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December 21, 2009

Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL
A1A 5B2

ATTENTION: Ms. Cheryl Blundon
Director of Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: Newfoundland and Labrador Hydro's (Hydro) 2010 Capital Budget Application – Response to RFI PUB-NLH-2

Further to Hydro's response to information request PUB-NLH-2, filed as part of Hydro's 2010 Capital Budget Application, attached is the original plus eight copies of the report entitled *Condition Assessment Final Report for Condition Assessment of Ten Diesel Plants* prepared by Hatch Limited. This report contains the findings of the review of condition of the older plants to assist in planning the replacement or modification in a logical sequence.

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Geoffrey P. Young
Senior Legal Counsel

GPY/jc

cc: Peter Alteen – Newfoundland Power
Paul Coxworthy – Stewart McKelvey Stirling Scales
Joseph S. Hutchings, Q.C. – Poole Althouse
Thomas Johnson – Consumer Advocate

HATCH™

Newfoundland and Labrador Hydro

Condition Assessment Final Report

For

Condition Assessment of Ten Diesel Plants

H333005-0000-10-236-0001
Rev. 1
December 18, 2009

Newfoundland and Labrador Hydro
Condition Assessment of Ten Diesel Plants

Condition Assessment Final Report

Prepared by:

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Gerry Stapleton, P.Eng. — December 18, 2009 Date

Approvals

Hatch

Approved by:

Greg Saunders, P.Eng. — December 18, 2009 Date

Newfoundland and Labrador Hydro

Approved by:

George Lundrigan, P.Eng. — Date

Disclaimer

This report has been prepared by Hatch Ltd. for the use of Newfoundland and Labrador Hydro (the "Client") for the purpose of assisting the Client with the assessment of ten (10) of their Diesel Generating Plants. Plant tours were conducted to determine mechanical, electrical, structural, ergonomic, environmental maintenance, and safety deficiencies within the limits of the plant building. Each plant was assessed according to each criteria to determine its suitability, on the day of the visit, for the current genset configuration, and shall not be used for any other purpose. Anyone or any authority using this document for reference or guidance should satisfy themselves as to the applicability and appropriateness of information contained within the report. Hatch Ltd. is providing no warranty or guarantee, express or implied, nor assuming liability of any kind relative to the commentary or data provided herein.

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1. Introduction

In June 2009, Newfoundland and Labrador Hydro (NLH) commissioned Hatch to perform a condition assessment of ten (10) of NLH's twenty-five (25) diesel plants. Eight (8) of NLH's diesel plants assessed were located in Labrador and two (2) diesel plants were located in Newfoundland. Following is a list of the plants included in the assessment:

- Williams Harbour;
- Charlottetown;
- Norman's Bay;
- Paradise River;
- Black Tickle;
- Rigolet;
- Makkovik;
- Postville;
- Francois; and
- Little Bay Islands.

This report outlines the observations and findings of the condition assessment. This report also contains a decision matrix to rank the diesel plants in order of priority for replacement or upgrading.

2. Background

These diesel plants, some of which date back to the rural electrification in the mid 60's, have been modified over the years to meet the increased load demand. The owner has expressed concerns regarding the plants which have been reported to be cluttered, have improper ventilation, poor lighting, excessive noise, lack of fire protection and facilities to safely perform maintenance work.

The ten (10) diesel plants selected for assessment are generally the oldest and/ or considered to be the most deficient; the oldest being forty-four (44) years. Of the remaining fifteen (15) plants not considered for assessment, four (4) standby plants located at St. Anthony, L'Anse Au Loup, Hawkes Bay and Happy Valley-Goose Bay are connected to electrical grid(s) and are relatively large with good operating and maintenance facilities plus have been significantly upgraded over the past twenty (20) years. Eight (8) other plants are relatively new ranging in age from twenty (20) years to three (3) years old. The three (3) remaining plants, located at Hopedale, Ramea and St. Brendan's, although older than twenty (20) years, have all been completely upgraded within the last twenty (20) years. The plants not assessed, although not without deficiencies, are considered to be adequate.

Plant tours were conducted to determine mechanical, electrical, structural, ergonomic, environmental maintenance, and safety deficiencies within the limits of the plant building. Each plant was assessed according to each criteria to determine its suitability for the current genset configuration.

It was outside the scope of this study to perform noise or emission studies. These criteria were rated and ranked based upon NLH existing data and input from NLH representatives.

3. Basis of Assessment

NLH considers the new diesel plant at St. Lewis, in southern Labrador, placed in service in 2006, to be the present standard of acceptance. The St. Lewis plant layout will constitute a standard for the review and evaluation of the conditions at the other diesel plants. Although NLH considers the St. Lewis plant to be the standard of acceptance, upon review Hatch may suggest modifications that will improve ergonomic conditions for other diesel plants.

Prior to conducting any site visits, Hatch completed an in-depth review of all drawings and specifications for the St. Lewis plant. Hatch then conducted a visit to the St. Lewis plant prior to conducting visits to the other plants which are the subject of this review. In addition, Hatch completed site tours of plants in L'Anse au Loup, Mary's Harbour, Port Hope Simpson, and Cartwright to gain familiarity with standard operating practices and procedures from NLH's plant personnel.

4. Evaluative Matrix Development

4.1 Rating

Each plant is assessed based on a predetermined set of criteria. Each criteria item is rated from 0 to 5 for each plant, with 0 representing "no change required" and 5 representing "recommend replacement".

Table 1: Rating of Condition Assessment Criteria

No change required	0
Recommend replacement	5

4.2 Weighting

The relative level of effort required to rectify each individual criteria item is identified by a weighting system, with 1 representing "Minor Effort Required to Impose Change" and 20 representing "Major Effort Required to Impose Change".

For the purpose of this assessment, any deficiency that was deemed a life safety issue or considered critical to the operability of the plant was still weighted based on level of effort to rectify. The rating in no way indicates its level of importance or need to rectify the issue.

4.3 Condition Assessment Criteria

4.3.1 Clearance Around Equipment

The Canadian Electrical Code (CEC) has working space requirement of 1.0 meter for rated electrical equipment. This dimension increases to 1.5 meters if the switchgear capacity is 1200 ampere or more and there is only one means of egress from the equipment. The plant layout of generators and switchgear was inspected for these spacing issues. NOTE: our engineering judgement is that 1.5 meters space between adjoining generators is inadequate for doing an engine re-build. Clearance dimensions, as measured during the site visits, can be found in Appendix B.

4.3.2 Adequate Work Areas

Each plant was assessed for adequate work areas, both in the generator hall and the separate workshop/work area, if present. The assessment included, but was not limited to, adequate work clearance around equipment in generator hall, ergonomic work benches, proper tools and tool storage, etc.

4.3.3 Available Wall Space

Each plant was assessed to determine the adequacy of the free wall space to support modifications to the existing wall mounted equipment and/or adequate free space to install new wall mounted equipment.

4.3.4 Lighting Type/Levels

Lighting system was visually inspected for secure mounting, completeness of fixtures assembly, operation, and qualitative evaluation of lighting levels. A detailed lighting level study with level measurements was not part of this assessment.

4.3.5 General Plant Noise

Each plant was assessed for general plant noise levels in various working areas of the plant. A detailed noise study with noise level readings/measurements was not a part of this assessment.

4.3.6 Ventilation

An overall air balance or ventilation study was not a part of this assessment. Each plant was assessed based on general observations for good ventilation practices.

4.3.7 Storage

Each plant was inspected for adequate storage space. Most plants are in very remote locations where availability of supplies can be sometimes limited. It is therefore crucial to the operation of the plant that a quantity of critical spares and other supplies be stored on site.

4.3.8 Availability/ Condition of Office

The availability/condition of a working office was assessed for each plant. Each office was assessed for adequate ergonomic conditions for the operator to perform everyday office duties, i.e. space, temperature, noise, etc.

4.3.9 Availability/Condition of Lunchroom

The availability/condition of a lunchroom was assessed for each plant.

4.3.10 Availability/Condition of Washroom Facilities

The availability/condition of a washroom was assessed for each plant.

4.3.11 Building Height

The building height of each plant was assessed. In addition to providing adequate clearance for lifting equipment, adequate building height can influence a number of factors including building lighting levels, temperature, noise levels, etc.

4.3.12 Lifting Devices

Proper maintenance/repairs require adequate lifting devices. Each plant was assessed for adequate lifting devices for each genset. These devices were assessed for ease of operation (i.e. electrical or manual chain), condition and suitability.

4.3.13 Conduit, Cable & Cable Tray

The conduits, cables, and cable tray systems were visually inspected for adequacy of support, terminations, presence of covers, presence of mounting hardware for equipment covers, and fire-stopping of cables/conduits penetrating interior walls of generator hall.

4.3.14 Fire Alarm System

Fire alarm system was inspected for presence of manual pull stations, heat and smoke detectors, and audible and visual alarms. The plant operator was interviewed for operation of system upon alarm and whether there was remote supervision. The fire alarm system was not activated to confirm that appropriate shutdown of generators and generator hall ventilation occurred.

4.3.15 Building Egress

The building at each plant was assessed based on the requirements of chapter 7 – "Means of Egress" in the NFPA 101 – Life Safety Code. Based on these requirements, the minimum width of egress passage is 760 mm (30 inches). This is superseded by the electrical code requirements when identifying spacing and egress around equipment.

Also, an assessment was carried out for building exiting at each site. Sites where the only exit was through the diesel room are identified as unacceptable under the NFPA 101 guidelines.

4.3.16 Exit & Emergency Lighting

Exit and emergency lighting system was inspected for presence of exit signs and emergency lighting fixtures along path of egress. The adequacy of the battery units to provide at least the 90 minutes of operation (required by the Life Safety Code) was not checked. (Operators indicated that the battery units are operated once a month for operation; it could not be confirmed that the yearly check of 90 minute capacity is completed.)

4.3.17 Building Envelope

The building envelope of each plant was assessed based on a "walk around" visual inspection of each plant. The purpose was to identify the appearance/general condition of the foundation walls, exterior walls, siding/cladding, windows, doors, roof, etc. A structural analysis of each building was not a part of this assessment.

5. Plant Tours/Assessments

5.1 St. Lewis, Labrador

- Clearance around equipment – Acceptable, no issues found.
- Adequate work areas – The workshop appeared to be slightly undersized. There was more than adequate laydown/work area in the generator hall.
- Available wall space – There was more than adequate wall space.
- Lighting type/levels – Acceptable, no issues found.
- General plant noise – Noise levels in plant were at acceptable levels. Noise levels in other areas were low.
- Ventilation – Temperature was moderate to high outside during time of visit; however plant was relatively cool.
- Storage – Storage area in plant was generally inadequate. Control room and work area appeared cluttered due to lack of storage.
- Availability/condition of office – Acceptable, no issues found.
- Availability/condition of lunchroom – Acceptable, no issues found.
- Availability/condition of washroom facilities – Acceptable, no issues found.
- Building height – Adequate room above crane bridge for air flow.
- Lifting devices – Electric hoist with electric trolley overhead crane was acceptable.
- Conduit, cable and cable tray – Acceptable, no issues found.
- Fire alarm system – Acceptable, no issues found.
- Egress – Meets code requirements (see section 4.3.15).
- Exit and emergency lighting – Re-align lamps so they illuminate the floor, to meet NBC (National Building Code) requirements.
- Building envelope – Excellent condition.

5.2 Williams Harbour, Labrador

- Clearance around equipment – Space around two of three generators is less than CEC requirements.
- Adequate work areas – Work area was very small, almost non-existent.
- Available wall space – Little to no available wall space.

- Lighting type/levels – Lighting fixtures are generally fluorescent with fluorescent and incandescent in the generator hall; some incandescent fixtures are missing globe lenses and new globes need to be installed, or fixtures replaced with fluorescent type.
- General plant noise – Noise levels in all areas appeared acceptable.
- Ventilation – Appeared acceptable.
- Storage – Storage area in plant was extremely small. Relies on small detached shed for most storage requirements. Storage space is generally inadequate.
- Availability/condition of office – Office space was less than the office space in St. Lewis, but generally adequate.
- Availability/condition of lunchroom – No lunchroom in plant. Nearest lunchroom facility would be the Hydro accommodation trailer a few hundred meters out the road.
- Availability/condition of washroom facilities – Washroom was located next to office and was also being used as a storage area.
- Building height – Minimal clearance above lifting device beam.
- Lifting devices – Chain hoist (manual) monorails above generators.
- Conduit, cable and cable tray – one junction box near exit door is missing a cover; replace cover to comply with CEC.
- Fire alarm system – only one visual alarm in the Generator Hall mounted on end-wall, engineering judgement suggests that a second visual alarm is required on opposite end wall.
- Egress – Egress from equipment to exit is adequate, around equipment in some cases is less than requirement of 1.0 meter.
- Exit and emergency lighting – Emergency lighting is integral to exit signs with rating of 36 watts for 30 minutes; it is suspected that system will not operate for 90 minutes per the LSC.
- Building envelope – Corner flashing missing, siding faded and dented (weathered) (fair to good condition).

5.3 Charlottetown, Labrador

- Clearance around equipment – Space around switchgear and three of four generators does not meet CEC requirements.
- Adequate work areas – Work area appeared inadequate for size of gensets.
- Available wall space – Little to no available wall space.
- Lighting type/levels – Acceptable, no issues found.
- General plant noise – Noise levels in plant and general work areas were excessive and appeared to moderate in the office and lunch areas.

- Ventilation – Temperature in plant was fairly high and uncomfortable. This plant has a two-story layout; the upstairs office, lunchroom and storage areas were all too warm.
- Storage – Plant is running above designed capacity. All gensets in plant were running, plus using an external portable genset trailer. Storage capacity is inadequate.
- Availability/condition of office – Office space was less than the office space in St. Lewis, but generally adequate.
- Availability/condition of lunchroom – Lunchroom was small and very warm due to being located on the second level.
- Availability/condition of washroom facilities – Generally adequate.
- Building height – Adequate clearance above lifting device for lighting and air flow.
- Lifting devices – Overhead crane with manual (chain) operation.
- Conduit, cable and cable tray – supports for conduit/cable are not to Code requirements at numerous locations; install additional cable supports, power and control cables in same tray, install new tray for control cables; in trench at wall between Generator Hall and Control Room there is no fire-stopping in this fire-separation; install fire-stopping to meet requirements of NBC.
- Fire alarm system – only one visual alarm in the generator hall mounted on end wall; engineering judgement suggests that a second visual alarm is required on opposite end wall; and heat detectors are not installed within 900 mm of peak of sloped roof as required by ULC S524.
- Egress – Building egress impeded by spacing between gensets (less than 1.5 meter).
- Exit and emergency lighting – stairwell does not have emergency lighting; install emergency lighting heads in stair to comply with NBC.
- Building envelope – Good to excellent condition.

5.4 Normans Bay, Labrador

- Clearance around equipment – Clearance between generator and secondary exit does not meet CEC requirements.
- Adequate work areas – Work area was very small, almost non-existent.
- Available wall space – Some available wall space.
- Lighting type/levels – two incandescent fixtures in generator hall have failed lamps, replace lamps or replace fixtures with fluorescent fixtures; outdoor fixture is missing lens and needs replacement.
- General plant noise – Noise level in plant was moderate. However, office is virtually in the plant with no noticeable means of separation/isolation, producing unacceptable noise levels.
- Ventilation – Temperature in plant was moderate to high; however temperature in office was too warm.

- Storage – Virtually no storage in plant and no detached sheds. Small work area was extremely cluttered.
- Availability/condition of office – Office was extremely small and located in the plant. Operator would find it very difficult to do office work due to the noise and heat.
- Availability/condition of lunchroom – No lunch room in plant. Nearest lunchroom facility would be Hydro accommodation trailer located at rear of plant.
- Availability/condition of washroom facilities – No washroom facility in plant. Nearest washroom would be Hydro accommodation trailer located at rear of plant.
- Building height – Adequate height above equipment.
- Lifting devices – Gantry crane only with manual operation.
- Conduit, cable and cable tray – wall between generator hall and office is a fire separation, where conduits/cables penetrate install fire-stopping material to comply with NBC.
- Fire alarm system – there is no system in the Plant, install a system to comply with Nalcor requirements.
- Egress – Does NOT meet code requirements. Must exit from office area through generator room. Also, width between genset and equipment on wall less than code required 760 mm.
- Exit and emergency lighting – Exit signs need servicing, either wiring problem of all lamps have failed (all breakers "on", but signs are not illuminated); by NBC all signs must be illuminated.
- Building envelope – Torn insulation, dented siding, paint peeling (fair to good condition).

5.5 Paradise River, Labrador

- Clearance around equipment – Acceptable, no issues found.
- Adequate work areas – Work area was very small, almost non-existent.
- Available wall space – Little to no available wall space.
- Lighting type/levels – Acceptable, no issues found.
- General plant noise – Acceptable.
- Ventilation – Plant has no mechanical ventilation. Plant relies on two turbine ventilators in the roof, eave soffit venting and windows. Plant was very warm at time of visit. Office has small A/C unit installed keeping temperature at an acceptable level.
- Storage – Storage area in plant was extremely small. Relies on small detached shed for most storage requirements. Storage space is generally inadequate.
- Availability/condition of office – Office was small but generally adequate.
- Availability/condition of lunchroom – No lunch room at plant.

- Availability/condition of washroom facilities – No washroom in plant. During winter months, the nearest washroom is in the operator's house approximately ½ km away.
- Building height – No clearance from equipment piping to bottom of truss.
- Lifting devices – 1 ton gantry available – not in plant.
- Conduit, cable and cable tray – wall between generator hall and office is a fire separation, where conduits/cables penetrate install fire-stopping material to comply with NBC.
- Fire alarm system – heat detectors are not installed within 900 mm of peak of sloped roof as required by ULC S524; when the system is in alarm it does not shut down the power generation; modify to comply with Nalcor requirements.
- Egress – Travel distances and egress width meets code requirements.
- Exit and emergency lighting – Exit signs do not comply with the NBC; replace with compliant signs.
- Building envelope – Wooded structure, asbestos sheeting, cracked foundation. Ice damning is a problem due to open trusses (bad to fair condition). Recommend further structural analysis to determine adequacy of building envelope.

5.6 Black Tickle, Labrador

- Clearance around equipment – Clearance in front of switchgear does not meet CEC requirements.
- Adequate work areas – Work area was small and appeared congested.
- Available wall space – Little to no available wall space.
- Lighting type/levels – HID (high-intensity discharge) fixtures in generator hall, good engineering practice would be to secure mounting with backup safety chains; HID fixtures do not have glare control; consider replacing with alternate style that has a cut-off feature for glare control.
- General plant noise – Noise levels in plant, office and general work areas were high.
- Ventilation – Plant temperature levels were moderate to high; office and work areas appeared acceptable.
- Storage – Storage capacity appeared adequate.
- Availability/condition of office – Office was very small and tight for space.
- Availability/condition of lunchroom – No lunch room in plant. Nearest lunch room facility is in Hydro accommodations trailer next door.
- Availability/condition of washroom facilities – Washroom located in plant and in Hydro accommodations trailer next door.
- Building height – Very little clearance above jib crane bridge.
- Lifting devices – Jib cranes with manual operations.

- Conduit, cable and cable tray – Wall between generator hall and office is a fire separation; where conduits/cables penetrate, install fire-stopping material to comply with NBC; and supports for conduit/cable are not adequate at numerous locations; install additional supports to be compliant with CEC.
- Fire alarm system – In the generator hall: only one visual alarm in the generator hall mounted on end-wall; engineering judgement suggests that a second visual alarm is required on opposite end-wall; and heat detectors are not installed within 900 mm of peak of sloped roof as required by ULC S524.
- Egress – Building egress does NOT meet code requirements (760 mm width requirement is not met between equipment in at least one location). Also require additional exit from generator room as exiting through storage room does not meet code requirements.
- Exit and emergency lighting – Acceptable, no issues found.
- Building envelope – Wooden doors inadequate for winter, leaks around roof mounted exhaust fans, holes burned into building column (fair to good condition).

5.7 Rigolet, Labrador

- Clearance around equipment – Access around switchgear, and three of four generators does not meet CEC requirements.
- Adequate work areas – Work area was inadequate.
- Available wall space – Little to no available wall space.
- Lighting type/levels – Consider replacing HID fixtures with alternate style that has a cut-off feature for glare control, lighting levels were not measured, but appear to be low in generator hall.
- General plant noise – Noise level in plant was high and appeared moderate in the office.
- Ventilation – Plant was very warm with only one genset running. Office has small a/c unit keeping temperature at an acceptable level.
- Storage – Storage area in plant was extremely small. Relies on small detached sheds for most storage requirements. Storage space is generally inadequate.
- Availability/condition of office – Office was small but generally adequate.
- Availability/condition of lunchroom – No lunch room in plant. Nearest lunch room facility is in Hydro accommodations trailer next door.
- Availability/condition of washroom facilities – Washroom located in plant and in Hydro accommodations trailer next door.
- Building height – No clearance available.
- Lifting devices – Jib cranes with manual operation/interference with lighting.
- Conduit, cable and cable tray – Interior walls of generator hall are a fire separation; where conduits/cables penetrate; install fire-stopping material to comply with NBC; and power and

control cables are in one tray, install a second tray for control cables to comply with Nalcor requirements.

- Fire alarm system – In the generator hall: only one visual alarm in the generator hall mounted on end-wall, engineering judgement suggests that a second visual alarm is required on opposite end-wall; in the workshop there is a manual pull station located above storage cabinet, remove this unnecessary item; and near venting for Generator G4 there is conduit/wire that allows moisture from vent to cause short/alarm; replace this conduit/wire with cable.
- Egress – Egress width requirement is acceptable. Require additional exit from generator hall as exit through office is not to code.
- Exit and emergency lighting – Acceptable, no issues found.
- Building envelope – Wooden section and deteriorated siding (bad to fair).

5.8 Makkovik, Labrador

- Clearance around equipment – Access around three generators does not meet CEC requirements.
- Adequate work areas – Work area appeared adequate.
- Available wall space – Little to no available wall space.
- Lighting type/levels – Consider replacing HID fixtures with alternate style that has a cut-off feature for glare control.
- General plant noise – Noise levels were moderate in the plant, and appeared acceptable in the office and work areas.
- Ventilation – Plant, office and work area temperatures were acceptable.
- Storage – Storage space is limited, but better than most.
- Availability/condition of office – Office appeared adequate.
- Availability/condition of lunchroom – Lunchroom appeared adequate.
- Availability/condition of washroom facilities – Washroom appeared adequate.
- Building height – No clearance available.
- Lifting devices – ½ gantry / ½ fixed overhead crane with manual operation.
- Conduit, cable and cable tray – Acceptable, no issues found.
- Fire alarm system – Heat detectors are not installed within 900 mm of peak of sloped roof as required by ULC S524, install heat detectors; a room is missing heat detector from backbox, replace device to be compliant with ULC-524 or remove backbox.
- Egress – Travel distances and egress width meets code requirements.
- Exit and emergency lighting – Acceptable, no issues found.

- Building envelope – Bad to fair condition.

5.9 Postville, Labrador

- Clearance around equipment – Access around two generators does not meet CEC requirements.
- Adequate work areas – Work area was inadequate.
- Available wall space – Little to no available wall space.
- Lighting type/levels – Acceptable, no issues found.
- General plant noise – Noise levels were fairly high in the plant. Noise levels were moderate in the office and work areas.
- Ventilation – Plant, office and work areas were moderately warm.
- Storage – Storage area in plant was extremely small. Relies on small detached sheds for most storage requirements. Storage space is generally inadequate.
- Availability/condition of office – Office was small but generally adequate.
- Availability/condition of lunchroom – No lunchroom.
- Availability/condition of washroom facilities – Washroom facilities appeared adequate.
- Building height – Very little clearance available.
- Lifting Devices – Jib cranes with manual operation.
- Conduit, cable and cable tray – Acceptable, no issues found.
- Fire alarm system – double doors in generator hall do not have a manual pull station; install device to be compliant with NBC.
- Egress – Travel distances and egress width meets code requirements.
- Exit and emergency lighting – Acceptable, no issues found.
- Building envelope – Fair to good condition.

5.10 Francois, Newfoundland

- Clearance around equipment – Access is acceptable, except at back of switchgear (doors at rear cannot open 90°).
- Adequate work areas – Work area was very small.
- Available wall space – Some available wall space.
- Lighting type/levels – fixture in washroom with missing lens, and fixture in office with a broken lens, replace lenses.
- General plant noise – Noise levels appeared acceptable in the office and general work areas outside the plant. Noise levels were moderate inside the plant.

- Ventilation – Plant and work area temperatures were acceptable. Office has small a/c unit that keeps temperature at an acceptable level.
- Storage – Storage area in plant was extremely small. Relies on small detached shed for most storage requirements. Storage space is generally inadequate.
- Availability/condition of office – Office was small but generally adequate.
- Availability/condition of lunchroom – Lunchroom was small and tight for space.
- Availability/condition of washroom facilities – Washroom facilities appeared adequate.
- Building height – Minimal clearance available.
- Lifting Devices – Portable 1 ton gantry available – not in plant.
- Conduit, cable and cable tray – Interior walls of generator hall are a fire separation, where conduits/cables penetrate install fire-stopping material to comply with NBC; and supports on several conduits are not compliant with CEC, install additional supports.
- Fire alarm system – Acceptable, no issues found.
- Egress – Travel distances and egress width meets code requirements.
- Exit and emergency lighting – Lamps and/or batteries have failed; refurbish system.
- Building envelope – Wooden doors and trim, roof sagging and shingles leaking, possible flooding issue due to floor elevation above original ground – fair to good condition.

5.11 Little Bay Islands, Newfoundland

- Clearance around equipment – Access between one generator and wall does not meet CEC requirements.
- Adequate work areas – There is no separate work area outside the plant. However, there was adequate room inside the plant to perform maintenance work on the gensets. A mobile bench is brought into the plant.
- Available wall space – Some available wall space.
- Lighting type/levels – plastic lenses on low-bay fixtures were deformed from exposure to high temperature, replace deformed lenses; lighting levels appear acceptable.
- General plant noise – No basis for evaluation. Gensets were not running during time of visit.
- Ventilation – No basis for evaluation. Gensets were not running during time of visit. Ventilation system did not have the same cross flow concept as the plant in St. Lewis. The quantity and size of fans/intakes were less than what is currently used at the plant in St. Lewis.
- Storage – Storage area in plant was extremely small. Relies on small detached shed for most storage requirements. Storage space is generally inadequate.
- Availability/condition of office – Office area was generally adequate.

- Availability/condition of lunchroom – No lunchroom in plant. Nearest lunchroom facility is in Hydro accommodations trailer across the road.
- Availability/condition of washroom facilities – Washroom facilities appeared adequate.
- Building height – finished ceiling no clearance available.
- Lifting Devices – Gantry available – not in plant.
- Conduit, cable and cable tray – there are several issues that are non-conformance with the CEC:
  - Power cables routed between generator hall and control room (cables are for temporary generators; have been installed for extended period – for years); install conduits or cable tray to comply with CEC;
  - Teck cables on wall are inadequately supported; install additional supports to comply with CEC;
  - Flex conduits for power cables (located beside cable tray) do not have termination bushings; install termination bushings to comply with CEC;
  - Interior walls of generator hall are a fire separation; where conduits/cables penetrate install fire-stopping material to comply with NBC; and
  - Cable trench in control room - a portion of trench is missing a cover (about 0.6 m long), install cover; power and control cables are installed together in trench, confirm that the control cables are rated 600 V, if not, then separate control cables from power cables.
- Fire alarm system – Acceptable, no issues found.
- Egress – Egress width is less than code required 760 mm. May be able to move wall mounted equipment to accommodate.
- Exit and emergency lighting – One battery unit needs to be replaced as unit lasted less than 70 minutes, replace unit to meet requirements of the LSC.
- Building envelope – Wooden building with shingles; structural concerns at new knee wall connection. Recommend further structural evaluation to determine adequacy of envelop.

6. Condition Assessment Evaluative Matrix

See Appendix A for evaluative matrix.

7. Summary and Recommendations

Below is a summary of the results, ranking each plant in the order of relative level of effort required to rectify all deficiencies. The table does not necessarily indicate which plant is in the worst condition, nor does it relate to the dollar amount required to implement the changes. As shown in the table, the plant in Rigolet received the highest ranking and thus requires a major level of effort to rectify its deficiencies, whereas Makkovik received the lowest ranking, and thus its deficiencies can be rectified with a relatively low level of effort.

Although St. Lewis was set as the bench mark and is considered to be the present standard of acceptance, a few deficiencies were identified as reflected in the score shown in Table 2. The workshop appeared to be slightly undersized. The storage area in plant was generally inadequate. The control room and workshop appeared cluttered due to this lack of storage. Also, the exit and emergency lighting lamps should be re-aligned so that they illuminate the floor.

Table 2: Overall Summary of Results

Summary of Results		
Site	**Score**	**Ranking**
Rigolet	621	1
Paradise River	533	2
Norman's Bay	532	3
Black Tickle	524	4
Williams Harbour	477	5
Postville	461	6
Francois	457	7
Charlottetown	451	8
Little Bay Islands	376	9
Makkovik	352	10
St. Lewis	26	11

Rigolet and Paradise River are suggested for replacement as outlined in Table 3.

Rigolet is ranked first although it appears to have recently undergone some upgrading. This plant is severely overcrowded and congested, resulting in serious egress issues. To rectify this issue, a new building is recommended.

Paradise River is ranked second in the suggested for replacement category. It is suggested for replacement due to one main issue: the integrity of the building envelope. The plant appears to be one of the oldest that was assessed. The plant had no mechanical ventilation. There is also the issue of asbestos sheathing on the interior of the plant. The operators noted severe frost heave of the foundation in the winter months that would indicate a potential structural concern. Again, to rectify these issues, a new building is recommended.

Table 3: Plants Suggested for Replacement

Site	Ranking
Rigolet	1
Paradise River	2

Likewise, the remaining plants are ranked in Table 4 for upgrading. Although most deficiencies are clearly outlined in this report, a detailed study to identify all necessary upgrades for each plant was outside the scope of this assessment. Upon further investigation of necessary corrective actions, some plants listed in Table 4 may require replacement.

Table 4: Plants Suggested for Upgrading

Site	Ranking
Norman's Bay	1
Black Tickle	2
Williams Harbour	3
Postville	4
Francois	5
Charlottetown	6
Little Bay Islands	7
Makkovik	8

The above recommendations for replacement and upgrades do not address the expansion requirements based on load growth as that is outside the scope of this assessment.

Appendix A

Condition Assessment Evaluative Matrix

HATCH™

Condition Assessment of Ten Diesel Plants

Newfoundland & Labrador Hydro

Rating

No Change Req'd	0
Needs replacement	5

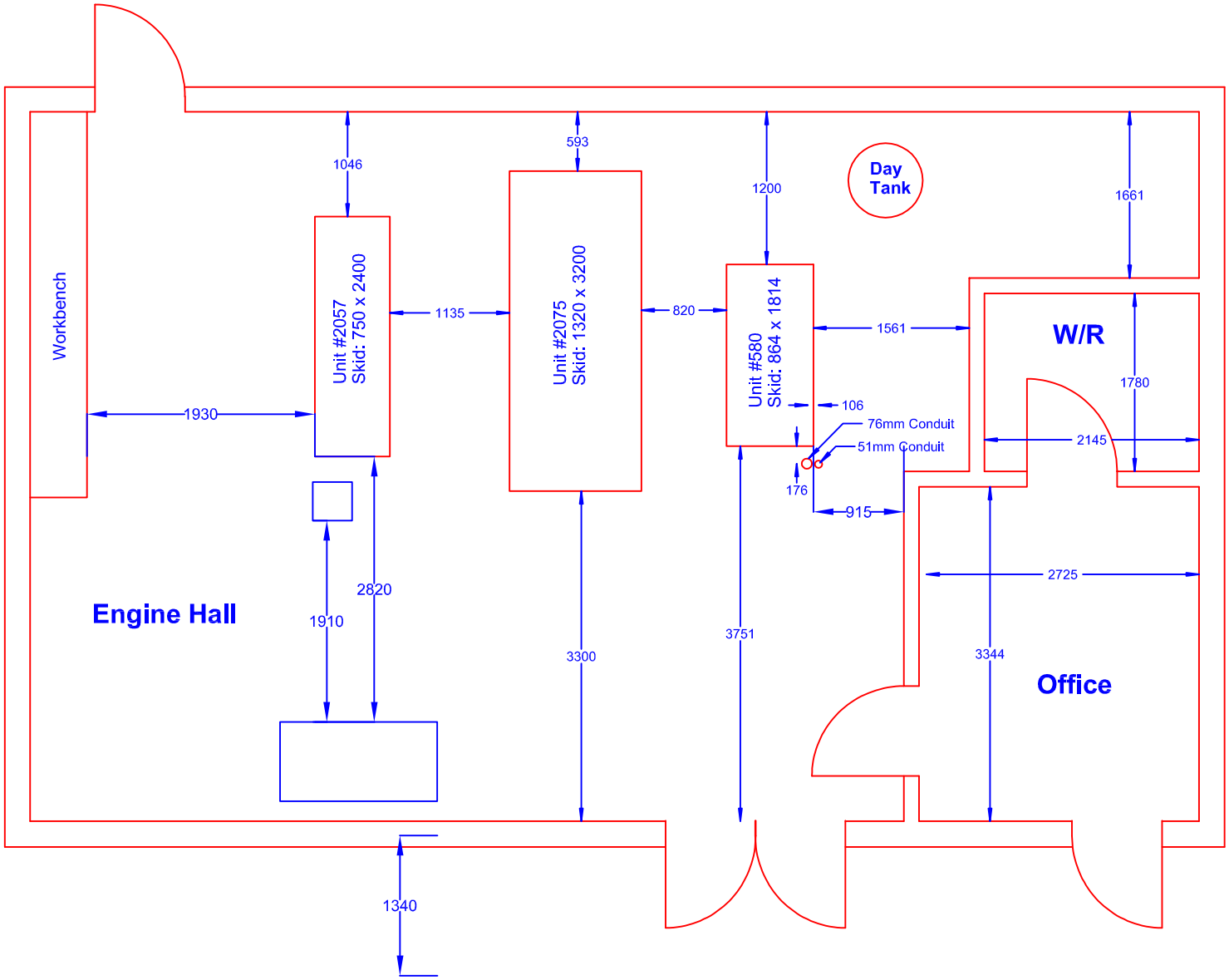
Site	Adaquate clearance around equipment for maintenance	Adequate work areas, work benches, etc...	Available Wall Space	Plant lighting levels and general condition	General assessment of noise	Building ventilation	On Site Storage	Availability/ condition/ location/ size of office	Availability/ condition/ location/ size of lunchroom	Availability/ condition/ location/ size of washroom	Building height	Availibility/ condition of overhead lifting devices	Conduit, cable and cable tray condition	Fire alarm system	Building egress	Exit and emergency lighting	General condition of building envelope	Total
St. Lewis	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	**26**
Williams Harbour	3	4	5	1	0	1	3	3	5	3	4	4	1	1	0	5	3	**477**
Charlottetown	4	3	5	1	5	4	4	2	2	2	2	2	3	2	2	1	1	**451**
Norman's Bay	2	4	3	3	5	4	5	5	4	4	3	4	1	5	4	1	2	**532**
Paradise River	0	4	5	0	0	5	3	3	5	5	5	4	1	2	0	5	5	**533**
Black Tickle	4	3	5	2	5	3	1	3	3	1	4	4	2	2	3	0	2	**524**
Rigolet	5	5	5	4	4	4	3	3	3	1	4	4	2	4	3	0	3	**621**
Makkovik	3	1	5	1	1	0	2	1	1	1	3	4	0	2	0	0	3	**352**
Postville	1	5	5	0	3	3	3	3	5	1	4	4	0	1	0	0	2	**461**
Francois	3	3	3	1	1	2	3	3	3	3	4	4	2	0	0	5	4	**457**
Little Bay Islands	0	2	3	1	0	2	3	1	3	1	4	4	3	0	2	3	4	**376**
Weight	20	15	15	5	5	15	5	5	5	5	20	15	1	1	10	1	15	

Major Effort to impose change **20**
Minor Effort to impose change **1**

Appendix B

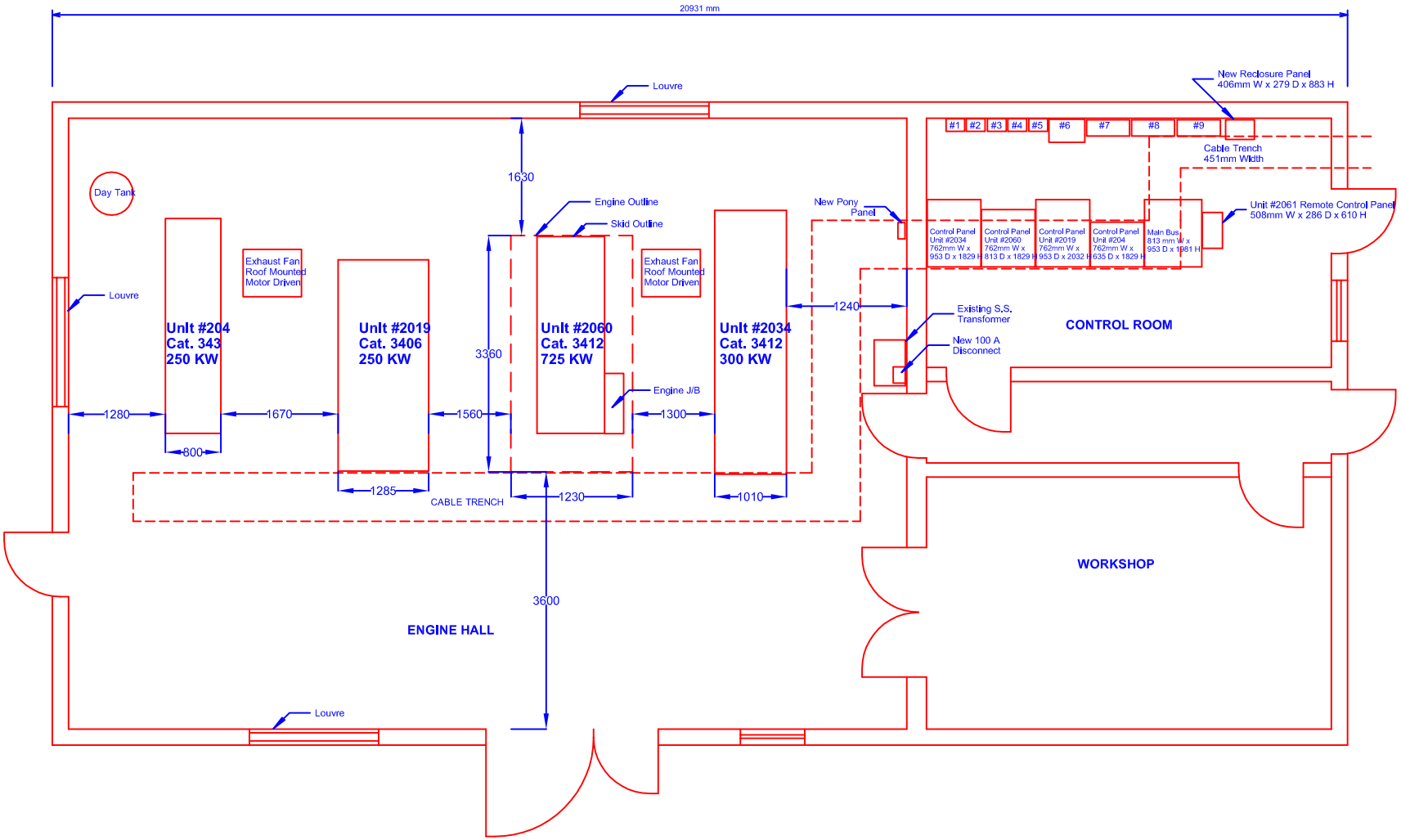
Diesel Plant Photographs & Floor Plans

Williams Harbour, Labrador



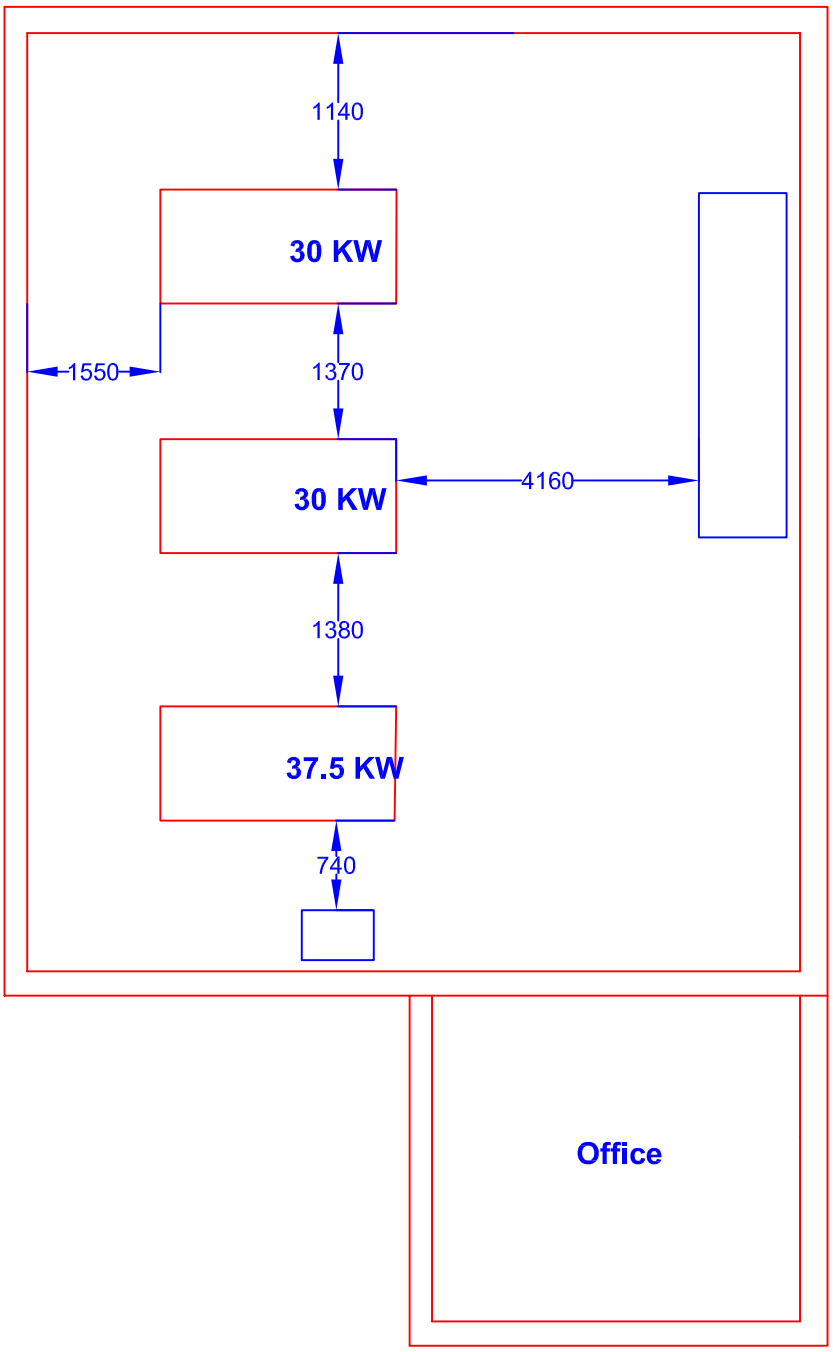
HYDRO	NEWFOUNDLAND AND LABRADOR HYDRO	
SCALE : 1 : 50	William's Harbour Powerhouse Plant Interior Layout	DATE: 09 01 08
DRAWN : R.P.		W.O.NO.
CHECKED		DWG.NO. A3- / REV.
APPROVED		

Charlottetown, Labrador



HYDRO	NEWFOUNDLAND AND LABRADOR HYDRO	
SCALE : NTS	CHARLOTTETOWN POWERHOUSE FLOOR PLAN	DATE : 01 03 25
DRAWN: R.P.		W.O.NO.
CHECKED		DWG.NO. A3- REV.
APPROVED		

Normans Bay, Labrador

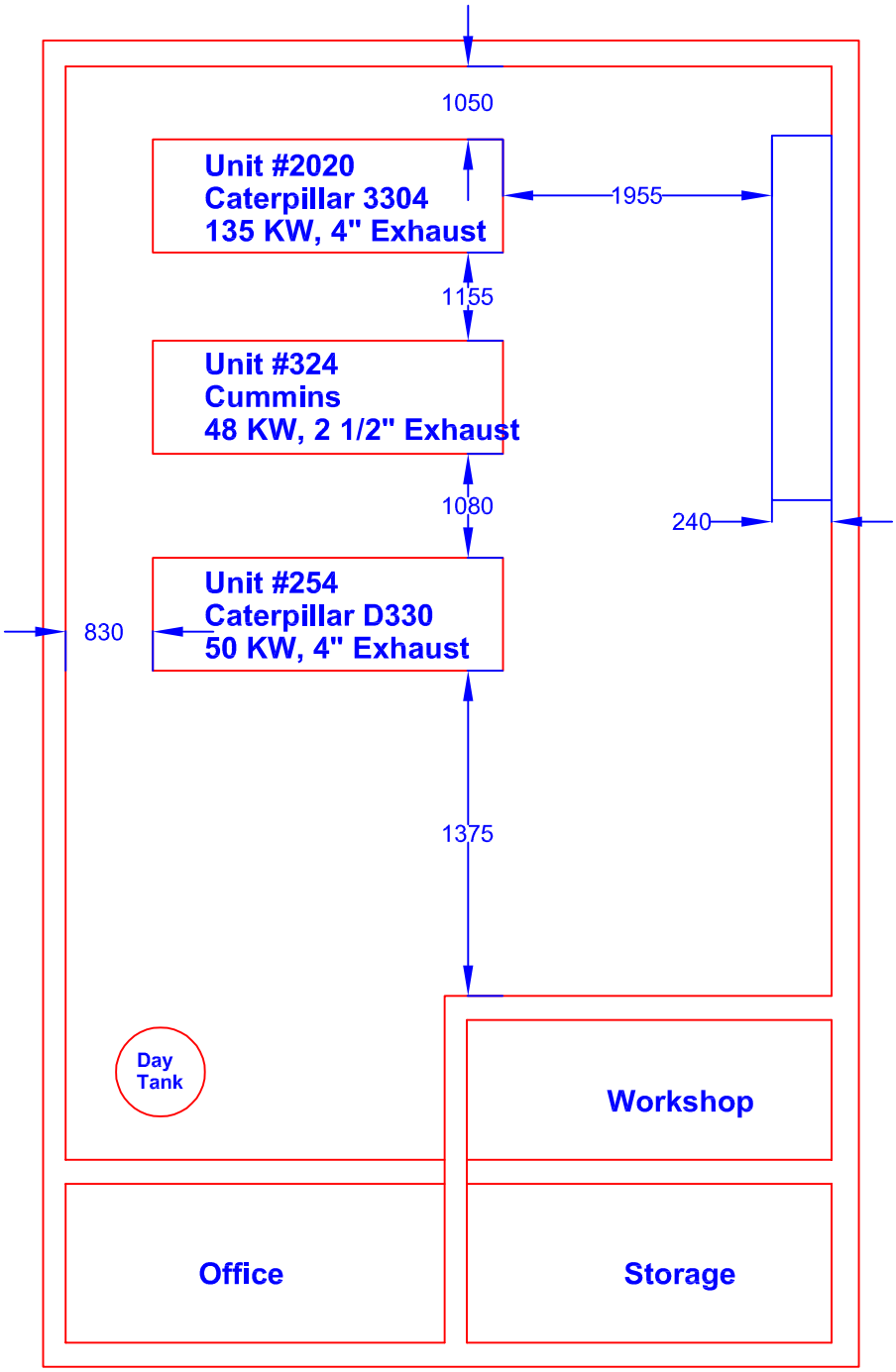


HYDRO

NEWFOUNDLAND AND LABRADOR HYDRO

SCALE : NTS	NORMAN'S BAY POWERHOUSE PLANT LAYOUT	DATE :	
DRAWN:		W.O.NO.	
CHECKED		DWG.NO. A3-	REV.
APPROVED			

Paradise River, Labrador

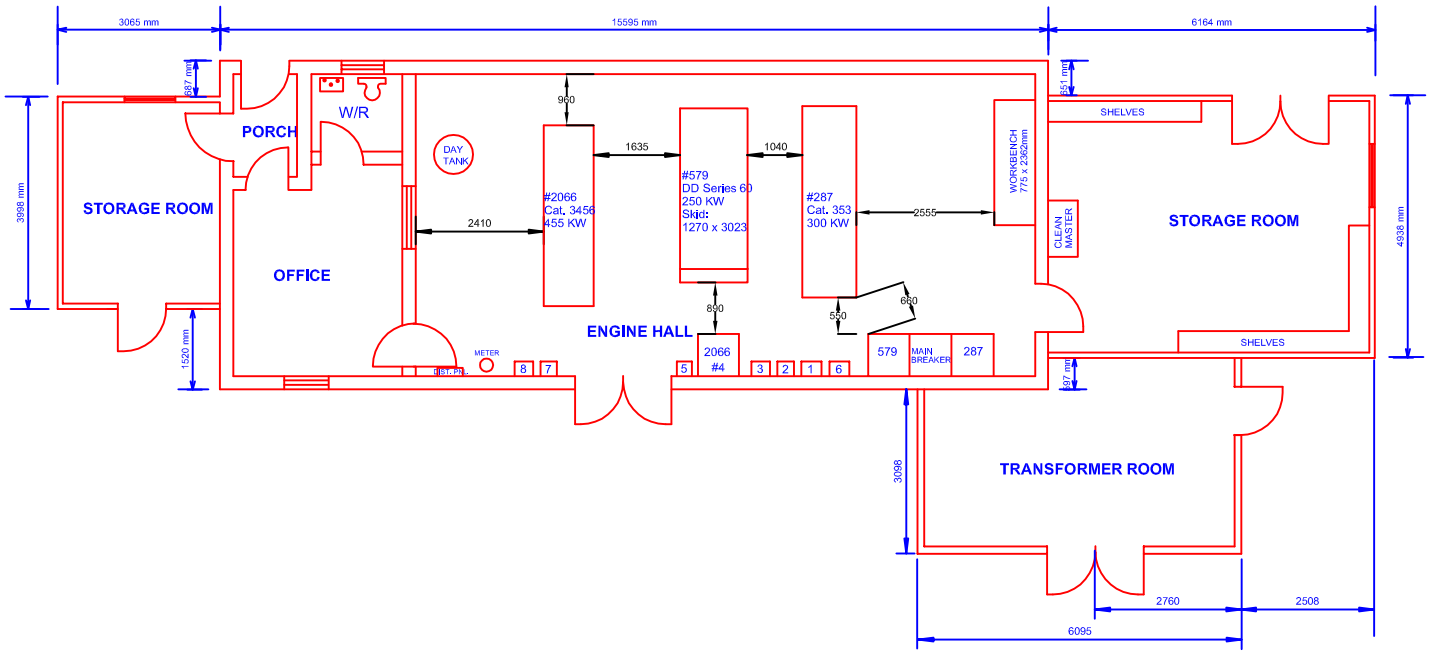


HYDRO

NEWFOUNDLAND AND LABRADOR HYDRO

SCALE : NTS	PARADISE RIVER POWERHOUSE PLANT LAYOUT	DATE : 04 12 02	
DRAWN: R.P.		W.O.NO.	
CHECKED		DWG.NO. A3-	REV.
APPROVED			

Black Tickle, Labrador



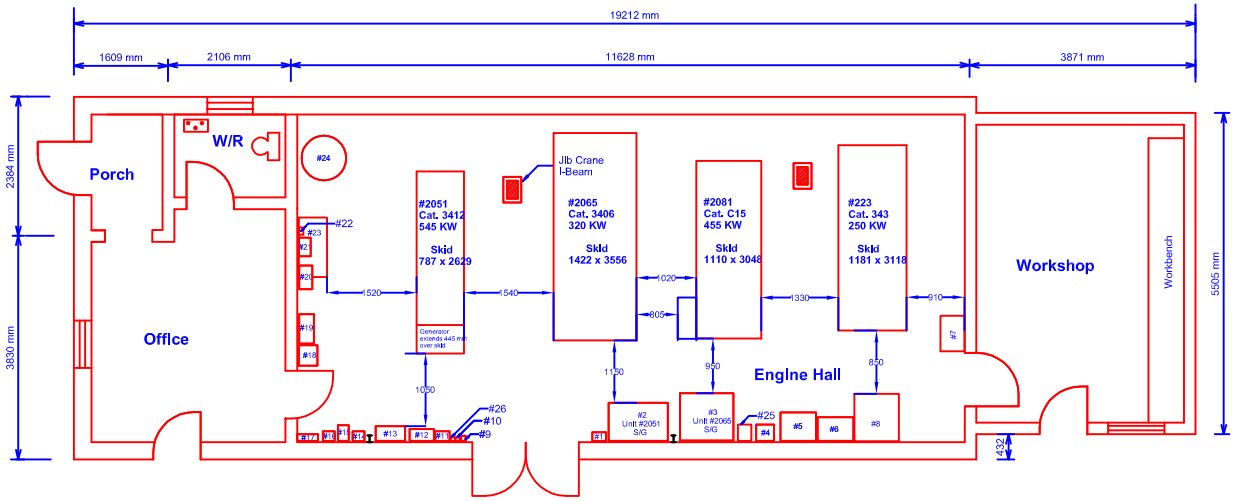
New engine (Unit #2066) installed in November 2002.
New engine (Unit #579) installed in September 2007.

Notes:

1. All dimensions are in millimeters.
2. Unit #2066 skid: 1105mm W x 3797mm L.
3. Generator on Unit #2066 extends 330mm past skid.
4. #1- A/C starter, #2066.
5. #2 - Rad. starter, #2066.
6. #3 - F/A system supply fan shutdown panel.
7. #4 - Unit #2006 switchrear panel.
7. #5 - Rad. starter for existing radiator.
8. #6 - Station service meter.
9. #7 - F/A system exhaust fan shutdown panel.
10. #8 - F/A system exhaust fan shutdown panel.
11. Generator on Unit #579 extends 254mm past skid.

HYDRO	NEWFOUNDLAND AND LABRADOR HYDRO	
SCALE : 1 : 75	BLACK TICKLE POWERHOUSE PLANT INTERIOR LAYOUT	DATE : 03 02 03 (November 2007)
DRAWN : R. P.		JOB COST NO. :
DESIGNED : R. P.		DWG.NO. : REV. 0
CHECKED		
APPROVED		

Rigolet, Labrador

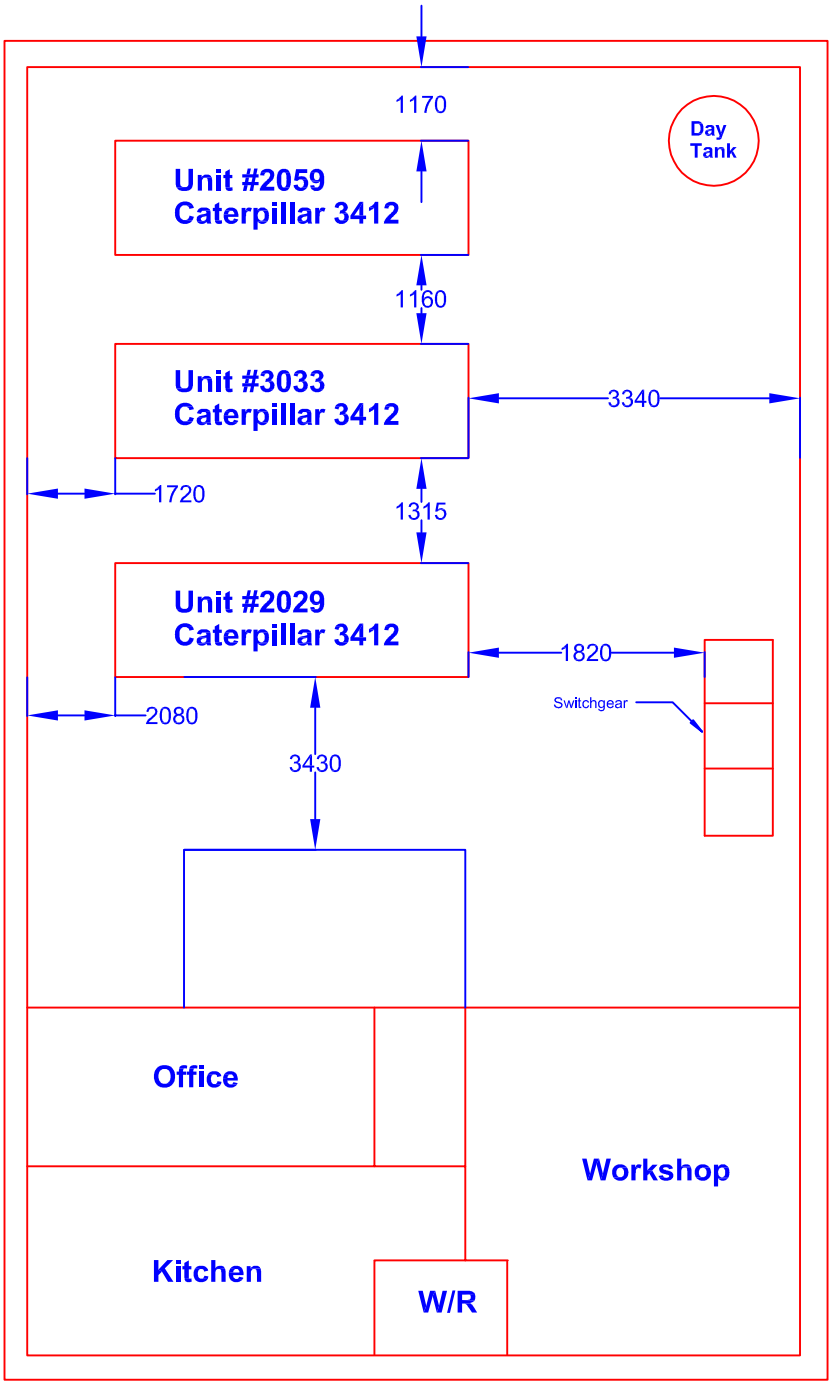


NOTE:

Width x Depth x Height (mm)
#1. Supply fan control panel, 235 x 152 x 279.
#2. Unit #2051 S/G, 1016x 737x 1854.
#3. Unit #2065 S/G, 914 x 813 x 1930.
#4. Unit #2065motor starter, 305 x 279 x 610.
#5. Overcurrent protection system panel, 610 x 483 x 629.
#6. Kyle reclosure control type "ME" panel, 406 x 305 x 889.
#7. Unit #223 S/G, 610 x 406 x 914.
#8. Unit #2081 S/G, 762 x 813 x 1930.
#9. Fire alarm pull station, 76 x 89 x 127.
#10. Light switch, 70 x 64 x 108.
#11. Unit #2049 fan disconnect, 254 x 165 x 660.
#12. Unit #223 fan disconnect, 419 x 203 x 521.
#13. Unit #2051 fan disconnect, 508 x 254 x 508.
#14. Station service (primary) disconnect, 203 x 165 x 483.
#15. Station service meter, 191 x 267 x 229.
#16. Station service (secondary) disconnect, 203x 165 x 483.
#17. Station service panel, 356 x 114 x 940.
#18. Fire extinguisher, 343 x 318 x 457.
#19. Eyewash, 508 x 254 x 635.
#20. Fuel control panel, 406 x 229 x 432.
#21. Fuel pump starter, 318 x 203 x 419.
#22. safety interrupt switch, 127 x 76 x 171.
#23. Battery bank, 1016 x 483 x 1118.
#24. Day tank, 762 diameter x 2083 height.
#25. Unit #2081 charge air cooler starter, 205 x 279 x 610.
#26. Fuel cooler starter, 70 x 64 x 108.

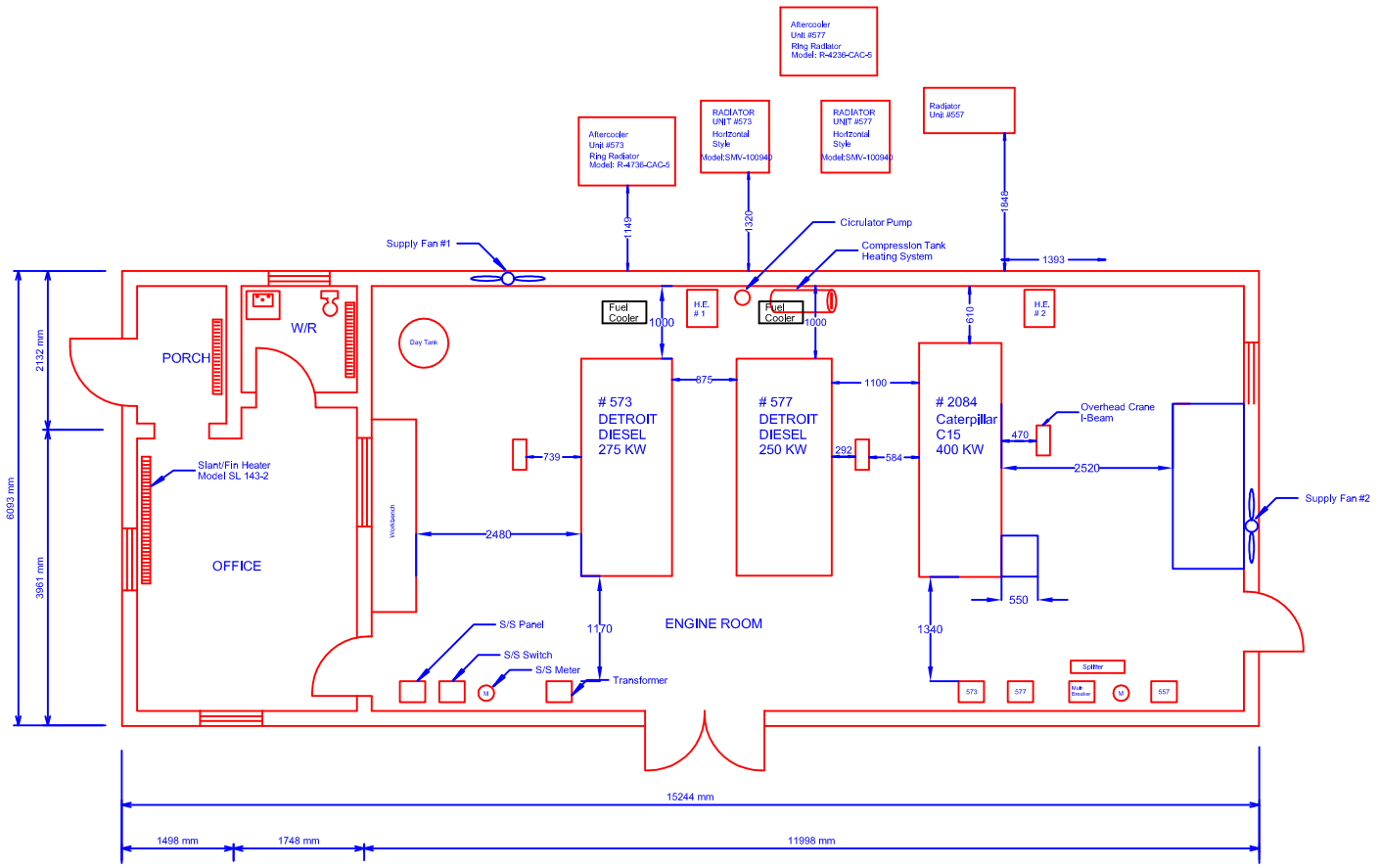
HYDRO	NEWFOUNDLAND AND LABRADOR HYDRO	
SCALE : 1 : 100	Rigolet Powerhouse	DATE : 06 02 08 (Revised 07 04 19)
DRAWN : R.P.	Plant Interior Layout	W.O.NO.
CHECKED		DWG.NO. A3- / REV.
APPROVED		

Makkovik, Labrador



HYDRO	NEWFOUNDLAND AND LABRADOR HYDRO	
SCALE : NTS DRAWN : R.P. CHECKED APPROVED	MAKKOVIK POWERHOUSE PLANT LAYOUT	DATE : 04 10 22 W.O.NO. DWG.NO. A3- REV.

Postville, Labrador

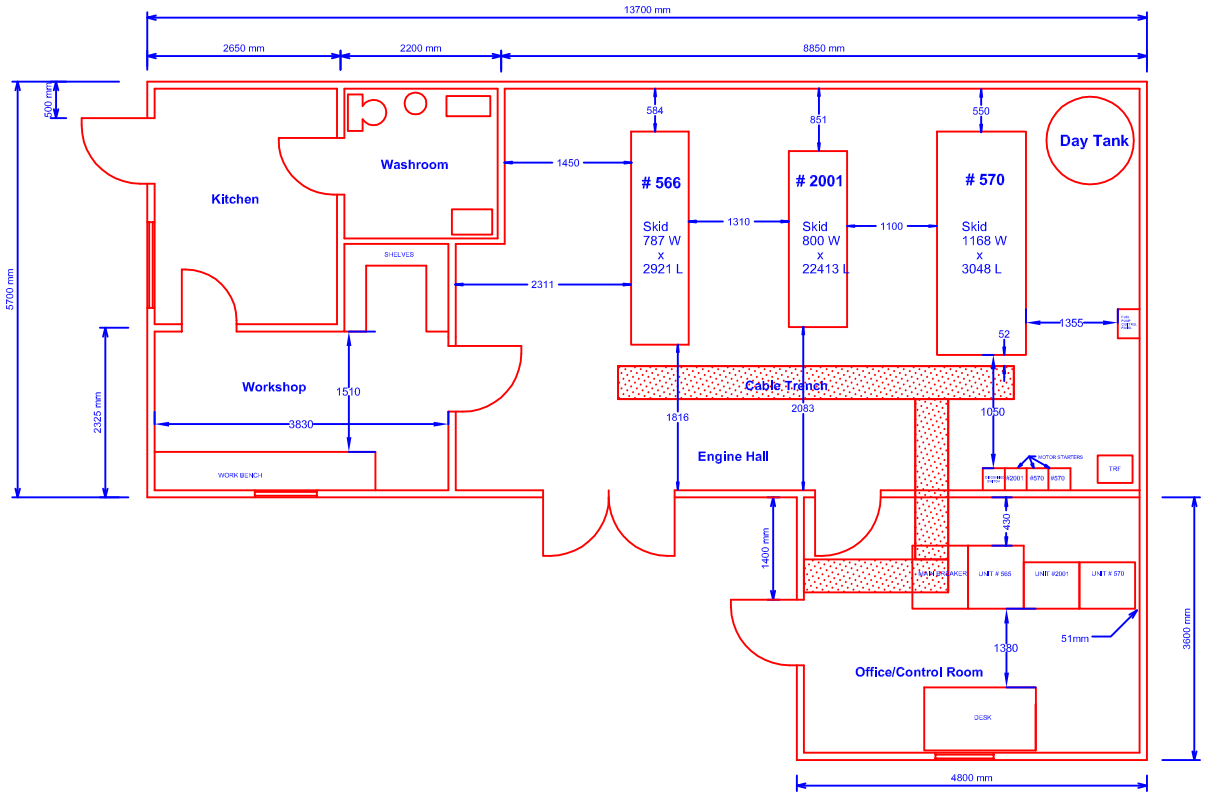


Notes:

1. All dimensions are in millimeters.
2. Unit #573 Skid: 1207 W x 3048 L x 305mm H.
3. Unit #577 Skid: 1276 W x 2908 L x 356mm H.
4. Unit #2088 Skid: 1105 W x 2464 L x 254mm H.
5. Overhead crane I-beam: 178 W x 406mm L.

HYDRO	NEWFOUNDLAND AND LABRADOR HYDRO	
SCALE : 1 : 50	**POSTVILLE POWERHOUSE**	DATE : 00 10 08 (Revised 09 05 17)
DRAWN : R. P.		JOB COST NO. :
DESIGNED : R. P.	**MECHANICAL EQUIPMENT LAYOUT**	DWG.NO. : REV. 0
CHECKED		
APPROVED		

Francois, Newfoundland

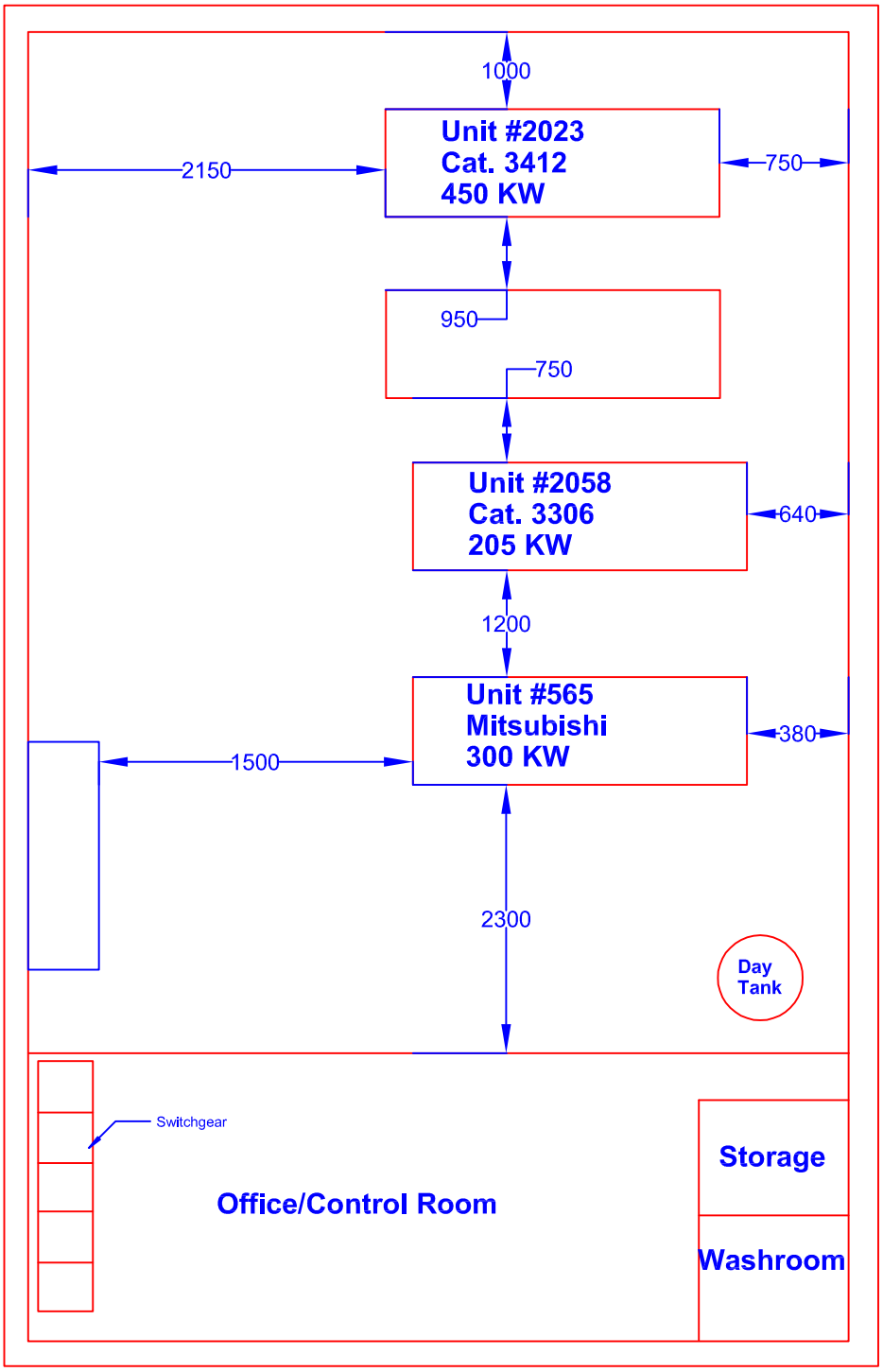


NOTES:

1. Main breaker - 762mm width x 864mm depth x 1981mm height.
2. Unit #565 Control Panel - 762mm width x 864mm depth x 1981mm height.
3. Unit #2001 Control Panel - 762mm width x 635mm depth x 1829mm height.
4. Unit #570 Control Panel - 762mm width x 635mm depth x 1829mm height.
5. The new standard size control panel as per St. Brendan's are 1016mm width x 737mm depth x 1829mm height.
6. To install the standard size control panel in the Francois Plant, would have to shift the main breaker, #565 Panel, & #2001 Panel toward the engine hall door min. 254mm (5 hour outage).
7. The existing control panels are accessed thru the back for maintenance.
8. Maximum width of the new panel without having to move the existing equipment is 813mm.

HYDRO	NEWFOUNDLAND AND LABRADOR HYDRO	
SCALE : 1 : 25	FRANCOIS POWERHOUSE FLOOR PLAN	DATE: 00 12 17
DRAWN: R.P.		W.O.NO.
CHECKED		DWG.NO. A3- REV.
APPROVED		

Little Bay Islands, Newfoundland



Notes:

1. There is a Mobile at this site - Caterpillar 3412, 450 KW
2. This is permanent to replace Unit #297 inside the plant.

HYDRO	NEWFOUNDLAND AND LABRADOR HYDRO	
SCALE : NTS DRAWN: R.P. CHECKED APPROVED	Little Bay Islands Powerhouse Engine Hall Layout	DATE : 05 06 26 W.O.NO. DWG.NO. A3- REV.

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