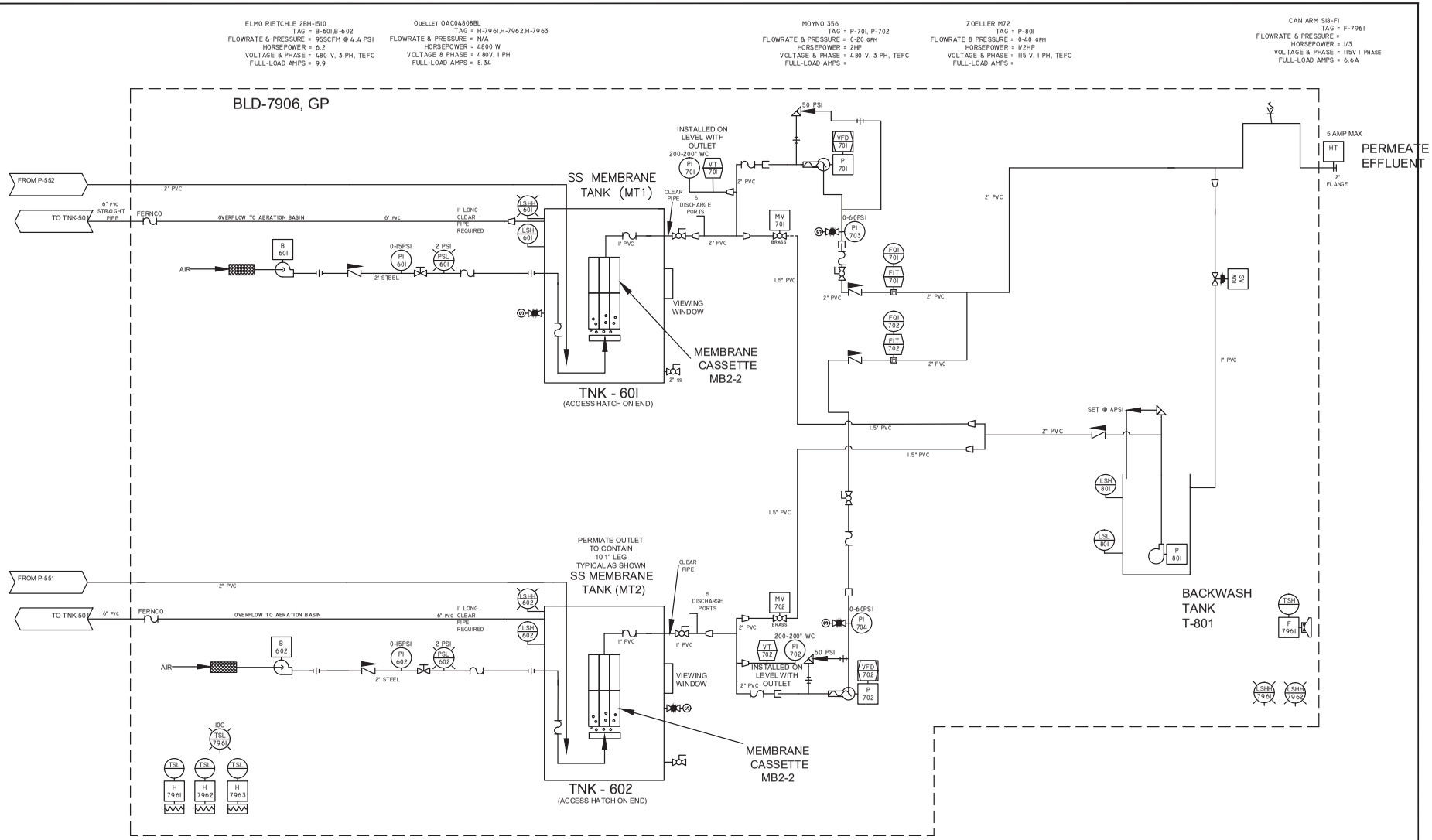
PROJECT NUMBER: 1704432

TITLE AND LOCATION: P&ID AMARUQ MINE

CUSTOMER: AGNICO EAGLE MINE

DRAWN BY: MH | DATE: | SHEET: 3 | SHEETS: 4



NOTES

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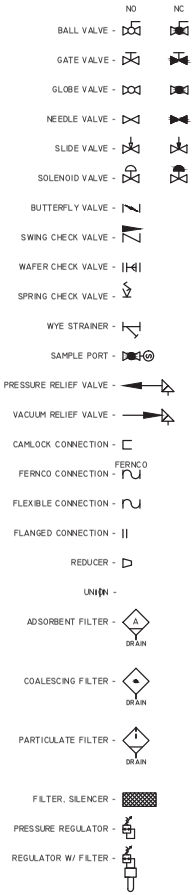
PROJECT NUMBER: 1704432

TITLE AND LOCATION: P&ID AMARUQ MINE

CUSTOMER: AGNICO EAGLE MINE

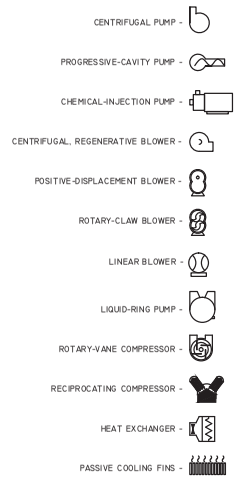
DRAWN BY	DATE	SHEET	SHEETS
MH		4	4

VALVES AND PIPING



EQUIPMENT

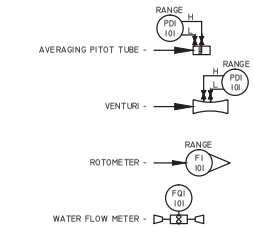
EQUIPMENT



EQUIPMENT

AV - ACTUATED VAVLE
B - BLOWER
F - FAN
H - HEATER
MBR - MEMBRANE BIOLOGICAL REACTOR
MV - MODULATED VALVE
P - PUMP
SV - SOLENOID VALVE
TNK - TANK
UV - ULTRA VIOLET LIGHT
VFD - VARIABLE FREQUENCY DRIVE

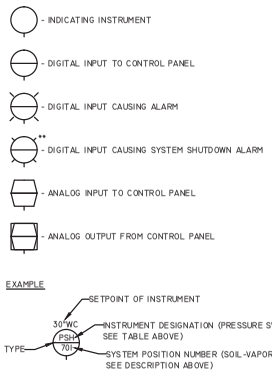
FLOW MEASUREMENT



INSTRUMENT DESIGNATION

	INPUT	1ST MODIFIER	2ND MODIFIER	3RD MODIFIER	OUTPUT	1ST MODIFIER	
A							A
B						BLOWER	B
C	CYCLE					COMPRESSOR	C
D		DIFFERENTIAL				AIR DRYER	D
E							E
F	FLOW					FAN	F
G	GAS (LEL)		GAUGE				G
H				HIGH	HAND	HEATER	H
I	CURRENT		INDICATOR				I
J							J
K							K
L	LEVEL			LOW			L
M					MOTORIZED		M
N							N
O							O
P	PRESSURE				PNEUMATIC	PUMP	P
Q		QUANTITY					Q
R							R
S	SPEED		SWITCH		SOLENOID		S
T	TEMPERATURE		TRANSMITTER				T
U							U
V						VALVE	V
W							W
X							X
Y							Y
Z	POSITION						Z

INSTRUMENT IDENTIFICATION



SYSTEM POSITION DESIGNATION

1000 - LIFT STATION
2000 - INLET SCREEN
3000 - EQUALIZATION TANK
4901 - SCREEN DISCHARGE PUMP TANK
5000 - AERATION TANK
5500 - SLUDGE HOLDING TANK
6000 - MBR TANK
6100 - CHEMICAL INJECTION
7000 - PERMEATE
7500 - UV LIGHT
7900 - BUILDING,TRAILER OR SKID
8000 - DISCHARGE TANK
8200 - CONTROL PANEL
8300 - TELEMETRY
9900 - EXTRAS

NOTES

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B	PRODUCTION	06/06/17	JJK
A2	SUBMITTAL REVISIONS	26/05/17	JJK
A	SUBMITTAL	23/05/17	JJK

PROJECT NUMBER: 1704432

TITLE AND LOCATION: P&ID AMARUQ MINE

CUSTOMER: AGNICO EAGLE MINE

DRAWN BY	DATE	SHEET	SHEETS
MH		4	4

Project:

1704432 - AGNICO EAGLE MINE - C

newterra®

clean water. modular solutions. simple.™

Contents:

ELECTRICAL SPECIFICATIONS	
VOLTAGE	600V
PHASE	3Ø
FREQUENCY	60 Hz
FULL LOAD AMPS	172A
MAIN DISCONNECT SIZE	400A - FUSED @ 250A
SCCR SYMMETRICAL (kAMPS)	10
SYSTEM APPROVAL AND CLASSIFICATION	cMET - CL1Div2
PANEL APPROVAL AND CLASSIFICATION	cMETus to UL698A

WIRE LEGEND

BLACK: POWER
RED: 120VAC CONTROL
WHITE: NEUTRAL
BLUE: +24VDC & IS WIRING
BLU/WHT: 0VDC
YELLOW: INTERLOCKS

NOTES:

1325 CALIFORNIA AVE.
BROCKVILLE, ONTARIO
CANADA K6V 5Y6
PHONE: (613)498-1876
www.newterra.com

LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432
TITLE AND LOCATION: SYSTEM SPECIFICATIONS

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	2	71

1704432 - AGNICO EAGLE MINE - C

FLOW SWITCH, NORMALLY CLOSED

FLOW SWITCH, NORMALLY OPEN

FLOAT SWITCH, NORMALLY CLOSED

FLOAT SWITCH, NORMALLY OPEN

LIMIT SWITCH, NORMALLY CLOSED

LIMIT SWITCH, NORMALLY OPEN

PRESSURE SWITCH, CHANGE OVER CONTACTS

PRESSURE SWITCH, NORMALLY CLOSED OPENS ON PRESSURE INCREASE

PRESSURE SWITCH, NORMALLY OPEN CLOSES ON PRESSURE INCREASE

TEMPERATURE SWITCH, CHANGE OVER CONTACTS

TEMPERATURE SWITCH, NORMALLY CLOSED OPENS ON TEMPERATURE INCREASE

TEMPERATURE SWITCH, NORMALLY OPEN CLOSES ON TEMPERATURE INCREASE

PROXIMITY SWITCH, NORMALLY CLOSED

PROXIMITY SWITCH, NORMALLY OPEN

METAL OXIDE VARISTOR
MOV

S7296
DIODE

TANDEM TERMINAL BLOCK

PANEL TERMINAL BLOCK

JUNCTION BOX TERMINAL BLOCK

CUSTOMER TERMINAL BLOCK

FUSED TERMINAL BLOCK

TOGGLE SWITCH, NORMALLY OPEN

TOGGLE SWITCH, CHANGE OVER CONTACTS, 3 WAY

PUSH BUTTON, NORMALLY CLOSED

PUSH BUTTON, NORMALLY OPEN

PUSH BUTTON, NORMALLY CLOSED MUSHROOM HEAD

SELECTOR SWITCH, 2 POSITION 2 NORMALLY OPEN

SELECTOR SWITCH, 3 POSITION 2 NORMALLY OPEN

PILOT LIGHT, X=COLOR

PILOT LIGHT, PUSH-TO-TEST X=COLOR

COLOR CODE
A - AMBER
B - BLUE
G - GREEN
R - RED
W - WHITE

BEACON LIGHT X=COLOR

CONTACT, NORMALLY CLOSED

CONTACT, NORMALLY OPEN

TIME DELAY CONTACT, INSTANTANEOUS OPEN TIMED CLOSED ON DE-ENERGIZE

TIME DELAY CONTACT, INSTANTANEOUS CLOSE TIMED OPEN ON DE-ENERGIZE

TIME DELAY CONTACT, INSTANTANEOUS OPEN TIMED CLOSE ON ENERGIZE

TIME DELAY CONTACT, INSTANTANEOUS CLOSE TIMED OPEN ON ENERGIZE

COIL - RELAY, CONTACTOR TIMER, MOTOR STARTER

ANNUNCIATOR, BELL

ANNUNCIATOR, HORN

ANNUNCIATOR, BUZZER

BATTERY

TRANSMITTER, 2 WIRE LOOP POWERED

INTRINSICALLY SAFE BARRIERS
(NOT TO SCALE)

4CHANNEL DISCRETE

2 CHANNEL ANALOG

NETWORK SWITCH -ETHERNET
(NOT REPRESENTATIVE OF ALL TYPES)
(NOT TO SCALE)

PANEL METER
AM=AMMETER
VM=VOLT METER

ETM
ELAPSED TIME METER

CURRENT TRANSFORMER

GROUND

INSTRUMENTATION GROUND

SOLENOID

CURRENT SWITCH

FUSED DISCONNECT
X=AMP RATING

FUSE, X=AMP RATING

CIRCUIT BREAKER
X=AMP RATING

COMBINATION STARTER
X - X AMP=CURRENT RANGE

CONTACTOR

DISTRIBUTION BLOCK

X HP
X FLA
X AWG
3 PHASE MOTOR

X kW
X AMP
X AWG
3 PHASE HEATER

RECEPTACLE, SINGLE OUTLET

RECEPTACLE, DUPLEX

TRANSFORMER
CONTROL POWER
(NOT REPRESENTATIVE OF ALL TYPES)

TRANSFORMER
DISTRIBUTION/LIGHTING
(NOT REPRESENTATIVE OF ALL TYPES)

120VAC
24VDC
72Wat
DC POWER SUPPLY
(NOT REPRESENTATIVE OF ALL TYPES)

REACTOR

COIL: *LOCATION*
4 POLE RELAY
CROSS REFERENCES

LOCATION
COMBINATION STARTER
CROSS REFERENCES

VARIABLE FREQUENCY DRIVE
(NOT REPRESENTATIVE OF ALL TYPES)
(NOT TO SCALE)

GENERAL PURPOSE WIRING
EXTERNAL TO PANEL

CL1Div2 WIRING
EXTERNAL TO PANEL

WIRING BY OTHERS
EXTERNAL TO PANEL

USA 3 PHASE
POWER WIRING COLOR CODE

480V	208/230V(HIGH LEG)
PHASE A - BROWN	PHASE A - BLACK
PHASE B - ORANGE	PHASE B - RED(ORG)
PHASE C - YELLOW	PHASE C - BLUE

CANADIAN 3 PHASE
POWER WIRING COLOR CODE

PHASE A - RED
PHASE B - BLACK
PHASE C - BLUE

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

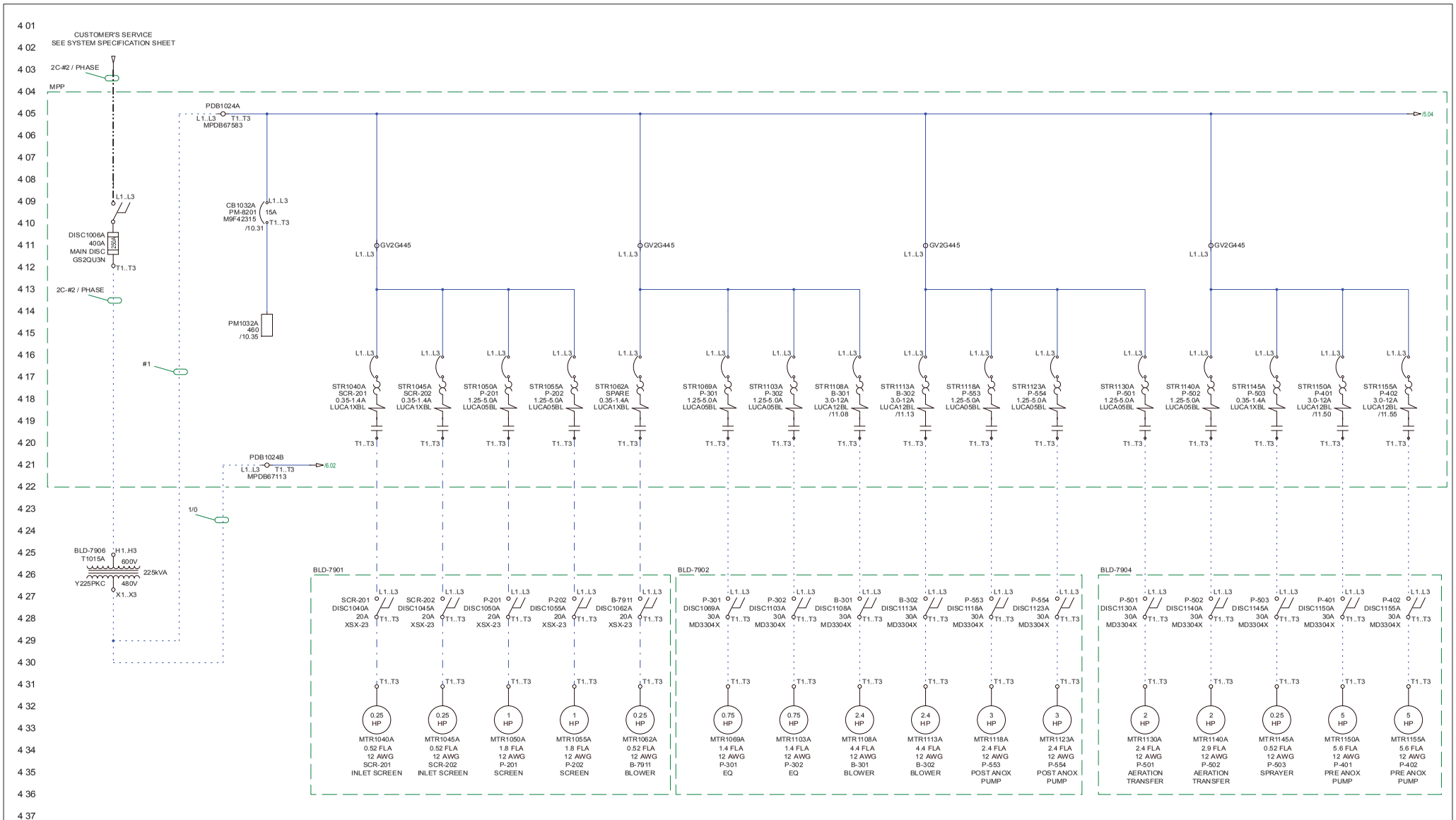
PROJ. NO: 1704432

TITLE AND LOCATION: LEGEND ELECTRICAL

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	3	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
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A	FOR SUBMITTAL	12/05/17	DMB

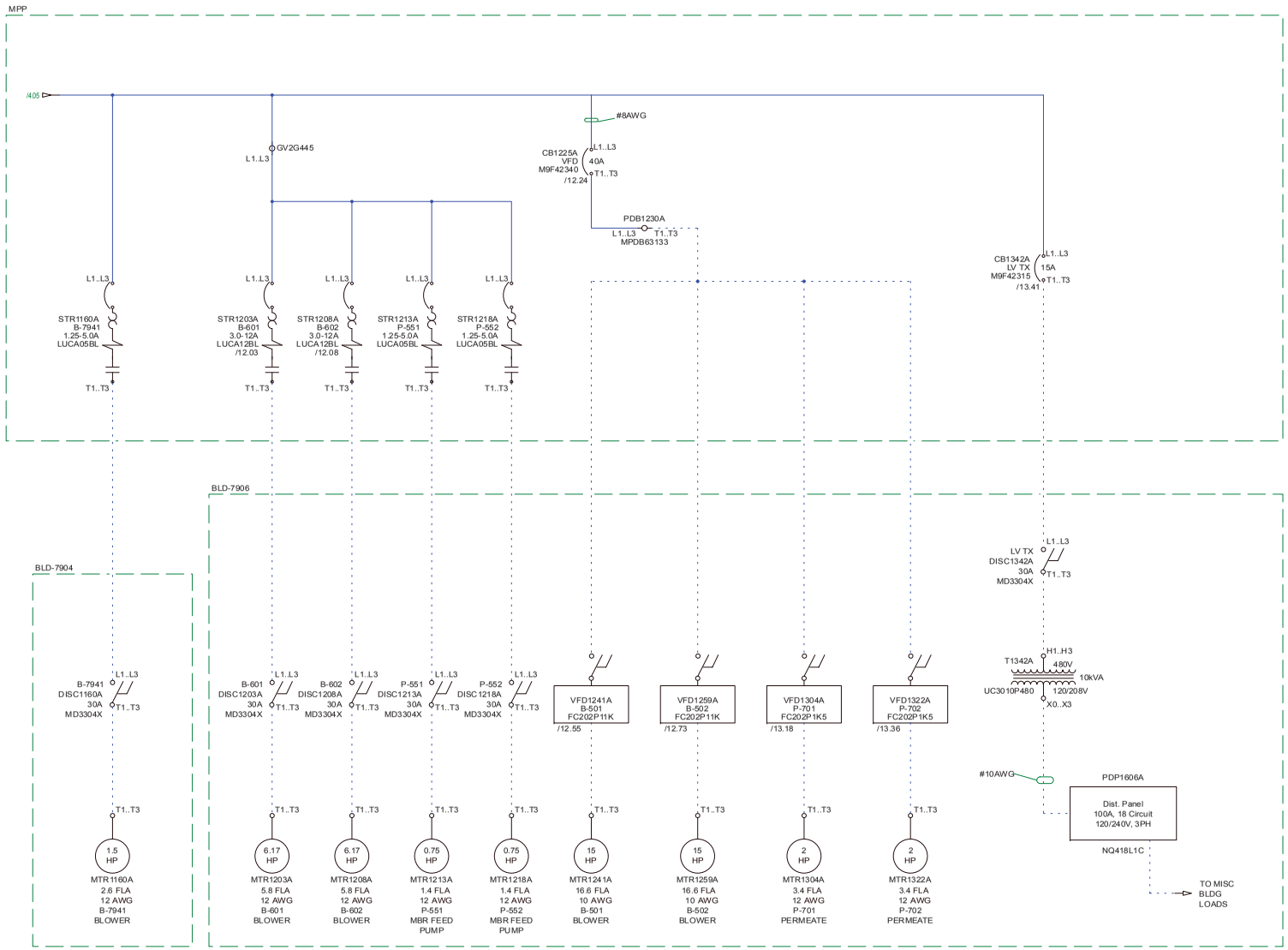
PROJ. NO: 1704432

TITLE AND LOCATION: SINGLE LINE DIAGRAM SHEET 1 OF 3

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	4	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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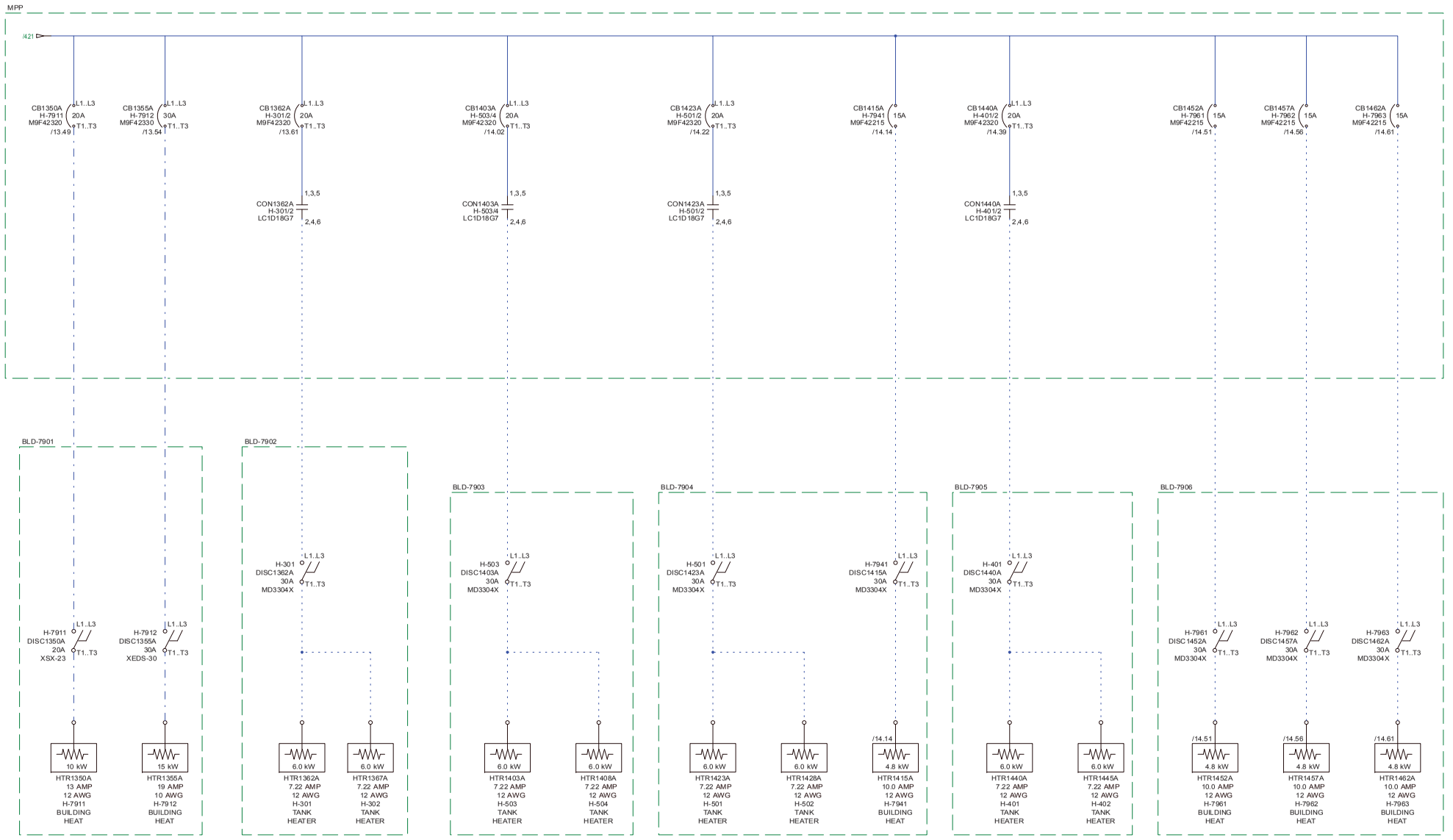
PROJ. NO: 1704432

TITLE AND LOCATION: SINGLE LINE DIAGRAM SHEET 2 OF 3

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	5	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

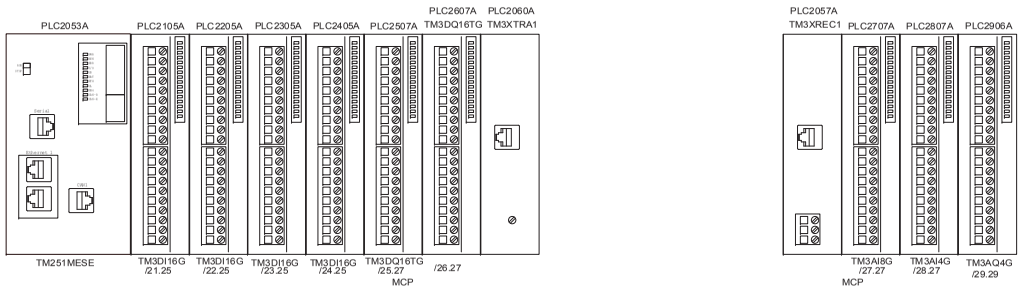
PROJ. NO: 1704432

TITLE AND LOCATION: SINGLE LINE DIAGRAM SHEET 3 OF 3

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	10/05/17	6	71

1704432 - AGNICO EAGLE MINE - C



MCP
PLC2053A

Name:	PLC
Address:	192.168.12.100
SNM:	
ETHERNET	

TM251MESE

CAT5 — CBL6 — C5E-STPRD-S25

MCP
PLC2053A

Name:	PLC
Address:	192.168.13.100
SNM:	
ETHERNET	

TM251MESE

CAT5 — C5E-STPRD-S7

MCP
OIT2008A

Name:	HMI
Address:	192.168.13.101
SNM:	
ETHERNET	

HMIDT542

CAT5 — C5E-STPRD-S10

MCP
ENET2011A

Name:	eWON
Address:	192.168.13.31
SNM:	
ETHERNET SWITCH	/20.12

EC6133D

ETH71A
17-110024

C5E-STPRD-S7

CBL1 CAT5
CBL2 CAT5
CBL3 CAT5

MCP
OIT2008A

USB

HMIDT542

USB — USB_A-A — CBL4

17-200161
USB71A

MPP

PLC3426A

RIO7902	Name:
192.168.12.101	Address:
SNM:	
ETHERNET	

CAT5

OTB1E0DM9LP
/34.26

PLC3426A
OTB1E0DM9LP
/35.11

PLC3606A
PLC3706A
PLC3806A
PLC3843A
PLC3906A

TM2DDI16DT /36.06
TM2DDI16DT /37.06
TM2DDI8DT /38.25
TM2DDO8TT /38.63
TM2DRA16RT /39.06

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

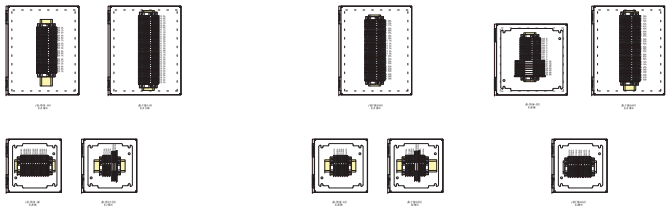
PROJ. NO: 1704432

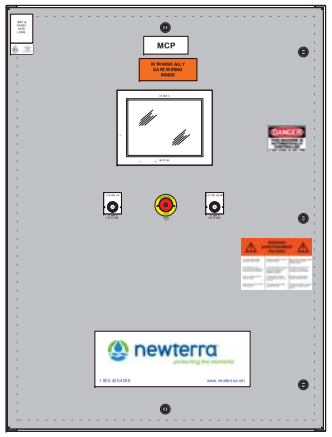
TITLE AND LOCATION: PLC/COMMUNICATION LAYOUT

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

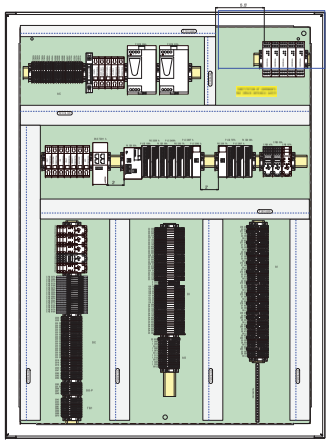
DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	7	71

1704432 - AGNICO EAGLE MINE - C



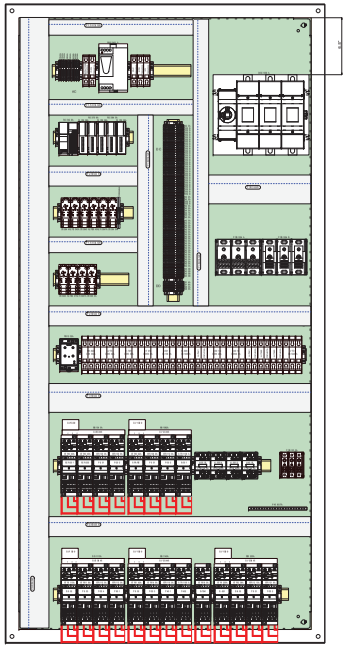


PANEL OUTER DOOR



MCP 1
ENABLEMENT 20Y
PANEL INTERIOR

PANEL OUTER DOOR



MPP
ENABLEMENT 20Y
PANEL INTERIOR

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

TITLE AND LOCATION: PANEL LAYOUTS

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	8	71

1704432 - AGNICO EAGLE MINE - C

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INTENTIONALLY BLANK

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/m/m/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

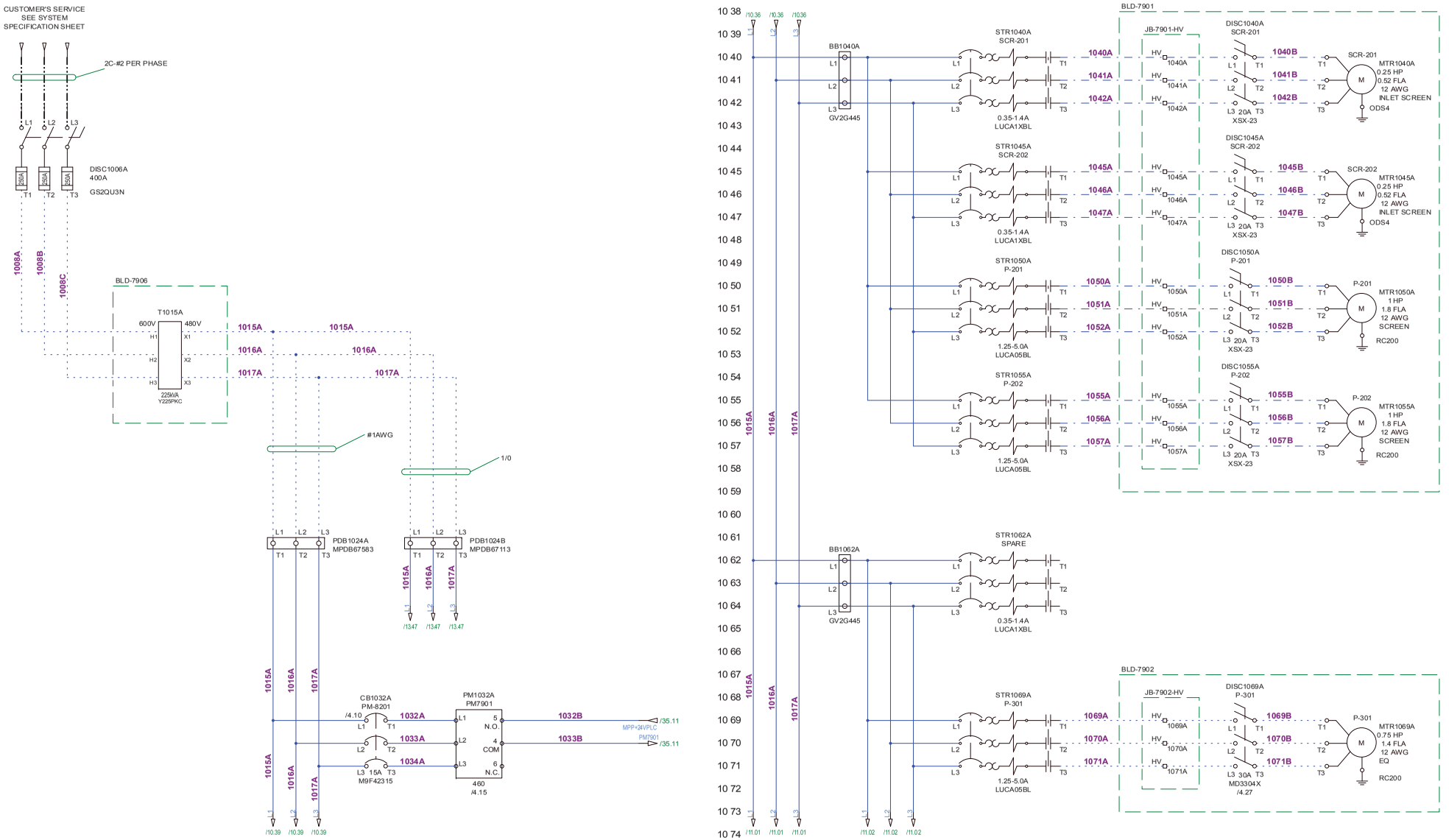
PROJ. NO: 1704432

TITLE AND LOCATION: SPARE SHEET

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	9	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. USE CANADIAN WIRING CODE

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C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

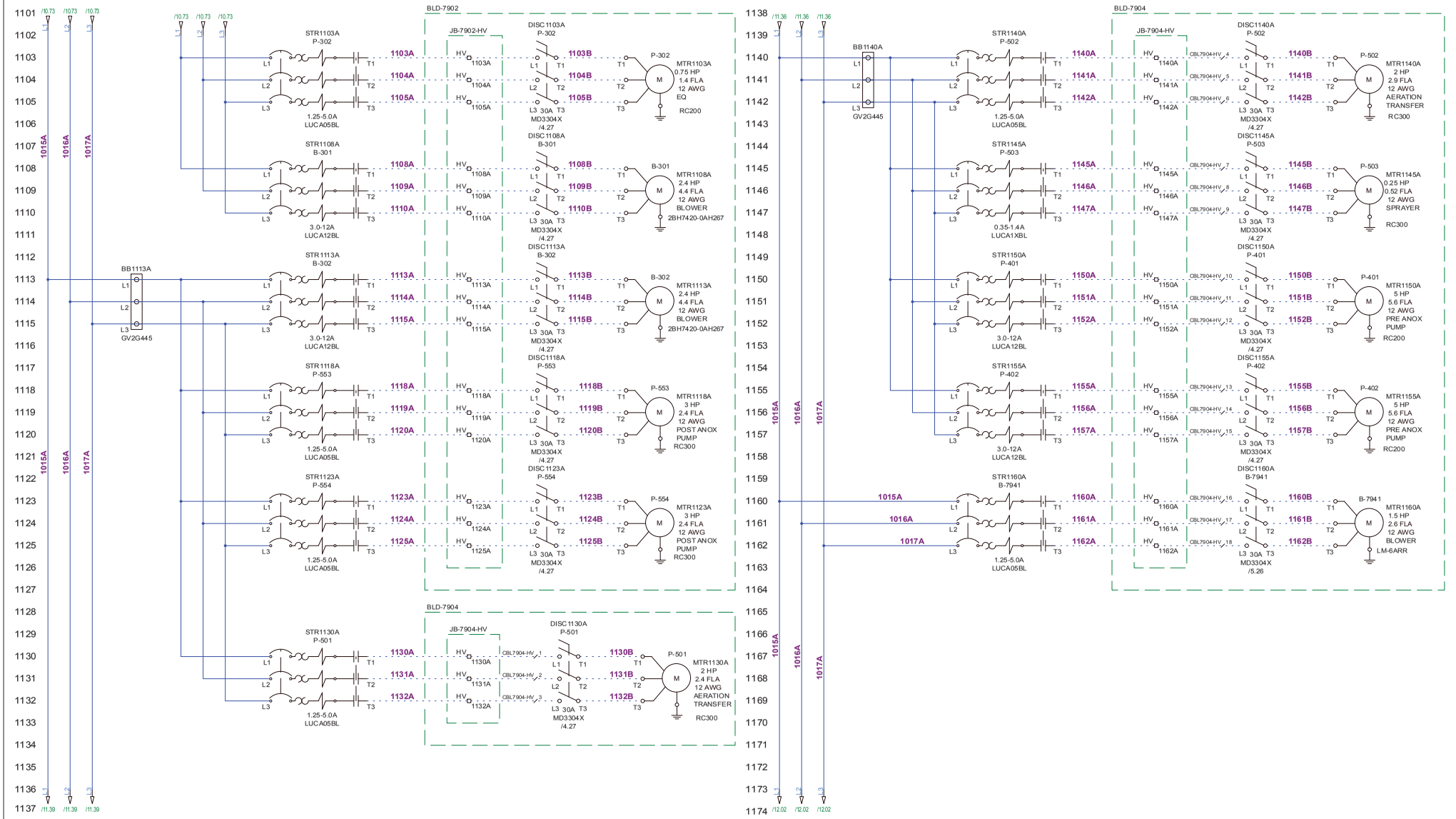
PROJ. NO: 1704432

TITLE AND LOCATION: 600V/480V POWER DISTRIBUTION MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	10	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. USE CANADIAN WIRING CODE

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

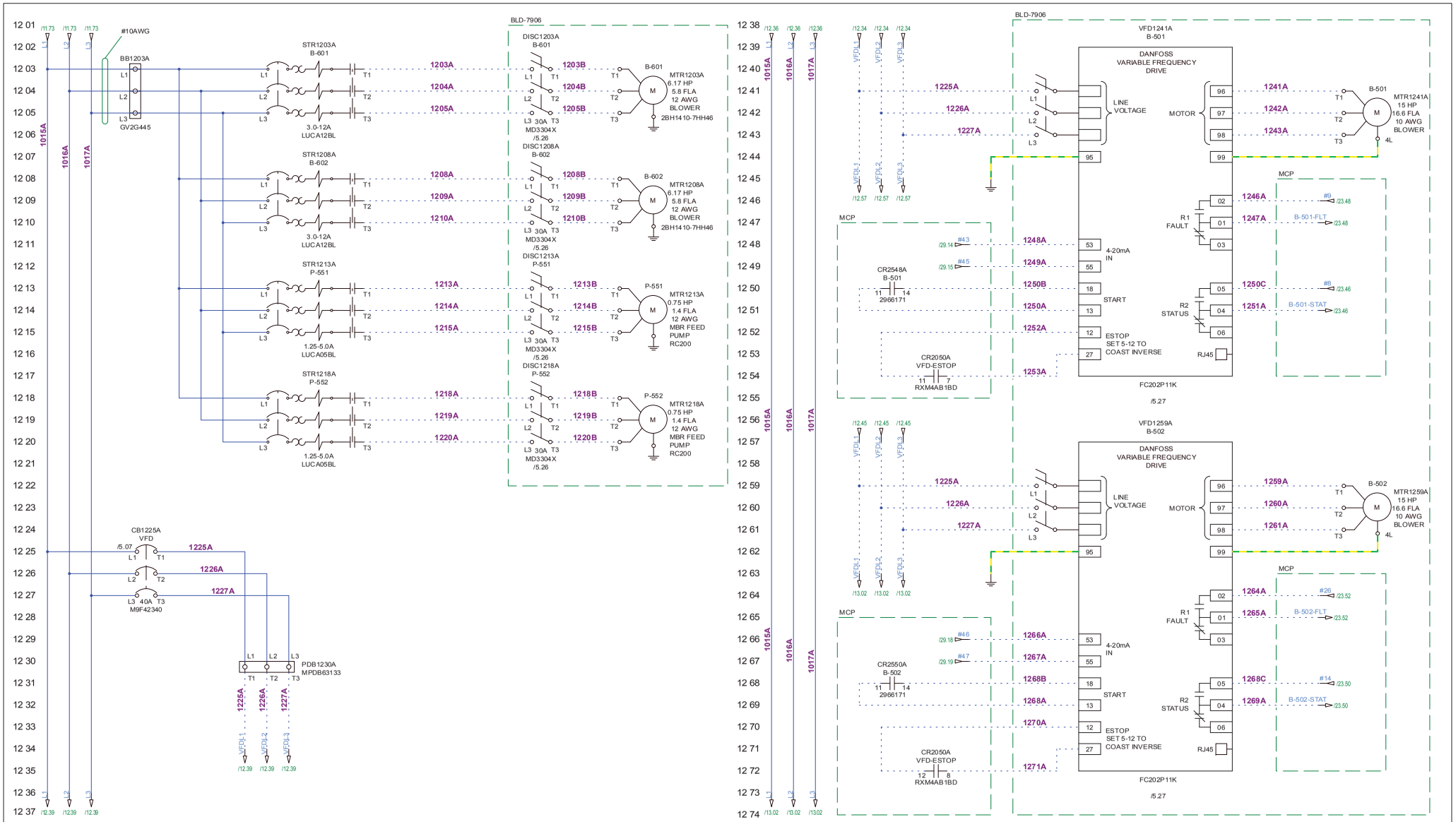
PROJ. NO: 1704432

TITLE AND LOCATION: 480V POWER DISTRIBUTION SHEET 1 OF 4 MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	11	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. USE CANADIAN WIRING CODE

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

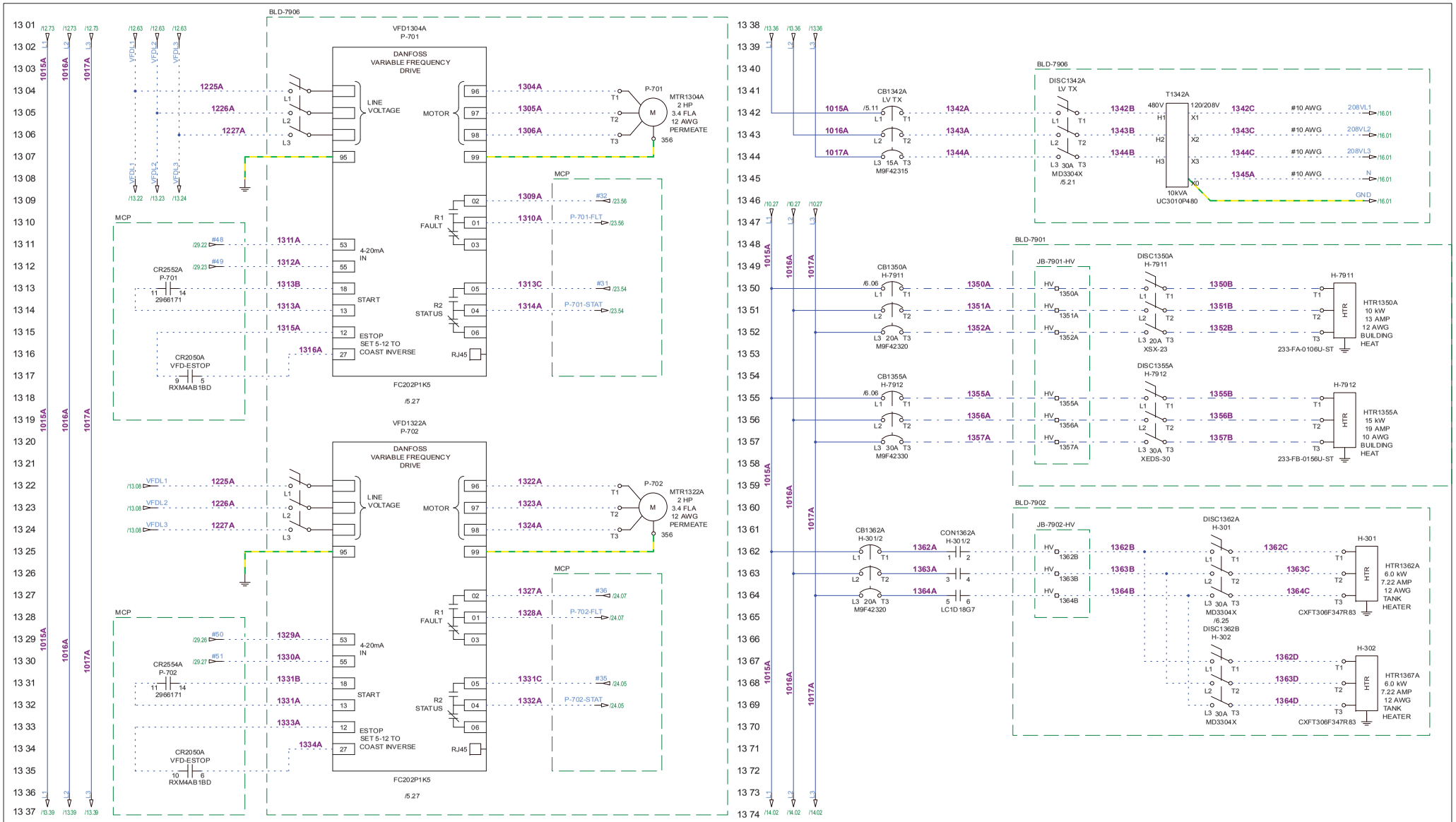
PROJ. NO: 1704432

TITLE AND LOCATION: 480V POWER DISTRIBUTION SHEET 2 OF 4 MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	12	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. USE CANADIAN WIRING CODE

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

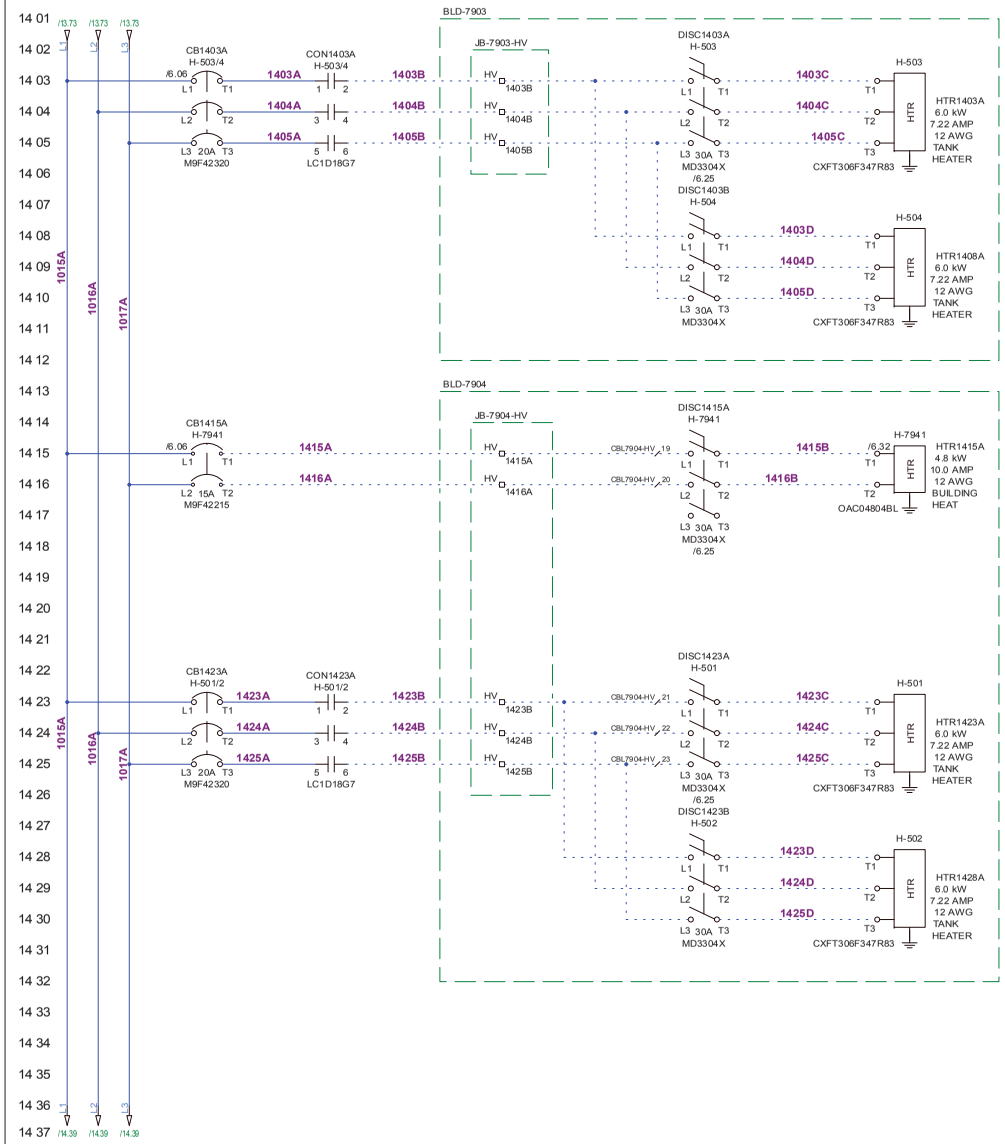
PROJ. NO: 1704432

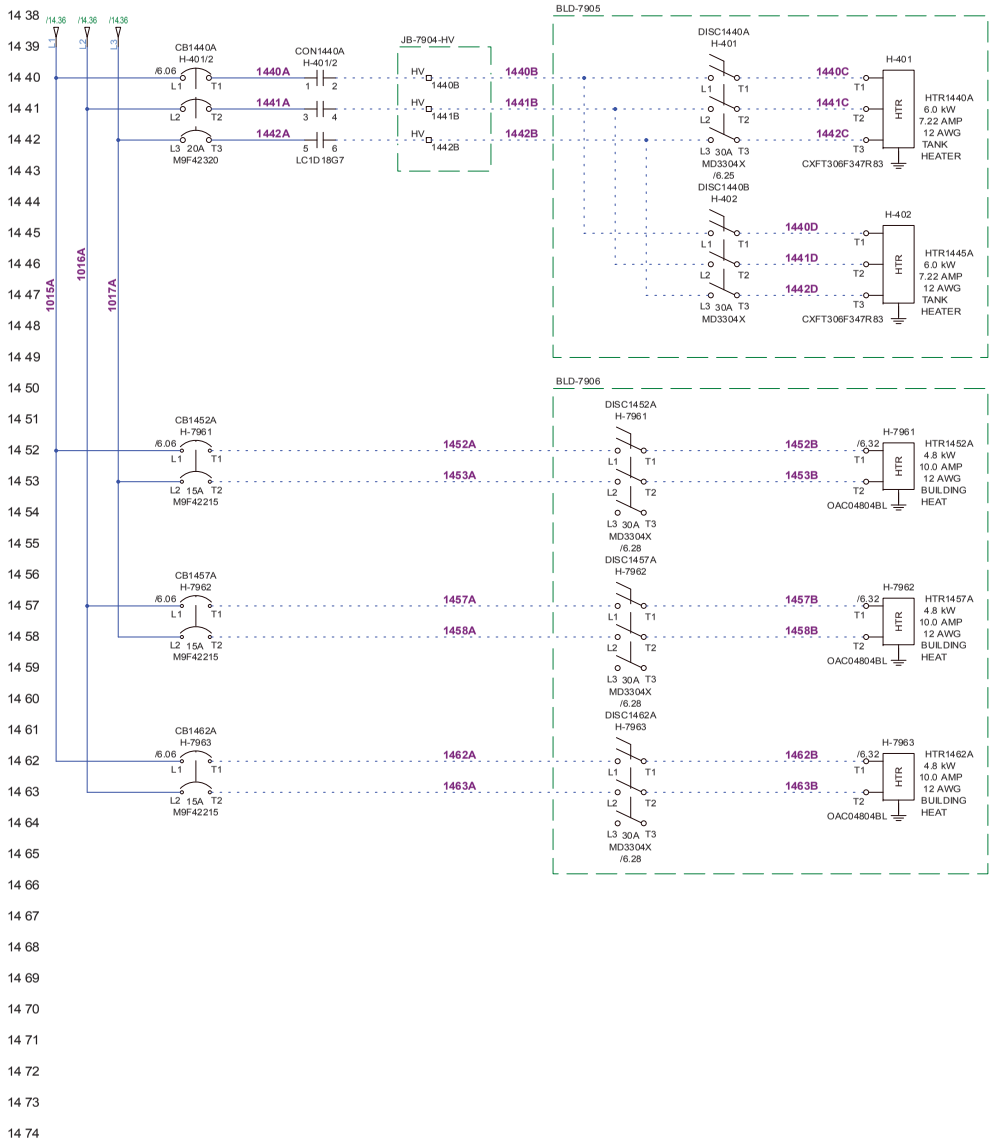
TITLE AND LOCATION: 480V POWER DISTRIBUTION SHEET 3 OF 4 MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	10/05/17	13	71

1704432 - AGNICO EAGLE MINE - C





WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. USE CANADIAN WIRING CODE
3. DEVICES IN BLD-7903 ARE ONLY REQUIRED FOR THE 400 MAN OPTION. IF THE 400 MAN IS NOT REQUIRED, STOP WIRING AT BASE OF P2019A CONNECTOR.
4. USE TANDEM FERRULES FOR CONNECTING WIRES TO DISTRIBUTION LUG

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

TITLE AND LOCATION: 480V POWER DISTRIBUTION SHEET 4 OF 4 MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	14	71

1704432 - AGNICO EAGLE MINE - C

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INTENTIONALLY BLANK

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. USE CANADIAN WIRING CODE

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CANADA K6V 5Y6
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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

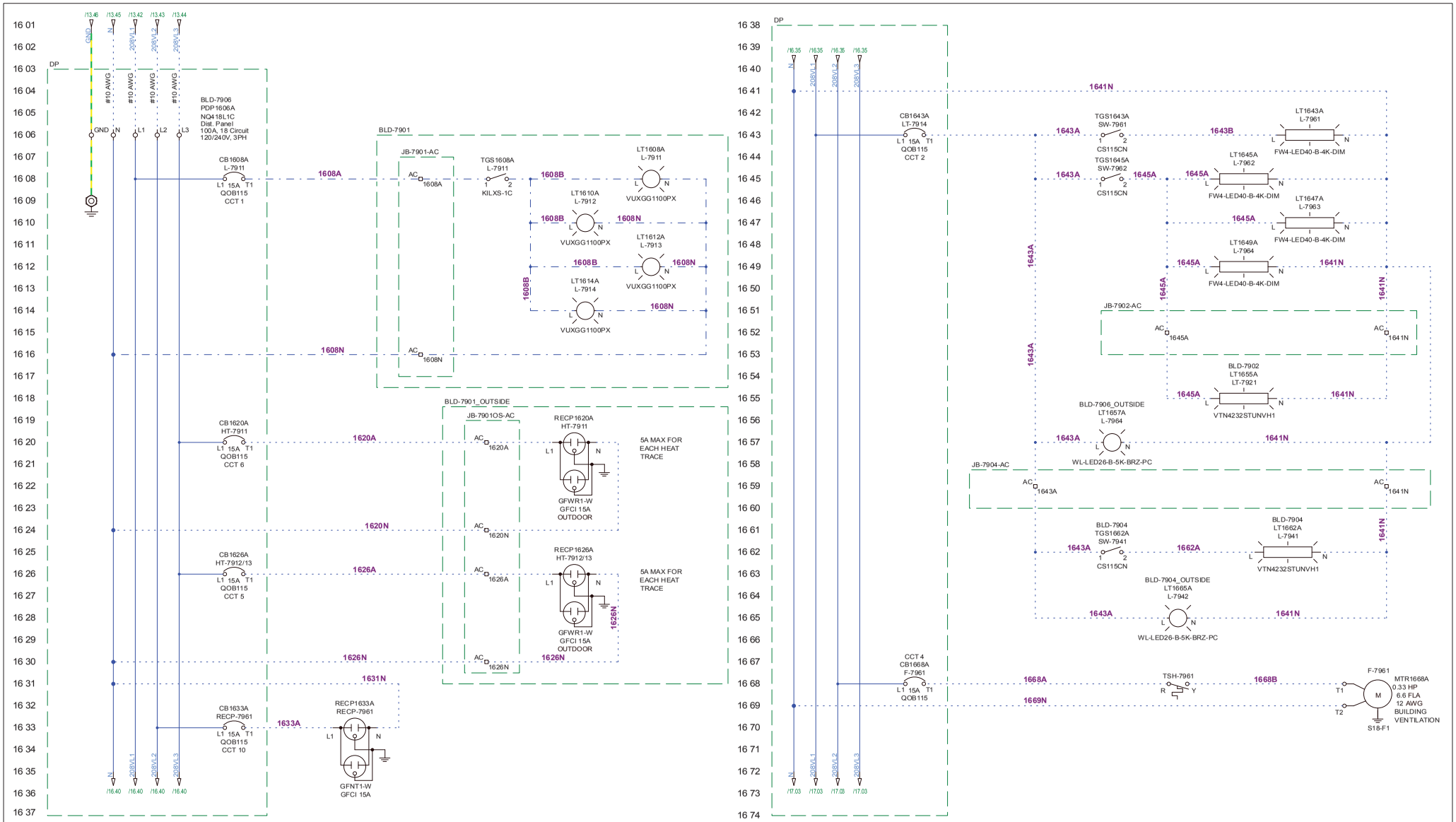
TITLE AND LOCATION: SPARE SHEET

MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	23/05/17	15	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

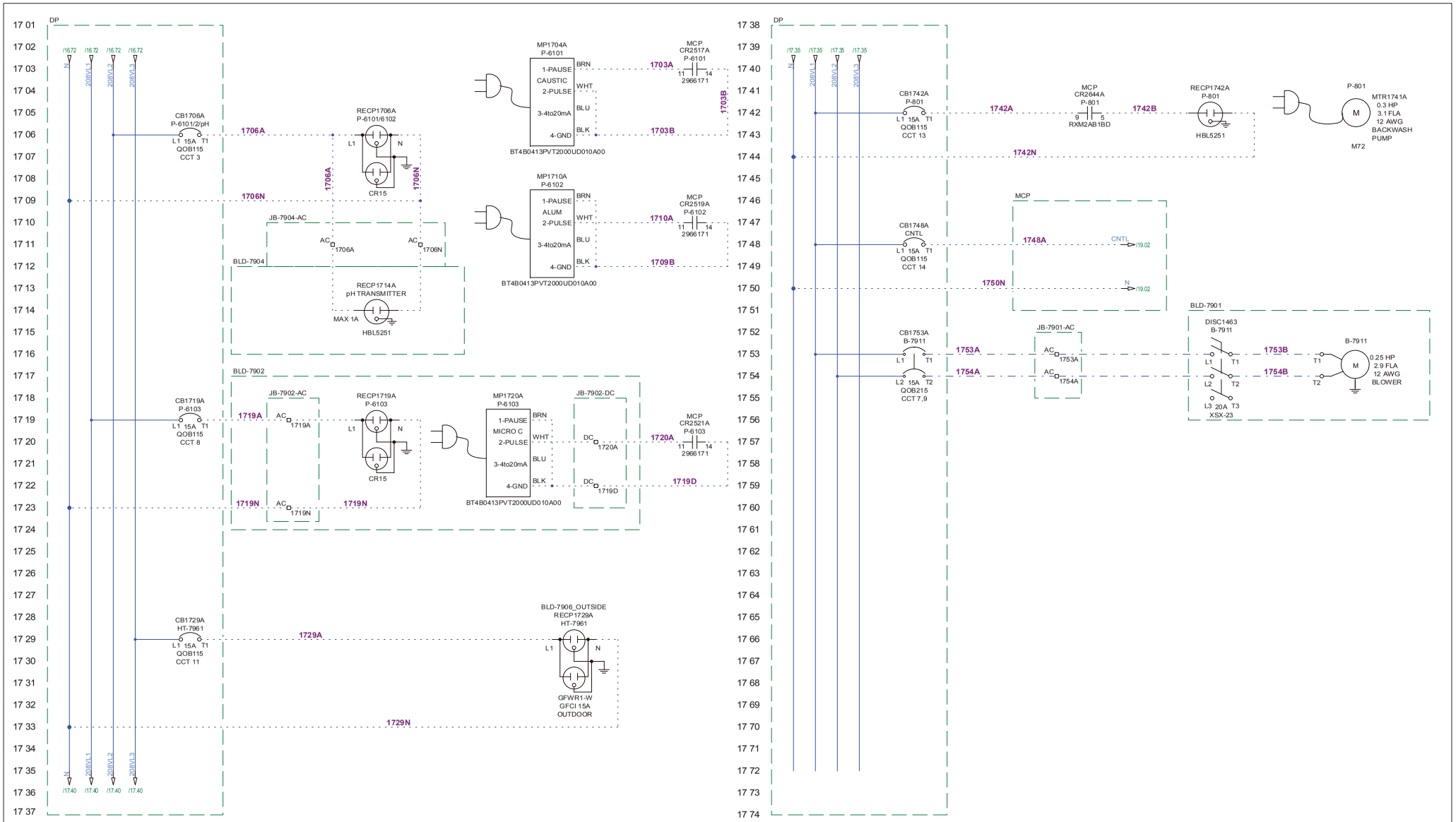
PROJ. NO: 1704432

TITLE AND LOCATION: LV DISTRIBUTION PANEL SHEET 1 OF 2 BLD-7906

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	16	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

TITLE AND LOCATION:
LV DISTRIBUTION PANEL
SHEET 2 OF 2
BLD-7906

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	17	71

1704432 - AGNICO EAGLE MINE - C

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INTENTIONALLY BLANK

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

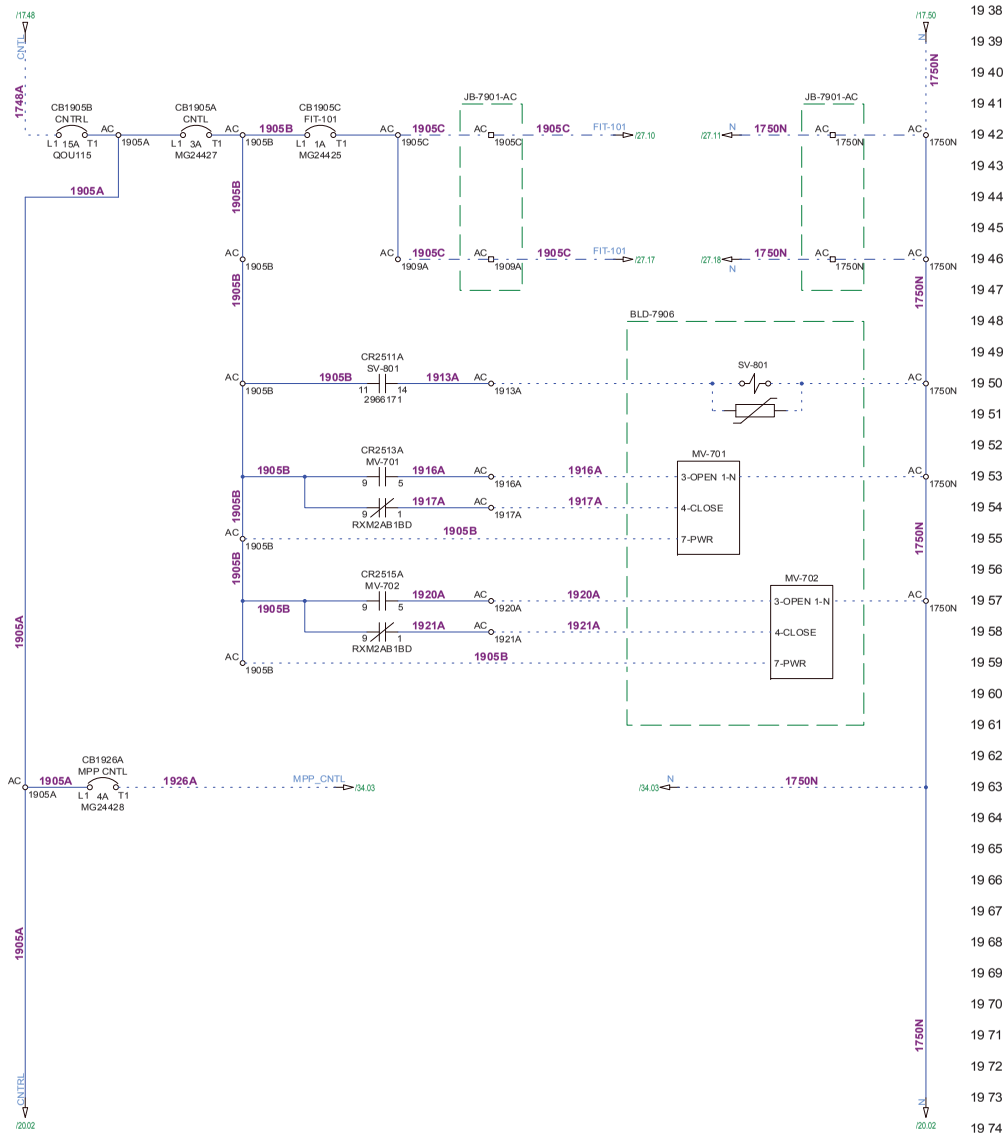
TITLE AND LOCATION: SPARE SHEET

BLD-7906

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	29/05/17	18	71

1704432 - AGNICO EAGLE MINE - C



INTENTIONALLY BLANK

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

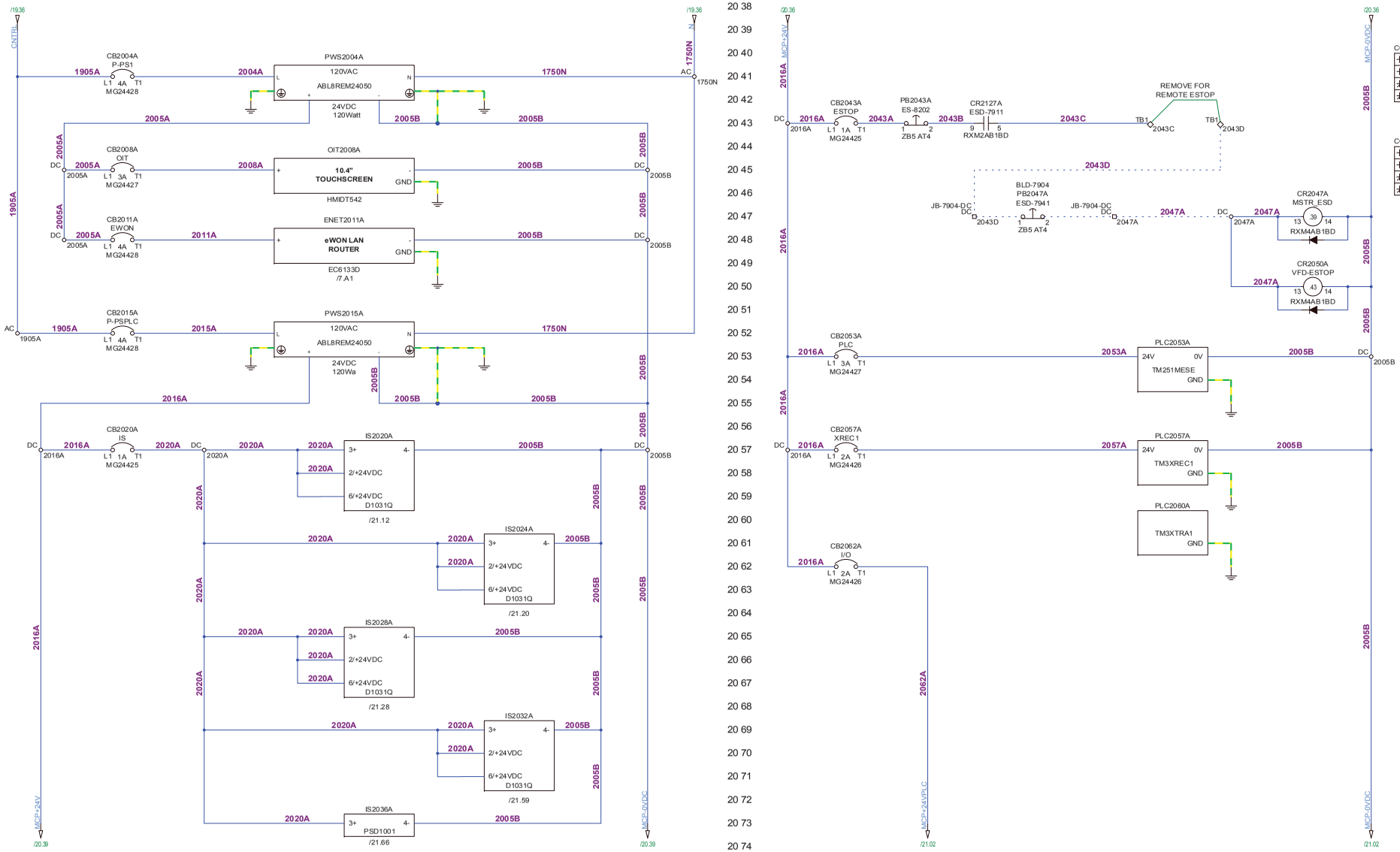
PROJ. NO: 1704432

TITLE AND LOCATION: MCP - 120VAC CONTROL POWER
MCP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	19	71

1704432 - AGNICO EAGLE MINE - C



CR2047A MSTR_ESD

COIL: .47		
	/21.42	/34.30

RXM4AB1BD

CR2050A VFD-ESTOP

COIL: .50		
	/13.17	/13.35
	/12.54	/12.72

RXM4AB1BD

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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www.newterra.com

LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

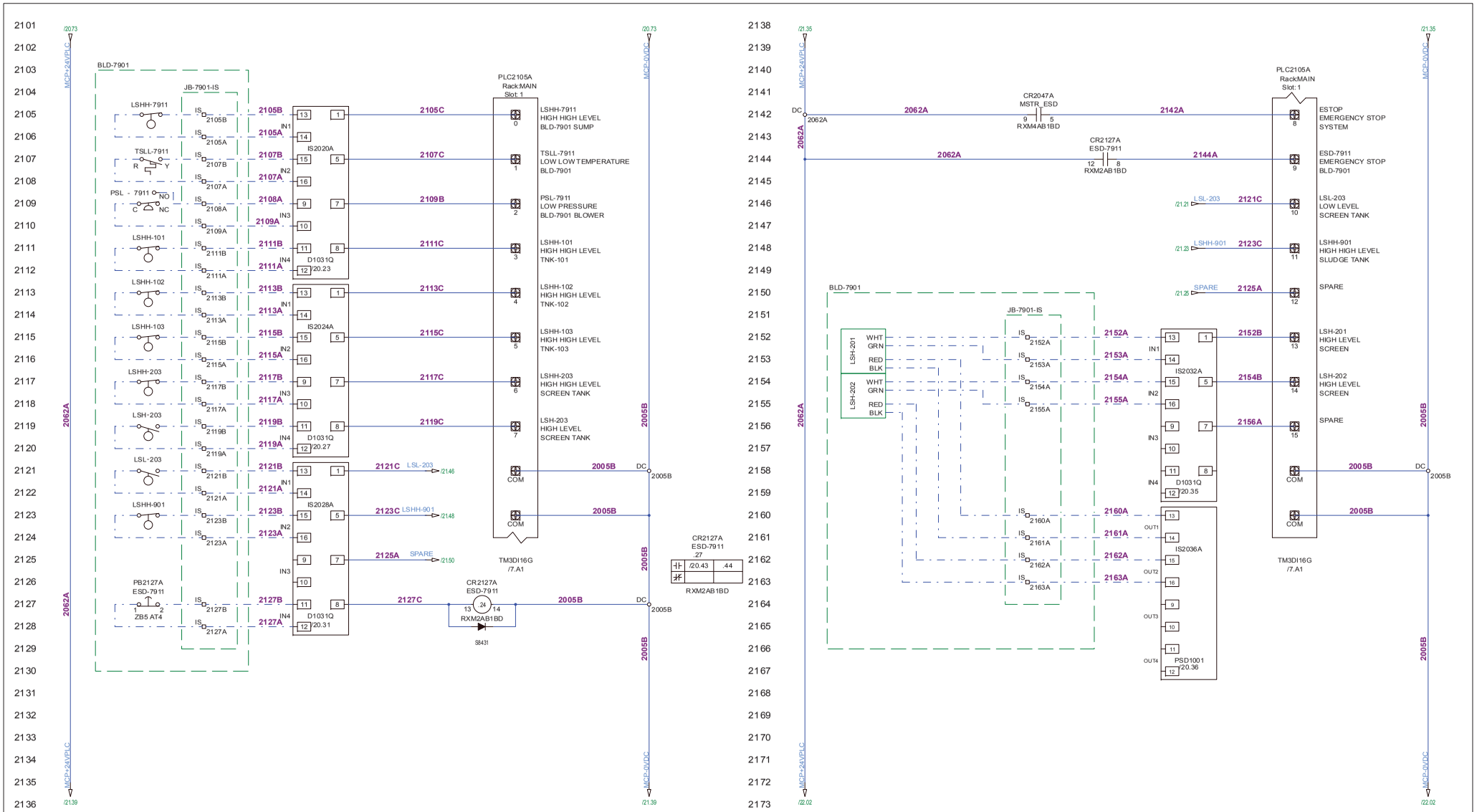
PROJ. NO: 1704432

TITLE AND LOCATION: MCP - 24VDC CONTROL POWER MCP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	20	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

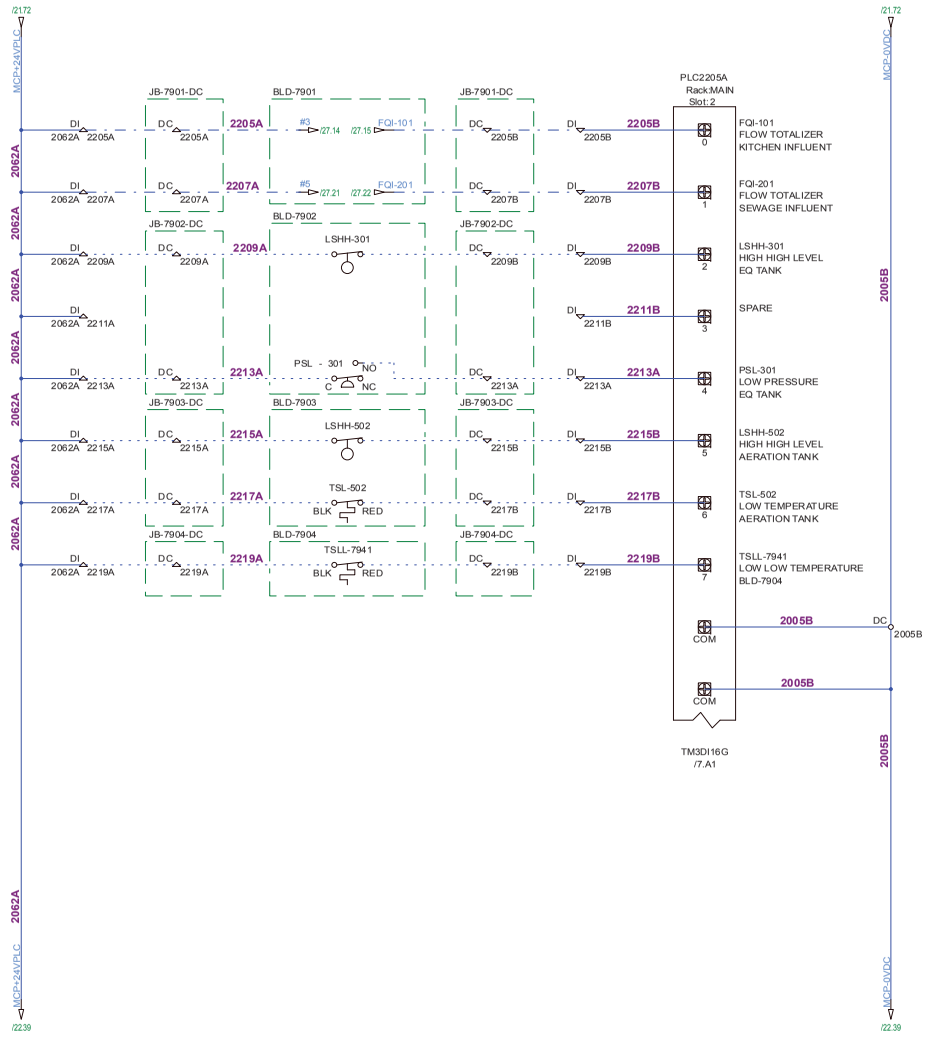
PROJ. NO: 1704432

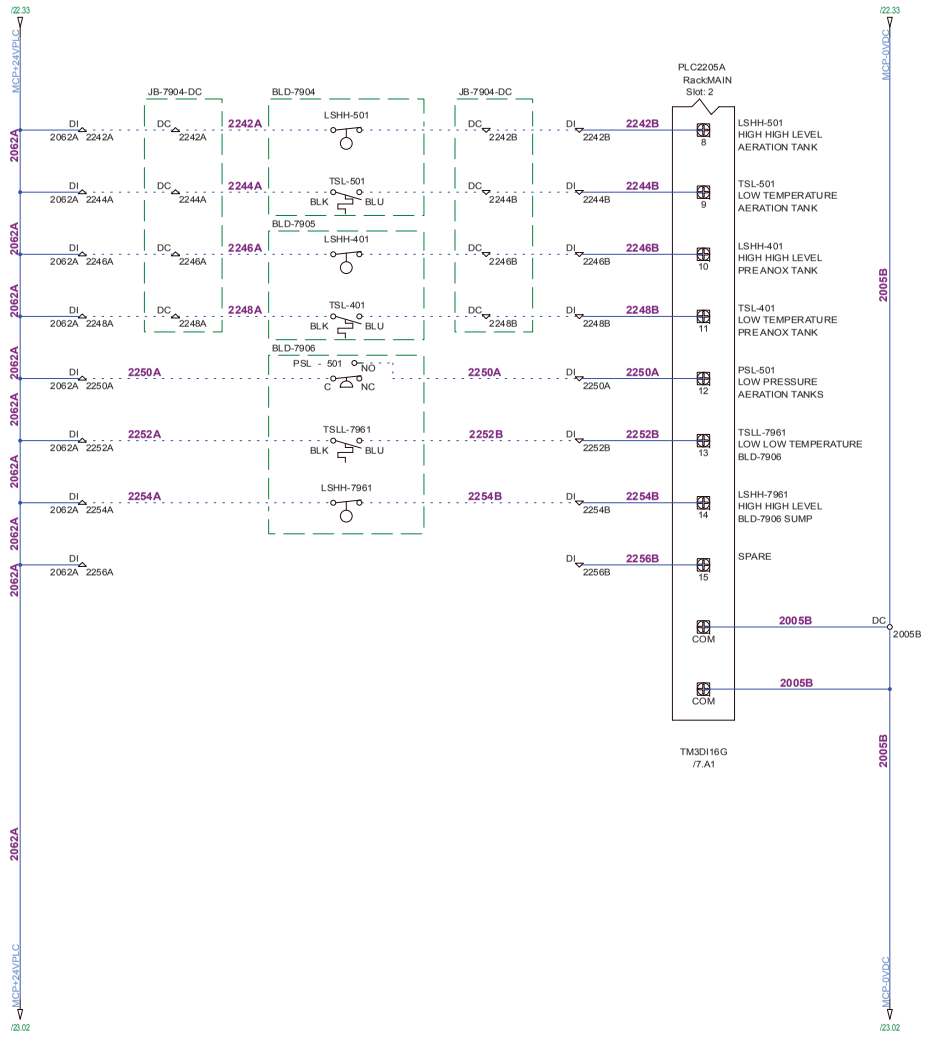
TITLE AND LOCATION:
MCP DISCRETE INPUTS
SHEET 1 OF 4
MCP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	21	71

1704432 - AGNICO EAGLE MINE - C





WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

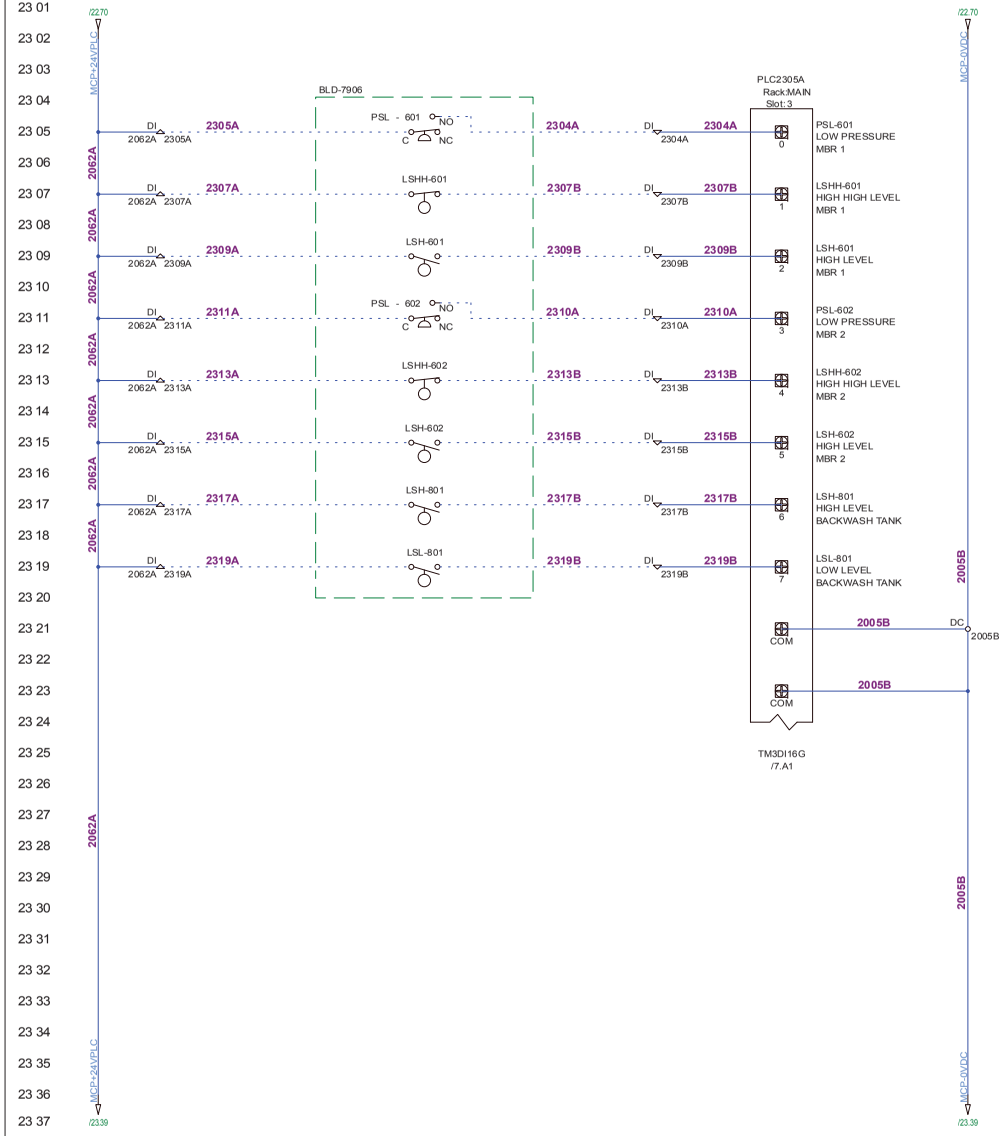
PROJ. NO: 1704432

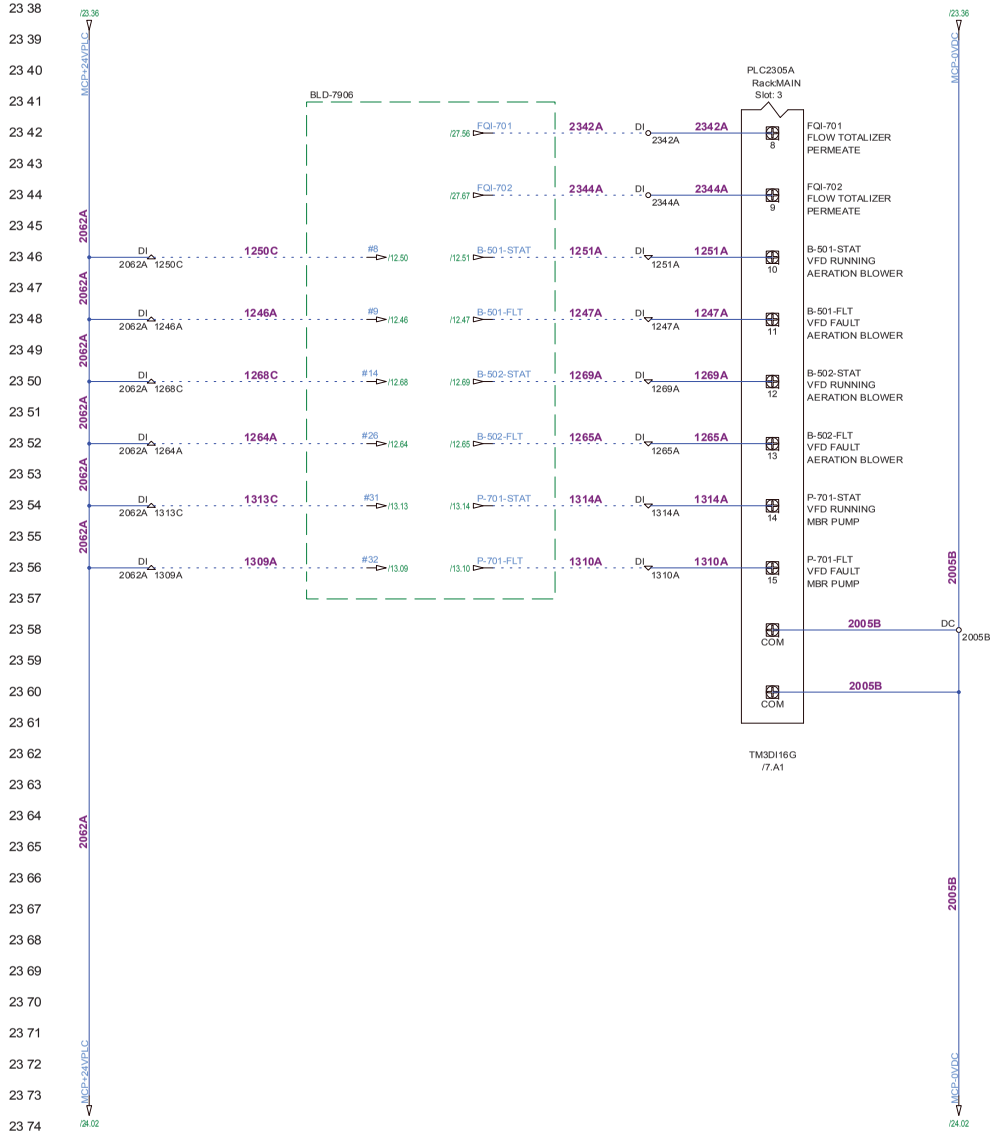
TITLE AND LOCATION:
MCP DISCRETE INPUTS
SHEET 2 OF 4
MCP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	22	71

1704432 - AGNICO EAGLE MINE - C





WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

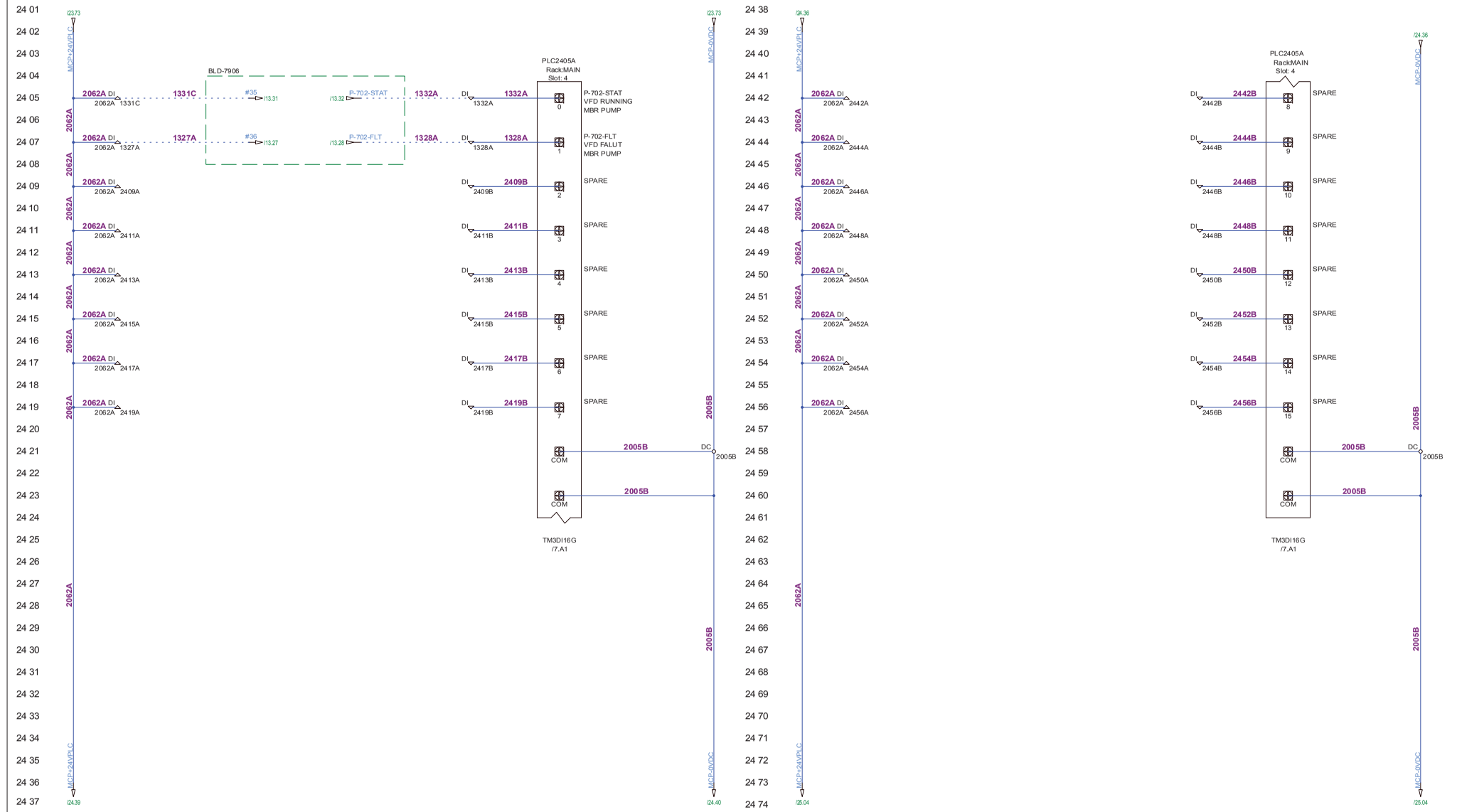
PROJ. NO: 1704432

TITLE AND LOCATION:
MCP DISCRETE INPUTS
SHEET 3 OF 4
MCP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	23	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

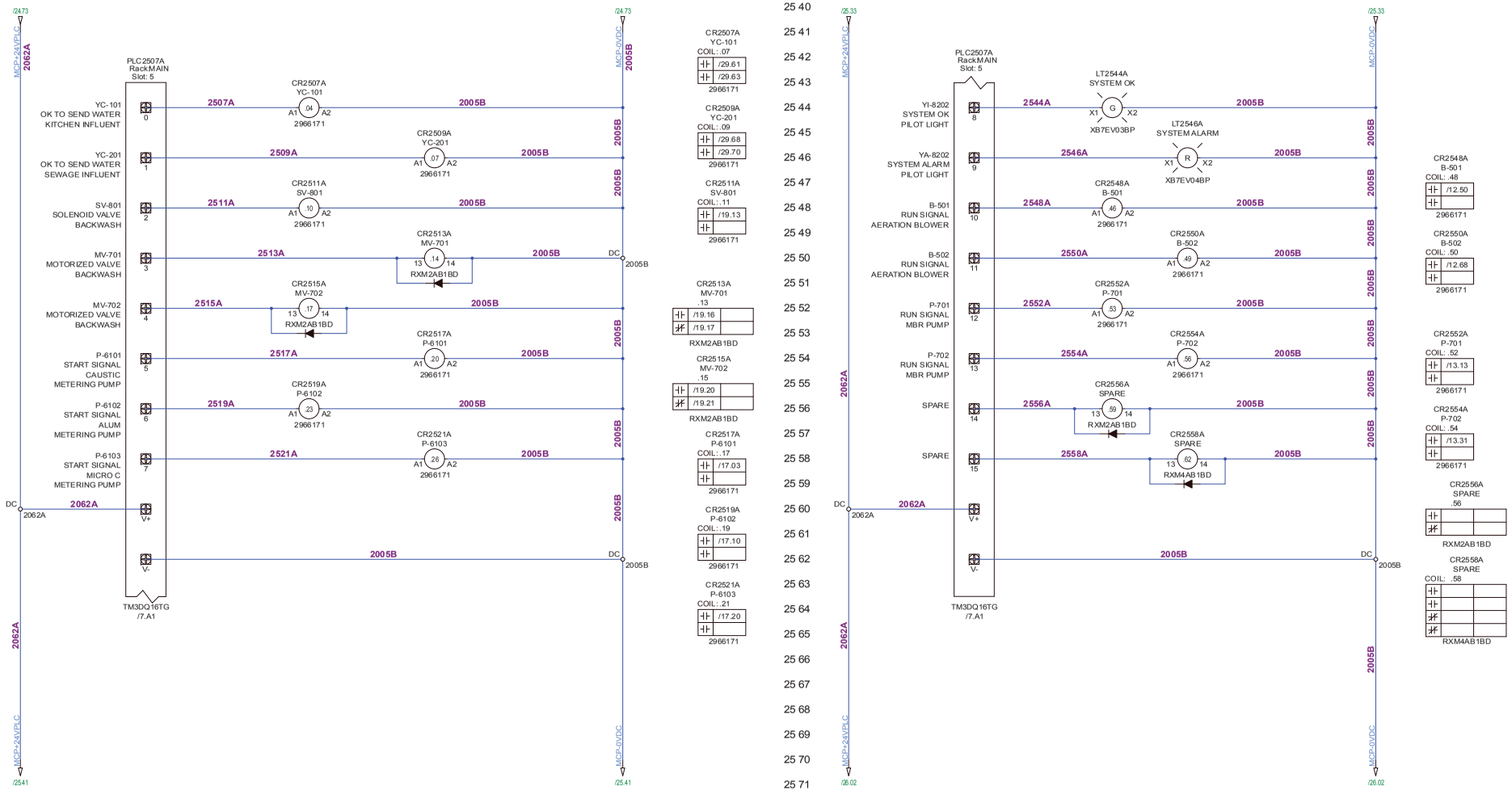
PROJ. NO: 1704432

TITLE AND LOCATION:
MCP DISCRETE INPUTS
SHEET 4 OF 4
MCP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	25/05/17	24	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

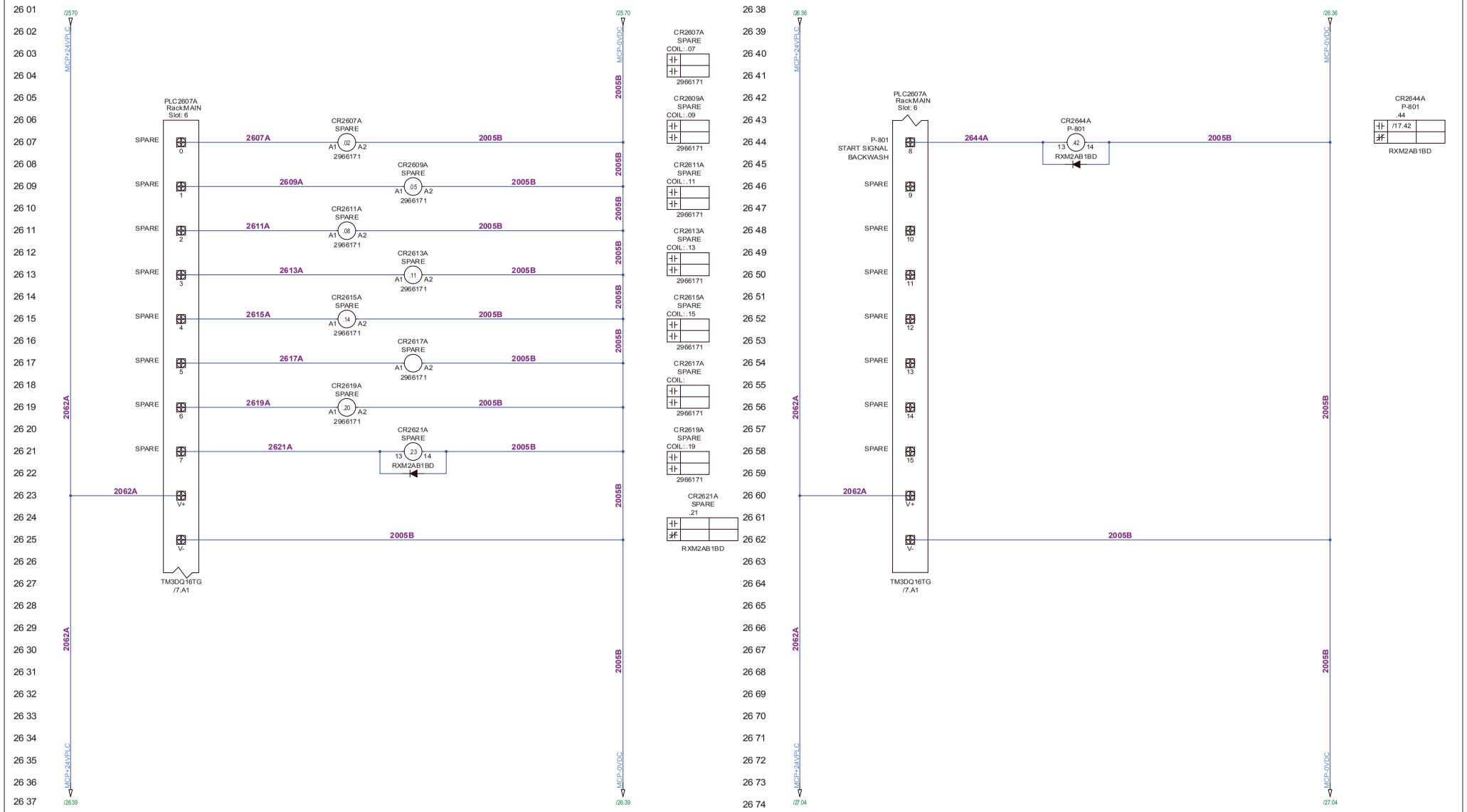
PROJ. NO: 1704432

TITLE AND LOCATION:
MCP DISCRETE OUTPUTS
SHEET 1 OF 2
MCP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	25	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

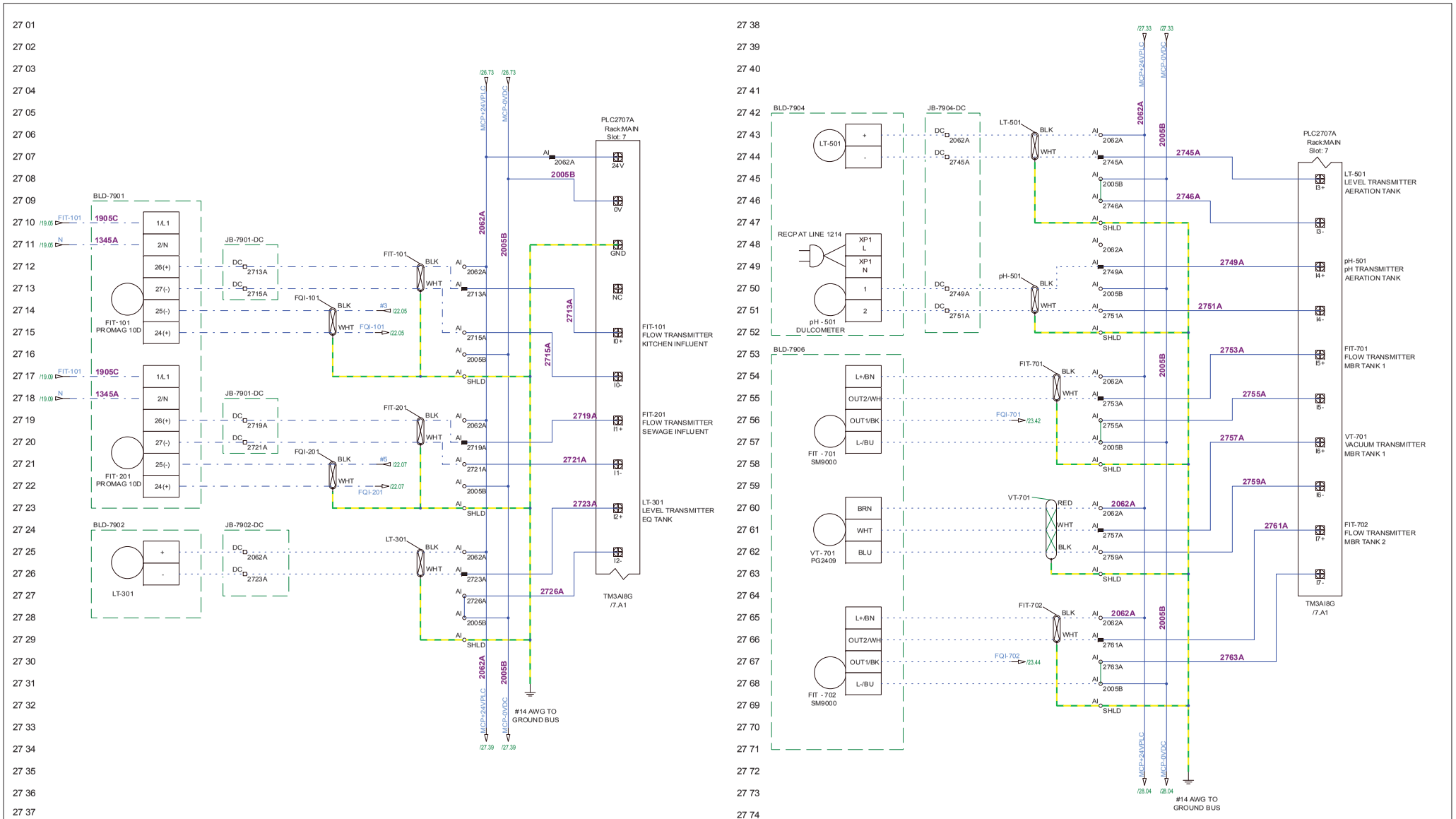
PROJ. NO: 1704432

TITLE AND LOCATION: MCP DISCRETE OUTPUTS SHEET 2 OF 2 MCP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	25/05/17	26	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

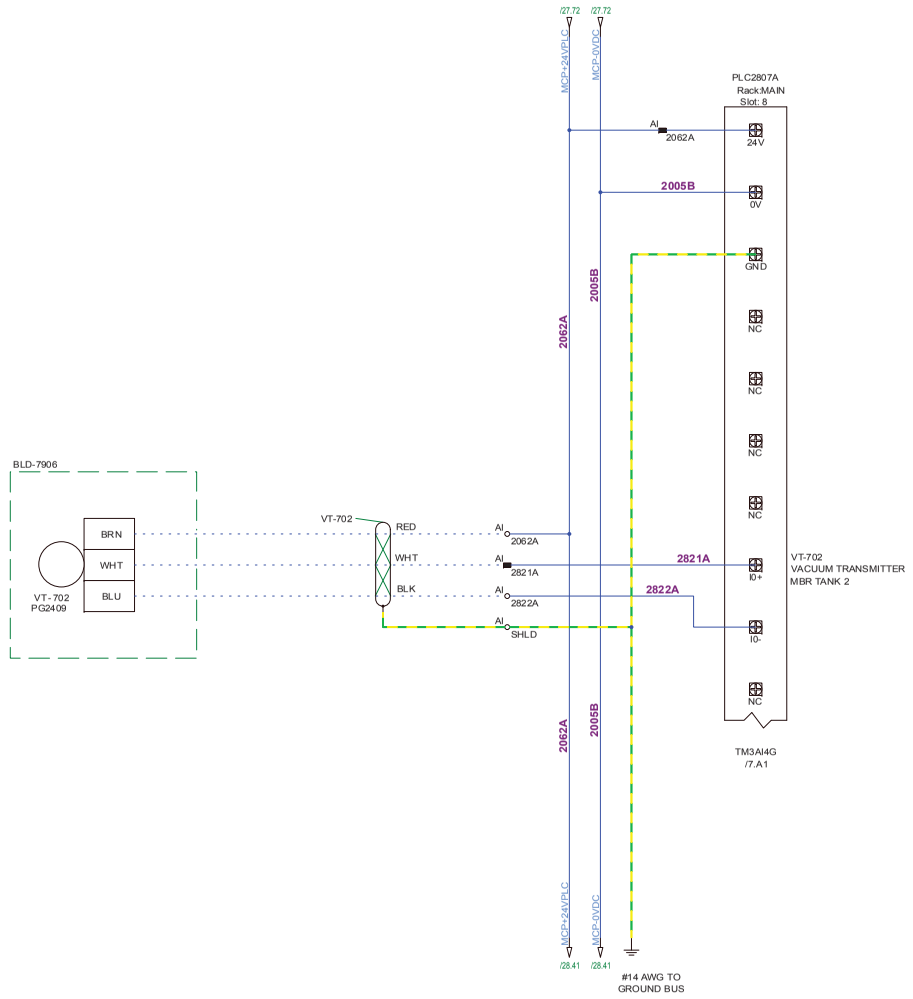
PROJ. NO: 1704432

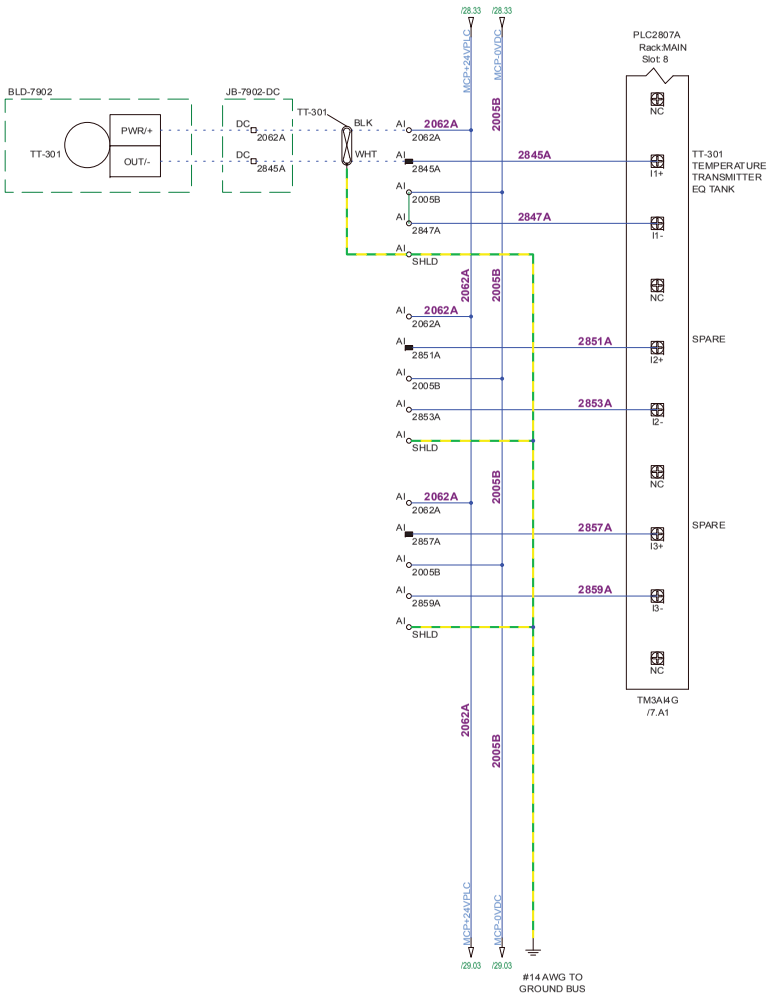
TITLE AND LOCATION: MCP ANALOG INPUTS SHEET 1 OF 2 MCP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	27	71

1704432 - AGNICO EAGLE MINE - C





WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

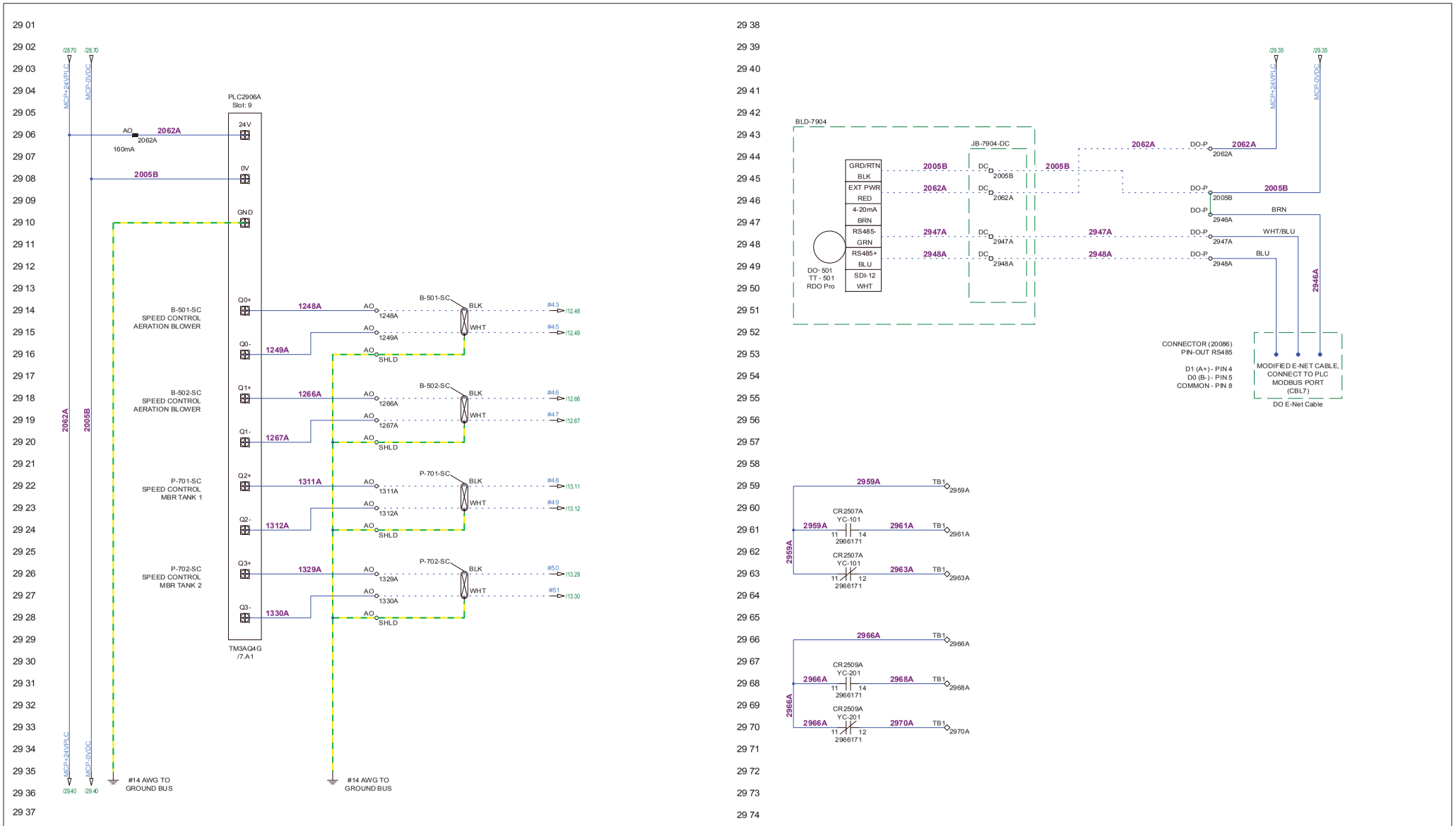
PROJ. NO: 1704432

TITLE AND LOCATION:
MCP ANALOG INPUTS
SHEET 2 OF 2
MCP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	29/05/17	28	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

TITLE AND LOCATION:
MCP ANALOG OUTPUTS, DO/TT
PROBE & CUSTOMER CONNECTIONS
MCP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	29/05/17	29	71

1704432 - AGNICO EAGLE MINE - C

30 01
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INTENTIONALLY BLANK

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INTENTIONALLY BLANK

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

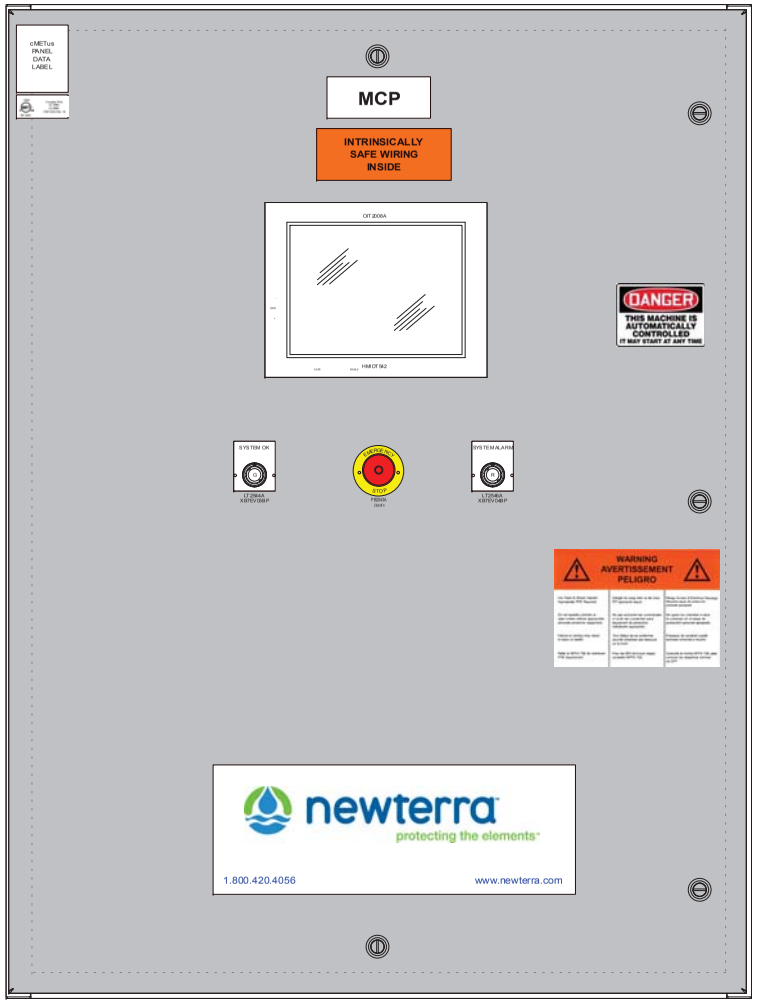
TITLE AND LOCATION: SPARE SHEET

MCP

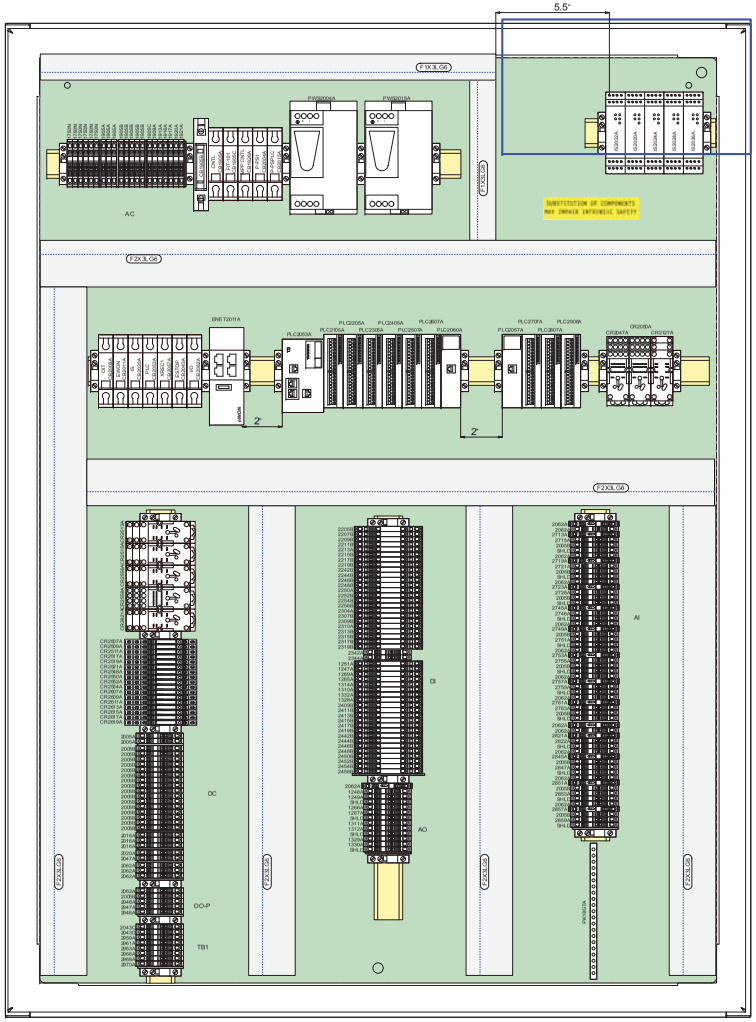
CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	29/05/17	30	71

1704432 - AGNICO EAGLE MINE - C



PANEL OUTER DOOR



MCP
EN4SD483612GY
PANEL INTERIOR

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

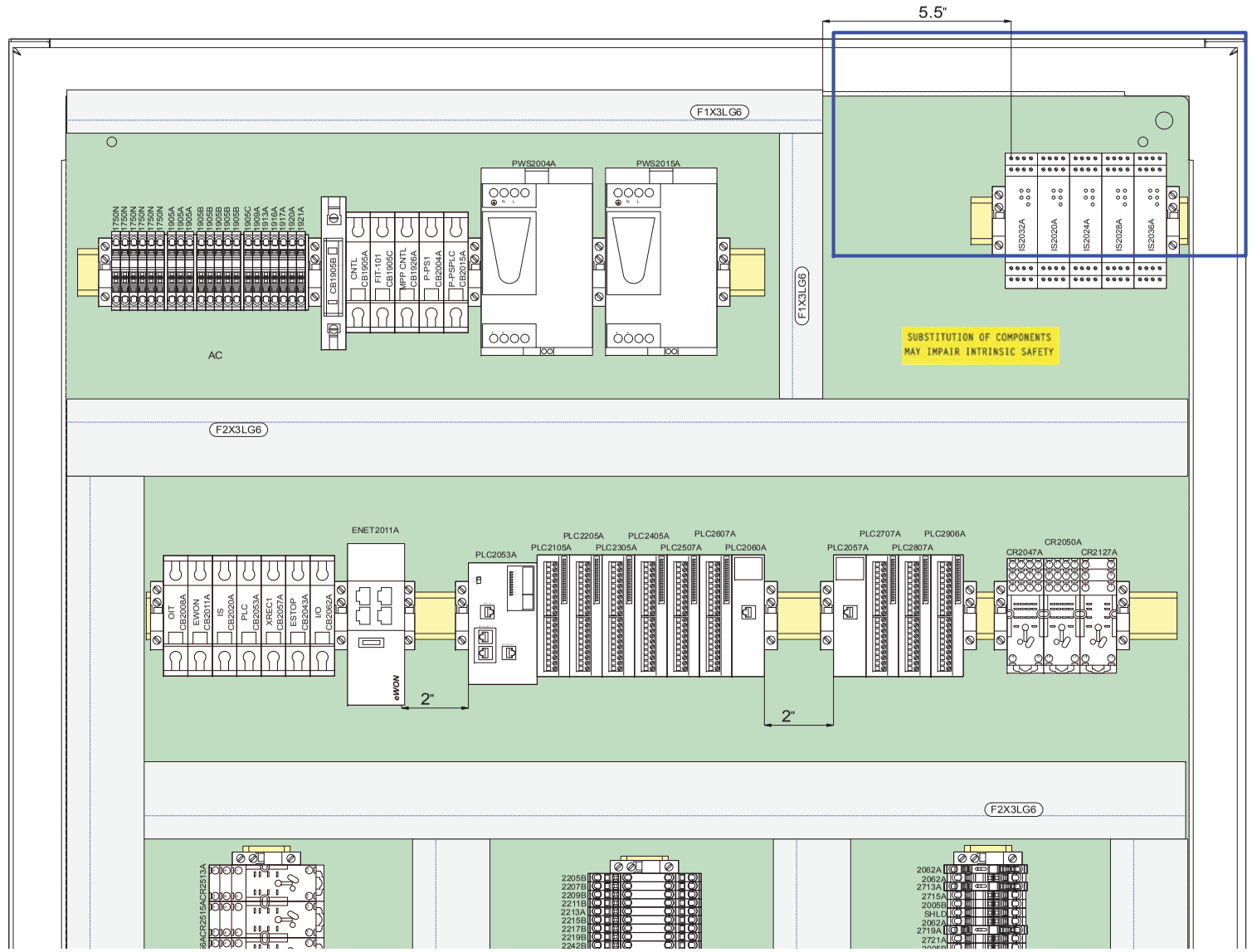
TITLE AND LOCATION: MCP PANEL LAYOUT

MCP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	31	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

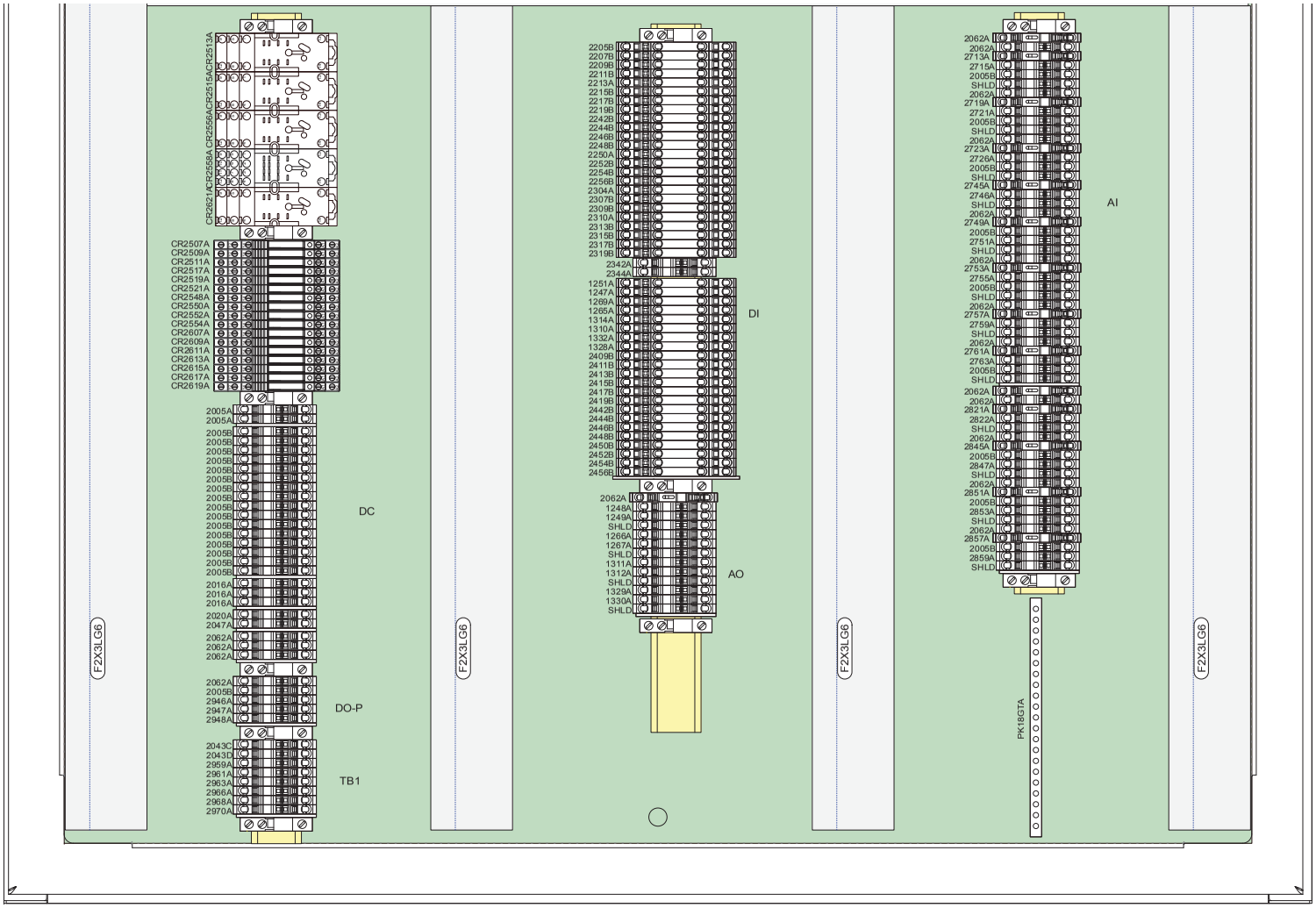
PROJ. NO: 1704432

TITLE AND LOCATION:
MCP PANEL LAYOUT
TOP
MCP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	32	71

1704432 - AGNICO EAGLE MINE - C



MCP
EN4SD483612GY

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

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CANADA K6V 5Y6
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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

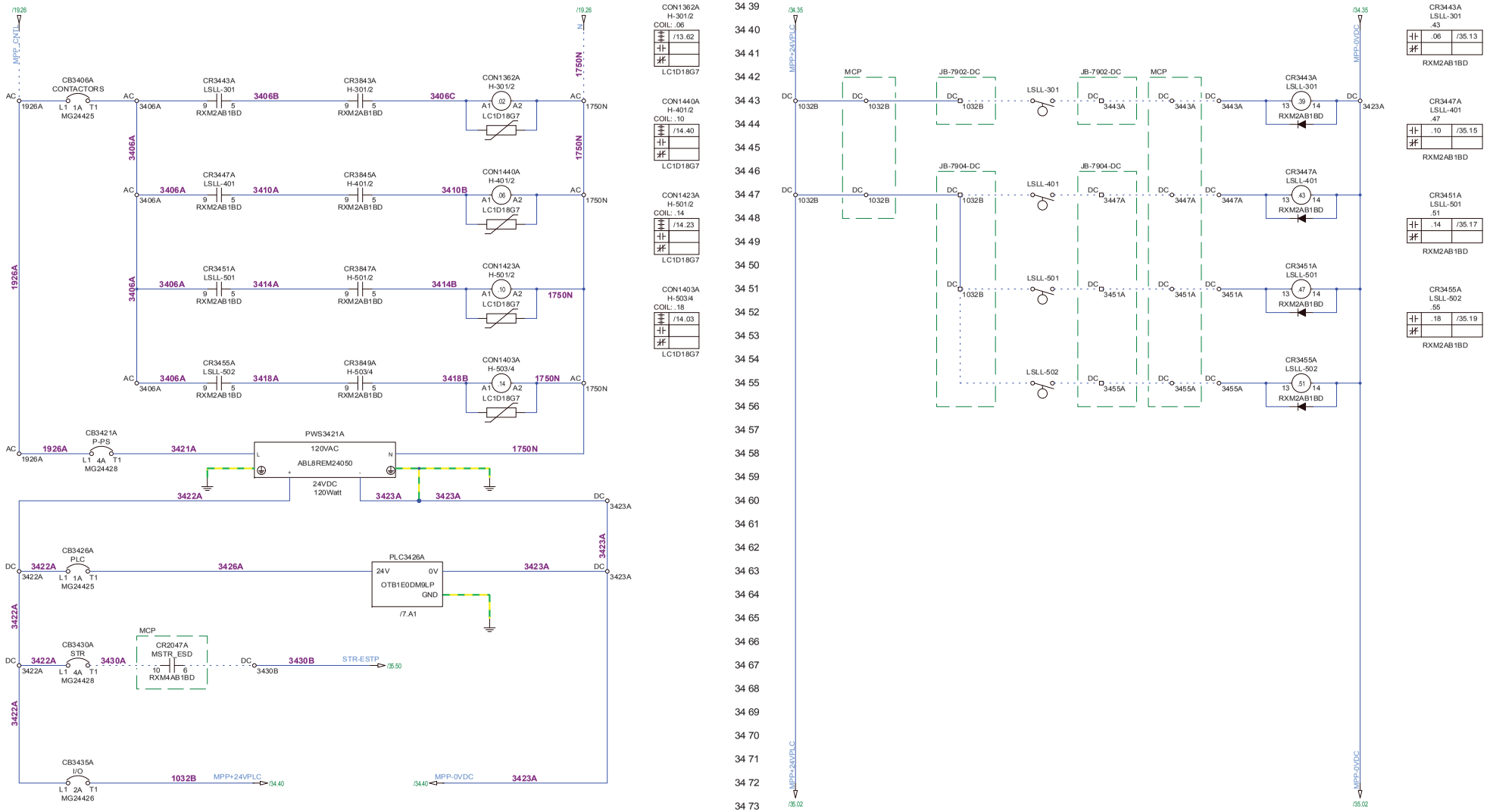
PROJ. NO: 1704432

TITLE AND LOCATION: MCP PANEL LAYOUT BOTTOM MCP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	33	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

1325 CALIFORNIA AVE.
BROCKVILLE, ONTARIO
CANADA K6V 5Y6
PHONE: (613)498-1876
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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

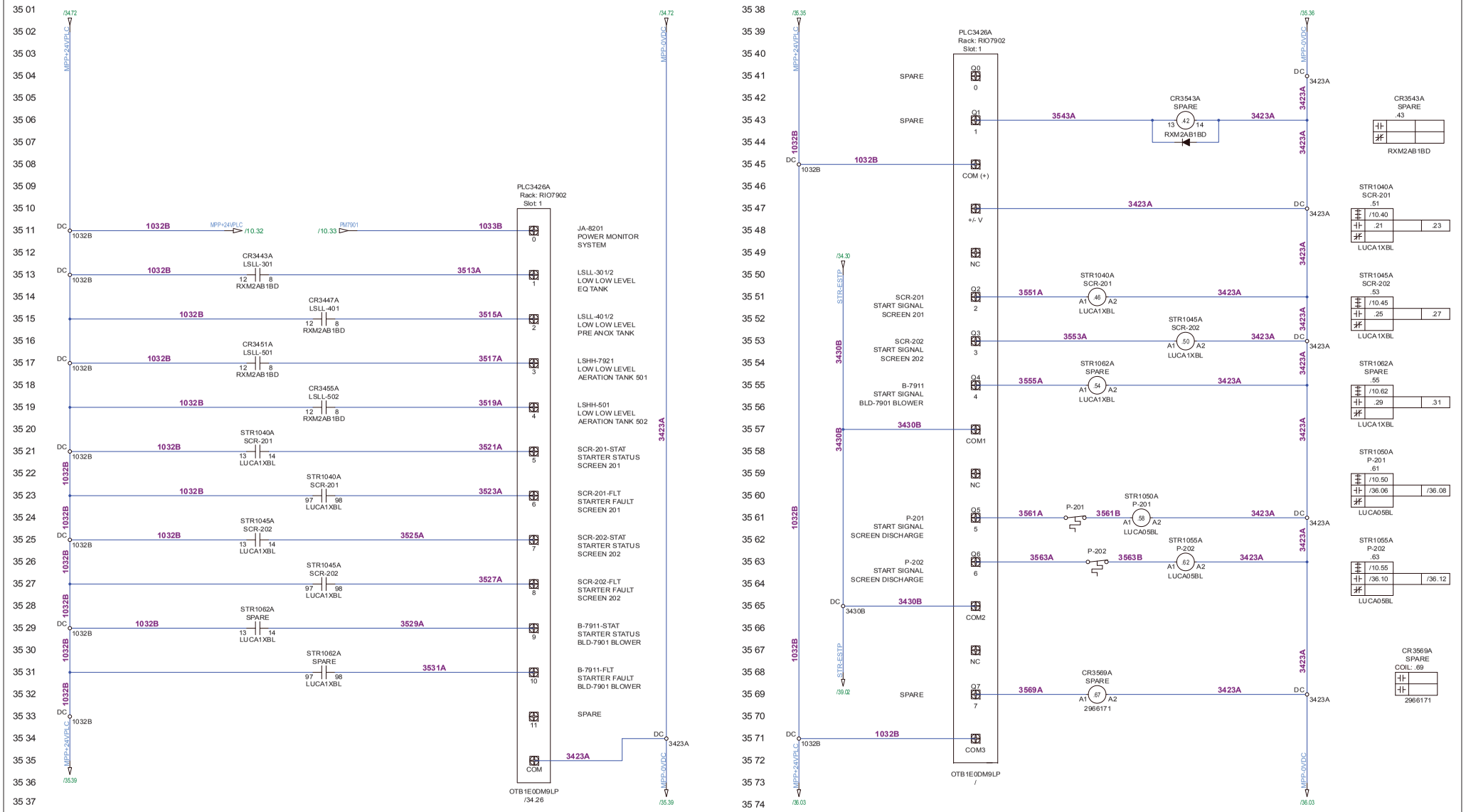
PROJ. NO: 1704432

TITLE AND LOCATION: MPP 120VAC & 24VDC CONTROL POWER MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	34	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

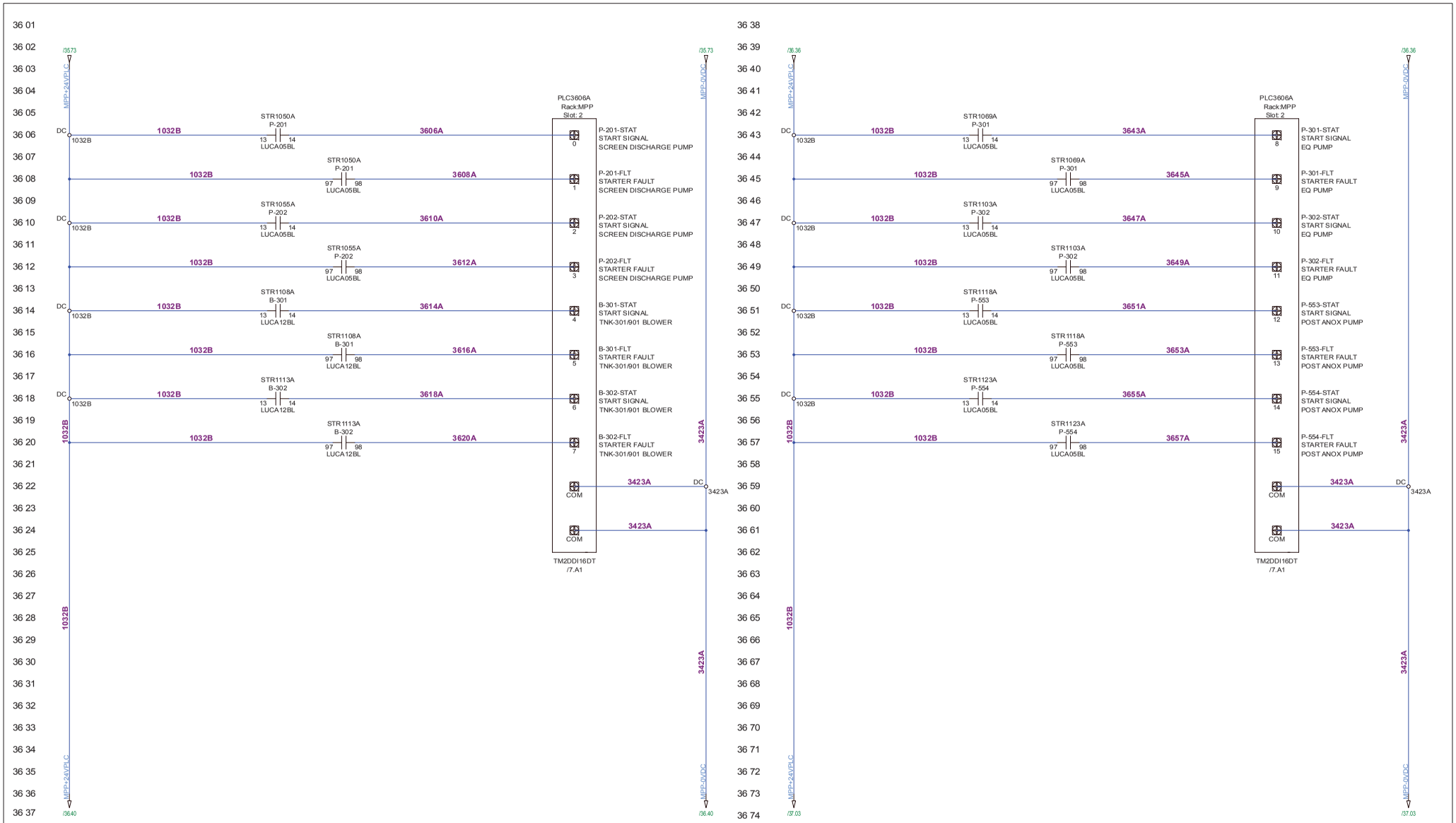
PROJ. NO: 1704432

TITLE AND LOCATION:
MPP OTB I/O
DISCRETE INPUTS/OUTPUTS
MPP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	35	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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BROCKVILLE, ONTARIO
CANADA K6V 5Y6
PHONE: (613)498-1876
www.newterra.com

LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

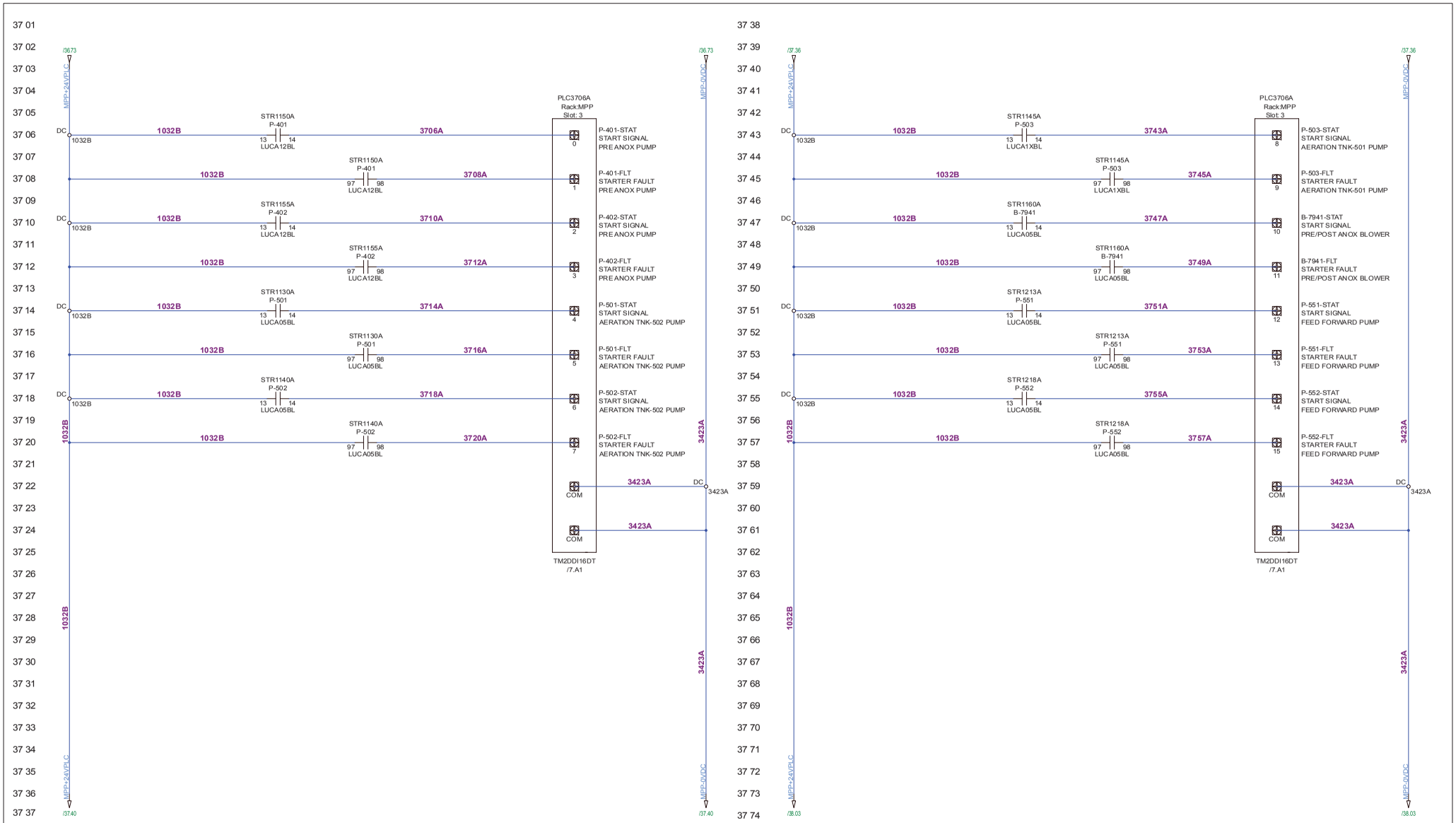
PROJ. NO: 1704432

TITLE AND LOCATION:
MPP DISCRETE INPUTS
SHEET 1 OF 2
MPP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	29/05/17	36	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

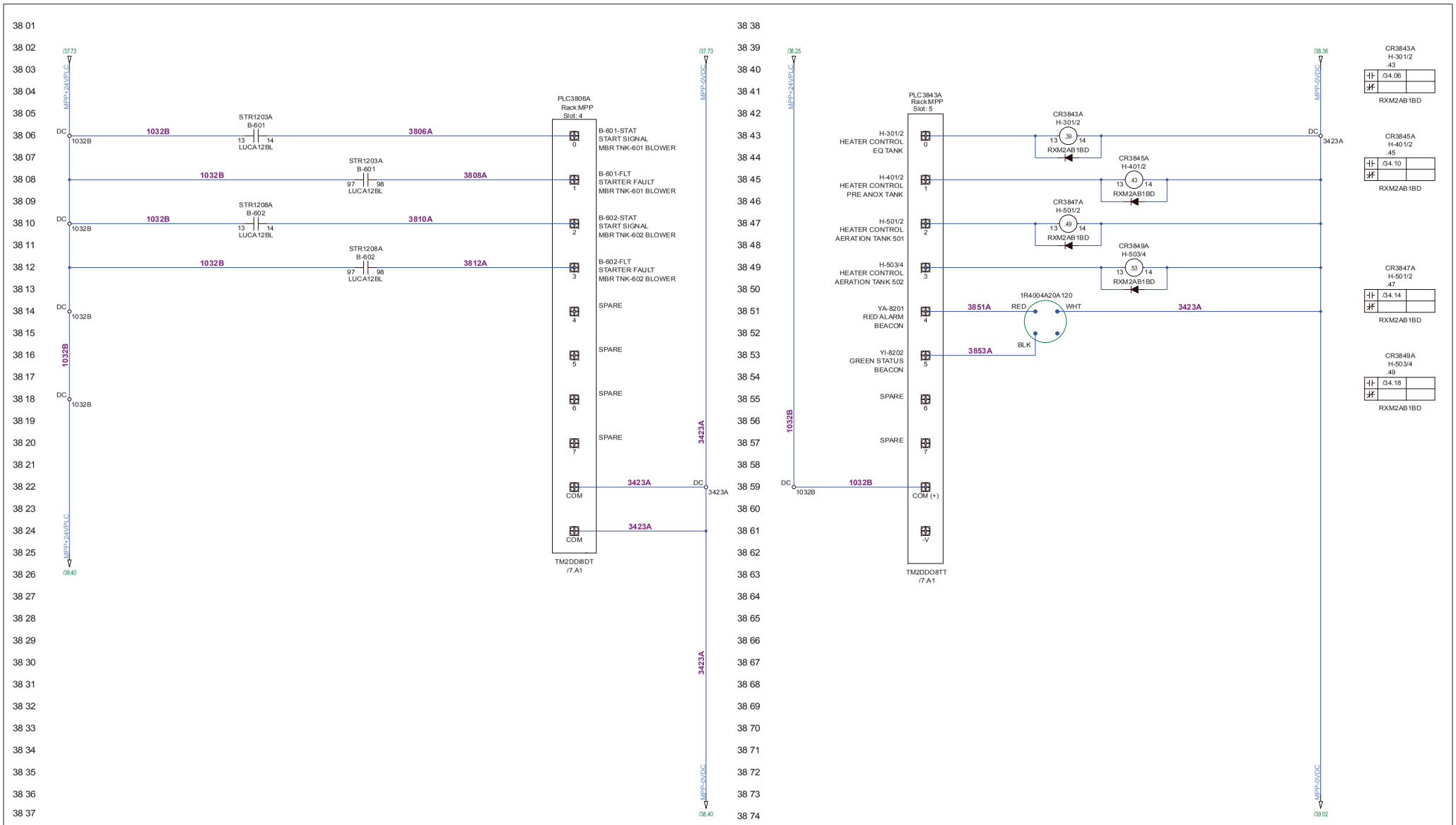
PROJ. NO: 1704432

TITLE AND LOCATION:
MPP DISCRETE INPUTS
SHEET 2 OF 2
MPP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	29/05/17	37	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

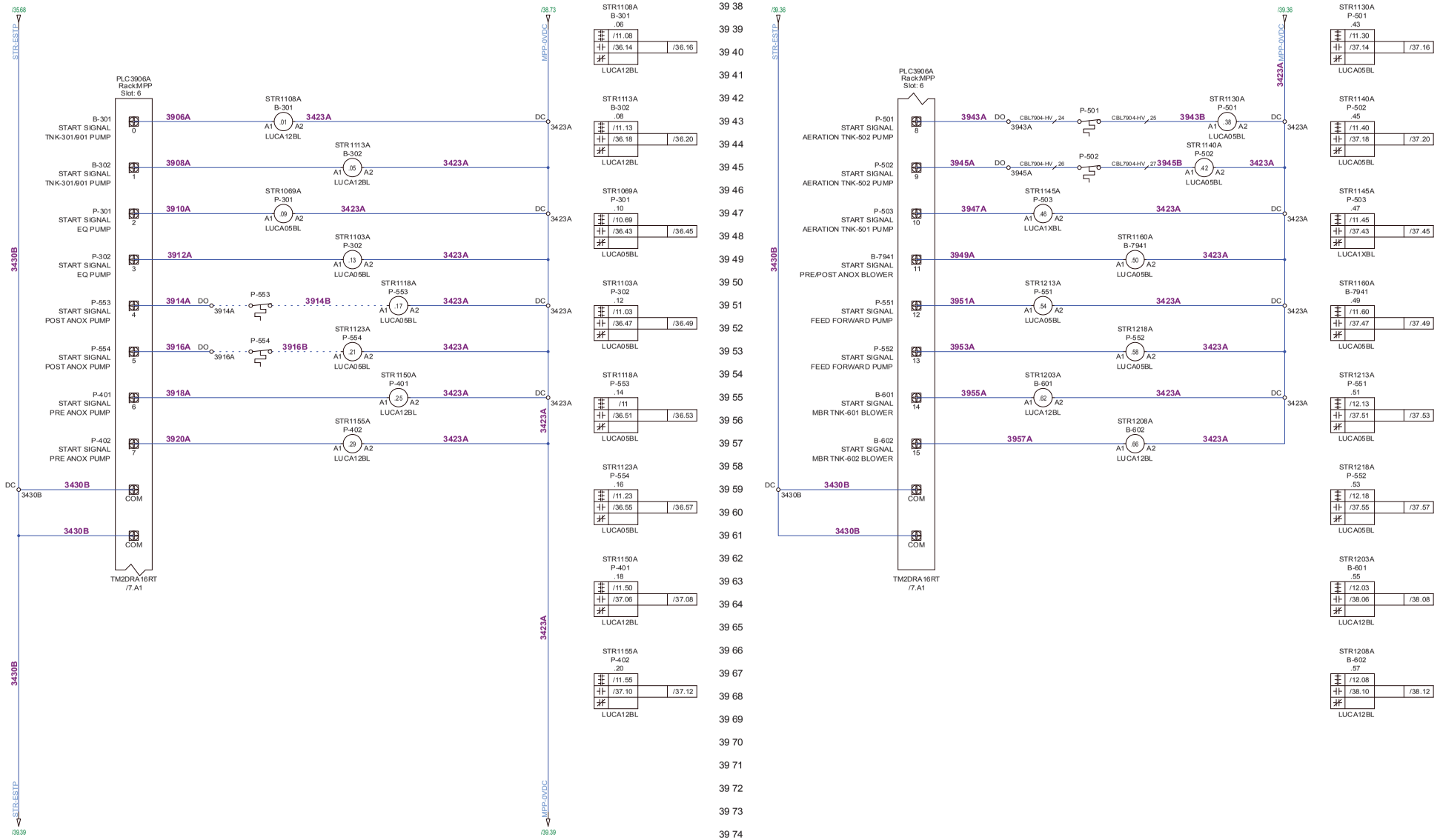
PROJ. NO: 1704432

TITLE AND LOCATION: MPP DISCRETE INPUTS & OUTPUTS MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	29/05/17	38	71

1704432 - AGNICO EAGLE MINE - C



WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1.

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

TITLE AND LOCATION:
MPP RELAY OUTPUTS
MPP

CUSTOMER:
AGNICO EAGLE
600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	39	71

1704432 - AGNICO EAGLE MINE - C

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INTENTIONALLY BLANK

WIRE LEGEND

BLACK:	POWER
RED:	120VAC CONTROL
WHITE:	NEUTRAL
BLUE:	+24VDC & IS WIRING
BLU/WHT:	0VDC
YELLOW:	INTERLOCKS

NOTES:

1. FOLLOW CANADIAN COLOUR CODE FOR POWER WIRING (SEE SHEET 3 - LEGEND)
2. WIRE SIZE IS #12 AWG FOR POWER UNLESS OTHERWISE SPECIFIED

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LEVEL	REVISION	DATE (dd/mm/yy)	BY
C	AS BUILT	14/08/17	DMB
B	FOR PRODUCTION	31/05/17	DMB
A1	FOR REVIEW	23/05/17	DMB
A	FOR SUBMITTAL	12/05/17	DMB

PROJ. NO: 1704432

TITLE AND LOCATION: MPP SPARE SHEET

MPP

CUSTOMER: AGNICO EAGLE 600 MAN AMARUQ MINE

DRAWN BY:	DATE:	SHEET:	SHEETS:
DMB	08/05/17	40	71

1704432 - AGNICO EAGLE MINE - C