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FINAL REPORT

100% Design Brief
Utilities Decommissioning

Smelter and Refinery
Decommissioning/Demolition
Thompson, Manitoba

Prepared for: Vale Canada Ltd.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

Conestoga-Rovers & Associates (CRA) has been retained by Vale Canada Ltd. (Vale) to develop the decommissioning plan for the Thompson Smelter and Refinery facilities and to provide detailed design for the associated utility decommissioning requirements at their Manitoba Operations Facility in Thompson Manitoba.

This report presents the 100% design brief for the utility requirements and includes the following information:

- Brief background description of the existing utility systems as they relate to the smelter and refinery facilities
- Description of the below grade, above grade, and electrical utilities packages that will form part of the smelter and refinery decommissioning
- Required approvals and studies
- Constructability review
- Listing of design drawings and specifications

1.2 BACKGROUND

CRA has conducted detailed site investigations and has reviewed available facility documentation including as-built drawings and equipment lists in order to understand the existing conditions of the various plant utility systems including those servicing the smelter and refinery facilities. CRA has used this information to develop baseline drawings for use in the development of the detailed design documents. The utility systems servicing the smelter, refinery, and other facilities are primarily sourced through the plants compressor (utility) building. The systems include the following:

Compressed Air/Air Drier (Instrument Air)

Air Compressors that are connected to the air dryer system are both located in the compressor building. The air dryers are fed high pressure air from the air compressors via a 14-inch compressed air line. The air dyers than supply air to the smelter and mill via separate, 12-inch discharge dry air mains along separate exterior overhead trestles.

Compressed Air/Air Drier (Instrument Air)

Air compressors that supply high pressure air to the plant are located in the compressor building. The air compressors are connected to two 16-inch air mains that include a 20-inch air main branching off one of the 16-inch air mains. The air mains run from the compressor building to the mine via an exterior overhead trestle and provide high pressure air to the plant via branch connections including a 6-inch and 8-inch connection to the refinery.

Vacuum

The vacuum system is located in the compressor building and includes separate 14-vacuum lines servicing the smelter, refinery and mill that run to the compressor building along separate exterior overhead trestles. The smelter vacuum line is no longer in service with its 14-inch line physically disconnected and capped-off from the vacuum system in the compressor building.

Potable Water

The potable water system includes a 14-inch watermain to the compressor building where the pressure is boosted via booster pumps to a 14-inch in discharge watermain. The 14-inch watermain is split into 8-inch and 6-inch lines with the 8-inch line supplying the elevated tank. The elevated tank supplies water to the overall plant system including connections to the smelter and the refinery.

Process (Raw) Water

Process water is supplied by 36-inch and 24-inch watermains to the compressor building. The process water pressure is boosted via booster pumps with a 30-inch discharge line that reduces to a 24-inch line servicing the smelter. Also connected to the 30-inch discharge is a branch connection that reduces and splits into two 14-inch lines that service the refinery. There are also 16-inch and 24-inch lines that service the concentrator from the compressor building. During previous excavations by Vale it was discovered that the old smelter raw water supply line and other miscellaneous piping are located below grade on the north side of the service road. This piping is not currently in service.

Sanitary, Storm, and Process Sewers

The sanitary and storm sewer systems include gravity piping and manholes of various sizes that service the plant with multiple connections to the smelter and the refinery. The storm sewer systems provides storm water collection from building roofs via piping connected to roof drains as well as general area drainage at catch basins located throughout the plant. The storm sewer system located west of the compressor building and smelter drains by gravity to the south west of the plant with the remaining storm sewer system draining to the north east of the plant. The process sewer for the refinery is a gravity drain that is an independent pipe that runs along the west side of the refinery and connects to the storm sewer system at the north west side of the refinery and west side of the mill.

Steam and Condensate

The boiler system and condensate return tank for the plant steam system are located in the compressor building. The boiler system provides steam to a header that has a 10-inch line running to the mill, a 12-inch line running to the smelter, and a 12-inch line servicing the plant along separate overhead trestles. The refinery has a 10-inch branch connection from the 12-inch plant line. Condensate is collected and pumped to the compressor building via separate 6-inch lines from the smelter and mill. The plant has a 6-inch pumped condensate return line that has a 6-inch connection to return the refinery condensate. The condensate lines are located on separate overhead trestles.

Electrical System (High Voltage)

The high voltage system includes four 138 kV, 3-phase power feeders running on overhead tower structures from the Vale switching station which is located at the north west corner of the plant. The equipment and components of the Vale switching station are owned by Vale. Two feeders #3 and #4 provide 138 kV, 3-phase power service to the smelter substation which provides power to the smelter via 13.8 kV feeders from the smelter substation switchgear. Two feeders #1 and #2 provide 138 kV, 3-phase power service to the main substation which provides power supply to the rest of the plant including the refinery.

Converter and Roaster Air (Smelter)

The Converter and Roaster blower systems are located in the compressor building with 54-inch Roaster and 60-inch Converter air mains running to the smelter along separate

exterior overhead trestles. The roaster and converter blowers are dedicated systems to the smelter process.

Figure 1 included in Appendix A shows the general process flow diagrams for the various utility systems servicing the smelter and refinery. Many of the systems servicing the smelter and the refinery also service other facilities at the plant and will be required to remain online. The potable water, process (raw) water, compressed air, vacuum, and steam/condensate systems service the smelter and the refinery as well as other facilities such as the mill and the mine. The roaster and converter air systems are dedicated to servicing the smelter.

This report details the requirements for the utility systems to be decommissioned and/or disconnected as part of the smelter and refinery decommissioning and identifies which systems will require investigation to determine what further future modifications are required to continue servicing the existing facilities to remain and future plant facilities.

2.0 UTILITY PACKAGES

CRA has developed utility work packages that include technical drawings and specifications detailing the requirements for the works to be completed as part of the smelter and refinery decommissioning. The utility requirements have been grouped into three (3) packages which include below grade utilities, above grade utilities, and electrical works. The 100% Design further expands on the 90% Design based on comments received from the 90% Design review. This section provides a description of each utility package.

2.1 BELOW GRADE UTILITIES

The below grade utilities include the potable water, process water, sanitary, storm, and process sewer systems that service the smelter, refinery, and other plant facilities. It was determined during the Draft Design review workshop that the main potable water system loop that runs south of the smelter and refinery will remain online as hydrants at that location are part of the firefighting plan for the Orica facility. Additionally it was determined at the workshop that the main storm sewer system will remain online to allow for controlled site area drainage to the south yard and the area currently occupied by the smelter and refinery. This has been reflected in the 100% Design by having only the connection pipes to the smelter and refinery facilities decommissioned while leaving the main potable water and storm sewer system online.

The below grade package shows and describes the isolation and cap points for the various water and sewer connections to the smelter and refinery and identifies piping, manholes, and catch basins to be decommissioned. The package details the requirements to fill decommissioned pipes, manholes, and catch basins with low strength concrete or grout to provide a solid sub-surface condition without any voids.

Manholes, catch basins, and valve stems scheduled for decommissioning will be removed to a min of 5 feet below grade and backfilled. Manholes and catch basins that will remain online but have existing connections to piping scheduled for decommissioning will have those connections capped with a brick bulkhead complete with grout to provide a water tight seal.

The process water piping feeding the smelter and refinery from the compressor building will have the main process water discharge pipe capped from within the compressor building with the exterior piping decommissioned by filling with low strength concrete or grout. The Draft Design workshop identified old raw water and other miscellaneous

piping located on the north side of the access road between the smelter and the compressor building. This piping will be decommissioned as described above.

Table 2-1 summaries quantities for the required works to the below grade utilities:

TABLE 2-1 – BELOW GRADE UTILITIES QUANTITIES

Utility System	*Pipe Sizes*	*No. of Excavations*	*No. of Isolation Points*	*Total Linear Feet of Decommissioned Pipe*
Potable Water	6", 8", 14"	3	3	900
Process Water	14", 20", 24", 30"	2	1	1900
Storm Sewer	10", 12", 18"	0	12	1300
Sanitary Sewer	8", 18"	0	4	1200
Process Sewer	18"	0	2	1500

The below grade utility package including drawings and specifications is located in Appendix B.

2.2 ABOVE GRADE UTILITIES

The above grade utilities include the steam/condensate, roaster air, converter air, compressed air, compressed dry air, and vacuum systems that service the smelter, refinery, and other plant facilities. The converter and roaster blower systems are dedicated to the smelter and can be removed in their entirety. The compressed air, compressed dry air, vacuum, and steam/condensate systems will remain online with connections to the smelter and refinery isolated and capped. It was identified in the Draft Design workshop that it was preferred to make the isolations to the above grade utilities at the equipment inside the compressor building. Steam/Condensate and compressed air connections to the refinery can be isolated at the branch connection to the respective mains that run along the overhead trestle to the north of the refinery.

Also included in the above grade utilities are the return lines between the mill and the smelter and the mill and the refinery. Piping connections between the mill and smelter

consists of various sizes of piping running along an overhead trestle to the west of the mill and connecting to the north wall of the smelter. The connections between the refinery and the mill include an effluent return line running along the overhead trestle north of the refinery and connecting to the east wall of the mill and return lines that run along the ground from the north wall of the refinery and the south wall of the mill.

The above grade utility package shows and describes the isolation and cap points for the compressed air, compressed dry air, vacuum, and steam/condensate systems and the isolation and cap points for the converter and roaster blower ancillary systems inside the compressor building. The package includes the isolation and cap points for the steam/condensate and compressed air systems at the overhead trestle north of the refinery. Also included are the isolation and cap points for the return lines between the smelter and the mill and the refinery and the mill. Table 2-2 summaries the quantities for the required works to the above grade utilities:

TABLE 2-2 – ABOVE GRADE UTILITIES QUANTITIES

Utility System	*Size of Pipe*	*No. of Isolation Points*
Steam/Condensate	12", 10", 6", 2"	4
Roaster Air	54", 3"	5
Converter Air	60", 3"	11
Compressed Air/Dry Air	12", 8", 6"	3
Vacuum	14"	1
Mill/Smelter Return Lines	3", 4", 6" 8", 10"	10
Mill/Refinery Return Lines	6", 8", 4"	4

Demolition and removal of decommissioned piping, valves, equipment and structures as well as required restoration will form part of the scope of work for the smelter and refinery decommissioning contract.

The above grade utility package including drawings and specifications is located in Appendix B.

2.3 ELECTRICAL

This section includes the description of the electrical utility package. The electrical utility package includes details for the necessary disconnections and re-routing of overhead power lines required as part of the smelter and refinery decommissioning.

The scope of work for the electrical utility package includes the following:

- Disconnection of feeders from the Vale switching station to the smelter substation.
- Disconnection of emergency tie between the smelter and the main substations.
- Disconnection of feeders from the main substation to the refinery.
- Installation of new power feeder to the south yard facilities (including Orica) via overhead line connected to the existing Thompson Open Pit (TOP) line that is fed from the main substation.
- Options for temporary power service to feed the smelter stack aircraft beacon.

The electrical package including drawings and specifications is located in Appendix B.

2.3.1 SMELTER DISCONNECTIONS

Power to the smelter is provided by feeders from the dedicated smelter substation that is in turn fed power from two 138 kV, 3-phase power lines connected to the Vale switching station via overhead transmission towers. Disconnecting the 138 kV feeders from the Vale switching station will disconnect all power to the smelter substation and smelter. The building services (lights, heaters etc.) for the smelter substation are fed from an electrical room in the smelter which will be de-energized once the 138 kV feeders are disconnected. There is also an existing 13.8 kV emergency tie between the smelter substation and the main substation that will require disconnection.

The electrical package shows and describes the location and disconnection points for the 138 kV feeders. The feeders will be disconnected at the Vale switching station on the outgoing tower structure. The disconnection at the Vale switching station will require coordination with Manitoba Hydro. The electrical package also describes the requirements to disconnect the 13.8 kV emergency tie between the smelter substation and the main substation. The cabling for the emergency tie will be disconnected from the switchgear at the main substation and will have the cable ends taped, labeled and left in the existing cable trays in the tunnels.

Demolition and removal of all equipment and structures (including the smelter substation, overhead transmission towers, cabling, switchgears, DC battery system, transformers etc.) will form part of the scope of work for the smelter and refinery decommissioning contract.

2.3.2 REFINERY DISCONNECTIONS

Power to the refinery is provided by three 13.8 kV, 3-phase feeders from the main substation including two that are below grade and one feeder that runs above grade along the overhead trestle and utility poles. The feeders are connected to breakers No. 952, No. 1352, and No. 1752 in the main substation switchgear.

The electrical package shows and describes the location and disconnection requirements for the 13.8 kV feeders to the refinery. The feeders will be disconnected at the main substation switchgear and will have the cable ends taped, labeled and left in the existing cable trays in the tunnels.

Removal of the existing feeder cables (as required) and utility poles will form part of the scope of work for the smelter and refinery decommissioning contract.

2.3.3 NEW FEEDER TO SOUTH YARD FACILITIES

Power service is provided to the south yard facilities (Orica, Scale House, etc.) via an overhead 4,160 V, 3-phase power line that is connected to the smelter facility's Transformer No. 7-1. Transformer No. 7-1 is connected to 13.8 kV switchgear located in the smelter. Transformer 7-1 is an exterior pad mounted transformer located beside the west wall of the smelter. A new feeder is required to provide power service to the south yard facilities once the smelter is decommissioned.

The electrical package shows and describes the routing and connection points for a new overhead feeder to the south yard facilities power line. The proposed design includes a connection to the existing 13.8 kV, 3-phase TOP overhead line east of the main parking lot with a new overhead line running parallel to the existing Birchtree power line up to the rail tracks on the south end of the plant site. The new line will than cross the haulage road, Birchtree line, and rail tracks and run through the yard parallel to the southern boundary of the site and connect to a new pad mounted transformer. The new pad-mounted transformer will step-down the voltage from 13.8 kV to 4,160 V and will be connected to the exiting south yard overhead line. The existing south yard overhead line will be disconnected from Transformer No. 7-1.

2.3.4 CONVERTER AND ROASTER BLOWERS DISCONNECTIONS

The converter and roaster blowers are systems dedicated to the smelter that will no longer be required once the smelter is decommissioned. The converter and roaster blower motors include 4,160 V power feeders from switchgears inside the compressor building and 600 V feeders to supporting equipment including control panels, oil pumps, oil vent fans etc. The electrical package shows and describes the 4,160 V disconnections and 600 V power supply disconnections required to de-energize the converter and roaster blowers and ancillary equipment. The 4,160 V feeders will be disconnected from the switchgear and the cabling will be taped, labeled and left in the existing cable trays.

2.3.5 TEMPORARY POWER TO SMELTER STACK AIRCRAFT BEACONS

The smelter stack aircraft beacons will require temporary power supply for the duration of the smelter demolition phase once the smelter power feeders have been disconnected. CRA has contacted various suppliers of temporary power supply solutions, to determine what technology is available to power the smelter stack aircraft beacons during the demolition phase. Table 2-3 below summarizes CRA's evaluation of the power supply options:

TABLE 2-3: SMELTER STACK AIRCRAFT BEACON TEMPORARY POWER OPTION EVALUATION

Description	*Advantages*	*Disadvantages*
Option 1: Temporary Feeder. Install 3c #10 Teck90 cable from a nearby distribution panel in compressor building. Bury cable approx. 450 mm to avoid interference with plant operation. Approx. Cost: $ 8,000	- Low tech solution relatively simple to implement. - Relatively low cost to install. - Low operating costs. - Requires no maintenance. - Cable should not interfere with demolition operations. - Cable can be abandoned in place or removed after demolition.	- Have to cross plant access road. May be difficult to install because of existing buried services. - Vale would prefer a solution that does not have to come from another building.
Option 2: Portable Standby Generator Supply a 2500W portable gasoline generator. Locate near the base of the stack. Have spare generator for backup in case of generator failure. Approx. Cost: Installation: $3,500 Rental Cost: $1500/month Fuel Cost: $200/month	- Stand alone system - Relatively simple solution. - Easy to implement. - Relatively low cost to install.	- Higher operating costs (monthly rental plus fuel costs). - Reliability of generators must be considered. - Maintenance required to refuel generators.

Description	*Advantages*	*Disadvantages*
Option 3: Solar Powered UPS System Supply a solar panel, battery and inverter system Approx. Cost: $40,000	- Stand alone system. - Low operating costs. - Should be no or little maintenance costs.	- High initial cost. - Complex solution. Potential for failure. - Design has to be upsized to accommodate possibility of low light conditions during winter months. - Battery systems may perform poorly in low temperature conditions. - Equipment is relatively large. Solar panels will be large. - Solar panels could be damaged as a result of nearby demolition.
Option 4: Battery Powered UPS System Supply a battery system plus inverter at the base of the stack in an outdoor enclosure. Supply a charger and second battery system in compressor building. Swap batteries periodically. Approx. Cost: $25,000	- Stand alone system. - Relatively simple solution. - Low operating costs.	- High initial cost. - Battery systems may perform poorly in low temperature conditions. - Maintenance costs associated with swapping battery systems.

Based on reliability and the costs of installation and operation CRA recommends Option1: Temporary Feeder as the recommended option.

2.4 FUTURE CONSIDERATIONS

During the investigation stage CRA has identified a number of additional utility system modifications outside of the scope of this project that should be considered and

investigated by Vale as the smelter and refinery decommissioning project progresses to the detailed design stage.

2.4.1 ABOVE GRADE SYSTEMS

It was identified that the removal of piping and equipment will be most economical if integrated as part of the demolition and removals scope of the smelter and refinery decommissioning contract. CRA has included a drawing package for the above grade utilities that captures the scope of the removals for the above grade systems which is included in Appendix C for reference.

The decommissioning of the smelter and refinery will significantly reduce the demand for steam from the steam system. It is recommended that Vale investigate the future steam requirements for the plant and develop a plan to modify the existing steam system to meet future demand and avoid system problems due to low steam velocities and water hammer. An interim system may be required along with a transition plan depending on the scope of the steam system modifications.

During consultation with Vale staff it was identified that the vacuum and compressed dry air systems may be reduced in capacity (i.e., vacuum and dry air units could be removed) as the demand for these systems will be reduced with the decommissioning of the smelter and the refinery.

There are a number of control cables that are currently using the smelter trestle south adjacent to the compressor building as a cable tray. These control cables should be identified and relocated as required prior to the decommissioning activities.

2.4.2 BELOW GRADE SYSTEMS

At the time of this submission Vale has elected to keep the potable water piping that runs south of the smelter and refinery online as the fire hydrants in the south yard form part of the fire-fighting response plan for the Orica facility. When the smelter and refinery are decommissioned this will reduce the overall potable water demand in the system. It is recommended that Vale investigate the future potable water demand requirements for the plant as well as the capacity of the current system to determine what modifications will be required to ensure that the potable watermain do not freeze and/or and or become stagnant due to low flow in the watermain system. The addition

of circulation pumps and chlorine injection system may be required to maintain water quality standards and prevent pipe freezing.

3.0 REQUIRED APPROVALS AND STUDIES

Table 3-1 identifies the required regulatory approvals and recommended studies for the project:

TABLE 3-1: REQUIRED APPROVALS AND STUDIES

Process System	*Approval Agency Requirements*
1. Electrical	a. Power Authority Consultation (Manitoba Hydro) b. Manitoba Hydro Electrical Permit c. Short Circuit Coordination Study

4.0 CONSTRUCTIBILITY

It is understood that the mining operations will remain online during the decommissioning of the smelter and refinery facilities. Coordination with Vale and appropriate construction sequencing will be critical to minimize and mitigate any impacts to Vale's operations at the site. This section summarizes constructability issues identified as well as the construction sequencing as it relates to the utility decommissioning portion of the work.

4.1 CONSTRUCTABILITY ISSUES

Table 4-1 lists the anticipated constructability issues and resolutions identified

TABLE 4-1: CONSTRUCTABILITY ISSUES AND RESOLUTIONS

No.	*Constructability Issue*	*Resolution*
1	Access road must remain open during excavation activities	Contractor to provide appropriate shoring and barriers for excavations adjacent to roadways
2	Power must be re-routed to the south buildings prior to the shutdown of the smelter	Provide construction sequencing in the contract or tender as a separate contract a complete prior to smelter decommissioning.
3	Temporary power must be routed to the smelter stack aircraft beacon prior to the shutdown of the smelter	Provide local temporary power source for beacon lights.
4	Connections to utilities that will remain online (water, sewer, steam etc.) must be isolated and capped prior to shutdown of smelter and refinery	Provide construction sequencing in the contract
5	Other projects at the plant site may impact the execution of the works	Include in contract detailed sequencing, project constraints, and requirements for coordination.

4.2 CONSTRUCTION SEQUENCING

Table 4-2 provides an overview of the construction sequencing related to the utilities decommissioning for the project:

TABLE 4-2: CONSTRUCTION SEQUENCING

1.0	**Pre-Construction**
1.1	Vale shutdown and cleaning of smelter and refinery
1.2	Mobilization
1.3	Shop Drawing Preparation and Review
1.4	Equipment Procurement
2.0	**Reroute Power to South Buildings**
2.1	Install new overhead lines
2.2	Install new pad mounted transformer
2.3	Connect new pad mounted transformer and overhead lines to TOP line
2.4	Shutdown and disconnect existing transformer
2.5	Connect new overhead line to existing overhead line
2.6	Testing and commissioning of new power feeder system
3.0	**Temporary Power to Smelter Aircraft Beacon**
3.1	Install new temporary power source
3.2	Disconnect existing feeder to aircraft beacon from smelter
3.3	Connect new temporary power supply to beacon
3.4	Testing and commissioning of new power supply to aircraft beacon
4.0	**Below Grade Utilities**
4.1	Temporary system shutdowns
4.2	Excavate, isolate and cap water and sewer piping
4.3	Excavate access points as required for pipe decommissioning
4.4	Fill pipe to be decommissioned with concrete or grout
4.5	Testing and commissioning
5.0	**Above Grade Utilities**
5.1	Temporary Shutdown existing systems (steam, air etc.) as required
5.2	Isolate, cut, and cap piping to be decommissioned
5.3	Return existing systems to service
5.4	Testing and commissioning
6.0	**Electrical Disconnections**
6.1	Coordinate disconnection work with Manitoba Hydro
6.2	Disconnect feeders from Vale switching station to smelter substation
6.3	Disconnect smelter emergency tie from main substation
6.4	Disconnect feeders from main substation to refinery
6.5	Disconnect main feeders to roaster and converter blowers
6.6	Disconnect feeder to ancillary systems to roaster and converter blowers
6.7	Verify all systems have been safely de-energized

7.0	**Substantial Completion of Utilities Decommissioning**
8.0	**Demobilization**
9.0	**Smelter and Refinery decommissioning activities**

4.3 IMPACT ON VALE OPERATIONS

Table 4-3 lists the anticipated constructability issues and resolutions identified:

TABLE 4-3: IMPACTS TO VALE OPERATIONS AND RESOLUTIONS

No.	*Impacts to Vale Operations*	*Resolution*
1	Existing systems to remain online such as Steam/Condensate and air systems will need to be re-designed for the new plant demands once the smelter and the refinery are offline	Have the system redesign completed including any required interim measures and change over plan prior to the smelter and refinery decommissioning
2	Existing systems to remain online such as Steam/Condensate, air, water etc. will require a temporary shutdown to isolate, cut and cap the piping connections to be decommissioned	During a Vale regular plant shutdown review all branch locations and install an isolation valve where none exists and test existing isolation valves and replace as required

5.0 DRAWINGS AND SPECIFICATIONS LIST

Tables 5-1 to 5-3 list the drawings and specifications included as part of the utilities decommissioning packages:

TABLE 5-1: BELOW GRADE UTILITIES DRAWINGS AND SPECIFICATIONS

Drawings	***Dwg/Spec No.***
Cover Sheet	G-01
Below Grade Water and Sewer Decommissioning Layout A	C-01
Below Grade Water and Sewer Decommissioning Detail Area 1	C-02
Below Grade Water and Sewer Decommissioning Detail Area 2	C-03
Below Grade Water and Sewer Decommissioning Detail Area 3	C-04
Below Grade Water and Sewer Decommissioning Detail Area 4	C-05
Details 1 of 5	C-06
Details 2 of 5	C-07
Details 3 of 5	C-08
Details 4 of 5	C-09
Details 5 of 5	C-10
Compressor Building Basement Floor Plan – Process Water Isolations and Removals	C-11
Specifications	
Excavation, Trenching, and Backfilling	02315
Utility Decommissioning (Potable Water, Process Water, & Sewer Systems	02226
Pipe Grouting	02431

TABLE 5-2: ABOVE GRADE UTILITIES DRAWINGS AND SPECIFICATIONS

Drawings	***Dwg/Spec No.***
Cover Sheet	G-001
Above Grade Utilities Plan Existing	M-01
Above Grade Utilities Decommissioning Plan	R-01
Detail Sheet 1 of 2	R-02
Detail Sheet 2 of 2	R-03
Ground Floor Plan Equipment & Piping Decommissioning Layout	R-04
Plan and Section Roaster Blower Isolation Points	R-05
Plan and Section Converter Blowers CB-4 & CB-5 Isolation Points	R-06

Drawings	*Dwg/Spec No.*
Sections Converter Blowers CB-4, CB-5	R-07
Converter Blowers CB-1, CB-2, CB-3 Basement Plan	R-08
Converter Blowers CB-1, CB-2, CB-3 Section	R-09
Converter Blowers CB-1, CB-2, CB-3 Details	R-10
Specifications	
Utility Decommissioning	02226
Utility Piping and Fittings	15201

TABLE 5-3: ELECTRICAL DRAWINGS AND SPECIFICATIONS

Drawings	*Dwg/Spec No.*
Cover Sheet	G-101
Electrical Site Plan – Power Service Disconnections and Proposed Modification	E-001
Smelter Substation and Facility Electrical Disconnection Diagram	E-002
Vale Switching Station Plan Feeders to Smelter Substation	E-003
New 13.8 kV Overhead Line Feeder to South Yard	E-004
Compressor Building Electrical Room No. 1 4160 V Converter Blowers Disconnection	E-005
13.8 kV Refinery Feeder and Compressor Building 4160 V Loads Disconnection	E-006
13.8 kV Emergency Tie and Refinery Feeders Disconnection from Main Substation	E-007
13.8 kV Refinery Feeder No. 2 Disconnection from Main Substation	E-008
Compressor Building Electrical Room No. 2 4160 V Blowers Disconnection	E-009
Main Substation 13.8 kV Switchgear Equipment Disconnection Layout	E-010
Compressor Building Electrical Equipment Disconnection Layout	E-011
Compressor Building Electrical Room No. 1 4160 V Switchgear Disconnection Layout	E-012
Compressor Building Electrical Room No. 1 575 VAC Starter Racks #1 & #2 Disconnection	E-013
Compressor Building Electrical Room No. 1 575 VAC Starter Racks #3 Disconnection	E-014

Drawings	*Dwg/Spec No.*
Compressor Building Electrical Room No. 2 4160 V Switchgear #2 Disconnection Layout	E-015
Compressor Building Electrical Room No. 2 575 V Starter Rack #5 & #6 Disconnection	E-016
Specifications	
Electrical General Requirements	16010
Electrical Systems Analysis	16015
Grounding - Primary	16061
Selective Electrical Decommissioning	16096
Electrical Utility Services	16210
Pad Mounted Distribution Transformers	16276
Overhead Power Distribution	16370

6.0 LIMITATIONS OF REPORT

Conestoga-Rovers & Associates prepared this design brief for Vale Canada Ltd. for use in the smelter and refinery decommissioning project. The material in it reflects Conestoga-Rovers & Associates' judgment and interpretation in light of the information available at the time of preparation. Any use, other than that intended as described above, which a Third Party makes of this report, or any reliance on decisions which the Third Party may make based on its contents, are the sole responsibility of the Third Party.

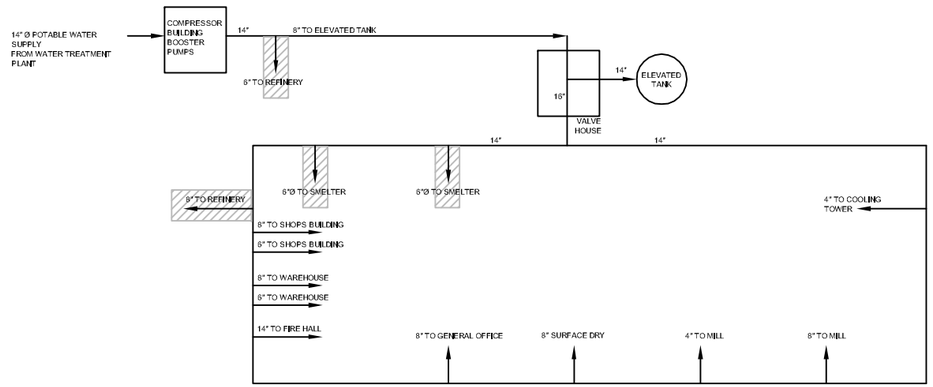
The conclusions and recommendations in this report are based on information determined and collected at the time of the detailed design. Additional information may be encountered between the design stage and the decommissioning stage of the project, which was not available or anticipated at the time of the completion of this report. Should conditions change at the site, the conclusions, recommendations, and detailed design may require modification.

All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

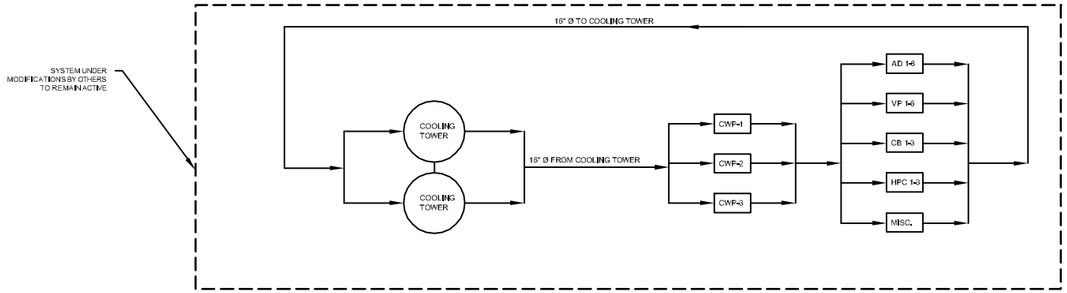
Dan Berringer, P. Eng.

APPENDIX A

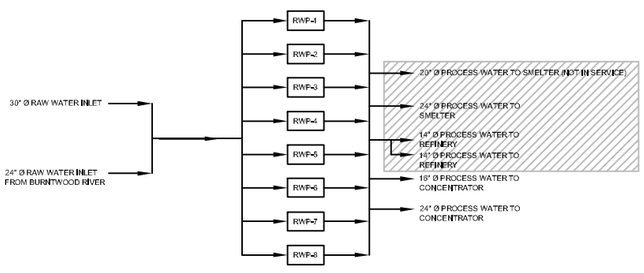
FIGURE 1 - UTILITIES PROCESS FLOW DIAGRAMS



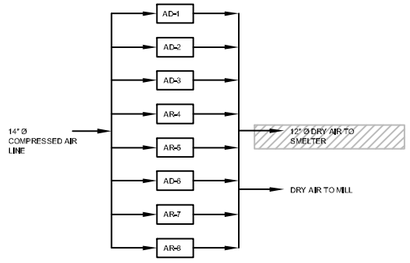
POTABLE WATER SYSTEM



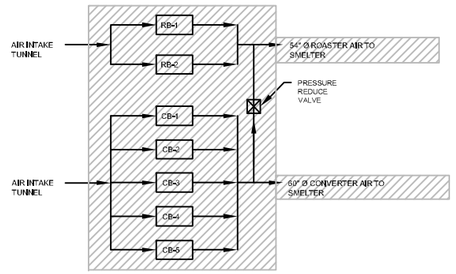
COOLING WATER SYSTEM



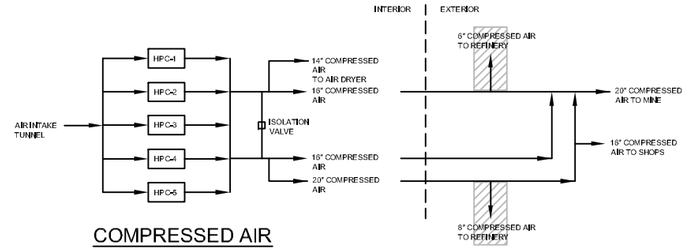
PROCESS WATER SYSTEM



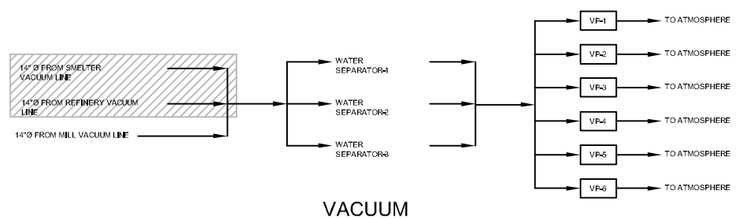
AIR DRYER SYSTEM



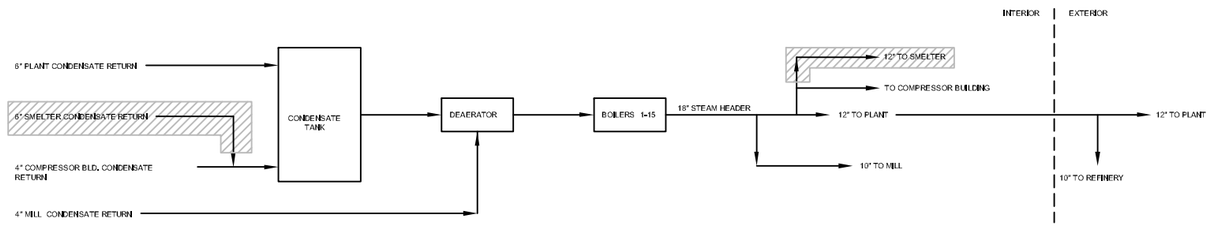
ROASTER AIR AND CONVERTER AIR SYSTEM



COMPRESSED AIR SYSTEM



VACUUM SYSTEM



STEAM CONDENSATE SYSTEM

LEGEND

	TO BE DECOMMISSIONED
RB	ROASTER BLOWER
CB	CONVERTER BLOWER
HPC	HIGH PRESSURE COMPRESSOR
CWP	COOLING WATER PUMP
PWP	POTABLE WATER PUMP
RWP	RAW WATER PUMP
VP	VACUUM PUMP

figure 1

VALE THOMPSON MINE SITE
UTILITY DECOMMISSIONING
UTILITIES PROCESS FLOW DIAGRAMS
Thompson, Manitoba

APPENDIX B

100% DESIGN UTILITY PACKAGES

APPENDIX B.1

ABOVE GROUND

SPECIFICATIONS

SECTION 15201

UTILITY PIPING AND FITTINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General engineering requirements.

B. General product requirements.

C. General fabrication and testing requirements.

D. General installation and commissioning requirements.

1.2 REFERENCES

A. Comply with the latest edition of the following statutes codes and standards and all amendments thereto.

B. American National Standards Institute (ANSI):

1. A21.52 - Ductile Iron Pipe, Centrifugally Cast, Gas.

2. B1.20.1 - Pipe Threads, General Purpose (Inch).

3. B16.1 - Cast Iron Pipe Flanges and Flanged Fittings Classes 25, 125, and 250.

4. B16.5 - Pipe Flanges and Flanged Fittings.

5. B16.11 - Forged Fittings, Socket Welding and Threaded.

6. B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges.

7. B16.25 - Butt Welding Ends.

8. B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300.

C. American Petroleum Institute (API): SPEC 5L - Specification for Line Pipe.

D. American Society of Mechanical Engineers (ASME):

1. Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Pressure Vessels.

2. Boiler and Pressure Vessel Code, Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.

3. B31.9 - Building Services Piping.

4. B36.10M - Welded and Seamless Wrought Steel Pipe.

E. American Society for Nondestructive Testing (ASNT): SNT TC 1A - Personnel Qualification and Certification in Nondestructive Testing.

F. ASTM International (ASTM):

1. A47 - Standard Specification for Ferritic Malleable Iron Castings.

2. A53/A53M - Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated, Welded and Seamless.

3. A105/A105M - Standard Specification for Carbon Steel Forgings for Piping Applications.

4. A106 - Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service.

5. A153/A153M - Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

6. A181/A181M - Standard Specification for Carbon Steel Forgings, for General Purpose Piping.

7. A182/A182M - Standard Specification for Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service.

8. A183 - Standard Specification for Carbon Steel Track Bolts and Nuts.

9. A193/A193M - Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.

10 A194/A194M - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service or Both.

11. A216/A216M - Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High Temperature Service.

12. A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

13. A276 - Standard Specification for Stainless Steel Bars and Shapes.

14. A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

15. A285/A285M - Standard Specification for Pressure Vessel Plates, Carbon Steel, Low and Intermediate Tensile Strength.

16. A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

17. A320/A320M - Standard Specification for Alloy/Steel Bolting Materials for Low Temperature Service.

18. A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure Retaining Castings for Use at Elevated Temperatures.

19. A403/A403M - Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings.

20. A409/A409M - Standard Specification for Welded Large Diameter Austenitic Steel Pipe for Corrosive or High Temperature Service.

21. A536 - Standard Specification for Ductile Iron Castings.

22. A563 - Standard Specification for Carbon and Alloy Steel Nuts.

23. A587 - Standard Specification for Electric Resistance Welded Low Carbon Steel Pipe for the Chemical Industry.

24. A774/A774M - Standard Specification for As Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.

25. A778 - Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products.

26. D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.

27. D413 - Standard Test Methods for Rubber Property - Adhesion to Flexible Substrate.

28. D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.

29. D1330 - Standard Specification for Rubber Sheet Gaskets.

30. D3261 - Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

31. D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

32. F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR PR) Based on Outside Diameter.

G. American Water Works Association (AWWA):

1. C104/A21.4 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

2. C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

3. C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.

4. C153/A21.53 - Ductile-Iron Compact Fittings 3 Inches Through 24 Inches and 54 Inches Through 64 Inches, for Water Service.

5. C200 - Steel Water Pipe 6 Inches and Larger.

6. C207 - Steel Pipe Flanges for Waterworks Service, Sizes 4 Inches Through 144 Inches.

7. C208 - Dimensions for Fabricated Steel Water Pipe Fittings.

8. C213 - Fusion Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.

9. C606 - Grooved and Shouldered Type Joints.

10. M11 - Steel Pipe - A Guide for Design and Installation.

H. American Welding Society (AWS):

1. A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

2. QC 1 - Standard for AWS Certification of Welding Inspectors.

I. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS): SP43 - Wrought Stainless Steel Butt-Welding Fittings Including Reference to Other Corrosion Resistant Materials.

J. National Fire Protection Association (NFPA): 24 - Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

1.4 PROGRESS SUBMITTALS

A. Shop Drawings: Shop Fabricated Piping:

1. Detailed pipe fabrication or spool drawings showing special fittings and bends, dimensions, coatings, and other pertinent information.

2. Layout drawing showing location of each pipe section and each special length; number or otherwise designate laying sequence on each piece.

B. Quality Control Submittals:

1. Manufacturer's Certification of Compliance.

2. Laboratory Testing Equipment: Certified calibrations, manufacturer's product data, and test procedures.

3. Certified welding inspection and test results.

4. Qualifications:

1. Weld Inspection and Testing Agency: Certification and qualifications.

2. Welding Inspector: Certification and qualifications.

3. Welders:

    1. List of qualified welders and welding operators.

    2. Current test records for qualified welder(s) and weld type(s) for factory and field welding.

5. Weld Procedures: Records in accordance with ASME Boiler and Pressure Vessel Code, Section IX for weld type(s) and base metal(s).

6. Nondestructive inspection and testing procedures.

7. Manufacturer's Certification of Compliance:

    1. Pipe and fittings.

    2. Factory applied resins and coatings.

8. Certified weld inspection and test reports.

9. Test logs.

10. Pipe coating applicator certification.

1.5 CLOSEOUT SUBMITTALS

A. Section 01100 – General Requirements Subsection 1.5 Administration Requirements: Requirements for closeout submittals.

B. Record Documents: Indicate location, size, and service of piping systems.

C. Warranties: Completed original warranty forms filled out in OWNER's name and registered with manufacturer.

1.6 QUALIFICATIONS

A. Independent Inspection and Testing Agency:

1. Ten (10) years' experience in field of welding and welded pipe and fittings' testing required for this Project.

2. Calibrated instruments and equipment, and documented standard procedures for performing specified testing.

3. Certified in accordance with ASNT SNT TC 1A for testing procedures required for this Project.

4. Testing Personnel: Qualified for nondestructive test methods to be performed.

5. Inspection Services: Qualified welding inspector.

B. Welding Inspector: AWS certified, AWS QC 1 qualified, with prior inspection experience of welds specified.

C. Welder and Welding Operator Qualifications:

1. Qualified by accepted inspection and testing agency before starting Work in accordance with Section IX, Article III of the ASME Boiler and Pressure Vessel Code.

2. Qualified to perform groove welds in Positions 2G and 5G for each welding process and pipe material specified.

3. Retesting: Upon ENGINEER's written request, retest qualified welder(s).

D. Provide services of independent inspection and testing agency for welding operations.

1.7 CERTIFICATIONS

A. Provide certificate of compliance from applicable regulatory authority, indicating approval of piping design, fabrication, installation or laying, and testing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01100 – General Requirements Subsection 1.12 Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Handle piping items strictly in accordance with manufacturer instructions during all stages of delivery and storage.

C. Prevent damage to exterior, interior, shape of pipe during activities prior to fabrication and installation.

D. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect the products from dirt, damage, deformation, non-compatible materials, heat, cold, sunlight exposure, rain, and moisture. Cold Weather Storage: Locate products to prevent coating from freezing to ground.

F. Receive the products in factory finish condition. Inspect for damage or deterioration of product quality. Replace damaged or deteriorated quality product as required and directed by OWNER.

1.9 SEQUENCING AND SCHEDULING

A. Section 01300 - Administrative Requirements.

B. Coordinate with work of other trades for piping fabrication, supporting, installation, connection and testing.

C. Coordinate installation of required in-line instrumentation and control valves.

D. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for mechanical installations.

E. Coordinate all work with OWNER including required system shutdowns.

1.10 MANUFACTURER'S WARRANTY

A. Provide 3-year manufacturer's warranty for products covered in this Section and on individual Pipe Data Sheets.

B. Fill out original warranty forms in OWNER's name and register with manufacturer.

PART 2 PRODUCTS

2.1 GENERAL

A. Design the system in accordance with CSA B51 and ASME and AWWA standards.

B. Piping Sizes: As shown on the Drawings.

C. All piping, fittings, and flange materials shall be suitable for the intended service and suitable for connection with the existing piping material.

2.2 MATERIALS

A. Pipe and fitting materials shall be as per the following:

1. Stainless Steel:

Item	*Description*
Flanges	ASTM A182/A182M, Grade 304lL, ANSI B16.5 Class 300, slip on, or weld neck raised face.
Bolting	Type 304L stainless steel, ASTM A320/A320M Grade B8M hex head bolts and ASTM A194/A194M Grade 8M hex head nuts.
Gaskets	5 mm thick, unless otherwise specified, red rubber (SBR), hardness 80 (Shore A), rated to 93 degrees C, conforming to ANSI B16.21, AWWA C207, and ASTM D1330, Grades 1 and 2. Blind flanges shall be gasketed covering entire inside face with gasket cemented to blind flange.

2. Carbon Steel (Steel):

Item	*Description*
Pipe	Schedule 40 black carbon steel, ASTM A106, Grade B seamless or ASTM A53, Grade B seamless or ERW. Threaded, butt-welded, grooved end, and flanged joints as required.
Fittings	Threaded or socket-weld, forged carbon steel, ASTM A105/A105M, conforming to ANSI B16.11; bore to match pipe inside diameter.
Branch Connections	Threadolet or socket in conformance with Fittings above.
Flanges	2-inches and smaller: Forged carbon steel, ASTM A105/A105M, ANSI B16.11 Class 3000 socket-weld or threaded, 1.50 mm raised face. 2.5-inches and larger: Forged carbon steel, ASTM A105/A105M, ANSI B16.5 Class 300 slip-on or welding neck, 1.5 mm raised face; weld neck bore to match pipe internal diameter. Use weld neck flanges when abutting butt-weld fittings.
Bolting	Carbon steel ASTM A307, Grade A hex head bolts and ASTM A563, Grade A hex head nuts.
Gaskets	1.5 mm thick, compressed inorganic fiber with nitrile binder, rated to 371 degrees C and 6900 kPa. Blind flanges shall be gasketed covering the entire inside face with the gasket cemented to the blind flange.

3. Ductile Iron:

Item	*Description*
Flanges	Class 150 flat face, ductile iron, threaded conforming to AWWA C115/A21.15.
Bolting	ASTM A307, Grade A carbon steel hex head bolts and ASTM A563, Grade A carbon steel hex head nuts
Gaskets	mm, red rubber (SBR), hardness 80 (Shore A), rated to 930 degrees C, conforming to ANSI B16.21, AWWA C207, and ASTM D1330, Grades 1 and 2. Blind flanges shall be gasketed covering the entire inside face with the gasket cemented to the blind flange.

4. HDPE (Plastic):

Item	*Description*
Flanges/caps	Van Stone type, cast ASTM A536 (65/45/12), ductile iron backing ring. or A molded polyethylene stub end thermally butt-fused to end of pipe. Pressure rating equal to the existing pipe pressure rating.
Bolting	Carbon steel, ASTM A307 Grade B square head bolts and ASTM A563 Grade A heavy hex head nuts.
Gaskets	Flat ring, 3 mm ethylene propylene rubber (EPR). Blind flanges shall be gasketed covering the entire inside face with the gasket cemented to the blind flange.

2.3 PIPING SUPPORT AND RESTRAINING SYSTEMS

A. Support piping, in general, as described hereinafter and as shown on the Drawings.

B. Manufacturer's catalog figure numbers are typical of the types and quality of standard pipe supports and hangers to be employed.

C. Pipe supports shown on the Drawings are intended to present the general arrangement of pipe supports in the area, represented as typical of similar arrangements to be used. No attempt has been made to show all required pipe supports and restraints in all locations, either on the Drawings or in the details, standard or custom made. Provide adequate number, size, and type of piping supports required.

D. Pipe support and restraining system components shall withstand the dead loads imposed by the weight of the pipes filled with water and shall have a minimum safety factor of 5, and live loads created by pumped fluid thrust and shall be adequately anchored to resist such forces without undue shock, vibration, or damage to the piping system or related equipment.

E. Support horizontal piping with adjustable swivel-ring, split-ring, or clevis type hangers as shown on the Drawings, or welded steel wall bracket. Other acceptable manufacturers: Grinnell; Figure 104, 260, or 199.

F. Furnish galvanized protection shield and oversized roller hangers under all insulated piping, as shown on the Drawings. Other acceptable manufacturers: Grinnell; Figure 167.

G. Support stacked horizontal runs of piping along walls by a metal framing system attached to concrete insert channels. Do not support pipe from the pipe above or below itself. Other acceptable manufacturers: Unistrut.

H. Horizontal piping hanger support rods shall attach to steel beams with I-clamps, to concrete with inserts or flanges fastened with flush shells, to wood not less than 65 mm thick with lag screws and angle clips.

I. Vertical Piping Hangers and Supports: Channel and pipe clamps as manufactured by Unistrut, or approved equal.

J. Hangers, Rods, Clamps, Protective Shields, Metal Framing Support Components, and Hanger Accessories: Galvanized unless otherwise specified.

K. Expansion Anchors: Type 316 stainless steel.

L. Submerged Supports: Type 316 stainless steel, electrically isolated from metal piping with a 6 mm x 75 mm neoprene rubber wrap.

M. Support Spacing: Maximum distance between pipe supports as set out below unless otherwise indicated on the Drawings:

Pipe size	*Maximum Distance Between Support Points*
0 to 1-inch	3 ft
1-inch to 2 inches	5 ft

* Spacings above are for specific gravity of 1.0, reduce spacings for greater specific gravities. Reduce spacings to 50 percent of above where valves occur in lines. Actual spacing will depend on pipe size and special loading conditions.

N. Support piping in a manner that will prevent undue strain on any valve, fitting, or piece of equipment. In addition, provide pipe supports at changes in direction or elevation, adjacent to flexible couplings, and where otherwise shown. Do not install pipe supports and hangers in equipment access areas.

2.4 PIPING FABRICATION AND ERECTION

A. Join pipe and fittings in accordance with the following requirements.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before fabrication and assembly.

D. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

E. Do not use pipe sections that have cracked or open welds.

F. Piping fabrication, inspection and testing shall be in accordance ASME and AWWA standards.

G. Erect piping with flanged and threaded connections as applicable in accordance with good engineering practice suitable for hydrocarbon processing industry. Use suitable lubricants on bolt threads.

H. The overall fabrication, supporting, and erection of piping shall be done in such a way as to impose minimum possible loading on connected equipment and valves. Wherever required, verify the alignment of the equipment and drive motor in pipe-connected and disconnected state, to verify that piping is not imposing undue load on the equipment.

2.5 FINSHES

A. Factory prepare, prime, and finish coat in accordance with manufacturers standards suitable for intended service.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and the Site conditions are ready to receive work.

B. Verify size, material, joint types, elevation, horizontal location, and pipe service of existing pipelines to be connected to new pipelines.

3.2 PREPARATION

A. Inspect pipe and fittings before installation, clean ends thoroughly, remove foreign matter and dirt from inside, and ensure that no dirt or other foreign matter enters the pipe during assembly.

B. Damaged Coatings and Linings: Repair using original coating and lining materials in accordance with manufacturer's instructions

3.3 WELDING

A. Perform in accordance with Section IX, ASME Boiler and Pressure Vessel Code and ASME B31.9 for Pressure Piping, as may be specified on Piping Data Sheets, and if recommended by piping or fitting manufacturer.

B. Weld Identification: Mark each weld with symbol identifying welder.

C. Pipe End Preparation:

1. Machine Shaping: Preferred.

2. Oxygen or Arc Cutting: Smooth to touch, true, and slag removal by chipping or grinding.

3. Beveled Ends for Butt Welding: ANSI B16.25.

D. Surfaces:

1. Clean and free of paint, oil, rust, scale, slag, or other material detrimental to welding.

2. Thoroughly clean each layer of deposited weld metal, including final pass, prior to deposition of each additional layer of weld metal with a power-driven wire brush.

E. Alignment and Spacing:

1. Align ends to be joined within existing commercial tolerances on diameters, wall thicknesses, and out of-roundness.

2. Root Opening of Joint: As stated in qualified welding procedure.

3. Minimum Spacing of Circumferential Butt Welds: Minimum four times pipe wall thickness or 1 inch, whichever is greater.

F. Climatic Conditions:

1. Do not perform welding if there is impingement of any rain, snow, sleet, or high wind on the weld area, or if the ambient temperature is below 0 degrees C.

2. Stainless Steel and Alloy Piping: If the ambient is less than 0 degrees C, local preheating to a temperature warm to the hand is required.

G. Tack Welds: Performed by qualified welder using same procedure as for completed weld, made with electrode similar or equivalent to electrode to be used for first weld pass, and not defective. Remove those not meeting requirements prior to commencing welding procedures.

H. Surface Defects: Chip or grind out those affecting soundness of weld.

I. Weld Passes: As required in welding procedure.

J. Weld Quality: Free of cracks, incomplete penetration, weld undercutting, excessive weld reinforcement, porosity slag inclusions, and other defects in excess of limits shown in applicable piping code.

3.4 INSTALLATION OF PIPING SYSTEMS - GENERAL REQUIREMENTS

A. Join pipe and fittings in accordance with manufacturer's instructions, unless otherwise shown or specified.

B. Remove foreign objects prior to assembly and installation.

C. Flanged Joints:

1. Install perpendicular to pipe centerline.

2. Bolt Holes: Straddle vertical centerlines, aligned with connecting equipment flanges or as shown.

3. Use torque-limiting wrenches to ensure uniform bearing and proper bolt tightness.

4. Plastic Flanges: Install annular ring filler gasket at joints of raised-face flange.

5. Raised-Face Flanges: Use flat-face flange when joining with flat-faced ductile or cast iron flange.

6. Verify compatibility of mating flange to adapter flange gasket prior to selecting grooved adapter flanging.

7. Threaded flanged joints must be shop fabricated and delivered to jobsite with flanges in place and properly faced.

D. Threaded and Coupled Joints:

1. Conform to ANSI B1.20.1.

2. Produce sufficient thread length to ensure full engagement when screwed home in fittings.

3. Countersink pipe ends, ream and clean chips and burrs after threading.

4. Make connections with not more than three threads exposed.

5. Lubricate male threads only with thread lubricant or tape as specified on Piping Data Sheets.

3.5 FIELD QUALITY CONTROL

A. Clean piping systems by flushing with water or blowing with air with valves wide open prior to testing and before installing any primary element instrumentation on the piping systems.

B. Provide temporary restraints or isolate expansion joints which cannot sustain the reactions due to test pressure.

C. Isolate equipment that is not to be subjected to the test pressure from the piping.

D. Piping shall pass field tests.

E. No leakage is allowed.

F. Hydrostatically test piping using clean water at ambient temperature except where there is risk of damage due to freezing. Another fluid may be used if it is safe for workmen and compatible with the piping.

G. Apply the hydrostatic test pressure for 2 hours.

H. If leaks are found, repair and retest until no leakage units found.

I. Drain piping and blow dry following successful completion of testing.

J. Prepare a report for each test, including:

1. Location or section of piping.

2. Time and duration of test.

3. Test pressure at start and completion.

4. Ambient and water temperatures.

5. Names and signatures of witnesses.

END OF SECTION

SECTION 02226

UTILITY DECOMMISSIONING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Decommissioning of existing Site utilities including compressed air, compressed dry air, steam, condensate, vacuum, roaster air, converter air, cooling water, and effluent return lines as shown on the Contract Drawings.

B. Coordination of utility decommissioning with OWNER operations.

C. Protection of existing structures, and utilities which are to remain.

1.2 REFERENCES

A. Section 01000 – General Requirements Subsection XX Quality Requirements: Requirements for references.

B. Section 15201 – Utility Piping and Fittings.

1.3 DEFINITIONS

A. Associated Piping and Appurtenances: Piping and appurtenances (e.g., valves, collars, meters) directly or indirectly attached to or formerly attached to or adjacent to the utility systems described in Subsection 1.1A.

1.4 PROGRESS SUBMITTALS

A. Section 01000 – Subsection 1.5 – Administrative Requirements: Submittal Procedures.

B. Shop Drawings: Indicate the decommissioning and removal sequence and the location of salvageable items; the location and construction of barricades, fences, and any temporary work.

C. Code Compliance: Submit copies of all required permits and inspection certificates or other code compliance documentation obtained by CONTRACTOR from the utility authorities, prior to commencing decommissioning activities.

D. Utility Decommissioning Plan: Within 7 days after the date of the Notice to Proceed, and prior to mobilization to the Site, submit a Utility Decommissioning Plan for review to ensure compliance with the requirements specified by the applicable authorities and the Contract Documents, and to permit OWNER to schedule testing and measurement activities. The plan shall include written procedures, schedules, and CONTRACTOR's drawings, as applicable. The Decommissioning Plan shall, as a minimum, address each of the following items:

1. A detailed description of the methods and procedures which will be used to perform decommissioning for each type of utility including:

    1. Compressed air piping.

    2. Compressed dry air piping.

    3. Steam piping.

    4. Condensate piping.

    5. Vacuum piping.

    6. Cooling water piping (roaster and converter air systems).

    7. Roaster air piping.

    8. Converter air piping.

    9. Refinery/Mill effluent return piping.

    10. Smelter/Mill effluent return piping.

2. The sequencing and scheduling of decommissioning including system shutdown requirements.

3. Complete details describing all safety protocols, including confirmation methods and checks to be completed for each utility system to verify readiness and safety prior to commencing the decommissioning work.

4. Complete details describing required propane pipe purging and verification of purging.

5. Detailed description of coordination requirements with OWNER including roles and responsibilities of both OWNER and CONTRACTOR.

6. Testing and commissioning plan and procedures.

1.5 CLOSEOUT SUBMITTALS

A. Section 01000 – Subsection 1.5 Administrative Requirements: Submittal Procedures.

B. Record Documents: Accurately record the actual locations of all capped utilities and decommissioned valves.

1.6 QUALIFICATIONS

A. CONTRACTOR: A company specializing in performing the Work of this Section with a minimum of 10 years of documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable federal, provincial, and local regulations for demolition of structures, safety of adjacent structures, dust control, runoff control, and disposal.

B. Obtain all required permits from the applicable utility authorities.

C. Do not close or obstruct roadways, sidewalks, hydrants, or valves without the required permits and approvals from OWNER.

1.8 SEQUENCING AND SCHEDULING

A. Section 01000 – Subsection 1.5 - Administrative Requirements: Requirements for coordination.

B. Schedule the Work so as to minimize any interruptions to existing services.

C. Submit a schedule of expected interruptions to OWNER for approval and adhere to the approved interruption schedule. No work shall be completed prior to receipt of written approval from the OWNER. Allow a minimum of 14 Days for OWNER review and approval of requested service interruptions.

D. All existing valves shall be operating by OWNER operations staff only.

D. Confirm with the OWNER a minimum of 24 hours in advance of any scheduled interruptions in service.

PART 2 PRODUCTS

2.1 UTILITY PIPING AND FITTINGS

A. Refer to Section 15201 – Utility Piping and Fittings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01000 – Subsection 1.13 - Execution Requirements: Examination

B. Field verify and mark all utilities which are to remain. Confirm with OWNER.

C. Field verify the exact locations of all utilities and appurtenances to be decommissioned.

D. Schedule, arrange, and coordinate system shutdowns with OWNER and verify that the utilities to be decommissioned are not in operation and that all electrical components have been de-energized prior to decommissioning.

E. Ensure that utilities have been properly isolated from those sections that are to remain in service.

3.2 PREPARATION

A. Provide, erect, and maintain temporary barriers to protect operations.

B. Protect existing structures and utilities which are not to be decommissioned.

C. Prevent movement of structures; provide any necessary bracing and shoring.

D. Mark the location of all utilities including those which are to remain and those which are to be decommissioned.

E. Conduct all work activities so as to minimize any interference with adjacent structures and OWNER operations.

F. Cease operations immediately if any adjacent structures appear to be in danger. Notify OWNER. Do not resume operations until so directed by OWNER.

G. Maintain protected egress and access at all times.

H. OWNER operations shall take precedence over all decommissioning activities.

3.3 UTILITY DECOMMISSIONING - GENERAL

A. Stockpile demolished materials on Site at a location determined by OWNER.

B. Break debris into sizes which are suitable for transportation and disposal, or reuse.

C. As required, temporarily or permanently disconnect and cap designated mechanical services in accordance with the requirements of OWNER.

D. Maintain active or energized utilities traversing the premises throughout the project, unless designated for removal.

E. At the end of each day's work, leave the Works in a safe and secure condition so that no part is in danger of toppling or falling and so as to ensure no unauthorized admittance to the area.

F. Remove materials as the Works progresses. Upon completion of the Works, leave areas in a clean condition.

G. Remove all temporary work.

3.4 DECOMMISSIONING – COMPRESSED AIR AND VACUUM AIR SYSTEMS

A. Coordinate with OWNER for required system shutdown(s)

B. Isolate and disconnect all associated piping, valves, filters, regulators, and appurtenances from the compressed air supply.

C. Use regulators and valves to bleed the system pressure. Ensure the entire line is bled and made safe prior to commencing any decommissioning activities.

D. Disconnect and cap designated compressed air and vacuum piping as indicated on the Drawings.

E. Cut all associated piping and appurtenances into manageable sizes to facilitate their removal.

3.5 DECOMMISSIONING – STEAM AND CONDENSATE SYSTEM

A. Coordinate with OWNER for required system shutdown(s)

B. Isolate and disconnect all associated piping, valves, and appurtenances from the steam system to be decommissioned.

C. Use regulators and valves to bleed the system to relieve pressure, drain any condensate from the system. Ensure system is made safe prior to starting works.

D. Cut steam piping as close as possible to tees of the sections to remain in service. The elimination of dead end piping runs is critical to reduce surge and condensation conditions.

E. Install blind flanges as per Section 15201.

F. Coordinate activities with OWNER.

3.6 DECOMMISSIONING – PROCESS PIPING

A. Main Supply Feed: Coordinate with OWNER to close all valves as indicated on the Drawings in order to make safe piping to be decommissioned.

B. Drain lines as required to perform decommissioning of the process piping.

C. Cut or remove piping at locations indicated.

D. Cap piping by installing blind flange and gasket suitable for the existing piping material as detailed in Sections 15201.

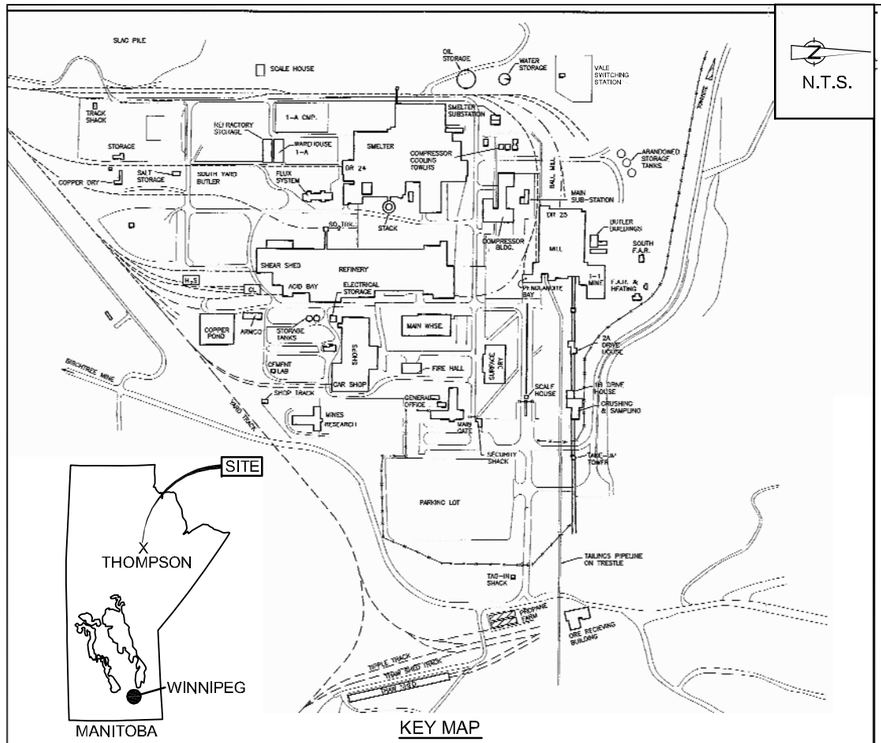
E. Remove all piping, valves, and appurtenances as shown on the Drawings.

3.7 FIELD QUALITY CONTROL

A. Section 01000 – Subsection XX - Quality Requirements: Field inspection and testing.

END OF SECTION

DRAWINGS
(11x17 DRAWINGS INCLUDED,
PLAN SIZE PROVIDED UNDER SEPARATE COVER)



KEY MAP

N.T.S.

Source Reference: AMEC Earth &Environmental Limited Project WX05384 Drawing Thompson Plant Site Plant. Dated January 2003.

DRAWING INDEX

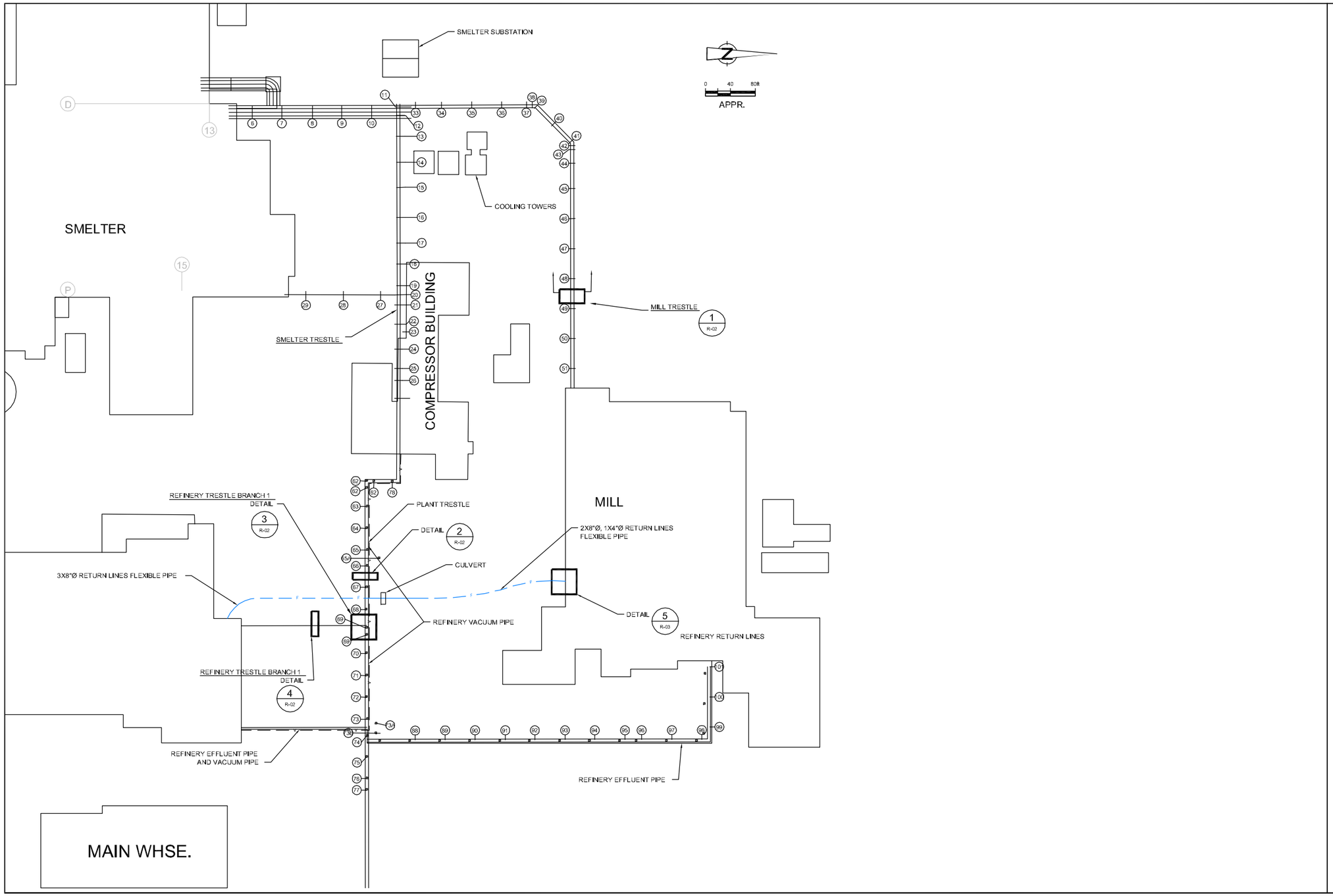
DWG. No	REV. No	DATE	TITLE
G-01	0	JULY 2012	COVER SHEET
M-01	3	JULY 2012	ABOVE GRADE UTILITIES EXISTING PLAN
R-01	3	JULY 2012	ABOVE GRADE UTILITIES DECOMMISSIONING PLAN
R-02	2	JULY 2012	DETAIL SHEET 1 OF 2
R-03	2	JULY 2012	DETAIL SHEET 2 OF 2
R-04	2	OCT 2012	GROUND FLOOR PLAN EQUIPMENT & PIPING DECOMMISSIONING LAYOUT
R-05	2	OCT 2012	PLAN AND SECTION ROASTER BLOWER ISOLATION POINTS
R-06	2	OCT 2012	PLAN AND SECTION CONVERTER BLOWERS CB-4 & CB-5 ISOLATION POINTS
R-07	2	OCT 2012	SECTIONS CONVERTER BLOWERS CB-4, CB-5
R-08	2	OCT 2012	CONVERTER BLOWERS CB-1, CB-2, CB-3 ISOLATION POINTS
R-09	2	OCT 2012	SECTIONS CONVERTER BLOWERS CB-1, CB-2, CB-3
R-10	2	DEC 2012	CONVERTER BLOWERS CB-1, CB-2, CB-3 DETAILS

VALE THOMPSON MINE SITE

THOMPSON, MANITOBA

UTILITY DECOMMISSIONING ABOVE GRADE 100% DESIGN

CONESTOGA-ROVERS & ASSOCIATES



LEGEND

- PIPE TRESTLE
- (71) BENT DESIGNATION NUMBER
- DETAIL LOCATION

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No.	Revision	Date	Initial
3	100% DESIGN	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

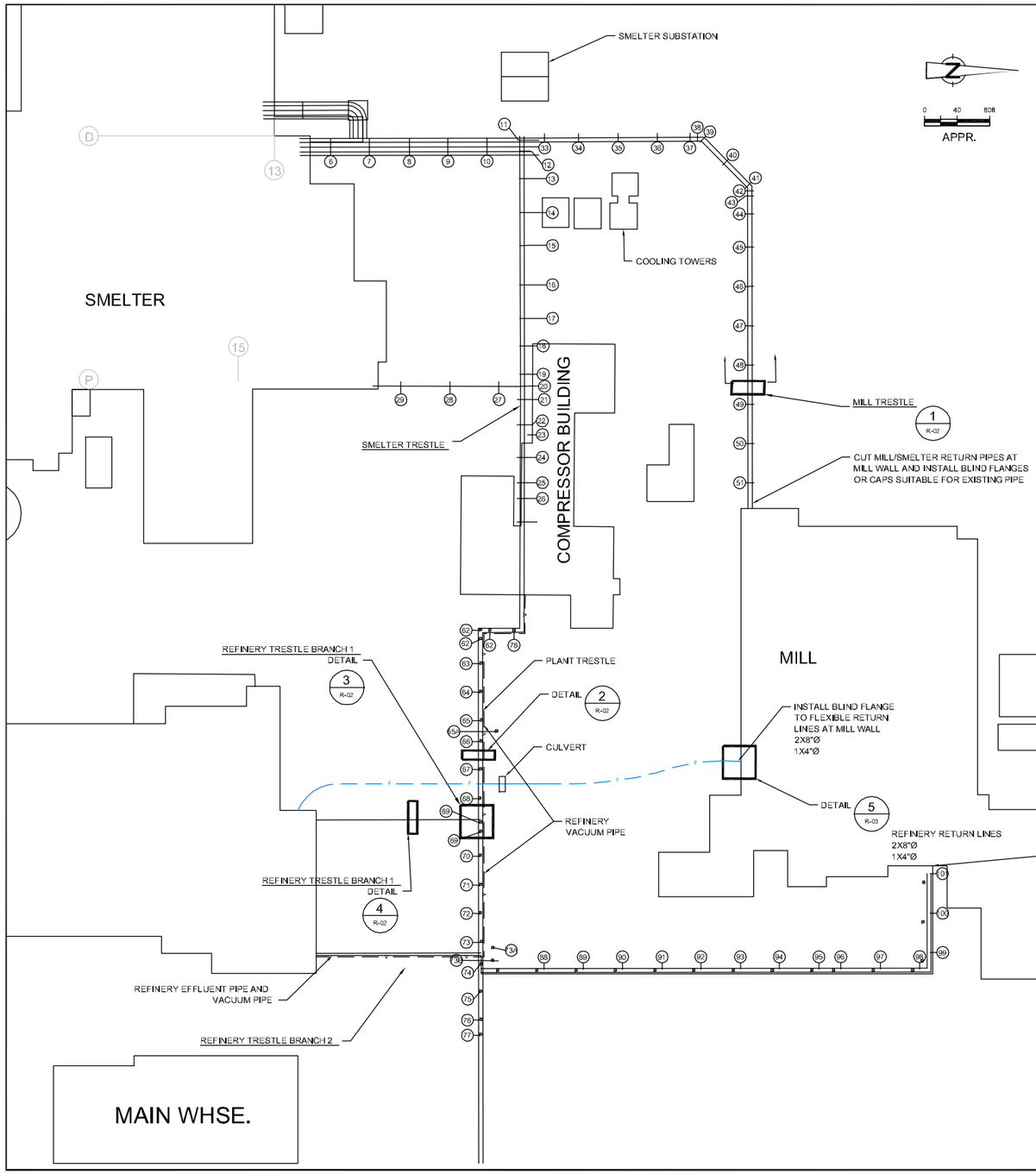
UTILITY DECOMMISSIONING

ABOVE GRADE UTILITIES EXISTING PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: APPROX. 1"=80'	Project No: 75756-09	Report No: 016	Drawing No: M-01

75756-09(016)CI-WA105 JAN 3/2013



LEGEND

- PIPE TRESTLE
- (71) BENT DESIGNATION NUMBER
- DETAIL LOCATION

GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND MEASUREMENTS INCLUDING LOCATION, SIZE, LENGTH, ELEVATION, AND CONFIGURATION OF ALL WORK SHOWN ON THE DRAWINGS PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES. CONTRACTOR SHALL REPORT TO VALE PM ANY DISCREPANCIES AND/OR UNSATISFACTORY CONDITIONS WHICH MAY ADVERSELY AFFECT THE PROPER COMPLETION OF THE WORK
2. THE OPERATION OF EXISTING VALVES (AS REQUIRED) SHALL BE CONDUCTED BY VALE STAFF AND SHALL REQUIRE A MIN OF 48 HOURS WRITTEN NOTICE.
3. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH VALE HEALTH AND SAFETY REQUIREMENTS FOR THE THOMPSON MINE SITE.
4. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MANITOBA WORKPLACE SAFETY AND HEALTH ACT.
5. VALE OPERATIONS SHALL TAKE PRECEDENCE OVER ALL DECOMMISSIONING ACTIVITIES.
6. CONTRACTOR SHALL COORDINATE AND ARRANGE WITH VALE ANY REQUIRED SYSTEM SHUTDOWNS AND SHALL RECEIVE WRITTEN APPROVAL FROM VALE PRIOR TO PROCEEDING WITH THE WORK. FORMAL WRITTEN REQUEST FOR SHUTDOWNS MUST BE PROVIDED A MIN OF 14 DAYS IN ADVANCE OF THE SHUTDOWN.
7. ROAD ACCESS SHALL BE MAINTAINED AT ALL TIMES.
8. CONTRACTOR SHALL MAINTAIN A SET OF DRAWINGS ON SITE AND SHALL UPDATE THOSE DRAWINGS WEEKLY WITH CONSTRUCTION RECORD INFORMATION.

DECOMMISSIONING NOTES

1. CONTRACTOR SHALL PROVIDE A WRITTEN DECOMMISSIONING PLAN A MIN OF 14 DAYS PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES.
2. COMPLETE ALL WORK IN ACCORDANCE WITH SECTION 02226 - ABOVE GRADE UTILITIES DECOMMISSIONING
3. ISOLATE, DISCONNECT AND CAP ALL PIPING AS SHOWN.
4. PROTECT FROM DAMAGE ALL ADJACENT PIPING, EQUIPMENT, STRUCTURES, WIRING, AND OTHER SYSTEMS NOT IDENTIFIED FOR DECOMMISSIONING. NOTIFY VALE PM IMMEDIATELY OF ANY DAMAGE THAT OCCURS AND REPAIR OR RESTORE THE DAMAGED SYSTEM.
5. ERECT, MAINTAIN, AND REMOVE ALL REQUIRED WORK PLATFORMS (STATIONARY AND/OR MOBILE) REQUIRED TO COMPLETE THE WORK.
6. CONTRACTOR SHALL MONITOR THE WEATHER SEVERAL DAYS IN ADVANCE TO ENSURE THAT WORKS ARE CONDUCTED DURING FAVORABLE WEATHER CONDITIONS.
7. VERIFY WITH VALE STAFF ALL PIPING, EQUIPMENT, AND OTHER SYSTEMS IDENTIFIED FOR DECOMMISSIONING AND THAT ALL SYSTEMS ARE PROPERLY ISOLATED AND READY FOR DECOMMISSIONING PRIOR TO COMMENCEMENT OF THE WORK.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No.	Revision	Date	Initial
3	100% DESIGN	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

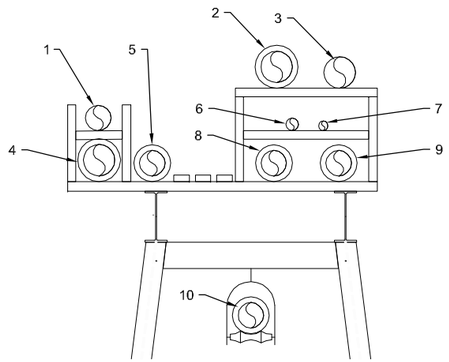
UTILITY DECOMMISSIONING

ABOVE GRADE UTILITIES DECOMMISSIONING PLAN

CONESTOGA-ROVERS & ASSOCIATES

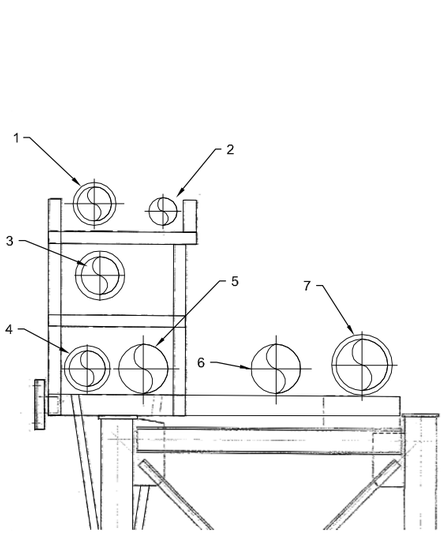
Source Reference			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: APPROX. 1"=80'	Project No: 75756-09	Report No: 016	Drawing No: R-01

75756-09(016)CI-WA104 JAN 3/2013



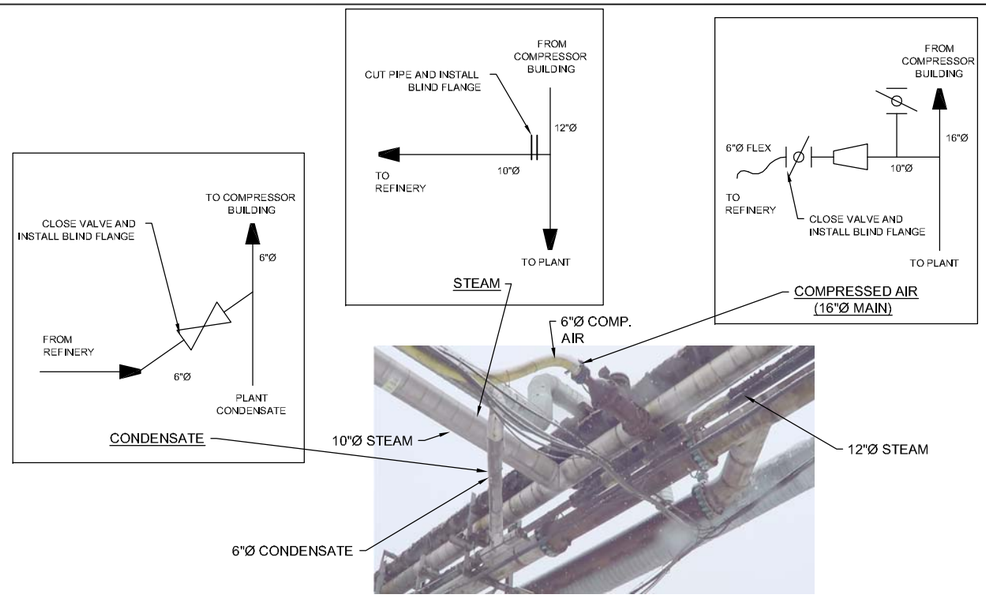
DETAIL 1
N.T.S. M-01,R-01

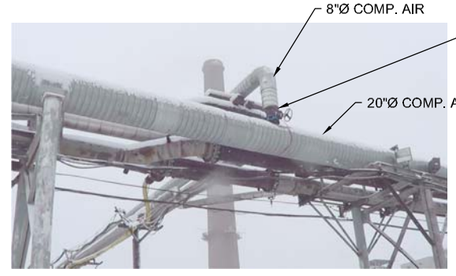
Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	8"	Steel	Spare Nickel Concentrate	N	Y	To Smelter
2	10"	Steel	Spare Nickel Concentrate	Y	Y	To Smelter
3	10"	Steel	Return Water	N	Y	To Mill
4	10"	Steel	Return Water	Y	Y	To Mill
5	6"	Steel	n/a	Y	N	not in service
6	4"	Plastic	n/a	N	N	not in service
7	3"	Plastic	n/a	N	N	not in service
8	10"	Steel	Return Water	Y	Y	To Mill
9	10"	Steel	n/a	Y	N	not in service
10	8"	Steel	Nickel Concentrate	Y	Y	To Smelter



DETAIL 2
N.T.S. M-01,R-01

Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	14"	Steel	Refinery Vacuum Air	Y	Y	To Comp. Bld.
2	12"	Steel	Propane (verify purged)	Y	N	not in service
3	12"	Steel	Steam	Y	Y	To Plant
4	6"	Steel	Condensate	Y	Y	To Comp. Bld.
5	16"	Steel	Compressed Air	N	Y	To Plant
6	16"	Steel	Compressed Air	N	Y	To Plant
7	20"	Steel	Compressed Air	Y	Y	To Plant





DETAIL 3 REFINERY PIPE DECOMMISSIONING SCHEMATICS
N.T.S. M-01,R-01

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No.	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

COMPRESSOR BUILDING DECOMMISSIONING

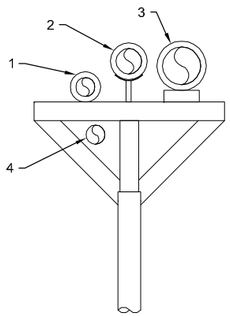
DETAIL SHEET 1 OF 2

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 016	Drawing No: R-02

75756-09(016)ME-WA005 JAN 4/2013

Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	6"	Steel	Condensate	Y	Y	To Comp. Bld.
2	8"	Steel	Compressed Air	Y	Y	To Refinery
3	12"	Steel	Steam	Y	Y	To Refinery
4	6"	Plastic	Compressed Air	N	Y	To Refinery



DETAIL 4
N.T.S. M-01,R-01

1. CUT FLEXIBLE RETURN LINE AT MILL SOUTH WALL AND INSTALL BLIND FLANGE.

DETAIL 5 MILL RETURN
N.T.S. M-01,R-01

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No.	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

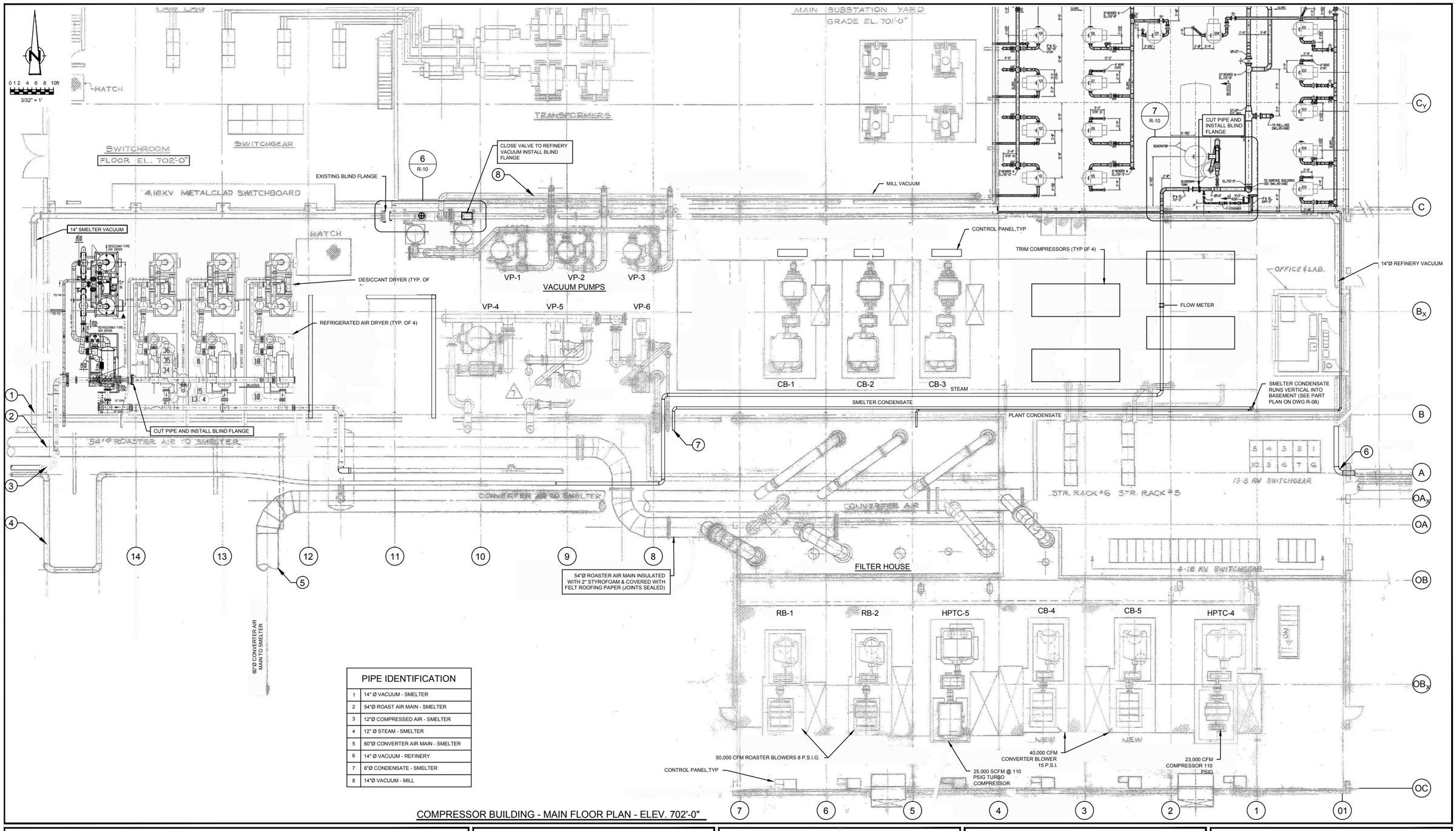
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

COMPRESSOR BUILDING DECOMMISSIONING

DETAIL SHEET 2 OF 2

CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: DEC 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 016	Drawing No: R-03



PIPE IDENTIFICATION	
1	14" Ø VACUUM - SMELTER
2	54"Ø ROAST AIR MAIN - SMELTER
3	12"Ø COMPRESSED AIR - SMELTER
4	12" Ø STEAM - SMELTER
5	60"Ø CONVERTER AIR MAIN - SMELTER
6	14" Ø VACUUM - REFINERY
7	6"Ø CONDENSATE - SMELTER
8	14"Ø VACUUM - MILL

COMPRESSOR BUILDING - MAIN FLOOR PLAN - ELEV. 702'-0"

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

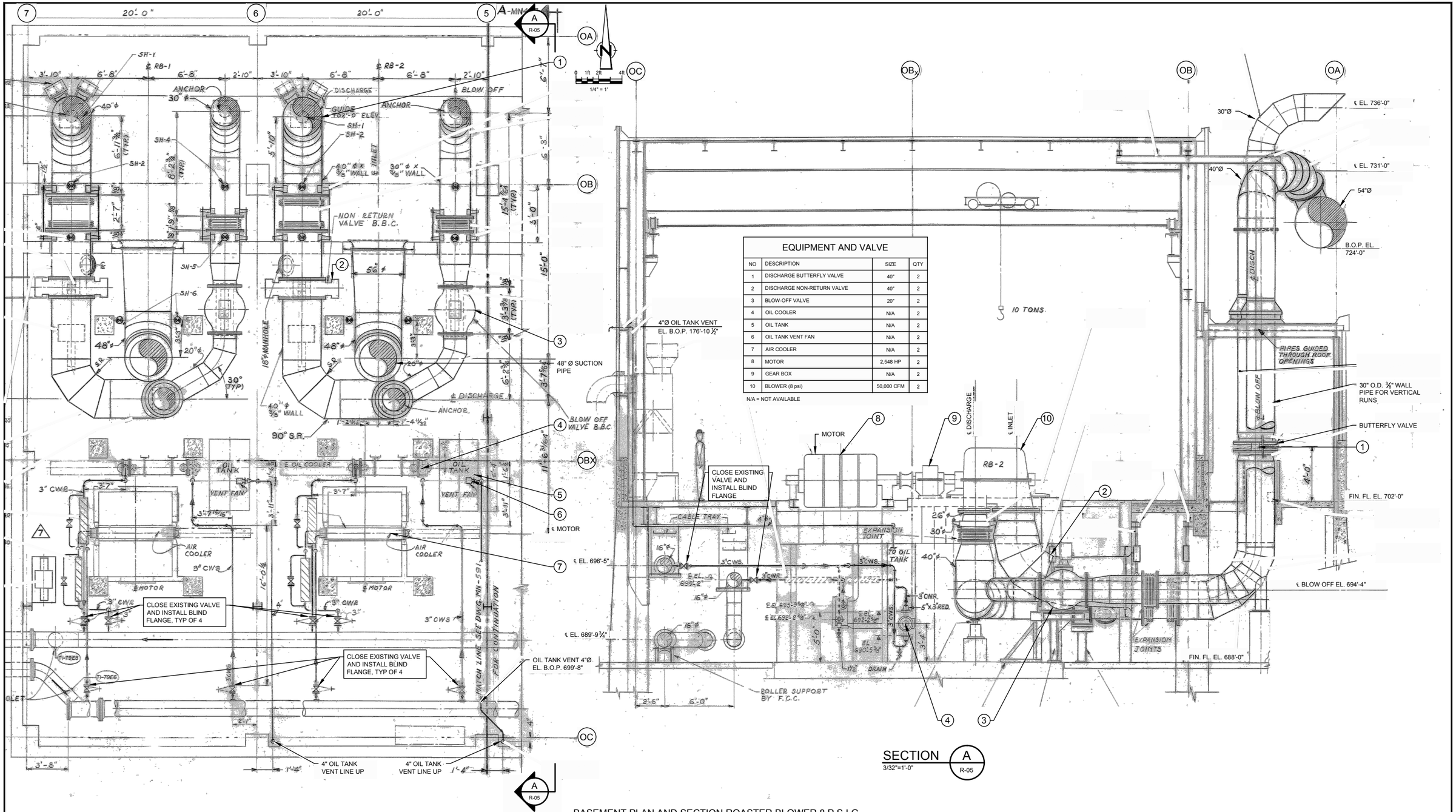
UTILITY DECOMMISSIONING

GROUND FLOOR PLAN EQUIPMENT & PIPING DECOMMISSIONING LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-B-1740 / 85-424-G-3925 / 85-424-G-5712 / 85-424-G-10553			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 3/32" = 1'-0"	Project No: 75756-09	Report No: 016	Drawing No: R-04

75756-09(016)RE-WA001 JAN 3/2013



EQUIPMENT AND VALVE

NO	DESCRIPTION	SIZE	QTY
1	DISCHARGE BUTTERFLY VALVE	40"	2
2	DISCHARGE NON-RETURN VALVE	40"	2
3	BLOW-OFF VALVE	20"	2
4	OIL COOLER	N/A	2
5	OIL TANK	N/A	2
6	OIL TANK VENT FAN	N/A	2
7	AIR COOLER	N/A	2
8	MOTOR	2,548 HP	2
9	GEAR BOX	N/A	2
10	BLOWER (8 psi)	50,000 CFM	2

N/A = NOT AVAILABLE

SECTION A R-05
3/32"=1'-0"

BASEMENT PLAN AND SECTION ROASTER BLOWER 8 P.S.I.G.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

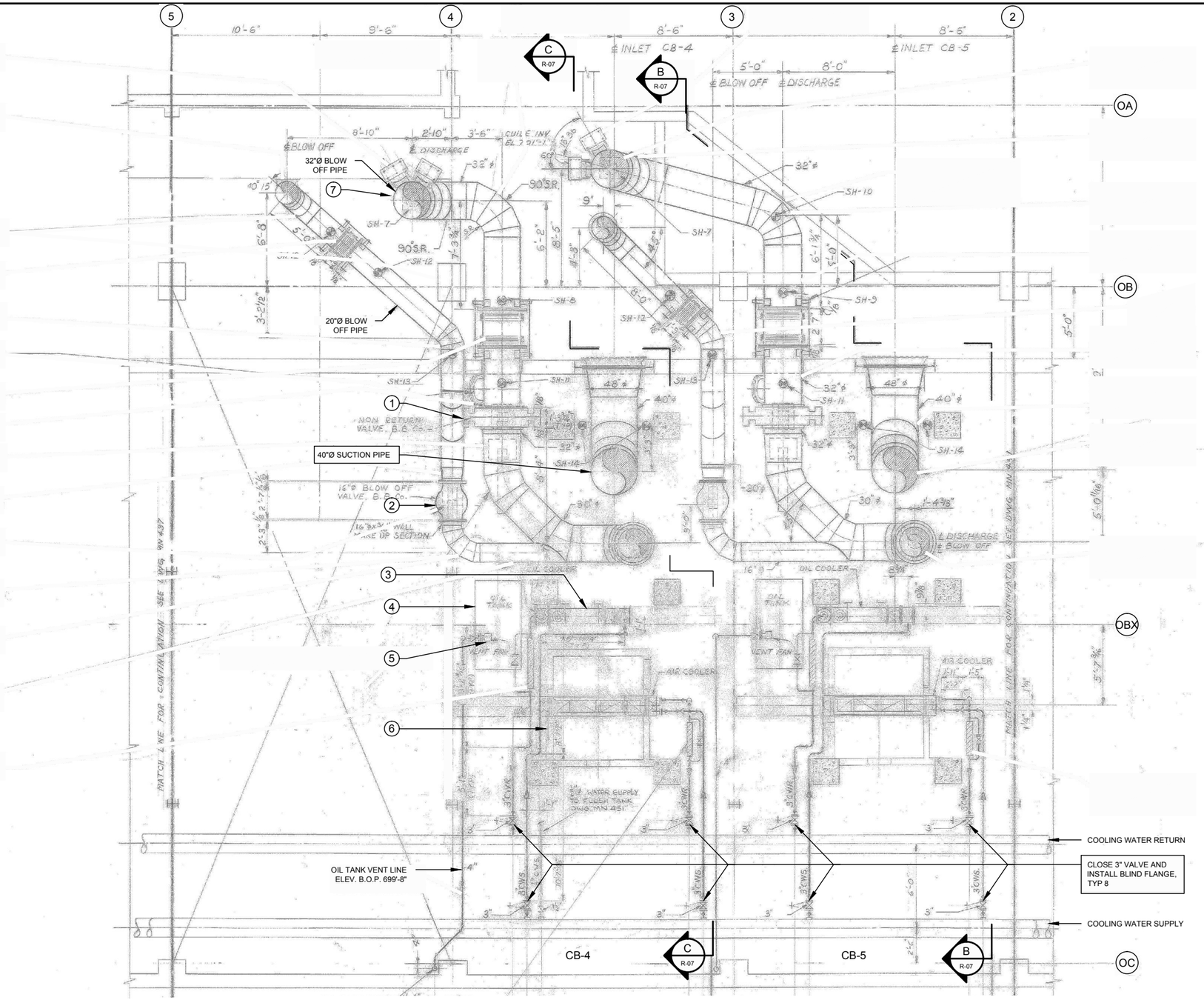
UTILITY DECOMMISSIONING

PLAN AND SECTION ROASTER BLOWER ISOLATION POINTS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01744			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 016	Drawing No: R-05

75756-09(016)RE-WA002 JAN 4/2013



N

0 1ft 2ft 4ft

1/4" = 1'

EQUIPMENT AND VALVE			
NO	DESCRIPTION	SIZE	QTY
1	DISCHARGE NON-RETURN VALVE	32"	2
2	BLOW-OFF VALVE	20"	2
3	OIL COOLER	N/A	2
4	OIL TANK	N/A	2
5	OIL TANK VENT FAN	N/A	2
6	AIR COOLER	N/A	2
7	DISCHARGE BUTTERFLY VALVE	32"	2

N/A = NOT AVAILABLE

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

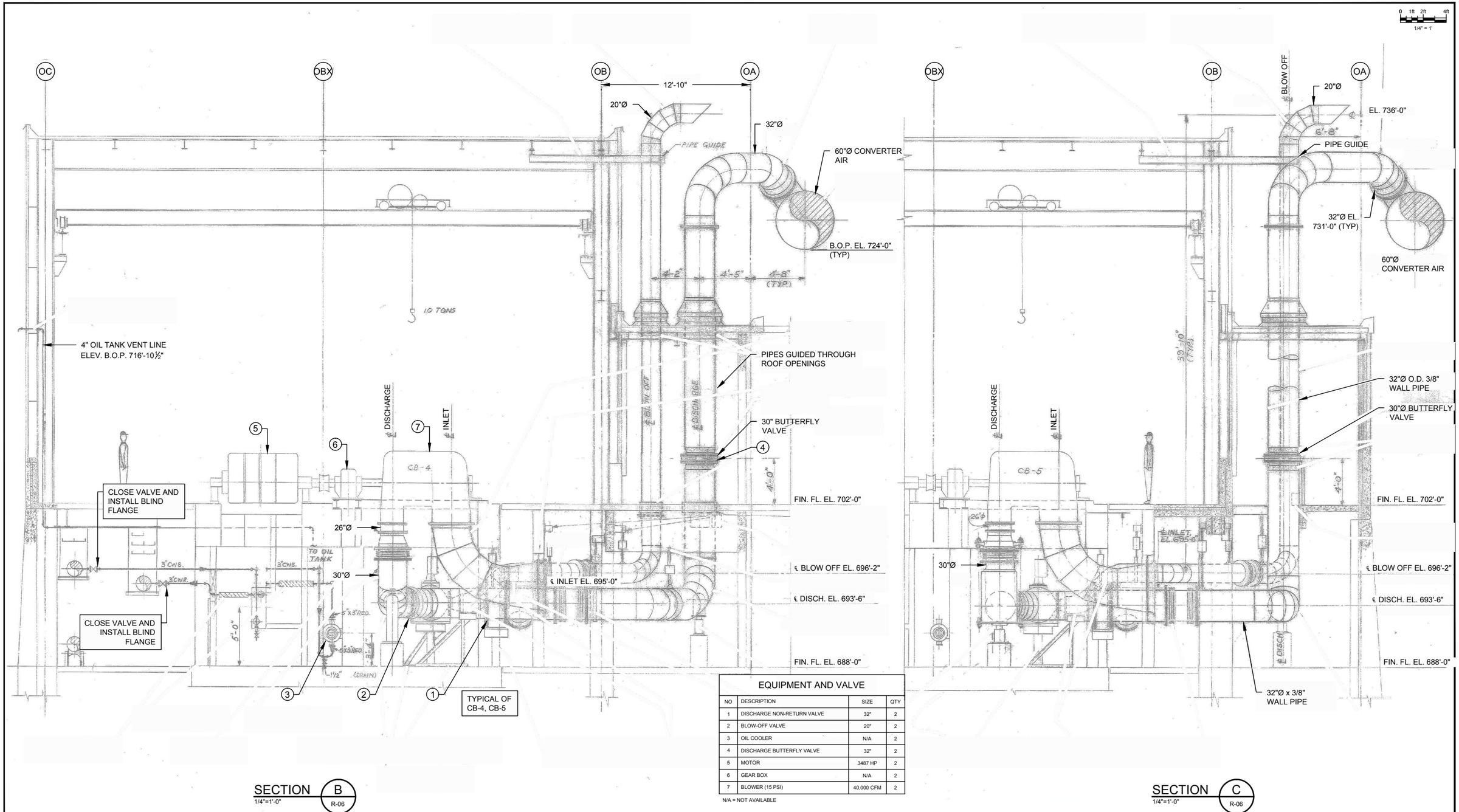
UTILITY DECOMMISSIONING

PLAN AND SECTION CONVERTER BLOWERS CB-4 & CB-5 ISOLATION POINTS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01746			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 016	Drawing No: R-06

75756-09(016)RE-WA003 JAN 4/2013



SECTION B
1/4"=1'-0"
R-06

EQUIPMENT AND VALVE

NO	DESCRIPTION	SIZE	QTY
1	DISCHARGE NON-RETURN VALVE	32"	2
2	BLOW-OFF VALVE	20"	2
3	OIL COOLER	N/A	2
4	DISCHARGE BUTTERFLY VALVE	32"	2
5	MOTOR	3487 HP	2
6	GEAR BOX	N/A	2
7	BLOWER (15 PSI)	40,000 CFM	2

N/A = NOT AVAILABLE

SECTION C
1/4"=1'-0"
R-06

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

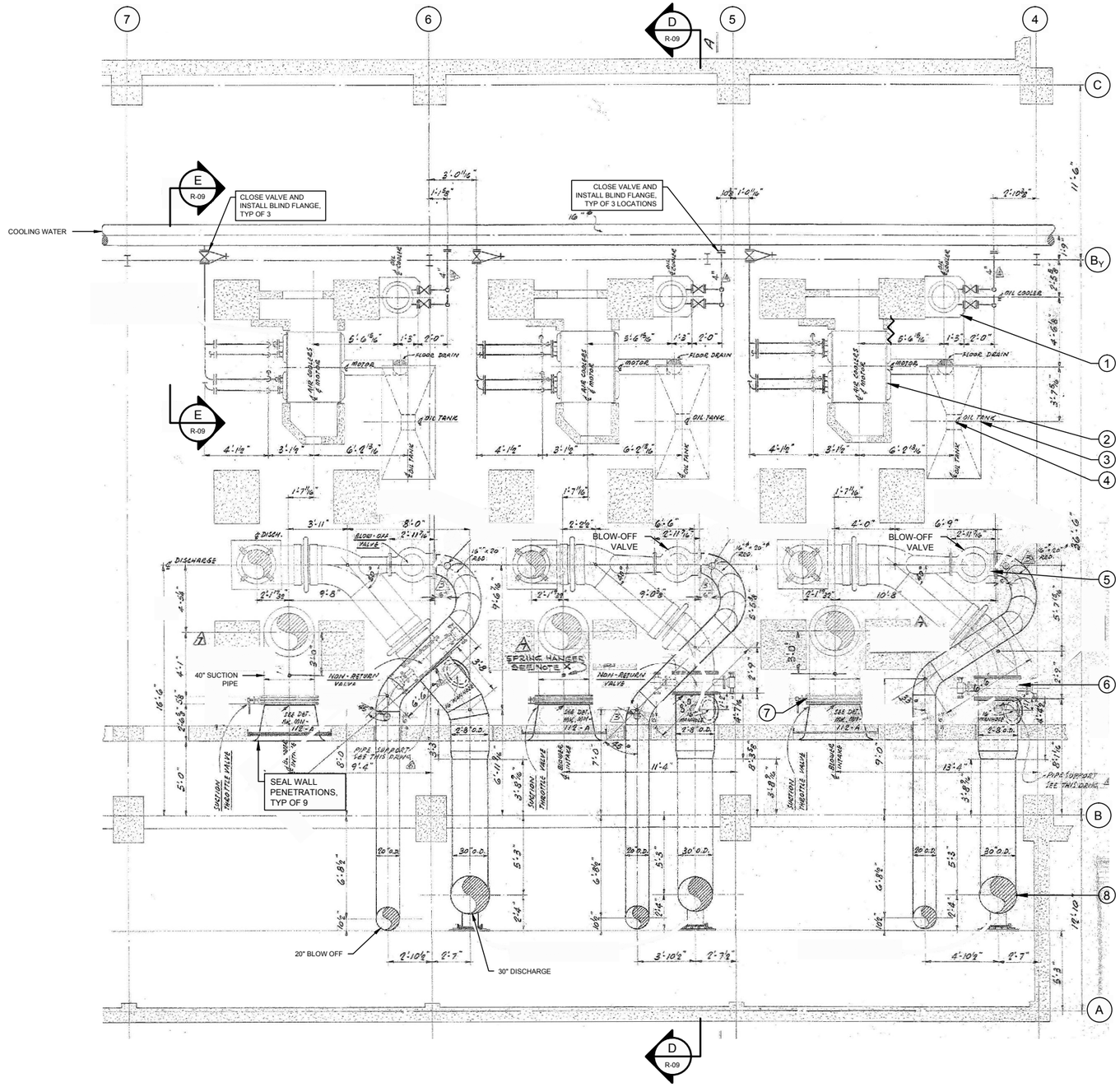
SECTIONS CONVERTER BLOWERS
CB-4, CB-5

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01745			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 016	Drawing No: R-07

75756-09(016)RE-WA005 JAN 4/2013

0 1 2 3 4 5ft
3/16" = 1'



EQUIPMENT AND VALVE REMOVALS

NO	DESCRIPTION	SIZE	QTY
1	OIL COOLER	N/A	3
2	AIR COOLER	N/A	3
3	OIL TANK	N/A	3
4	OIL TANK VENT FAN	N/A	3
5	BLOW OFF VALVE	20"	3
6	DISCHARGE NON-RETURN VALVE	30"	3
7	SUCTION THROTTLE VALVE	30"	3
8	DISCHARGE BUTTERFLY VALVE	40"	3

N/A = NOT AVAILABLE

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

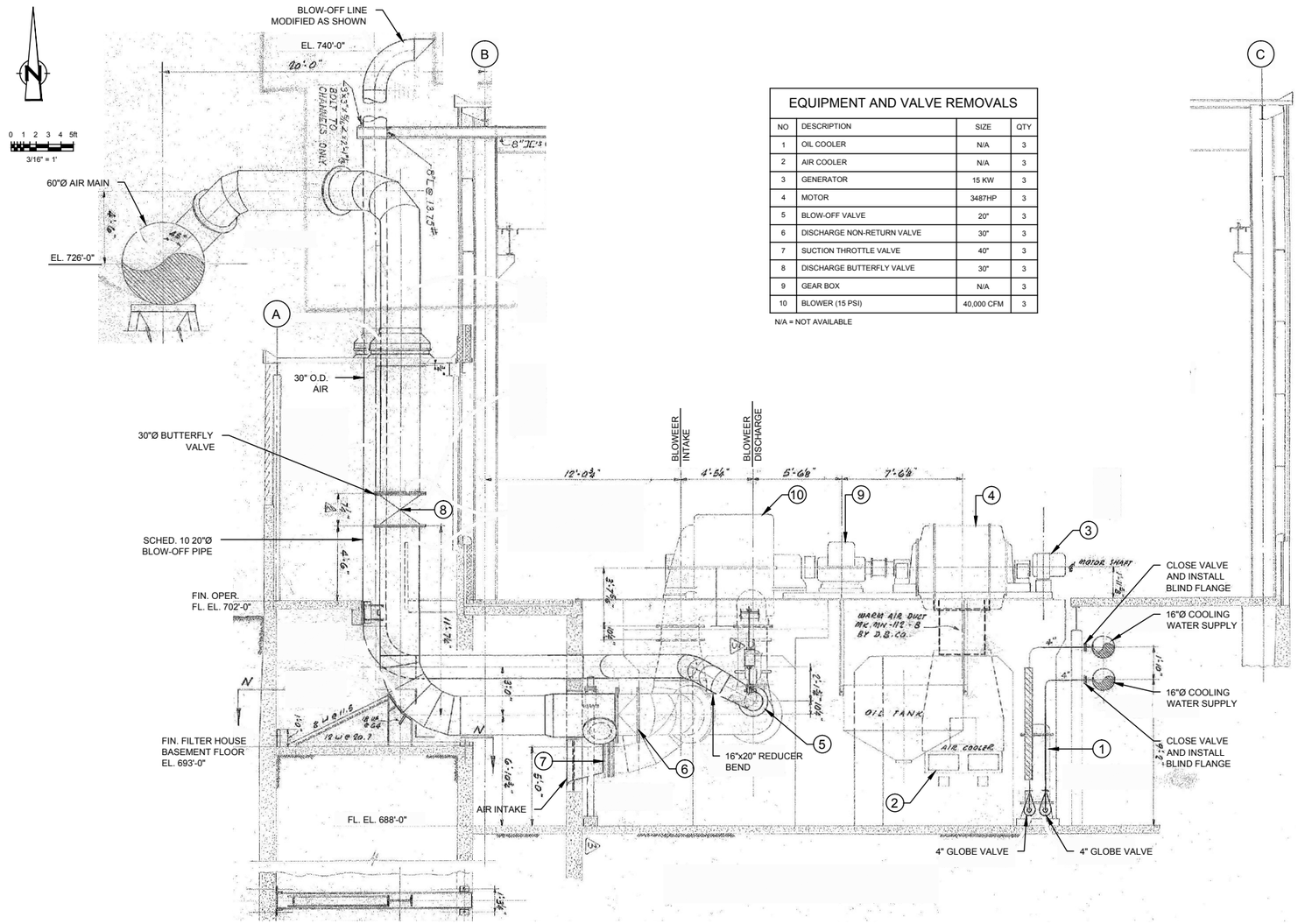
UTILITY DECOMMISSIONING

CONVERTER BLOWERS CB-1, CB-2, CB-3
ISOLATION POINTS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01611			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 016	Drawing No: R-08

75756-09(016)RE-WA006 JAN 4/2013

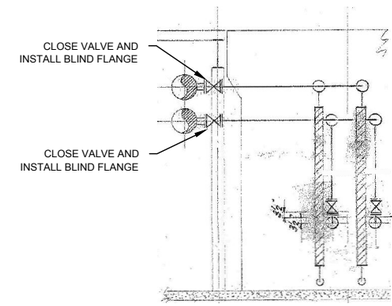


EQUIPMENT AND VALVE REMOVALS

NO	DESCRIPTION	SIZE	QTY
1	OIL COOLER	N/A	3
2	AIR COOLER	N/A	3
3	GENERATOR	15 KW	3
4	MOTOR	3487HP	3
5	BLOW-OFF VALVE	20"	3
6	DISCHARGE NON-RETURN VALVE	30"	3
7	SUCTION THROTTLE VALVE	40"	3
8	DISCHARGE BUTTERFLY VALVE	30"	3
9	GEAR BOX	N/A	3
10	BLOWER (15 PSI)	40,000 CFM	3

N/A = NOT AVAILABLE

SECTION D
3/16"=1'-0"
R-08



SECTION E
3/16"=1'-0"
R-08

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

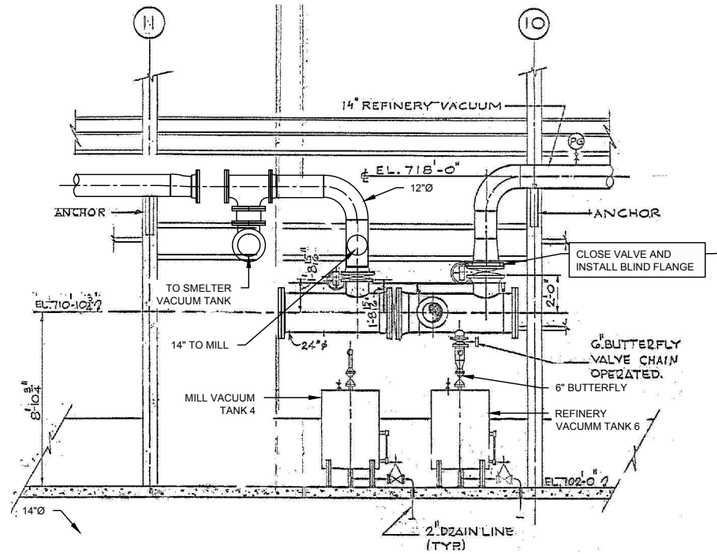
UTILITY DECOMMISSIONING

SECTIONS CONVERTER BLOWERS
CB-1, CB-2, CB-3

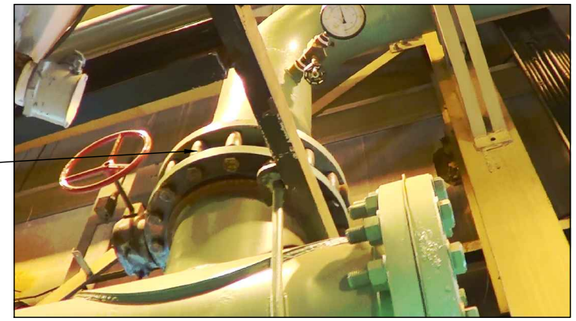
CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01611, 85-424-G-1749			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 3/16" = 1'-0"	Project No: 75756-09	Report No: 016	Drawing No: R-09

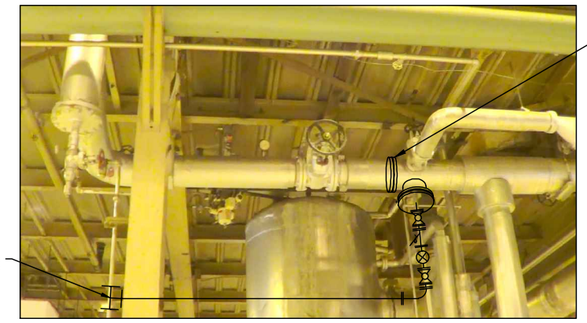
75756-09(016)RE-WA007 JAN 3/2013



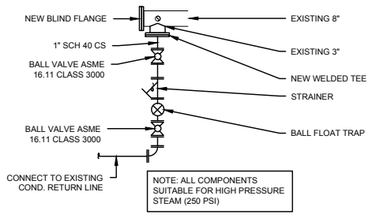
DETAIL 6
1/4"=1'-0"
R-04



REFINERY VACUUM ISOLATION VALVE

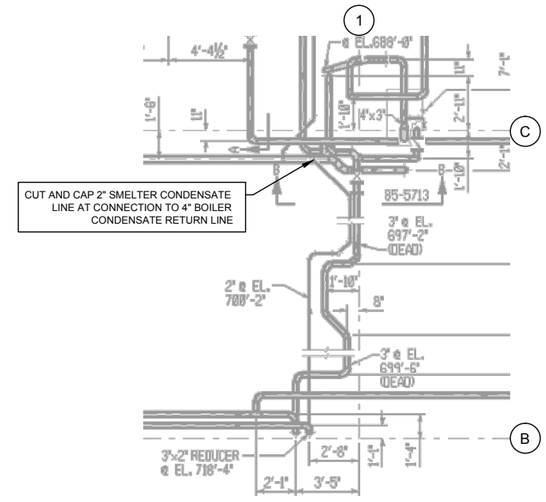


SMELTER STEAM MODIFICATIONS



ELEVATION

DETAIL 7
NTS
R-04



CUT AND CAP 2" SMELTER CONDENSATE LINE AT CONNECTION TO 4" BOILER CONDENSATE RETURN LINE

PART PLAN - BASEMENT
(CROSS REFERENCE DWG R-01)

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

CONVERTER BLOWERS CB-1, CB-2, CB-3
DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01611, 85-424-G-1749			Date: DEC 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 016	Drawing No: R-10

75756-09(016)RE-WA008 JAN 3/2013

APPENDIX B.2

BELOW GROUND

SPECIFICATIONS

SECTION 02226

UTILITY DECOMMISSIONING
(POTABLE WATER, PROCESS WATER, & SEWER SYSTEMS)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Decommissioning of existing below grade utilities including potable water piping, process water piping, storm sewer piping, sanitary sewer piping, process sewer piping, and associated valves, manholes, and catch basins.

1.2 REFERENCES

A. Section 01000 – Subsection 1.6 - Quality Requirements: Requirements for references.

B. Canadian Portland Cement Association (CPCA).

C. American Water Works Asscociation (AWWA).

1.3 DEFINITIONS

A. Associated Piping and Appurtenances: Piping and appurtenances (e.g., valves, collars, meters) directly or indirectly attached to or formerly attached to or adjacent to the water or sewer system.

B. Clean Soil: Excavated soils and sediments which are inert and free of unacceptable contamination and which are suitable for reuse as determined by ENGINEER based on visual inspection, sampling and analysis.

C. Contaminated Soil: Soils and sediments which are contaminated, as determined by ENGINEER based on regulatory criteria, visual inspection, sampling and analysis, and field screening.

1.4 SUBMITTALS

A. Section 01000 – Subsection 1.5 – Administrative Requirements: Submittal Procedures.

B. Shop Drawings: Indicate the decommissioning and removal locations and sequence; the location of excavations and construction of barricades, fences, and any temporary work.

C. Code Compliance: Submit copies of all required permits and inspection certificates or other code compliance documentation obtained by CONTRACTOR from the utility authorities, prior to commencing decommissioning activities.

D. Utility Decommissioning Plan: Within 7 days after the date of the Notice to Proceed, and prior to mobilization to the Site, submit a Utility Decommissioning Plan for review to ensure compliance with the requirements specified by the applicable authorities and the Contract Documents, and to permit ENGINEER to schedule testing and measurement activities. The plan shall include

written procedures, schedules, and CONTRACTOR's drawings, as applicable. The Decommissioning Plan shall, as a minimum, address each of the following items:

1. A detailed description of the methods and procedures which will be used to perform decommissioning for each type of utility including:

    a. Potable Water Piping and associated valves and hydrants
    b. Process Water Piping and associated valves
    c. Storm Sewer Piping and associated catch basins
    d. Sanitary Sewer Piping and associated manholes
    e. Process Sewer Piping and associated manholes

2. The sequencing and scheduling of decommissioning including system shutdown requirements.

3. Detailed description of coordination requirements with the OWNER.

4. Testing and commissioning plan and procedures.

1.5 CLOSEOUT SUBMITTALS

A. Section 01000 – Subsection 1.5 Administrative Requirements: Submittal Procedures.

B. Record Documents: Accurately record the actual locations of all capped utilities, decommissioned valves, catch basins and manholes.

1.6 QUALIFICATIONS

A. Contractor: A company specializing in performing the Work of this Section with a minimum of 10 years of documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable federal, provincial, and local regulations for demolition of structures, safety of adjacent structures, dust control, runoff control, and disposal.

B. Obtain all required permits from the applicable utility authorities.

D. Do not close or obstruct roadways, sidewalks, hydrants, or valves without the required permits and approvals from the OWNER.

1.8 SYSTEM PROTECTION

A. Protect all work from freezing.

B. Prevent damage to any pipeline due to hydrostatic uplift during the decommissioning works until the work is complete.

1.9 SEQUENCING AND SCHEDULING

A. Section 01000 – Subsection 1.5 - Administrative Requirements: Requirements for coordination.

B. Schedule the Work so as to minimize any interruptions to existing services.

C. Submit a schedule of expected interruptions to the OWNER for approval and adhere to the approved interruption schedule.

D. Notify the OWNER a minimum of 24 hours in advance of any interruptions in service.

E. Do not interrupt water service for more than 3 hours unless otherwise authorized by the OWNER.

F. Notify the OWNER's fire department of any planned or accidental interruptions of water supply to hydrants.

1.10 MEASUREMENT AND PAYMENT

A. Section 01000 – Subsection 1.4 – Price and Payment Procedures.

B. The Work outlined in this Section will be measured and paid for at the unit price as indicated in the Bid Form.

C. All decommissioned pipe shall be measured horizontally over the centreline of the pipe.

D. Include the following in the unit price bid per foot of decommissioned pipe

1. All necessary equipment and labour to fill decommissioned pipe with low strength concrete or grout.

2. Supply and installation of low strength concrete or grout.

3. Unloading, storage, and handling of required materials.

4. Removal and disposal of existing pipe contents prior to decommissioning.

5. Watermain flushing, disinfection and leakage/pressure testing.

6. Hydrant relocations shall be paid for in the unit price for hydrants in the Bid Form.

7. Brick bulkheads for sewer connections shall be paid for in the unit price for brick bulkheads in the Bid Form.

8. Blind flange caps to existing potable water and process water piping systems shall be paid for in the unit price for blind flange caps in the Bid Form.

PART 2 PRODUCTS

2.1 CONCRETE OR GROUT FILL FOR ABANDONED PIPE

A. General: Grout shall be suitable for injection into the decommissioned pipe completely filling the pipe free of voids.

B. Refer to Section 02431 – Pipe Grouting

2.2 BACKFILL MATERIAL

A. Backfill in accordance with Section 02315.

2.3 CATCH BASIN AND MANHOLE BULKHEAD MATERIAL

A. General: Seal openings from decommissioned pipes in sub-surface structures to remain in service (manholes and catch basins) with brick and mortar suitable for exterior use. All seals shall be made water tight and constructed of materials suitable for the intended service.

B. Brick and Mortar seals:

1. Brick bulkhead thickness to equal that of existing manhole or catch basin concrete wall.
2. Brick shall be suitable for exterior use in storm and sanitary sewers
3. The contact surface of each brick shall be coated with mortar to provide a watertight seal.
4. The interior surface of the brick bulkhead to be grouted to provide a watertight seal.

2.4 POTABLE WATER AND PROCESS WATER PIPING

A. General: Excavate where required as per Section 02315 and disconnect potable and process water piping identified for decommissioning from the main system and install blind flange to cap the branch connection as indicated on the contract drawings.

B. Ductile Iron Pipe and Fittings:

1. AWWA C150 ductile iron pipe.

2. The minimum wall thickness for pipe with mechanical and push-on joints shall be Class 50.

3. The minimum wall thickness for pipe with flanged joint or plain end and Victaulic coupling shall be Class 53.

4. Joints - ANSI A21.11 (AWWA C111) rubber gasket mechanical or push-on-joints.

5. Fittings - ANSI A21.10 (AWWA C110) gray iron fittings.

6. Fitting joints - ANSI A21.11 (AWWA C111) rubber gasket mechanical joints.

7. Flanges - ANSI B16.1, Class 150.

C. Carbon Steel Piping and Fittings:

1. Flanges – ANSI B16.5, Class 150.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01000 – Subsection 1.13 - Execution Requirements: Examination

B. Field verify the location and elevation of all utilities which are to remain.

C. Field verify the location and elevation of all utilities and appurtenances to be decommissioned.

D. Schedule, arrange, and coordinate system shutdowns with OWNER and verify that the utilities to be decommissioned are not in operation prior to decommissioning.

E. Ensure that utilities have been properly isolated from those sections that are to remain in service.

3.2 PREPARATION

A. Provide, erect, and maintain temporary barriers as required.

B. Protect existing structures and utilities which are not to be decommissioned.

C. Prevent movement of structures; provide any necessary bracing and shoring.

D. Mark the location of all utilities including those which are to remain and those which are to be decommissioned.

E. Conduct all work activities so as to minimize any interference with adjacent structures and OWNER operations.

F. Cease operations immediately if any adjacent structures appear to be in danger. Notify the OWNER. Do not resume operations until so directed by the OWNER.

G. Maintain protected egress and access at all times.

3.3 UTILITY DECOMMISSIONING - GENERAL

A. Excavate as required for decommissioning purposes.

B. Remove demolished materials from the Site. Do not bury materials on the Site.

C. Break debris into sizes which are suitable for transportation and disposal, or reuse.

D. Load debris directly into transport vehicles/containers.

E. If required, temporarily remove and/or cap sewer and water lines so as to prevent leakage.

F. Maintain active or energized utilities traversing the premises throughout the project, unless designated for removal.

G. At the end of each day's work, leave the Works in a safe and secure condition so that no part is in danger of toppling or falling and so as to ensure no unauthorized admittance to the area.

H. Remove materials as the Works progresses. Upon completion of the Works, leave areas in a clean condition.

I. Remove all temporary work.

J. Rough grade and compact any areas affected by work activities in accordance with Section 02315. Maintain Site grades, slopes, and contours.

K. Blasting will not be permitted.

3.4 DECOMMISSIONING – WATER DISTRIBUTION PIPING

A. Valves: decommission valves in place and remove the valve stem to a min of 5 ft below grade as indicated on the Contract Drawings, accurately record the locations of decommissioned valves on the Record Drawings.

B. Disconnect and cap designated water services as indicated on the Drawings.

C. Fill all pipe designated for decommissioning with grout as indicated on the Contract Drawings.

D. Backfill excavations in accordance with Section 02315.

E. Coordinate activities including all service interruption with the OWNER.

3.5 DECOMMISSIONING – STORM, SANITARY, AND PROCESS SEWERS

A. Where piping scheduled for decommission connects to a manhole or catch basin that will remain in service install brick bulkheads to the decommissioned pipe connections as indicated on the drawings.

B. Manholes and catch basins scheduled for decommissioning shall be filled with low strength concrete or grout. Remove the top of the manhole or catch basing to a min of 5 feet below grade and backfill as indicated on the Contract Drawings.

C. Fill all pipe designated for decommissioning with grout as indicated on the Contract Drawings.

D. Brick bulkhead width to be equal to that of the existing manhole structure.

E. Coordinate activities with the OWNER so as to not interrupt facility operations.

3.6 DECOMMISSIONING – PIPE DECOMMISSIONING (FILL)

A. Fill all pipe scheduled for decommissioning as indicated on the Contract Drawings with grout.

B. Provide all required labour, equipment and material to provide access points (as required) for the application of pipe fill and to allow confirmation that the pipe has been completely filled.

C. Identify and seal all pipe openings into sub-surface structures to remain in service prior to pipe filling activities

D. Protect sealed openings (bulkheads) into catch basins and manholes from blowout during pipe line filling.

3.7 DISINFECTION

A. Shutdown the potable water service in coordination with the OWNER.

B. Ensure that no unwanted matter is allowed to enter any sections the potable watermain.

C. Submerge all fittings, tools and equipment to be in direct contact with wetted surfaces in a chlorine solution that has a minimum concentration of 50 ppm.

D. Install disinfected blind flanges to the branch connections as indicated on the drawings.

E. Perform pressure and leakage testing.

F. Return the system to service.

3.8 LEAKAGE TESTING

A. Notify the OWNER a minimum of 2 Working Days in advance of all proposed testing.

B. Conduct hydrostatic leakage tests under the supervision of the OWNER, upon completion of the decommissioning and capping of branch connections to the watermain.

C. Hydrostatic pressure and hydrostatic leakage tests may be conducted either simultaneously or separately.

D. Confirm that the maximum pressure at any point along the test sections does not exceed the pipe rating.

E. Hydrostatic Leakage Test:

F. Fill the test section slowly with water making sure that all air is removed from the pipeline.

G. Allow a period of 24 hours before starting the test.

H. Subject the test section to a continuous test pressure of 150 PSI (1035 kPa) for one hour or as directed by the OWNER.

I. Leakage is the amount of water added to the test section in order to maintain the test pressure for the test duration.

J. Compare the measured leakage with the allowable leakage as calculated for the test section.

K. Allowable leakage: 2.2 litre per 1-inch of pipe diameter per km of pipe per 24 hours based on a test pressure of 1034 kPa (150 psi) and prorated for the duration of the test.

L. If the measured leakage exceeds the allowable leakage, locate and repair all leaks and retest the section until a satisfactory result is obtained.

3.9 FIELD QUALITY CONTROL

A. Section 01000 – Subsection XX - Quality Requirements: Field inspection and testing.

END OF SECTION

SECTION 02315

EXCAVATION, TRENCHING, AND BACKFILLING

PART 1 GENERAL

1.1 RELATED SECTIONS

A. Section 02226B – Below Grade Utilities Decommissioning.

1.2 RELATED MANITOBA PROVINCIAL STANDARD CONSTRUCTION SPECIFICATIONS

A. MPSCS 900 – Specifications for Granular Base Course.

1.3 MEASUREMENT AND PAYMENT

A. Work outlined in this Section shall not be measured separately for payment. Excavation, trenching, shoring, bracing, cofferdams, underpinning, dewatering and backfilling shall be considered to be incidental to the below grade utilities decommissioning work and all costs for this Work shall be included in the unit prices for the related below grade utilities decommissioning work as indicated on the Bid Form.

1.4 REFERENCES

A. ASTM International (ASTM);

1. C117 95 - Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.

2. C136 95a - Test Method for Sieve Analysis of Fine and Coarse Aggregates.

3. D422 63(1990) - Test Method for Particle Size Analysis of Soils.

4. D698 91 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft lbf/ft^3) (600 kN m/m^3).

5. D1557 91 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft lbf/ft^3) (2,700 kN m/m^3).

6. D4318 95 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

B. Canadian General Standards Board (CGSB);

1. CAN/CGSB 8.1 88 - Sieves, Testing, Woven Wire, Inch Series.

2. CAN/CGSB 8.2 - [M88], Sieves, Testing, Woven Wire, Metric.

C. Canadian Standards Association (CSA): CAN/CSA A23.1 94 - Concrete Materials and Methods of Concrete Construction.

1.5 DEFINITIONS

A. Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.

1. Common Excavation: Excavation of materials of whatever nature, which are not included under the definitions of rock excavation.

2. Rock Excavation: Excavation of material from solid masses of igneous, sedimentary or metamorphic rock which, prior to its removal, was integral with its parent mass, and boulders or rock fragments having an individual volume in excess of 3 ft^3.

B. Waste Material: Excavated material unsuitable for use in the Work or which is surplus to the requirements of the Contract.

C. Borrow Material: Material obtained from locations outside the area to be graded, and required for construction of fill areas or for other portions of the Work. Source of the borrow material is to be approved by OWNER.

D. Unsuitable Materials: Following may be classified as unsuitable:

1. Weak and compressible materials under excavated areas.

2. Frost susceptible materials under excavated areas.

3. Frost Susceptible Materials: Fine grained soils with a plasticity index of less than 10 when tested in accordance with ASTM D4318, and gradation within the limits specified when tested in accordance with ASTM D422 and ASTM C136: Sieve sizes to conform to CAN/CGSB 8.1.

E. Unshrinkable Fill: Very weak mixture of Portland cement, concrete aggregates and water that resists settlement when placed in utility trenches, and is capable of being readily excavated.

1.6 SAMPLES

A. Submit samples in accordance with Section 01000 – General Requirements Subsection XX - Submittals.

B. Inform OWNER of the proposed sources of fill materials a minimum of 10 Working Days prior to commencing the Work, and provide access for sampling as required.

1.7 PROTECTION OF EXISTING FEATURES

A. Existing Buried Utilities and Structures:

1. Indicated size, depth and location of existing utilities and structures are for guidance only. Completeness and accuracy of this information is not guaranteed.

2. Prior to commencing any excavation Work establish the location and state of the use of any buried utilities and structures.

3. Confirm the locations of all buried utilities by careful test excavations.

4. Maintain and protect from damage all water, sewer, gas, electric, telephone and other utilities and structures encountered.

5. Record the locations of any maintained, rerouted and decommissioned underground lines.

B. Existing buildings and surface features:

1. Conduct, with OWNER, a condition survey of all existing buildings, roads, fencing, service poles, wires, rail tracks, pavement, survey bench marks which may be affected by the performance of the Work.

2. Protect all existing buildings and surface features from damage while the Work is in progress. In the event of damage, immediately complete the necessary repairs and/or restoration to the approval of OWNER.

1.8 SHORING, BRACING AND UNDERPINNING

A. Protect all existing structures and services from damage.

B. Engage the services of a qualified professional engineer who is registered and licensed in province of Manitoba, to design and inspect shoring, bracing and underpinning required for the Work.

C. Submit the design and all supporting data to OWNER for review at least 10 Working Days prior to commencing the Work.

D. Design and supporting data submitted is to bear the stamp and signature of a qualified professional engineer registered and licensed to practice in the province of Manitoba.

1.9 DISPOSAL OF MATERIALS

A. CONTRACTOR shall arrange with OWNER for the disposal of any surplus excavated materials on OWNER's site.

1.10 COLD WEATHER WORK

A. Obtain the prior, written consent of OWNER before starting excavation in frozen ground. Written authorization from OWNER must be obtained for all methods to be used to carry out such Work.

B. All excavations shall be protected to prevent frost from penetrating the ground below the foundations. Any footing or structure laid on frost which, in the opinion of OWNER, has been injured through CONTRACTOR's failure to adhere to the requirements of this subsection or any other Specification Section, shall be removed and made good by CONTRACTOR at CONTRACTOR's own expense.

C. Backfilling shall not be performed with frozen material and no fill shall be placed over material which is already frozen.

D. Replace any excavated frozen material with suitable backfill material at no additional cost to OWNER. Frozen material may be stockpiled for use after it has thawed, and has been deemed acceptable for use by OWNER.

PART 2 PRODUCTS

2.1 MATERIALS

A. Type 1 and Type 2 fill:

1. Crushed, pit run or screened stone, gravel or sand.

2. Gradations shall be within the limits specified when tested in accordance with ASTM C136 and ASTM C117. Sieve sizes shall be in accordance with CAN/CGSB 8.1.

3. Granular A and B in accordance with MPSCS 900.

B. Type 3 Fill: Selected material from excavation or other sources, approved by OWNER for the use intended, unfrozen and free from rocks larger than 6 inches in any dimension, cinders, ashes, sods, refuse or other deleterious materials.

C. Unshrinkable Fill: Proportioned and mixed to provide:

1. Maximum compressive strength of 0.4 MPa at 28 Days.

2. Maximum Portland cement content of 25 kg/m^3.

3. Minimum strength of 0.07 MPa at 24 hours.

4. Concrete Aggregates: In accordance with CAN/CSA A23.1.

5. Portland Cement: Type 10.

6. Slump: 160 to 200 mm.

PART 3 EXECUTION

3.1 SITE PREPARATION

A. Remove any obstructions, ice and snow, from all surfaces to be excavated within the limits indicated on the Contract Drawings.

3.2 STOCKPILING

A. Stockpile fill materials in areas approved by OWNER. Stockpile granular materials in a manner which will prevent segregation.

B. Protect all fill materials from contamination.

C. Protect stockpiles from erosion and control run off with silt protection.

3.3 SHORING, BRACING AND UNDERPINNING

A. Construct temporary work to the depths, heights and locations as approved by OWNER.

B. During backfill operations:

1. Remove sheeting and shoring from excavations, unless otherwise indicated in the Contract Documents or directed by OWNER.

2. Do not remove bracing until backfilling has reached the respective levels of such bracing.

3. Pull sheeting in increments that will ensure that the compacted backfill is maintained at an elevation at least 20 inches above the toe of the sheeting.

C. When sheeting is required to remain in place, cut off the tops at an elevation that is a min of 5 feet below grade.

3.4 DEWATERING AND HEAVE PREVENTION

A. Keep all excavations free of water while the Work is in progress.

B. As required submit, for OWNER's review, the details of all proposed dewatering or heave prevention methods.

C. Avoid excavation below the groundwater table if a quick condition or heave is likely to occur. Prevent piping or bottom heave of excavations.

D. Protect open excavations against flooding and damage due to surface run off.

E. Dispose of water in accordance with the local authority having jurisdiction and in a manner which is not detrimental to public and private property, or any portion of the Work completed or under construction.

3.5 EXCAVATION

A. Excavate to the lines, grades, elevations and dimensions as indicated on the Contract Drawings.

B. Dispose of all surplus and unsuitable excavated material at a location on Site approved by OWNER.

C. Do not obstruct the flow of surface drainage or natural watercourses.

D. Earth bottoms of excavations shall be comprised of undisturbed soil, level and free from loose, soft or organic matter.

E. Notify OWNER when the bottom of the excavation is reached.

F. Obtain OWNER's approval of completed excavations.

G. Remove unsuitable material from the excavation bottom to the extent and depth as directed by OWNER.

H. Correct any unauthorized over excavation as follows:

1. Fill under bearing surfaces and footings with fill concrete.

2. Fill under other areas with Type 2 fill compacted to not less than 95 percent of Standard Proctor Maximum Dry Density (SPMDD).

I. Hand trim, make firm and remove all loose material and debris from excavations. Where material at the bottom of an excavation is disturbed, compact the foundation soil to a density at least equal to that of the undisturbed soil. Clean out rock seams and fill with concrete mortar or grout to the approval of OWNER.

3.6 FILL TYPES AND COMPACTION

A. Use fill of the types as indicated on the Contract Drawings. Compaction densities are percentages of the maximum densities obtained from ASTM D698.

1. Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95 percent SPMDD.

2. Under Concrete Slabs: Provide a 6 inch compacted thickness base course of Type 1 fill to the underside of the slab. Compact the base course to 100 percent SPMDD.

3. Place unshrinkable fill in the areas as indicated on the Contract Drawings.

3.7 BEDDING AND SURROUND OF UNDERGROUND SERVICES

A. Place and compact granular material for the bedding and surround of underground services as indicated on the Contract Drawings.

B. Place bedding and surround material in unfrozen conditions.

3.8 BACKFILLING

A. Do not proceed with backfilling operations until OWNER has inspected and approved all installations.

B. Areas to be backfilled shall be free from debris, snow, ice, water and frozen ground.

C. Do not use backfill material which is frozen or which contains ice, snow or debris.

D. Place backfill material in uniform layers not exceeding 6 inches of compacted thickness up to the grades indicated in the Contract Documents. Compact each layer before placing the succeeding layer.

E. Place unshrinkable fill in the areas as indicated on the Contract Drawings. Consolidate and level unshrinkable fill with internal vibrators.

1. Place bedding and surround material as specified on the Contract Drawings.

2. Place layers simultaneously on both sides of the installed Work to equalize loading.

3.9 RESTORATION

A. Upon completion of the Work, remove all waste materials and debris, trim slopes, and correct all defects as directed by OWNER.

B. Clean and reinstate any areas affected by the Work to the satisfaction of OWNER.

C. Use temporary plating to support traffic loads over unshrinkable fill for the initial 24 hour curing period.

END OF SECTION

SECTION 02431

PIPE GROUTING

PART 1 GENERAL

1.1 RELATED SECTIONS

A. Section 02226 – Below Grade Utilities Decommissioning.

1.2 MEASUREMENT AND PAYMENT

A. Work outlined in this Section shall be included in unit price per foot for decommissioned pipe as per Subsection 1.10.D of Section 02226 - Below Grade Utilities Decommissioning.

1.3 DEFINITIONS

A. Grouting: Filling carrier pipe by pumping.

B. Back Grouting: Secondary pressure grouting to ensure that voids have been filled in the carrier pipe.

C. Carrier Pipe: Sanitary sewer, storm sewer, process sewer, potable water pipe, or process water pipe.

1.4 REFERENCES

A. ASTM International (ASTM):
   1. C138 - Standard Test Method for Unit Weight, Yield and Air Content (Gravimetric) of Concrete.
   2. C494/C494M - Standard Specification for Chemical Admixture for Concrete.
   3. C869 - Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete.
   4. C937 - Standard Specification for Grout Fluidifier for Pre-placed Aggregate Concrete.
   5. C942 - Standard Test Method for Compressive Strength of Grout for Pre-placed Aggregate Concrete into Laboratory.
   5. C1017 - Standard Specification for Chemical Admixture for Use in Producing Flowing Concrete.

B. Canadian Standards Association (CRA):
   1. A23.1/23.2 - Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
   2. A3000 - Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004, and A3005).

1.5 SUBMITTALS

A. Submit description of materials, grout mix, equipment and operational procedures to accomplish each grouting operation. Description may include sketches as appropriate, indicating type and location of mixing equipment, pumps, injection points, venting method, flow lines, pressure measurement, volume measurement, grouting sequence, schedule, and stage volumes. Tests and certifications shall have been performed within last 12 months prior to date of submittal.

B. Submit grout mix design report, including:

1. Grout type and designation.

2. Grout mix constituents and proportions, including materials by weight and volume.

3. Grout densities and viscosities, including wet density at point of placement.

4. Initial set time of grout.

5. Bleeding, shrinkage/expansion.

6. Compressive strength.

7. Detailed description of grout pressure limiting equipment.

8. Bulkhead designs.

C. For cellular grout, also submit the following:

1. Foam concentrate supplier's certification of dilution ratio for foam concentrate.

2. A description of proposed cellular grout production procedures.

D. Maintain and submit logs of grouting operations indicating pressure, density, and volume for each grout placement.

PART 2 PRODUCTS

2.1 MATERIALS

A. Grout: Low density (cellular) grout, unless otherwise approved by OWNER.

B. Do not include toxic or poisonous substances in grout mix or otherwise inject such substances underground.

2.2 GROUT

A. Employ and pay for commercial testing laboratory, acceptable to OWNER, to prepare and test grout mix design. Develop one or more mixes based on following criteria as applicable:

1. Size of pipe.

2. Absence or presence of groundwater.

3. Adequate retardation.

4. Non-shrink characteristics.

4. Pumping distances.

B. Prepare mixes that satisfy required application. Provide materials conforming to the following standards:

1. Cement: CSA A3001 Type GU.

2. Fly Ash: CSA A3001, Type F, maximum twenty percent (20 percent) of fly ash replacement by mass of total cementitious materials.

3. Water: A23.1/A23.2, potable.

4. Foam: ASTM C869.

5. Slurry: ASTM C138.

6. Cellular Grout: ASTM C138.

7. Sand: CSA A23.1/A23.2.

C. Provide grout meeting the following minimum requirements:

1. Minimum 28-Day Unconfined Compressive Strength: 2 MPa for cellular grout.

2. Determine strength by ASTM C942.

3. Maximum Allowable Density: Less than 2000 kg/m^3.

D. Fluidifier: Provide fluidifier, meeting ASTM C937 that holds solid constituents of grout in colloidal suspension and is compatible with cement and water used in grouting operations.

E. Admixtures:

1. Use admixtures meeting ASTM C494/C494M and ASTM C1017 as required, to improve pumpability, control time of set, hold sand in suspension and reduce segregation and bleeding.

2. For cellular grout, do not use foam or admixtures that promote steel corrosion.

3. Ensure that admixtures used in mix are compatible. Provide written confirmation from admixture manufacturers of their compatibility.

PART 3 EXECUTION

3.1 PREPARATION

A. Notify OWNER a minimum of 24 hours in advance of grouting operations.

B. Select and operate grouting equipment to avoid damage to new or existing underground utilities and structures.

C. In selection of grouting placement consider pipe flotation, length of pipe, depth from surface, type of pipe, type of pipe blocking and bulkheading, grout volume and length of pipe to be grouted between bulkheads.

D. Operate dewatering systems until grouting operations are complete and grout has reached initial set.

3.2 EQUIPMENT

A. Batch and mix grout in equipment of sufficient size and capacity to provide necessary quality and quantity of grout for each placement stage.

B. Use equipment for grouting of type and size generally used for work, capable of mixing grout to homogeneous consistency, and providing means of accurately measuring grout component quantities and accurately measuring pumping pressures. Use pressure grout equipment, which delivers grout to injection point at steady pressure.

3.3 PRESSURE GROUTING FOR PIPING

A. Perform grouting operations to fill pipe and voids.

B. Keep grout pressure below value that may cause damage or distortion of the pipe. Provide seals which will prevent grout from spilling.

C. Control grout pressures so that pipe is not overstressed, and ground heave is avoided.

D. Pump grout until material discharging is similar in consistency to that at the point of injection.

E. Protect permanent bulkheads installed in manholes and catch basins from blow out during grouting.

F. Remove any temporary bulkheads installed for grouting.

3.4 FIELD QUALITY CONTROL

A. Pressure Grouting for Piping:

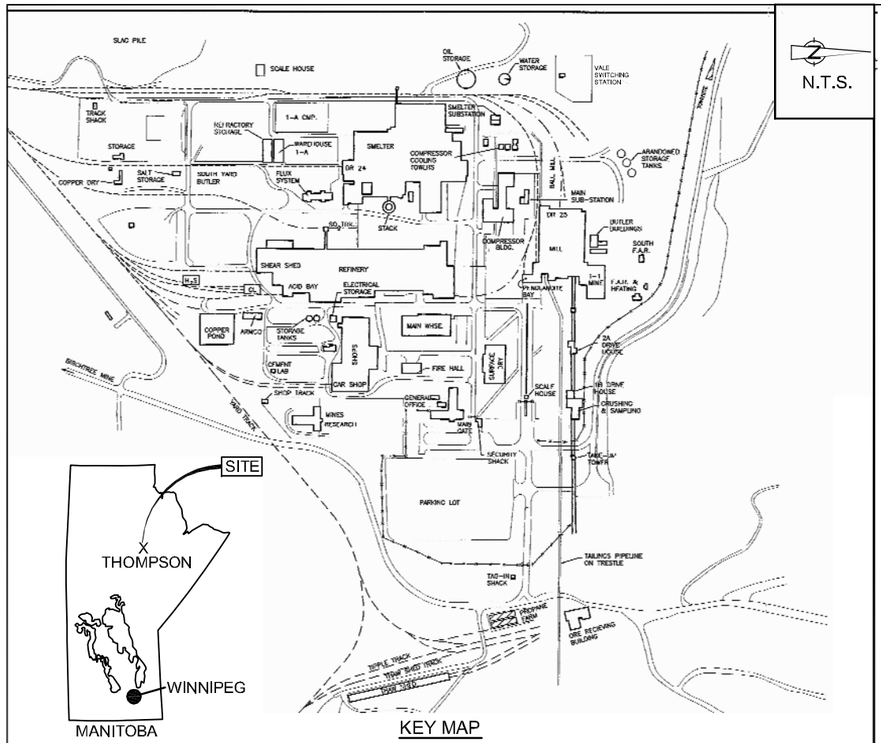
1. For cellular grout, check slurry density both at point of batching and placement at least twice each hour in accordance with ASTM C138. Record density, time, and temperature. Density must be within three percent (3 percent) of design density at point of batching and five percent (5 percent) of design density at point of placement.

2. Make one (1) set of four (4) compressive test specimens for every 200 feet of pipe grouting performed.

END OF SECTION

DRAWINGS

(11x17 DRAWINGS INCLUDED,
PLAN SIZE PROVIDED UNDER SEPARATE COVER)



KEY MAP

N.T.S.

Source Reference: AMEC Earth &Environmental Limited Project WX05384 Drawing Thompson Plant Site Plant. Dated January 2003.

DRAWING INDEX

DWG. No	REV. No	DATE	TITLE
G-01	0	JULY 2012	COVER SHEET
C-01	3	JULY 2012	BELOW GRADE WATER AND SEWER DECOMMISSIONING LAYOUT
C-02	3	JULY 2012	BELOW GRADE WATER AND SEWER DECOMMISSIONING DETAIL AREA 1
C-03	3	JULY 2012	BELOW GRADE WATER AND SEWER DECOMMISSIONING DETAIL AREA 2
C-04	3	JULY 2012	BELOW GRADE WATER AND SEWER DECOMMISSIONING DETAIL AREA 3
C-05	3	JULY 2012	BELOW GRADE WATER AND SEWER DECOMMISSIONING DETAIL AREA 4
C-06	2	JULY 2012	DETAILS 1 OF 5
C-07	3	JULY 2012	DETAILS 2 OF 5
C-08	3	JULY 2012	DETAILS 3 OF 5
C-09	3	JULY 2012	DETAILS 4 OF 5
C-10	3	JULY 2012	DETAILS 5 OF 5
C-11	2	OCT 2012	COMPRESSOR BUILDING BASEMENT FLOOR PLAN - PROCESS WATER ISOLATIONS AND REMOVALS

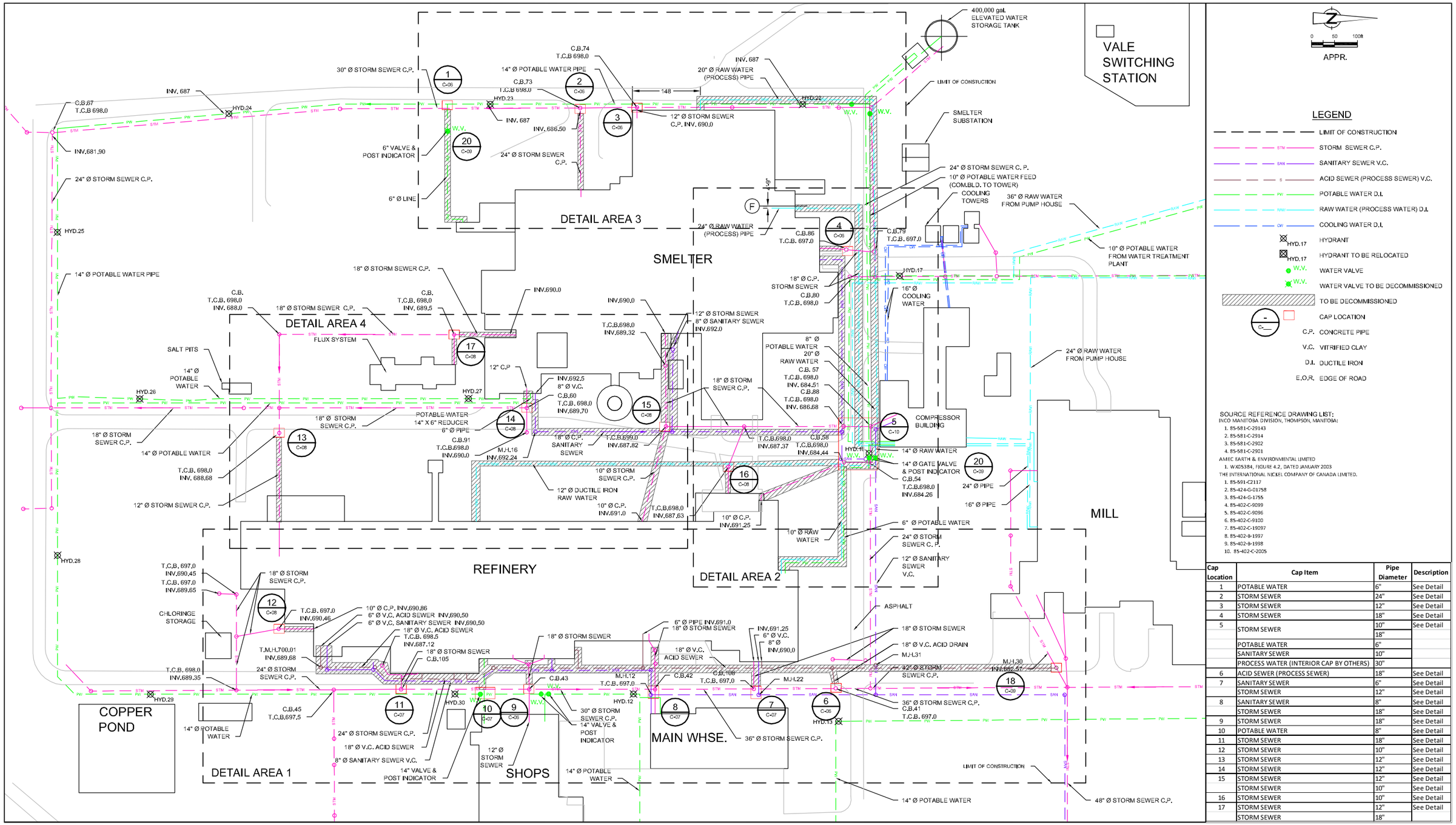
VALE THOMPSON MINE SITE

THOMPSON, MANITOBA

UTILITY DECOMMISSIONING BELOW GRADE

100% DESIGN

CONESTOGA-ROVERS & ASSOCIATES



SOURCE REFERENCE DRAWING LIST:

INCO MANITOBA DIVISION, THOMPSON, MANITOBA:
1. 85-581-C-29143
2. 85-581-C-2914
3. 85-581-C-2902
4. 85-581-C-2901

AMEC EARTH & ENVIRONMENTAL LIMITED
1. WX05384, FIGURE 4.2, DATED JANUARY 2003

THE INTERNATIONAL NICKEL COMPANY OF CANADA LIMITED.
1. 85-591-C2117
2. 85-424-C-01758
3. 85-424-G-1755
4. 85-402-C-9099
5. 85-402-C-9096
6. 85-402-C-9100
7. 85-402-C-19097
8. 85-402-8-1997
9. 85-402-8-1998
10. 85-402-C-2005

Cap Location	Cap Item	Pipe Diameter	Description
1	POTABLE WATER	6"	See Detail
2	STORM SEWER	24"	See Detail
3	STORM SEWER	12"	See Detail
4	STORM SEWER	18"	See Detail
5	STORM SEWER	10"	See Detail
		18"	
	POTABLE WATER	6"	
	SANITARY SEWER	10"	
	PROCESS WATER (INTERIOR CAP BY OTHERS)	30"	
6	ACID SEWER (PROCESS SEWER)	18"	See Detail
7	SANITARY SEWER	6"	See Detail
	STORM SEWER	12"	See Detail
8	SANITARY SEWER	8"	See Detail
	STORM SEWER	18"	See Detail
9	STORM SEWER	18"	See Detail
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11	STORM SEWER	18"	See Detail
12	STORM SEWER	10"	See Detail
13	STORM SEWER	12"	See Detail
14	STORM SEWER	12"	See Detail
15	STORM SEWER	12"	See Detail
	STORM SEWER	10"	See Detail
16	STORM SEWER	10"	See Detail
17	STORM SEWER	12"	See Detail
	STORM SEWER	18"	

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3	100% DESIGN	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

BELOW GRADE WATER AND SEWER DECOMMISSIONING LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source References: INCO			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: 1"=100'	Project No: 75756-09	Report No: 008	Drawing No: C-01

75756-09(008)C01-WA001 JAN 7/2013

GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY LOCATION AND ELEVATION OF ALL BURIED SERVICES PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES.
2. THE OPERATION OF EXISTING VALVES (AS REQUIRED) SHALL BE CONDUCTED BY VALE STAFF AND SHALL REQUIRE A MIN OF 48 HOURS WRITTEN NOTICE.
3. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH VALE HEALTH AND SAFETY REQUIREMENTS FOR THE THOMPSON MINE SITE.
4. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MANITOBA WORKPLACE SAFETY AND HEALTH ACT.
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6. CONTRACTOR SHALL COORDINATE AND ARRANGE WITH VALE ANY REQUIRED SYSTEM SHUTDOWNS AND SHALL RECEIVE WRITTEN APPROVAL FROM VALE PRIOR TO PROCEEDING WITH THE WORK. FORMAL WRITTEN REQUEST FOR SHUTDOWNS MUST BE PROVIDED A MIN OF 14 DAYS IN ADVANCE OF THE SHUTDOWN.
7. ROAD ACCESS SHALL BE MAINTAINED AT ALL TIMES.
8. CONTRACTOR SHALL MAINTAIN A SET OF DRAWINGS ON SITE AND SHALL UPDATE THOSE DRAWINGS WEEKLY WITH CONSTRUCTION RECORD INFORMATION.
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5. DO NOT DISTURB THE BEDDING OF EXISTING PIPES TO REMAIN IN SERVICE. WHERE BEDDING IS DISTURBED REPLACE BEDDING AS DESCRIBED IN THE CONTRACT DOCUMENTS.
6. DO NOT DISTURB BUILDING FOUNDATION FOOTINGS AND ASSOCIATED LOAD BEARING SOIL.
7. DO NOT DISTURB THE FOUNDATION OF THE EXISTING ROADWAYS.
8. ERECT, MAINTAIN, AND REMOVE SUPPORTING SHORING SYSTEM ALONG ALL SIDES OF REQUIRED EXCAVATIONS. SHORING SYSTEMS SHALL BE DESIGNED, APPROVED, AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE OF MANITOBA.
9. PROTECT SOIL FROM FREEZING ADJACENT TO AND BELOW ALL FOOTINGS.
10. ALL BACKFILL MATERIAL SHALL BE FREE OF DELETERIOUS MATERIAL AND PLACED IN LOOSE LIFT THICKNESSES NOT EXCEEDING 6 INCHES AND COMPACTED NOT LESS THAN 98% SPMDD. DO NOT ALLOW OR USE FROZEN BACKFILL MATERIAL.
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APPR.

LEGEND

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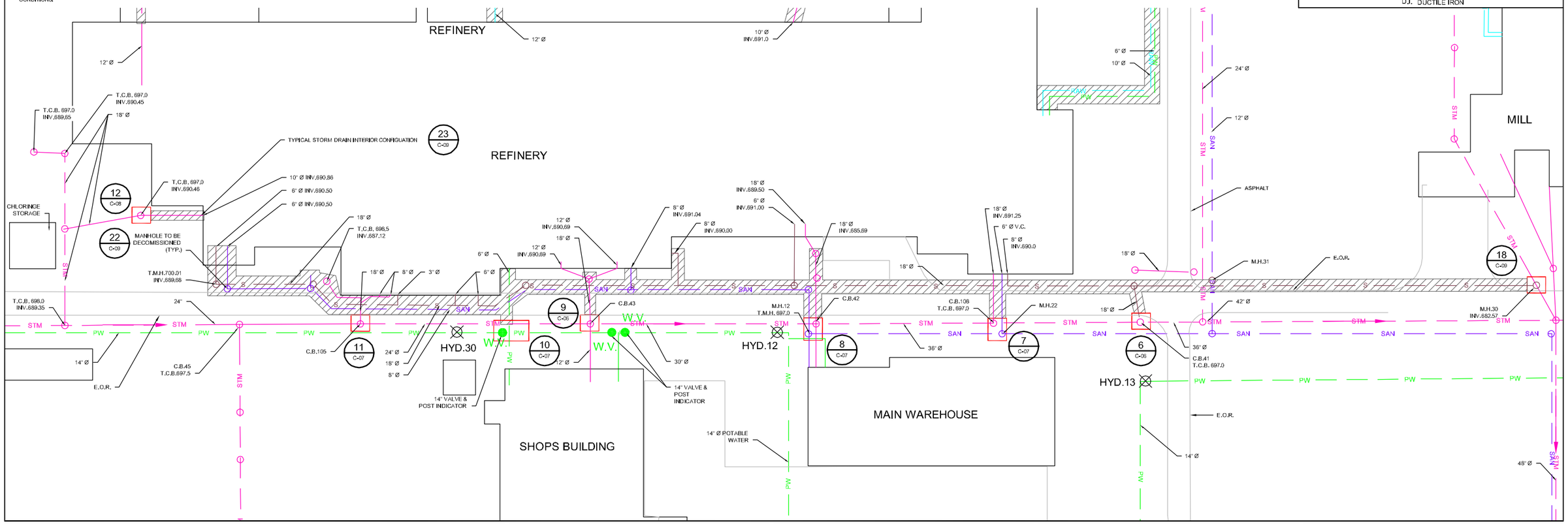

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Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

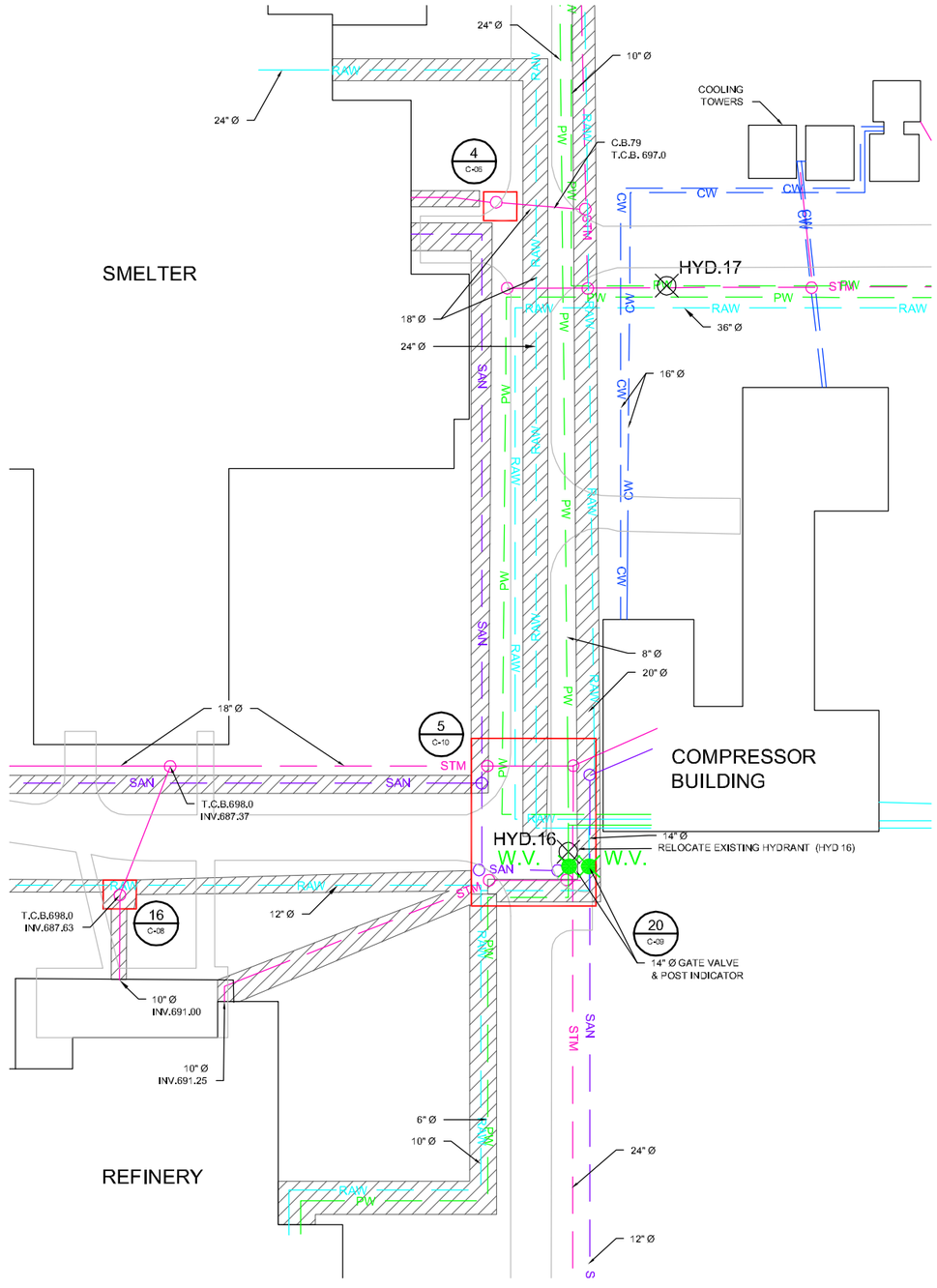
UTILITY DECOMMISSIONING

BELOW GRADE WATER AND SEWER DECOMMISSIONING DETAIL AREA 1

CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: 1"=50'	Project No: 75756-09	Report No: 008	Drawing No: C-02

75756-09(008)CI-WA001 JAN 7/2013



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- E.O.R. EDGE OF ROAD

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Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

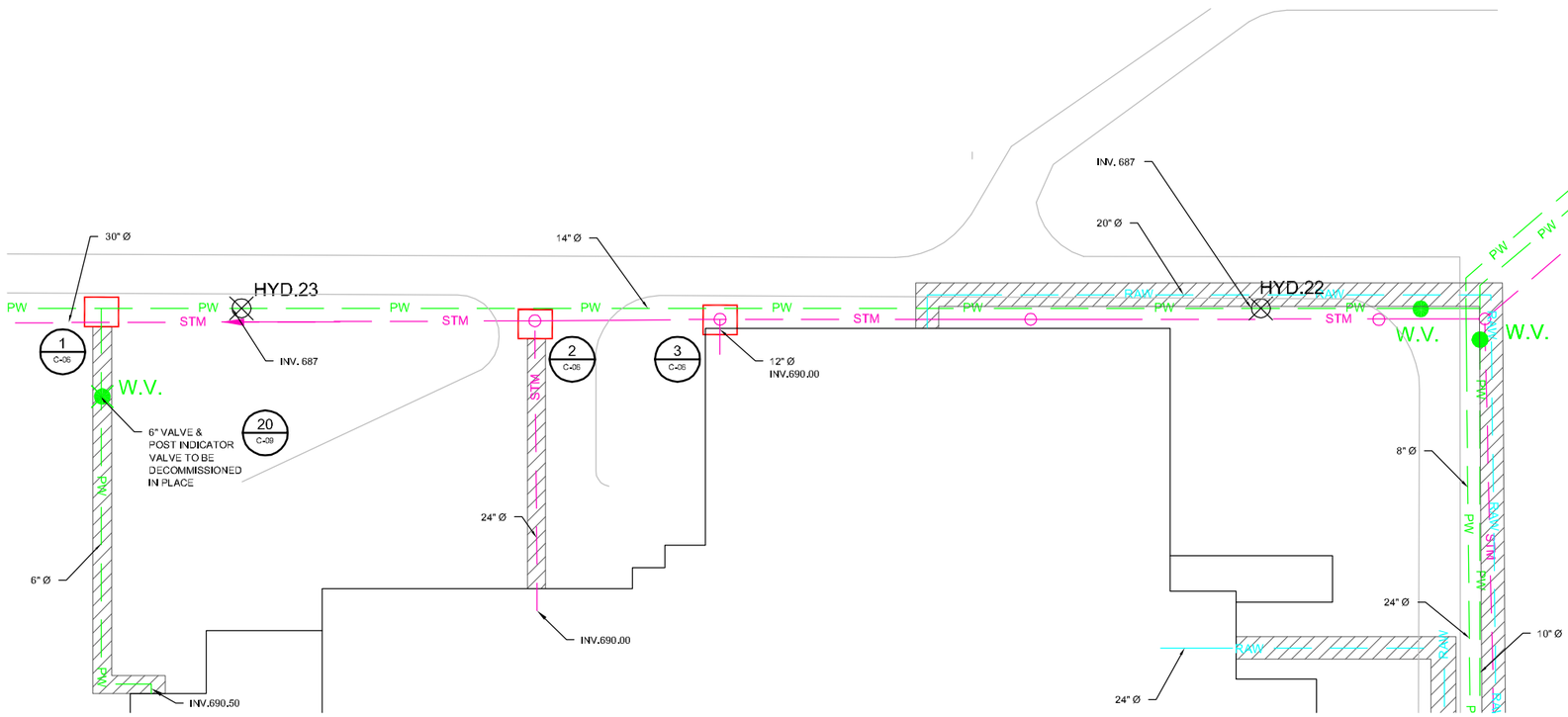
UTILITY DECOMMISSIONING

BELOW GRADE WATER AND SEWER DECOMMISSIONING DETAIL AREA 2

CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: 1"=50'	Project No: 75756-09	Report No: 008	Drawing No: C-03

75756-09(008)C01-WA001 JAN 7/2013



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5. VALE OPERATIONS SHALL TAKE PRECEDENCE OVER ALL DECOMMISSIONING ACTIVITIES.
6. CONTRACTOR SHALL COORDINATE AND ARRANGE WITH VALE ANY REQUIRED SYSTEM SHUTDOWNS AND SHALL RECEIVE WRITTEN APPROVAL FROM VALE PRIOR TO PROCEEDING WITH THE WORK. FORMAL WRITTEN REQUEST FOR SHUTDOWNS MUST BE PROVIDED A MIN OF 14 DAYS IN ADVANCE OF THE SHUTDOWN.
7. ROAD ACCESS SHALL BE MAINTAINED AT ALL TIMES.
8. CONTRACTOR SHALL MAINTAIN A SET OF DRAWINGS ON SITE AND SHALL UPDATE THOSE DRAWINGS WEEKLY WITH CONSTRUCTION RECORD INFORMATION.
9. CONTRACTOR SHALL PROVIDE A WRITTEN DECOMMISSIONING PLAN A MIN OF 14 DAYS PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES.

DECOMMISSIONING NOTES

1. ALL PIPING AND MANHOLES MARKED AS "TO BE DECOMMISSIONED" SHALL BE DECOMMISSIONED BY FILLING THE PIPE AND MANHOLE WITH GROUT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
2. MANHOLES TO REMAIN IN SERVICE WITH EXISTING CONNECTIONS TO PIPE IDENTIFIED AS "TO BE DECOMMISSIONED" SHALL HAVE THOSE CONNECTIONS CAPPED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. POTABLE WATER AND PROCESS WATER IDENTIFIED AS "TO BE DECOMMISSIONED" SHALL BE DECOMMISSIONED BY FILLING THE PIPE WITH GROUT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
4. POTABLE WATER PIPING SHALL BE PRESSURE TESTED AND DISINFECTED WHERE REQUIRED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
5. DO NOT DISTURB THE BEDDING OF EXISTING PIPES TO REMAIN IN SERVICE. WHERE BEDDING IS DISTURBED REPLACE BEDDING AS DESCRIBED IN THE CONTRACT DOCUMENTS.
6. DO NOT DISTURB BUILDING FOUNDATION FOOTINGS AND ASSOCIATED LOAD BEARING SOIL.
7. DO NOT DISTURB THE FOUNDATION OF THE EXISTING ROADWAYS.
8. ERECT, MAINTAIN, AND REMOVE SUPPORTING SHORING SYSTEM ALONG ALL SIDES OF REQUIRED EXCAVATIONS. SHORING SYSTEMS SHALL BE DESIGNED, APPROVED, AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE OF MANITOBA.
9. PROTECT SOIL FROM FREEZING ADJACENT TO AND BELOW ALL FOOTINGS.
10. ALL BACKFILL MATERIAL SHALL BE FREE OF DELETERIOUS MATERIAL AND PLACED IN LOOSE LIFT THICKNESSES NOT EXCEEDING 8 INCHES AND COMPACTED NOT LESS THAN 98% SPMDD. DO NOT ALLOW OR USE FROZEN BACKFILL MATERIAL.
11. CONTRACTOR SHALL MAINTAIN ALL EXCAVATIONS FREE FROM WATER.
12. CONTRACTOR SHALL MONITOR THE WEATHER SEVERAL DAYS IN ADVANCE TO ENSURE THAT WORKS ARE CONDUCTED DURING FAVOURABLE WEATHER CONDITIONS.
13. CONTRACTOR SHALL INSTALL, MAINTAIN, AND REMOVE ANY TEMPORARY PLUGS REQUIRED FOR CONTROL OF GROUT PLACEMENT IN PIPES TO BE DECOMMISSIONED.
14. SEQUENCING: THE CONTRACTOR SHALL PROVIDE A DETAIL SCHEDULE OF THE WORK IN THEIR DECOMMISSIONING PLAN. THE CONTRACTOR SHALL SCHEDULE THE WORK TO TAKE PLACE IN THE FOLLOWING SEQUENCE:
    1) WORKS IN DETAIL AREA 1
    2) WORKS IN DETAIL AREA 4
    3) WORKS IN DETAIL AREA 2
    4) WORKS IN DETAIL AREA 3

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
3	100% DESIGN	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

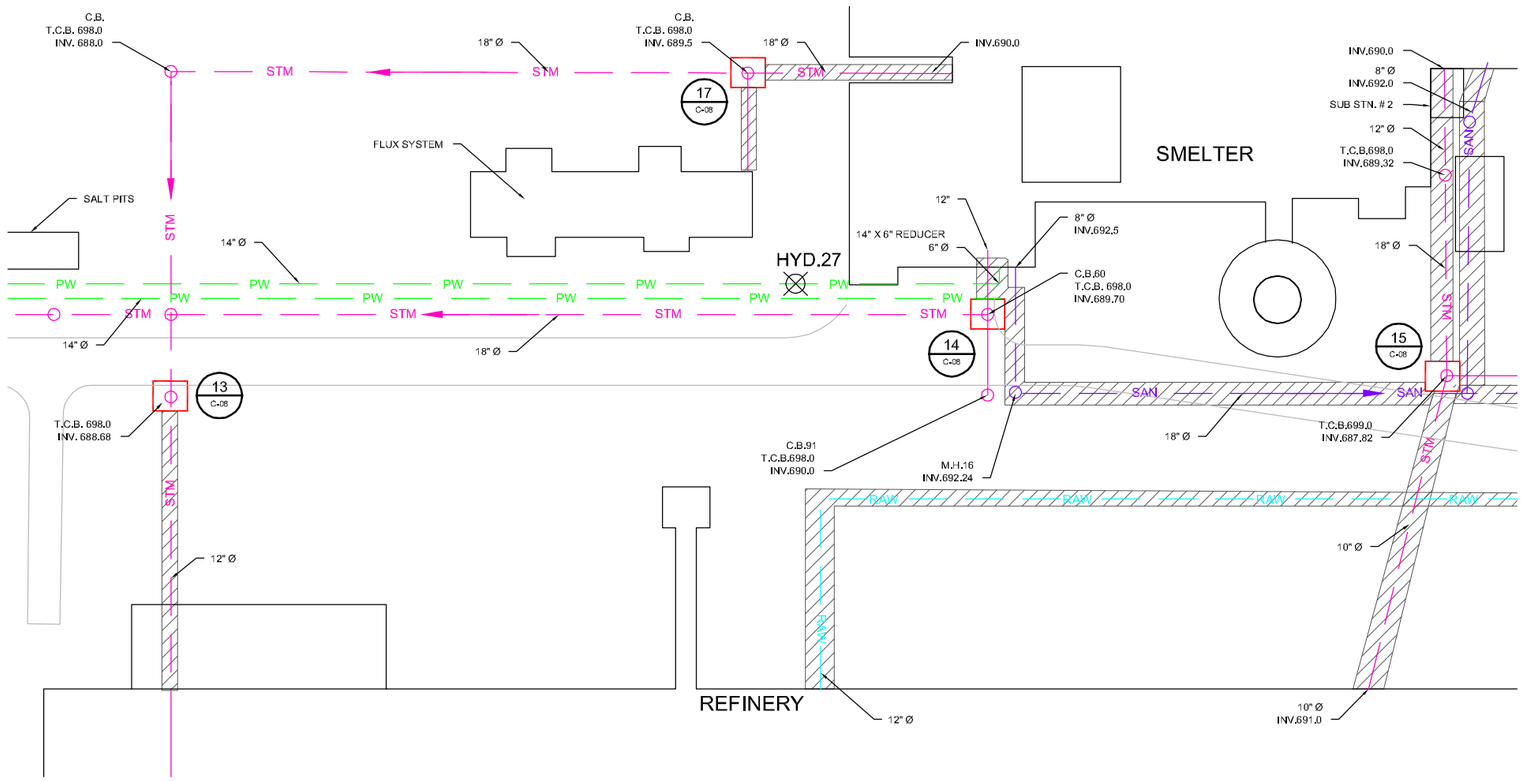
UTILITY DECOMMISSIONING

BELOW GRADE WATER AND SEWER DECOMMISSIONING DETAIL AREA 3

CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: 1"=50'	Project No: 75756-09	Report No: 008	Drawing No: C-04

75756-09(008)CI-WA001 JAN 7/2013



0 20 50m

APPR.

LEGEND

- LIMIT OF CONSTRUCTION
- STM — STORM SEWER C.P.
- SAN — SANITARY SEWER V.C.
- S — ACID SEWER (PROCESS SEWER) V.C.
- PW — POTABLE WATER D.I.
- RAW — RAW WATER (PROCESS WATER) D.I.
- CW — COOLING WATER D.I.
- HYD.17 — HYDRANT
- HYD.17 — HYDRANT TO BE RELOCATED
- W.V. — WATER VALVE
- W.V. — WATER VALVE TO BE DECOMMISSIONED
- TO BE DECOMMISSIONED
- CAP LOCATION
- C.P. CONCRETE PIPE
- V.C. VITRIFIED CLAY
- D.I. DUCTILE IRON
- E.O.R. EDGE OF ROAD

GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY LOCATION AND ELEVATION OF ALL BURIED SERVICES PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES.
2. THE OPERATION OF EXISTING VALVES (AS REQUIRED) SHALL BE CONDUCTED BY VALE STAFF AND SHALL REQUIRE A MIN OF 48 HOURS WRITTEN NOTICE.
3. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH VALE HEALTH AND SAFETY REQUIREMENTS FOR THE THOMPSON MINE SITE.
4. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MANITOBA WORKPLACE SAFETY AND HEALTH ACT.
5. VALE OPERATIONS SHALL TAKE PRECEDENCE OVER ALL DECOMMISSIONING ACTIVITIES.
6. CONTRACTOR SHALL COORDINATE AND ARRANGE WITH VALE ANY REQUIRED SYSTEM SHUTDOWNS AND SHALL RECEIVE WRITTEN APPROVAL FROM VALE PRIOR TO PROCEEDING WITH THE WORK. FORMAL WRITTEN REQUEST FOR SHUTDOWNS MUST BE PROVIDED A MIN OF 14 DAYS IN ADVANCE OF THE SHUTDOWN.
7. ROAD ACCESS SHALL BE MAINTAINED AT ALL TIMES.
8. CONTRACTOR SHALL MAINTAIN A SET OF DRAWINGS ON SITE AND SHALL UPDATE THOSE DRAWINGS WEEKLY WITH CONSTRUCTION RECORD INFORMATION.
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4. POTABLE WATER PIPING SHALL BE PRESSURE TESTED AND DISINFECTED WHERE REQUIRED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
5. DO NOT DISTURB THE BEDDING OF EXISTING PIPES TO REMAIN IN SERVICE. WHERE BEDDING IS DISTURBED REPLACE BEDDING AS DESCRIBED IN THE CONTRACT DOCUMENTS.
6. DO NOT DISTURB BUILDING FOUNDATION FOOTINGS AND ASSOCIATED LOAD BEARING SOIL.
7. DO NOT DISTURB THE FOUNDATION OF THE EXISTING ROADWAYS.
8. ERECT, MAINTAIN, AND REMOVE SUPPORTING SHORING SYSTEM ALONG ALL SIDES OF REQUIRED EXCAVATIONS. SHORING SYSTEMS SHALL BE DESIGNED, APPROVED, AND SEALED BY A PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE OF MANITOBA.
9. PROTECT SOIL FROM FREEZING ADJACENT TO AND BELOW ALL FOOTINGS.
10. ALL BACKFILL MATERIAL SHALL BE FREE OF DELETERIOUS MATERIAL AND PLACED IN LOOSE LIFT THICKNESSES NOT EXCEEDING 8 INCHES AND COMPACTED NOT LESS THAN 98% SPMDD. DO NOT ALLOW OR USE FROZEN BACKFILL MATERIAL.
11. CONTRACTOR SHALL MAINTAIN ALL EXCAVATIONS FREE FROM WATER.
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    3) WORKS IN DETAIL AREA 2
    4) WORKS IN DETAIL AREA 3

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No	Revision	Date	Initial
3	100% DESIGN	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

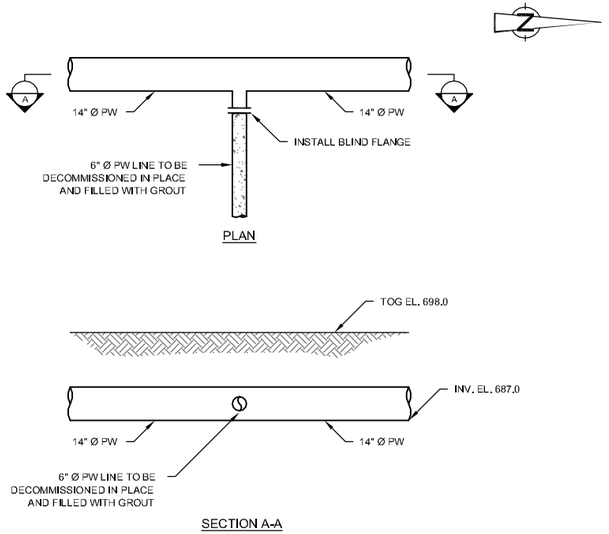
UTILITY DECOMMISSIONING

BELOW GRADE WATER AND SEWER
DECOMMISSIONING DETAIL AREA 4

CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: 1"=50'	Project No: 75756-09	Report No: 008	Drawing No: C-05

75756-09(008)C-WA001 JAN 7/2013



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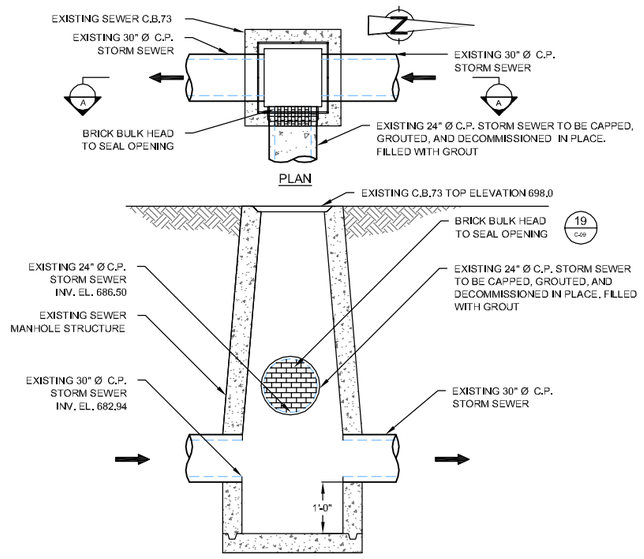

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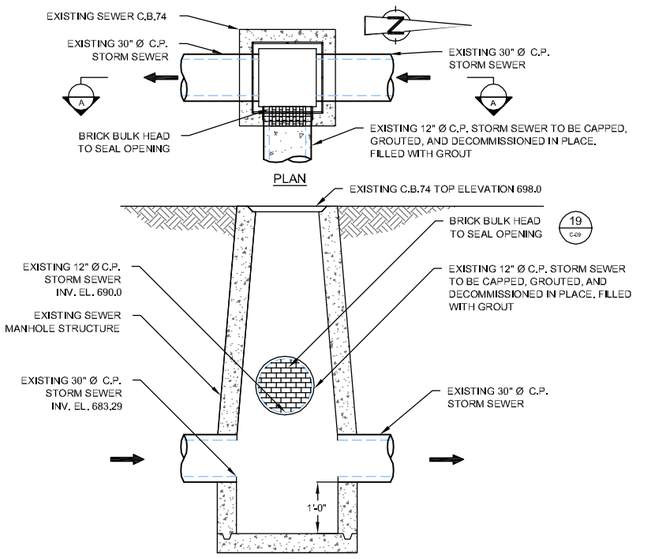

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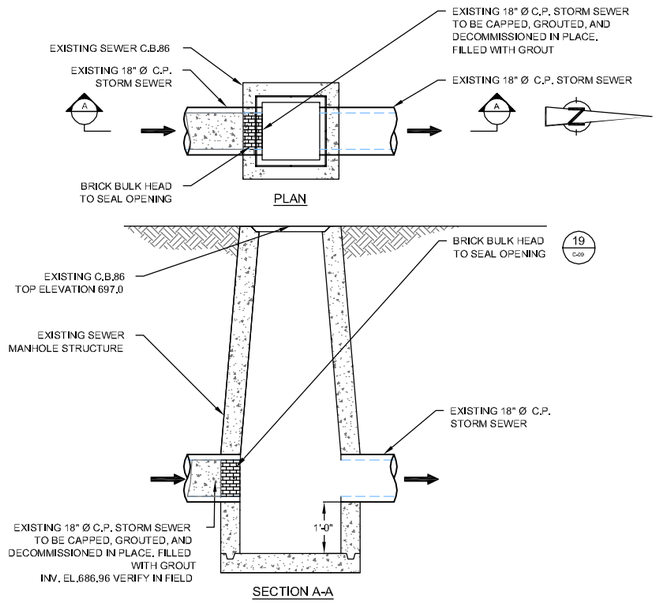

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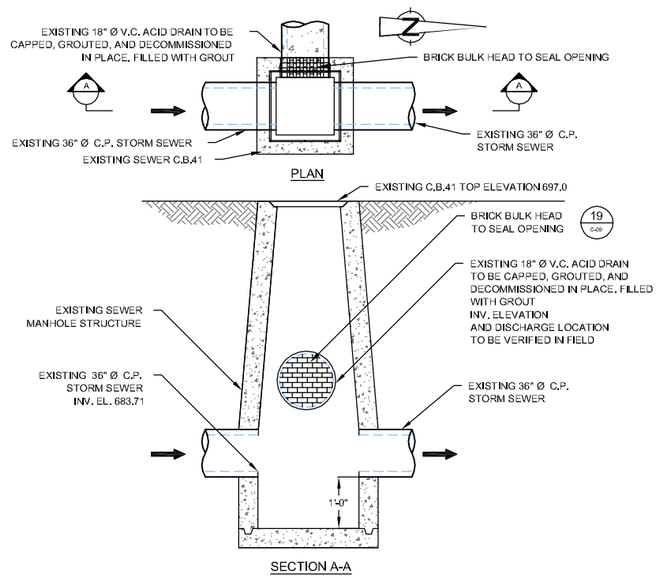

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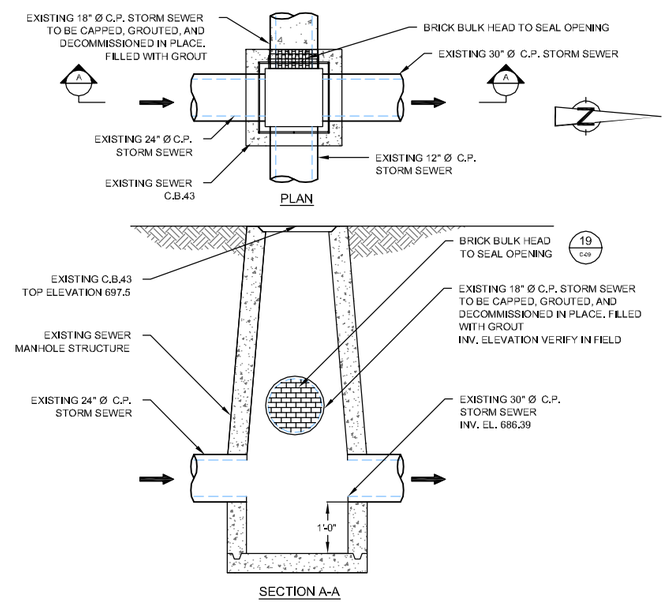

9 C-01.G02 CAP LOCATION 9 DETAIL
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SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	ISSUED FOR 90% DESIGN	12/07/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

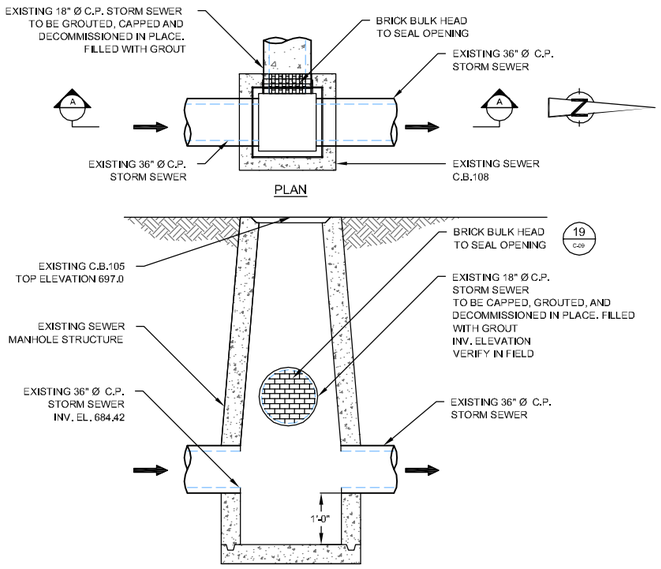
UTILITY DECOMMISSIONING

DETAILS
1 OF 5

CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: C-06

75756-09(008)CI-WA004 JAN 7/2013



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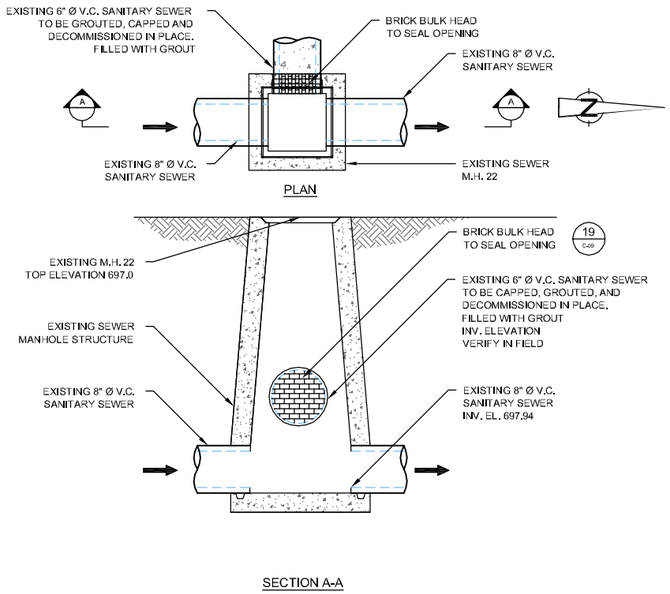

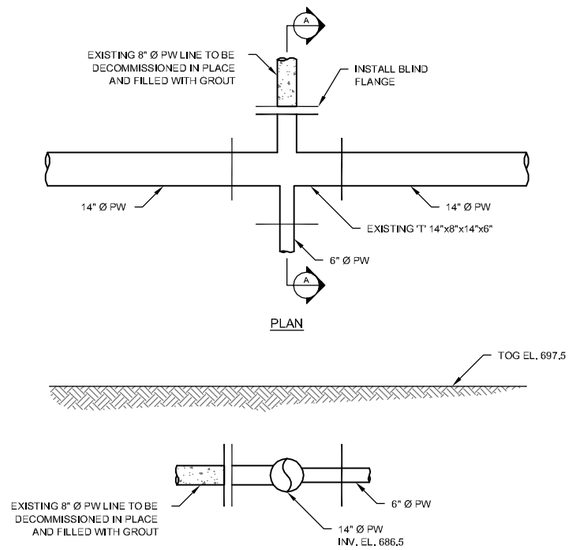

10 C-01,C-02 CAP LOCATION 10 ARRANGEMENT PLAN
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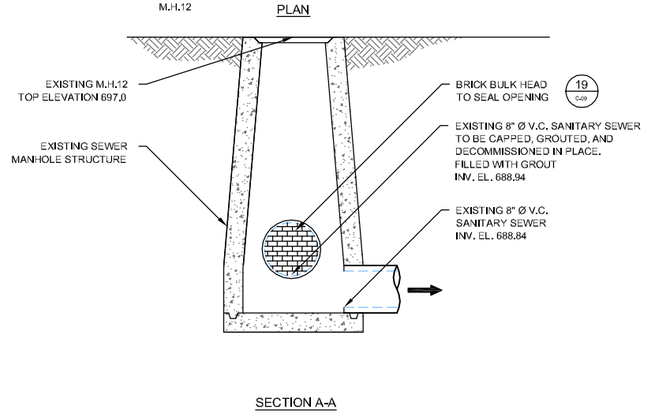

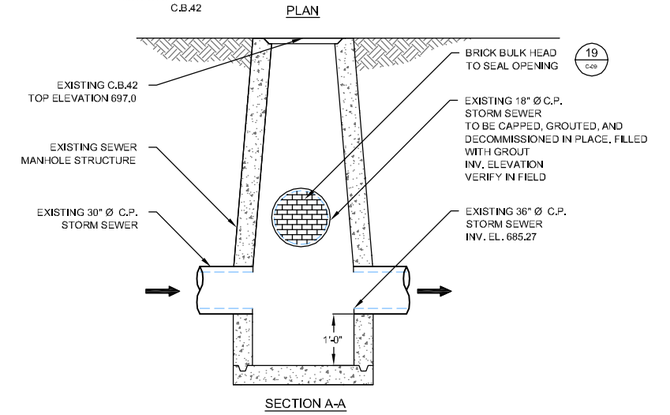

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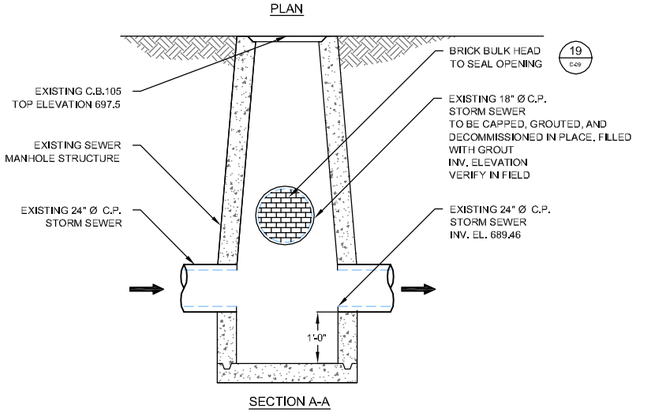


11 C-01,C-02 CAP LOCATION 11 DETAIL
N.T.S.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
3	100% DESIGN	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION 1	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

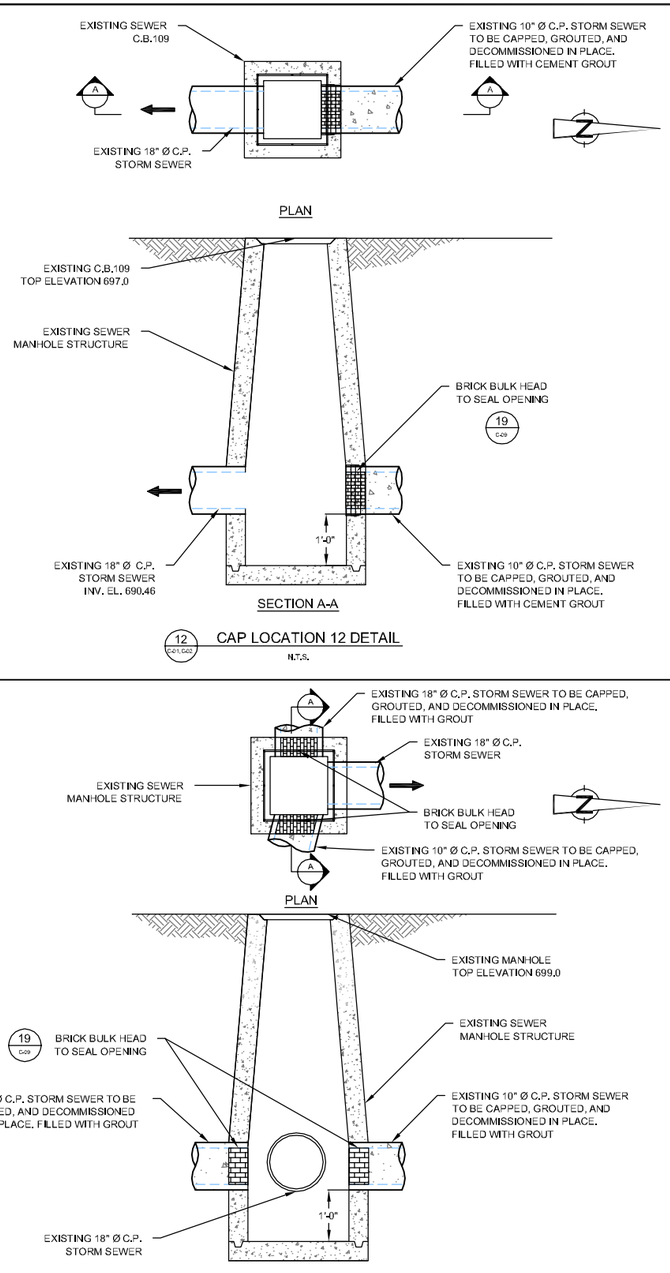
UTILITY DECOMMISSIONING

DETAILS
2 OF 5

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: C-07

75756-09(008)CI-WA004 JAN 7/2013



12 C-01,C-03 CAP LOCATION 12 DETAIL
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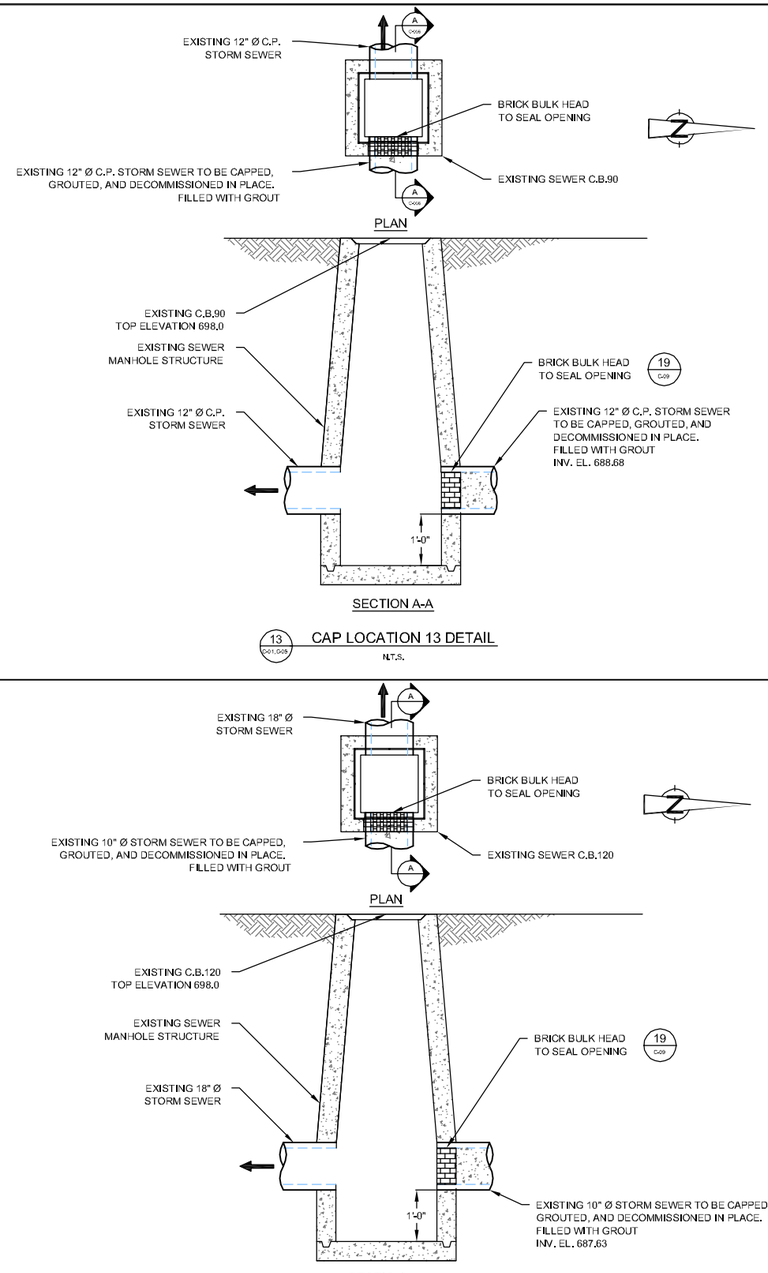

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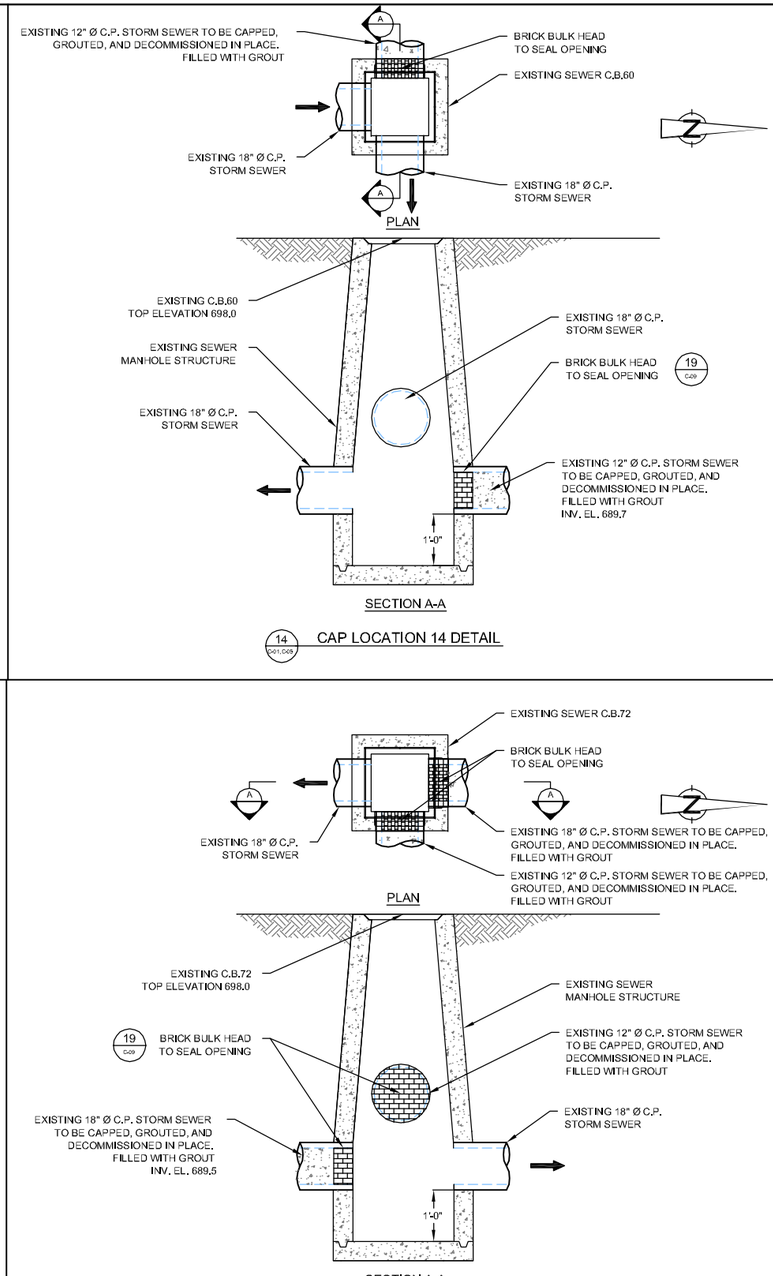


14 C-01,C-03 CAP LOCATION 14 DETAIL

15 C-01,C-03 CAP LOCATION 15 DETAIL
N.T.S.

16 C-01,C-03 CAP LOCATION 16 DETAIL
N.T.S.

17 C-01,C-03 CAP LOCATION 17 DETAIL

SCALE VERIFICATION; THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
3	100% DESIGN	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION 1	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

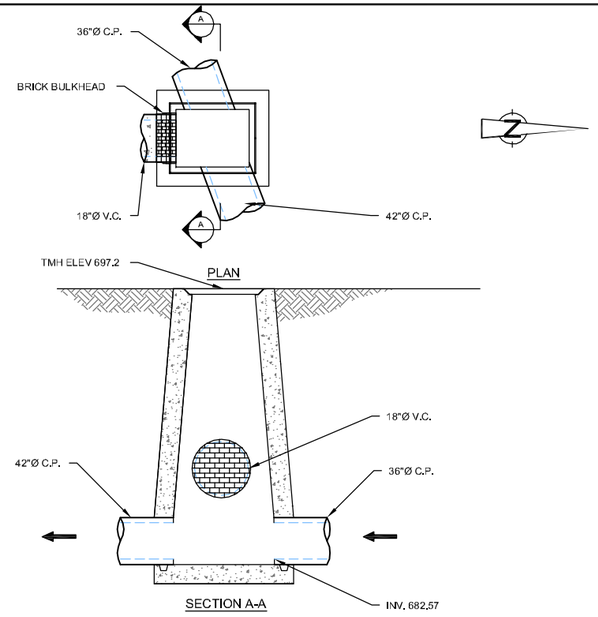
UTILITY DECOMMISSIONING

DETAILS
3 OF 5

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: C-08

75756-09(008)CI-WA004 JAN 7/2013



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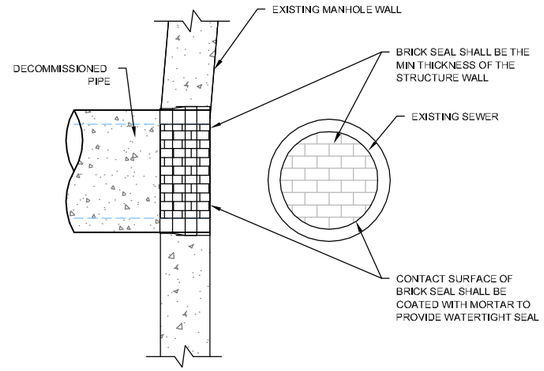

19 C-02 C-03 C-04 BRICK BULKHEAD TYPICAL
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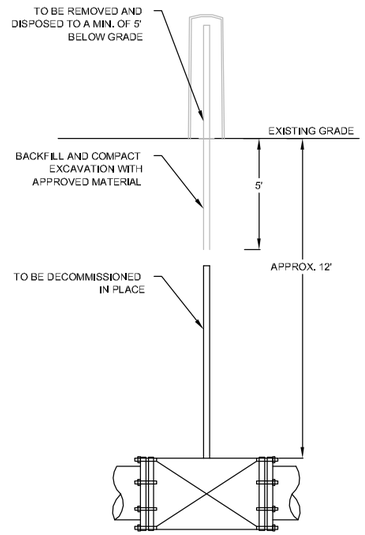

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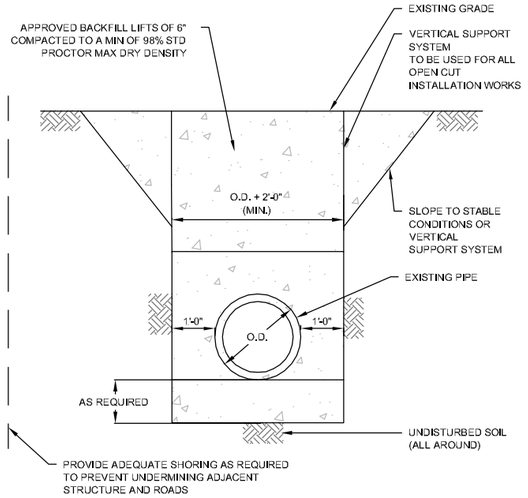

21 C-02 TRENCH DETAIL (TYPICAL)
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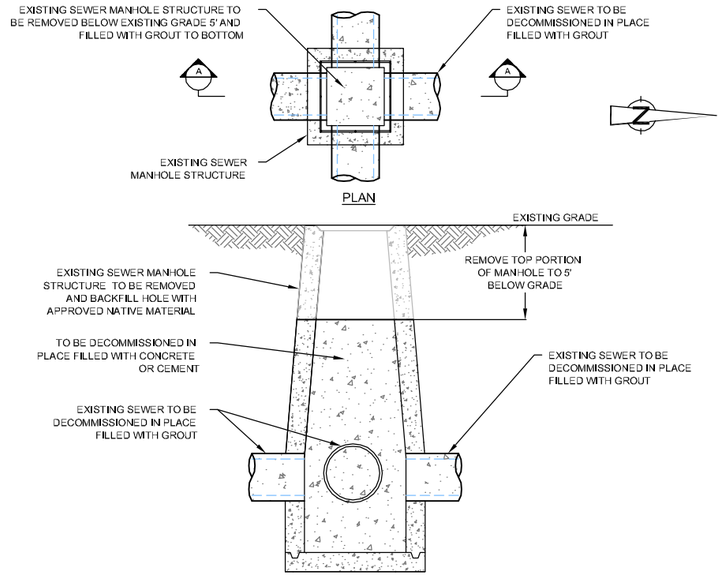

22 C-02 MANHOLE DECOMISSION DETAIL (TYPICAL)
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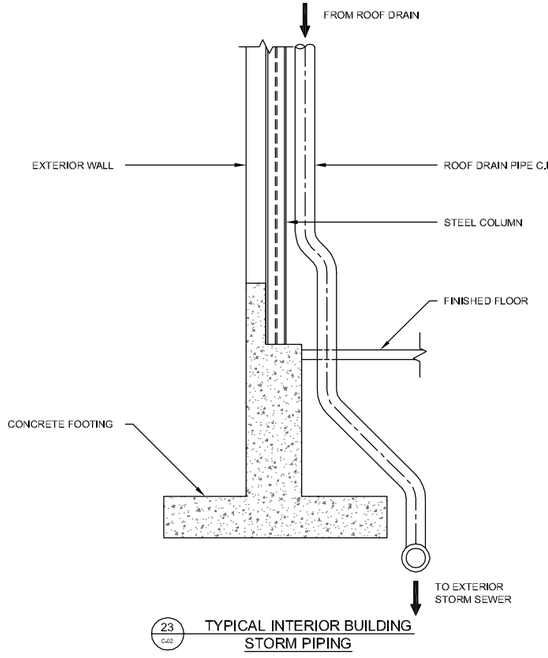


23 C-02 TYPICAL INTERIOR BUILDING STORM PIPING

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
3	100% DESIGN	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION 1	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

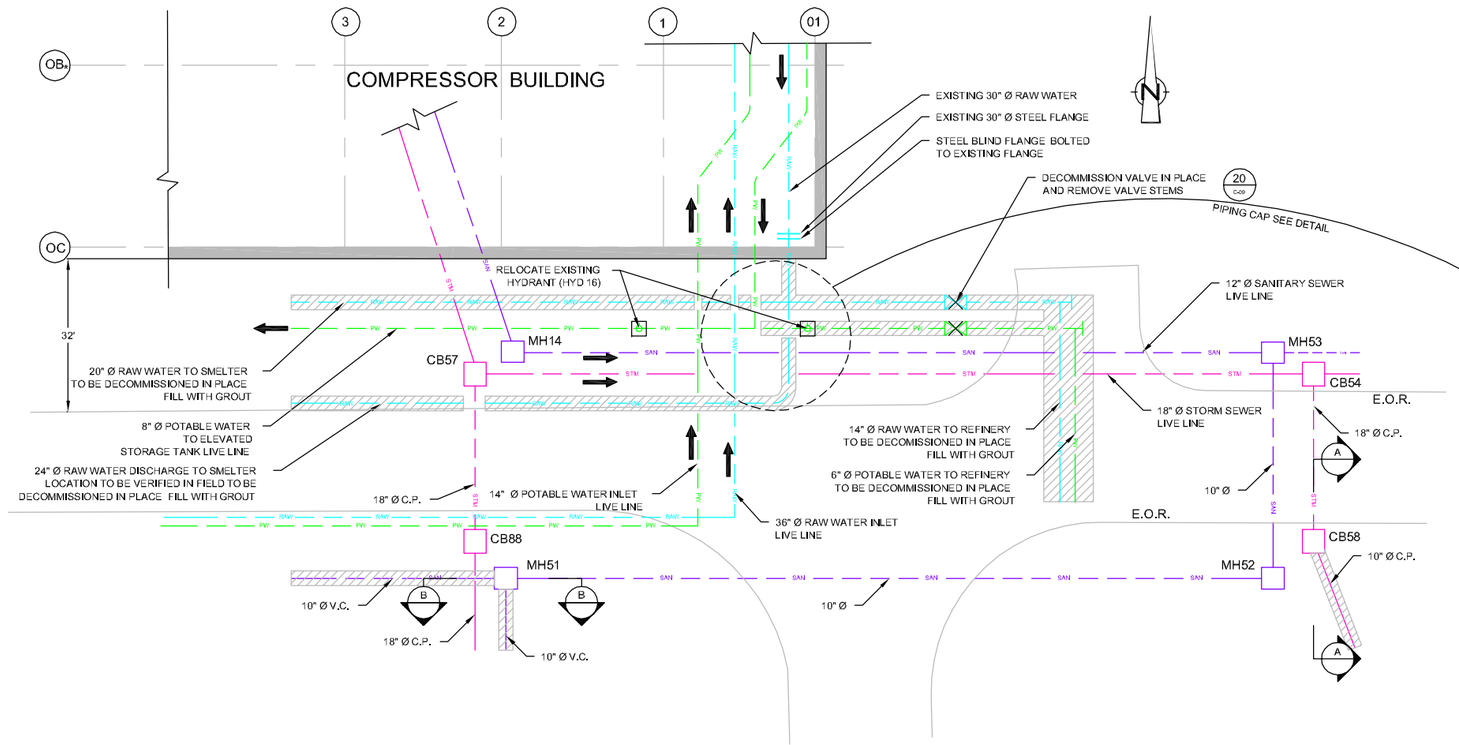
UTILITY DECOMMISSIONING

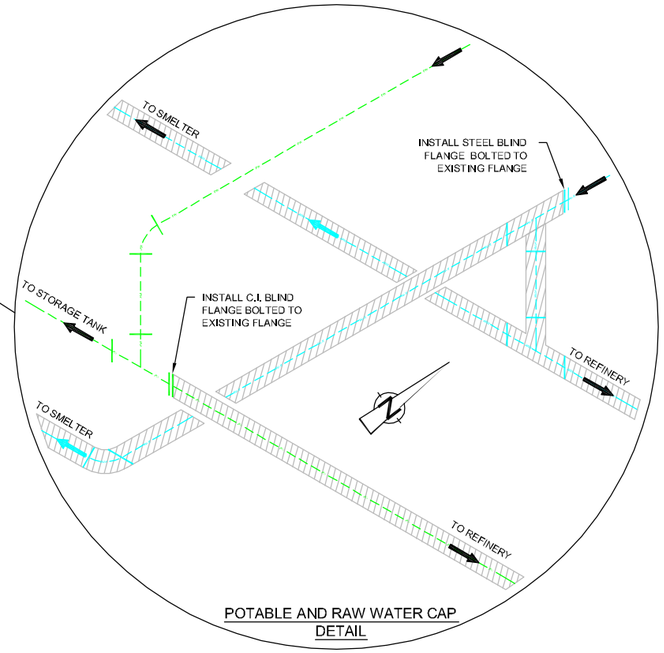
DETAILS
4 OF 5

CONESTOGA-ROVERS & ASSOCIATES

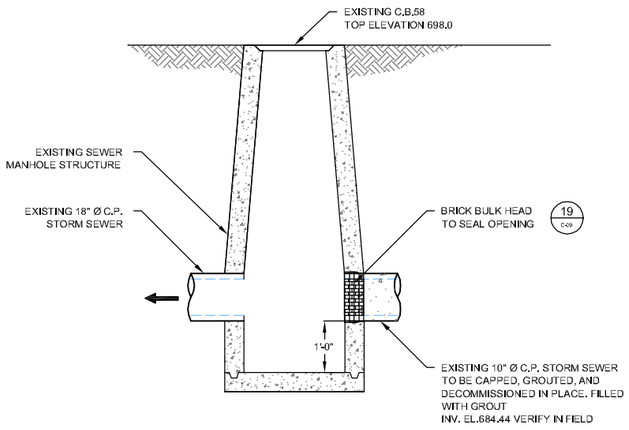
Source References			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: C-09

75756-09(008)CI-WA004 JAN 7/2013

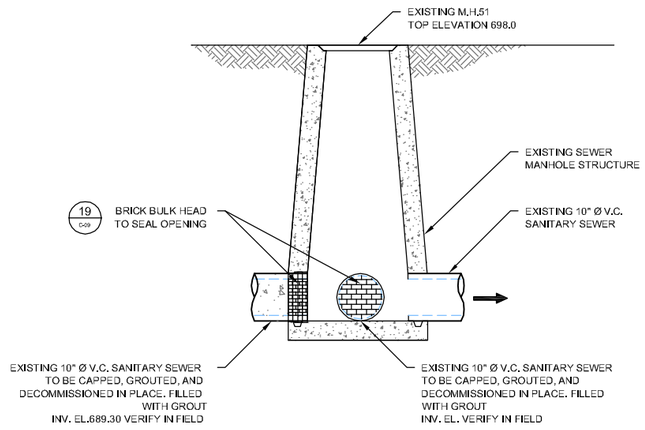




POTABLE AND RAW WATER CAP DETAIL



SECTION A-A



SECTION B-B

5 C-01,C-03 CAP LOCATION 5 ARRANGEMENT PLAN
N.T.S.

LEGEND

- LIMIT OF CONSTRUCTION
- STM — STORM SEWER C.P.
- SAN — SANITARY SEWER V.C.
- S — ACID SEWER (PROCESS SEWER) V.C.
- PW — POTABLE WATER D.I.
- RAW — RAW WATER (PROCESS WATER) D.I.
- CW — COOLING WATER STL
- HYD.17 — HYDRANT
- HYD.17 — HYDRANT TO BE RELOCATED
- W.V. — WATER VALVE
- W.V. — WATER VALVE TO BE DECOMMISSIONED
- TO BE DECOMMISSIONED
- C-__ — CAP LOCATION
- C.P. CONCRETE PIPE
- V.C. VITRIFIED CLAY
- D.I. DUCTILE IRON
- E.O.R. EDGE OF ROAD

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

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Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

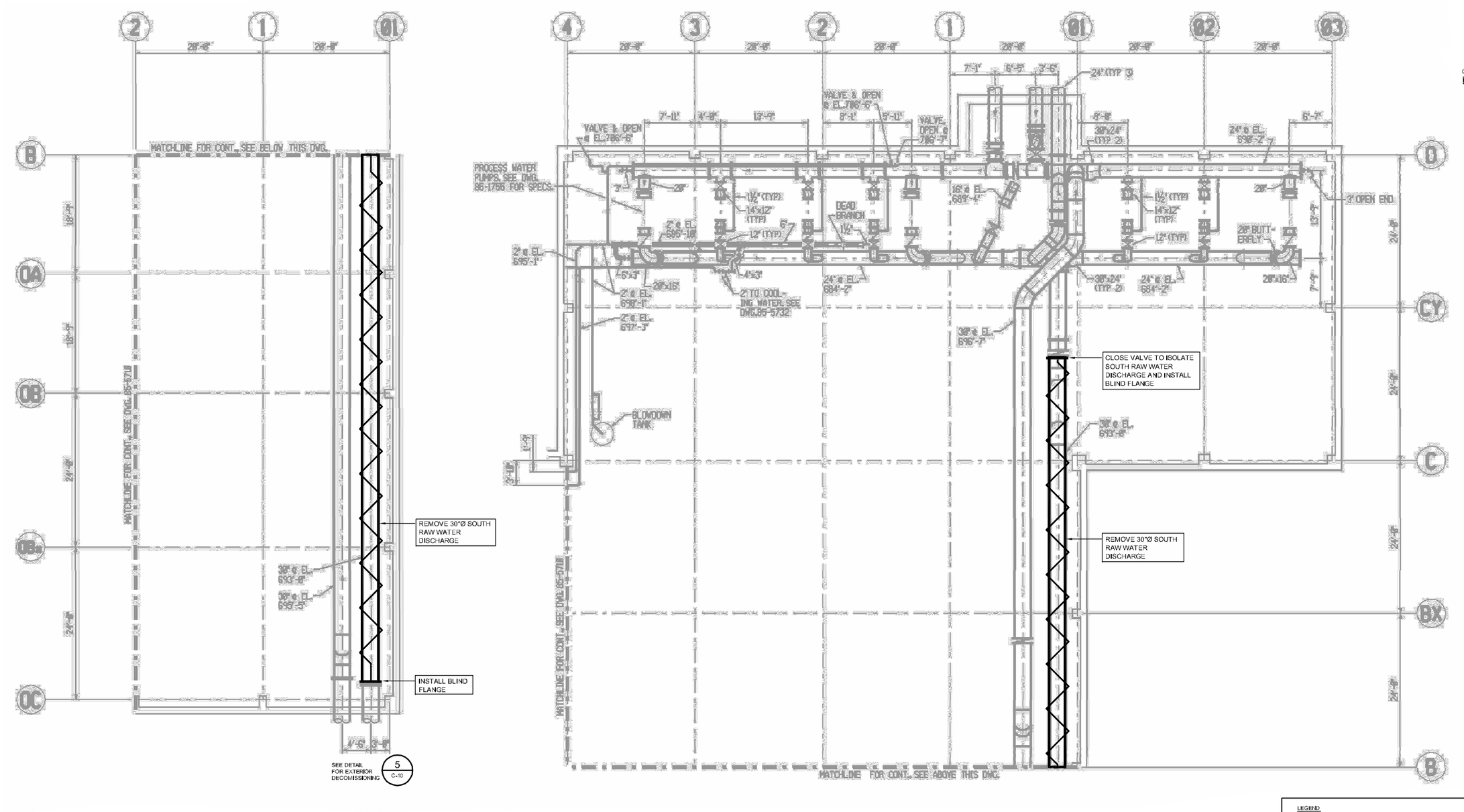
UTILITY DECOMMISSIONING

DETAILS
5 OF 5

CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: G. WONG	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: C-10

75756-09(008)CI-WA004 JAN 7/2013



BASEMENT FLOOR PLAN - REMOVALS EXISTING EQUIPMENT AND PIPING LAYOUT

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No.	Revision	Date	Initial
2	100% DESIGN	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

COMPRESSOR BUILDING BASEMENT FLOOR PLAN - PROCESS WATER ISOLATIONS AND REMOVALS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			Date:
INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01755			OCT 2012
Project Manager: J. PUSKAS.	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/8"=1'-0"	Project No: 75756-09	Report No: 008	Drawing No: C-11

75756-09(008)RE-WA004 JAN 7/2013

APPENDIX B.3

ELECTRICAL

SPECIFICATIONS

SECTION 16010

GENERAL ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements of this section apply to and form part of all Sections of Division 16 – Electrical.

B. Specifications are divided into divisions of Work and a division may consist of the Work of more than one SUBCONTRACTOR. Responsibility as to which SUBCONTRACTOR provides labour, materials, equipment and services required to complete Work rests solely with CONTRACTOR.

1.2 RELATED SECTIONS

A. Section 16015 - Electrical Systems Analysis.

B. Section 16096 - Selective Electrical Decommissioning.

1.3 CODES AND STANDARDS

A. Perform the decommissioning, disconnection and installation in accordance with CSA C22.1-12 except where specified otherwise in the Contract Documents.

B. Construct overhead systems in accordance with CSA C22.3 No. 1-10 except where specified otherwise in the Contract Documents.

C. Manitoba Electrical Code.

D. Manitoba Hydro Electrical Codes and Standards.

E. Department of Labour Mechanical and Engineering - Electrical Inspections in Manitoba.

F. Perform grounding in accordance with CSA C22.2 No. 41.

G. Vale Thompson Mine Applicable Codes and Standards.

1.4 VOLTAGE RATINGS

A. Operating Voltages: In accordance with CAN3-C235-83.

B. All distribution devices and equipment shall operate satisfactorily at 60 Hz within the normal operating limits established by the above-noted standard. Equipment shall operate in extreme operating conditions established in the above-noted standard without damage to the equipment.

1.5 PERMITS, FEES, AND INSPECTION

A. Pay all associated permit and inspection fees.

B. Notify CONSULTANT and OWNER of any changes required by the Manitoba Inspection Authority prior to making any changes.

C. Furnish Certificates of Acceptance from the Inspection Authority on completion of Work to CONSULTANT and OWNER.

D. Arrange for inspection of all Work by the Manitoba Hydro Inspection Authority. On completion of Work, present to OWNER the final unconditional certificate of approval.

E. Comply with the requirements of the latest edition of the applicable CSA Standards, the requirements of OWNER, the Manitoba Hydro, Federal, Provincial and Municipal Codes, the applicable Standards of the Underwriters' Association and the Manitoba Department of Labour Mechanical and Engineering - Electrical Inspection Department. These codes and regulations constitute an integral part of these Specifications. In the event of conflict, the requirements of the codes take precedence over the Contract Documents.

F. Before starting any Work, submit the required number of copies of Contract Drawings and Specifications to the local electrical distribution company for their approval and comments for Works associated with the Manitoba Hydro switching station disconnections. Comply with any changes requested as part of the Contract, but notify CONSULTANT and OWNER immediately of such changes for proper processing of these requirements. Prepare and furnish any additional drawing details for information as may be required.

1.6 MATERIALS AND EQUIPMENT

A. Provide materials and equipment in accordance with Division 1.

B. All equipment and material shall be CSA certified. Where there is no alternative to supplying equipment which is not CSA certified, CONTRACTOR shall obtain special approval from the Manitoba Hydro Electrical Inspection Authority.

1.7 FINISHES

A. Shop finish metal enclosure surfaces by application of a rust resistant primer on the inside and outside, and at least two coats of finish enamel.

1. Paint outdoor electrical equipment "equipment green" finish in accordance with EEMAC Y1-2-1979.

2. Paint indoor switchgear and distribution enclosures light grey in accordance with EEMAC 2Y-1-1958.

B. Clean and touch up any surfaces of shop-painted equipment which have been scratched or marred during shipment or installation, to match original paint.

C. Clean and prime any exposed non-galvanized hangers, racks and fastenings to prevent rusting.

1.8 ELECTRICAL EQUIPMENT IDENTIFICATION

A. Identify all electrical equipment with nameplates as follows:

1. Nameplates:

1. Lamacoid 3 mm thick plastic engraving sheet, white face, black core, mechanically attached with self-tapping screws.

2. Do not use self-adhesive nameplates.

3. Use rivets and/or nuts and bolts where access may conflict with a protruding screw point.

2. Nameplate Sizes: Refer to Individual Specification Sections.

B. Wording on nameplates shall be approved by OWNER prior to manufacture.

C. Allow for average of twenty-five (25) letters per nameplate.

D. Identification shall be English.

E. Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics and modification/disconnection as "Spare".

F. Disconnects and Circuit Breaker: Indicate equipment being controlled and voltage.

G. Terminal Cabinets and Pull Boxes: Indicate system and voltage.

H. Transformers: Indicate capacity, primary and secondary voltages.

I. Issue nameplates lists for review prior to manufacture.

J. Lighting Panels: Plates shall be updated as per modification/disconnection.

K. Disconnect Switches: Plates shall be mounted externally on switch box cover matching OWNER's identification methods.

L. Plates shall be installed after all painting has been completed and shall be secured with self-tapping screws except on the inside of panel doors where gluing will be accepted.

M. Have the manufacturers' nameplates affixed to each item of equipment showing the size, name of equipment, serial number and all information usually provided, including voltage, cycle, phase, horsepower, etc., and the name of the manufacturer and their address. Ensure that all stamped, etched or engraved lettering on plates is perfectly legible. Do not paint over nameplates and where apparatus is to be concealed, attach the nameplate in a location approved by OWNER on the equipment support or frame.

N. Identify all equipment with the corresponding remote controls and/or interlocking.

1.9 WIRING IDENTIFICATION

A. Identify wiring with permanent indelible identifying markings, either numbered or with coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

B. Maintain phase sequence and colour coding throughout.

C. Colour Code: According to OWNER requirements.

1.10 WIRING TERMINATIONS

A. Lugs, terminals, and screws used for termination of wiring shall be suitable for either copper or aluminum conductors.

1.11 MANUFACTURER'S AND CSA LABELS

A. Labels shall be visible and legible after equipment is installed.

1.12 WARNING SIGNS

A. As specified in the Contract Documents and to meet requirements of the Manitoba Hydro Codes.

B. Decal signs shall be a minimum size of 175 mm x 250 mm.

C. Protect exposed live equipment during construction to ensure the safety of all personnel.

D. Shield and mark live parts "LIVE 4160 VOLTS", or with the appropriate voltage in English.

1.13 SINGLE LINE ELECTRICAL DIAGRAMS

A. Provide single line electrical diagrams as follows:

1. Electrical Power Distribution System: As modified and disconnected.

2. Electrical HV (Transmission) Systems: As decommissioned and showing disconnected equipment.

1.14 FIELD QUALITY CONTROL

A. Conduct and pay for the following tests:

1. Power transmission and distribution system including phasing, voltage, grounding and setting of protection equipment and devices.

2. Circuits originating from substation switchgears or existing overhead lines.

3. Transformers and associated devices.

B. Submit all test results for OWNER's representative review and approval.

1.15 FIRE TRANSITS

A. All cable trays, conduit etc. transitioning through building walls to be sealed with a one (1) hour fire rated caulking or fire transit.

B. Fire transit to be ULC listed.

1.16 CLEANING

A. Comply with the requirements of Division 1.

B. Before energizing any system, inspect and clean the entire interior of the substation switchgear, etc. to ensure that they are free from dust and other debris.

C. Remove all debris, surplus material, and all tools.

1.17 EXECUTION

A. Use of the permanent electrical system for temporary construction service shall only be allowed after the prior written permission of OWNER has been obtained.

B. Maintain at the Site, at all times, qualified personnel and supporting staff, with proven experience in erecting, supervising, and testing projects of comparable nature and complexity.

C. Expedite Work as follows:

1. Continuously check and expedite delivery of equipment and materials.

2. If necessary, inspect at the source of manufacture.

3. Continuously check and expedite the flow of necessary information to and from all parties involved.

4. Inform OWNER promptly where information is required.

D. Work for Division 16 shall be coordinated with other Divisions in such a manner so as not to interfere with other Work. In areas where the ducts, pipes, wiring and equipment for other Sections will be decommissioned, disconnected and/or installed in proximity to pipes, wiring and equipment pertaining to this Division, co-operate and coordinate with SUBCONTRACTORS and other CONTRACTORS to ensure that all pipes, ducts, wiring and equipment are installed in locations that best meet the requirements of OWNER.

END OF SECTION

SECTION 16015

ELECTRICAL SYSTEMS ANALYSIS

PART 1 GENERAL

1.1 SCOPE

A. CONTRACTOR shall furnish short-circuit and protective device coordination studies as prepared by an approved electrical engineering firm.

B. CONTRACTOR shall furnish an Arc Flash Hazard Analysis Study per the requirements set forth in CSA 2462-12 - Workplace Electrical Safety in the Workplace. Arc flash hazard analysis shall be performed according to IEEE 1584 equations.

C. Scope of the studies shall include all new distribution equipment supplied by CONTRACTOR under this Contract as well as all parts of power distribution system being modified.

1. Include analysis for all parts of new addition to existing power distribution systems

2. Include analysis for all parts of existing power distribution systems directly affected by modifications.

3. OWNER will provide the portion of the existing analysis report for revision by the company responsible for performing the short-circuit and coordination study of the modified part of distribution system.

1.2 RELATED SECTIONS

A. Section 16096 - Selective Electrical Decommissioning.

B. Section 16370 - Overhead Power Distribution.

1.3 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems.

2. 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.

3. 399 – Recommended Practice for Industrial and Commercial Power System Analysis.

4. 1584 - Guide for Performing Arc-Flash Hazard Calculations.

B. American National Standards Institute (ANSI):

1. C57.12.00 – Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers.

2. C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

3. C 37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.

D. Canadian Standards Association (CSA): C22.1 - 12 - Safety Standard for Electrical Installations.

E. Manitoba Electrical Code.

1.4 SUBMITTALS FOR REVIEW/APPROVAL

A. Short-circuit and protective device coordination studies shall be submitted to the design engineer prior to receiving final approval of the distribution equipment shop drawings and/or prior to release of equipment drawings for manufacturing. If formal completion of the studies may cause delay in equipment manufacturing, approval from ENGINEER may be obtained for preliminary submittal of sufficient study data to ensure that the selection of device and characteristics will be satisfactory.

1.5 SUBMITTALS FOR CONSTRUCTION

A. Results of short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. No more than five (5) bound copies of the complete final report shall be submitted. Additional copies of the short-circuit input and output data, where required, shall be provided on CD in PDF format.

B. Report shall include the following sections:

1. Executive Summary.

2. Descriptions, purpose, basis and scope of the study.

3. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short-circuit duties.

4. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip unit settings, fuse selection.

5. Fault current calculations including a definition of terms and guide for interpretation of the computer printout.

6. Details of the incident energy and flash protection boundary calculations.

7. Recommendations for system improvements, where needed.

8. One-line diagram.

D. Arc flash labels shall be provided in hard copy only.

1.6 QUALIFICATIONS

A. Short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer in Province of Manitoba skilled in performing and interpreting the power system studies and familiar with SKM System Analysis Inc. software and the Vale Mine format.

B. Registered Professional Electrical Engineer shall have a minimum of five (5) years of experience in performing power system studies.

1.7 COMPUTER ANALYSIS SOFTWARE

A. Studies shall be performed using the latest revision of the SKM Systems Analysis Power*Tools for Windows (PTW) software program or approved equal.

PART 2 PRODUCT

2.1 STUDIES

A. CONTRACTOR to furnish short-circuit and protective device coordination studies as prepared by the approved engineering firm.

B. CONTRACTOR shall furnish an Arc Flash Hazard Analysis Study per CSA Z462-12 - Workplace Electrical Safety.

2.2 DATA COLLECTION

A. CONTRACTOR shall furnish all data as required by the power system studies. ENGINEER performing short-circuit, protective device coordination and arc flash hazard analysis studies shall furnish CONTRACTOR with a listing of required data immediately after award of the contract. CONTRACTOR shall expedite collection of the data to assure completion of the studies as required for final approval of the distribution equipment shop drawings and/or prior to the release of the equipment for manufacturing.

B. Load data utilized may include existing and proposed loads obtained from the existing Documents provided by OWNER.

C. If applicable, include fault contribution of existing equipment in the study CONTRACTOR shall obtain required existing equipment data, if necessary, to satisfy the study requirements.

2.3 SHORT-CIRCUIT AND PROTECTIVE DEVICE EVALUATION STUDY

A. Use actual conductor impedances if known. If unknown, use typical conductor impedances based on IEEE Standard 141-1993.

B. Transformer design impedances shall be used when test impedances are not available.

C. Provide the following:

1. Calculation methods and assumptions.

2. Selected base per unit quantities.

3. One-line diagram of the system being evaluated.

4. Source impedance data, including electric utility system where applicable and equipment fault contribution characteristics.

5. Tabulations of calculated quantities.

6. Results, conclusions, and recommendations.

D. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each:

1. Electric utility's supply termination point.

2. Modified incoming switchgear.

3. Modified unit substation primary and secondary terminals.

4. Other significant locations throughout the system.

E. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.

F. Protective Device Evaluation:

1. Evaluate equipment and protective devices and compare to short-circuit ratings.

2. Adequacy of switchgear/switchboard to withstand short-circuit stresses.

3. Notify OWNER in writing, of existing, circuit protective devices improperly rated for the calculated available fault current.

2.4 PROTECTIVE DEVICE COORDINATION STUDY

A. Proposed protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.

B. Include on each TCC graph, a complete title and one-line diagram with legend identifying the specific portion of the system covered.

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.

D. Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.

E. Plot the following characteristics on the TCC graphs, where applicable:

1. Electric utility's overcurrent protective device.

2. Medium voltage equipment overcurrent relays.

3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.

4. Transformer full load current, magnetizing inrush current and ANSI through-fault protection curves.

5. Conductor damage curves.

6. Ground fault protective devices, as applicable.

F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

2.5 ARC FLASH HAZARD ANALYSIS

A. Arc flash hazard analysis shall be performed according to the IEEE 1584 equations.

B. Flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear and busway) where work could be performed on energized parts.

C. Safe working distances shall be based upon the calculated arc flash boundary considering an incident energy of 1.2 cal/cm^2.

E. When appropriate, the short-circuit calculations and the clearing times of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations

F. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 Section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than

2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.

2.6 REPORT SECTIONS

A. Input data shall include, but not be limited to the following:

1. Feeder input data including feeder type (cable or bus), size, length, number per phase, conduit type (magnetic or non-magnetic) and conductor material (copper or aluminum).

2. Transformer input data, including winding connections, secondary neutral-ground connection, primary and secondary voltage ratings, kVA rating, impedance, percent taps and phase shift.

B. Short Circuit Output Data for new and modified part of power distribution system.

1. Fault Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:

1. Voltage.

2. Calculated fault current magnitude and angle.

3. Fault point X/R ratio.

4. Equivalent impedance.

2. Momentary Duty Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:

1. Voltage.

2. Calculated symmetrical fault current magnitude and angle.

3. Fault point X/R ratio.

4. Calculated asymmetrical fault currents:

1. Based on fault point X/R ratio.

2. Based on calculated symmetrical value multiplied by 1.6.

3. Based on calculated symmetrical value multiplied by 2.7.

5. Equivalent impedance.

3. Interrupting Duty Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:

    1. Voltage.

    2. Calculated symmetrical fault current magnitude and angle.

    3. Fault point X/R ratio.

    4. No AC Decrement (NACD) Ratio.

    5. Equivalent impedance.

C. Recommended Protective Device Settings:

1. Phase and Ground Relays:

    1. Current transformer ratio.

    2. Current setting.

    3. Time setting.

    4. Instantaneous setting.

    5. Recommendations on improved relaying systems, if applicable.

2. Circuit Breakers:

    1. Adjustable pickups and time delays (long time, short time, ground).

    2. Adjustable time-current characteristic.

    3. Adjustable instantaneous pickup.

    4. Recommendations on improved trip systems, if applicable.

3. Fuses:

    1. Type rating.

    2. Recommendations on improvements, if applicable.

D. Incident energy and flash protection boundary calculations:

1. Arcing fault magnitude.

2. Protective device clearing time.

3. Duration of arc.

4. Arc flash boundary.

5. Working distance.

6. Incident energy.

7. Hazard Risk Category.

8. Recommendations for arc flash energy reduction.

E. Model Data: Provide short circuit model data in electronic format, to OWNER, to be integrated into their plant-wide short circuit model. Coordinate with OWNER regarding specific format.

PART 3 EXECUTION

3.1 FIELD ADJUSTMENT

A. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study.

B. Supply and install fuses according to the recommendations provided by the coordination study.

C. Make minor modifications to equipment as required to accomplish conformance with short-circuit and protective device coordination studies.

D. Notify OWNER in writing of any required major equipment modifications.

E. Vale Operation Representative will incorporate the study results into existing short-circuit and the coordination study records.

3.2 ARC FLASH WARNING LABELS

A. CONTRACTOR of the Arc Flash Hazard Analysis shall provide a 3.5 inch x 5 inch thermal transfer type label of high adhesion polyester for each work location analyzed.

B. All labels will be based on recommended overcurrent device settings and will be provided after the results of the analysis have been presented to OWNER and after any system changes, upgrades or modifications have been incorporated in the system.

C. Label shall include the following information, at a minimum:

1. Location designation.

2. Nominal voltage.

3. Flash protection boundary.

4. Hazard risk category.

5. Incident energy.

6. Working distance.

7. Engineering report number, revision number and issue date.

D. Labels shall be machine printed, with no field markings.

E. Arc flash labels shall be provided in the following manner and all labels shall be based on recommended overcurrent device settings.

1. For each 600 volt panelboard, one arc flash label shall be provided.

2. For each low voltage switchboard, one arc flash label shall be provided.

3. For each switchgear, one flash label shall be provided.

4. For medium voltage switches, one arc flash label shall be provided.

F. Labels shall be field installed by CONTRACTOR under the Startup and Acceptance Testing contract portion.

3.3 ARC FLASH TRAINING

A. CONTRACTOR of the Arc Flash Hazard Analysis shall train OWNER's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours).

END OF SECTION

SECTION 16061

GROUNDING - PRIMARY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding electrodes and conductors.

1.2 REFERENCES

A. Institute of Electrical and Electronics Engineers (IEEE):

1. C2 - National Electrical Safety Code.

2. 142 - Grounding of Industrial and Commercial Power Systems.

3. 837 - Qualifying Permanent Connections Used in Substation Grounding.

B. Canadian Standards Association (CSA):

1. C22.2 No. 0.4 - Bonding of Electrical Equipment.

2. C22.2 No. 41 - Grounding and Bonding Equipment.

3. C22.3 No. 1 - Overhead Systems.

4. C22.3 No. 7 - Underground Systems.

C. Manitoba Electrical Code, 11th Edition, August 2012.

D. Vale Thompson Mine Standards and Requirements.

1.3 SYSTEM DESCRIPTION

A. Multiple vertical electrodes buried in rectangular pattern for primary system including pad-mounted transformer with nominal supply voltage of 13.8 kV in accordance with Manitoba Hydro Electrical Codes and Standards.

B. Pole-mounted service line switching device grounding.

C. Neutral grounding.

1.4 PROGRESS SUBMITTALS

A. Shop Drawings: Indicate layout of grounding system and installation details.

B. Product Data: Include for grounding electrodes and connectors.

C. Test Reports: Indicate overall resistance to ground and resistance of each electrode at each system.

D. Provide a ground potential Rise Study verifying that station ground design meets Manitoba Electrical Code.

E. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of exothermic connectors.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents: Accurately record actual locations of grounding electrodes and connections.

1.6 REGULATORY REQUIREMENTS

A. Conform to Manitoba Electrical Code.

B. Furnish products listed and classified by CSA as suitable for purpose specified and shown.

C. Complete grounding work in accordance with CSA C22.2 No. 0.4 except where specified otherwise.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

A. Conform to IEEE 142 and 837.

B. Comply with Manitoba Electrical Codes and Standards - Manitoba Regulation 96/2012.

2.2 MATERIALS

A. Rod Electrode: Copper-clad steel electrode, 19 mm diameter, 3 m length; as manufactured by OZ/Gedney Company. Other acceptable manufacturers:

1. Ideal Industries.

2. AB Chance Company.

B. Conductors:

1. Bare, stranded, soft annealed copper wire, size No. 2/0 AWG for ground bus, electrode interconnections, metal structures, gradient control mats, transformers, switches, and ground connections.

2. PVC insulated, colored green, stranded soft annealed copper wire, size No. 4 AWG for grounding cable sheaths, raceways, pipe work, screen guards, switchboards, and potential transformers.

3. No. 2/0 AWG extra flexible copper conductor for connection of switch mechanism operating rod to gradient control mat.

C. Bolted removeable test links.

D. Gradient Control Mat: Galvanized steel copper, 12 x 18 m, 100 x 100 mm mesh size.

E. Accessories: Non-corroding, necessary for complete grounding system, type, size material as indicated, including:

1. Grounding and bonding bushings.

2. Protective type clamps.

3. Bolted type conductor connectors.

4. Thermit welded type conductor connectors.

5. Bonding jumpers and straps.

6. Pressure wire connectors.

F. Cable sheath isolating sleeves.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that final backfill and compaction has been completed before driving rod electrodes.

B. Verify that trenching is completed before installing horizontal electrodes.

3.2 GROUNDING INSTALLATION

A. Install continuous grounding system including, electrodes, conductors, connectors, and accessories in accordance with CSA C22 No. 0.4 and requirements of local authority having jurisdiction.

B. Install connectors in accordance with manufacturer's instructions.

C. Protect exposed grounding conductors from mechanical injury.

D. Make buried connections, and connections to electrodes, structural steel work, using copper welding by thermit process and permanent mechanical connectors in accordance with IEEE 837.

E. Use mechanical connectors for grounding connections to equipment provided with lugs.

F. Use No. 2/0 AWG bare copper cable for main ground bus of substation and No. 2/0 AWG bare copper cable for taps on risers from main ground bus to equipment.

G. Use tinned copper conductors for aluminum structures.

H. Do not use bare copper conductors near unjacketed lead sheath cables.

3.3 ELECTRODE INSTALLATION

A. Install ground rod electrodes at transformer and switchgear locations.

B. Install gradient control mats. Connect mats to station ground electrode and switch mechanism operating rods.

C. Make special provision for installing electrodes that will give acceptable resistance to ground value, where rock or sand terrain prevails.

3.4 EQUIPMENT GROUNDING

A. Install grounding connections as indicated to typical station equipment including:

1. Metallic watermain, neutral, gradient control mats.

2. Non-current carrying parts of: Transformers, reclosers, current transformers, frames of gang-operated switches, and fuse bases.

B. Ground hinged doors to main frame of electrical equipment enclosure with flexible jumper.

C. Connect metallic piping (water, oil, air, etc.) inside station to main ground bus at several locations, including each service location within station. Make connections to metallic water pipes outside station to assist in reduction of station ground resistance value.

3.5 NEUTRAL GROUNDING

A. Connect transformer neutral and distribution neutral together using 1,000 V insulated conductor to one side of ground test link, the other side of the test link being connected directly to main station ground. Ensure distribution neutral are bonded directly to transformer neutral and not to main station ground.

B. Interconnect electrodes and neutrals at each grounding installation.

C. Connect neutral of station service transformer to main neutral bus with tap of same size as secondary neutral.

D. Ground transformer tank with continuous conductor from tank ground lug through connector on ground bus to primary neutral. Connect neutral bushing at transformer to primary neutral in same manner.

3.6 POLE-MOUNTED SWITCHING DEVICE GROUNDING

A Drive 4 ground rods, 3 m long, at base of each pole on which group-operated line switching devices are mounted.

B. Arrange rods in square formation with 3 m sides, located so that operator must stand within square to operate switch.

C. Interconnect ground rods with stranded annealed copper conductor and join to switch operating handle ground wires. Connect to gradient control mat in 2 locations.

D. Connect operating handle of switch to handle base with No. 2/0 AWG extra flexible copper conductor.

3.7 CABLE SHEATH GROUNDING

A. Bond single conductor, metallic sheathed cables together at one end only. Break sheath continuity by inserting insulating sleeves in cables.

B. Use No. 6 AWG flexible copper wire soldered, not clamped, to cable sheath.

C. Connect bonded cables to ground with No. 2/0 AWG copper conductor.

3.8 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations.

C. Test Procedures: IEEE 142, Fall of potential method.

D. Perform ground continuity and resistance tests using method appropriate to the Site conditions and to approval of ENGINEER and local authority having jurisdiction.

E. Perform test before energizing electrical system.

END OF SECTION

SECTION 16096

SELECTIVE ELECTRICAL DECOMMISSIONING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Summary of disconnection and modification for selective portion of electrical high voltage primary power transmission and distribution systems as indicated on the Drawings.

1.2 DESCRIPTION OF WORK

A. In general 138 kV primary power transmission system disconnection includes:

1. Coordination and consultation with Manitoba Hydro for disconnection from Vale Switching Station of two (2) 138 kV Feeders: No. 3 and No. 4 supplying the Thompson Mine Smelter Substation.

2 Disconnection of conductors for Feeders No. 3 and No. 4 mounted on tower structure and supplying the Thompson Mine Smelter Substation (equipped with Transformers No. 5, No. 6, and No. 7) from Vale Switching Station 138 kV BUS 1 and BUS 2.

B. Disconnection of following feeders in the Main Substation:

1. 13.8 kV feeder No. 1 from 1,200A circuit breaker #952 for isolation of power supply to Refinery Facility loads, including disconnection of feeder cables.

2. 13.8 kV feeder No. 2 from 1,200A circuit breaker #1792 for isolation of power supply to Refinery loads, including disconnection of feeder cables.

3. 13.8 kV feeder to Refinery Electrical Room No. 7 from 1,200A circuit breaker #1352 for isolation of power supply to Refinery loads, including disconnection of feeder cables.

4. 13.8 kV emergency tie feeder between Smelter Substation and Main Substation from breaker #1252, including disconnection of feeder cables.

C. Disconnection of the 4160V air blowers located in the Compressor Building:

1. Disconnection in Electrical Room No. 1 from 4160 V switchgear/switchboard start and run buses the following circuit breakers: 42-2, 42-3, 42-6, 6-2, 6-3 and 6-6 for converter blowers No. 1, No. 2 and No. 3, including blower's associated equipment, power and control cables.

2. Disconnection in Electrical Room No. 2 from 4160 V switchgear start and run buses the following circuit breakers: 42-3, 42-4, 42-5, 42-6, 6-3, 6-4, 6-5 and 6-6 for converter blowers No. 4 and No. 5 and roaster blowers No.1 and No.2 including blower's associated equipment, power and control cables.

D. Modification to power distribution system to provide new source of power supply to South Yard:

1. Design and installation of new 13.8 kV, 3-phase overhead line from existing 13.8 kV overhead line to Thompson Open Pit (TOP) for connection to existing 4160 V, 3-phase overhead line at the South Area including installation of new 500kVA, 13.8 kV/4160 V, 3-phase step down transformer as specified and indicated on the Drawings. New 13.8 kV overhead power service final routing and location of overhead line shall be surveyed by CONTRACTOR upon approval by OWNER prior to preparing the final design.

2. Disconnection of S&C 13.8 kV fused switch from the Smelter Substation No. 1 supplying transformer T7-1-500 kVA, 13.8 kV/4160V, 3-phase and modification of the existing 4160V overhead line to the end pole near the Smelter Facility.

3. Provide power supply to the following loads located at the South Yard: Contractor Storage Area, Scale House, Copper Drier South Yard, Ground Water Pumps, ICI Emulsion, Power MAG and Orica Explosive Plan from new power service via transformer connected to overhead feeder tap to existing TOP line.

4. New service to be energized prior to disconnection of power service from the Smelter Facility.

E. Provision of short circuit study and protective device coordination study for the modified power distribution system to adjust the protective devices as specified, studies shall meet existing Vale Study Report format.

F. Installation of temporary power supply for the smelter stack aircraft beacons from alternate 240VAC, 1-phase, 2-wire power source. Temporary power supply shall be required for the period after removal of electrical supply to the Smelter Facility, until demolition of stack.

G. Refer to Division 1 for all utilities decommissioning and the Contract documentation requirements. Additional Electrical Works or details for power distribution system disconnection are also specified under other Sections of Division 16 and indicated on the Contract Drawings.

1.2 EXAMINATION

A. Review the Contract Documents to identify electrical equipment, control and protection components, removed or modified by other, but executed under Division 16.

B. Refer to Division 1 for all utilities decommissioning sequencing. Additional Works or details may also be specified under other Divisions and indicated on the Contract Drawings.

C. Examine the Drawings and Specifications; visit the Site to ascertain that the Works can be carried out satisfactorily without changes to the Contract Documents.

D. If anything in the Contract Documents interferes with execution of the Works and intent of the Project, or does not comply with applicable codes and regulations, inform OWNER immediately in writing.

1.3 REFERENCES

A. Canadian Standards Association (CSA):

1. C22.1 - Canadian Electrical Code, Part I – Safety Standards for Electrical Installations.

2. C22.1 - Canadian Electrical Code, Part II – Safety Standards for Electrical Equipment.

B. Manitoba Electrical Codes and Standards.

1.4 PROGRESS SUBMITTALS

A. Shop Drawings: Product Data: Include manufacturer's catalog information showing dimensions, colors, and configurations related to new installations.

B. Submit detailed schedules and work plans for any work that affects operation of the mine power supply services and modification to remaining online equipment at the Vale Thompson Mine Facilities not scheduled for disconnection.

C. Provide detailed work schedule where continuous process operation will be affected by electrical disconnection Works.

1.5 SEQUENCING AND SCHEDULING

A. This section provides overview of the proposed electrical utility disconnection and modification work, and constraints for the electrical Works related to demolition, removal and modification remaining to equipment online.

B. Electrical Service Modifications: Obtain approval from electrical inspection. Arrange for Operation Department to restore power to modify power system.

C. Schedule work accordingly, allow time and incorporate listed limitations and constraints.

PART 2 PRODUCTS

2.1 GENERAL

A. Provide equipment necessary to conduct power system disconnection Works.

B. All materials and equipment that are removed but not re-used are the property of OWNER and shall be disposed of or stored as directed by OWNER. Any materials not accepted by OWNER shall be removed from the Site and discarded.

2.2 TEMPORARY PRODUCTS

A. Allow for and provide products for temporary electrical installations required in order to maintain modified part of facility in continuous operation.

PART 3 EXECUTION

3.1 GENERAL

A. Field to verify measurements and circuiting arrangements.

B. Information on the Drawings for disconnection of Smelter Substation, Refinery Facility and modification of the power service to South Yard are based on existing record documents.

C. Verify that abandoned wiring and equipment serve only abandoned facilities.

D. Works shall not take place during wet weather periods or "Weather Warning" conditions.

3.2 SAFETY

A. Ensure the safety of all personnel and equipment on Site during decommissioning and disconnection Works.

B. Protect exposed live or energized electrical or control equipment during works for personal safety of all workers on the Site. Provide temporary barriers, locks, etc. as required. Strictly follow lock-out procedures.

C. Provide grounding and bonding for systems affected by the work of this Section.

D. At all times keep the Site free from accumulations of debris resulting from the Works.

3.3 DISCONNECTION – GENERAL

A. Protect and preserve utilities on the Site that are intended to remain in active condition. Maintain access to existing electrical installations that remain active.

B. Disconnect power distribution feeders, switches, and cables as specified and indicated on the Drawings.

3.4 IDENTIFICATION

A. Identify all electrical equipment with tags and labels affected by work of this Section. Tag all abandoned cables and wiring.

B. Permanent marker handwritten tags or portable handheld labeler(s) are acceptable in most cases for the equipment being disconnected. Install tags as work proceeds. Do not leave unidentified systems.

C. Remove equipment nameplates and provide permanent lamacoid nameplates marked as "Spare" or "Not-In-Service".

D. Provide warning signs.

3.5 TEMPORARY SYSTEMS

A. Provide temporary wiring and connections to maintain existing systems online during disconnection and temporary power supply for the Smelter Stack air craft beacons during demolition.

B. Provide suitable installation for temporary systems as requested by OWNER.

C. Protect and preserve utilities on the site that are intended to remain in active condition. Maintain access to existing electrical installations that remain active.

END OF SECTION

SECTION 16210

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coordination with Manitoba Hydro for the disconnection of the parts of the power transmission and distribution systems associated with decommissioning and demolition of the Smelter and Refinery Facilities at Vale Thompson Manitoba Mine, including:

1. Disconnection from Vale Switching Station 138 kV BUS 1 and BUS 2 feeders No. 3 and No. 4 mounted on tower structure and supplying the Thompson Mine Smelter Substation equipped with Transformers No. 5, No. 6, and No. 7.

2. Disconnection of 13.8 kV feeders in the Main Substation associated with the Smelter and Refinery Facilities decommissioning. Refer to Section 16096- Selective Electrical Decommissioning for the feeders disconnection details.

3. Disconnection of 4160V feeders to the air blowers form the switchgears No. 1 and No. 2 located in the Compressor Building. Refer to Section 16096- Selective Electrical Decommissioning for the feeders disconnection details.

B. Approval by Manitoba Hydro Electrical Inspection Authority for design and installation of new 13.8 kV, 3-phase power overhead line required to reconnect the power service to existing 4160V overhead line at South Yard.

1.2 REFERENCES

A. Canadian Electrical Code, Part III - Electricity Distribution and Transmission Systems.

B. Manitoba Hydro Electrical Code and Standards.

C. The Manitoba Electrical Code, 11th Edition, August 2012.

1.3 PROJECT INFORMATION

A. Project Name: Utility Decommissioning, Vale Thompson Mine Site, Thompson, Manitoba.

1. Address/Location: Vale Thompson Mine Site.

2. Vale, Manitoba Operation Project Manager:
Chris Wojciechowski
Vale Manitoba Operations
P.O. Box 5000
Thompson, Manitoba R8N 1P3.

3. Utility Company: Manitoba Hydro.

    1. West Manitoba Hydro Inspector's Supervisor:
    Ken Dawyduk
    Telephone: 1-204-360-7507

    2. Manitoba Hydro Contact for Vale Thompson Mine, Manitoba Division:
    Don Didyshuk
    Telephone: 1-204-727-9220.

4. Manitoba Department of Labour Mechanical & Engineering Branch - Manitoba Electrical Inspection:

    1. Lorne Uruski
    Telephone: 1-204-945-1233
    Email: lorne.uruski@gov.mb.ca

5. Project Engineer: Conestoga-Rovers & Associates Limited.

    1. CRA Project Manager:
    Jamie Puskas
    Telephone: 1-519-884-0510
    Email: jpuskas@craworld.com

    2. Electrical Engineer:

    Teresa Roszkowski
    Telephone: 1-519-884-0510
    Email: troszkowski@craworld.com

    3. Reference: CRA Project No. 075756 (10).

1.4 SYSTEM DESCRIPTION

A. Characteristics for new power service to the South Yard at the Vale Thompson Mine site: 13.8 kV, 3-phase, 60 Hz primary overhead line for the electrical service to the South Yard, including installation of step down transformer - 500 kVA, 13.8 kV/4160V, 3-phase for connection with existing 4160V, 3-phase, 60 Hz overhead line.

1.5 PROGRESS SUBMITTALS

A. Shop Drawings:

1. Provide dimensioned plan showing new primary system routing.

2. Provide detailed drawings showing equipment configuration on each utility pole.

3. Provide data and cut sheets for all products.

4. Arrange all Shop Drawings into single submittal and submit for approval to Manitoba Hydro Electrical Inspection Authority.

1.6 CLOSEOUT SUBMITTALS

A. Record Documents:

1. Record actual overhead line installation details, integrate changes, and modifications implemented to the existing equipment in the field.

2. Indicate "as-recorded" routing of the overhead line and the transformer precast concrete product on the Site plan; record the equipment mounted at each utility pole at new overhead line.

1.7 QUALITY ASSURANCE

A. Perform work of this Section in accordance with Manitoba Hydro requirements and standards.

B. Obtain approval of 13.8 kV primary overhead line design drawings sealed by a professional engineer licensed in Manitoba, by Electrical Inspector of the Manitoba Department of Labour, Mechanical & Engineering Branch, before construction.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

A. Furnish products listed and classified by CSA as suitable for purpose specified and shown.

B. Confirm service design and products with OWNER. Adjust work (layouts, equipment type, locations) and services to meet Vale Mine power distribution requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as shown on the Drawings and match on OWNER power distribution service design reference documents.

B. Arrange all services with OWNER.

C. Arrange inspections, and approvals with Manitoba Hydro Electrical Inspection Authority.

3.2 PREPARATION

A. Specifically confirm with OWNER new 13.8 kV overhead line tap connection with existing service line, new overhead line routing, and configuration prior to proceeding with design.

B. Arrange to locate all services prior to commencement of any excavation work. Establish location of the overhead line utility poles. Identify and clearly mark locations to indicate areas where hand excavation is required to prevent disturbance during work if excavation of the utility system.

C. Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered. Obtain direction from OWNER before moving or otherwise disturbing existing structures.

D. Conduct, in the presence of OWNER, a condition survey of existing buildings, fencing, service poles, road and tracks crossing, paving, and wires which may be affected by the Works.

E. Protect existing equipment and surface features which may be affected by work from damage while Work is in progress and repair damage resulting from work, at CONTRACTOR's expense. In the event of damage, immediately make repair to the approval of OWNER.

3.3 INSTALLATION

A. CONTRACTOR Work:

1. Provide excavations, trenching, base material installation, backfilling, compaction, and grading.

2. Install primary 13.8 kV overhead line, step down transformer and modify existing 4160V overhead line.

3. Install primary cables and weatherhead for connection to the overhead line lines from new transformer.

4. Install and connect primary and secondary grounding for the equipment associated with new 13.8 kV overhead line and connection with existing 4160V overhead line.

B. Utility Company Work:

1. Manitoba Hydro isolation of power service from 138 kV Vale switching station required for disconnection of transmission line to the Vale Thompson Mine Smelter Substation.

2. Approval of design documents for 13.8 kV new service line before construction and inspection before energizing new installation.

3.4 FIELD QUALITY CONTROL

A. OWNER representative may inspect the Works. Provide written notice minimum 6 Days in advance.

END OF SECTION

SECTION 16276

PAD MOUNTED DISTRIBUTION TRANSFORMERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. 13.8 kV/4.16 kV three phase tamperproof pad mounted distribution transformer.

1.2 RELATED SECTIONS

A. Section 16061 - Grounding Primary.

B. Section 16096 - Selective Electrical Decommissioning.

C. Section 16370 - Overhead Power Distribution.

1.3 REFERENCES

A. Canadian Standards Association (CSA):

1. C227.4 – Three-Phase, Dead Front, Pad-Mounted Distribution Transformer.

2. C802.1 – Minimum Efficiency Values for Liquid-Filled Distribution Transformers.

3. C233.1 - Gapless Metal Oxide Surge Arresters for Alternating Current System.

B. American National Standards Institute (ANSI): ANSI/IEEE C57.12.90 – Test code for Transformers.

C. Electrical Equipment Manufacturers Advisory Council (EEMAC): Standard of Installation.

D. Manitoba Safety Code.

E. Vale Thompson Mine Applicable Standards and Requirements.

1.4 PROGRESS SUBMITTALS

A. Product Data: Include outline and support point dimensions of enclosure and accessories, unit weight, voltage, kVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.

B. Test Reports: Indicate loss data, efficiency at 0, 50 and 100 percent rated load, and sound level.

C. Manufacturers' Instructions: Indicate anchoring method and dimensioned foundation template, dimensioned termination locations. Identify internal and external component layout on assembly drawing. Identify insulating liquid capacity.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents:

1. Final as-built drawings and product sheets.

2. Test reports.

3. Installation information including equipment anchorage provisions.

B. Operation and Maintenance Data:

1. Provide maintenance data for incorporation into manual.

2. Provide recommended spare parts list.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with a minimum 3 years documented experience.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of the Manitoba Electrical Code.

B. Furnish products listed and classified by CSA as suitable for the purpose specified and shown.

1.8 DELIVERY AND HANDLING

A. Ship the transformer and ancillary equipment suitably protected from damage during transportation.

B. Crate parts removed for shipment.

1.9 MANUFACTURER'S WARRANTY

A. Provide standard manufacturer's warranty.

PART 2 PRODUCTS

2.1 THREE PHASE PAD MOUNTED DISTRIBUTION TRANSFORMER

A. Overall assembly shall be tamper-proof construction. All transformer control accessories shall be enclosed in a tamperproof compartment. All access to interior components shall be through tamper-proof doors secured with shrouded pentahead bolts and locking facilities. Wind stops and door stays to be supplied to keep doors in open position.

B. Liquid filled transformer shall be naturally cooled (ONAN) of the sealed tank design, complete with integral radiators. Tank shall be fabricated from welded steel plate. Base shall be suitable for mounting on a flat slab type foundation and suitable for skidding or rolling in any direction.

C. Primary winding shall be connected to 3 phase, 3 wire system with four 2-1/2 percent full capacity off-load taps; 2 above normal and 2 below normal. Tap selection shall be by manually operated with position indicator and suitable for padlocking in all tap positions. Tap position shall be clearly marked on the tap changer dial plate. A warning notice shall be applied adjacent to the handle of the tap changer stating: "WARNING OFF CIRCUIT TAP SWITCH – OPERATE ONLY WHEN TRANSFORMER IS DE-ENERGIZED".

D. Secondary winding shall be suitable for 3-phase, 3 wire existing power distribution system.

E. Transformer shall be suitable for outdoor installation and all iron or steel fasteners shall be galvanized in accordance with CSA standards.

F. 13.8 kV/4.16 kV transformer primary and secondary voltage connections:

1. Primary voltage terminals shall be side mounted suitable for single conductor cables.

2. Overall assembly shall be tamper-proof construction including two separate access compartments. Access compartments include the primary voltage termination compartment, and secondary voltage termination compartment. Access compartments are separate from one another to enable safe equipment operation, restricting access to the primary voltage cable compartment to only authorized trained personnel.

3. Secondary voltage terminals shall be side mounted suitable for connecting single conductor cables.

G. Core material shall be high-grade, grain-oriented, non-aging silicon core steel with high magnetic permeability, low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below saturation to allow for a minimum of 10 percent overvoltage excitation. Cores shall be properly annealed to reduce stresses induced during the manufacturing processes and reduce core losses.

H. Transformer shall meet the energy efficiency requirements of CAN/CSA C802.1.

I. Provide warning labels in accordance with EEMAC standards. Provide nameplate showing transformer connection data and overload capacity based on rated allowable temperature rise.

J. Transformer manufacturer shall certify that the transformer is non-PCB containing less than 1 part per million detectable PCBs. Nonflammable transformer liquids including askarel and

insulating liquids containing tetrachloroethylene, perchloroethylene, chlorine compounds, or halogenated compounds are not acceptable and shall not be provided.

K. Main transformer tank and attached components shall be designed to withstand pressures greater than the required operating design value without permanent deformation. Construction shall consist of carbon steel reinforced with external, internal or sidewall braces. All seams and joints shall be continuously welded.

L. Transformer shall be complete with the following minimum accessories:

1. Liquid temperature gauge.

2. Liquid level gauge.

3. Liquid drain valve and sampling valve.

4. Filter press connection upper and lower.

5. Ground pads on tank with terminals for ground connections.

6. Lifting lugs and jack steps.

7. Manhole and sealed cover.

8. Pressure-vacuum gauge.

9. Pressure relief device.

10. Electrical data nameplate with all electrical data.

11. Warning signs complete with "Non-PCB" label.

2.2 TRANSFORMER CHARACTERISTICS

A. 13.8 kV/4.16 kV Transformer Characteristics:

1. Primary Voltage: 13.8 kV for connection via transition cables to 3-phase, 3 wire overhead system.

2. Secondary Voltage: 4160 V, wye connected to 3 phase, 3 wire system.

3. Frequency: 60 Hz +/- 1 Hz.

4. Capacity: 500 kVA.

5. Basic Impulse Level: 95 kV (HV), 60 kV (LV).

6. Primary Voltage Taps: Off-load, four 2.5 percent taps.

7. Winding Temperature Rise: 65 degrees C measured by resistance.

8. Maximum Ambient Temperature: 40 degrees C.

9. Standard Impedance.

10. Lightning Arrestors:

    1. Provide optional pricing for lightning arresters listed herein.

    2. Arrester component parts shall conform to CSA C233 to protect equipment of 15 kV distribution system.

    3. Arrester Characteristics:

        1. Intermediate arrester.

        2. Voltage Rating: 15 kV.

2.3 INSPECTIONS AND FACTORY TESTS

A. Transformer shall be inspected at each stage of manufacture in accordance with the Manufacturer's Quality Assurance Program and shall be completely assembled prior to shipment. All deficiencies shall be corrected before shipment. Manufacturer shall advise OWNER 5 Working Days before completion and before testing commences to allow OWNER, if required, to make arrangements to witness the inspection(s).

B. Following tests shall be performed but not limited to the following:

    1. Resistance measurements.

    2. Ratio test on all taps.

    3. Polarity and phase relationship.

    4. Exciting current.

    5. Impedance and load test.

    6. Applied and induced potential tests.

    7. Core insulation test.

C. In addition to the standard production tests the following shall also be provided:

    1. Transformer shall be energized 5 consecutive times at 110 percent of rated voltage.

    2. Manufacturer shall provide certification that the fully assembled transformer is suitable for full field vacuum filling.

D. A certified test report will be supplied prior to or at time of shipping.

2.4 PAINTING

A. All metal surfaces that shall be painted or coated shall be shall be finished with pad-mounted green paint consisting of 1 coat zinc primer and 2 coats of alkyd enamel, final thickness of 3 mils minimum dry.

PART 3 EXECUTION

3.1 EXAMINATION

A. Confirm with OWNER the required class and type of transformer to be suitable for existing power distribution system before ordering.

B. Check factory made connections of transformer unit for mechanical security and electrical continuity.

C. Check transformer insulating liquid for correct quantity and specification according to manufacturer's instructions.

3.2 INSTALLATION

A. Install grounding system to meet Manitoba Hydro Electrical Code.

B. Ensure concrete pad fully cured before transformer installed.

C. Set and secure transformer unit in place, rigid, plumb and square.

D. Make primary and secondary connections.

D. Connect transformer unit ground bus to system ground.

E. Take care to prevent contamination of liquid and components when field filling transformer.

F. Use only metal hose when field-filling transformer with oil. Never, under any circumstances, use rubber hose.

G. Set taps to produce secondary voltage at no-load.

3.3 FIELD QUALITY CONTROL

A. Install transformer protection according to Section 16015 - Electrical System Analysis.

B. Carry out following insulation tests using megger with 20,000 megohm scale and resulting insulation resistance corrected to base of 20 VC.

1. High voltage to ground with secondary grounded for duration of test.

2. Low voltage to ground when primary grounded for duration of test.

3. High to low voltage.

C. Inspect primary and secondary connections for tightness and for signs of overheating.

D. Check oil level and temperature indicators.

E. Set transformer taps to rated voltage as specified.

F. Inspect for oil leaks and excessive rusting.

G. Inspect oil level.

H. Check fuses for correctness of type and size in accordance with Coordination Study Report.

I. Check for grounding continuity between primary and secondary circuits of transformer.

END OF SECTION

SECTION 16370

OVERHEAD POWER DISTRIBUTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Overhead power distribution system for reconnection of existing loads to new power source.

B. Engineering design requirements.

1.2 REFERENCES

A. Canadian Standards Association (CSA):

1. C22.1 - Canadian Electrical Code, Part I – Safety Standard for Electrical Installations.

2. C22.3 - Canadian Electrical Code, Part III – Electricity Distribution and Transmission Systems.

3. CAN/CSA G12 - Zinc-Coated Steel Wire Strands

4. CAN/CSA C83 - Communication and Power Line Hardware.

5. CAN/CSA 015 - Wood Utility Poles and Reinforcing Stubs.

6. CAN/CSA 080 Series - Wood Preservation.

7. CSA 0116 - Power and Communication Sawn Wood Crossarms.

8. CSA 0124 - Specification for the Physical Properties of Power and Communication Wood Insulator Pins.

9. CAN/CSA C233.1 - Gapless Metal Oxide Surge Arresters for Alternating Current Systems.

10. C49.1 - Round Wire, Concentric Lay, Overhead Electrical Conductors.

11. C49.2 - Compact Aluminum Conductors Steel Reinforced (ACSR).

12. C57 - Electric Power Connectors for Use in Overhead Line Conductors.

13. C22.2 No. 242 - IEEE Standard Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminations (Adopted IEEE 48).

B. American National Standards Institute (ANSI):

1. C29.5 - Wet-Processed Porcelain Insulators, Low and Medium Voltage Pin Type.

2. C37.42 - Fuse cutouts and Fuse Links.

3. C37.46 - Power Fuses and Fuse Disconnecting Switches.

C. Electrical and Electronic Manufacturers' Association of Canada (EEMAC):

1. 1B-1 - Wet Process Porcelain Insulators (Strain Type).

2. 2B-1 - Wet Process Porcelain Insulators (Spool Type).

3. G1-1 - Indoor and Outdoor Switch and Bus Insulators

D. Manitoba Hydro Electrical Code and Standards.

E. The Manitoba Electrical Code, 11th Edition, August 2012.

1.3 SYSTEM DESCRIPTION

A. Design and installation of the primary 13.8 kV overhead lines service including:

1. Poles and pole hardware.

2. Crossarms and armless hardware.

3. Equipment mounts.

4. Insulators.

5. Lightning arresters.

6. Sky wires.

7. Load interrupter switches with gang operating mechanism.

8. Outdoor fuse cutouts and fuse links.

9. Outdoor high voltage cable termination.

10. Identification.

11. Accessories.

B. Modification to existing 13.8 kV and 4160V overhead lines including:

1. Disconnection of South Yard 4160V overhead line from transformer T7-1 at the Smelter Facility. Modification of existing utility pole to be new terminal pole.

2. Tap off connection from existing Thompson Open Pit (TOP) 13.8 kV overhead line complete with outdoor fuse cutouts and fuses. Install new overhead line branch circuit running from tap connection to TOP line along, the Birchtree Line Road and yard track to the South Yard area.

3. Terminal pole complete with:

    1. Gang operated load break switch with power fuses.

    2. Lightning arrestors.

    3. Transition to 15 kV underground cable (primary feed to 500 kVA pad-mounted transformer);

4. Terminal pole complete with:

    1. Transition from 5 kV underground cable (secondary feed from 500 kVA transformer).

    2. Lightning arrestors.

    3. Pole mounted fuse cutouts.

    4. Connection to existing South Yard 4160V overhead line.

1.4 PROGRESS SUBMITTALS

A. Shop Drawings:

1. Site Plan showing exact routing, utility pole and equipment location for designed 13.8 kV overhead line.

2. Installation Drawing: Configuration, layouts with dimensions, required clearances, weights and guying method shown.

3. All electrical drawings shall be done in electronic file format and submitted to CONSULTANT and OWNER's representative in printed and electronic editable format.

4. All drawings and reference documents shall be submitted to governing authority for review and approval as required.

5. All drawings shall be sealed by a professional engineer licensed in the Province of Manitoba.

B. Product Data:

1. Include electrical characteristics including service type, voltage, continuous current, power (kVA), short circuit rating, interrupting ratings, HV basic impulse level (BIL), power conductor sizes, ground size and arrangements, and equipment withstand ratings.

2. Include complete bill of materials. Include catalog numbers utility poles, insulators, switches, fuses, conductors, lighting arresters, line hardware, and other overhead line devices as required. List all options and accessories furnished.

3. Provide detailed product data sheets or manuals for review when required to evaluate submittal, requested by Inspector and CONSULTANT.

C. Manufacturer's Instructions: Submit installation details.

D. Field Reports: Commissioning report on field tests, including all test forms and confirming proper installation prior to energization.

1.5 CLOSEOUT SUBMITTALS

A. Record Documents:

1. As-built drawings as listed under Article 1.4 including any field modifications.

2. As-built drawings shall be submitted in printed and electronic Adobe Acrobat PDF and editable (AutoCAD DWG) format on CD.

B. Operation and Maintenance Data: Indicate and submit maintenance data for incorporation into Operations and Maintenance Manuals.

1. As-built product data as listed under Article 1.4 including any field modifications.

2. Include complete bill of materials with catalog numbers. Provide operating manuals, manufacturer's instructions or control descriptions for each device type. Recommended renewal parts list and service schedules.

3. Copies of factory test and field test reports.

4. Operation and Maintenance Data to be submitted in printed and electronic Adobe Acrobat PDF format on CD. Upon approval, large manuals may be provided only in electronic Adobe Acrobat PDF format.

C. Warranties: Completed original warranty forms filled out in OWNER's name and registered with manufacturer.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 10 years documented experience.

B. Installer: Company specializing in performing the work of this Section complying with minimum 10 years documented experience and qualifications, and approved by manufacturer.

C. Design overhead power distribution system under direct supervision of a professional engineer experienced in design of the work of this Section and licensed in the Province of Manitoba.

1.7 REGULATORY REQUIREMENTS

A. Confirm to requirements of the Manitoba Electrical Code.

B. Submit design and all documents for review and necessary plan approval as required by governing authorities.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Include instructions for storage, handling, protection, examination, preparation, and installation.

B. Provide complete assembly with hardware and instructions for installation and lifting including removable lifting means.

C. Perform external inspection before product is removed from the carrier's transport vehicle to identify shipping damage or rough handling in transit.

D. Off-load and rig equipment as per manufacturers handling instructions. Use only approved lifting methods. Protect equipment from shock, falling and mechanical damage during rigging. Sensitive components are mounted within equipment assembly.

E. Protect equipment and all components from mechanical damage, moisture, dust and metal debris during construction. Store equipment on shipping skids completely wrapped in covering of heavy-duty plastic or similar material, to prevent entry of water, snow, dirt, and dust.

1.9 SEQUENCING AND SCHEDULING

A. Obtain approval of design documents from Inspector of Manitoba Department of Labour, Mechanical & Engineering before starting the construction.

B. Schedule work to meet requirements of OWNER.

1.10 MANUFACTURER'S WARRANTY

A. Provide 1-year manufacturer's and installer's warranty for complete primary overhead system.

B. Fill out original warranty forms in OWNER's name and register with manufacturer.

1.11 SYSTEM STARTUP AND COMMISSIONING

A. Obtain Electrical Inspection from Manitoba Department of Labour & Engineering approval prior to connection. Verify the safety and readiness, phasing, and connections prior to energization.

B. Energize line. Verify tap connection, cut out switches and protection fuses for new branch of overhead connected to existing 13.8 kV line, operation protection of load break switch with fuses for protection of new step down transformer 13.8 kV/4.16 kV, 3-phase and connection to existing 4160V overhead line in South Yard.

1.12 SPARE PARTS

A. Furnish 1 spare lightning arrester.

B. Furnish 3 spare fuses of each type.

PART 2 PRODUCTS

2.1 GENERAL

A. Furnish products listed and classified by CSA as suitable for the purpose specified and shown.

B. Wood Preservation: Conform to CAN/CSA 080 Series.

C. Power Line Hardware: Conform to CAN/CSA C83.

2.2 DESIGN REQUIREMENTS

A. Provide design for OWNER overhead power distribution system. Confirm rating of the overhead line with OWNER Overhead line pole with fuse cutouts for connection to existing 13.8 kV line, poles for the 13.8 kV line spans at primary and secondary terminal poles at 500kVA step down transformer, including conductors, insulators, load interrupter, lightning arrestors, guys, hardware and accessories.

B. Confirm design of the overhead primary pole line to the Manitoba Electrical Code. Design drawings shall be sealed by a professional engineer licensed in the Province of Manitoba.

C. Comply with the existing conditions and modify as required by construction site requirements.

2.3 POLES

A. Wood Utility Poles: Conform to CAN/CSA 015. Poles of adequate length sized for 13.8 kV, 3-phase overhead power line including listed distribution equipment for code clearance of conductors above finished grade elevation at road crossing, railway and crossing of existing 13.8 kV overhead pole line.

1. Poles for primary circuits (length to suit).

2. Poles for cutouts and load interrupter switches mounting.

3. Poles for connection to existing 13.8 kV and 4160V overhead lines.

4. Pole for transition conduit from underground cable to overhead conductors at connection to transformer.

B. Reinforcing Stubs: Conform to CSA 015.

2.4 CROSSARMS

A. Wood Crossarms: Conform to CSA 0116, straight-grained, free of twists, pressure or vacuum treated with wood preservative:

1. Primary Circuits: 1 per pole, 4 pin.

2. Dead End and Corner Poles: Double arms.

3. Vertically Mounted Load Break Switches: Mount as per manufacturer recommendations.

4. For each crossarm:

1. Insulator Pins: Conform to CSA O124, located at top cross arm as required.

2. Two 32 x 6 mm galvanized steel braces.

3. One 9 x 38 mm galvanized steel lag screw.

4. Two 9 x 114 mm galvanized steel bolts.

5. Through bolts and double arm bolts as required.

B. Metal Crossarms: Hollow, structural steel, pre-manufactured holes for bolts, hot-dipped galvanized.

2.5 ARMLESS HARDWARE

A. Pole top insulator brackets, horizontal insulator brackets (double and triple insulator), malleable iron, hot dip galvanized.

B. Deadend Brackets: One piece channel steel, pre-manufactured holes for bolts, hot-dipped galvanized.

2.6 EQUIPMENT MOUNTS

A. Pole Bands: 4-piece or offset type, including bolts, 1-piece steel components, drop-formed, pre-manufactured holes for bolts, hot-dipped galvanized.

B. Mounting Straps: 1-piece steel, drop-formed, pre-manufactured holes for bolts, hot-dipped galvanized.

2.7 POLE HARDWARE

A. Braces:

1. Angle Crossarm Braces: One piece angle steel, drop-formed, pre-manufactured holes for bolts, hot-dipped galvanized.

2. Flat Crossarm Braces: Flat rolled steel bar, pre-manufactured holes for bolts, hot-dipped galvanized.

B. Guys and Anchors:

1. Guy Strand: Conform to CSA G12 or ASTM A475. Guy wire to be high strength, stranded galvanized steel 7.9 mm minimum, Grade 160. Where guy attaches to pole, provide 1 guy hook and 1 preformed guying deadend.

2. Guying Deadends: High strength stranded steel cable, minimum 7.9 mm nominal diameter, galvanized, produced to CSA G12 or ASTM A475.

3. Guy Clamps: 3-bolt heavy duty or preformed grip type.

4. Eye Bolt: 19 mm thimble, length to suit, 4-hole guy straps, and 16 mm machine bolt with square washer to attach guy wire to pole. Eyenuts and eyelets.

5. Guy Guard: Plastic, yellow, UV resistant, 2.1 m long.

6. Anchor Rod: 19 mm diameter by 2.7 m long, galvanized steel with thimble eye. Rock type, when applicable.

7. Anchor Plate: Heavy duty, screw type. Expanding or plate if specifically approved.

8 Manufacturer: SLACAN or approved equal.

C. Accessories: Guy hooks or plates, servi-sleeves, extension clevis, hooks and grid gains (malleable iron), clamps, clips, rope thimbles, strain plates, turnbuckles, hot-dip galvanized.

2.8 GANG OPERATED LOAD SWITCH

A. Manufacturer: S&C, Alduti-Rupter Switches.

B. Rating: 14.4 kV, 110 kV BIL, 12.5 kA RMS Sym, fuse interrupting.

C. Type: Full load air break, vertical mounted, vertical break, gang operated, single throw, 3 pole, full load interrupter switch.

D. Manual Operator Switch: Gang operated switch mechanism, quick-make, quick-break by levers at ground level. Include complete system. Offset bearings, vertical pipes, pipe shaft, guides, couplings, position indicator, foot bearing, operating pipe insulator, operating handle with padlock.

E. Power Fuse: Integral with switch assembly, 180 degree opening fuse. Select fuse type and rating in accordance with the coordination study.

2.9 FUSE CUTOUTS AND FUSE LINKS

A. Manufacturer: S&C, Open Cutouts, Type XS.

B. Fuse Cutouts: Outdoor open cutout, vertical mounted, complete with fuse holder, continuous rating 200A at 13.8 kV, interrupting rating as per results of study report.

C. Fuse Holders and Links: Automatic indicating drop-out type, normal duty, 200A rating. Fuse links electrically and mechanically interchangeable between various makes and types, sized as per results of the coordination study reports.

2.10 INSULATORS

A. Match insulators types and manufacturers as found on existing overhead lines.

B. Primary Insulators: Pin type. Conform to ANSI C29.5, for low and medium voltages for primary conductors, as required.

C. Secondary Insulators: Spool type. Conform to EEMAC2B-1, mounted on secondary racks, for secondary runs.

D. Guy Strain Insulators: Strain type. Conform to EEMAC 1B-1, 1 per guy wire.

E. Line post, suspension, spool type insulators: standard. Conform to ANSI C29.5.

2.11 LIGHTNING ARRESTORS

A. Metal-oxide heavy duty distribution class outdoor type lightning arresters with polymer housing, distribution class, size as indicated on the Drawings, manufactured to ANSI/IEEE C62.11.

2.12 OVERHEAD LINE CONDUCTORS

A. Overhead Conductors: ACSR, bare aluminum conductors steel reinforced. Coordinate with the existing 13.8 kV and 4160V overhead lines and as indicated on the Drawings for conductor sizing.

B. Overhead Splices: Full-tension for ACSR, single-sleeve aluminum, or two-piece, aluminum outer sleeve with steel inner sleeve for larger size wires, or longer spans.

C. Overhead taps for combination of ACSR, copper, compact and solid conductors, wedge type.

2.13 OUTDOOR HIGH VOLTAGE CABLE TERMINATION

A. Description: Shielded power cable termination kit, factory engineered for the application and cable being terminated.

B. Assembly:

1. Stress Control Tubing and Outer Tubing: High permittivity, high resistivity, heat or cold

shrinkable.

2. Multiple shrinkable skirts, UV stable, non-tracking.

3. Heat activated or tape sealant materials to prevent moisture ingress and contamination.

4. Heavy cast copper solderless compression type lugs; size, type, and number of holes as required for generator and switchgear connections.

5. Ground braid and clamp.

C. Manufacture: 3M Cold Shrink QT II silicone rubber termination kit; or equal.

2.14 IDENTIFICATION

A. Pole ID Number: Mark with rustproof number nails with 50 mm high designated number.

B. Pole Dating Nails: Aluminum with current year.

C. Warning Signs: Provide all warning signs and labels as required.

2.15 ACCESSORIES

A. Miscellaneous conductors connection hardware: clamps, connectors, clevises, brackets, clamps, cable positioners and holders.

B. Miscellaneous mounting hardware (e.g., mounting metal plates, brackets, bolts, nuts, washers, hooks).

C. Service Riser: PVC Schedule 80 conduit, flared cable guard, metal mounting straps.

D. Grounding: Grounding mats, ground rods, bare copper conductors in accordance with code requirements.

2.16 SOURCE QUALITY CONTROL

A. Perform standard electrical and mechanical factory tests. Tests will be in accordance with the latest version of applicable CSA, EEMAC, ANSI, and IEEE standards.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify soil conditions prior to pole installation. Ensure that surrounding soil is undisturbed and/or properly compacted.

B. Verify location of power utility poles and routing of pole line with OWNER.

3.2 INSTALLATION

A. Install in accordance with manufacturers' instructions and approved design.

B. Locate and dig pole hole. Make hole large enough to allow space for tamping backfill.

C. Set pole and align at right angles to pole line on straight runs. Install anchors and guys.

D. Set pole to maintain same elevation as final power utility company pole.

E. Replace backfill in 150 mm layers. Tamp each layer, and apply final layer to drain water away from pole.

F. For swampy condition, slope installation or rock mounted poles, install cribs in accordance with Manitoba Hydro requirements.

G. Insert anchor at least 1.8 m into ground. Backfill and tamp in 150 mm layers.

H. Shorten poles when required by cutting from top end. Apply hot preservative to shortened end of pole.

I. Install load interrupter switch, fused cutouts and arresters in accordance with manufacturer's instructions and located as shown on the Drawings.

J. Set cross arms at right angles to line for straight runs, and to bisect the angle of turns in line direction. Install insulators.

K. Install number nails on each pole and identify primary circuit on poles showing phasing of each conductor.

L. Install and connect grounding and bonding system in accordance with requirements of Section 16061 - Grounding - Primary.

M. Install pole riser.

N. Install, terminate, and connect medium voltage cable to primary and secondary sides of new step down transformer (13.8 kV/4160V).

O. Install primary conductors on pole lines.

P. Identify each pole.

3.3 INTERFACE WITH OTHER WORK

A. Arrange and coordinate works under this Section with OWNER's representative.

B. Install new 13.8 kV overhead line complete with poles, conductors, insulators, lightning arrestors, running along the Birchtree Road O/H line and yard tracks to new transformer location for power service to the Mine South Yard loads and replacement of existing service from the Smelter Facility prior to disconnection of the Smelter Facility.

3.4 FIELD QUALITY CONTROL

A. Perform standard field tests in accordance with the latest version of applicable CSA and EEMAC Standards. Provide written report.

B. General Checks:

1. Compare nameplate data, equipment sizes and types with Drawings and Specifications.

2. Inspect physical and mechanical condition.

3. Verify assembly (mechanical and electrical connections) and removal of all shipping braces and accessories.

4. Verify that electrical bolted connections are torqued to the manufacturer's recommendations.

5. Measure and record Megger readings phase-to-phase, phase-to-ground, and neutral-to-ground (4-wire systems only).

6. Equipment grounding and bonding connections.

7. Paint/protective finishes condition.

8. Verify phasing and connections prior to energization.

3.5 ADJUSTING

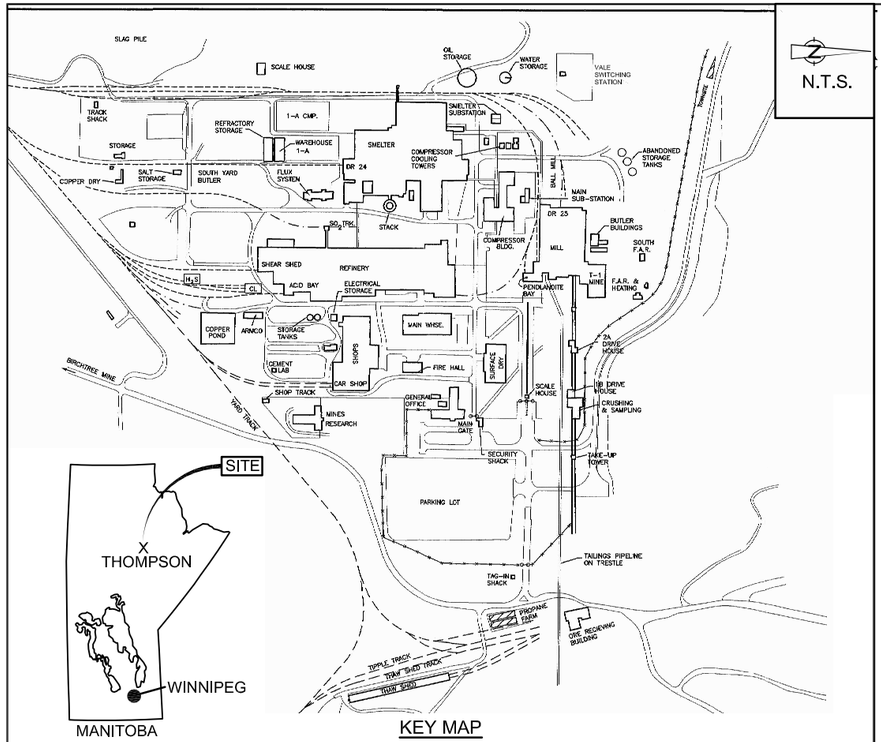
A. Perform field adjustments as required to place the equipment in final operating condition.

3.6 PROTECTION OF FINISHED WORK

A. Do not permit unauthorized personnel access to the electrical Works during construction, tests, and energization. Provide barriers and limit access.

END OF SECTION

DRAWINGS
(11x17 DRAWINGS INCLUDED,
PLAN SIZE PROVIDED UNDER SEPARATE COVER)



N.T.S.

Source Reference: AMEC Earth &Environmental Limited Project WX05384 Drawing Thompson Plant Site Plant. Dated January 2003.

DRAWING INDEX

DWG. No	REV. No	DATE	TITLE
G-101	0	SEPT 2012	COVER SHEET
E-001	2	SEPT 2012	ELECTRICAL SITE PLAN - POWER SERVICE DISCONNECTIONS AND PROPOSED MODIFICATION
E-002	2	SEPT 2012	SMELTER SUBSTATION AND FACILITY ELECTRICAL DISCONNECTION DIAGRAM
E-003	2	SEPT 2012	VALE SWITCHING STATION PLAN FEEDERS TO SMELTER SUBSTATION
E-004	2	SEPT 2012	NEW 13.8kV OVERHEAD LINE FEEDER TO SOUTH YARD
E-005	2	SEPT 2012	COMPRESSOR BUILDING ELECTRICAL ROOM No.1 4160V CONVERTER BLOWERS DISCONNECTION
E-006	2	SEPT 2012	13.8kV REFINERY FEEDER AND COMPRESSOR BUILDING 4160V LOADS DISCONNECTION
E-007	2	SEPT 2012	13.8kV EMERGENCY TIE AND REFINERY FEEDERS DISCONNECTION FROM MAIN SUBSTATION
E-008	2	SEPT 2012	13.8kV REFINERY FEEDER No.2 DISCONNECTION FROM MAIN SUBSTATION
E-009	2	SEPT 2012	COMPRESSOR BUILDING ELECTRICAL ROOM No.2 4160V BLOWERS DISCONNECTION
E-010	2	SEPT 2012	MAIN SUBSTATION 13.8kV SWITCHGEAR EQUIPMENT DISCONNECTION LAYOUT
E-011	2	SEPT 2012	COMPRESSOR BUILDING ELECTRICAL EQUIPMENT DISCONNECTION LAYOUT
E-012	2	SEPT 2012	COMPRESSOR BUILDING ELECTRICAL ROOM No.1 4160V SWITCHGEAR DISCONNECTION LAYOUT
E-013	2	SEPT 2012	COMPRESSOR BUILDING ELECTRICAL ROOM No1 575VAC STARTER RACKS #1 & 2 DISCONNECTION
E-014	2	SEPT 2012	COMPRESSOR BUILDING ELECTRICAL ROOM No.1 575VAC STARTER RACKS #3 DISCONNECTION
E-015	2	SEPT 2012	COMPRESSOR BUILDING ELECTRICAL ROOM No.2 4160V SWITCHGEAR #2 DISCONNECTION LAYOUT
E-016	2	SEPT 2012	COMPRESSOR BUILDING ELECTRICAL ROOM No.2 575V STARTER RACK #5 & #6 DISCONNECTION

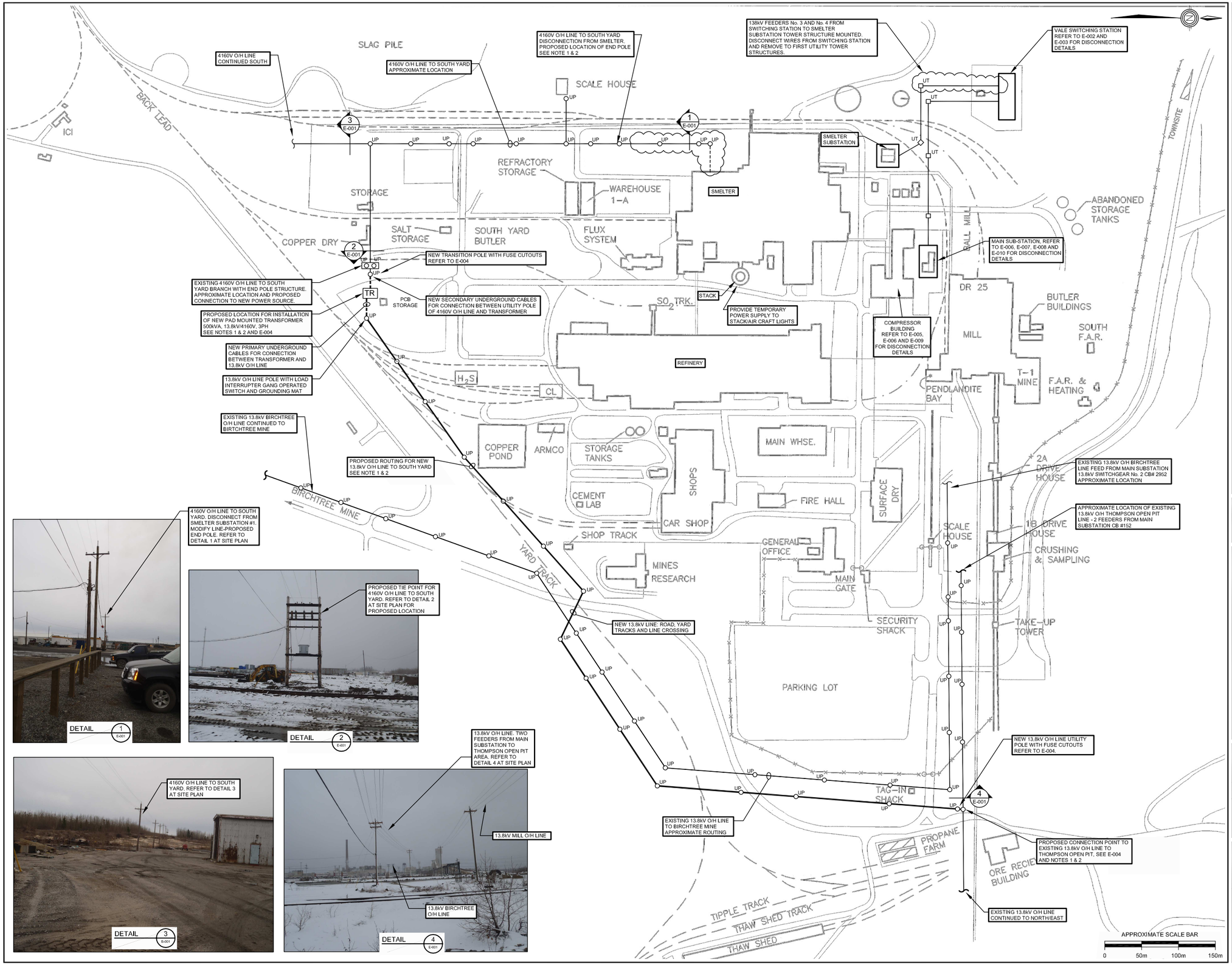
VALE THOMPSON MINE SITE

THOMPSON, MANITOBA

UTILITY DECOMMISSIONING ELECTRICAL

100% DESIGN

CONESTOGA-ROVERS & ASSOCIATES



No	Revision	Date	Initial

NOTES:

1. COORDINATE WITH VALE OPERATION, CONNECTION POINTS FOR NEW 13.8kV O/H SERVICE TO SOUTH YARD FROM EXISTING THOMPSON OPEN PIT O/H LINE RUNNING NORTH/EAST TO 4160V O/H LINE IN TO SOUTH YARD.
2. FIELD VERIFY EXISTING SERVICE ROUTING AND PROPOSED INSTALLATION PRIOR TO PROCEEDING WITH DESIGN OF NEW SERVICE OVERHEAD LINE.

LEGEND

- EQUIPMENT TO BE DISCONNECTED
- UP — OVERHEAD LINE UTILITY POLE
- UT — OVERHEAD LINE TRANSMISSION TOWER STRUCTURE
- ---------- UNDERGROUND CABLES

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

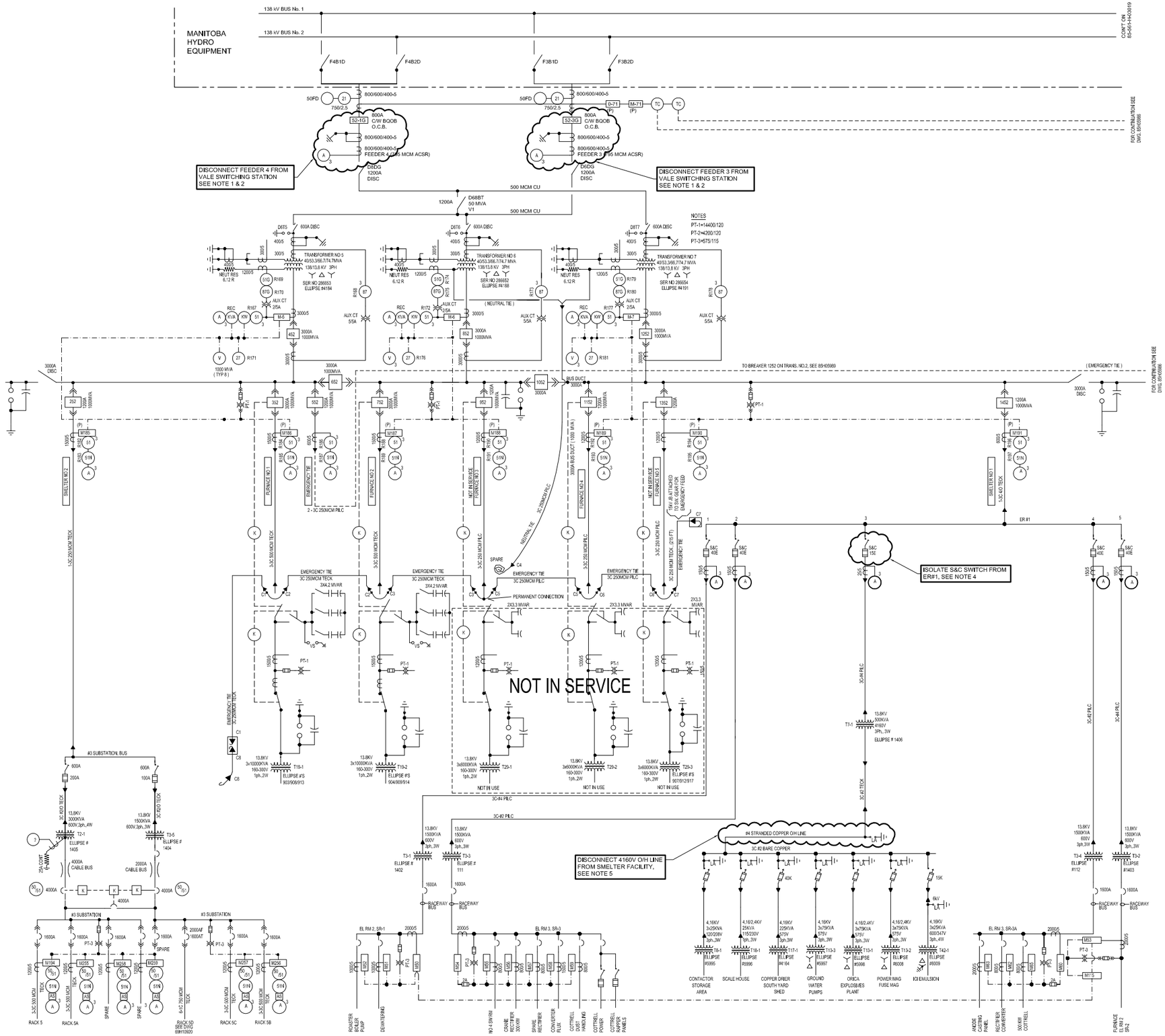
ELETRICAL SITE PLAN - POWER SERVICE DISCONNECTIONS AND PROPOSED MODIFICATION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.

Project Manager:	Reviewed By:	Date:	
D. B.	T. R.	SEPT 2012	
Scale: 1 : 2500	Project No: 75756-09	Report No: 008	Drawing No: E-001

75756-09(008)EL-WA001 JAN 7/2013



NO	Revision	Date	Initial

NOTES:

1. COORDINATE DISCONNECTION OF FEEDERS 3 & 4 FROM VALE SWITCHING STATION WITH MANITOBA HYDRO.
2. OPEN CIRCUIT BREAKERS 52-1G & 52-3G. DISCONNECT 138 kV CONDUCTORS FOR FEEDERS No. 3 AND No. 4 TO SMELTER SUBSTATION O/H LINES ON VALE SWITCHING STATION HIGH VOLTAGE STRUCTURE.
3. VERIFY THAT SMELTER SUBSTATION HAS BEEN DE-ENERGIZED.
4. OPEN FUSED DISCONNECT SWITCH, REMOVE 15E FUSES AND LOCK-OUT IN "OFF" POSITION TO ISOLATE T7-1 TRANSFORMER FROM 13.8 kV SWITCHGEAR IN ER#1.
5. DISCONNECT 4160V O/H LINE TO SOUTH AREA FROM SMELTER FACILITY. MODIFY HYDRO POLE LOCATED OUTSIDE OF THE SMELTER DEMOLITION AREA FOR O/H LINE END POLE.

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

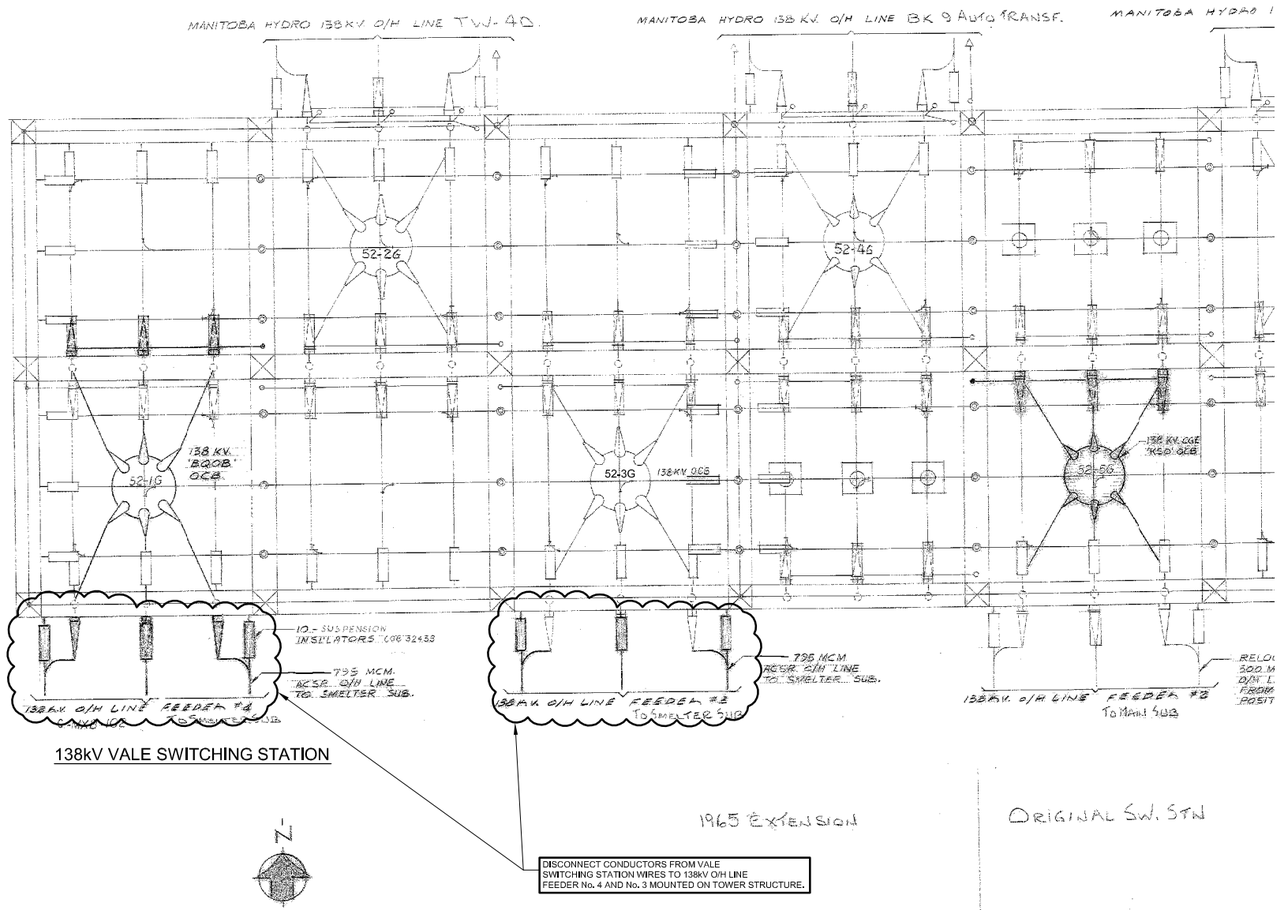
VALE THOMPSON MINE SITE THOMPSON, MANITOBA

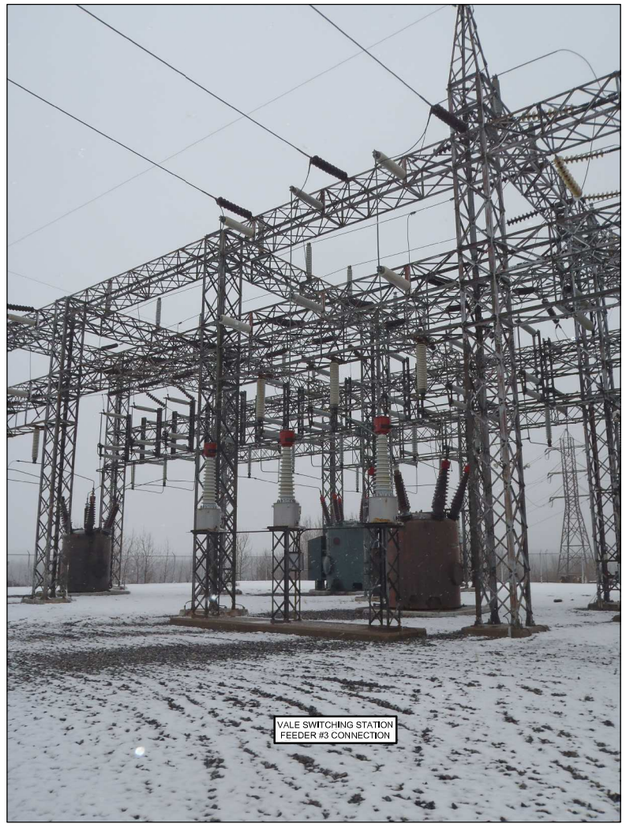
UTILITY DECOMMISSIONING

SMELTER SUBSTATION AND FACILITY ELECTRICAL DISCONNECTION DIAGRAM

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project NO: 75756-09	Report NO: 008	Drawing NO: E-002




VALE SWITCHING STATION FEEDER #3 CONNECTION

No	Revision	Date	Initial

NOTES:

1. DISCONNECT CONDUCTORS FOR FEEDER No. 4 AND No. 3 TO SMELTER SUBSTATION FROM VALE SWITCHING STATION STRUCTURE. REFER TO PHOTO.

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

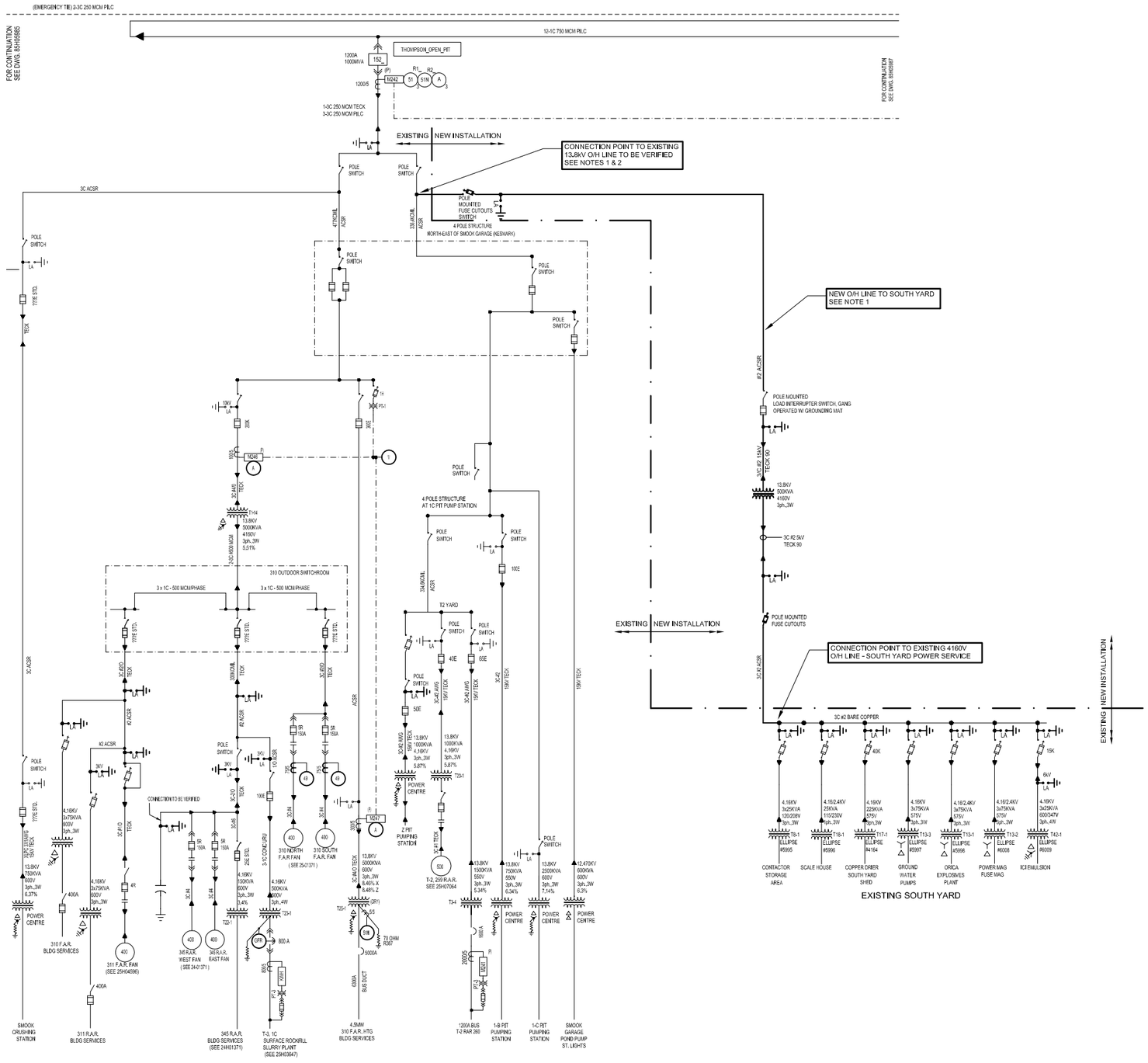
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

VALE SWITCHING STATION PLAN
FEEDERS TO SMELTER SUBSTATION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-003



NO	Revision	Date	Initial

NOTES:

1. DESIGN, SUPPLY AND INSTALL NEW 13,8kV O/H LINE TO SOUTH AREA AS SPECIFIED. CONNECT / TAP NEW 13,8 kV O/H LINE TO SOUTH YARD TO BRANCH FEEDER RUNNING FROM THOMPSON OPEN PIT (TOP) TO SMOOK GARAGE AS INDICATED ON THE SITE PLAN, E-0001. INSTALL STEP DOWN TRANSFORMER, 500kVA, 13,8kV/4160V AT THE SOUTH YARD LOCATION. CONNECT SECONDARY OF NEW TRANSFORMER TO EXISTING 4160V O/H LINE AT SOUTH YARD. VERIFY CONNECTION POINTS PRIOR TO DESIGN, WITH VALE OPERATION AND SITE CONDITIONS, ADJUST AS RECOMMENDED BY OWNER AND COORDINATE WITH EXISTING INSTALLATION.
2. PROVIDE PROTECTION FOR NEW INSTALLATION. SELECT FUSE RATINGS ACCORDING TO REPORT FOR THE MODIFIED SYSTEM COORDINATION STUDY.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

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Status	Date	Initial

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

NEW 13.8kV OVERHEAD LINE FEEDER TO SOUTH YARD

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			
INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-004

NO.	Revision	Date	Initial

NOTES:

1. COORDINATE WITH VALE OPERATION, THE DISCONNECTION OF CONVERTER BLOWERS No. 1, No. 2, AND ASSOCIATED CABLES FROM 4160V STARTING AND RUNNING BUS AT 4160V SWITCHGEAR No. 1 LOCATED IN COMPRESSOR BUILDING.
2. SET IN "OFF" POSITION AND RACK-OUT 4160V BREAKERS FROM STARTING AND RUNNING UNITS, DISCONNECT CABLES AND DROP CABLES INTO CABLE TRAYS BELOW. INSTALL CABLE MARKERS ON BOTH ENDS OF THE ABANDONED CABLES. APPLY "NOT IN SERVICE" TAG AND MECHANICAL LOCKS.
3. REFER TO DRAWINGS E-011 AND E-012 FOR 4160V SWITCHGEAR No. 1 LAYOUT AND DRAWING E-013 FOR DISCONNECTION OF ASSOCIATED EQUIPMENT IN COMPRESSOR BUILDING ELECTRICAL ROOM No. 1.

LEGEND

EQUIPMENT TO BE DISCONNECTED

THIS DRAWING HAS BEEN PREPARED UTILIZING BASELINE DRAWINGS PROVIDED BY THE CLIENT. WHILE THE BASELINE INFORMATION IS BELIEVED TO BE RELIABLE, CRA DOES NOT WARRANT ITS ACCURACY OR COMPLETENESS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED HEREIN AS A RESULT. THE BASELINE INFORMATION ON THIS DRAWING ORIGINATED FROM THE CLIENTS DRAWING. #85-561-H-03019 THOMPSON UTILITY, MAIN SUBSTATION, HIGH VOLTAGE, PLANT SINGLE LINE DIAGRAM - "AS BUILT", REVISION 10, DATED NOVEMBER 2010. AND DRAWING #85-561-H-05987, REV 10.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

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100% DESIGN	12/31/12	TR
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VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

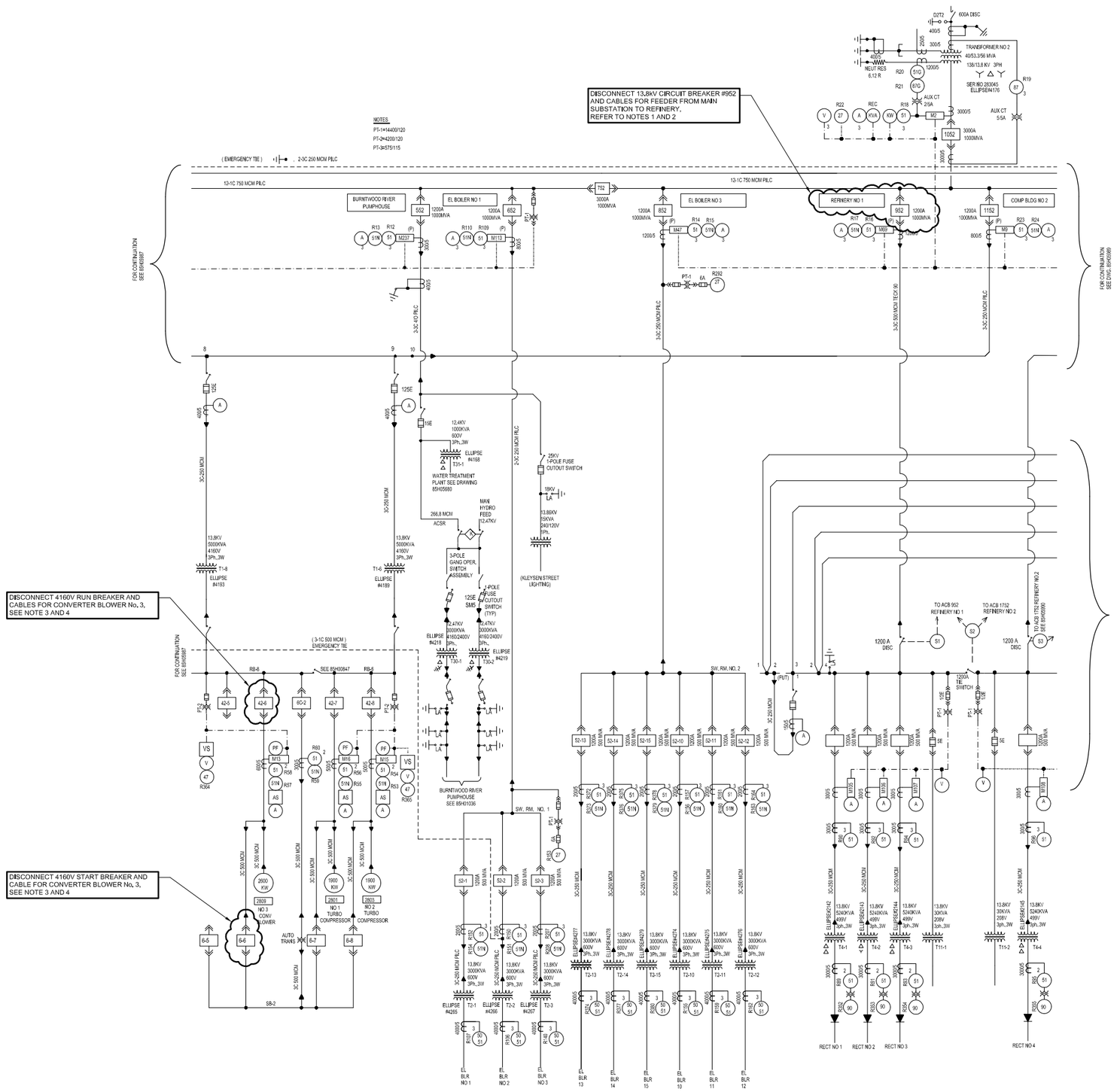
UTILITY DECOMMISSIONING

COMPRESSOR BUILDING ELECTRICAL ROOM No.1
4160V CONVERTER BLOWERS DISCONNECTION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			
INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-005

75756-09(008)EL-WA005 JAN 7/2013



NO	Revision	Date	Initial

NOTES:

1. COORDINATE WITH VALE OPERATION DISCONNECTION OF MAIN SUBSTATION 13,8kV SWITCHGEAR FEEDERS TO REFINERY, EMERGENCY TIE TO SMELTER SUBSTATION AND BLOWER ASSOCIATED WITH SMELTER FACILITY OPERATION FROM COMPRESSOR BUILDING 4160V SWITCHGEAR No. 1
2. DISCONNECT 13.8kV CIRCUIT BREAKER #952 AND CABLES TO REFINERY FACILITY. DRAW-OUT BREAKER AND DROP 3-3/C #500 MCM TECK 90 CABLE INTO CABLE TRAY BELOW. IDENTIFY END OF ABANDONED CABLES WITH MARKER. APPLY MECHANICAL LOCK AND TAG "NOT IN SERVICE" AT SWITCHGEAR CELL 9. REFER TO E-010 FOR SWITCHGEAR LAYOUT.
3. SET IN "OFF" POSITION AND RACK-OUT 4160V BREAKERS FROM STARTING AND RUNNING UNITS, DISCONNECT CABLES AND DROP CABLES INTO CABLE TRAYS BELOW. INSTALL CABLE MARKERS ON BOTH ENDS OF THE ABANDONED CABLES. APPLY "NOT IN SERVICE" TAG AND MECHANICAL LOCKS.
4. REFER TO DRAWINGS E-011 AND E-012 FOR 4160V SWITCHGEAR No. 1 LAYOUT AND DRAWINGS E-013 AND E-014 FOR DISCONNECTION OF ASSOCIATED EQUIPMENT IN COMPRESSOR BUILDING ELECTRICAL ROOM No. 1.

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
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Status	Date	Initial

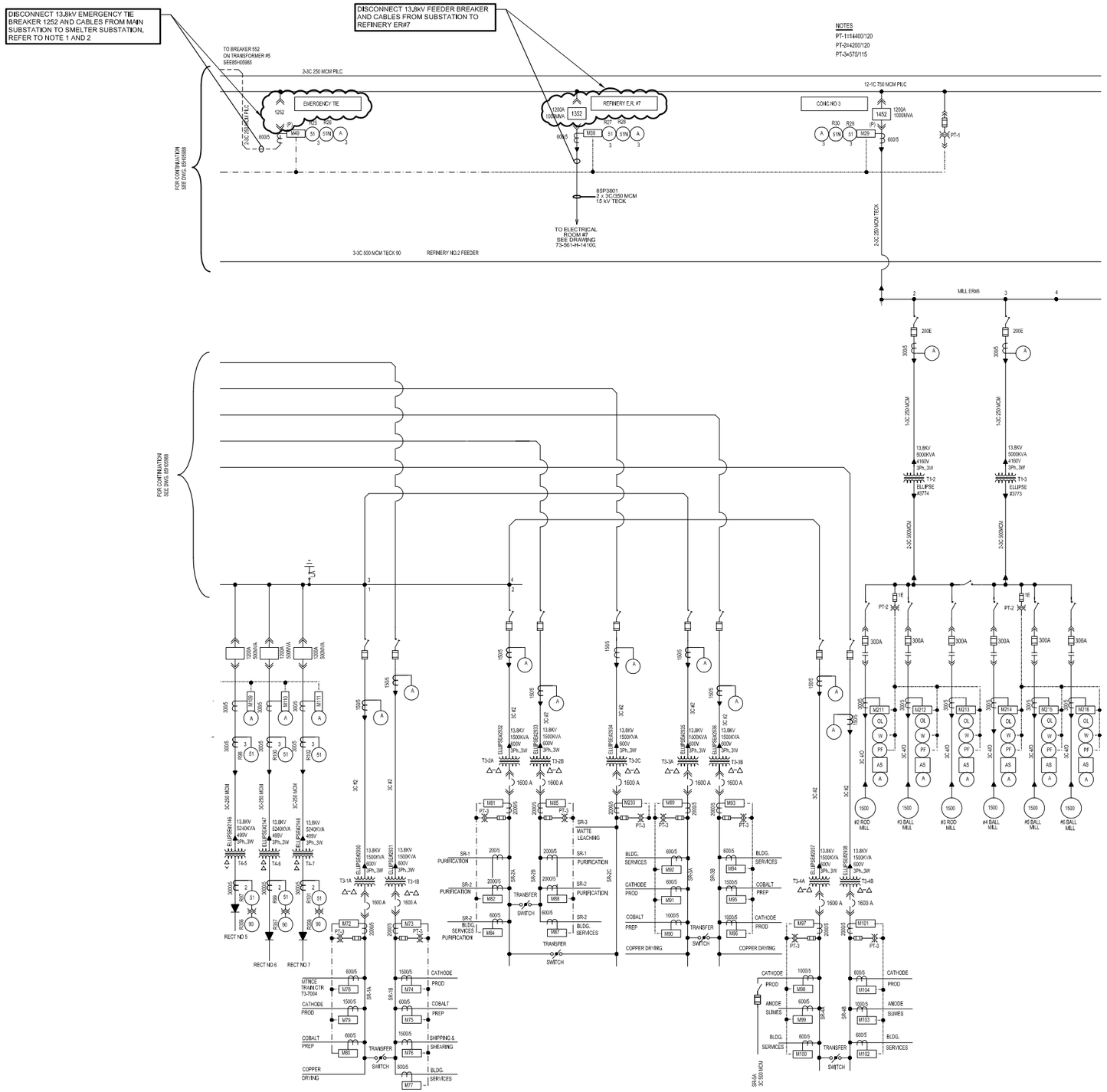
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

13.8kV REFINARY FEEDER AND COMPRESSOR BUILDING 4160V LOADS DISCONNECTION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-006



No	Revision	Date	Initial

NOTES:

1. COORDINATE WITH VALE OPERATION DISCONNECTION FROM MAIN SUBSTATION 13,8kV SWITCHGEAR EMERGENCY TIE TO SMELTER SUBSTATION AND FEEDERS TO REFINERY.
2. DISCONNECT 13.8kV CIRCUIT BREAKERS #1252 AND #1352 AND ASSOCIATED CABLES, DRAW-OUT BREAKERS, DISCONNECT CABLES AND DROP CABLES INTO CABLE TRAYS BELOW. IDENTIFY END OF ABANDONED CABLES WITH CABLE MARKER, APPLY MECHANICAL LOCK AND TAG "NOT IN SERVICE" AT THE SWITCHGEAR CELL 12 & CELL 13. REFER TO DRAWING E-010 FOR MAIN SUBSTATION 13,8kV EQUIPMENT LAYOUT.

LEGEND

EQUIPMENT TO BE DISCONNECTED

THIS DRAWING HAS BEEN PREPARED UTILIZING BASELINE DRAWINGS PROVIDED BY THE CLIENT. WHILE THE BASELINE INFORMATION IS BELIEVED TO BE RELIABLE, CRA DOES NOT WARRANT ITS ACCURACY OR COMPLETENESS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED HEREIN AS A RESULT. THE BASELINE INFORMATION ON THIS DRAWING ORIGINATED FROM THE CLIENTS DRAWING. #85-561-H-03019 THOMPSON UTILITY, MAIN SUBSTATION, HIGH VOLTAGE, PLANT SINGLE LINE DIAGRAM - "AS BUILT", REVISION 10, DATED NOVEMBER 2010. AND DRAWING #85-561-H-05989, REV 7.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

VALE THOMPSON MINE SITE THOMPSON, MANITOBA

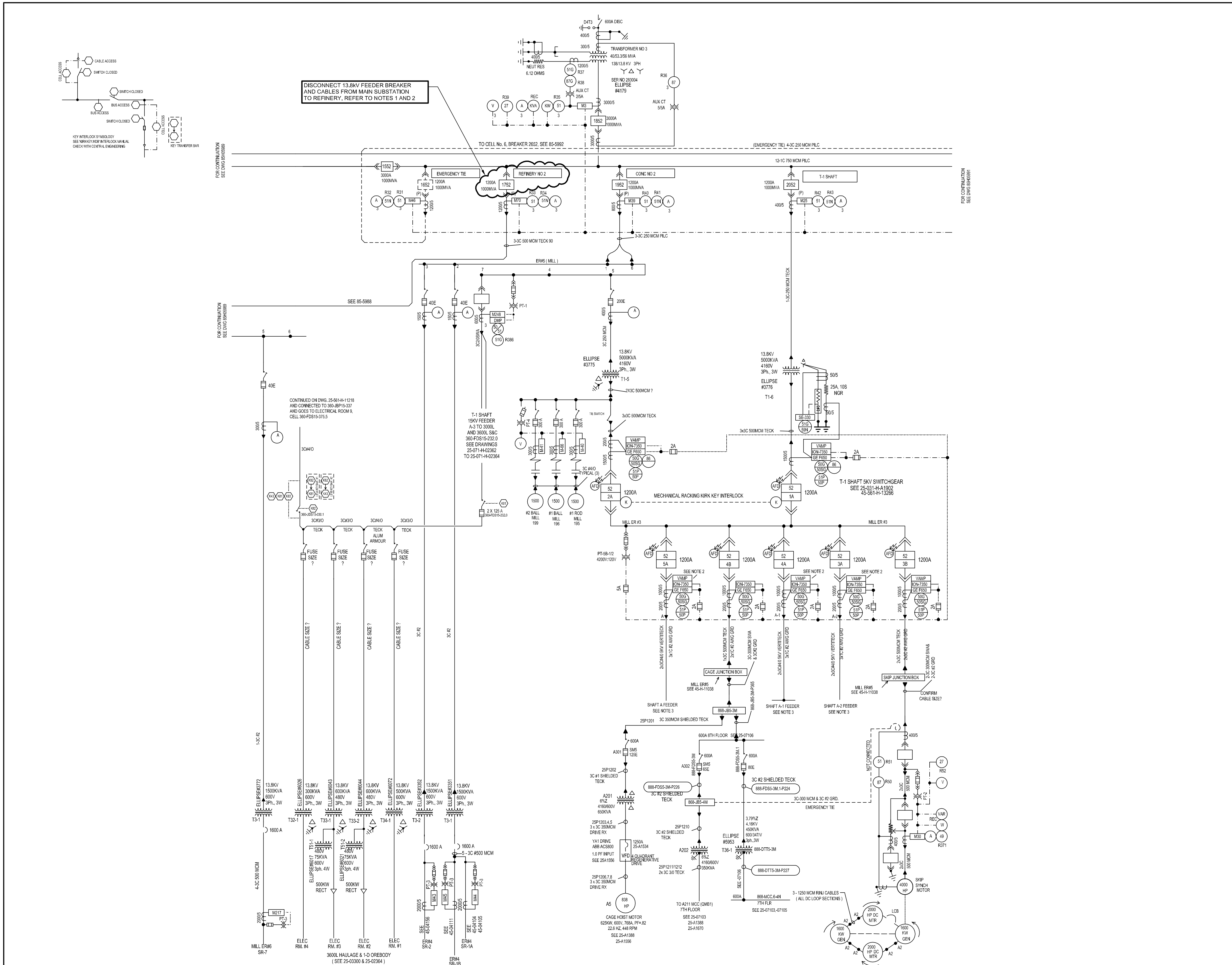
UTILITY DECOMMISSIONING

13.8kV EMERGENCY TIE AND REFINARY FEEDERS DISCONNECTION FROM MAIN SUBSTATION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-007

75756-09(008)EL-WA007 JAN 7/2013



Nº	Revision	Date	Initial

NOTES:

1. COORDINATE WITH VALE OPERATION DEPARTMENT DISCONNECTION FROM MAIN SUBSTATION 13.8kV SWITCHGEAR FEEDER TO REFINERY.
2. DISCONNECT 13.8kV CIRCUIT BREAKER #1752 AND CABLES. DRAW-OUT BREAKER, DISCONNECT 3-3/C #500 MCM TECK 90 CABLES. DROP CABLES INTO CABLE TRAY BELOW. IDENTIFY END OF ABANDONED CABLES WITH CABLE MARKER, APPLY MECHANICAL LOCK AND TAG "NOT IN SERVICE" AT THE SWITCHGEAR CELL 17. REFER TO DRAWING E-010 FOR MAIN SUBSTATION 13.8kV EQUIPMENT LAYOUT.

LEGEND

EQUIPMENT TO BE DISCONNECTED

THIS DRAWING HAS BEEN PREPARED UTILIZING BASELINE DRAWINGS PROVIDED BY THE CLIENT. WHILE THE BASELINE INFORMATION IS BELIEVED TO BE RELIABLE, CRA DOES NOT WARRANT ITS ACCURACY OR COMPLETENESS AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED HEREIN AS A RESULT. THE BASELINE INFORMATION ON THIS DRAWING ORIGINATED FROM THE CLIENTS DRAWING. #85-561-H-03019 THOMPSON UTILITY, MAIN SUBSTATION, HIGH VOLTAGE, PLANT SINGLE LINE DIAGRAM - "AS BUILT", REVISION 10, DATED NOVEMBER 2010. AND DRAWING #85-561-H-05990, REV 12.

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

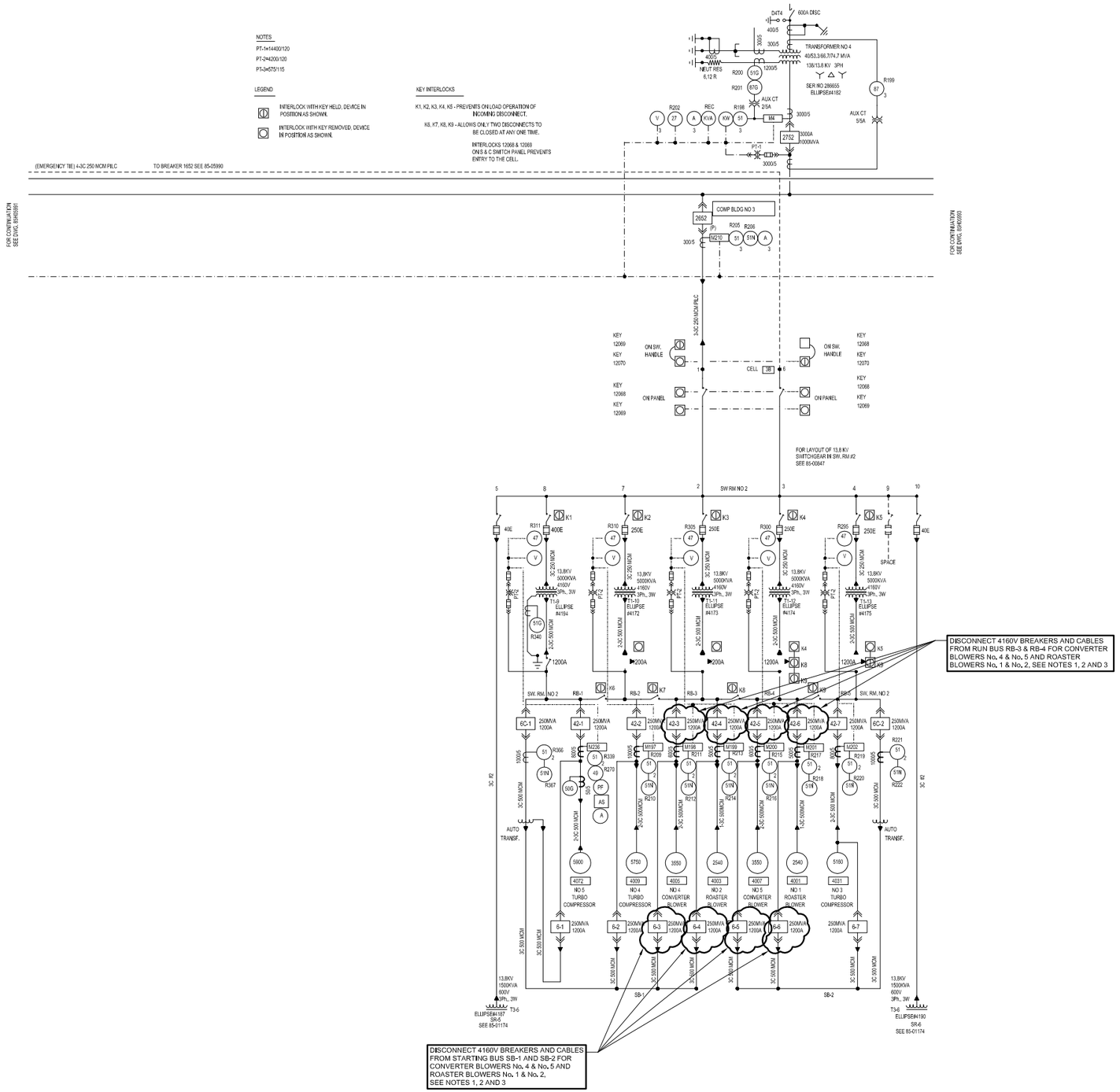
UTILITY DECOMMISSIONING

13.8kV REFINERY FEEDER No. 2
DISCONNECTION FROM MAIN SUBSTATION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project Nº: 75756-09	Report Nº: 008	Drawing Nº: E-008

75756-09(008)EL-WA008 JAN 7/2013



No	Revision	Date	Initial

NOTES:

1. COORDINATE WITH VALE OPERATION DISCONNECTION OF CONVERTER BLOWERS No. 4 AND No. 5, ROASTER BLOWERS No. 1 AND No. 2 AND ASSOCIATED CABLES FROM STARTING AND RUNNING BUSES AT 4160V SWITCHGEAR No. 2 LOCATED IN COMPRESSOR BUILDING.
2. SET IN "OFF" POSITION AND DRAW-OUT 4160V CIRCUIT BREAKERS. DISCONNECT AND DROP CABLES INTO CABLE TRAYS BELOW. INSTALL CABLE MARKERS ON BOTH ENDS OF THE ABANDONED CABLES. APPLY TO UNIT "NOT IN SERVICE" TAG AND MECHANICAL LOCK.
3. REFER TO DRAWING E-015 FOR 4160V SWITCHGEAR No. 2 LAYOUT AND DRAWING E-016 FOR DISCONNECTION OF ASSOCIATED EQUIPMENT IN COMPRESSOR BUILDING ELECTRICAL ROOM No. 2.

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

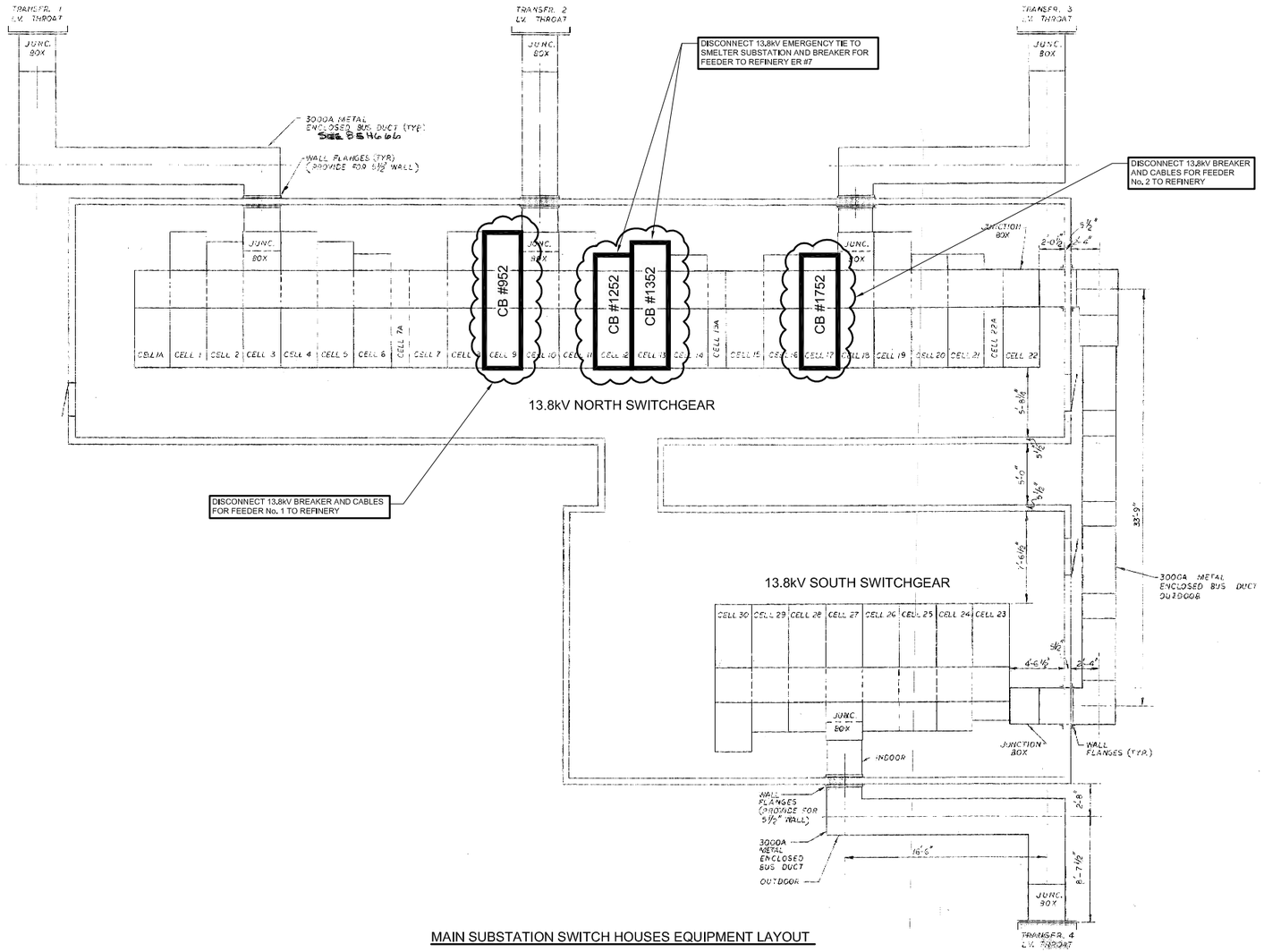
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

COMPRESSOR BUILDING ELECTRICAL ROOM #2
4160V BLOWERS DISCONNECTION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-009



MAIN SUBSTATION SWITCH HOUSES EQUIPMENT LAYOUT

No	Revision	Date	Initial

NOTES:

1. REFER TO E-006, E-007, AND E-008 FOR MAIN SUBSTATION SINGLE LINE DIAGRAMS SHOWING DISCONNECTION DETAILS.

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

Status	Date	Initial
100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR

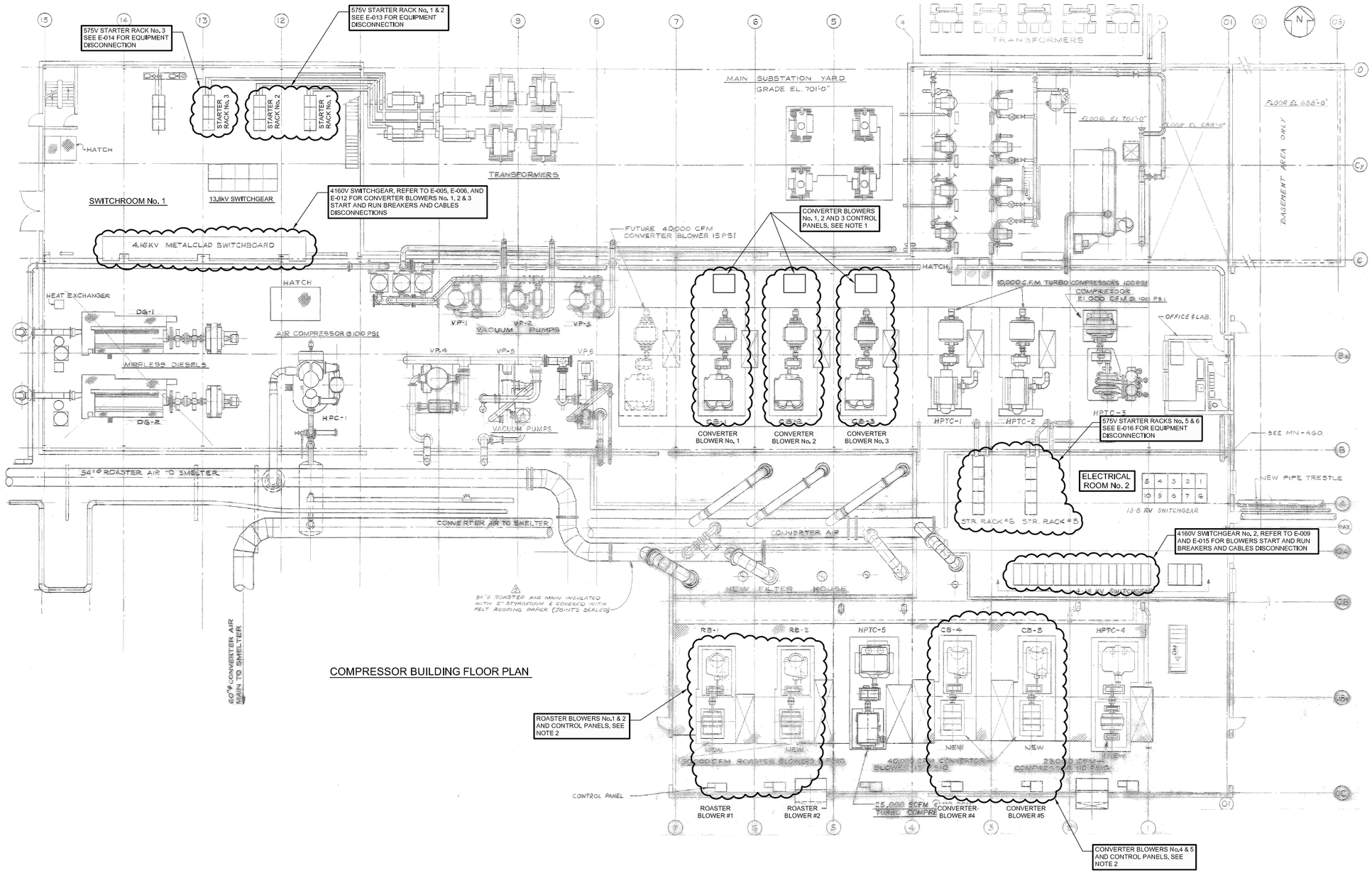
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

MAIN SUBSTATION 13.8kV SWITCHGEAR EQUIPMENT DISCONNECTION LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-010



COMPRESSOR BUILDING FLOOR PLAN

No	Revision	Date	Initial

NOTES:

1. DISCONNECT START AND RUN BREAKERS & FEEDERS IN 4160V SWITCHGEAR No. 1 FOR CONVERTER BLOWERS No. 1, 2, & 3, DISCONNECT BREAKERS, AC/DC POWER AND CONTROL CABLES INCLUDING FIELD MOUNTED CONTROL PANELS. DISCONNECT SWITCHES AND CABLES FROM 575VAC RACKS No. 1, 2 & 3 FOR ALL EQUIPMENT ASSOCIATED WITH EACH BLOWER.
2. DISCONNECT START AND RUN BREAKERS AND FEEDERS IN 4160V SWITCHGEAR No. 2 FOR CONVERTER BLOWERS No. 4 & 5 AND ROASTER BLOWERS No. 1 & 2. DISCONNECT BREAKERS, AC/DC POWER AND CONTROL CABLES INCLUDING FIELD MOUNTED CONTROL PANELS. DISCONNECT SWITCHES AND CABLES FROM 575 VAC RACK No. 5 & 6 FOR ALL EQUIPMENT ASSOCIATED WITH EACH BLOWER.

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

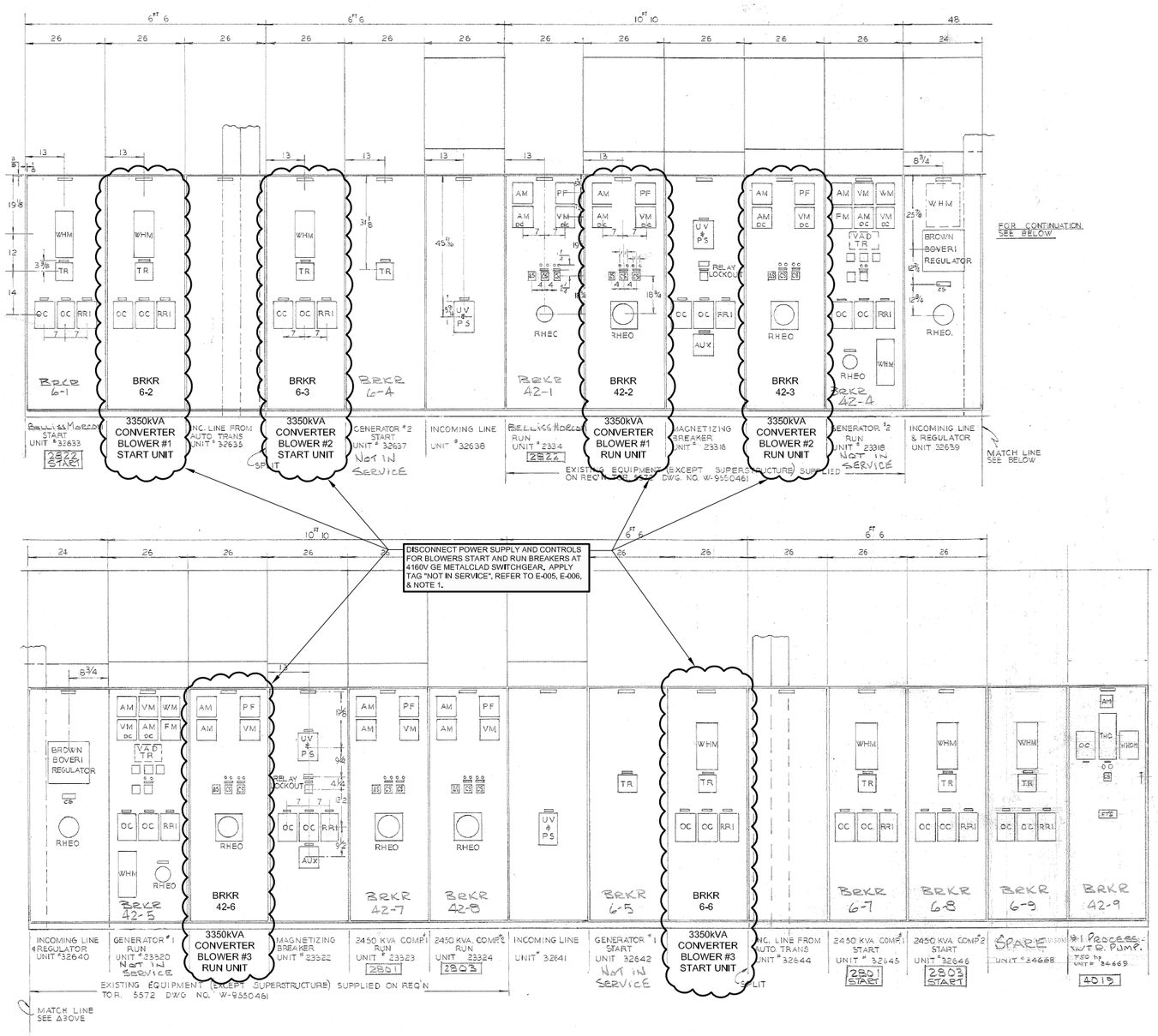
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

COMPRESSOR BUILDING ELECTRICAL EQUIPMENT DISCONNECTION LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-011



4160V SWITCHGEAR No. 1 FRONT LAYOUT

No	Revision	Date	Initial

NOTES:

1. DISCONNECT START AND RUN BREAKERS FOR CONVERTER No. 1, 2, & 3. DISCONNECT 125VDC CONTROL FOR BREAKERS CLOSING AND TRIP CIRCUITS, BLOWER CONTROL PANELS INCLUDING AC POWER SUPPLY. DC SUPPLY FROM BATTERIES AND BLOWER ASSOCIATED EQUIPMENT INTERLOCKS. REFER TO BLOWER CONTROL SCHEMATICS. CONSULT THE OWNER FOR REQUIRED INFORMATION.
2. REFER TO SINGLE LINE DIAGRAMS E-013 AND E-014. FOR DISCONNECTION OF ASSOCIATED EQUIPMENT FROM 575VAC RACKS #1, #2 & #3.

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

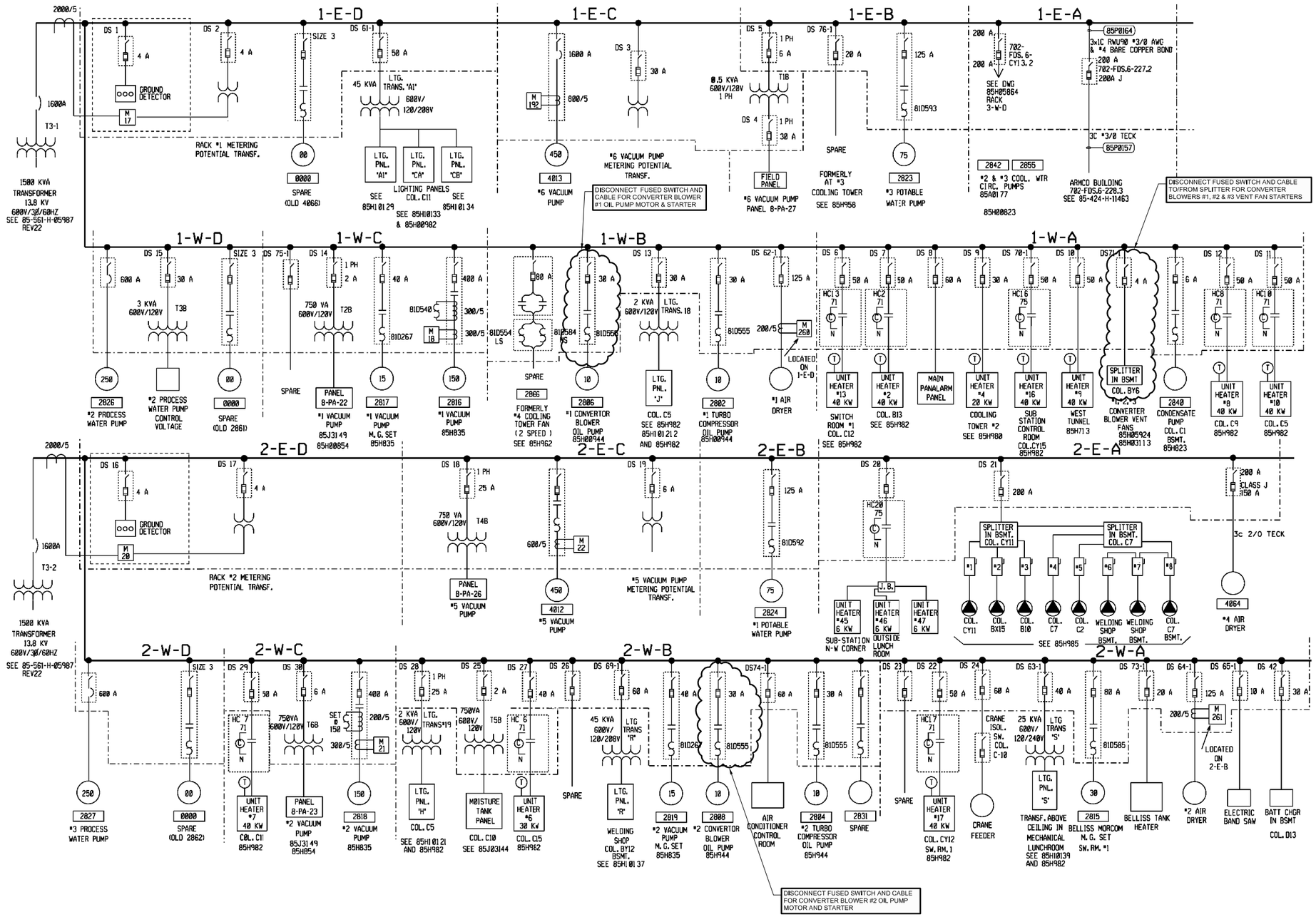
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

COMPRESSOR BUILDING ELECTRICAL ROOM No. 1
4160V SWITCHGEAR DISCONNECTION LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-012



NO	Revision	Date	Initial

NOTES:

1. DISCONNECT 575V SWITCH FOR CONVERTER BLOWER OIL PUMPS AND VENT FAN (SPLITTER), REMOVE FUSES, DISCONNECT WIRING FOR EQUIPMENT INTERLOCKS FROM STARTER AND FIELD LOCATED MOTOR. APPLY MECHANICAL LOCK, MARK-UP BOTH ENDS OF ABANDONED CABLES AND SWITCH/STARTER AS "SPARE".

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

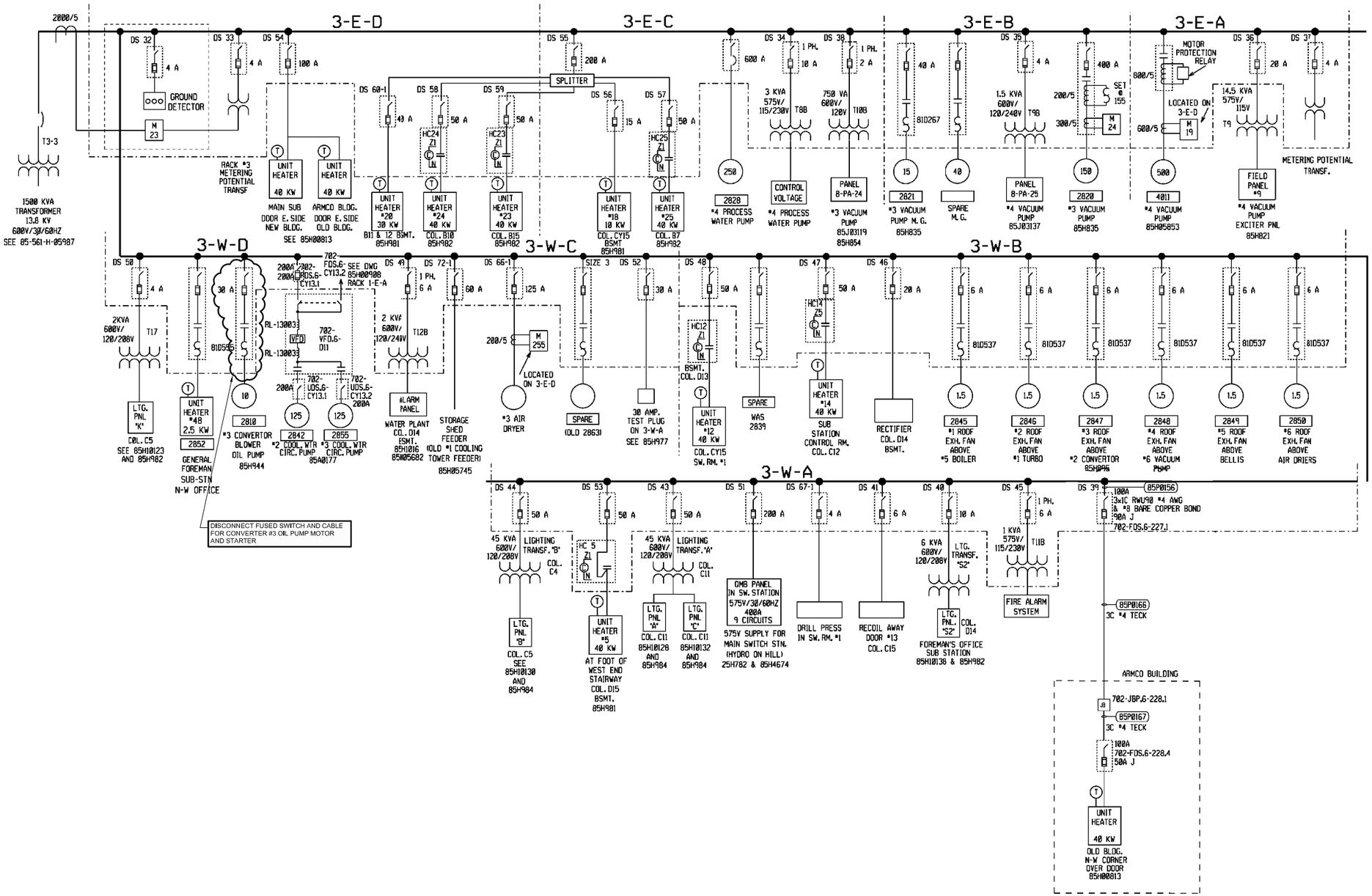
UTILITY DECOMMISSIONING

COMPRESSOR BUILDING ELECTRICAL ROOM No. 1
575VAC STARTER RACKS #1 & 2 DISCONNECTION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			
INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-013

75756-09(008)EL-WA013 JAN 7/2013



N♀	Revision	Date	Initial

NOTES:

1. DISCONNECT 575V SWITCH FOR CONVERTER BLOWER #3 OIL PUMP. REMOVE FUSES, DISCONNECT WIRING FOR ASSOCIATED EQUIPMENT INTERLOCKS FROM STARTER AND FIELD LOCATED MOTOR. APPLY MECHANICAL LOCK, MARK-UP BOTH ENDS OF ABANDONED CABLES AND SWITCH/STARTER AS "SPARE".

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

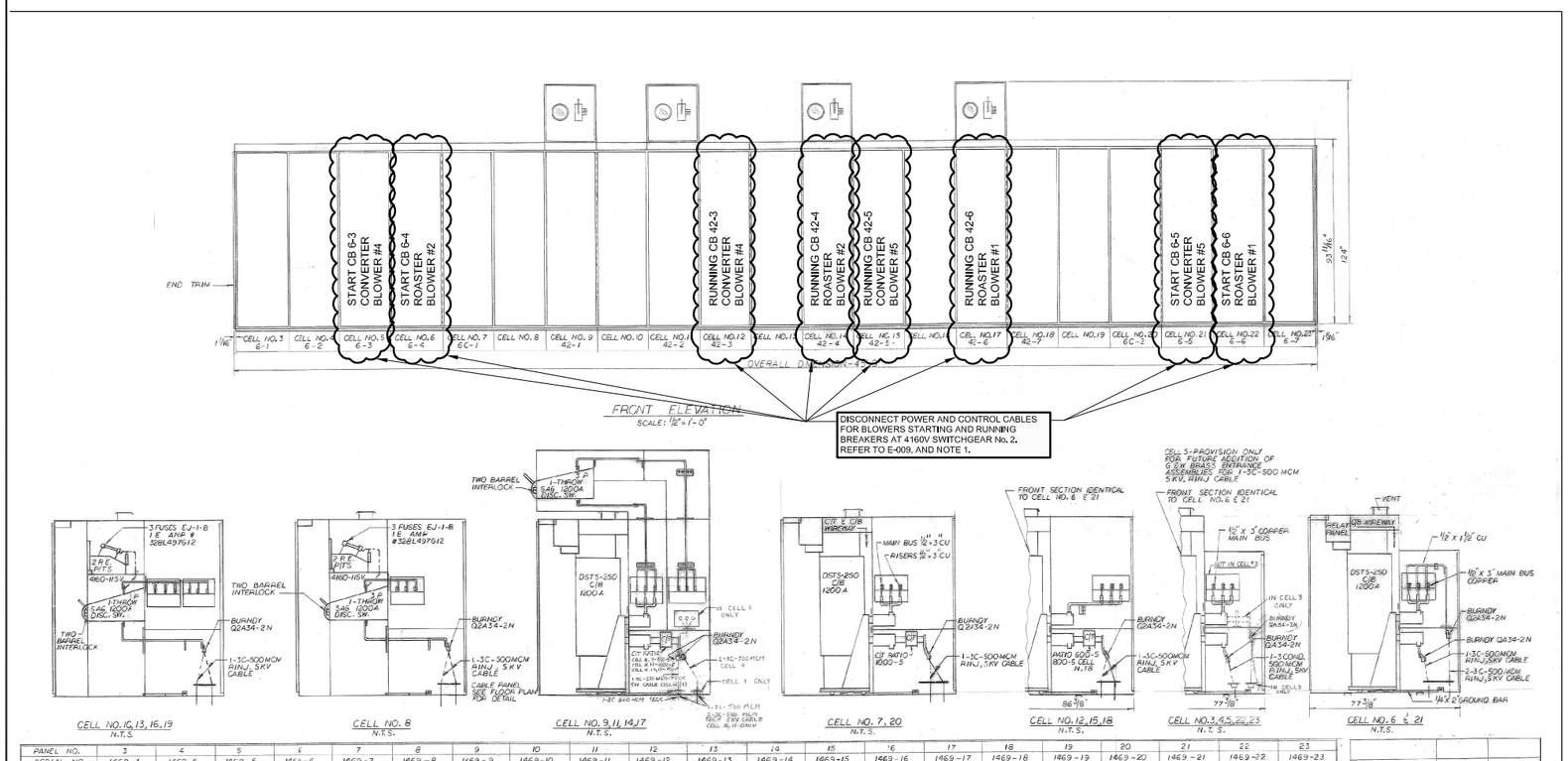
UTILITY DECOMMISSIONING

COMPRESSOR BUILDING ELECTRICAL ROOM No. 1
575VAC STARTER RACKS #3 DISCONNECTION

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project N♀: 75756-09	Report N♀: 008	Drawing N♀: E-014

75756-09(008)EL-WA014 JAN 7/2013



PANEL NO.		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SERIAL NO.		1469-3	1469-4	1469-5	1469-6	1469-7	1469-8	1469-9	1469-10	1469-11	1469-12	1469-13	1469-14	1469-15	1469-16	1469-17	1469-18	1469-19	1469-20	1469-21	1469-22	1469-23
C/B SERIAL NO.		14691-1-1	14691-1-2	14691-1-3	14691-1-4	14691-1-5	—	14691-1-6	—	14691-1-7	14691-1-8	—	14691-1-9	14691-1-10	—	14691-1-11	14691-1-12	—	14691-1-13	14691-1-14	14691-1-15	14691-1-16
C/B PART LIST		WS281-P-0621E	WS281-P-0621E	WS281-P-0621E	WS281-P-0621E	WS281-P-0621E	—	WS281-P-0621E	—	WS281-P-0621E	WS281-P-0621E	—	WS281-P-0621E	WS281-P-0621E	—	WS281-P-0621E	WS281-P-0621E	—	WS281-P-0621E	WS281-P-0621E	WS281-P-0621E	WS281-P-0621E
BUS RATING		1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1100 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A	1200 A
C/T	RATIO	—	—	—	—	1000-5	—	800/5A	—	1000-5	600-5	—	500-5	600-5	—	500-5	800-5	—	1000-5	—	—	—
	ACCURACY	—	—	—	—	0.3 B 0.0 2.5 L 200	—	0.3 B 0.0 2.5 L 200	—	0.3 B 0.0 2.5 L 200	0.3 B 0.0 2.5 L 200	—	0.3 B 0.0 2.5 L 200	0.3 B 0.0 2.5 L 200	—	0.3 B 0.0 2.5 L 200	0.3 B 0.0 2.5 L 200	—	0.3 B 0.0 2.5 L 200	—	—	—
	R L.	—	—	—	—	W1290-P-0565 1 PC DIA. EL. CU 600 X 10 PC LG.	—	—	—	W1290-P-0565 1 PC DIA. EL. CU 600 X 10 PC LG.	W1290-P-0561 1 PC DIA. EL. CU 600 X 10 PC LG.	—	W1290-P-0565 1 PC DIA. EL. CU 600 X 10 PC LG.	W1290-P-0561 1 PC DIA. EL. CU 600 X 10 PC LG.	—	W1290-P-0550 1 PC DIA. EL. CU 600 X 10 PC LG.	W1290-P-0564 1 PC DIA. EL. CU 600 X 10 PC LG.	—	W1290-P-0564 1 PC DIA. EL. CU 600 X 10 PC LG.	—	—	—
	PRIMARY	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	RATIO	—	—	—	—	—	4160-115 V	4160 - 120 V	4160-115 V	—	—	4160-115 V	—	—	4160-115 V	—	—	4160-115 V	—	—	—	—
P/T	ACCURACY	—	—	—	—	—	0.3 W XY 0.6 Z	0.3 WXY 0.6 Z	0.3 W XY 0.6 Z	—	—	0.3 W XY 0.6 Z	—	—	0.3 W XY 0.6 Z	—	—	0.6 W XY 0.3 Z	—	—	—	—
	R L.	—	—	—	—	—	2211 B	—	2211 B	—	—	2211 B	—	—	2211 B	—	—	—	—	—	—	—
S.S.TRANSFORMER		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DISCONNECT		—	—	—	—	—	5AG1200 A	5AG1200 A	5AG1200 A	5AG1200 A	—	5AG1200 A	5AG1200 A	—	5AG1200 A	5AG1200 A	—	5AG1200 A	—	—	—	—
POTHEAD/CABLE LUGS		Q2A26-6 GRD.	Q2A34-2N	Q2A34-2N	Q2A34-2N Q2A34-2N	Q2A34-2N	Q2A34-2N	PROVISION ONLY	Q2A34-2N	Q2A34-2N Q2A34-2N	Q2A34-2N	Q2A34-2N	Q2A34-2N Q2A34-2N	Q2A34-2N	Q2A34-2N	Q2A34-2N	Q2A34-2N	Q2A34-2N	Q2A34-2N	Q2A34-2N	Q2A34-2N Q2A34-2N	Q2A26 GRD.
GROUND BAR		1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU	1/4 x 2 CU
INTERLOCKS																						

HORN, PRESS. SWS, PRESS. GAUGES	ENG'G'D BY	
DESCRIPTION	REQ. NO. ORDER NO.	
MATERIAL ORDERED ON REQUISITIONS		

No	Revision	Date	Initial

NOTES:

1. DISCONNECT START AND RUN BREAKERS FOR CONVERTER BLOWERS No. 4 & 5 AND ROASTER BLOWERS No. 1 AND 2. DISCONNECT 125VDC CONTROL FOR BREAKERS CLOSING AND TRIP CIRCUITS, BLOWERS CONTROL PANELS INCLUDING AC POWER SUPPLY, DC SUPPLY FROM BATTERIES AND BLOWER ASSOCIATED EQUIPMENT INTERLOCKS. REFER TO BLOWER CONTROL SCHEMATICS. CONSULT THE OWNER FOR REQUIRED INFORMATION.
2. REFER TO DISCONNECTION SINGLE LINE DIAGRAMS E-016 FOR DISCONNECTION OF ASSOCIATED EQUIPMENT FROM 575VAC RACKS #5 & #6.

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	DEC 7 2012	TR
Status	Date	Initial

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

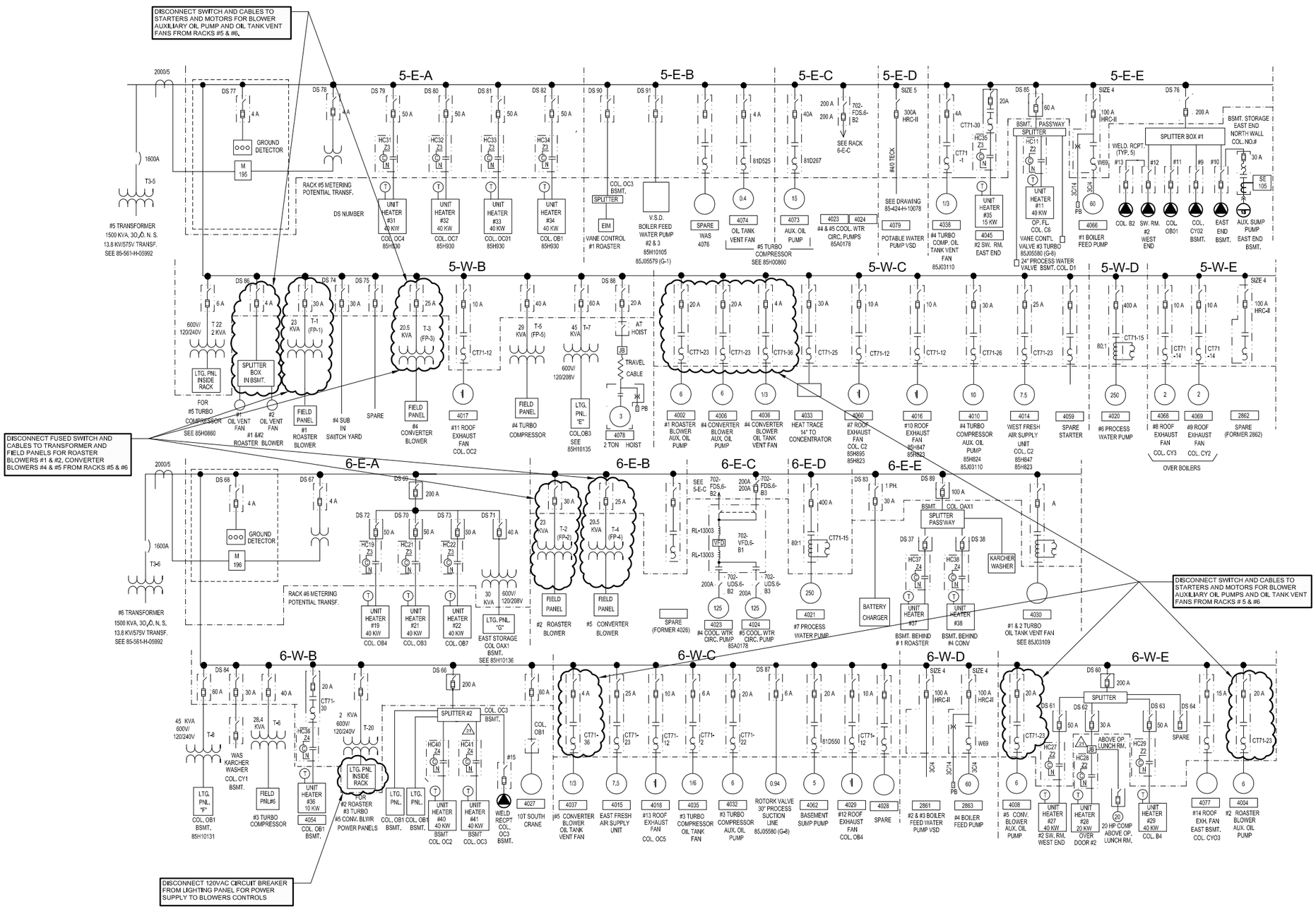
UTILITY DECOMMISSIONING

COMPRESSOR BUILDING ELECTRICAL ROOM No. 2
4160V SWITCHGEAR #2 DISCONNECTION LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.

Project Manager:	Reviewed By:	Date:	
D. B.	T. R.	SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-015



NO	Revision	Date	Initial

NOTES:

1. DISCONNECT FROM 575V RACK #5 & #6 FUSED SWITCH AND CABLES FOR CONVERTER BLOWERS #4 & #5 AND ROASTER BLOWERS #1 & #2 AUXILIARY OIL PUMP, OIL TANK VENT FAN AND FIELD CONTROL PANEL. REMOVE FUSES, DISCONNECT CABLES BETWEEN SWITCHES, TRANSFORMERS, FIELD PANELS AND MOTORS. APPLY MECHANICAL LOCK AND CABLE MARKERS TO BOTH ENDS OF ABANDONED CABLES AND MARK-UP SWITCH/STARTER AS "SPARE".

LEGEND

EQUIPMENT TO BE DISCONNECTED

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

DRAWING STATUS

100% DESIGN	12/31/12	TR
90% DESIGN	12/07/12	TR
Status	Date	Initial

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

COMPRESSOR BUILDING ELECTRICAL ROOM No. 2
575V STARTER RACK #5 & #6 DICONNECTION

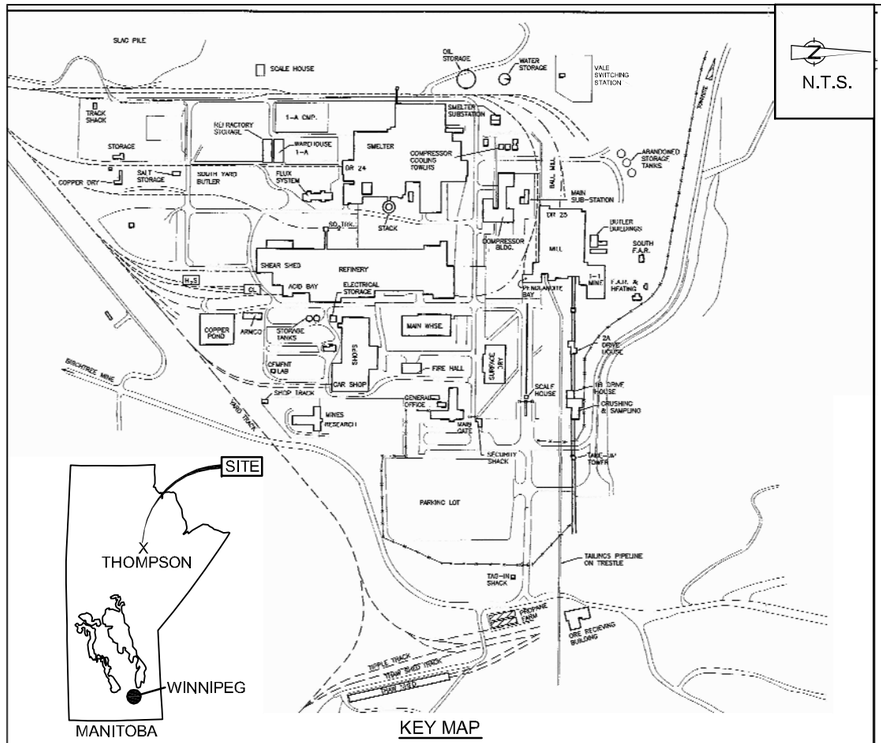
CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INCO INC.			
Project Manager: D. B.	Reviewed By: T. R.	Date: SEPT 2012	
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: E-016

APPENDIX C

UTILITY DECOMMISSIONING AND REMOVALS
ABOVE GRADE 100% DESIGN
(FOR REFERENCE ONLY)

(11x17 DRAWINGS INCLUDED,
PLAN SIZE PROVIDED UNDER SEPARATE COVER)



KEY MAP

N.T.S.

Source Reference: AMEC Earth &Environmental Limited Project WX05384 Drawing Thompson Plant Site Plant. Dated January 2003.

VALE THOMPSON MINE SITE

THOMPSON, MANITOBA

UTILITY DECOMMISSIONING & REMOVALS

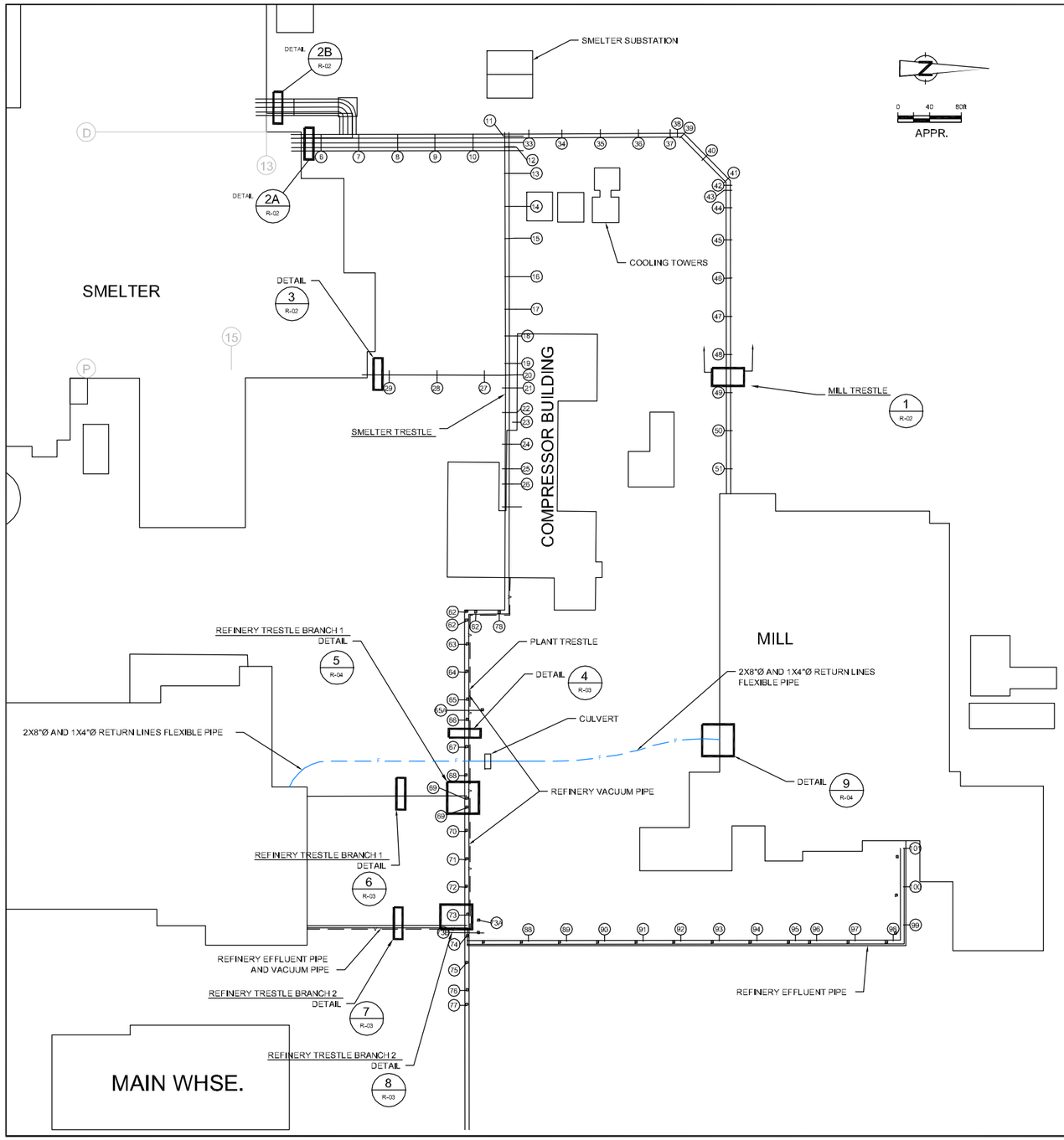
ABOVE GRADE 100% DESIGN

(FOR REFERENCE ONLY)

CONESTOGA-ROVERS & ASSOCIATES

DRAWING INDEX

DWG. No	REV. No	DATE	TITLE
G-01	0	JULY 2012	COVER SHEET
M-01	3	JULY 2012	ABOVE GRADE UTILITIES EXISTING PLAN
R-01	3	JULY 2012	ABOVE GRADE UTILITIES DECOMMISSIONING PLAN
R-02	2	JULY 2012	DETAIL SHEET 1 OF 3
R-03	2	JULY 2012	DETAIL SHEET 2 OF 3
R-04	2	JULY 2012	DETAIL SHEET 3 OF 3
R-05	2	OCT 2012	GROUND FLOOR PLAN EXISTING EQUIPMENT & PIPING LAYOUT
R-06	2	OCT 2012	GROUND FLOOR PLAN REMOVALS EQUIPMENT & PIPING LAYOUT
R-07	2	OCT 2012	PLAN AND SECTION ROASTER BLOWER ISOLATION POINTS AND REMOVALS
R-08	2	OCT 2012	PLAN AND SECTION CONVERTER BLOWERS CB-4 & CB-5 ISOLATION POINTS AND REMOVALS
R-09	2	OCT 2012	SECTIONS CONVERTER BLOWERS CB-4, CB-5
R-10	2	OCT 2012	CONVERTER BLOWERS CB-1, CB-2, CB-3 ISOLATION POINTS AND REMOVALS
R-11	2	OCT 2012	SECTIONS CONVERTER BLOWERS CB-1, CB-2, CB-3
R-12	2	DEC 2012	CONVERTER BLOWERS CB-1, CB-2, CB-3 DETAILS



GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND MEASUREMENTS INCLUDING LOCATION, SIZE, LENGTH, ELEVATION, AND CONFIGURATION OF ALL WORK SHOWN ON THE DRAWINGS PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES. CONTRACTOR SHALL REPORT TO VALE PM ANY DISCREPANCIES AND/OR UNSATISFACTORY CONDITIONS WHICH MAY ADVERSELY AFFECT THE PROPER COMPLETION OF THE WORK
2. THE OPERATION OF EXISTING VALVES (AS REQUIRED) SHALL BE CONDUCTED BY VALE STAFF AND SHALL REQUIRE A MIN OF 48 HOURS WRITTEN NOTICE.
3. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH VALE HEALTH AND SAFETY REQUIREMENTS FOR THE THOMPSON MINE SITE..
4. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MANITOBA WORKPLACE SAFETY AND HEALTH ACT.
5. VALE OPERATIONS SHALL TAKE PRECEDENCE OVER ALL DECOMMISSIONING ACTIVITIES.
6. CONTRACTOR SHALL COORDINATE AND ARRANGE WITH VALE ANY REQUIRED SYSTEM SHUTDOWNS AND SHALL RECEIVE WRITTEN APPROVAL FROM VALE PRIOR TO PROCEEDING WITH THE WORK. FORMAL WRITTEN REQUEST FOR SHUTDOWNS MUST BE PROVIDED A MIN OF 14 DAYS IN ADVANCE OF THE SHUTDOWN.
7. ROAD ACCESS SHALL BE MAINTAINED AT ALL TIMES.
8. CONTRACTOR SHALL MAINTAIN A SET OF DRAWINGS ON SITE AND SHALL UPDATE THOSE DRAWINGS WEEKLY WITH CONSTRUCTION RECORD INFORMATION.

DECOMMISSIONING NOTES

1. CONTRACTOR SHALL PROVIDE A WRITTEN DECOMMISSIONING PLAN A MIN OF 14 DAYS PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES.
2. COMPLETE ALL WORK IN ACCORDANCE WITH SECTION 02226 - ABOVE GRADE UTILITIES DECOMMISSIONING
3. ISOLATE, DISCONNECT AND CAP ALL PIPING AS SHOWN.
4. PROTECT FROM DAMAGE ALL ADJACENT PIPING, EQUIPMENT, STRUCTURES, WIRING, AND OTHER SYSTEMS NOT IDENTIFIED FOR DECOMMISSIONING. NOTIFY VALE PM IMMEDIATELY OF ANY DAMAGE THAT OCCURS AND REPAIR OR RESTORE THE DAMAGED SYSTEM.
5. ERECT, MAINTAIN, AND REMOVE ALL REQUIRED WORK PLATFORMS (STATIONARY AND/OR MOBILE) REQUIRED TO COMPLETE THE WORK.
6. CONTRACTOR SHALL MONITOR THE WEATHER SEVERAL DAYS IN ADVANCE TO ENSURE THAT WORKS ARE CONDUCTED DURING FAVORABLE WEATHER CONDITIONS.
7. VERIFY WITH VALE STAFF ALL PIPING, EQUIPMENT, AND OTHER SYSTEMS IDENTIFIED FOR DECOMMISSIONING AND THAT ALL SYSTEMS ARE PROPERLY ISOLATED AND READY FOR DECOMMISSIONING PRIOR TO COMMENCEMENT OF THE WORK.

LEGEND

- PIPE TRESTLE
- (71) BENT DESIGNATION NUMBER
- DETAIL LOCATION

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No.	Revision	Date	Initial
3	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

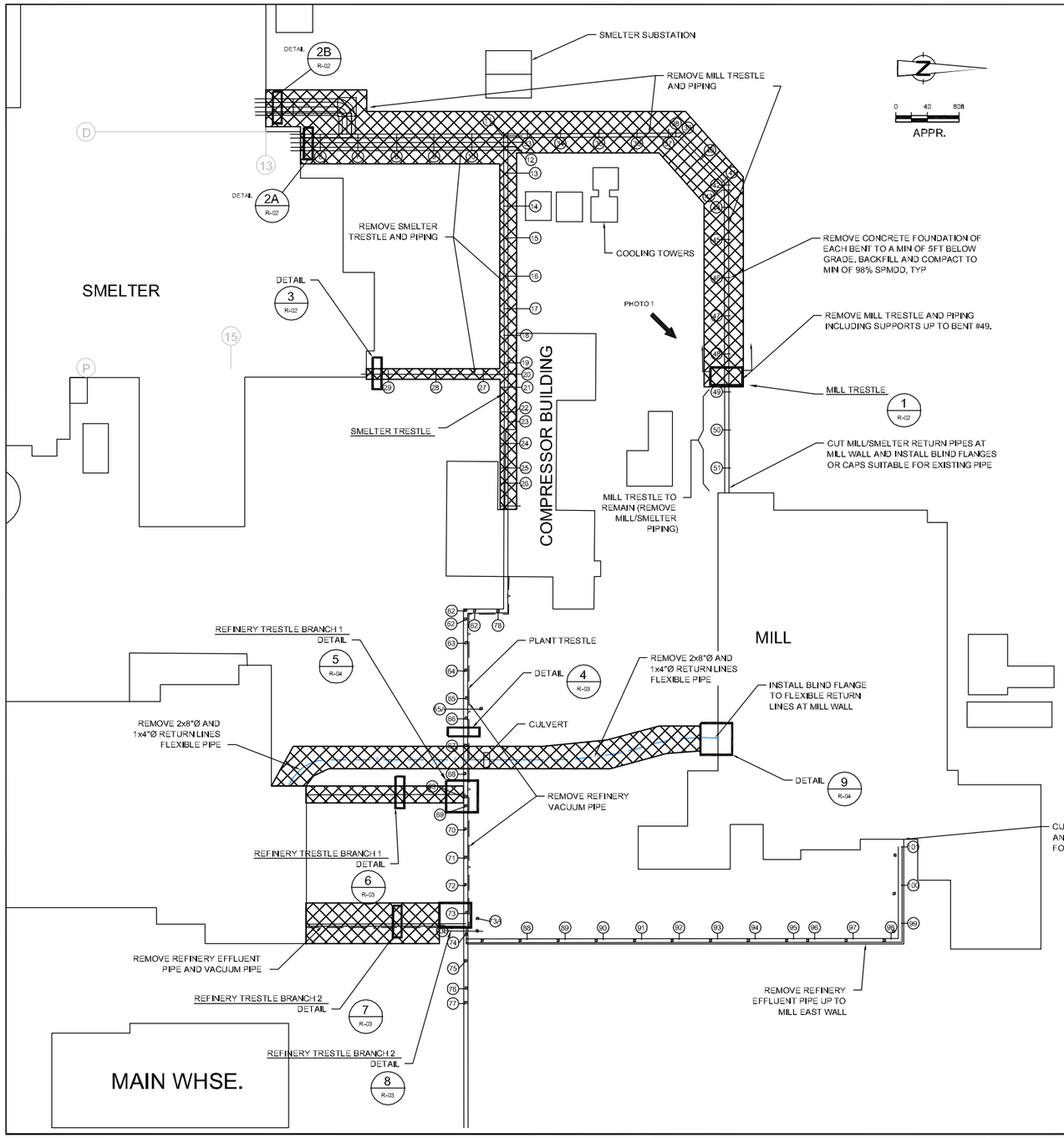
UTILITY DECOMMISSIONING

ABOVE GRADE UTILITIES EXISTING PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: APPROX. 1"=80'	Project No: 75756-09	Report No: 008	Drawing No: M-01

75756-09(008)CI-WA105 JAN 3/2013



LEGEND

- PIPE TRESTLE
- BENT DESIGNATION NUMBER
- DETAIL LOCATION
- REMOVALS

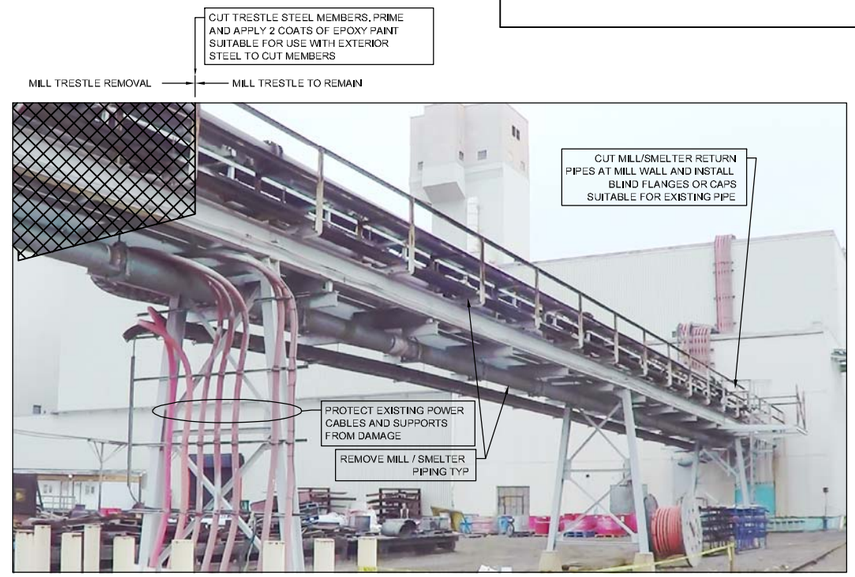


PHOTO 1 - MILL TRESTLE REMOVALS

GENERAL NOTES

1. CONTRACTOR SHALL FIELD VERIFY ALL CONDITIONS AND MEASUREMENTS INCLUDING LOCATION, SIZE, LENGTH, ELEVATION, AND CONFIGURATION OF ALL WORK SHOWN ON THE DRAWINGS PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES. CONTRACTOR SHALL REPORT TO VALE PM ANY DISCREPANCIES AND/OR UNSATISFACTORY CONDITIONS WHICH MAY ADVERSELY AFFECT THE PROPER COMPLETION OF THE WORK
2. THE OPERATION OF EXISTING VALVES (AS REQUIRED) SHALL BE CONDUCTED BY VALE STAFF AND SHALL REQUIRE A MIN OF 48 HOURS WRITTEN NOTICE.
3. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH VALE HEALTH AND SAFETY REQUIREMENTS FOR THE THOMPSON MINE SITE..
4. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MANITOBA WORKPLACE SAFETY AND HEALTH ACT.
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7. ROAD ACCESS SHALL BE MAINTAINED AT ALL TIMES.
8. CONTRACTOR SHALL MAINTAIN A SET OF DRAWINGS ON SITE AND SHALL UPDATE THOSE DRAWINGS WEEKLY WITH CONSTRUCTION RECORD INFORMATION.

DECOMMISSIONING NOTES

1. CONTRACTOR SHALL PROVIDE A WRITTEN DECOMMISSIONING PLAN A MIN OF 14 DAYS PRIOR TO THE START OF DECOMMISSIONING ACTIVITIES.
2. COMPLETE ALL WORK IN ACCORDANCE WITH SECTION 02226 - ABOVE GRADE UTILITIES DECOMMISSIONING
3. ISOLATE, DISCONNECT AND CAP ALL PIPING AS SHOWN.
4. PROTECT FROM DAMAGE ALL ADJACENT PIPING, EQUIPMENT, STRUCTURES, WIRING, AND OTHER SYSTEMS NOT IDENTIFIED FOR DECOMMISSIONING. NOTIFY VALE PM IMMEDIATELY OF ANY DAMAGE THAT OCCURS AND REPAIR OR RESTORE THE DAMAGED SYSTEM.
5. ERECT, MAINTAIN, AND REMOVE ALL REQUIRED WORK PLATFORMS (STATIONARY AND/OR MOBILE) REQUIRED TO COMPLETE THE WORK.
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7. VERIFY WITH VALE STAFF ALL PIPING, EQUIPMENT, AND OTHER SYSTEMS IDENTIFIED FOR DECOMMISSIONING AND THAT ALL SYSTEMS ARE PROPERLY ISOLATED AND READY FOR DECOMMISSIONING PRIOR TO COMMENCEMENT OF THE WORK.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
3	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
2	90% DESIGN	12/07/12	D.B.
1	DRAFT DESIGN REVISION	07/23/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

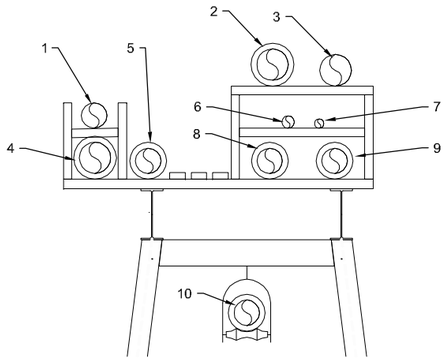
ABOVE GRADE UTILITIES DECOMMISSIONING PLAN

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			Date: JULY 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: APPROX. 1"=80'	Project No: 75756-09	Report No: 008	Drawing No: R-01

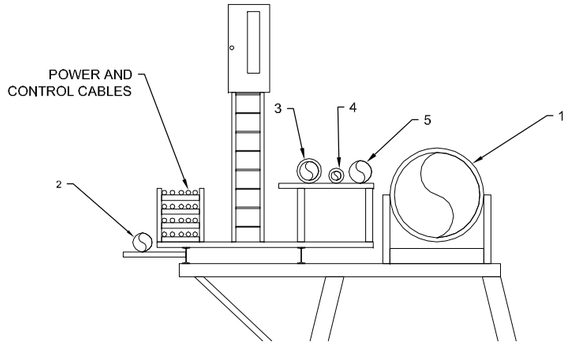
75756-09(008)CI-WA104 JAN 3/2013

NOTE:
1) REMOVE ALL PIPING, CABLING AND TRESTLE COMPONENTS
2) REMOVE CONCRETE SUPPORTS TO MIN. OF 5 FT. BELOW GRADE, BACKFILL AND COMPACT TO A MIN. OF 98% SPMDD



DETAIL 1
N.T.S. R-01

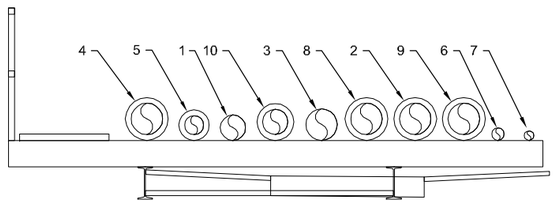
Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	8"	Steel	Spare Nickel Concentrate	N	Y	To Smelter
2	10"	Steel	Spare Nickel Concentrate	Y	Y	To Smelter
3	10"	Steel	Return Water	N	Y	To Mill
4	10"	Steel	Return Water	Y	Y	To Mill
5	6"	Steel	n/a	Y	N	not in service
6	4"	Plastic	n/a	N	N	not in service
7	3"	Plastic	n/a	N	N	not in service
8	10"	Steel	Return Water	Y	Y	To Mill
9	10"	Steel	n/a	Y	N	not in service
10	8"	Steel	Nickel Concentrate	Y	Y	To Smelter



DETAIL 2A
N.T.S. R-01

Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	54"	Steel	Roaster Air	Y	Y	To Smelter
2	12"	Steel	Compressed Air	N	Y	To Smelter
3	12"	Steel	Steam	Y	Y	To Smelter
4	6"	Steel	Condensate	Y	Y	To Comp. Bld
5	14"	Stainless Steel	Vacuum Air	N	N	To Comp. Bld

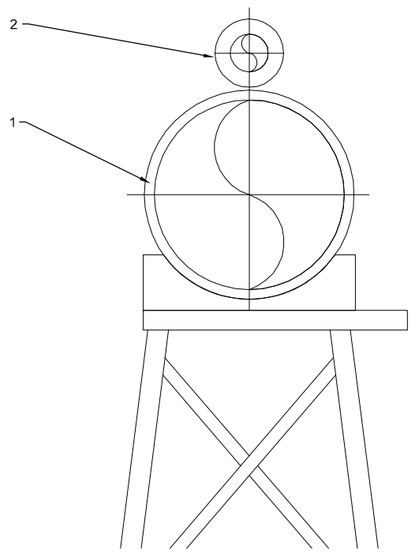
NOTE:
1) REMOVE ALL PIPING, CABLING AND TRESTLE COMPONENTS
2) REMOVE CONCRETE SUPPORTS TO MIN. OF 5 FT. BELOW GRADE, BACKFILL AND COMPACT TO A MIN. OF 98% SPMDD



DETAIL 2B
N.T.S. R-01

Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	8"	Steel	Spare Nickel Concentrate	N	Y	To Smelter
2	10"	Steel	Spare Nickel Concentrate	Y	Y	To Smelter
3	10"	Steel	Water	N	Y	To Mill
4	10"	Steel	Return Water	Y	Y	To Mill
5	6"	Steel	n/a	Y	N	not in service
6	4"	Plastic	n/a	N	N	not in service
7	3"	Plastic	n/a	N	N	not in service
8	10"	Steel	Return Water	Y	Y	To Mill
9	10"	Steel	n/a	Y	N	not in service
10	8"	Steel	Nickel Concentrate	Y	Y	To Smelter

NOTE:
1) REMOVE ALL PIPING, CABLING AND TRESTLE COMPONENTS
2) REMOVE CONCRETE SUPPORTS TO MIN. OF 5 FT. BELOW GRADE, BACKFILL AND COMPACT TO A MIN. OF 98% SPMDD



DETAIL 3
N.T.S. R-01

Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	60"	Steel	Converter Air	Y	Y	To Smelter
2	12"	Steel	Propane (verify purged)	Y	N	not in service

NOTE:
1) REMOVE ALL PIPING, CABLING AND TRESTLE COMPONENTS
2) REMOVE CONCRETE SUPPORTS TO MIN. OF 5 FT. BELOW GRADE, BACKFILL AND COMPACT TO A MIN. OF 98% SPMDD

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

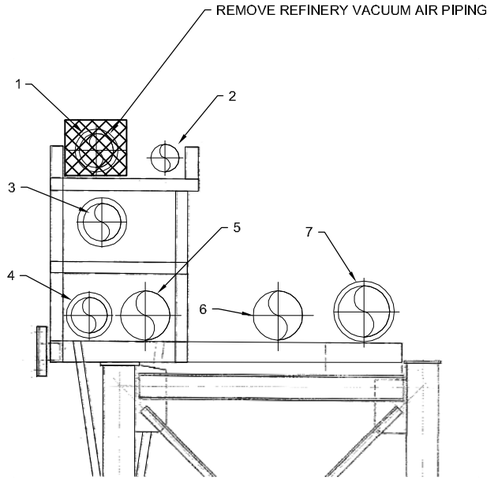
COMPRESSOR BUILDING DECOMMISSIONING

DETAIL SHEET 1 OF 3

CONESTOGA-ROVERS & ASSOCIATES

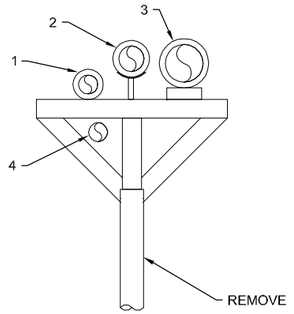
Source Reference:			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E.RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: R-02

75756-09(008)ME-WA005 JAN 3/2013



DETAIL 4 R-01
N.T.S.

Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	14"	Steel	Refinery Vacuum Air	Y	Y	To Comp. Bld.
2	12"	Steel	Propane (verify purged)	Y	N	not in service
3	12"	Steel	Steam	Y	Y	To Plant
4	6"	Steel	Condensate	Y	Y	To Comp. Bld.
5	16"	Steel	Compressed Air	N	Y	To Plant
6	16"	Steel	Compressed Air	N	Y	To Plant
7	20"	Steel	Compressed Air	Y	Y	To Plant

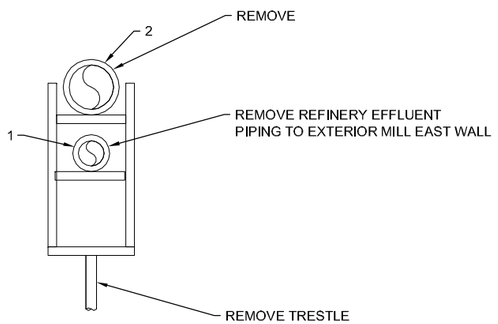


DETAIL 6 R-01
N.T.S.

Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	6"	Steel	Condensate	Y	Y	To Comp. Bld.
2	8"	Steel	Compressed Air	Y	Y	To Refinery
3	12"	Steel	Steam	Y	Y	To Refinery
4	6"	Plastic	Compressed Air	N	Y	To Refinery

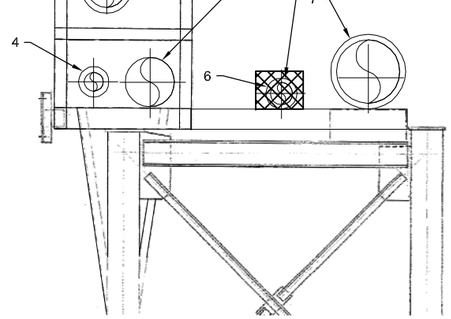
NOTE:
1) REMOVE ALL PIPING, CABLING AND TRESTLE COMPONENTS
2) REMOVE CONCRETE SUPPORTS TO MIN. OF 5 FT. BELOW GRADE, BACKFILL AND COMPACT TO A MIN. OF 98% SPMDD

Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	6"	Steel	Refinery Effluent	Y	Y	To Comp. Bld.
2	14"	Steel	Refinery Vacuum Air	Y	Y	To Comp. Bld.

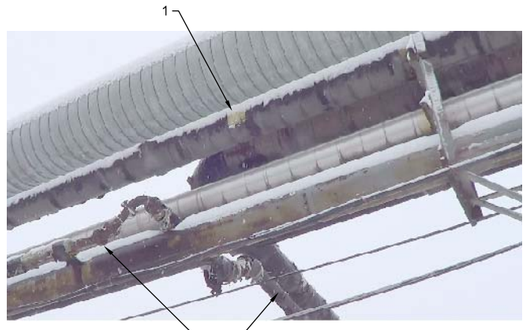


NOTE:
1) REMOVE ALL PIPING, CABLING AND TRESTLE COMPONENTS
2) REMOVE CONCRETE SUPPORTS TO MIN. OF 5 FT. BELOW GRADE, BACKFILL AND COMPACT TO A MIN. OF 98% SPMDD

DETAIL 7 R-01
N.T.S.



Pipe Details Table						
No.	Size	Material	Contents	Insulated	Active	Flow Direction
1	14"	Steel	Refinery Vacuum Air	Y	Y	To Comp. Bld.
2	12"	Steel	Propane (verify purged)	Y	N	not in service
3	12"	Steel	Steam	Y	Y	To Plant
4	6"	Steel	Condensate	Y	Y	To Comp. Bld.
5	16"	Steel	Compressed Air	N	Y	To Plant
6	6"	Steel	Refinery Effluent	Y	Y	To Mill
7	20"	Steel	Compressed Air	Y	Y	To Plant



DETAIL 8 R-01
N.T.S.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

COMPRESSOR BUILDING DECOMMISSIONING

DETAIL SHEET 2 OF 3

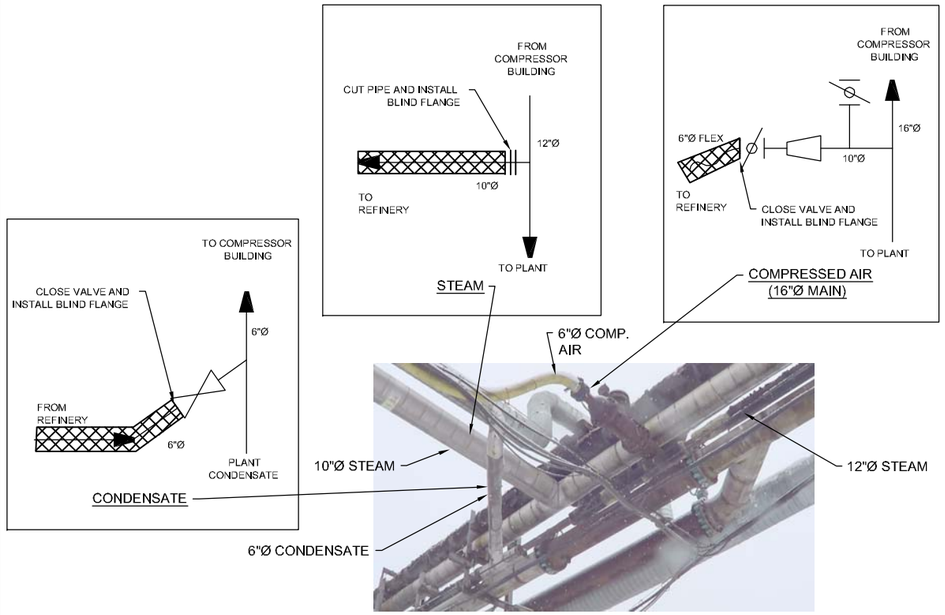
CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: R-03

75756-09(008)ME-WA005 JAN 3/2013

LEGEND

REMOVALS



DETAIL 5 REFINERY PIPE DECOMMISSIONING SCHEMATICS
N.T.S. R-01

1. CUT FLEXIBLE RETURN LINE AT MILL SOUTH WALL AND INSTALL BLIND FLANGE.
2. REMOVE EXTERIOR FLEXIBLE RETURN LINES.

DETAIL 9 MILL RETURN
N.T.S. R-01

No	Revision	Date	Initial
2	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

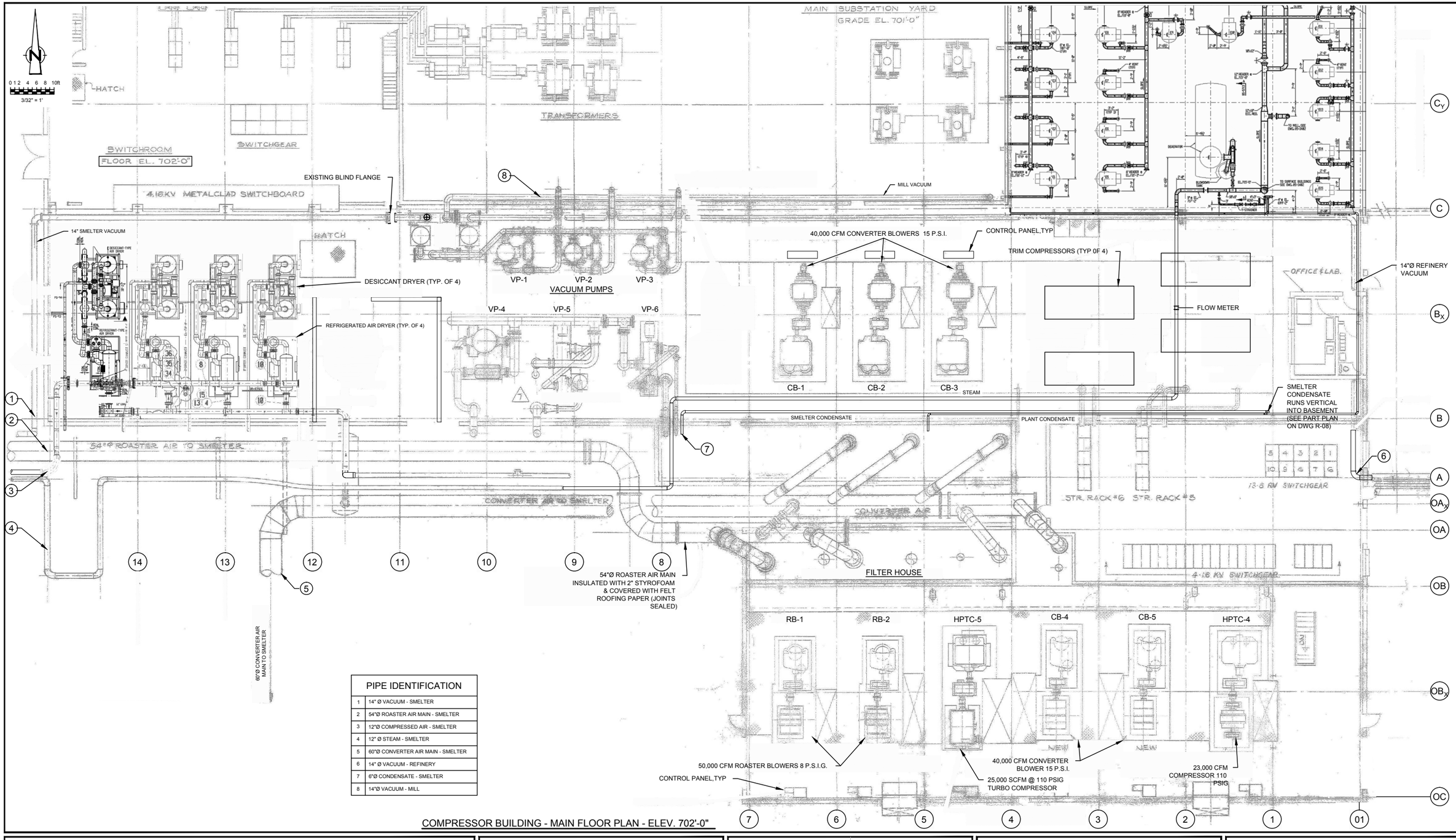
COMPRESSOR BUILDING DECOMMISSIONING

DETAIL SHEET 3 OF 3

CONESTOGA-ROVERS & ASSOCIATES

Source References			Date: DEC 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: E. RUSS
Scale: N.T.S.	Project No: 75756-09	Report No: 008	Drawing No: R-04

75756-09(008)ME-WA005 JAN 4/2013



PIPE IDENTIFICATION	
1	14" Ø VACUUM - SMELTER
2	54"Ø ROASTER AIR MAIN - SMELTER
3	12"Ø COMPRESSED AIR - SMELTER
4	12" Ø STEAM - SMELTER
5	60"Ø CONVERTER AIR MAIN - SMELTER
6	14" Ø VACUUM - REFINERY
7	6"Ø CONDENSATE - SMELTER
8	14"Ø VACUUM - MILL

COMPRESSOR BUILDING - MAIN FLOOR PLAN - ELEV. 702'-0"

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

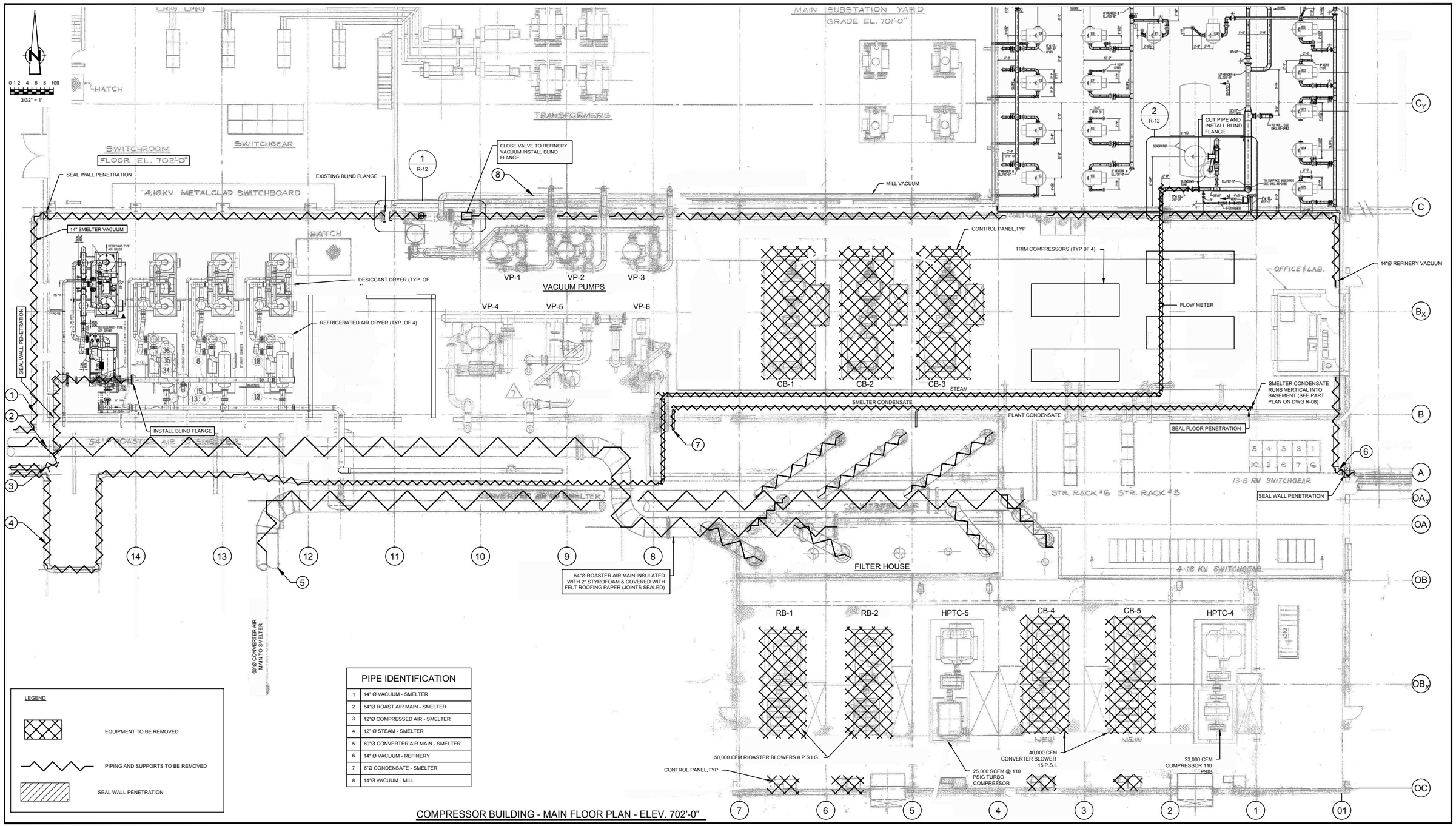
UTILITY DECOMMISSIONING

GROUND FLOOR PLAN
EXISTING EQUIPMENT & PIPING LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-B-1740 / 85-424-G-3925 / 85-424-G-5712 / 85-424-G-10553			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 3/32" = 1'-0"	Project No: 75756-09	Report No: 008	Drawing No: R-05

75756-09(008)RE-WA009 JAN 4/2013



PIPE IDENTIFICATION	
1	14" Ø VACUUM - SMELTER
2	54"Ø ROAST AIR MAIN - SMELTER
3	12"Ø COMPRESSED AIR - SMELTER
4	12" Ø STEAM - SMELTER
5	60"Ø CONVERTER AIR MAIN - SMELTER
6	14" Ø VACUUM - REFINERY
7	6"Ø CONDENSATE - SMELTER
8	14"Ø VACUUM - MILL

LEGEND

- EQUIPMENT TO BE REMOVED
- PIPING AND SUPPORTS TO BE REMOVED
- SEAL WALL PENETRATION

COMPRESSOR BUILDING - MAIN FLOOR PLAN - ELEV. 702'-0"

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

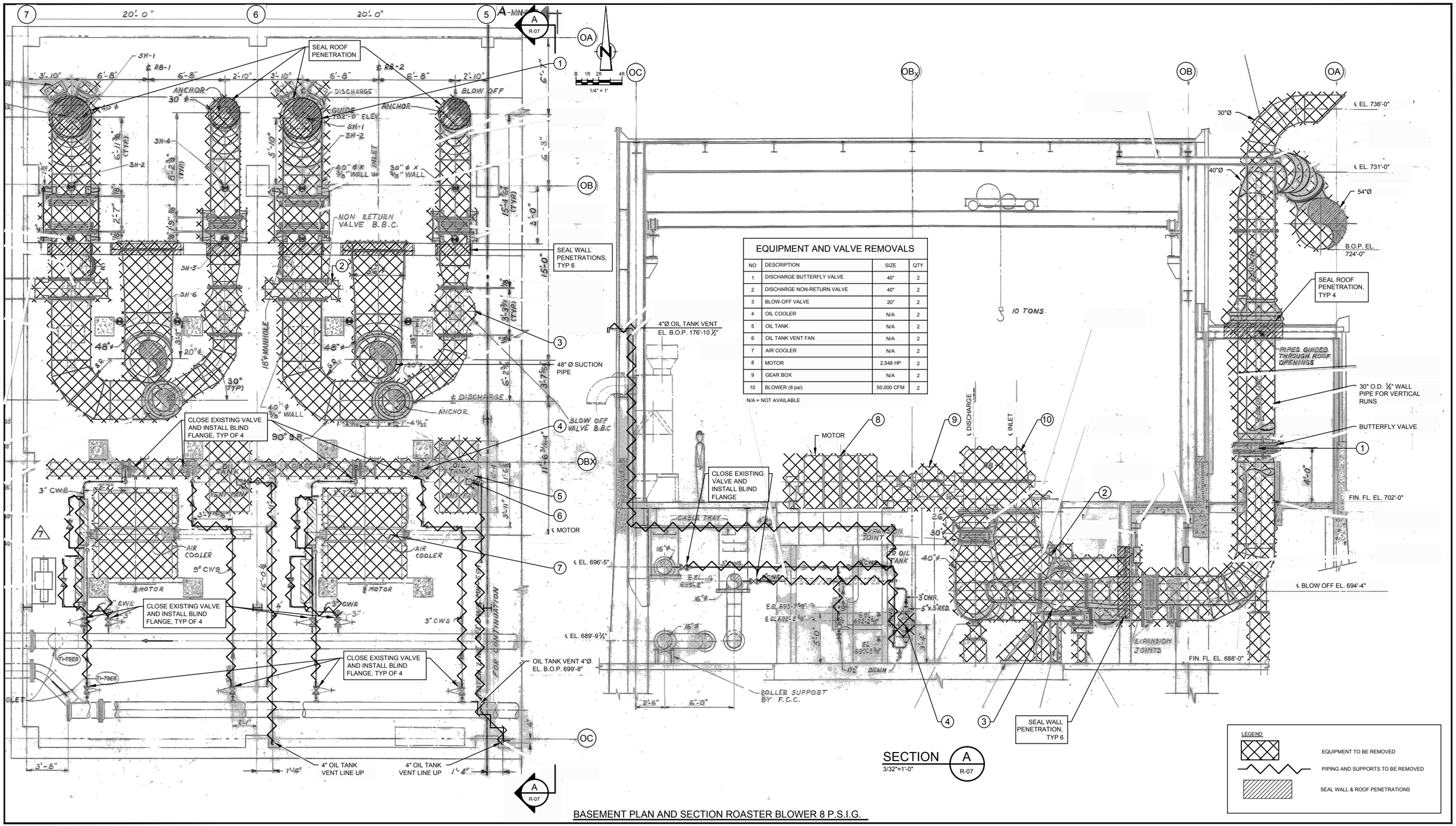
UTILITY DECOMMISSIONING

GROUND FLOOR PLAN
REMOVALS EQUIPMENT & PIPING LAYOUT

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-B-1740 / 85-424-G-3925 / 85-424-G-5712 / 85-424-G-10553			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 3/32" = 1'-0"	Project No: 75756-09	Report No: 008	Drawing No: R-06

75756-09(008)RE-WA001 JAN 4/2013



EQUIPMENT AND VALVE REMOVALS

NO	DESCRIPTION	SIZE	QTY
1	DISCHARGE BUTTERFLY VALVE	40"	2
2	DISCHARGE NON-RETURN VALVE	40"	2
3	BLOW-OFF VALVE	20"	2
4	OIL COOLER	N/A	2
5	OIL TANK	N/A	2
6	OIL TANK VENT FAN	N/A	2
7	AIR COOLER	N/A	2
8	MOTOR	2,548 HP	2
9	GEAR BOX	N/A	2
10	BLOWER (8 psi)	50,000 CFM	2

N/A = NOT AVAILABLE

BASEMENT PLAN AND SECTION ROASTER BLOWER 8 P.S.I.G.

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
2	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

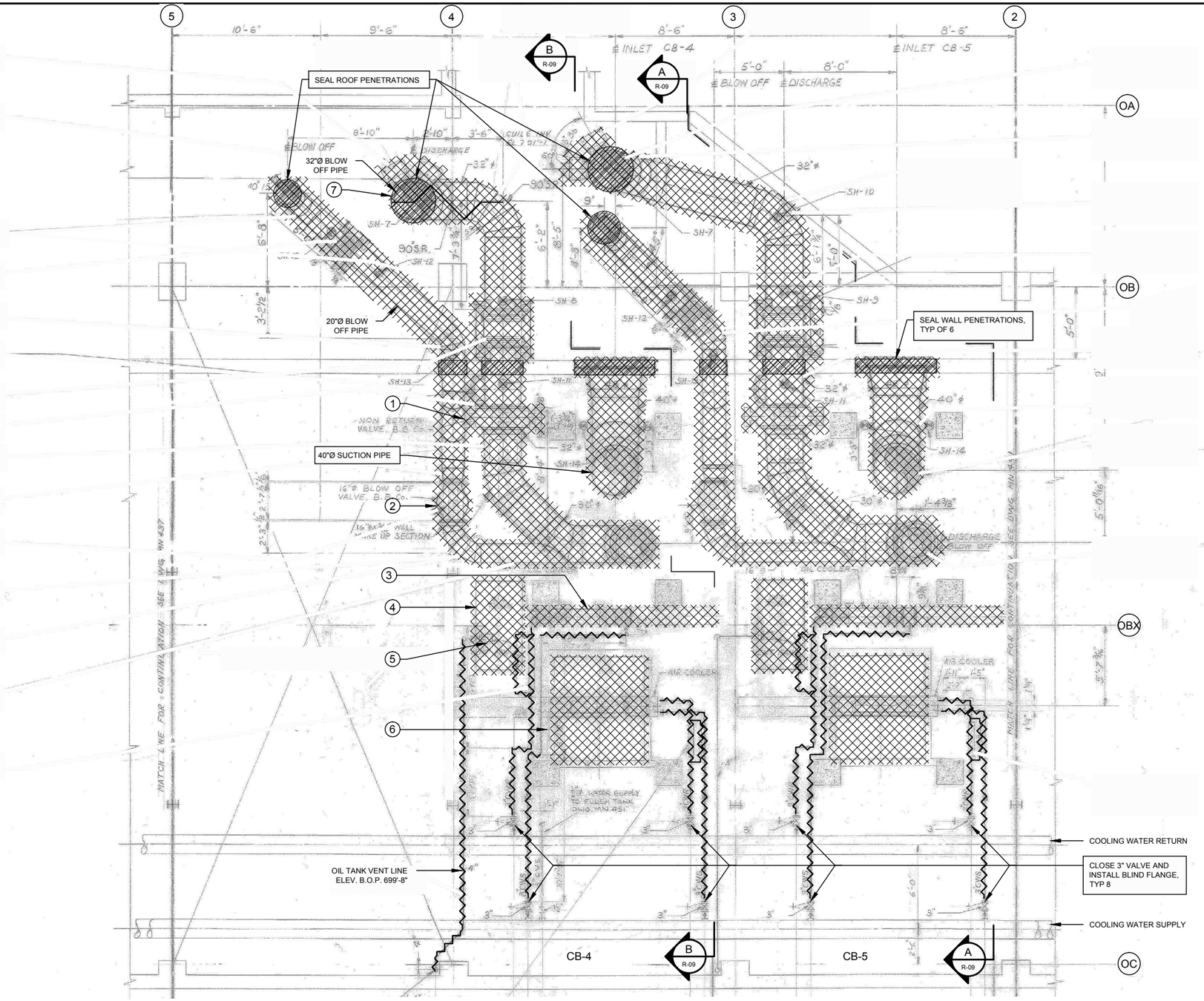
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

PLAN AND SECTION ROASTER BLOWER ISOLATION POINTS AND REMOVALS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01744			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 008	Drawing No: R-07



EQUIPMENT AND VALVE REMOVALS			
NO	DESCRIPTION	SIZE	QTY
1	DISCHARGE NON-RETURN VALVE	32"	2
2	BLOW-OFF VALVE	20"	2
3	OIL COOLER	N/A	2
4	OIL TANK	N/A	2
5	OIL TANK VENT FAN	N/A	2
6	AIR COOLER	N/A	2
7	DISCHARGE BUTTERFLY VALVE	32"	2

N/A = NOT AVAILABLE

LEGEND

EQUIPMENT TO BE REMOVED

PIPING AND SUPPORTS TO BE REMOVED

SEAL WALL PENETRATION

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No.	Revision	Date	Initial
2	100% DESIGN (FOR REFERENCE ONLY)	12/31/12	D.B.
1	90% DESIGN	12/7/12	D.B.

Approved

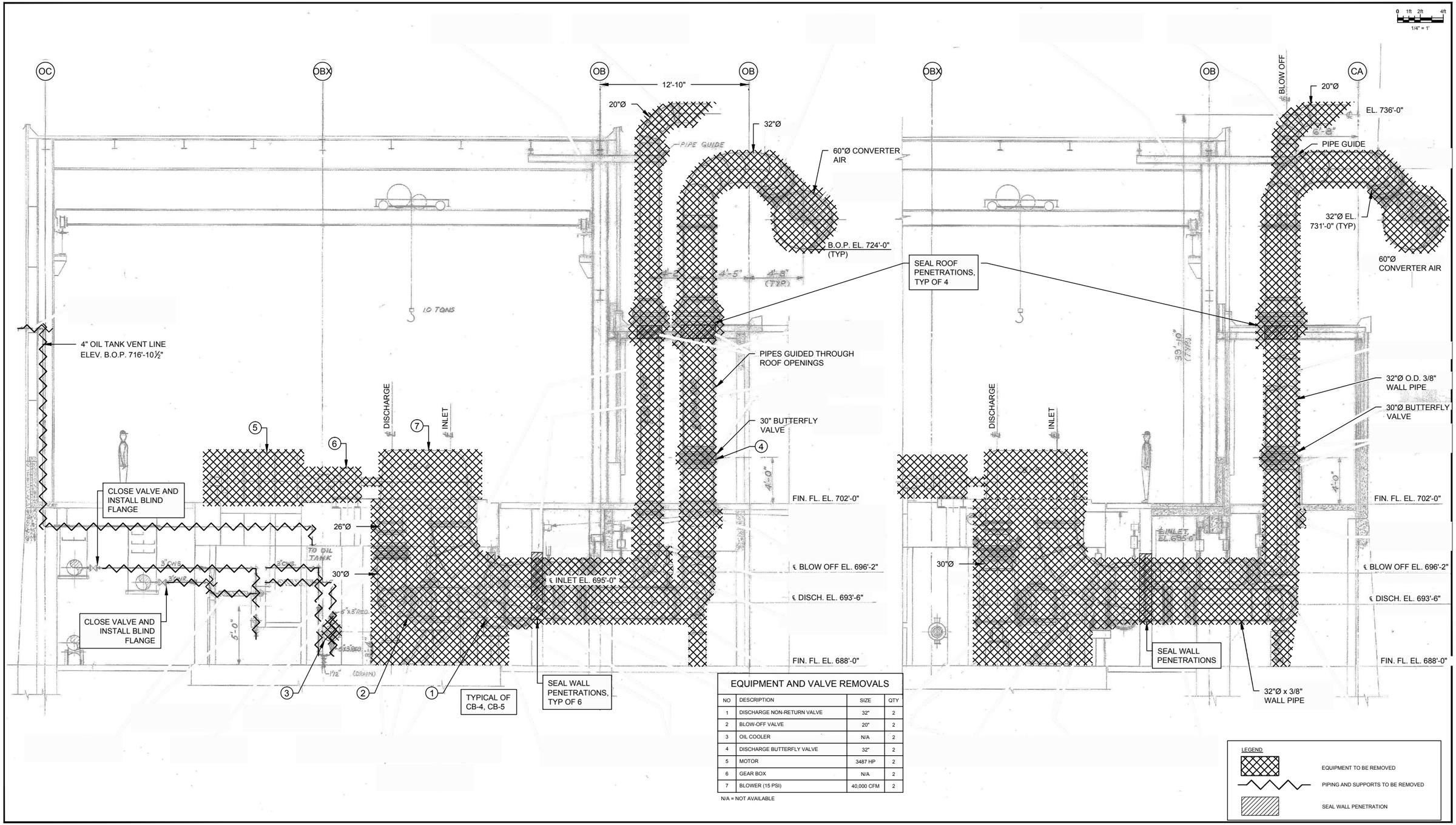
VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

PLAN AND SECTION CONVERTER BLOWERS CB-4 & CB-5 ISOLATION POINTS AND REMOVALS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01746			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 008	Drawing No: R-08



EQUIPMENT AND VALVE REMOVALS

NO	DESCRIPTION	SIZE	QTY
1	DISCHARGE NON-RETURN VALVE	32"	2
2	BLOW-OFF VALVE	20"	2
3	OIL COOLER	N/A	2
4	DISCHARGE BUTTERFLY VALVE	32"	2
5	MOTOR	3487 HP	2
6	GEAR BOX	N/A	2
7	BLOWER (15 PSI)	40,000 CFM	2

N/A = NOT AVAILABLE

LEGEND

- EQUIPMENT TO BE REMOVED
- PIPING AND SUPPORTS TO BE REMOVED
- SEAL WALL PENETRATION

SCALE VERIFICATION: THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

No	Revision	Date	Initial
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1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

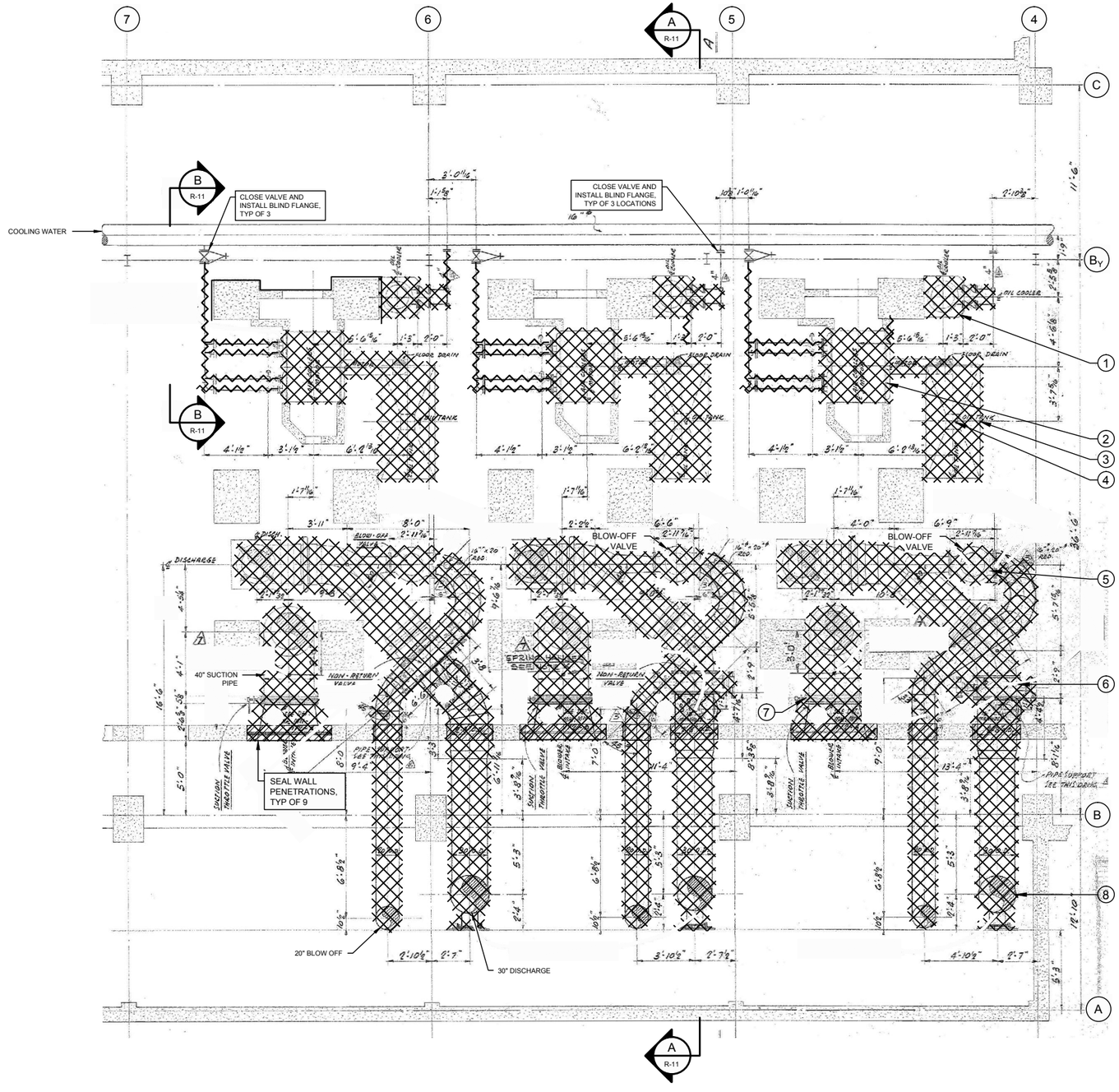
SECTIONS CONVERTER BLOWERS
CB-4, CB-5

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01745			Date: OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 008	Drawing No: R-09

75756-09(008)RE-WA005 JAN 4/2013

0 1 2 3 4 5ft
3/16" = 1'



EQUIPMENT AND VALVE REMOVALS			
NO	DESCRIPTION	SIZE	QTY
1	OIL COOLER	N/A	3
2	AIR COOLER	N/A	3
3	OIL TANK	N/A	3
4	OIL TANK VENT FAN	N/A	3
5	BLOW OFF VALVE	20"	3
6	DISCHARGE NON-RETURN VALVE	30"	3
7	SUCTION THROTTLE VALVE	30"	3
8	DISCHARGE BUTTERFLY VALVE	40"	3

N/A = NOT AVAILABLE

LEGEND

EQUIPMENT TO BE REMOVED

PIPING AND SUPPORTS TO BE REMOVED

SEAL WALL PENETRATION

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1	90% DESIGN	12/7/12	D.B.

Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

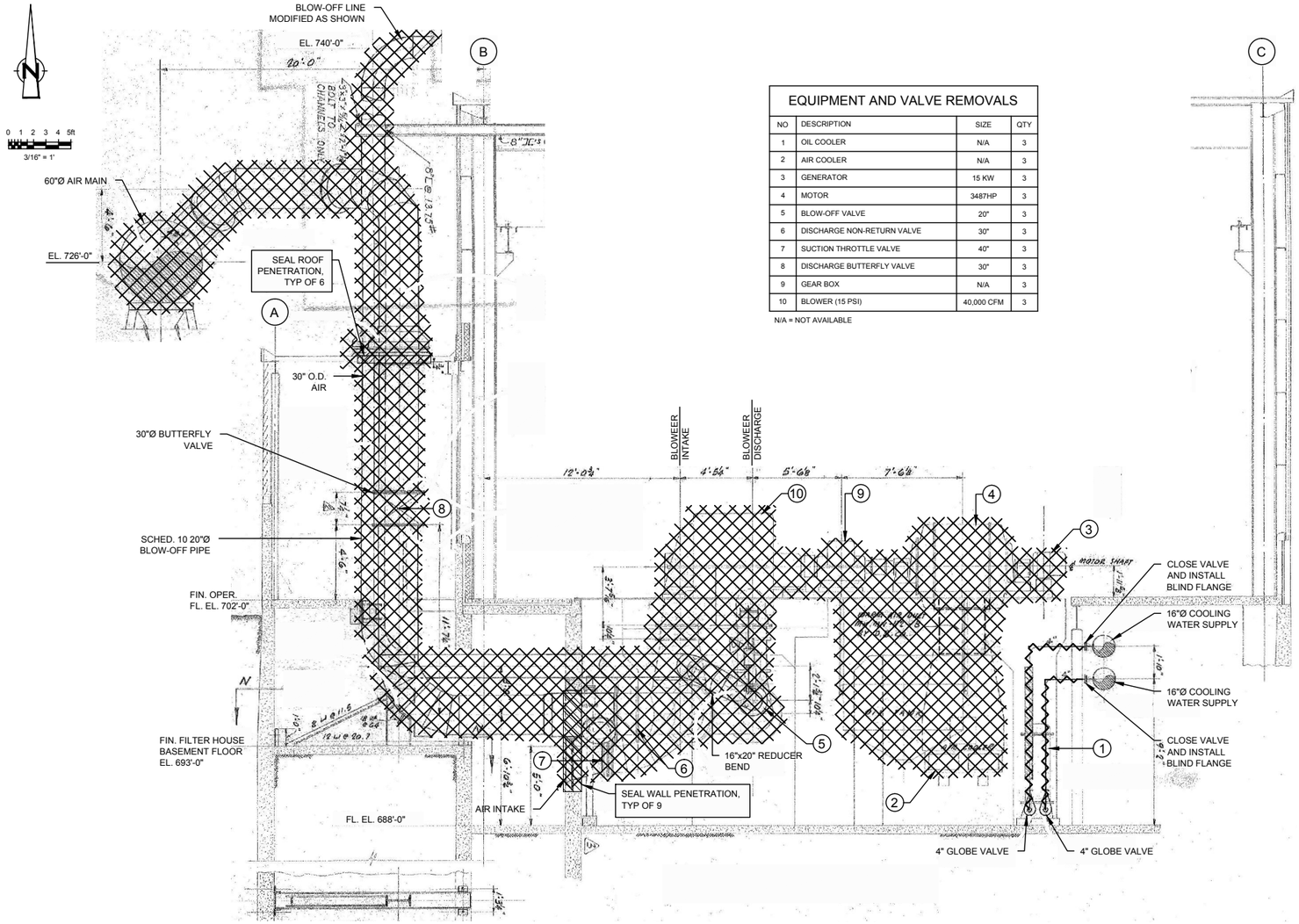
UTILITY DECOMMISSIONING

CONVERTER BLOWERS CB-1, CB-2, CB-3
ISOLATION POINTS AND REMOVALS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			Date:
INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01611			OCT 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 008	Drawing No: R-10

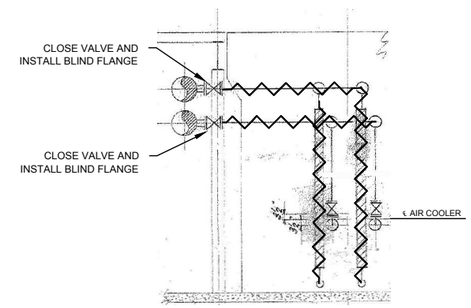
75756-09(008)RE-WA006 JAN 4/2013



SECTION A
3/16"=1'-0"
R-10

EQUIPMENT AND VALVE REMOVALS			
NO	DESCRIPTION	SIZE	QTY
1	OIL COOLER	N/A	3
2	AIR COOLER	N/A	3
3	GENERATOR	15 KW	3
4	MOTOR	3487HP	3
5	BLOW-OFF VALVE	20"	3
6	DISCHARGE NON-RETURN VALVE	30"	3
7	SUCTION THROTTLE VALVE	40"	3
8	DISCHARGE BUTTERFLY VALVE	30"	3
9	GEAR BOX	N/A	3
10	BLOWER (15 PSI)	40,000 CFM	3

N/A = NOT AVAILABLE



SECTION B
3/16"=1'-0"
R-10

LEGEND

EQUIPMENT TO BE REMOVED

PIPING AND SUPPORTS TO BE REMOVED

SEAL WALL PENETRATION

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Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

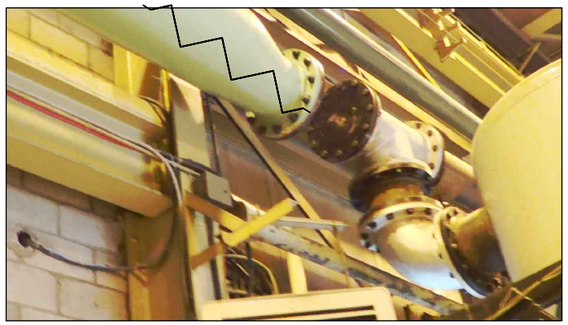
UTILITY DECOMMISSIONING

SECTIONS CONVERTER BLOWERS
CB-1, CB-2, CB-3

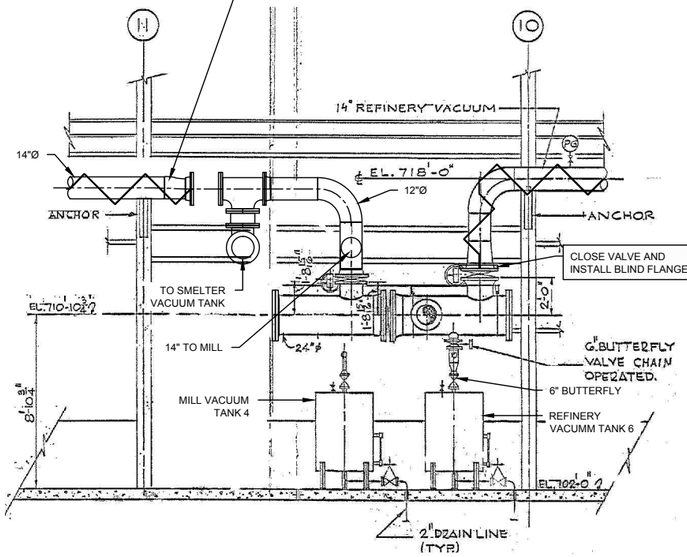
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:			Date:
INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01611, 85-424-G-1749			OCT 2012
Project Manager:	Reviewed By:	Designed By:	Drawn By:
J. PUSKAS	B. SAMUELL	D. BERRINGER	L. FOWLER
Scale:	Project No:	Report No:	Drawing No:
3/16" = 1'-0"	75756-09	008	R-11

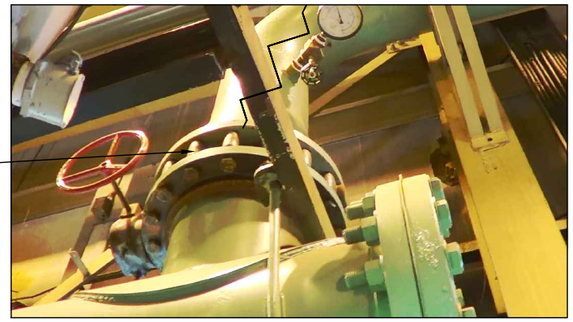
75756-09(008)RE-WA007 JAN 4/2013



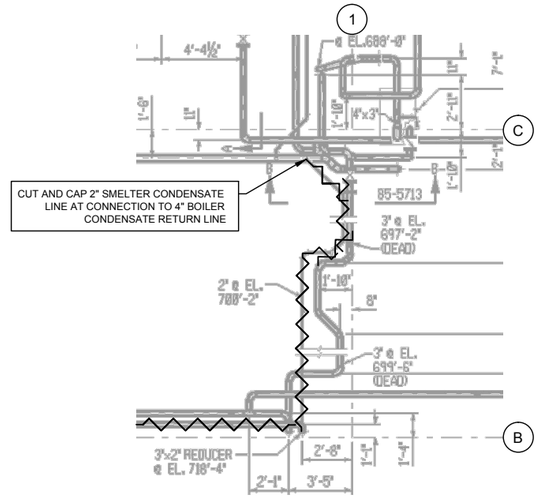
SMELTER VACUUM PIPING



DETAIL 1
1/4"=1'-0"
R-06

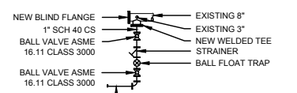


REFINERY VACUUM ISOLATION VALVE



CUT AND CAP 2" SMELTER CONDENSATE LINE AT CONNECTION TO 4" BOILER CONDENSATE RETURN LINE

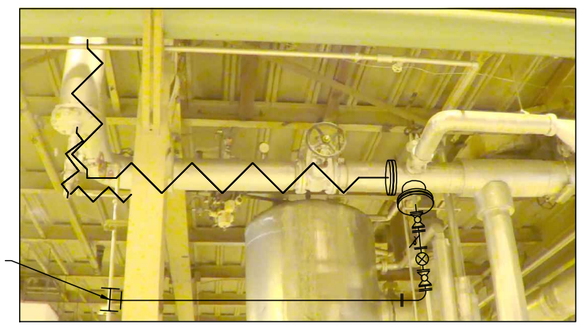
PART PLAN - BASEMENT
(CROSS REFERENCE DWG R-01)



NOTE: ALL COMPONENTS SUITABLE FOR HIGH PRESSURE STEAM (250 PSI)

ELEVATION

DETAIL 2
NTS
R-06



SMELTER STEAM MODIFICATIONS

LEGEND

EQUIPMENT TO BE REMOVED

PIPING AND SUPPORTS TO BE REMOVED

SEAL WALL PENETRATION

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Approved

VALE THOMPSON MINE SITE
THOMPSON, MANITOBA

UTILITY DECOMMISSIONING

CONVERTER BLOWERS CB-1, CB-2, CB-3
DETAILS

CONESTOGA-ROVERS & ASSOCIATES

Source Reference: INTERNATIONAL NICKEL CO. OF CANADA 85-424-G-01611, 85-424-G-1749			Date: DEC 2012
Project Manager: J. PUSKAS	Reviewed By: B. SAMUELL	Designed By: D. BERRINGER	Drawn By: L. FOWLER
Scale: 1/4" = 1'-0"	Project No: 75756-09	Report No: 008	Drawing No: R-12

75756-09(008)RE-WA008 JAN 7/2013