

Rossdale Low Pressure Plant

Structural Evaluation

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Executive Summary

As requested by the City of Edmonton, RJC Engineers has completed the Structural Evaluation of the Low Pressure Plant (LPP). The LPP, a historical-designated building located near downtown along the river valley in Edmonton, consists of three attached structures: the Switch House, Turbine Hall and Boiler Hall.

The intent of the Structural Evaluation was to assess the structures under the current National Building Code – 2019 Alberta Edition (AB2019) with the intent of determining necessary upgrades to reoccupy the buildings for new commercial use.

RJC completed the following work to complete the evaluation:

- Background and Historical Review: Reviewed available structural information.
- Code Review: Used National Building Code 2019 Alberta Edition (hereafter AB2019) to determine how to analyze the structures.
- Site Investigation: Completed site measurements and condition review of the structures.
- Structural Analysis: Determined structural capacity of major components and compared it to load requirements from AB2019.
- Summary of Structural Analysis & Costs: Summary of deficiencies and estimated structure-only costs
- Path Forward: Outline next steps

The findings of the evaluation are:

- The available information is limited.
- The AB2019 code recommended a structural evaluation be completed and upgrades be considered prior to reoccupation. The main factors are:
 - o Proposed change of use (from industrial to commercial)
 - o Higher expected snow loads (due to changes in operation)
 - o Structure load-path & condition deficiencies
 - o Changes in structural performance due to removal of equipment/structure.
 - o Limited information on original design codes
 - o Significant code changes since era of construction. These include the new requirements for snow drifts & rain ponding.
- The Structural Analysis found the structure could not meet the load demands (from AB2019) for some parts of the structure. The main deficiencies are:
 - o Roofs of all three main areas (Turbine Hall, Switch House and Boiler Hall)
 - o Overall lateral support for east-west direction
 - o Steel connections, especially for the Switch House and Turbine Hall Roofs

- o Steel plate floor areas
- 2015 stabilization work completed on west wall of Boiler Hall was not code compliant (to 2010 Alberta Building Code)
- The Path Forward is to reinforce or repair the structure. Currently the building, as confirmed by the Structural Evaluation (and by previous Engineers), is not suitable for occupancy, except for very short-term controlled conditions (i.e. day events that are limited during only certain climatic loads).

It is important to note the evaluation is based on comparing the existing as-is structure to current AB2019 code. It is not automatic the deficiencies need to be addressed (although RJC will strongly recommend some must be). As stated in AB2019, upgrading of existing buildings, especially historical buildings, is to be discussed amongst the City, the Authority Having Jurisdiction (AHJ) and the Structural Engineer of Record. Ultimately the decision of what structural elements are critical to upgrade will become a City decision (with AHJ approval).

Should all the deficiencies/upgrades noted in the report be completed, RJC is estimating structure-only-budget could be in the range of structure-only-budget could be approach structure-only-budget could be a

Review comments were provided by Clark Builders and BTY during the budget development. Variance of opinion was provided, which led to the 25% variance noted.

The budget **excludes several key costs** (see Section 4.1.1) that are also necessary to complete the work. They could be a significant portion of the direct structural costs. As well, a very healthy contingency should be considered by the City. The main reasons are the type/age of structure and the historical designation, which might influence the options for rehabilitation.

As a final point, RJC used reasonable judgement to estimate the building's future use and any structural modifications. That judgement led to several important assumptions used during the Evaluation. Should those assumptions be incorrect, the findings could be impacted. Therefore RJC will stress that the structural evaluation will require on-going verification by future phases of the work.



1.0 Introduction

As requested by the City of Edmonton, RJC completed a Structural Evaluation of the Low Pressure Plant Buildings (hereafter known as the LPP) located in Edmonton, Alberta. The LPP consists of three attached buildings: the Switch House, Turbine Hall and Boiler Hall.

The intent of the Structural Evaluation was to assess the structures under the current National Building Code – 2019 Alberta Edition (AB2019) with the intent of determining necessary upgrades to reoccupy the buildings for new commercial use. The key outcome was to determine if the structure was capable of carrying the AB2019 loads and to determine the difference (i.e. delta) where not capable. To complete this, the focus of the Evaluation was to:

- Evaluate the structure under the AB2019, including evaluating it based on National Building Code: Commentary L (Structural Evaluation and Upgrading of Existing Buildings).
- Evaluate for snow and floor occupancy based on proposed uses.
- Evaluate the building for lateral loads and overall stability.

The report is broken into the following sections: Background & Historical Review, Code Evaluation, Site Investigations, Structural Analysis, Summary of Structural Analysis & Costs, and Path Forward. Each of the sections outline the steps completed and conclusions for the Structural Evaluation.

2.0 Background and Historical Review

The following summarizes the available information and background of each building, summarizing the structural system. The available record information for review can be found in Appendix B (list of documents available).

2.1 Available Information

Available information was provided by the City of Edmonton and EPCOR (previous Owner) based on their historical records. It included historical drawings and reports.

In general the historical structural drawings available were limited and only showed portions of the structure. Roughly 10 pages show structural details that generally showed one component of the structure (i.e. piles) for that one phase. Important structural information such as framing plans, equipment loads, design loads, material grades, rebar configurations, connections and the codes the structures were designed to, are not shown on the drawings.

Other drawings available include structural details from the stabilization of the Boiler Hall West Wall (2015) and localized structural work during decommissioning.

The available reports included recent condition assessments and structural evaluations (since decommissioning). They identified several structural deficiencies including concerns regarding roof capacity, localized floor capacity, modified/damaged structure, column strength/stability, and lateral capacity. The reports also note there has been limited occupancy since decommissioning (for maintenance or short-term controlled conditions).

In summary, the available information is very limited and the structure has known deficiencies which have prevented recent occupancy.

2.2 Background

The LPP structures were constructed in different phases, as it expanded power capacity. The Switch House was built in two phases (roughly 1942/1947), while the Turbine/Boiler Hall was built in seven phases between 1938 and 1954.

In general the building operated as an industrial power plant up until 1998 when plant was decommissioned. The Halls have remained heated but generally unoccupied since (except as needed for maintenance and controlled day events). The Switch House office space was also decommissioned in 1998, but continued to be used as an office space up until 2014.

The structural systems for each area are as follows:

2.2.1 Switch House

The Switch House structure is a two-storey structure with basement. In general, the roof structure consist of steel deck, OWSJs, and steel beams/columns. The 2nd/main floor consist of concrete slabs with concrete-encased steel structure. The eastern half of the main floor structure is also sub-framed with steel structure (which reinforced floor for equipment).

The basement floor is believed to be slab-on-grade with concrete footings, based on the limited drawings available.

The exterior walls below grade are concrete and are believed to be load-bearing. The walls above grade walls are a mix of concrete and multi-wythe brick and are not believed to be load-bearing vertically; they do however provide overall lateral stability for the building and are wind-bearing.

The Switch House shares structure on its west side (with Turbine Hall), including the concrete foundation wall, brick wall above main floor and shared steel columns.

August 8, 2022 RJC No. EDM.030264.0010 The former use for the building was office space, equipment areas, and control panel rooms for the equipment in the adjacent Halls.

2.2.2 Turbine Hall

The Turbine Hall structure consists of a one-storey building with basement. It is centrally located between the Boiler Hall/Switch House and is the second tallest building of the three. It was originally built in several phases in conjunction with the Boiler Hall.

The roof structure consists of steel deck on steel beams/channels on steel columns (partially encased in the masonry brick walls). There is a steel crane structure above the main floor running the long direction of the building.

The main floor structure consists mostly of concrete slabs & beams, but there is also some areas with steel framing (steel plate on steel beams).

Based on the available drawings and limited pile investigation testing, the basement floor is slab-on-grade. The foundations for the building are believed to be a mix of concrete pile caps supported by creosote wood or concrete piles, OR large concrete footings.

The exterior walls below grade are concrete and are believed to be load-bearing. The walls above grade walls are a mix of concrete and multi-wythe brick and are not believed to be load-bearing vertically; they do however provide overall lateral stability for the building and are wind-bearing.

The Turbine Hall shares structure on the two long sides (Switch House & Boiler Hall), including the concrete foundation wall, overlapping main floor structures (Boiler Hall), main floor brick wall and shared steel columns on both sides.

The former use for the building was industrial power plant activities. The structure previously supported several large turbines and other equipment used for production of power.

2.2.3 Boiler Hall

The Boiler Hall consists of a two-storey building with full basement and is located adjacent to the Turbine Hall. It is the western-most and tallest building in the LPP.

In general, the roof structure consists of steel deck on shallow OWSJ, supported by steel girder trusses and beams, on steel columns (some partially embedded in the masonry brick walls).

The signature large exterior smokestacks on roof are supported by steel framing and tie-wires on the roof edges. The stack supports were replaced/reinforced and the remaining gypsum-based roof deck was replaced with metal deck in 2015.

Above the main floor, the mezzanines consists of steel grating/plate or concrete-topped floors on steel beams/columns. The main floor structure consists of concrete slabs/beams and steel infill areas (steel plate on steel beams). The columns below grade are either steel or concrete.

Based on the available drawings, the basement floor is slab-on-grade. The foundations for the building are believed to be a mix of concrete pile caps supported by creosote wood or concrete piles, OR large concrete footings.

The exterior walls below grade are concrete and are believed to be load-bearing. The walls above grade walls are a mix of concrete and multi-wythe brick and are not believed to be load-bearing vertically; they do however provide overall lateral stability for the building and are wind-bearing. Other lateral support is provided by steel cross bracing along the east & west walls.

Since the LPP was decommissioned, steel upgrades were completed to augment the western wall in 2015 (Dialog). Based on the available information, the main reason was concerns related to the demolition of the adjacent Gas Turbine Hall, which exposed the Boiler Hall west wall to direct wind. The reports from Dialog indicate stabilization was required based on limited design checks that were completed at that time. A large horizontal truss and vertical braces were added to brace the wall/columns.

The former use for the building was industrial power plant activities. The structure previously supported several large boilers (which were hung from steel frames) and other equipment used for production of power.

2.3 Limits

Overall the available information in regards to the original construction is limited. Basic information such as capacity of the structure, equipment weights, member size/condition, grade of materials & rebar configuration are not shown in the drawings/reports. Therefore, to complete the Evaluation, RJC needed to use engineering judgement and historical general practices to make reasonable assumptions about the quality of the structure.

It is important to note that while those assumptions have been reasonably considered, the limits of the available information will require on-going verification during detailed design to ensure the correct capacities and member information was used.

Additionally the Boiler Hall work (2015) did not fully upgrade the West Wall to the current Alberta Code at the time (2010). It is understood the project had a limited budget available and that limited load evaluation was completed. Therefore the project was focused on short-term stabilization of the wall and roof replacement of the gypsum decking. The drawings indicate the new steel added was designed to 2010 code, but in discussions with Dialog staff who were part of the project, the existing structure was not upgraded or was justified using a Low Importance Factor (which assumes the building isn't occupied). Therefore the stabilization work is believed to not be code-compliant and additional measures are necessary.

3.0 Code Review

After reviewing the historical information, RJC evaluated the structure based on current structural codes. The purpose of this work was to use these codes to determine if the structure met suitable levels of safety and help identify weaknesses in the structure that might need upgrading.

The following Codes and Standards were examined:

- National Building Code (Alberta Edition 2019) Part 4 and previous Building Codes
- National Building Code Commentary L Application of NBC Part 4 of Division B for Structural Evaluation and Upgrading of Existing Structures.
- Material design standards to be as per Section 1.3 of Division B of NBC(AE), including such items as:
 - CSA S16 Design of Steel Structures
 - CSA A23.1, A23.2 and A23.3 Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete/ Design of Concrete Structures
 - O86-14 Engineering Design in Wood
 - CSA S304-14 (R2019) Design of Masonry Structures

The findings of these codes are found below.

3.1 Current and Original Codes

The National Building Code (Part 4) is the main section which governs current structural design. It outlines the approach required for design of new buildings, by providing the loads and load factors to be used for limit-state design. This provided key inputs as follows:

• Limit-state design method was used in our evaluation. Full-time occupancy is expected in future, so load factor from Part 4 could not be reduced through Commentary L (see Section 3.2). Standard load combinations were used in analysis of the members per Part 4.

- Building is assumed to be regularly occupied, therefore used normal importance factor of 1.0. The building was not believed to need a high or post-disaster importance.
- Roofs were assumed to be as currently constructed. Basic snow plus existing drifts from high
 roofs or parapets were accounted for only. Any future roof loads, such as roof top units or
 associated drifts, were not considered.
- Previously RWDI completed a wind and snow load assessment on the structure (RWDI, 2014). It provided schematic confirmation of the loads made by Dialog. It did not provide an advantage over the existing code values, so code values were used. No modelling of snow loads or drifts were believed to have been completed during this assessment.
- Superimposed dead loads were estimated to account for potential finishes. Further confirmation of those assumptions will be required during future design phases.
- All floor areas were assumed to be assembly occupancy (generally 100psf/4.8kPa), except the second floor of the Switch House (50psf/2.4kPa). Further confirmation of these assumptions will be required during future design phases.
- No allowances were made for new mechanical or electrical equipment (and associated housekeeping pads) on floors. Further confirmation of this assumptions will be required during future design phases once M&E areas are designated.
- Earthquake given there is no geotechnical report, the same assumption made by previous reports (Site Class C) has been used preliminarily as part of the evaluation. Further confirmation of this assumptions will be required during future design phases.
- Building is assumed to remain in the same configuration. No significant changes in massing or structure were assumed.

3.2 Commentary L – Existing Buildings

In addition to the code factors from Part 4, Commentary L of the National Building Code was used as part of the Structural Evaluation. The purpose of reviewing the Commentary was that it provided:

- A rational method for evaluating existing structures by providing a roadmap for review of the past performance, condition, use and original construction parameters.
- Guidance for evaluating the appropriateness of continued use (i.e. grandfathering) of the structure. This helped determine a method for considering what components might need to be considered for upgrading or review.
- A clear objective, which was to ensure the structure meets current codes, or provided safety levels in line with the intent of those codes.

The Commentary outlines the key principles in a Structural Evaluation, which are as follows:

- Careful examination by a professional engineer does not reveal any evidence of significant damage, distress, or deterioration,
- The structural system is reviewed, and critical details are examined and checked for load transfer
- The building has demonstrated satisfactory performance for at least 30 years
- There are no changes within the past 30 years that could significantly increase the loads on the building or affect its durability, and no such changes are contemplated on past performance

When RJC completed a review of these principles, the structures generally do not meet the requirements noted above. Some areas of deterioration were found (Section 4.0), critical details were reviewed and load capacity was determined to be insufficient (see Section 5.0). As well, the building is expected to have changes in use, which resets the 30 year performance requirement. In short, the LPP cannot simply be grandfathered forward, as it fails all four principles.

Further discussion of the reasons can be found below in Section 3.2.1. The code numbering in Commentary L is referenced in Section 3.2.1 (as CL-#) in case additional information is needed.

3.2.1 Key Findings

The key findings from the Commentary L Evaluation are:

- A change of use is expected. The floor loads will change from equipment and industrial maintenance to assembly occupancy. Changes in use require review for floor adequacy (CL-#20/17). In general it is believed the floor loads will be smaller than previous, but there are localized areas that could see higher loads. Those areas need to be checked based on Commentary recommendations.
- A change in snow load is expected. The buildings previously were very poorly insulated and operated at high temperatures (especially the Boiler Hall). It is believed the snow accumulation would have been decreased by these conditions due to potential snow melt. Given the proposed changes, the future snow loads could be larger than the historical snow accumulation and historical performance is not suitable to grandfather forward. Those areas need to be checked based on Commentary recommendations.
 - Boiler Hall increased roof insulation value in 2015. Roof structure was not upgraded for potentially higher snow loads in 2015.
 - Turbine Hall and Switch House are expected to improve the insulation (roofing replacement expected in 2023). Those areas need to be checked based on Commentary recommendations.
 - Buildings were constructed prior to major code changes, including snow drifts in 1965 and rain loads due to blocked drains in 1970 (CL#19). The structure may not account for these conditions and checking is necessary for capacity based on Commentary recommendations.

- Rain loads due to plugged roof drains was identified as issue previously (Dialog report) due to lack of scuppers on upper roof. RJC is in agreement; the conditions are such that the performance is not suitable based on Commentary recommendations.
- Since 1998, the structure has been maintained at a temperature barely above zero. This would not meet the 30 year period discussed in Commentary L. This timeline of performance is not suitable based on Commentary recommendations.
- The Gas Turbine Hall to the west was demolished in 2010s. This left the Boiler Hall exposed to new wind loads it hadn't seen since 1960s.
 - This lead to concerns regarding stability of Boiler Hall West Wall and partial reinforcement in 2015. However, the 8-year installation period does not demonstrate satisfactory performance requirement in Commentary L (30 years) This timeline of performance is not suitable based on Commentary recommendations.
 - It is believed the existing structure was not upgraded to carry loads from wall truss (i.e. checked under low importance assuming limited occupancy). The system did not meet code at time of construction and there is potential deficiency that needs upgrading for occupancy.
- Equipment was removed in 1998 in both Halls. It is believed the equipment, especially the boilers in Boiler Hall, contributed to lateral stability of the building.
 - It is believed no engineering checks or upgrading was completed when equipment was removed. This change of conditions is not suitable for grandfathering based on Commentary recommendations.
- The era of construction was such that the previous code standards would not have provided a life safety that matches the intent of the current code. Snow, rain and lateral loads appear to have the most impact. They could have not accounted for these conditions and checking is necessary for capacity based on Commentary recommendations.
- The building was constructed prior to major Earthquake code requirements, as they did not form part of code until 1990 (CL-#19). As noted in CL-#38, earthquake requirements can present major difficulties for rehab of existing buildings, particularly in heritage and other buildings constructed of unreinforced masonry (which are both true for LPP). Depending on path forward with building, consideration of this component will be required to determine the appropriateness of upgrade.
- Relaxation of the code Load Combination Factors (CL-#22) is not feasible given the intent is to
 occupy building. Previously this has been used to justify the 2015 stabilization work (based on
 assumption it is unoccupied), but that is no longer the intent for the building.
- No restrictions on floor capacity (i.e. limiting # of people) was contemplated. It is generally difficult to enforce and does not appear suitable given the large spaces available (CL-#34).

The floor structures in the Halls are susceptible to vibrations, especially steel floor areas. It is not recommended the building be used for anything causing significant floor vibrations, such as concerts or dance floors (CL-#35).

In summary the conditions are such that the past performance, the overall structure's condition, the use changes, the era of construction (compared with code changes) and the changes due to equipment removal result in checking of the structure being required based on the Commentary L recommendations.

3.2.2 Limits

It is important to note the code findings above depends on the assumed future use as well as the decisions of the Owner/AHJ on what/how they want to approach the building upgrades. Some leniency, with items such as Earthquake upgrades, is possible but needs acceptance of Owner/AHJ. As noted in Commentary, "before any upgrading of the existing building is undertaken, the life safety implications of the conclusion of the structural evaluation should be discussed with the Owner of the building and the authority having jurisdiction to decide a course of action".

Furthermore, it is worth noting Commentary L only applies to the existing structure. Any new structures added or significantly modified structure will be required to be designed to current codes.

3.3 Material Design Standards

In addition to the major building codes, the current material standards were also used to guide the Structural Evaluation. The key outcome was to review the potential challenges related with applying current standards to historical building systems, components and materials.

The findings were there are some portions of the LPP structure that is not addressed in current standard material codes. This meant care was necessary to review these items differently (i.e. use older codes to develop capacities) while also applying the standard design principles of today's material codes. Some examples are:

- Steel connections have single bolted/riveted connections. This would no longer be suitable under current standard practice and should potentially be addressed by strengthening or adjusting connection.
- Riveted connections is non-standard for current detailing. Where new connections are added, they
 will either need to be designed based on older principles or have bolts that "appear" to be riveted.
- Welding may require specialized procedures given the existing steel grades are unknown. Further investigation to determine suitability/capacity of welding these materials is recommended. It is expected several types of steel were used in building, given the different ages of construction and renovation.
- Smooth rebar is used throughout the building. Current structures used deformed rebar so new areas will use deformed.

Unreinforced masonry walls comprise at least part of the lateral system for the buildings. In
general unreinforced walls, especially for heights in the Boiler Hall, would not typically be used for
lateral support with today's design approaches. Upgrade in the east-west direction, which depends
on moment frames and unreinforced masonry will need review.

In summary, care was necessary to determine structural capacity and to estimate potential repair options.

4.0 Site Investigation

With the Historical and Code information available, RJC then completed additional site work. The purpose was to complete additional site measurements, examine structural condition in more-depth and to augment the available information. The following outlines the site observations and the testing completed:

4.1 Visual Observations

In general the overall condition of the structure is consistent with the age and use as an industrial building. The structures are uniquely configured to support plant operation and have been modified over time to accommodate changes in equipment. This has resulted in structures that are varied, interdependent, and altered (which is typical of structures where the focus is on plant performance and function). This has resulted in a structure which is both robust in areas where equipment was supported, while also having other areas with observable deficiencies/ flaws due to age and modifications made during it's lifespan.

RJC performed a number of condition assessments while on site. The purpose was for RJC (as a Professional Structural Engineer) to carefully examine (as noted in Commentary L) the structure to find "any evidence of significant damage, distress, or deterioration". Some were found and are summarized in Appendix C. The tables show the deficiency found and a general potential repair approach, with associated overall budget for each structural area repairs. Photos of the conditions found can be found in Appendix A.

4.1.1 Limits on Costing in Tables (Appendix C)

It is very important to note here that the table shows only the estimated <u>direct structural costs</u> and should be considered rough budget numbers.

The key factor on the costs are the amount of repairs required and timeline to complete are unknown. We have costed based on assuming all the work proceeding under one contract. We have also assumed the quantity of repair and the associated repair details, without having completed any design detailing. All repair recommendations should be considered preliminary in nature and subject to change, especially given the historical designation may impact the repair methods chosen. All of this is of course based on the assumed use of the building and that the potential scopes would be sequenced in a manner that makes sense to complete.

Costing was reviewed with by Clark Builders and BTY. Review comments were provided by during the budget development and some differences were found with their recommendations and RJC's budget. This led to application of the 25% variance noted in the overall budget costing in the Executive Summary.

Significant non-structural costs are excluded from the costs noted, because they are highly dependent on the rehabilitation approach, budget, schedule, access, and/or are generally unknown at this time. They include items such as the contractor's general condition costs, access costs (shoring, lifts), further material testing (for welding, load tests or concrete sampling), painting or protection of materials, paint removal (for welding, especially if lead paint), hazardous materials testing or removal, demolition (for areas with finishes), proposed modifications to structure (unless directly noted), and consultant design fees. Overall the non-structural costs are likely a significant portion or even exceed the direct structural estimated costs.

Another difficult-to-quantify factor is the costs related to matching the historical construction types. Those costs are highly dependent on how rigorous the matching is. We have assumed a medium level of matching in the estimates, which would be an approach like using creating similar look with potentially non-historically correct materials. Difference of approach could impact costs noted significantly.

Finally, the costing is based on RJC using reasonable judgement to estimate the building's future use and structural modifications. That judgement led to several important assumptions used in the costing. Should those assumptions be incorrect, the costing could be impacted. Updating of the costing is recommended throughout the design process moving forward.

4.2 Summary of Testing

To complete the Site Investigations, it is important to note the level of testing completed during the site visits:

Condition assessments: visual observations were completed over several months.

- Ground-Penetrating Radar: scanning was completed over approximately 10-15 concrete floor areas (total in 3 buildings) to determine the general reinforcing in slab areas. This was used to spot check capacity of the concrete floors.
- Turbine Hall roof: scaffolding was used to examine the roof up close (in five discrete areas). The scaffolding was spread along the length of the hall and covered roughly 20% of the width of the structure.
 - Note: scaffolding was not installed in Boiler Hall main floor. Partial review of structure could be completed from mezzanine/stairs. It was determined that it would be cost-prohibitive to scaffold outside the mezzanine, as it would require a significant amount of scaffolding.
- Created one 6'x6' ceiling opening in Switch House (as well as access through current holes) to observe roof framing.
- Boiler Hall main floor large steel infill areas: scaffolding was used to gain access to review up-close the underside of these areas.
- Pile testing in Turbine Hall (Appendix G)
- Core testing: Concrete cores were tested from the exposed foundations (section 4.3) to examine the underground concrete condition. No other concrete core testing was completed, as generally the concrete visually was generally in good condition.
- Steel Testing: no steel material testing was completed (either non-destructive testing (NDT) or coupon tests). A previous NDT test report was available (Acuren, 2014) which had steel material properties that was used as guide for steel strengths for the Structural Analysis (see Section 5).
 - Further testing was not considered useful at this time because the delta between capacity and loads was significant (see Section 5.0). Even with small increases in steel yield strength that might have been expected, it likely would not have changed the conclusions of Section 5.0 (given the delta was significant).

4.3 Core Testing

The footings below grade, in the original phase of the pile investigation, were tested while we had access to subgrade concrete.

4" cores were made vertically through the footing and no rebar was found in the cores. The concrete appeared to generally be in good condition visually, had small aggregate and was quite sandy. Cores were filled when the holes from the pile investigation were filled.

See Appendix G for testing summary sheet. The compressive strength found in the cores was roughly 45MPa on the two cores (City of Edmonton Engineering Services Group). This indicates the concrete is in good condition below grade, at the location uncovered.

4.4 Limits

The reviews were limited to visual observations of accessible areas. Limited testing occurred during our evaluation. When the project proceeds into detailed design, additional site investigations will be required to confirm the conditions and capacities of the structures, including potential demolition of some of the areas to further expose structure such as columns or foundations, depending on the work proposed.

During the site assessments framing did not match the record drawing information and was not consistent across different phases of the construction. Reasonable efforts have been made to measure a representative sample, but assumptions had to be made regarding member size consistency to complete the Structural Analysis. When the project proceeds, further site measurements may be required to confirm the assumptions in the evaluation/costing. Furthermore, when repair details are created, they may vary across phases which could add to construction costs.

5.0 Structure Analysis

After collecting all the available information both historically and on-site, RJC then completed a Structural Analysis as recommended by review of the AB2019 Code and Commentary L. The key factors driving the review were changes in use, the site conditions found, the building changes since power plant operation, the era of construction and the deficiencies observed.

The approach taken was to analyse the gravitational system independently for each structure, while the lateral systems was evaluated as one interconnected building.

Key assumptions were necessary (see Section 5.1) to estimate the capacity of the structures. Each area is broken down for major elements of different levels (see Section 5.2 to 5.5). Each level was reviewed based on the proposed future use or climatic requirements from AB2019, while also taking into account the historical information (Section 2) and available site information (Section 4).

5.1 Assumptions

Historical construction information was key to determining structural capacity. This led to the following approach and the development of key assumptions.

Steel elements such as roof decks, open web steel joists (OWSJ), beams, trusses, columns and built-up elements were measured to calculate their physical properties. Concrete elements such as slabs and beams were measured and scanned to obtain an approximation of their reinforcement. This led to development of the sizes used in the analysis.

Material grades and specifications were developed based on historical information/capacities along with any available material reports, which led to development of the compressive strength of concrete, yield strength of structural steel and yield strength of reinforcing steel. The structural analysis was based on the following assumptions for grade of materials:

- the concrete compressive strength (f'c) was assumed to be 20 MPa
- the reinforcing steel yielding strength (fy) was assumed to be 230 MPa
- the structural steel yielding strength (Fy) was assumed to be 210 MPa.

Additionally, construction methods and approaches from the era were taken into account, such as the use of rivets in structural steel and plain steel as concrete reinforcing. Each area was then evaluated based on the historical assumptions and measured conditions.

5.2 Switch House

The Switch House building is approximately 31 m x 16.5 m, with an elevation to roof level of 9.355 m above ground level. The building consists of a basement, two levels and a roof. The structural system for the 2nd and the main floor level consists of reinforced concrete, and structural steel encased in concrete. The structural system for the roof consists of structural steel.

Each portion of the building was evaluated as follows:

5.2.1 Roof

The roof structure of the Switch House is steel deck supported on open web steel joists (OWSJ) and steel beams. The superimposed dead load (SDL) was assumed to be 0.87 kPa, which assumed minimal finishes in roof/ceiling. The calculated roof snow load (SL) is 1.46 kPa with snow drifts as shown on drawing H202 in Appendix D.

It is important to note that when the building was constructed, the building code did not account for snow drifts on roofs, thus severely underestimating the snow load on the roof. Therefore, Commentary L indicates grandfathering is not suitable, so RJC reviewed the roof's capacity.

The analysis was conducted on the major roof components to compare their estimated capacity with the required loads from the current AB2019. The results are presented on Table 1 with the location of key elements shown on drawing H202 in Appendix D. The table compares the demand to the capacity. Numbers below one indicates the structure has capacity, while over 1.0 means the loads exceed the calculated capacity.

TABLE 1: SWITCH HOUSE ROOF			
Element Loading Type and Location		Demand/Capacity Ratio	
	Base snow area	0.62	
Roof Deck	Area with snow drift from parapet	0.71	
	Area with snow drift from Turbine Hall	1.42	
	Base snow area	1.04	
RJ1 (Long OWSJ)	Area with snow drift from parapet	1.18	
	Area with snow drift from Turbine Hall	2.06	
	Base snow area	1.16	
RJ2 (Short OWSJ)	Area with snow drift from parapet	1.34	
	Area with snow drift from Turbine Hall	2.60	
SB21 and SB23 East of interior columns / Snow drift from parapet		1.37	
SB21 and SB23	West of interior columns / Snow drift from Turbine Hall	1.88	
Roof Columns Interior typical		0.86	

As the table shows, the elements in the snow drift areas are not sufficient to carry AB2019 snow loads. Therefore, the roof structure does not provide similar levels of safety as structures designed to the current code. Given the delta in some cases is 2.6 (meaning the capacity is 38% of the loads), it is significantly under designed and upgrading should be strongly considered.

It is important to note that connections for these roof elements likely have similar deficiencies and will require upgrading. Each connection was not reviewed at this stage, but will require checking during future design phases.

Finally, perimeter roof columns were not analyzed as access to them was not possible without more destructive testing.

5.2.2 Second Floor

The second floor of the Switch House is a suspended concrete slab supported on steel beams encased in concrete. The planned future use of the floor is generally assumed to be "Office area". Based on proposed use, the floor was assessed using a SDL of 1.6 kPa and LL of 2.4 kPa.

Since the second floor is assumed to continue as office space, and it has performed satisfactorily over time without distress or failure, while also being in generally good condition, it is believed that the structure will continue to perform adequately for office type uses, assuming no significant office filing storage loads are applied.

Concrete scanning was done in the slab in a few selected areas. The purpose was to develop an understanding of the reinforcement in the structure, from which localized checks were completed. Based on the capacity determined, the floor structure is capable of 2.4 kPa office use.

Since the second floor columns are encased in concrete and masonry, an analysis of them could not be performed.

5.2.3 Main Floor

The main floor structure of the Switch House is a suspended concrete slab supported on concrete beams and walls, with steel reinforcement on the eastern portion where heavier equipment was located. The previous use was "Equipment area and service room", with a live load (LL) of 3.6 kPa with several areas with housekeeping pads.

The main floor use is assumed to be changing to assembly use with potentially some back of house office areas. Given the weight of the existing equipment, as well as the housekeeping pads, and the fact it has performed satisfactorily over the years, and is generally in good condition, it is believed the floor will be suitable for assembly occupancy.

Additionally, concrete scanning was done on the slab in a few selected areas. The purpose was to develop an understanding of the reinforcement in the structure, from which localized checks were completed. Based on the capacity determined, the floor structure is capable to support the assembly use.

There are likely some localized areas of the floor which need repair, including some beams with exposed bottom steel . At a minimum the floor should be fully fire-rated.

Further studies of the concrete columns will be required. In order to complete this, removal of finishes or localized destructive testing would be required to finalize their capacity. It is not believed however that they are likely to be deficient, given the proposed uses do not appear to result in an overall increase in load.

5.2.4 Basement

The basement structure of the Switch House is a concrete slab on grade. The planned future use of the floor is currently unknown, and was previously used for "Equipment area and service room", with a live load (LL) of 3.6 kPa.

For the purpose of the evaluation, the basement is assumed to continue being a mechanical area or back of house storage with no plans to really occupy the space. Given it is a slab on grade, and has performed satisfactorily over the years, it is believed the floor slab will be suitable for the general back of house use.

Based on drawings or site measurements, the slab thickness is believed to be 127 mm. For areas where the top of slab is visible, there does not seem to be significant cracking, so the subgrade is believed to be sufficient.

Foundations need to be further studied to confirm their capacity and assess their state. Evaluation of them during this phase was not considered critical and is dependent not only on the uses of the above floors but also the projected framing changes needed to make the building accessible (i.e. new stairs and elevator).

5.3 Turbine Hall

The Turbine Hall is approximately 123 m x 15 m, with an elevation to roof level of 13.552 m above ground level. The building consists of a basement, one level and a roof.

The structural system for the basement consists of reinforced concrete. The main floor structural system is reinforced concrete, with structural steel sub-framing and infill areas. The structural system for the roof consists of structural steel.

5.3.1 Roof

The roof structure for the Turbine Hall is steel deck supported on channel joists, which are then supported on steel frames. The superimposed dead load (SDL) was assumed to be 0.87 kPa, which assumed minimal finishes in roof/ceiling. The calculated SL is 1.46 kPa with snow drifts as shown on drawing H207 in Appendix D.

It is important to note that when the building was constructed, the building code did not account for snow drifts on roofs, thus severely underestimating the snow load on the roof. Therefore, Commentary L indicates grandfathering is not suitable, so RJC reviewed the roof's capacity.

Also, the building was previously operated at higher temperatures and had limited roof insulation. It is believed this potentially decreased the amount of snow that accumulated on the roof. The plan is to upgrade the roof insulation value, so the heat loss will be decreased and the amount of snow accumulation could exceed what it has seen historically. Commentary L again indicates review is recommended, under these conditions.

The analysis was conducted on the major roof components to compare their estimated capacity with the required loads from the current Alberta Building Code. The results are presented on Table 2, with the location of these elements shown on drawing H207 in Appendix D.

Based on the site measurements, the roof member sizes varied in different phases of construction. The analysis was performed in all the elements that could be measured from the scaffolding and are shown on drawing H207 in Appendix D, but the results in the table represent only the best and worst-case scenarios for the different roof joist sizes.

TABLE 2: TURBINE HALL ROOF			
Element	Loading Type and Location	Type and Location Demand/Capacity Ratio	
	Base snow area	0.62	
Roof Deck	Area with snow drift from parapet	0.71	
	Area with snow drift from Turbine Hall	1.76	
	Base snow area	0.43	1.16
Joist	Area with snow drift from parapet	0.63	1.32
	Area with snow drift from Turbine Hall	1.48	3.09
Frame Beams	Positive moment in beam	1.67	
Frame beams	Negative moment in beam	8.56	
Frame Columns	Typical	2.07	

As the table shows, the elements in the snow drift areas are not sufficient to carry AB2019 snow loads. Therefore, the roof structure does not provide similar levels of safety as structures designed to the current code. Given the delta in some cases is 8.56 (meaning the capacity is 11% of the loads due to issues with stability; see below), it is significantly under designed and upgrading should be strongly considered.

It is important to note that connections for these roof elements likely have similar deficiencies and will require upgrading. A few of the localized connections were reviewed and found to be insufficient to carry current drifted snow loads. Not every connection was reviewed at this stage, but will require checking during future design phases.

The main beams supporting the joists for vertical load are moment frames in the east-west direction. Due to frame action, the beams see negative moments near the columns. However, they are not braced on their bottom chord adequately, creating a condition where the beams have a demand/capacity ratio of 8.56. Bracing the bottom cord of all these frames would decrease the ratio to 1.07 for negative moment. However, the beams are still deficient for positive moment (due mostly to the drifts) and reinforcing is strongly recommended.

5.3.2 Main Floor

The main floor structure for the Turbine Hall is a combination of slab supported on concrete beams and infill slab supported on steel sub-framing. The planned future use of the floor was assumed to be "General assembly", with live load of 4.8 kPa.

The previous use of the building was primarily industrial and heavy equipment was located on the main floor. Based on the premise that the new loads for assembly will not exceed the previous loads from equipment, it is believed that the slabs would be able to support effectively a live load of 4.8 kPa. This is also consistent with previous load assessments completed by other Structural Engineers (Dialog, 2018).

Concrete scanning was performed, as well as information from a previous scanning report (Maverick, 2019) on a limited number of locations on the main floor to confirm the general existing reinforcement. The capacity determined showed the floor structure is adequate for the assembly use.

However, there are exceptions where areas of the slab are not sufficient to support assembly loads. This includes areas that have been infilled with steel plates, areas where the existing framing has been damaged or has deficient sub-framing, and where structural elements were cut without consideration of providing an alternate loading path. Localized repairs are required to address these locations.

5.3.3 Basement

The basement structure for the Turbine Hall is a concrete slab on grade. The planned future use of the floor was assumed to be "General assembly" with live load of 4.8 kPa.

The basement also had heavy industrial equipment and maintenance areas on the slab. Given it is a slab on grade, and has performed satisfactorily over the years, it is believed the floor slab will be suitable for the assembly use proposed. The slab thickness was 127-150 mm thick where we cut for the pile investigation. The subgrade is also believed to be sufficient since there was no significant signs of cracking observed on top of slab.

It is important to note though the slab has several chase-ways, grates and uneven surfaces that will either need to be infilled or replaced for the occupancy load.

5.4 Boiler Hall

The Boiler Hall is approximately 110 m x 22 m, with an elevation to roof level of 23.061 m above ground level. The building consists of a basement, the main floor, a mezzanine and a roof.

The structural system for the basement consists of reinforced concrete. The main floor structural system is a mix of reinforced concrete, and steel plates on structural steel. The mezzanine structure is a suspended concrete slab on steel beams. The structural system for the roof consists of structural steel.

5.4.1 Roof

The roof structure for the Boiler Hall is steel deck supported on OWSJ, which are then supported on steel trusses. The SDL was assumed to be 1.27 kPa due to the high amount of non-structural steel hanging from the roof structure. The calculated SL is 1.46 kPa with snow drifts as shown on drawings H217 and H218 in Appendix D. The snow drift on the Boiler Hall roof is not as significant as in the other two roofs, due to it being the high roof. Only the parapet around the roof perimeter and the central stacks produce drifting.

Also, the building was previously operated at higher temperatures and had limited roof insulation. It is believed this potentially decreased the amount of snow that accumulated on the roof. The plan is to upgrade the roof insulation value, so the heat loss will be decreased and the amount of snow accumulation could exceed what it has seen historically. Commentary L indicates review is recommended under these conditions.

The analysis was conducted on the major roof components to compare their estimated capacity with the required loads from the current Alberta Building Code. The results are presented on Table 3, with the location of these elements shown on drawings H217 and H218 in Appendix D.

TABLE 3: BOILER HALL ROOF			
Element Type and Location	Loading Type	Element	Demand/Capacity Ratio
1007.7	Typical	Top Chord	1.75
1937 Truss at GL-13 (Shown in DW-3-B-501)		Bot Chord	1.72
(OHOWITH DW 3 B 301)		Vert/Diag	n/a
T 1007 T	Typical	Top Chord	1.48
Typ. 1937 Truss (Shown in DW-3-B-501)		Bot Chord	1.13
(OHOWITH DW 3 B 301)		Vert/Diag	1.23
	Typical	Top Chord	0.90
Truss at GL-5		Bot Chord	0.78
		Vert/Diag	1.07
	Typical	Top Chord	1.54
Truss at GL-8		Bot Chord	1.27
		Vert/Diag	1.30

TABLE 3: BOILER HALL ROOF			
Element Type and Location	Loading Type	Element	Demand/Capacity Ratio
	Typical	Top Chord	1.93
Truss at GL-7		Bot Chord	1.90
		Vert/Diag	2.06
	Base snow area	Top Chord	0.91
		Bot Chord	0.87
OWC II ong Chan		Diag	0.91
OWSJ Long Span	Area with snow drift from parapet	Top Chord	1.00
		Bot Chord	0.95
		Diag	1.00
	Base snow area	Top Chord	0.82
		Bot Chord	0.82
OWC I Chart Chan		Diag	1.02
OWSJ Short Span	Area with snow drift from parapet	Top Chord	0.95
		Bot Chord	0.95
		Diag	1.12
Columns	Typical		1.55

As the table shows, some of the OWSJs where the snow drift is present are not sufficient to carry current snow loads. Therefore, upgrade should be considered given the joists do not provide similar levels of safety as structures designed under current codes.

The trusses were found with a larger delta between capacity and required loads. Consideration for reinforcement of these members is considered even more critical than the joists. One other approach would be to reduce the dead load by removing the miscellaneous non-structural steel. This would decrease the demand on the structure and could reduce the amount of reinforcing necessary for the trusses. See photo 29/30 for examples of the non-structural steel that could be removed.

It is important to note that connections for these roof elements likely have similar deficiencies and will require upgrading. A few of the localized connections were reviewed and found to be insufficient.

The existing exterior columns were also analyzed and were found significantly deficient in regards to their ability to act like a moment frame (with the existing trusses) or provide lateral restraint for the building in the east-west direction. A significant upgrade to the lateral system is required to limit the lateral loads on the columns, while also some reinforcement & repair (i.e. corrosion repair) of the columns will be required.

5.4.2 Mezzanine

The mezzanine structure for the Boiler Hall is a suspended concrete slab supported on steel beams. The proposed future use of the floor is generally unknown, but was assumed to be "General assembly", with live load of 4.8 kPa.

The previous use of the building was primarily industrial and heavy equipment. RJC was not able to measure some of the members of this floor (due to height above floor), so we cannot at this time determine overall if the floor is suitable for assembly occupancy. That said, since the mezzanine previously stored equipment and had maintenance access, it is believed to have supported similar loads in past.

Further evaluation would be needed if this space is intended to be occupied. Repairs are also necessary to the steel plate and concrete floors, which are marked off as not suitable for walking or are spalling on the underside.

The columns that support the mezzanine structure that have been reinforced with 1" thick plates are capable of carrying the load efficiently. But there are 2 columns that don't have this reinforcement, so these columns need to be reinforced to have the necessary capacity. Additionally, there are some very slender columns which would not meet current steel requirements for slenderness and may need reinforcement or bracing to support future loads, depending on planned future uses.

5.4.3 Main Floor

The main floor structure for the Boiler Hall is a combination of slab supported on concrete beams and steel plate on steel beams. The proposed future use of the floor was assumed to be "General assembly" with live load of 4.8 kPa.

The previous use of the building was primarily industrial and heavy equipment was located on the main floor. Based on the premise that the new loads for assembly will not exceed the previous loads from equipment, it is believed that the slabs would be able to effectively support a live load of 4.8 kPa. This is also consistent with previous load assessments completed by other structural engineers (Dialog, 2018).

Concrete scanning was performed, as well as information from a previous scanning report (Maverick, 2019) on a limited number of locations on the main floor to confirm the general existing reinforcement, and the results obtained appeared to show that the floor structure is adequate for the proposed uses.

The steel portion of the floor was analyzed assuming a 4" thick concrete infill on top of the existing steel plate. The steel plate was not analyzed as there was no accessible area to measure its thickness. However, the steel members that were analyzed are marked on drawing H210 in Appendix D.

The analysis shows that the floor is generally adequate for the proposed use, although local deficiencies need to be fixed and connections need to be further analyzed.

5.4.4 Basement

The basement structure for the Boiler Hall is a concrete slab on grade. The planned future use of the floor was assumed to be "General assembly" with live load of 4.8 kPa.

The basement also had heavy industrial equipment and maintenance areas on the slab. Given it is a slab on grade, and has performed satisfactorily over the years, it is believed the floor slab will be suitable for the assembly use proposed. The slab thickness was 127-150 mm thick where we cut for the pile investigation. The subgrade is also believed to be sufficient since there was no significant signs of cracking observed on top of slab.

It is important to note though the slab has several chase-ways, grates and uneven surfaces which will either need to be infilled or replaced for the occupancy load expected.

5.5 Lateral Analysis

RJC completed a lateral analysis in conjunction with the gravitational analysis. The process was to complete an engineering study of the existing structure to ensure the existing building had suitable standard of performance and identifiable load path.

In terms of the lateral wind loads in the north-south direction, where there are very long brick walls and embedded steel bracing, it is understood the loads have an identifiable load path and has performed in this direction, based on general principles. Also, it is believed the overall structural changes in this direction were not significantly impacted by the decommissioning and therefore there is a record of performance historically for loads in this direction.

In terms of the lateral wind loads in the east-west direction, where there is limited lateral support (especially in the Halls), and where the changes since decommissioning appear significant and the columns were found to be deficient to act as frames, the structure is not suitable for lateral loads from AB2019. The load path currently is unclear and is likely dependent on non-typical support conditions, as well as combined lateral stability. RJC completed localized checks to confirm the capacity of the structure and found several members that were well over 1.0. It is recommended a lateral system be added in this direction, with focus on adding capacity for the two halls and connects all three buildings laterally.

5.6 Limits

Read Jones Christoffersen Ltd. performed design checks to confirm the adequacy of the structure, but did not confirm every member or connection. The approach for the evaluation was to take a considered sampling approach with no attempt to check every element or portion of the building. The intent of the review was to determine, in a general way, the overall quality and sufficiency of the structure, but not to ascertain the quality or sufficiency of every element of the structure.

During future phases of the design, further work will be required to confirm the capacity of the structure for the intended uses, as well as the assumptions made during the above analysis.

6.0 Summary of Structural Analysis & Costs

Based on the Structural Analysis completed in Section 5.0, the building has structural deficiencies that need consideration or should be addressed. However, it is important to note any proposed upgrading strategy will require discussions between the City, Authority Having Jurisdiction (AHJ) and the design engineers. Upgrading the structure to current code is not a simple process and will require direction from the City on how they would like to proceed.

The key findings for the City to consider from the Structural Evaluation are as follows:

- 1) In general the basement and main floors are sufficient for 4.8kPa live load for commercial use.
 - a. In general the existing structure has seen previous loads that exceeded this and has performed. Localized areas will require reinforcing, specifically steel grate/plate areas.
 - b. There is also some areas, specifically in Turbine Hall towards north end, which need repair in order to be used for 4.8kPa.
- 2) The interior/exterior stairs and catwalk areas are not expected to be re-used and are not sufficient for 4.8kPa live load. Reinforcement or repair is likely required to make these areas suitable for occupancy again.
- 3) The Boiler Hall mezzanine was not fully evaluated, but preliminarily it is believed it could be used for assembly. However, there is significant repair areas required.
- 4) The 2nd floor of the Switch House is suitable for 2.4kPa live load. In general the existing structure has performed under similar loads previously.
- 5) Roofs in general the roofs are not sufficient to carry current snow loads. The basic snow areas are close to 1.0 demand to load ratio (i.e. close to sufficient), while the drift areas are significantly under. The worst two areas are the western roof areas of the Turbine Hall and Switch House, where drift from higher roofs is significantly over the base snow. To meet current codes, upgrades would be required and are generally recommended given the difference between capacity and code loads is significant.

- 6) Lateral in east-west direction upgrade is required as no consistent lateral system could be determined and confirmed as suitable. Also, the demand on the columns for carrying lateral loads significantly exceed capacity, so it is recommended the columns not be used to carry lateral loads.
 - a. In the north-south direction, it appears sufficient for wind.
 - b. Earthquake analysis depends on unknown site classification, which is assumed to be Site Class C. This would need to be confirmed prior to making final determination for EQ capacity. However it is expected wind will govern over EQ based on our preliminary checks.
- 7) Costing for the items found during the Structural Analysis, can be found in Appendix E. See costing comments provided in Section 4.1.1. The same comments regarding non-structural costs apply to the costs noted in Section 5.0 & 6.0.

While the above generally determined the capacity of the areas, further investigations may be required based on planned modifications. In addition there are areas that are difficult to evaluate due to the lack of available information (i.e. foundations) or areas with finishes preventing scanning (i.e. large concrete members or buried columns). It must be stressed that the above is general and that on-going structural evaluation will be required as the project moves forward.

7.0 Path Forward

Based on the Evaluation completed and the deficiencies noted in Sections 4.0 thru 6.0, a significant amount of structural upgrading should be considered prior to reoccupying the LPP.

Given the lack of historical information, the structure has several unknowns, especially for areas covered by finishes or below grade. On-going work to uncover the conditions will be expected not only during design, but during construction as work proceeds. Based on RJC's experience with historical buildings, red flags will arise as structure is exposed/modified. A significant contingency should be allotted to address these potential unknowns.

In terms of codes, further discussion is necessary to determine what components the City wants to upgrade on the building, as well as what is acceptable to the Authority Having Jurisdiction. Regardless it is RJC's assertion the structure currently is not suitable for occupancy (this also was echoed by the previous engineering reports) and upgrades are necessary. Any upgrades will need to be carefully considered with the building's historical designation, while also improving the factor of safety in line with existing codes. Some of the areas noted in Section 5.0 are significantly under capacity when compared to current codes and that safety level is not suitable in our opinion.

RJC sees two paths forward:

- 1) Complete base building repair prior to tenant upgrades OR
- 2) Complete the repairs as part of reoccupation renovation, where the tenant and use is clearer.

The former approach tackles the deficiencies earlier so it helps stabilize the building sooner. The latter approach provides more focused efforts to align with tenant needs and potentially less modifications than a base-building upgrade. Regardless, a structural repair will need to occur early in the repair scopes, both to ensure safety during construction and for the future users of the building.

Overall, the structure analysis showed the delta between capacity and demand, with some areas being insufficient when checked using current codes and assumed uses. It appears the most critical areas are the roof structures (especially in western portion on Switch House & Turbine Hall), the lateral system (especially east-west for the two halls), the columns in the two Halls, the stairs (especially in Boiler Hall), the steel infill plates on main floors of the two halls, and the insufficient existing main floor structures (i.e. the Turbine walkways, the Turbine floor near north Switch House door with cut beam (#31 in Appendix C) and the very north steel framed higher floor (#26 in Appendix C)). In some cases, both the capacity and condition may result in upgrading of these areas or transfer of load carrying to different elements to reduce demand.

7.1 Other Considerations For Path Forward

Some other consideration as the project moves forward:

- Acceptable deflections in general the building was not designed with performance of
 commercial finishes in mind, except perhaps related to the exterior brick walls. Addition of new
 interior gypsum board walls could be impacted by the current building performance, as some
 of the deflections found in our analysis exceeded current typical standard deflection amounts
 used today.
- Acceptable vibrations in both Halls, there are portions of the steel plated floor areas which
 have noticeable vibrations. These areas may not perform well or may be noticeable to users.
 The biggest challenges would be performance with non-flexible flooring and activities involving
 large oscillating loads (such as dancing).
- Foundations while testing was completed on a few isolated areas and in general the performance of the structure appears okay in relation to the foundations, new uses or floor area added will likely trigger more load on existing foundations in some instances. Load testing or additional foundations could be required to carry these loads. A geotech report will likely be required to provide suitable foundation information for structures added.

The other key note is that while reasonable efforts have been made to ascertain the structure sizes and capacities, this work involves significant assumptions both about the structural sizes. Those findings above will require on-going review to ensure the assumptions are correct and that the condition on site (member size, condition, connection, supporting members) are verified to ensure the loads can be adequately carried.

7.2 Summary of Key Upgrades

The key upgrades that RJC envisions to occupy the building are as follows (see Appendix F for sketch):

- New core shafts or bracing, located on Boiler Hall side of the central wall (between the two Halls).
 Core Shafts will need to run from at least roof to main floor. The intent is for them to provide lateral support for both Halls, taking demand of lateral support off the columns.
- 2. Reinforcement of decking in drift areas in Turbine Hall/Switch House and in parapet areas within all three buildings.
- 3. Added framing between joists in drift zones (and/or reinforce existing joists)
- 4. Reinforce beams/girders/trusses by adding steel to framing
- 5. Connection reinforcement by welding bolted connections or adding additional bolts.
- 6. Repair and reinforcement of columns shared between Halls. This upgrade is dependent on lateral upgrade (see #1) and what available bracing could be added. Address areas with rusting (especially shared columns between Turbine & Boiler Hall)
- 7. Repair or reinforce column locations missing anchor rods
- 8. Repair or replace or remove steel infill areas on main floor
- 9. Re-frame North floor area in Turbine Hall (#26 in Appendix C)
- 10. Re-frame broken beam area in Turbine Hall (#31 in Appendix C)
- 11. Localized fireproofing repairs to Switch House concrete areas (where steel exposed)
- 12. Basement Switch House floor investigate and prevent water infiltration causing accumulation of silt.
- 13. Analyze West Wall lateral support for Boiler Hall. Existing was not upgraded so need to confirm suitable loads for occupied conditions. Also need to determine if upgrading is staying or if other reinforcement is being added, as well as if the area will be used as a floor as designed.
- 14. Repair concrete areas with exposed rebar or spalling. Typically underside of floors and some Boiler Hall basement columns.
- 15. Address Boiler Hall framing which is significantly modified. Determine what is suitable to remain and what needs reinforcing. Depends on intended uses.

16. Determine if painting of some of the steel is required to protect long-term. Upgrading of steel could require removal of paint (especially if lead paint). Efforts should be made to quickly paint again if removed.

7.3 Costs/Limits

RJC developed <u>structure-only costs</u> noted in Appendix C & E, which includes on direct structural costs only and assumes all the deficiencies noted are addressed. There is significant <u>non-structural costs</u> <u>excluded</u> from the cost noted (See costing comments provided in Section 4.1.1: same comments regarding non-structural costs apply below).

The cost breakout is as follows:

TABLE 4: ESTIMATED COSTS			
Area	Deficiency Costs	Upgrade Costs	
Switch House			
Turbine Hall			
Boiler Hall			
TOTAL			

RJC is estimating <u>structure-only budget</u> could be in the range of \$XXXXX in current day dollars. Given the very preliminary work to date and the unusual volatility of pricing in the current market, the budget could be approach \$XXXXXXX

The budget <u>excludes several key costs</u> (see Section 4.1.1) that also are necessary to complete the work. They could be a significant portion of the direct structural costs. As well, a very healthy contingency should be considered by the City. The main reasons are the type/age of structure and the historical designation, which might influence the options for rehabilitation.

7.4 Limits of Liability

This report is intended to provide a structural assessment of the noted building and to outline the conditions apparent at the time of our review. Read Jones Christoffersen Ltd. performed general design checks to confirm the adequacy of the structure, but did not confirm every single member or connection. During future phases of the design, further work will be required to confirm the capacity of the structure for the intended uses, as well as the assumptions made during the Structural Evaluation.

The review was limited to visual observations of accessible areas and areas that were visible where testing or dismantling of finishes was performed. Reviews were made on a considered sampling approach with no attempt to review or inspect every element. The review focused on determining areas of visually significant deterioration that need for repair, and to determine, in a general way, the overall quality and sufficiency of the structure.

RJC's comments are not a guarantee nor warranty of any aspect of the condition of the building whatsoever, nor that the building has been built in accordance with the drawings and specifications of previous available information. Any opinions of probable cost presented by the Consultant are based on incomplete and very preliminary design, as well as factors over which the Consultant has no control. The Consultant does not guarantee the accuracy of these probable costs and shall have no liability where the probable costs are exceeded.

Reports prepared by the Consultant are exclusively for the use and benefit of the Client. They are not for the use or benefit of, nor may they be relied upon by, any other person or entity without written permission of the Consultant .RJC shall not be held liable for the opinions expressed in this report, including estimated costs

Should you have any questions or comments regarding the information presented herein, please contact this office.

Yours truly,

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Appendix A

Photographs

TABLE A-1: SWITCH HOUSE



Photo 1: Switch House exterior



Photo 2: Roof – Typical framing



Photo 3: Roof – Framing



Photo 4: Roof – Joists



Photo 5: 2nd Floor – Typical



Photo 6: 2nd Floor – Opening to infill

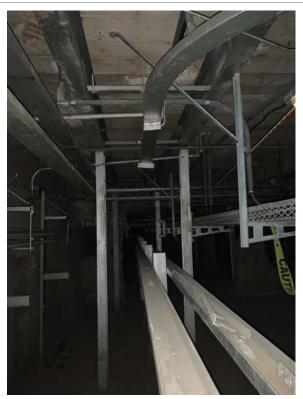


Photo 7: Main Floor – Steel sub-framing

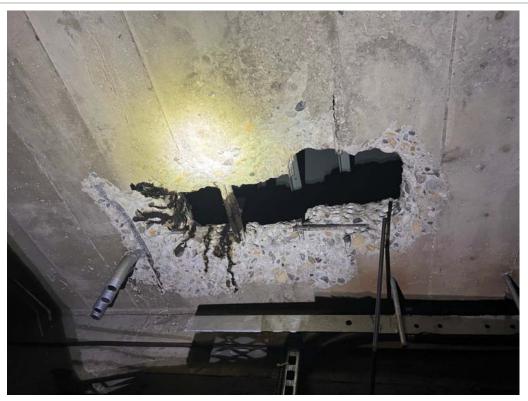


Photo 8: Main Floor – Typical Hole in Floor. Requires Removal of Corroded Steel to Infill



Photo 9: Basement – Silt deposit from water infiltration. Water infiltration could impact longevity of concrete.

TABLE A-2: TURBINE HALL



Photo 10: Exterior



Photo 11: Roof - Overall



Photo 12: Roof –Damaged Central deck plate at peak. Insufficient support provided.

Could lead to localized failure

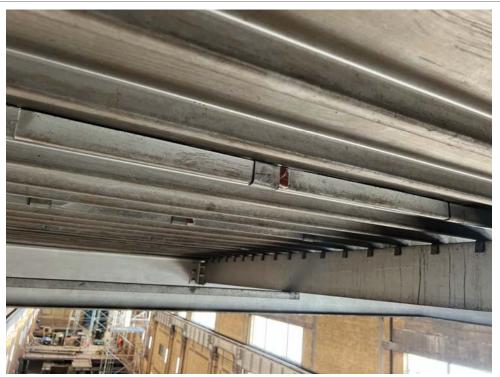


Photo 13: Roof – Deck connector potentially loose. Affects roof diaphragm to carry lateral loads.

Possible additional connection required when roof removed.



Photo 14: Roof – Rusted deck at drain. Could lead to localized failure.

Removal or Repair could be required.



Photo 15: Roof – Girder and deck rust. Appears generally to be surface rust.



Photo 16: Main Floor – Column with rust on Boiler Hall side. Loss of section likely results in decreased column capacity. Removal of rust and reinforcement could replace damage.



Photo 17: Main Floor – Column with organic growth. Likely deterioration of brick and potentially most rust of column inside of wall. Rust would lead to lower capacity column.



Photo 18: Main Floor – Damaged / cracked floor area. Floor is currently not supported due to removed beam. Safety concern needing to be addressed.



Photo 19: Main Floor – North framing incomplete. Needs reinforcement. No discerable load path for some of the elements.

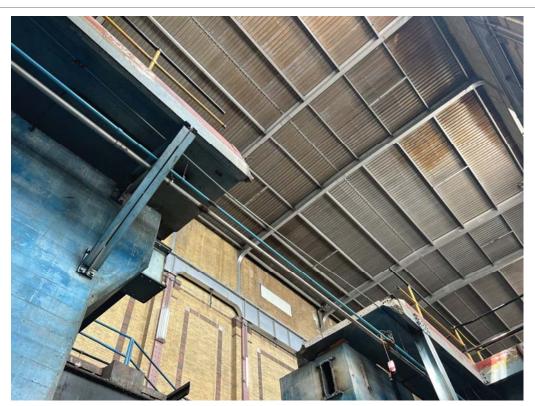


Photo 20: Main Floor – Walkway framing incomplete. Area currently taped off as not safe. Fall risk.



Photo 21: Main Floor – Typical plated areas. In general some of these are not sufficiently supported and could lead to failure

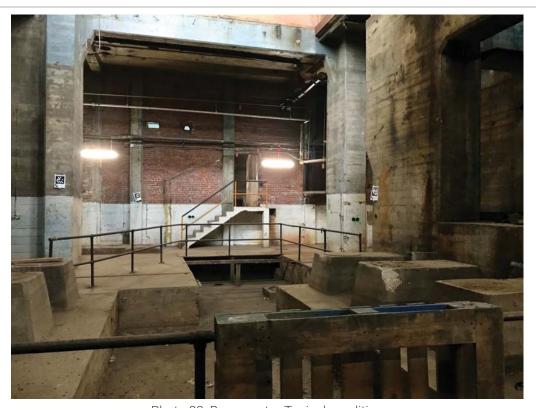


Photo 22: Basement – Typical condition



Photo 23: Basement - Floor scanning



Photo 24: Basement – Typical stair bearing condition. Grating likely not capable of point load support. Could lead to partial failure of stairs.



Photo 25: Basement – Column consolidation. Can lead to localized lower compressive capacity of the element and potentially additional damage if stressed differently than previous.

TABLE A-3: BOILER HALL



Photo 26: Boiler Hall Exterior



Photo 27: Exterior – West side. Exposed rebar has corroded. Localized repairs to cover rebar and protect damaged areas could be used to extend life-span.



Photo 28: Exterior – Stair. Poor condition generally for use.



Photo 29: Roof – Joists and miscellaneous framing.

Miscellaneous steel is the vertical "wall" steel in foreground of photo



Photo 30: Roof – Stack and miscellaneous framing (orange most steel in top left).



Photo 31: Roof - Truss bolting



Photo 32: Mezzanine – Overall



Photo 33: Mezzanine – Underside spalling. Could lead to localized deterioration and failure.

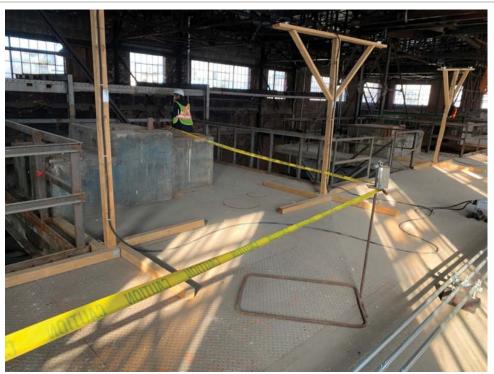


Photo 34: Mezzanine – Plated areas blocked off. Blocked off as determined not suitable for traffic. Repairs of these areas could be needed to open again.





Photos 35 and 36: 2nd Floor – Typical condition of boiler frames. Cut, bent and corroded steel in some areas results in lower capacity of members. Depending on future use some repairs might be necessary.

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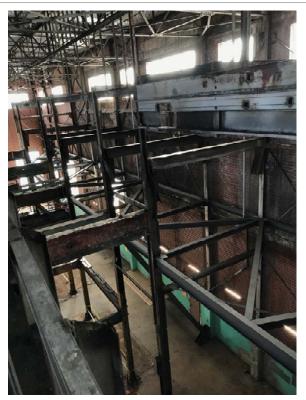


Photo 37: 2nd Floor – West wall truss framing

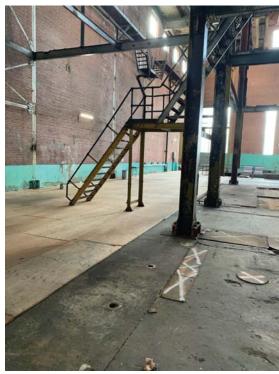


Photo 38: 2nd Floor – Typical stair. Would not meet current codes for rise-run. Also stairs have some concerning connection details and low handrails.



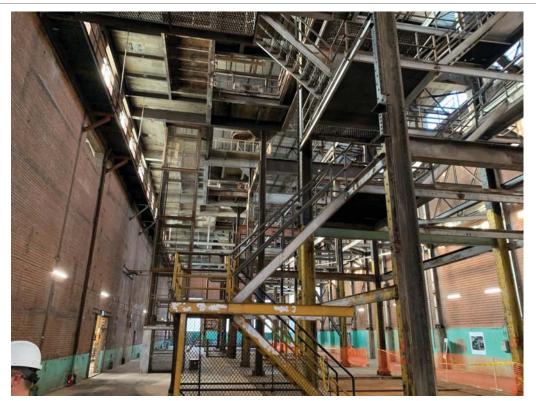


Photo 39: Main Floor – Overall



Photo 40: Main Floor – Overall from underneath



Photo 41: Main Floor – Condition down hallway. Corroded and spalled concrete. Local damage could cause capacity issues on floor above. Repair may be necessary by removing corroded bar and infill concrete.



Photo 42: Main Floor – Steel infill. Some significant corrosion on surface. Where section is lost, could affect local capacity.



Photo 43: Main Floor – Temporary shoring. Does not adequately support plate above. Could lead to failure of floor plate.



Photo 44: Main Floor – Underside condition. Deteriorated concrete could lead to local failure. Repair may be necessary by removing corroded bar and infill concrete.

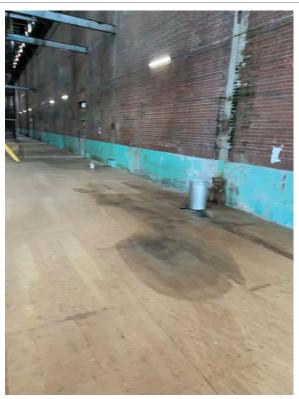


Photo 45: Main Floor – Signs of water infiltration. Water can damage structure and lead to loss of lifespan.

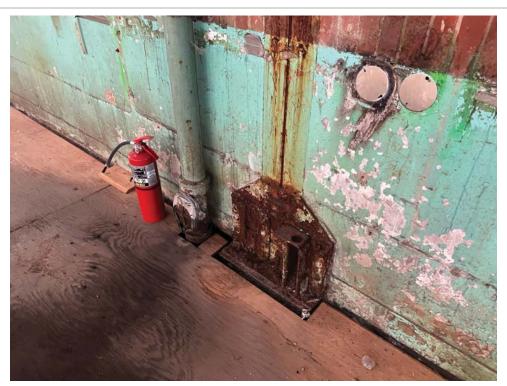


Photo 46: Main Floor – Anchor bolt missing. Column is no longer connected at base.

This could lead to instability of column base.

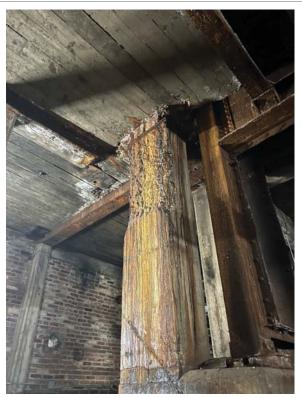


Photo 47: Basement – Deteriorated concrete column. Reinforcement is necessary to repair column.



Photo 48: Basement – Beam with bolts through. Unusual detail which may have been a temporary repair. Exposed rebar and bolts should be covered with concrete.



Appendix B

Available Information

The following information was available was provided by the City of Edmonton/EPCOR during the previous conditions assessment work in 2021, which included both relevant structural and condition reports, as well as original and renovation drawings.

TABLE B-1: AVAILABLE INFORMATION			
Туре	Date	Author/Description	
REPORT	March 26, 2019	DIALOG - Evaluation of Rossdale Power Plant Structure for Temp Occupancy (for Main Floor of Turbine and Boiler Hall)	
REPORT	April 23, 2019	DIALOG - Evaluation of Rossdale Power Plant Structure for Temp Occupancy (for Main Floor of Turbine and Boiler Hall)	
REPORT	April 11, 2019	MAVERICK INSPECTIONS – Ground Penetrating Radar Report (for Main Floor of Turbine and Boiler Hall)	
REPORT	January 2009	STANTEC CONSULTING - LPP Structural Assessment Report	
REPORT	December 2008	THURBER ENGINEERING LTD —Rossdale LPP Observation of Crack: Low Pressure Boiler Building	
REPORT	October 2014	KRAIN CONSULTING - Roof Condition Report	
REPORT	November 2018	CITY OF EDMONTON - Rossdale Power Plant Occupancy Strategy	
REPORT	October 2014	DIALOG - Schematic Design Report	
REPORT	December 2012	DIALOG - Building Review and Structural Evaluation	
REPORT	December 2012	DIALOG - Rossdale Generating Station Scenario One - Building Stabilization	
REPORT	February 2011	DIALOG - Preliminary Building Assessment	
REPORT	October 2014	Acuren – Rossdale Generating Station, Metallurgical Assessment of Structural Steel Members	
DRAWINGS	1938-1965	Existing available drawings (roughly 10 showing structural information)	
DRAWINGS	2010	STANTEC - Decommission Drawings - Structural	
DRAWINGS	2015	DIALOG - Record Drawings - Structural Stabilization	



Appendix C

Site Observation - Deficiency Tables

		es Christoffersen Engineers		
			Rossdale LPP SWITCH HOUSE- SITE OBSERVED DEFICIENCIES	
	PROJECT NO.:		30624.0012	
#	Area	Description of Visual or Known Deficiency	Potential Repair (General Description)	
1	Basement	Basement floor floods based on soil deposits	Areas to be sealed and source of water identified to prevent further damage to structure/foundations. Assume adding sump pit and sealing tunnels	
2	Basement	Steel reinforcement of eastern portion of main floor	Lateral connections should be added to ensure	
		appears to be only gravity support of floor.	stability of reinforcement	
3	Exterior	Minor deterioration of brick/mortar/lintels	Repair as required by replacing lost material	
4	Exterior	Exterior concrete has some minor spalling and	Repair as required by replacing lost material	
		minor deterioration of the surfaces Overall it is expected that the building would not	Additional consideration during design will be	
5	General	meet current standards for deflection criteria for	required to ensure finishes are not damaged by	
3	General	finishes.	building movement	
6	General	Paint on steel is missing a few locations	Consider painting to increase life-span of steel	
		Main Floor concrete beams have exposed steel on	Fire-rating of steel will be required. Patching of	
7	Main Floor	bottom.	concrete could also be used	
8	Main Floor	South stairway had some damage (main floor to 2nd floor) on edges of the treads. Appears to have deteriorated and have been patched in several areas.		
9	Main/2nd Floor Columns	Steel Columns generally are not visible at time of review. In general the columns are covered with brick or concrete	No repair is required. However it is an unknown that may require upgrading once exposed during construction	
10	Roof	Roof structure is shallow for spans.	Limited steel repair or connection upgrading is	
11	Roof	Lateral connection between decking and exterior brick walls unknown.	expected. Joists for short spans are very shallow Upgrading could be required to complete lateral system	
		OTDUOTUDE ONLY FOTING ATER BURGET		
		STRUCTURE ONLY ESTIMATED BUDGET		
	*	SEE PLAN FOR LOCATIONS OF DEFICENCIES NOTED		
	**	SEE SECTION 4.1 FOR LIM	IITS ON COSTING TABLES	
	***	NA = NOT AVAILABLE AT THIS TIME (UNKNOWN)		

r	Read Jon Consulting	es Christoffersen Engineers		
		PROJECT NAME:	Rossdale LPP	
		BUILDING AREA:	SWITCH HOUSE- SITE OBSERVED DEFICIENCIES	
	PROJECT NO.:		30624.0012	
#	Area	Description of Visual or Known Deficiency	Potential Repair (General Description)	
20	Basement	Steel stairs to basement level all have significant deficiencies. Some have post supports sitting on metal grate areas or not even bearing on floors (i.e. floating).	Repair or replace (includes TH & BH)	
21	Basement	Openings cut in central basement wall between the Boiler and Turbine Hall.	Localized repairs or infill will be required	
22	Exterior	Minor deterioration of brick/mortar/lintels The exterior stairs have significant rust and are no	Repair as required by replacing lost material	
23	Exterior	longer be performing as intended. It is likely they will need replacement.	Replace	
24	General	Overall it is expected that the building would not meet current standards for deflection criteria for finishes.	Additional consideration during design will be required to ensure finishes are not damaged by building movement	
25	General	The exterior has some minor spalling and minor deterioration of the surfaces of some of exterior concrete. There are also a couple locations with minor cracks in the exterior walls at the foundation level.	Repair as required by replacing lost material	
26	Main Floor	Main Floor (north end north of first opening): the steel sub-framing and remaining concrete framing is not adequately supported.	Reframe or replace	
27	Main Floor	Main Floor: Steel plate areas are generally not adequately supported.	Repair or replace with concrete floors	
28	Main Floor	The concrete has been modified due to plant operations over the years and there are several locations with exposed concrete rebar or rough-cut edges on columns/beams.	Repair where necessary	
29	Main Floor	There are a few locations where the concrete appears to be poorly consolidated, but is a condition which has been there for years. It appears to be concentrated in the corners of the large concrete columns	Monitor moving forward. Depending on proposed plans, may require further investigation	
30	Main Floor	Slab: Area of slab towards south end has line of tightly spaced openings (running N-S), which appear to prevent slab from spanning	infill or repair of this area is expected	
31	Main Floor	Adjacent to the north entrance to the Switch House, there is a cut concrete beam which makes the floor unstable in this location. It is currently blocked off from access	Will require reframing to reinstitute floor capacity	
32	Main Floor	Main Floor: is not level	tripping hazard will need to be removed and floor generally levelled. However a full topping added might require localized or overall reinforcement due to additional weight	
33	Main Floor	Main Floor walkways between pedestals are have been cut off	Not suitable for walking on. Currently blocked off. Would need addressing if reopening walkways	

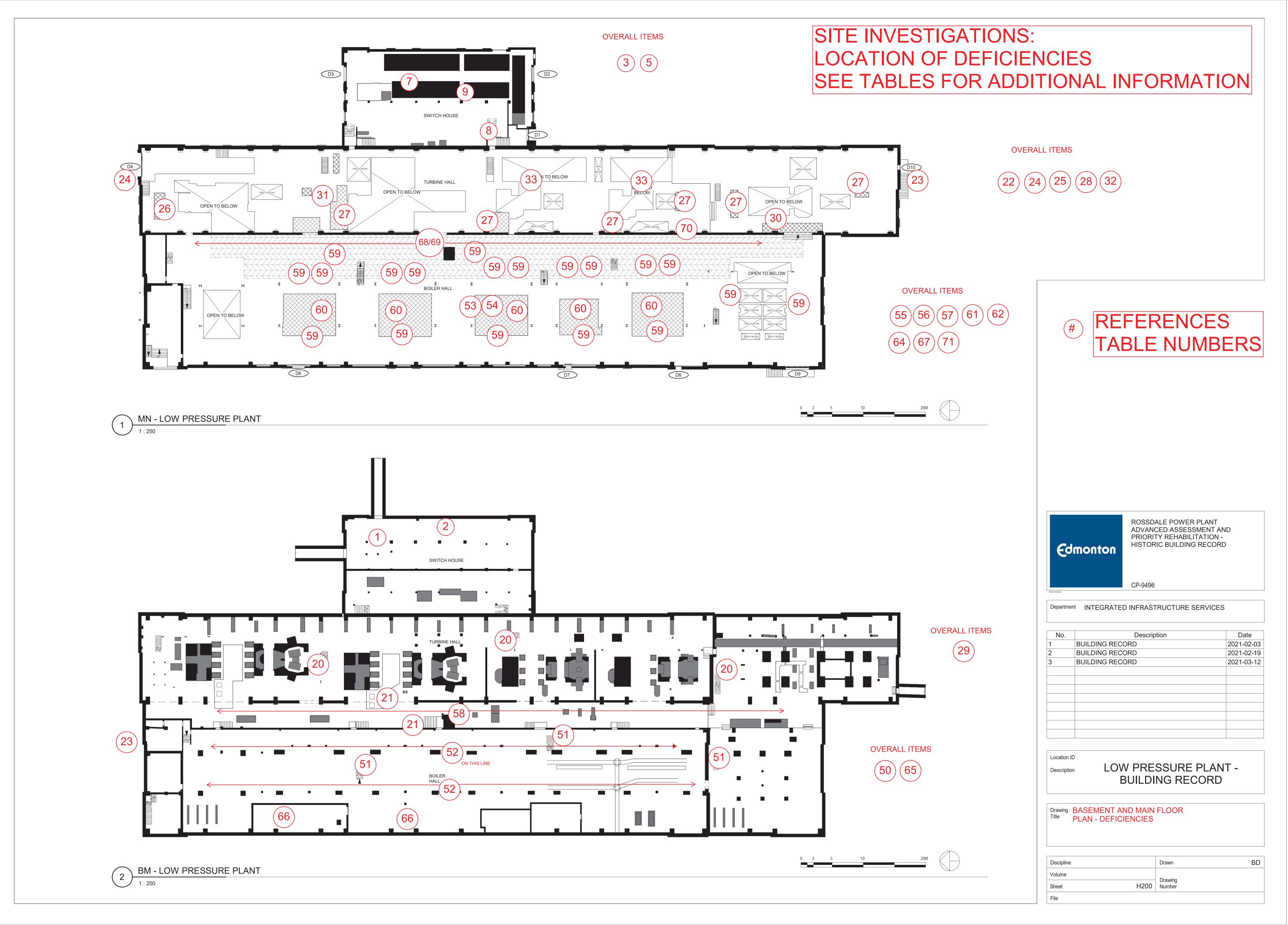
rj		nes Christoffersen g Engineers		
	PROJECT NAME:		Rossdale LPP	
	BUILDING AREA:		SWITCH HOUSE- SITE OBSERVED DEFICIENCIES	
		PROJECT NO.:	30624.0012	
#	Area	Description of Visual or Known Deficiency	Potential Repair (General Description)	
34	Roof	Roof (at Peak): several different details were found on site. In general there is splice in decking without central support member. Some or all are generally considered not sufficient, especially with the added snow loads	Add member in center to resupport and/or modify decking where required	
35	Roof	SEE SECTION 4.1 FOR LIMITS ON COSTING TABLES	Some replacement may be required and can be examined further when roofing is removed and top of deck exposed	
36	Roof	Roof Deck: Missing or loose connectors in some locations. Connection is a clip-style system, which has come loose over time in some locations, which impacts diaphragm capacity	Additional connection of deck to structure recommended during roof replacement	
37	Roof	Lateral connection between decking and exterior brick walls unknown. Could be required to complete lateral system	Add connection	
		STRUCTURAL ESTIMATED COSTS ONLY		
	* SEE PLAN FOR LOCATIONS OF DEFICENCIES NOTED		DF DEFICENCIES NOTED	
	**	SEE SECTION 4.2 FOR EXCLUSIONS FOR COSTING		
	***	NA = NOT AVAILABLE AT THIS TIME (UNKNOWN)		

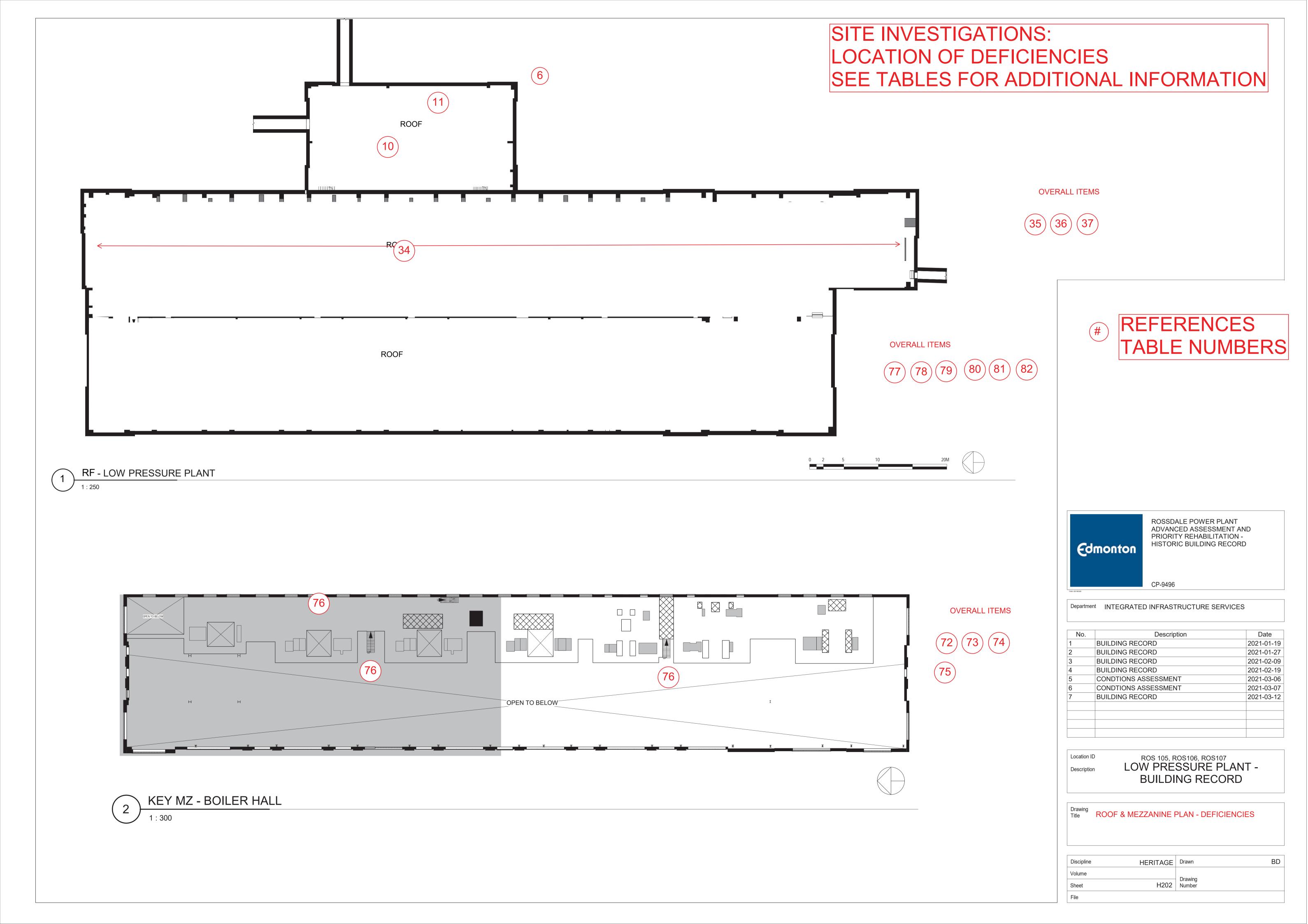


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		PROJECT NAME:	Rossdale LPP
		BUILDING AREA:	SWITCH HOUSE- SITE OBSERVED DEFICIENCIES
		PROJECT NO.:	30624.0012
#	Area	Description of Visual or Known Deficiency	Potential Repair (General Description)
50	Basement	Slabs are currently not flat and have several openings/changes in elevation. Grating and plates in some areas are bent or loose or do not provide adequate support	Repairs to flatten or infill floor will be required.
51	Basement	Several of the stairs to basement level havedeficiencies.	Repair or Replace
52	Basement Column	Concrete columns (under main building columns): some have signs of spalling or loss of concrete exposing rebar	Restoration of concrete will be required. Roughly 5% of columns requiring significant repairs
53	Boiler Frames	Overall modified framing of boiler frames. Depending on future use and loads, some members might need reinforcement or replacement	Repair as necessary. Scope very open, so rough budget provided
54	Boiler Frames	Lateral stability of columns needs further investigation - dependent on cantilever condition of frames due to removed lateral supports	Add to columns either by bracing or reinforcement
55	Exterior	Minor deterioration of brick/mortar/lintels	Repair
56	General	Overall it is expected that the building would not meet current standards for deflection criteria for finishes.	Additional consideration during design will be required to ensure finishes are not damaged by building movement
57	General	Paint on steel is missing/damaged	Re-painting structure (increase life-span)
58	Main Floor	Significant spalling of Main floor structure (over Turbine Hall hallway on west side).	Restoration of rebar and concrete areas. Roughly 5% of area requiring repair
59	Main Floor	Steel plate areas are not adequately supported by temporary shoring. Some of the areas were temporarily reinforced when the building was recently used for an event. This includes wood supports in some of the steel plated areas. It appears some of those supports may be loose now and will need to be reviewed.	Permanent Repair required.
60	Main Floor	Significant rusting on steel areas in central openings.	Repair or Replace or Remove area
61	Main Floor	Concrete beams (partial repair): Areas where bolts have been used to reinforce concrete columns should be repaired as detailing is not considered sufficient	·
62	Main Floor	Main Floor: is not level	tripping hazard will need to be removed and floor generally levelled. However a full topping added might require localized or overall reinforcement due to additional weight
63	Main Floor	The main floor concrete is in okay condition, although a good portion of the floor is covered by plywood sheathing and could not be reviewed.	unknown top condition of floor (eastern portion of Hall)



# Area Description of Visual or Known Deficiency The concrete has been modified due to plant operations over years and there are several locations with exposed concrete r or rough-out edges on columns/beams. SEE SECTION 4.1 FOR LIMITS ON COSTING TABLES	AUNA FUK LUATING	
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The concrete has been modified due to plant operations over years and there are several locations with exposed concrete ror rough-cut edges on columns/beams. Main Floor SEE SECTION 4.1 FOR LIMITS ON COSTING TABLES Stress Cracks in Pedestals on West Wall. Localized to a fer locations Main Floor Main Floor Basement Main Floor Column Columns (shared with TB Hall): condition of columns partia unknown but exposed areas show signs of surface rust an corrosion. Columns (shared with TB Hall): one column (toward middle so has significant organic growth on adjacent brick. Columns: General Boiler Framing is known to have deficiencie terms of slenderness of columns. This is partially due to structure of the plant o	requirements Fire-rating of steel will be required. Costing not	
The concrete has been modified due to plant operations over years and there are several locations with exposed concrete ror rough-cut edges on columns/beams. Main Floor SEE SECTION 4.1 FOR LIMITS ON COSTING TABLES Stress Cracks in Pedestals on West Wall. Localized to a fer locations There are several areas of floor and stairs to basement blocked due to safety. It appears the areas are blocked off because structural concerns. Main Floor Column Main Floor Columns (shared with TB Hall): Anchor bolt supports are ruste few locations, with one location completely missing anchor ror Columns (shared with TB Hall): condition of columns partia unknown but exposed areas show signs of surface rust an corrosion. Columns (shared with TB Hall): one column (toward middle so has significant organic growth on adjacent brick.	e require reinforcement to meet current slenderness	
The concrete has been modified due to plant operations over years and there are several locations with exposed concrete ror rough-cut edges on columns/beams. 65 Main Floor 66 Main Floor Main Floor Main Floor 68 Main Floor Column Main Floor Main Floor Column Column Main Floor Column Columns (shared with TB Hall): condition of columns partia unknown but exposed areas show signs of surface rust an	column	
The concrete has been modified due to plant operations over years and there are several locations with exposed concrete ror rough-cut edges on columns/beams. 65 Main Floor 66 Main Floor Main Floor Main Floor Main Floor Basement 68 Main Floor Column Column The concrete has been modified due to plant operations over years and there are several locations with exposed concrete ror rough-cut edges on columns/beams. SEE SECTION 4.1 FOR LIMITS ON COSTING TABLES Stress Cracks in Pedestals on West Wall. Localized to a fer locations There are several areas of floor and stairs to basement blocked due to safety. It appears the areas are blocked off because structural concerns. Columns (shared with TB Hall): Anchor bolt supports are ruste few locations, with one location completely missing anchor recommendations.	Additional investigation would be recommended in future phases by removing brick and exposing column	
The concrete has been modified due to plant operations over years and there are several locations with exposed concrete ror rough-cut edges on columns/beams. Main Floor Basement Main Floor Main	plates	
The concrete has been modified due to plant operations over years and there are several locations with exposed concrete ror rough-cut edges on columns/beams. 65 Main Floor SEE SECTION 4.1 FOR LIMITS ON COSTING TABLES 66 Main Floor Stress Cracks in Pedestals on West Wall. Localized to a fee locations	Repair or Replace structure in these areas	
The concrete has been modified due to plant operations over years and there are several locations with exposed concrete ror rough-cut edges on columns/beams. 65 Main Floor SEE SECTION 4.1 FOR LIMITS ON COSTING TABLES	Reinforce pedestals	
The concrete has been modified due to plant operations over years and there are several locations with exposed concrete r	Monitor moving forward. Depending on proposed plans, may require further investigation	
	Repair where necessary	
	(General Description)	
PROJECT NO.:	30624.0012	
BUILDING AREA:	SWITCH HOUSE- SITE OBSERVED DEFICIENCIES	
PROJECT NAME:	Rossdale LPP	
BUILDING AREA: PROJECT NO.:		







Appendix D

Structural Analysis - Drawings and Figures

CONDUIT ROOM QMN-193 TUNNEL BM-105 CONDUIT ROOM BM-103 SOUTH STAIRWELL NORTH STAIRWELL BM - SWITCH HOUSE MN-102 SWITCH GEAR LINE UP MN-101 BREAKER ROOM SOUTH STAIRWELL NORTH STAIRWELL MN -SWITCH HOUSE FOR GENERAL USE ONLY CONFIRM ALL SIZES ON SITE

PARTIAL FRAMING PLANS

HATCH LEGEND

CONCRETE

METAL

PLYWOOD

OPEN TO BELOW

MASKED REGION

PROJECTING SURFACE

Consultant MECHANICAL/ELECTRICAL MECHANICAL/ELECTRICAL

Williams Engineering Canada Inc.

10065 Jasper Ave #200,

Edmonton, AB T5J 3B1

Contact: Sheldon Samborsky (M), Ben the marc boutin architectural collaborative inc.
205 9th Avenue SE, Suite 100
Calgary, AB, T2G 0R3
Contact: Richard Cotter BUILDING/FIRE CODE Jensen Hughes 5855 9 St SE #106, Calgary, AB T2H 1Z9 Contact: Kyle Duckworth DFS Inc Architecture & Design 400 Boulevard de Maisonneuve O Montréal, QC H3A 1L4 Contact: Evan Oxland COST BTY Group 404 6 Ave SW #645, Calgary, AB T2P 0R9 Contact: Michael Gabert Saucier + Perrotte Architectes 7043 Waverly St, Montreal, QC H2S 3J1 Contact: Anne-Marie Saucier STRUCTURAL/CIVIL/BUILDING ENVELOPE Read Jones Christoffersen Ltd 17415 102 Ave NW #100, Edmonton, AB T5S 1J8 Naheyawin 1205 - 10903 103 Ave NW, Edmonton, Alberta, T5K 2X6 CONSULTANT PROJECT 20008 PRELIMINARY NOT FOR CONSTRUCTION



ROSSDALE POWER PLANT ADVANCED ASSESSMENT AND PRIORITY REHABILITATION -HISTORIC BUILDING RECORD

CP-9496

Department INTEGRATED INFRASTRUCTURE SERVICES

No.	Description	Date
1	BUILDING RECORD	2021-01-19
2	BUILDING RECORD	2021-01-27
3	BUILDING RECORD	2021-02-09
4	BUILDING RECORD	2021-02-19
5	CONDTIONS ASSESSMENT	2021-03-06
6	CONDTIONS ASSESSMENT	2021-03-07
7	BUILDING RECORD	2021-03-12

Location ID ROS LOW P

ROS 105, ROS106, ROS107 LOW PRESSURE PLANT -BUILDING RECORD

PLANS ROS105 SWITCH HOUSE BM & MN PLANS

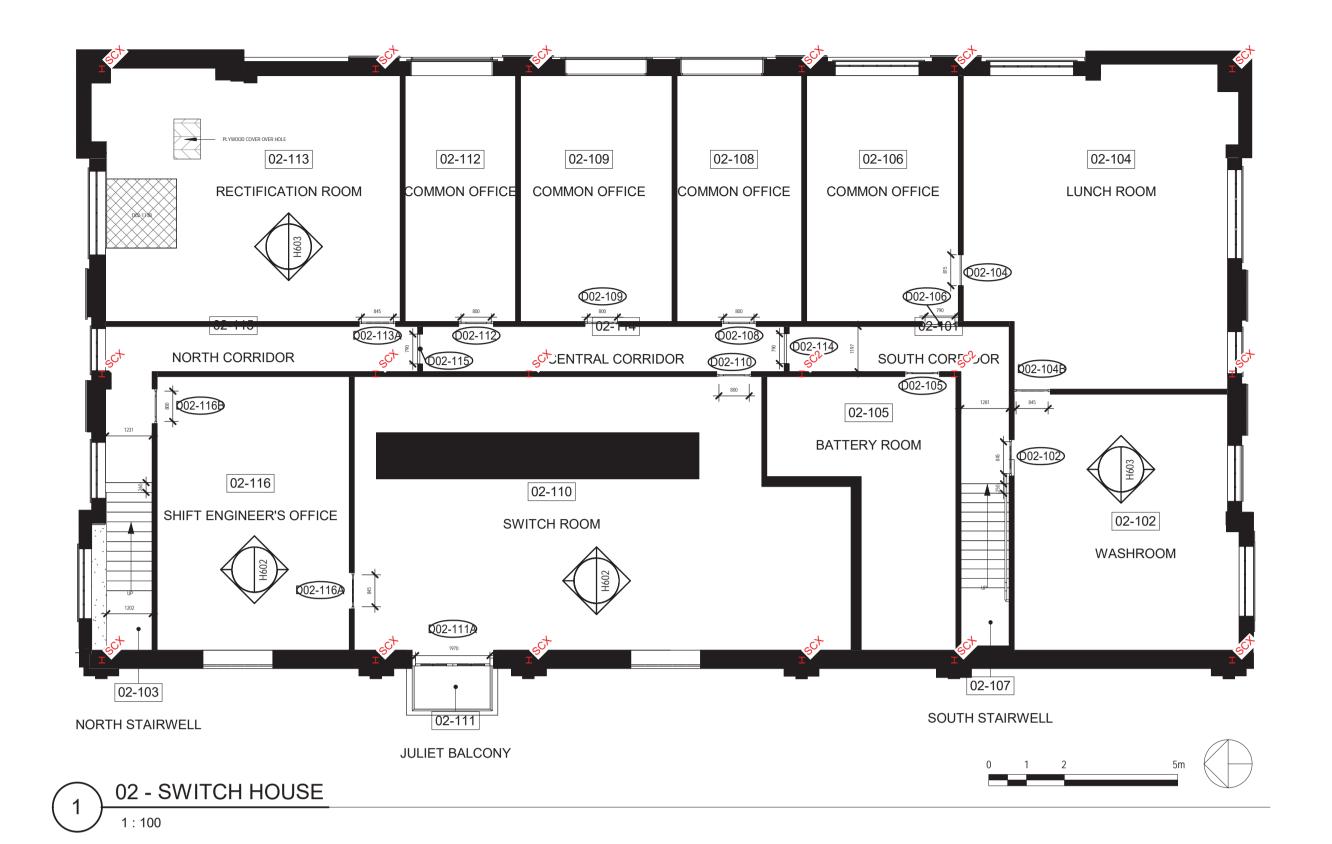
Discipline HERITAGE Drawn BD

Volume
Sheet H201 Drawing Number

File

PARTIAL FRAMING PLANS

HATCH LEGEND



SL=1.46kPa

RF-19 5 ACESS TO TURBINE HALL ROOF RJ2@1800

RJ1@1800

38x0.91 STEEL DECK-

RJ1@ 1800

RF - SWITCH HOUSE



SB21 S310X52 Fy = 210MPa SB22 C150X12 or 16 Fy = 210MPa SB23 S310X47 Fy = 210MPa T > 83.5x6.35 HORIZ 12.7bIA RODS T > 50.8x6.35 HORIZ / 12.7x12.7 VERT.? 19DIA RODS 12.7DIA RODS 2 - 25.4DIAM RODS PER CORD PER CORD

Consultant MECHANICAL/ELECTRICAL MECHANICAL/ELECTRICAL
Williams Engineering Canada Inc.
10065 Jasper Ave #200,
Edmonton, AB T5J 3B1
Contact: Sheldon Samborsky (M), Ber the marc boutin architectural collaborative inc. 205 9th Avenue SE, Suite 100 Calgary, AB, T2G 0R3 Contact: Richard Cotter BUILDING/FIRE CODE DFS Inc Architecture & Design Jensen Hughes 5855 9 St SE #106, Calgary, AB T2H 1Z9 Contact: Kyle Duckworth 400 Boulevard de Maisonneuve Montréal, QC H3A 1L4 Contact: Evan Oxland COST BTY Group 404 6 Ave SW #645, Calgary, AB T2P 0R9 Contact: Michael Gabert Saucier + Perrotte Architectes 7043 Waverly St, Montreal, QC H2S 3J1 Contact: Anne-Marie Saucier STRUCTURAL/CIVIL/BUILDING ENVELOPE Read Jones Christoffersen Ltd Naheyawin 1205 - 10903 103 Ave NW, Edmonton, Alberta, T5K 2X6 17415 102 Ave NW #100, Edmonton, AB T5S 1J8 CONSULTANT PROJECT 20008 PRELIMINARY NOT FOR CONSTRUCTION ROSSDALE POWER PLANT ADVANCED ASSESSMENT AND PRIORITY REHABILITATION - HISTORIC BUILDING RECORD **Edmonton** CP-9496 Department INTEGRATED INFRASTRUCTURE SERVICES

Description Date BUILDING RECORD 2021-01-19 BUILDING RECORD 2021-01-27 2021-02-09 **BUILDING RECORD** 2021-02-19 **BUILDING RECORD** CONDTIONS ASSESSMENT 2021-03-06 CONDTIONS ASSESSMENT 2021-03-07 BUILDING RECORD 2021-03-12

Location ID ROS 105, ROS106, ROS107
LOW PRESSURE PLANT BUILDING RECORD

Drawing Title ROS105 SWITCH HOUSE 02 & RF PLANS

 Discipline
 HERITAGE
 Drawn
 BD

 Volume
 Drawing
 Drawing

 Sheet
 H202
 Number

 File
 Number
 Number

FOR GENERAL USE ONLY CONFIRM ALL SIZES ON SITE

KEY MN - TURBINE HALL MN-217 INTERIOR STAIRS D4 MN-213 INTERIOR STAIRS OPEN TO BELOW MN-210 OPEN TO BELOW GENERATOR UNIT #4 MN - TURBINE HALL - NORTH • MN-233 14"WIDE BEAM-INTERIOR STAIRS OPEN TO BÉLOW MN-230 MN-260 GENERATOR UNIT #3 GENERATOR UNIT #1 OPÈN TÓ BELOW GENERATOR UNIT #2 OPEN TO BELOW OPEN TO BELOW OPEN TO BELOW OPEN TO BELOW MN - TURBINE HALL - CENTRE

PARTIAL FRAMING PLANS



CONCRETE

METAL

PLYWOOD

OPEN TO BELOW

MASKED REGION

PROJECTING SURFACE

Consultant MECHANICAL/ELECTRICAL MECHANICAL/ELECTRICAL
Williams Engineering Canada Inc.
10065 Jasper Ave #200,
Edmonton, AB T5J 3B1
Contact: Sheldon Samborsky (M), Ber the marc boutin architectural collaborative inc.
205 9th Avenue SE, Suite 100
Calgary, AB, T2G 0R3
Contact: Richard Cotter BUILDING/FIRE CODE Jensen Hughes 5855 9 St SE #106, Calgary, AB T2H 1Z9 Contact: Kyle Duckworth DFS Inc Architecture & Design 400 Boulevard de Maisonneuve Montréal, QC H3A 1L4 Contact: Evan Oxland COST BTY Group 404 6 Ave SW #645, Calgary, AB T2P 0R9 Contact: Michael Gabert Saucier + Perrotte Architectes 7043 Waverly St, Montreal, QC H2S 3J1 Contact: Anne-Marie Saucier STRUCTURAL/CIVIL/BUILDING ENVELOPE Read Jones Christoffersen Ltd 17415 102 Ave NW #100, Edmonton, AB T5S 1J8 Naheyawin 1205 - 10903 103 Ave NW, Edmonton, Alberta, T5K 2X6 Contact: Frank Cavaliere (S), John Balla (C), Nick Trovato (BE) CONSULTANT PROJECT 20008 PRELIMINARY NOT FOR CONSTRUCTION



ROSSDALE POWER PLANT ADVANCED ASSESSMENT AND PRIORITY REHABILITATION -HISTORIC BUILDING RECORD

CP-9496

Department INTEGRATED INFRASTRUCTURE SERVICES

No.	Description	Date
1	BUILDING RECORD	2021-02-02
2	BUILDING RECORD	2021-02-15
3	BUILDING RECORD	2021-02-19
4	CONDTIONS ASSESSMENT	2021-03-06
5	CONDTIONS ASSESSMENT	2021-03-07
6	BUILDING RECORD	2021-03-12

Location ID

Description

ROS 105, ROS106, ROS107 LOW PRESSURE PLANT -BUILDING RECORD

Title ROS106 TURBINE HALL MN FLOOR PLANS

 Discipline
 HERITAGE
 Drawn
 BD

 Volume
 Drawing
 Number

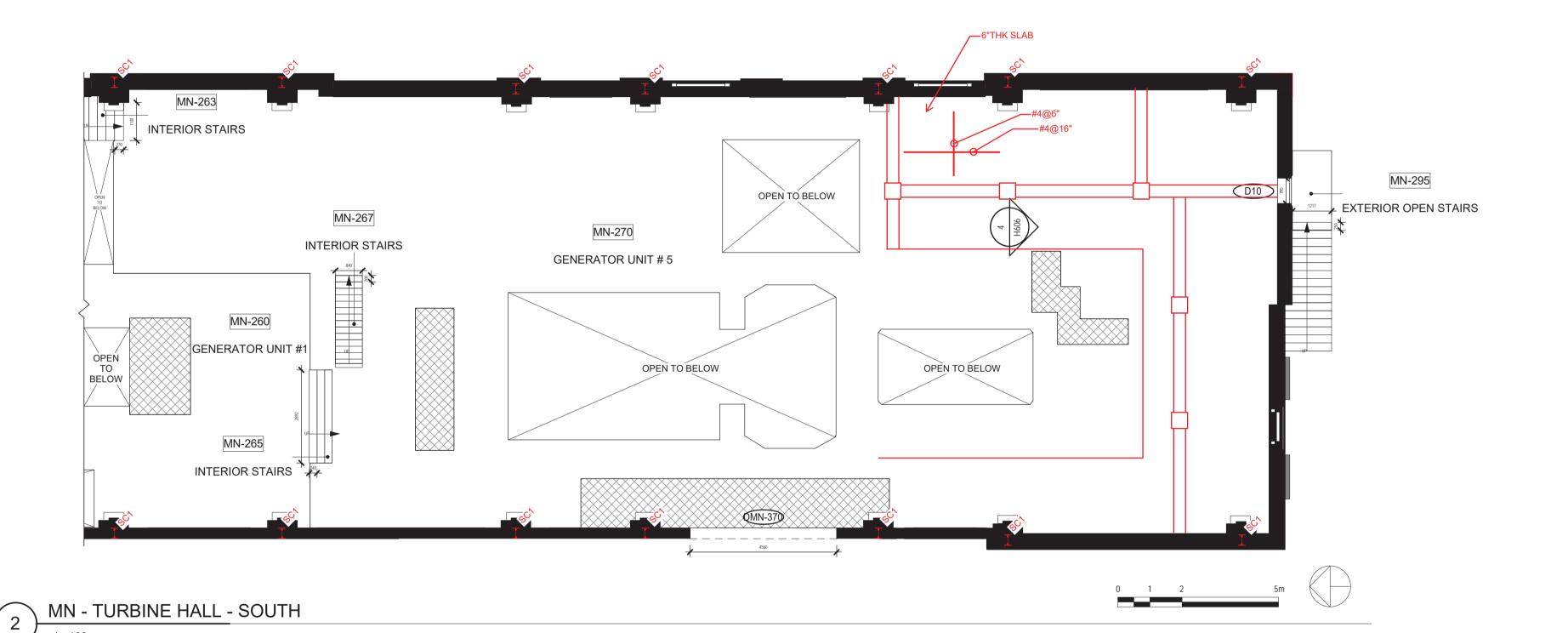
 File
 File
 File

T SC1
Built-up column
4 - L102x76x13 LLH

FOR GENERAL USE ONLY

CONFIRM ALL SIZES ON SITE

KEY MN - TURBINE HALL - SOUTH

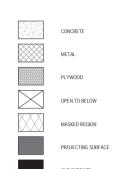


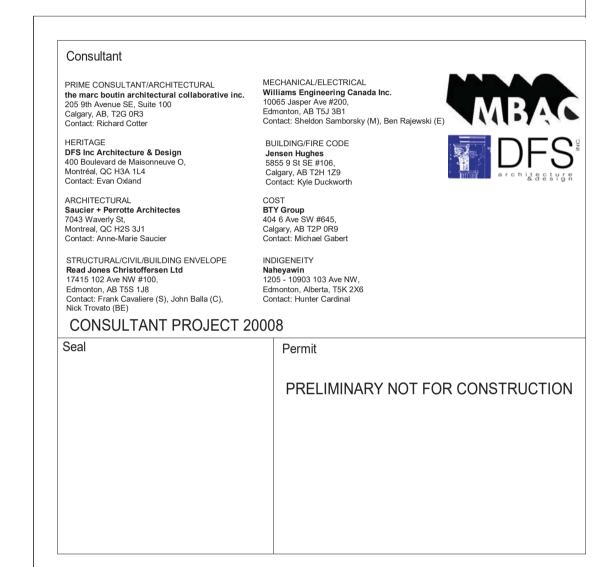


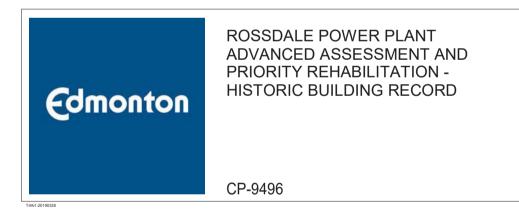
FOR GENERAL USE ONLY CONFIRM ALL SIZES ON SITE

PARTIAL FRAMING PLANS

HATCH LEGEND







Department INTEGRATED INFRASTRUCTURE SERVICES

No.	Description	Date
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2	BUILDING RECORD	2021-02-15
3	BUILDING RECORD	2021-02-19
4	CONDTIONS ASSESSMENT	2021-03-07
5	BUILDING RECORD	2021-03-12

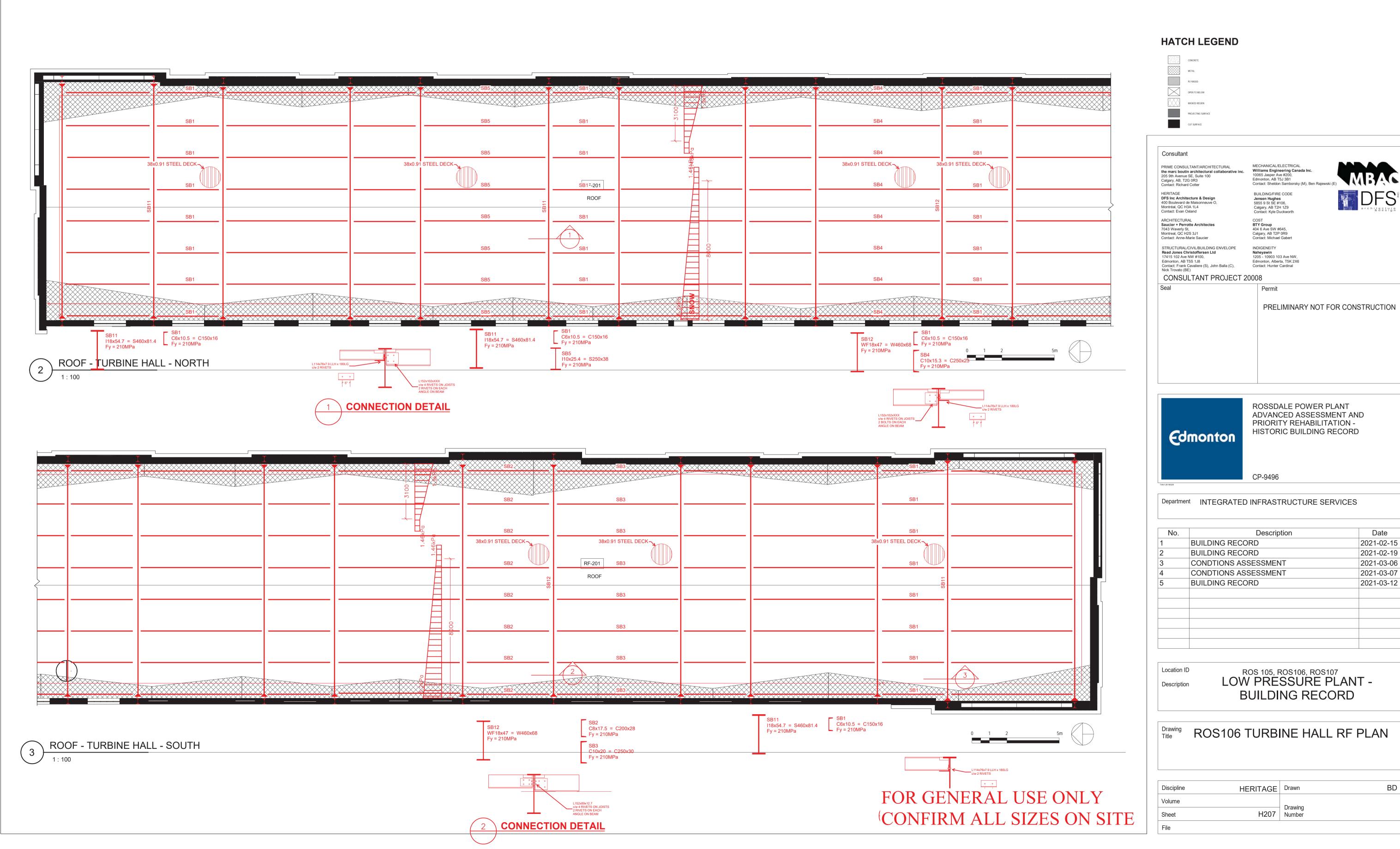
Location ID ROS 105, ROS106, ROS107
LOW PRESSURE PLANT BUILDING RECORD

Title ROS106 TURBINE HALL MN FLOOR PLANS

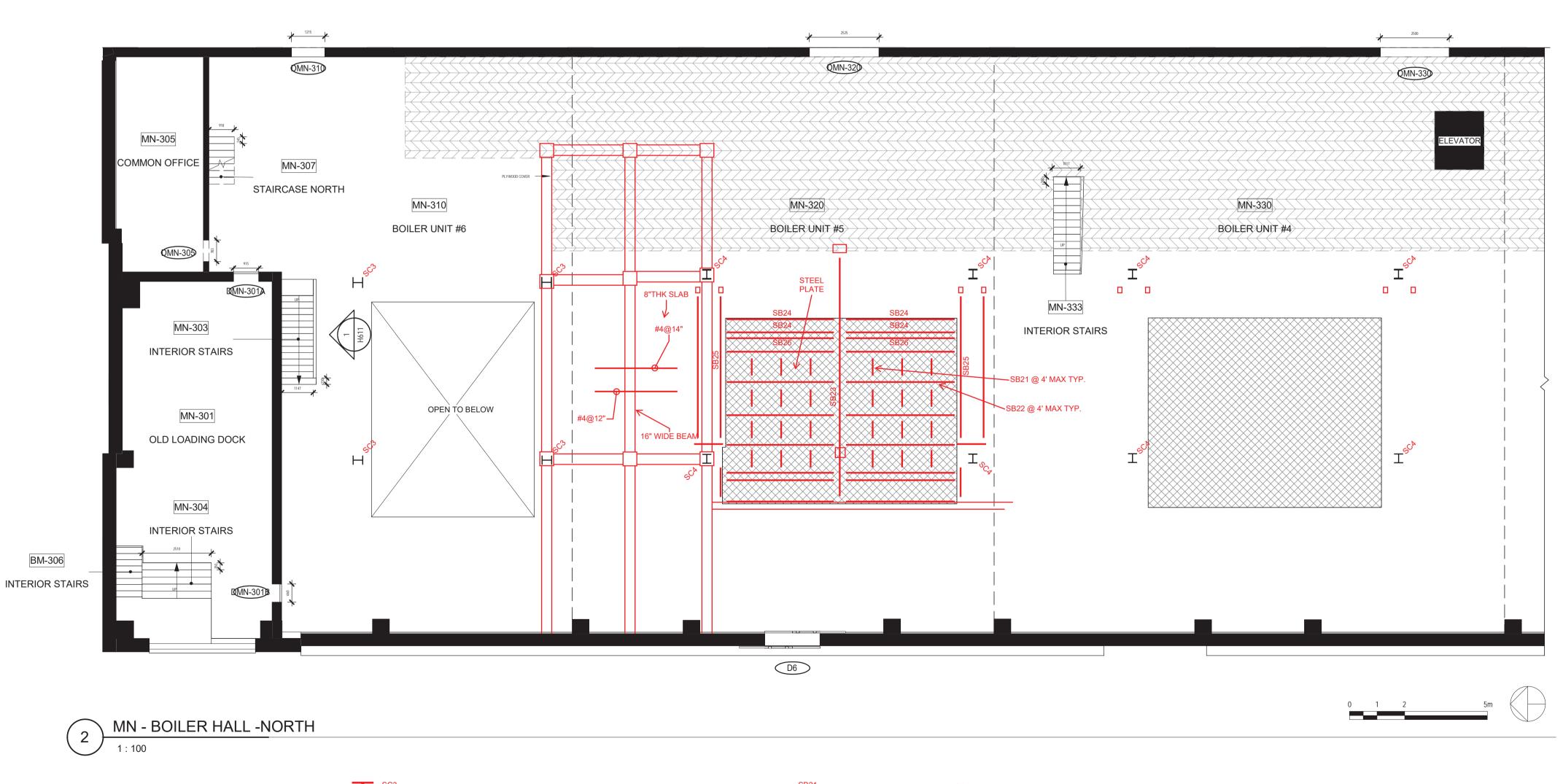
Discipline	HERITAGE	Drawn	BD
Volume		Drouging	
Sheet	H206	Drawing Number	
File			

KEY ROOF - TURBINE HALL 1:300

PARTIAL FRAMING PLANS



KEY MN - BOILER HALL



PARTIAL FRAMING PLANS

HATCH LEGEND

CONCRETE

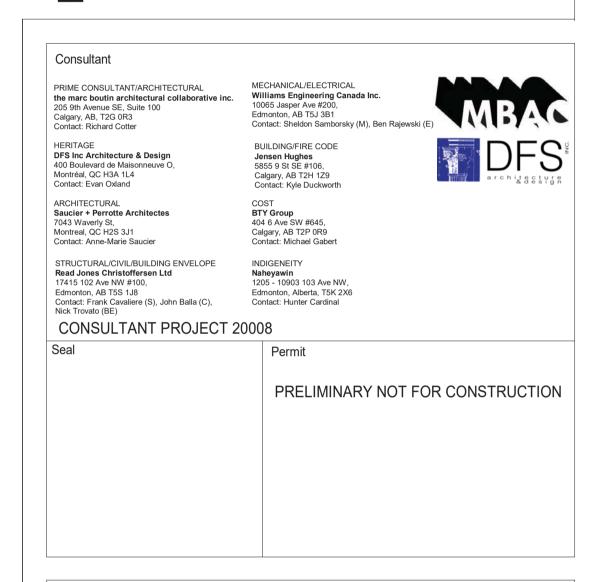
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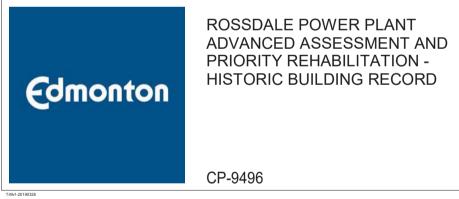
PLYWOOD

OPEN TO BELOW

MASKED REGION

PROJECTING SURFACE





Department INTEGRATED INFRASTRUCTURE SERVICES

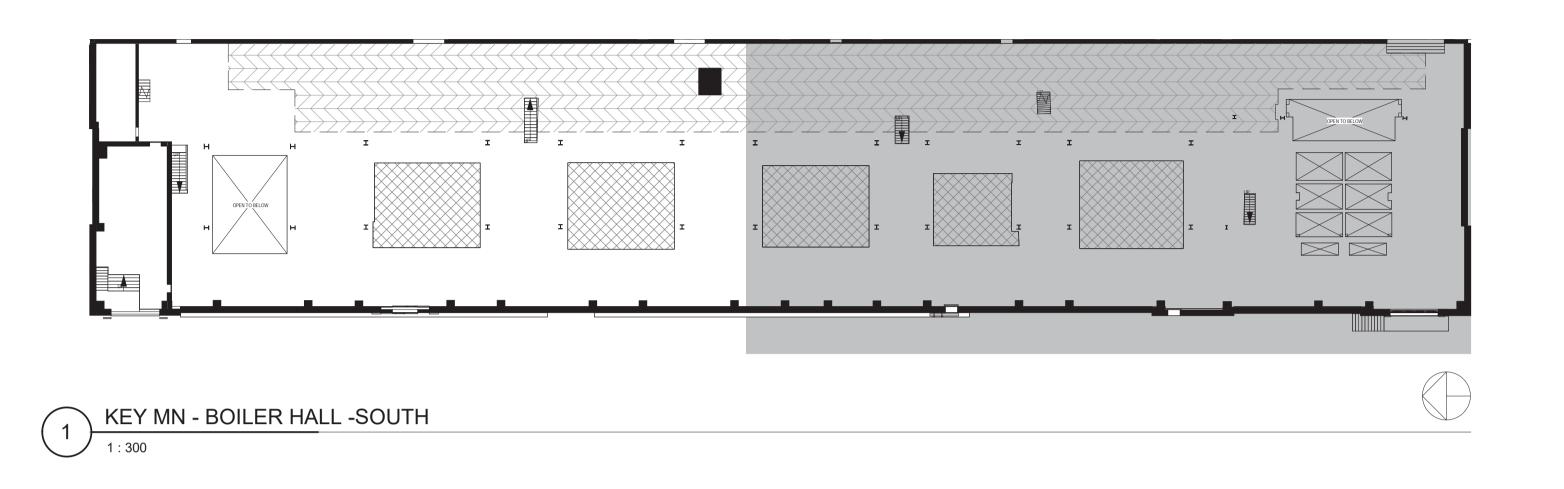
No.	Description	Date
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2	BUILDING RECORD	2021-02-12
3	BUILDING RECORD	2021-02-17
4	CONDTIONS ASSESSMENT	2021-03-07
5	BUILDING RECORD	2021-03-12

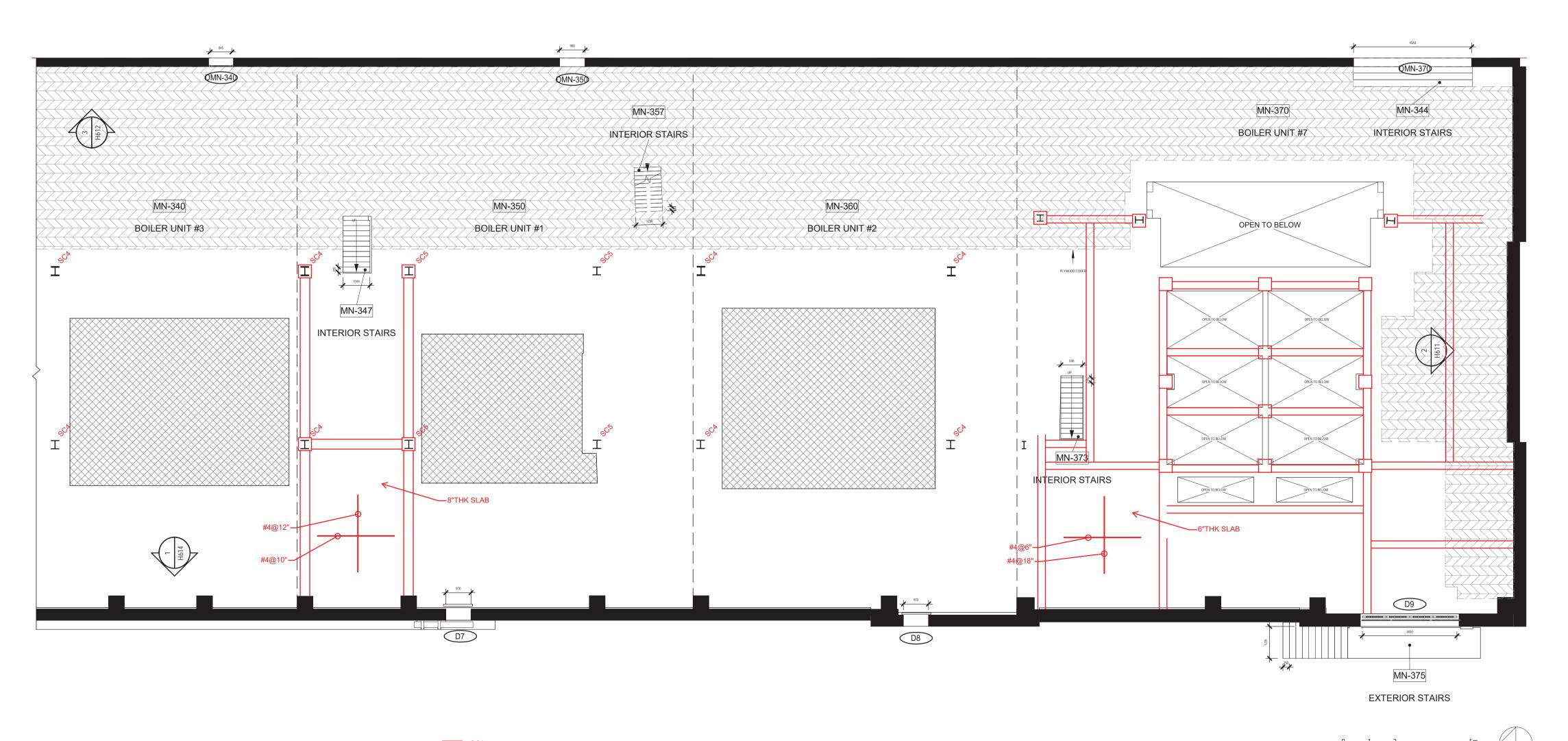
Location ID ROS 105, ROS106, ROS107 LOW PRESSURE PLANT - BUILDING RECORD

Title ROS107 BOILER HALL - MN FLOOR PLANS

Discipline	HERITAGE	Drawn	BD
Volume		Descripe	
Sheet	H210	Drawing Number	
File			

PARTIAL FRAMING PLANS







HATCH LEGEND

Consultant

MECHANICAL/ELECTRICAL MECHANICAL/ELECTRICAL
Williams Engineering Canada Inc.
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Edmonton, AB T5J 3B1
Contact: Sheldon Samborsky (M), Ber the marc boutin architectural collaborative inc.
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Calgary, AB, T2G 0R3
Contact: Richard Cotter BUILDING/FIRE CODE Jensen Hughes 5855 9 St SE #106, Calgary, AB T2H 1Z9 Contact: Kyle Duckworth

COST BTY Group 404 6 Ave SW #645, Calgary, AB T2P 0R9 Contact: Michael Gabert

DFS Inc Architecture & Design 400 Boulevard de Maisonneuve Montréal, QC H3A 1L4 Contact: Evan Oxland

Saucier + Perrotte Architectes 7043 Waverly St, Montreal, QC H2S 3J1

Contact: Anne-Marie Saucier STRUCTURAL/CIVIL/BUILDING ENVELOPE Read Jones Christoffersen Ltd 17415 102 Ave NW #100, Edmonton, AB T5S 1J8

Naheyawin 1205 - 10903 103 Ave NW, Edmonton, Alberta, T5K 2X6 CONSULTANT PROJECT 20008

PRELIMINARY NOT FOR CONSTRUCTION

Edmonton

ROSSDALE POWER PLANT ADVANCED ASSESSMENT AND PRIORITY REHABILITATION -HISTORIC BUILDING RECORD

CP-9496

Department INTEGRATED INFRASTRUCTURE SERVICES

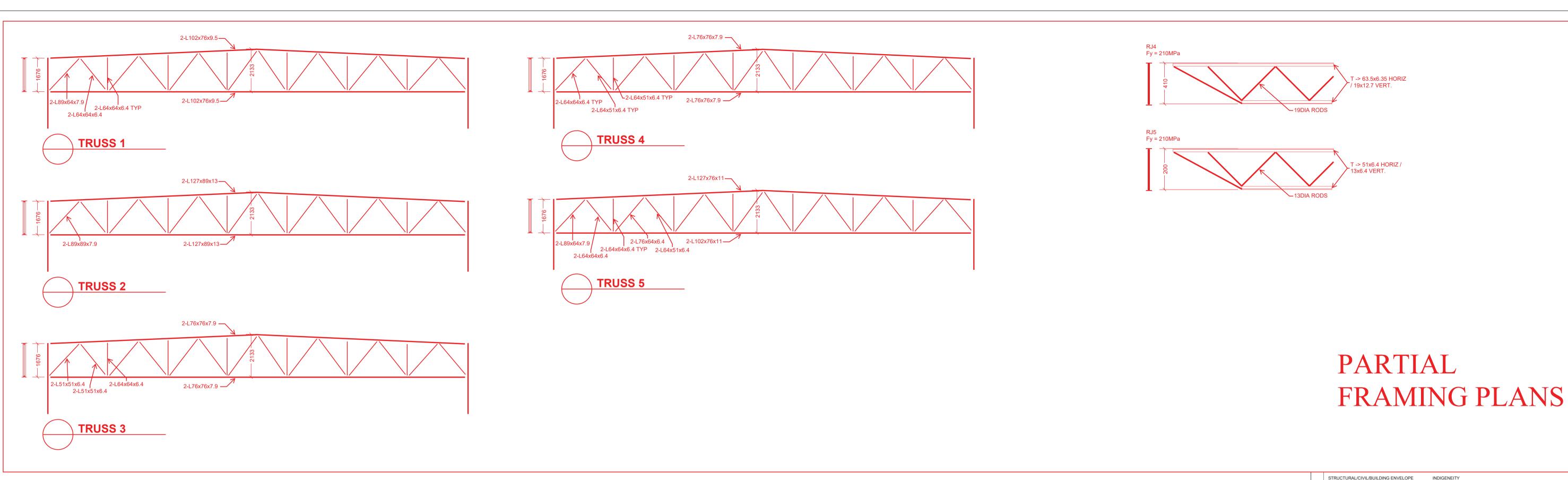
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2	BUILDING RECORD	2021-02-12
3	BUILDING RECORD	2021-02-17
4	CONDTIONS ASSESSMENT	2021-03-07
5	BUILDING RECORD	2021-03-12

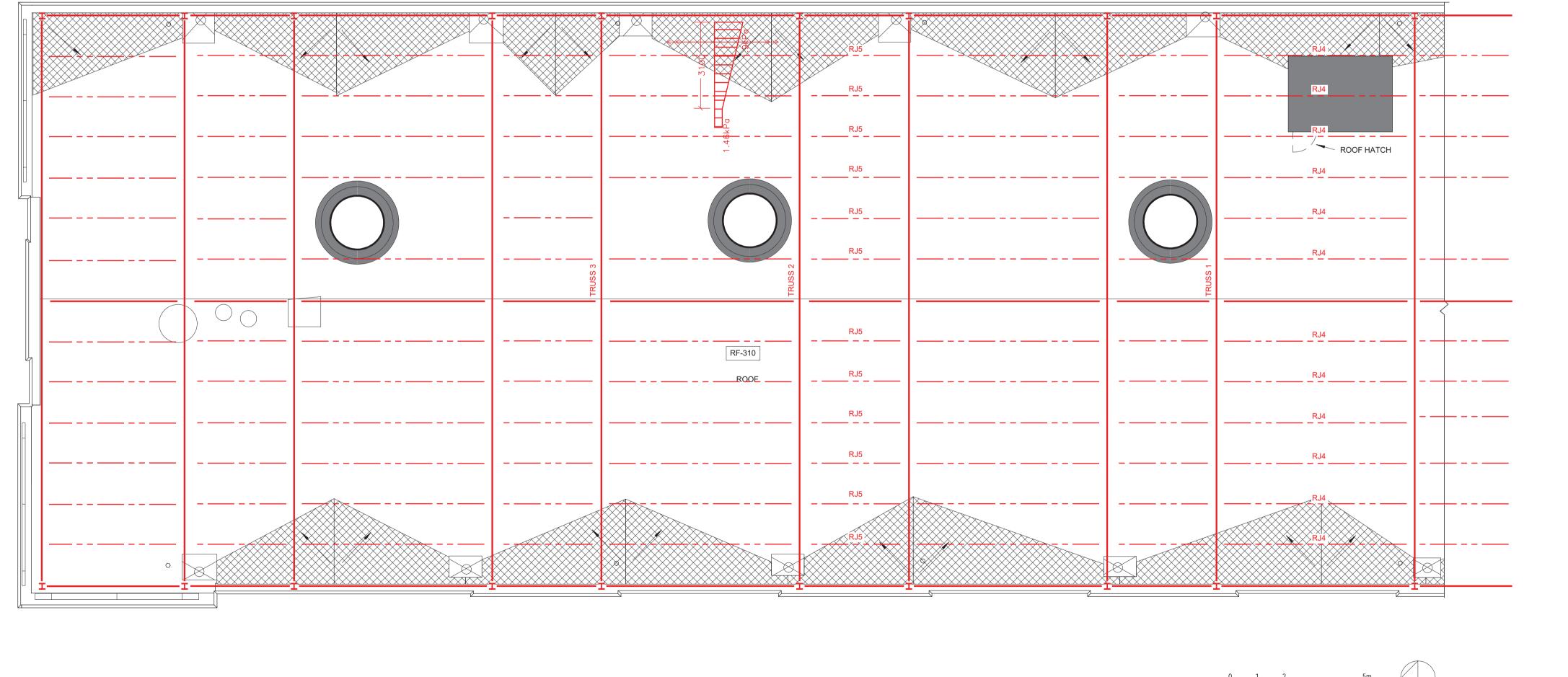
Location ID

LOW PRESSURE PLANT -**BUILDING RECORD**

Drawing ROS107 BOILER HALL - MN FLOOR **PLANS**

Discipline		Drawn	BD
Volume		Drowing	
Sheet	H211	Drawing Number	
File			

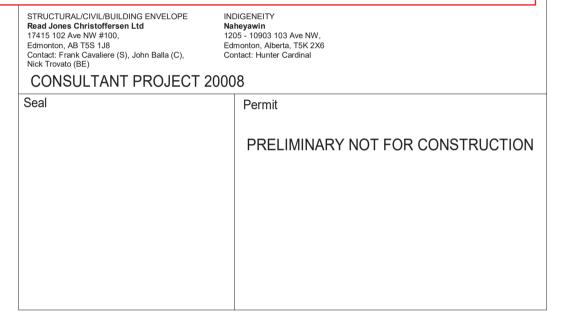


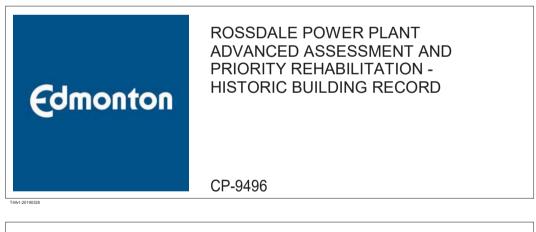


RF- BOILER HALL - NORTH

1: 100

FOR GENERAL USE ONLY CONFIRM ALL SIZES ON SITE





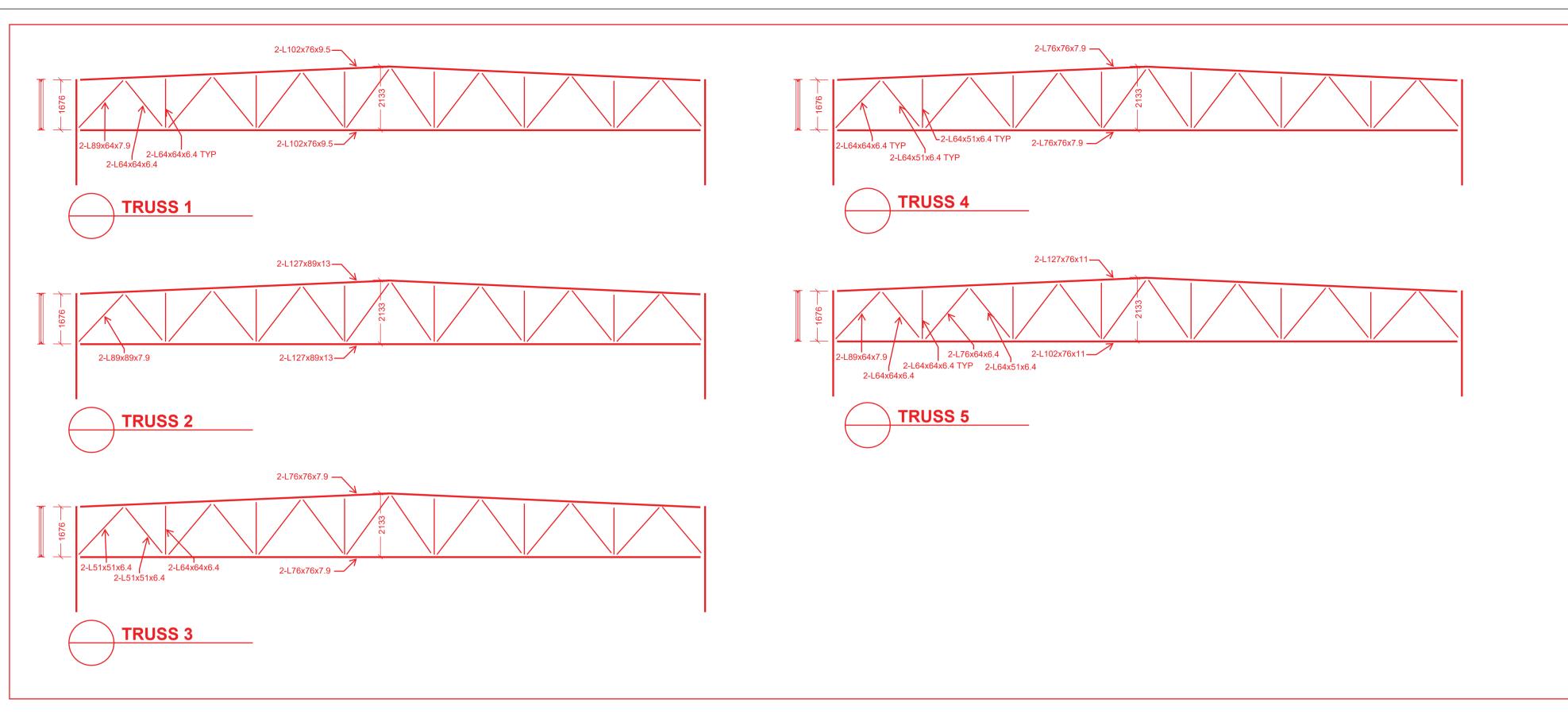
Department INTEGRATED INFRASTRUCTURE SERVICES

Description	Date
BUILDING RECORD	2021-02-02
BUILDING RECORD	2021-02-12
BUILDING RECORD	2021-02-17
CONDTIONS ASSESSMENT	2021-03-07
BUILDING RECORD	2021-03-12
	BUILDING RECORD BUILDING RECORD BUILDING RECORD CONDTIONS ASSESSMENT

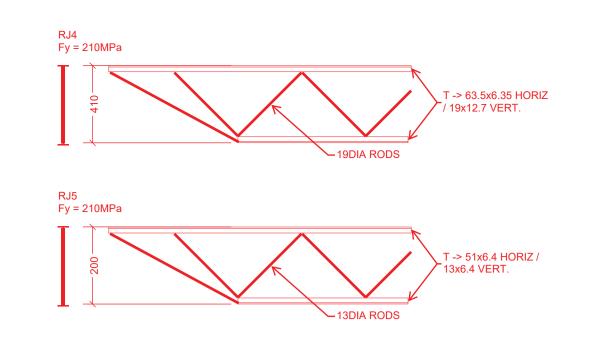
Location ID ROS 105, ROS106, ROS107
LOW PRESSURE PLANT BUILDING RECORD

Drawing Title ROS107 BOILER HALL - RF PLAN

Discipline	HERITAGE	Drawn	BD
Volume		Drowing	
Sheet	H217	Drawing Number	
File			



RF-BOILER HALL - SOUTH



PARTIAL FRAMING PLANS

Naheyawin 1205 - 10903 103 Ave NW, Edmonton, Alberta, T5K 2X6

PRELIMINARY NOT FOR CONSTRUCTION

Date 2021-02-02

2021-02-12

2021-03-07

2021-03-12

ROSSDALE POWER PLANT

PRIORITY REHABILITATION - HISTORIC BUILDING RECORD

CP-9496

Description

Department INTEGRATED INFRASTRUCTURE SERVICES

BUILDING RECORD
BUILDING RECORD

BUILDING RECORD

BUILDING RECORD

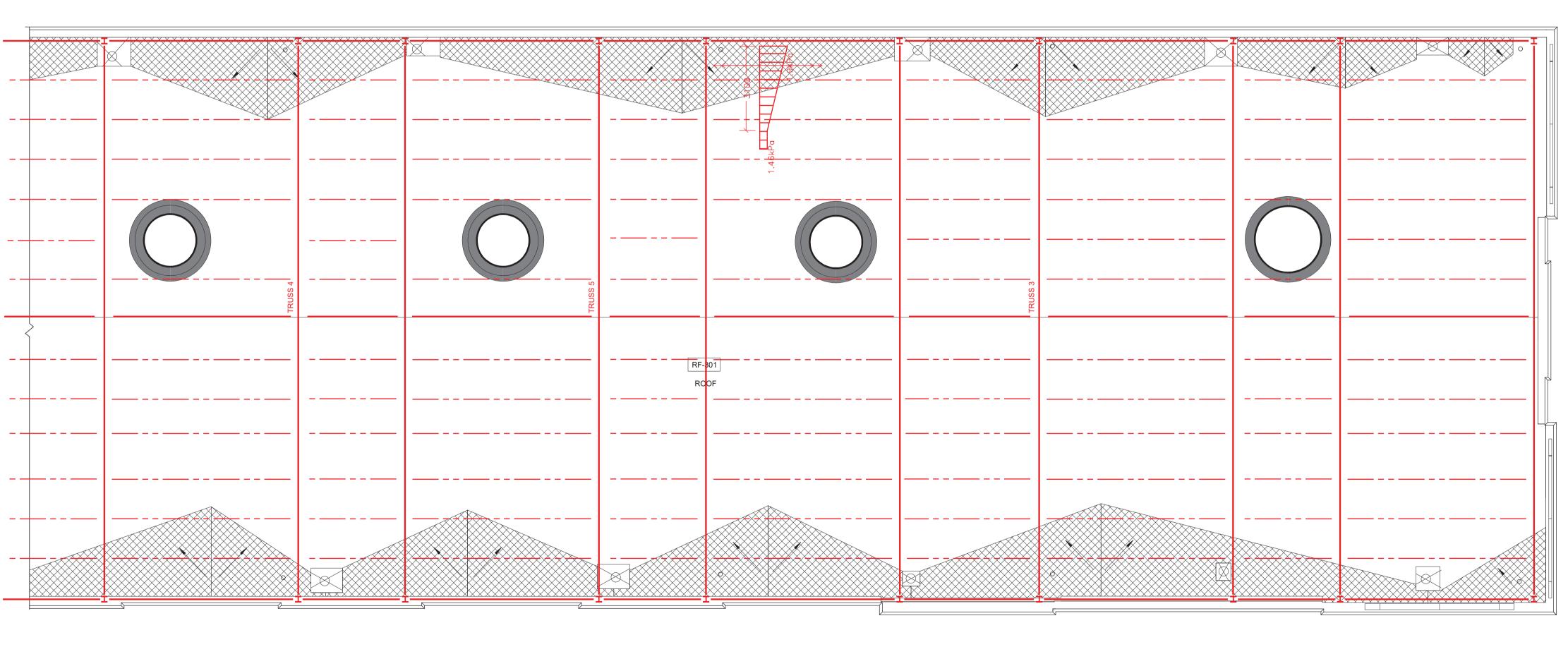
CONDTIONS ASSESSMENT

Read Jones Christoffersen Ltd

CONSULTANT PROJECT 20008

Edmonton

17415 102 Ave NW #100, Edmonton, AB T5S 1J8



0 1 2 5m

Location ID

ROS 105, ROS106, ROS107 LOW PRESSURE PLANT -BUILDING RECORD

Drawing Title ROS107 BOILER HALL - RF PLAN

Discipline HERITAGE Drawn BD

Volume
Sheet H218 Drawing Number

File

FOR GENERAL USE ONLY CONFIRM ALL SIZES ON SITE



Appendix E

Structural Analysis - Deficiency Tables



		PROJECT NAME:	Rossdale LPP	
		BUILDING AREA:	SWITCH HOUSE	
		PROJECT NO.:	30624.0012	
#	Area	Description of Structural Finding or Deficiency	Potential Repair or Upgrade (General Description)	
1	Roof	Steel deck is overstressed by the increased snow drift in areas adjacent to the Turbine Hall, approximately 40% of roof	Additional joists to be installed between existing OWSJs to reduce deck span	
2	Roof	OWSJs are overstressed by the increased snow drift in areas adjacent to the Turbine Hall, approximately 40% of roof	Additional joists to be installed between existing OWSJs to reduce load (Same solution as previous)	
3	Roof	OWSJs are overstressed by the increased snow drift in areas adjacent to the parapet	An additional joist to be installed between existing OWSJs closer to the perimeter of building	
4	Roof	Steel beams are overstressed by the increased snow drift from the Turbine Hall and the parapet	Reinforce steel beams with plates and/or angles welded to their flanges	
5	Roof	Element connections are likely overstressed by the increased snow drifts	Reinforce connections with plates, angles or extra welding	
6	General	The lateral system is insufficient for the building	Introduce a masonry stair and/or elevator core to act as a lateral resisting system	
		STRUCTURE ONLY ESTIMATED BUDGET		
	*	SEE PLAN FOR LOCATIONS OF DEFICENCIES NOTED		
	**	SEE SECTION 4.1 FOR LIMITS ON COSTING		
	***	NA = NOT AVAILABLE AT THIS TIME (UNKNOWN)		



PROJECT NAME:		Rossdale LPP	
	BUILDING AREA:	TURBINE HALL	
	PROJECT NO.:	30624.0012	
# Area	Description of Structural Finding or Deficiency	Potential Repair or Upgrade (General Description)	
1 Roof	Steel deck is overstressed by the increased snow drift in areas adjacent to the Boiler Hall, approximately 65% of roof	Additional joists to be installed between existing OWSJs to reduce deck span	
2 Roof	Joist beams are overstressed by the increased snow drift in areas adjacent to the Boiler Hall, approximately 65% of roof	Additional joists to be installed between existing OWSJs to reduce load (Same solution as previous)	
3 Roof	Joist beams are overstressed by the increased snow drift in areas adjacent to the parapet	An additional joist to be installed between existing OWSJs closer to the perimeter of building	
4 Roof	Some Joist beams are overstressed by just the base snow load	Reinforce OWSJ with plates and bars welded to the joist elements, or install additional joists between existing OWSJ (depends on AHJ acceptance)	
5 Roof	Steel beams are overstressed by the increased snow drift from the Boiler Hall and the parapet	Reinforce steel beams with plates and/or angles welded to their flanges, and brace bottom flange of beams	
6 Roof	Steel built-up columns are too slender for the length and are overstressed by the added snow drifts	Reinforce the columns with steel plates welded to their flanges and webs (costing highly dependent on demo required)	
7 Roof	Some connections are overstressed by the increased snow drifts	Reinforce connections with plates, angles or extra welding	
8 Basemen	The slab has grates, chase-ways and uneven surfaces in several locations	Infill or replace	
9 General	The lateral system is insufficient for the building	Introduce a concrete stair and/or elevator core to act as a lateral resisting system (SEE BH COSTING)	
	SEE SECTION 4.1 FOR LIMITS ON COSTING		
	STRUCTURE ONLY ESTIMATED BUDGET		
*	CELL ENTLONE COORTIONS OF DEFICE HOLES HOLES		
**	GEE GEOTION 6.2 FOR EXCEDSIONS FOR GOOTING		
		·	

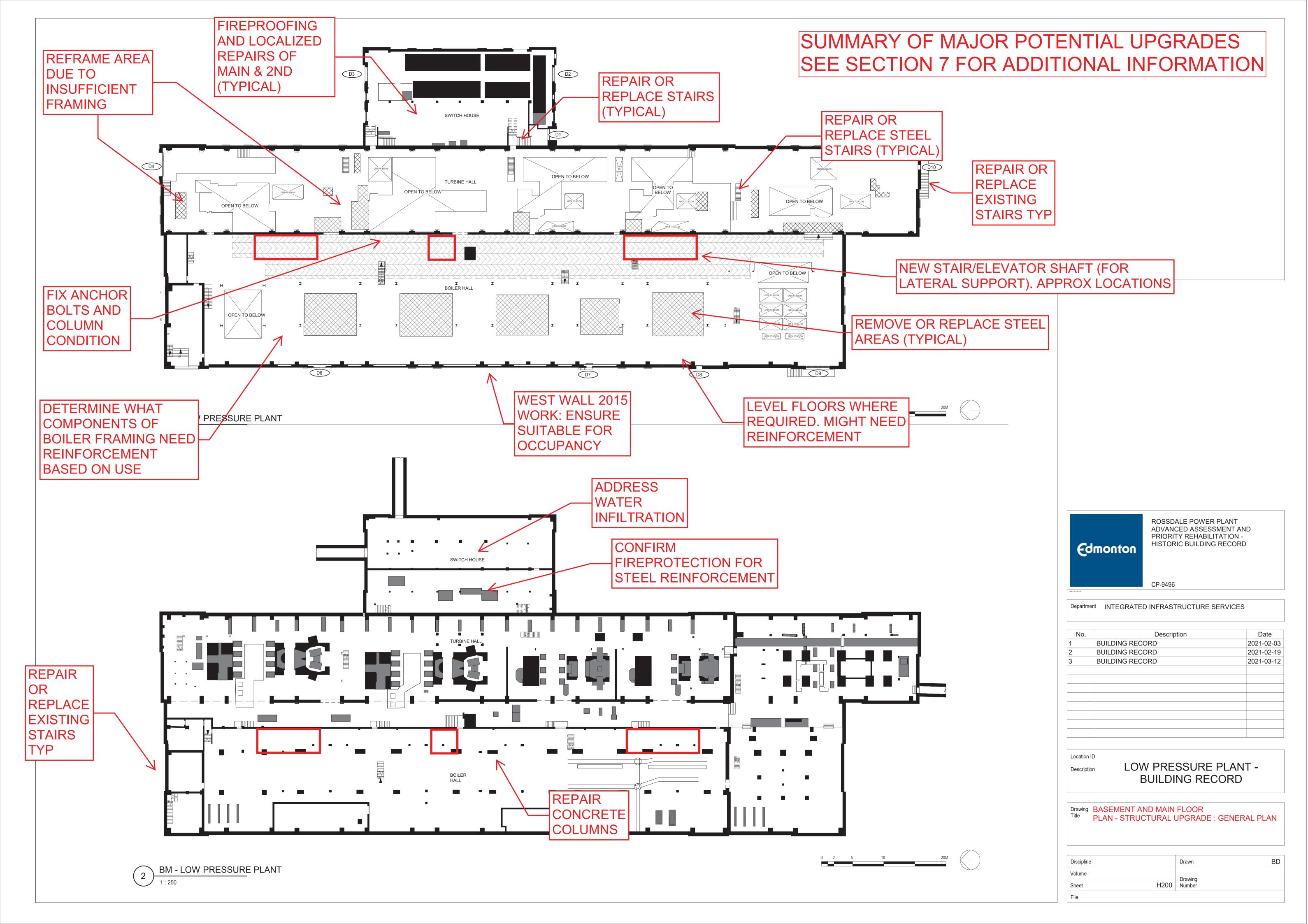


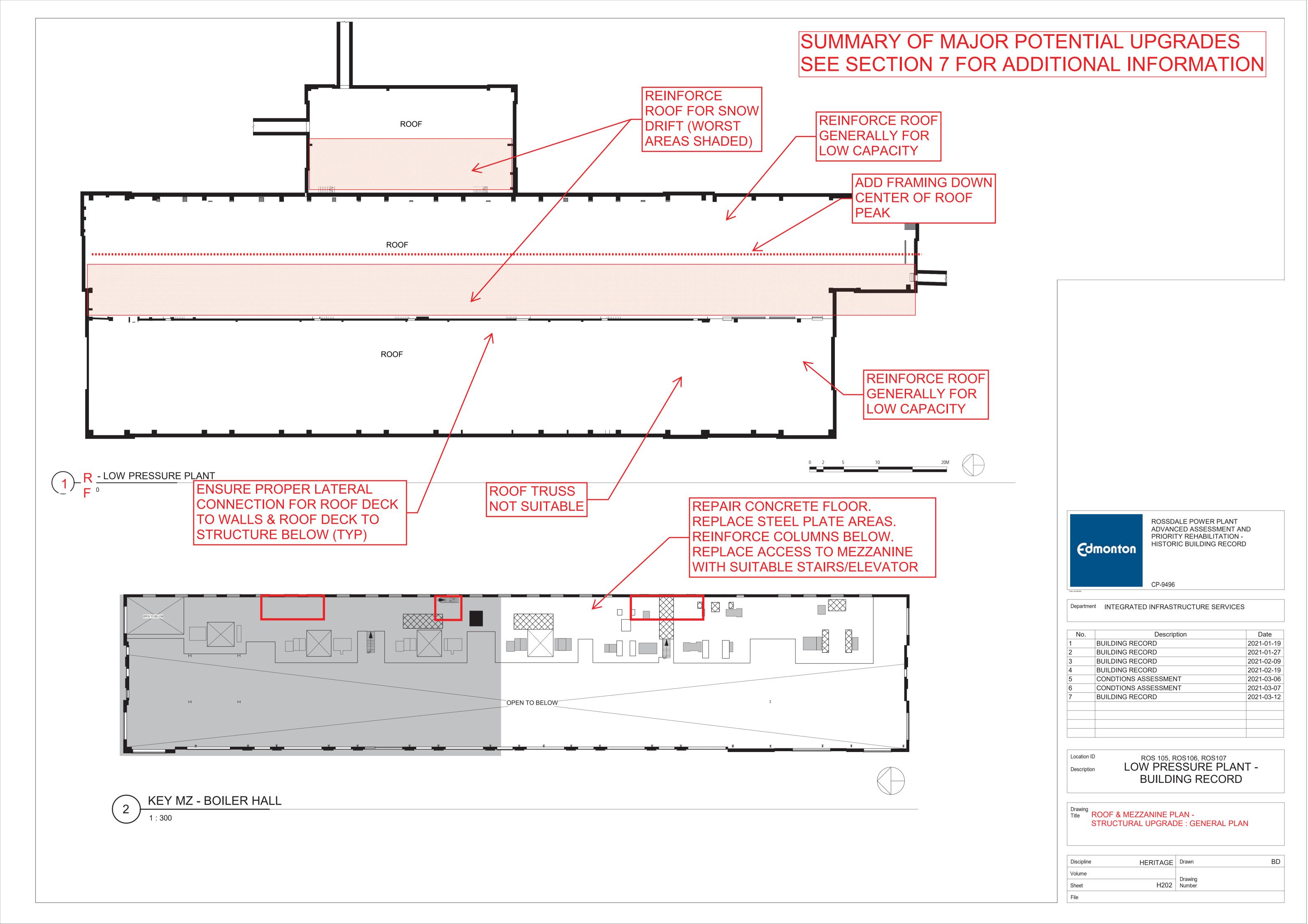
PROJECT NAME:			Rossdale LPP
			BOILER HALL
PROJECT NO.:			30624.0012
			Potential Repair or Upgrade
#	Area	Description of Structural Finding or Deficiency	(General Description)
1	Roof	OWSJs are overstressed by the increased snow drift in areas adjacent to the parapet	An additional joist to be installed between existing OWSJs closer to the perimeter of building
2	Roof	Some OWSJs are overstressed by just the base snow load	Reinforce OWSJ with plates and bars welded to the joist elements, or install additional joists between existing OWSJ (depends on AHJ acceptance)
3	Roof	Trusses are overstressed at varying magnitudes	Remove non-structural steel hanging from BH roof. Reinforce truss elements with plates, rods and angles
4	Roof	Steel built-up columns are too slender for the length and are overstressed by the added snow drifts	Reinforce the columns with steel plates welded to their flanges and webs (depends on how resolved)
5	Roof	Element connections are likely overstressed by the increased snow drifts	Reinforce connections with plates, angles or extra welding
6	Mezzanine	2 steel columns are overstressed	Reinforce columns with plates welded to the section flanges
7	Mezzanine	Some slender columns for the length they span	Reinforce columns with plates and/or angles or brace columns
8	Main Level	Steel infill areas are dropped.	Minimum work is raising floor to prevent trips, while depending on how infilled, would need reinforcement (and potential paint to prevent future rusting)
9	Basement	The slab has grates, chase-ways and uneven surfaces in several locations	Infill or replace
10	General	The lateral system is insufficient for the building	Introduce a stair and/or elevator core to act as a lateral resisting system
11	General	Boiler Framing Existing Conditions	Addressing boiler hall existing framing will be required on some level. Highly variable scope depending on how it would be addressed
		SEE SECTION 4.1 FOR LIMITS ON COSTING	
		OTDUOTUDE ONLY FOTIMATED DUDGET	
<u> </u>		STRUCTURE ONLY ESTIMATED BUDGET	
	*	SEE PLAN FOR LOCATIONS OF DE	I FICENCIES NOTED
	** SEE SECTION 6.2 FOR EXCLUSIONS FOR COSTING		
	***	NA = NOT AVAILABLE AT THIS T	



Appendix F

Structural Upgrades - General Plan







Appendix G

Pile Investigation



PILE INVESTIGATION REPORT

Project Name:	Rossdale Pile Investigation	Rossdale Pile Investigation					
Project Number:	Edm.030624.0012						
General Contractor:	CLARK BUILDERS	Weather:	NA				

Pile Investigation Report

On July 21 & Sept 14th, 2022, at the request of the City of Edmonton and as part of the work to reoccupy the building, Read Jones Christoffersen Ltd. (RJC) performed a structural condition foundation review at a couple locations for the Rossdale Power Plant (specifically the Turbine Hall) in Edmonton, Alberta.

The areas reviewed were in the Turbine Hall basement. The locations were selected by RJC for ease of access and to examine the older foundation areas. Areas chosen are shown at end of report for records sake.

Assistance was provide by Clark Builders cut the slab areas out so the foundations could be viewed.

The following outlines the findings of the two phases along with a summary of the work at the end.

JULY 21: PHASE 1 REVIEW

Two excavation areas were cut in the existing slab (see plan for locations) and the ground was hydrovac'd to expose the foundations. The holes were roughly 5ft wide, 5ft down from top of slab and 2ft under the edge of the existing pile cap or footing.

It was assumed if piles were present they would be close to the edge of cap, but no piles were uncovered in the two excavation areas in phase 1. It appears the most likely explanation is the area of the construction could have used footings instead of wood piles with pile caps. The other possibility is the piles are further under cap, but this seems unlikely to RJC given the common practice of piles near edge of caps and based on what was found in phase 2 (and shown on available drawings for other areas). Therefore we will refer it as a footing (although there is some minor uncertainty of its construction).

While the excavations did not uncover wood piles, there was still important information obtained. The following was observed on site:

1) The slab is roughly 5"-6" and did not have reinforcing.

- 2) Slab concrete appeared relatively uniform and aggregate size seemed relatively consistent. The concrete was found to be "soft" and was relatively easy to sawcut/demo.
- 3) The subgrade below the slab/footing appeared to have signs of clay and black dirt. In general it appeared to have only average compaction. No large voids were observed under slab areas.
- 4) No signs of deterioration were visible on the side of the footing cap exposed. No significant signs of sulphate attack were visible on surface. No cracking or rebar was visible on side or top.
- 5) It appears the top of footing was poured to top of slab height. While this is less common practice (usually top of footing are buried below slab), this is an important observation to have found. Future work that plans on cutting in services for slab will need to account for footing and may affect where some of these items can be located.
- 6) A water or drainage line was found under the footing.
- 7) No piles were found in the locations excavated. The hydrovac ran approximately 2' under the footing. It was felt that further investigation under the footing was not likely to yield piles or could potentially lead to undermining of part of the footing.
- 8) Cores were taken from the footings and results are included at end of report. Generally appeared to be in good condition.

The following photos were taken on site:



Figure 1: Hole #1 Looking towards footing



Figure 2: Hole 1: Looking toward footing



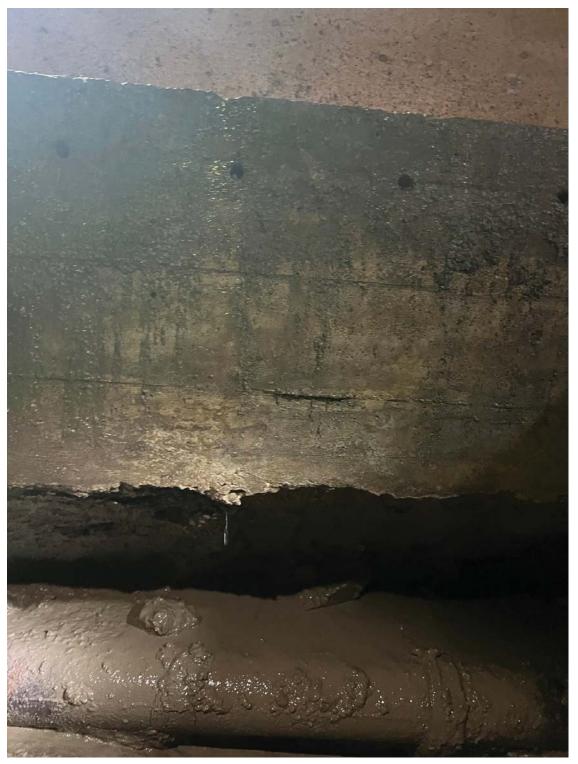


Figure 3: Hole 1 photo of excavation under footing



Figure 4: Hole #2 Looking towards footing





Figure 5: Hole 2: Showing footing/slab



Figure 6: Hole 2 looking at excavation under footing

SEPTEMBER 14: PHASE 1 REVIEW

One location was excavated in Phase 2 (see plan for location) in the original 1938 portion of the construction. The ground was hydrovac'd to expose the foundations. The hole was roughly 15ftx15ft & roughly 5ft down maximum from top of slab.

Two wood and two concrete piles were found in the excavation area. This did not match the current drawings (see plans at end) which showed all four as wood piles. It is unknown why some were concrete, but it appears the exterior primary structure might be on wood piles, while the equipment supports might be on concrete piles.

The following was observed on site:

- 1) The slab is roughly 5"-6" and had minor mesh reinforcement at bottom of slab. Slab concrete appeared relatively uniform and aggregate size seemed relatively consistent. The concrete was found to be in okay condition.
- 2) The subgrade below the slab/footing appeared to have signs of clay and black dirt. In general it appeared to have only average compaction.
- 3) Overall it appears the piles are still in adequate condition.
 - a. The concrete piles were earth formed and were very rough. They were roughly 12-16" diameter in size. The concrete appeared to have small aggregate with a significant amount of sand. The concrete visually appeared solid at surface where it was poked with steel rod to see if any localized softness (none was observed).
 - b. The wood piles were roughly 9-11" in diameter and were located under the exterior foundation wall. The top 12-14" were exposed and reviewed.
 - i. The surface of the pile appeared solid, as it held up to hydro pressure from the hydrovac work & could not significantly be damaged with a knife (RJC tried to embed the knife it only went in about 1/8" max). One small portion of the bark appeared to come off in one location, but otherwise the surface appeared consistent and no visual signs of deterioration could be observed.
 - ii. The piles appeared to be embedded into the concrete foundation at top.

The following photos were taken on site:





Figure 7: Wood Pile Under Exterior Wall



Figure 8: Wood Pile Surface





Figure 9: Wood Pile



Figure 10: Wood Pile Size





Figure 11: Concrete Pile





Figure 12: Concrete Pile

SUMMARY

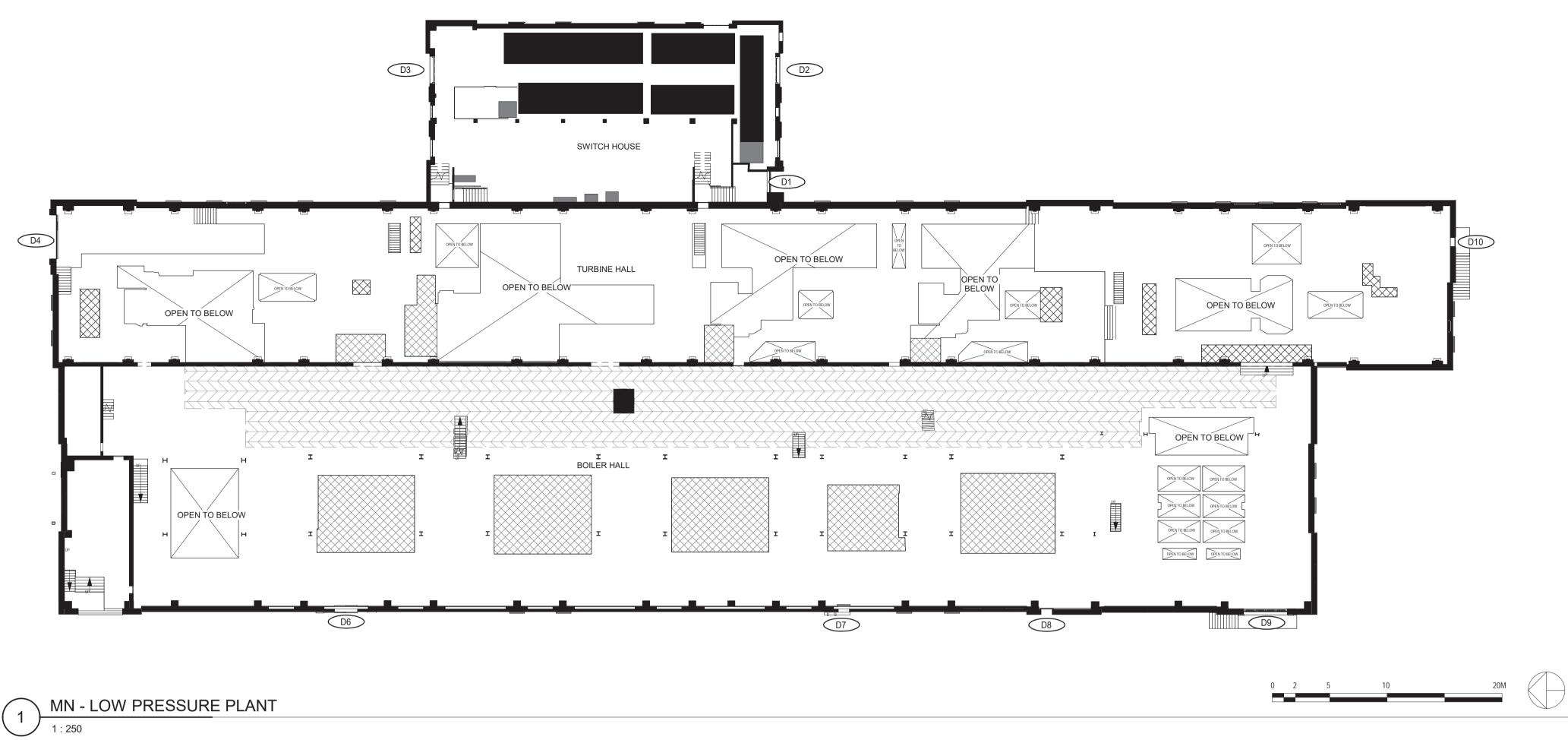
Based on the investigation, the following information was uncovered during the foundation investigation:

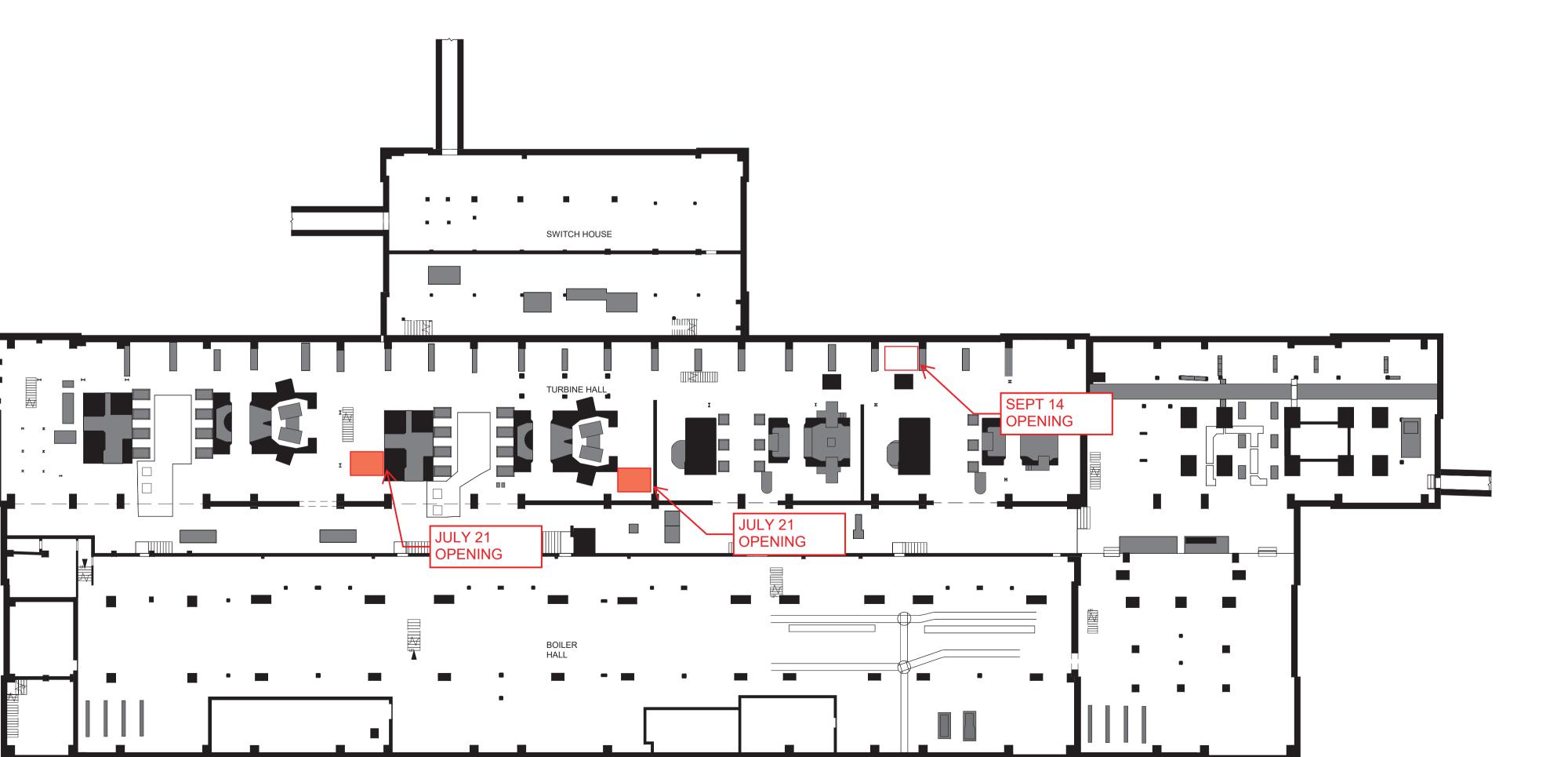
- In general the purpose of the investigation was to examine portions of the foundations, especially the wood piles, to see their conditions. Given the age, it was deemed important to get an idea of the condition of the foundation and to provide this information to COE, so they had record of condition at this time.
- In general, the structure overall has not shown significant signs of damage that would indicate the foundation are of concern. That said, in general the foundations would be near the end of typical life-span so again review was deemed appropriate.
- The foundations, even if shown on the drawings, do not match the as-built conditions. This will be important as design proceeds, as there is increased uncertainty of the foundation type and construction.
 - In general, the foundations appear to be a mix of footings and different pile types. Again as the project proceeds to reoccupation, additional verification of the foundations may be required.
- The wood piles generally appeared to be in good condition. No observable deterioration was found based on the visual review of the top of the pile.
- The concrete piles shape appeared to be rough, but conditions appeared to be okay.
- The concrete footings/caps appeared generally to be in good condition based on a visual review and the core testing completed.

In general, it appears the foundations observed were in good condition. It is important to note the sample size was very small for the overall amount of foundation in the buildings, but the pile investigation did provide a sample review and additional knowledge of the as-built conditions. The knowledge gained will be helpful for assessment of the existing structure as well as for planned modifications to the structure.

Michael Fowlie, Associate

Any corrective work noted above requires immediate attention of the Contractor and constitutes written instructions to bring the work into conformity with the Contract Documents at no extra cost to the Owner. This shall not be construed as a complete list nor shall it relieve the contractor from responsibility for the proper performance of the work in accordance with the Contract Documents. Field review is conducted with such frequency as RJC deems appropriate to observe various stages of the work and to ascertain that it is being done in general conformity with the Contract Documents. Field review is not carried out for the benefit of the Contractor. RJC does not guarantee the performance of, and shall have no responsibility for, the acts or omissions of any contractor, subcontractor, supplier, or any other entity furnishing materials or performing work on the project.





RJC: MDF

AREA OF INVESTIATION PLANT

ROS106, ROS107, ROS108 LOW

Discipline		Drawn	BD
Volume		Drawing	
Sheet H	1200	Drawing Number	
File			

HATCH LEGEND

Consultant MECHANICAL/ELECTRICAL MECHANICAL/ELECTRICAL

Williams Engineering Canada Inc.

10065 Jasper Ave #200,

Edmonton, AB T5J 3B1

Contact: Sheldon Samborsky (M), Ben R the marc boutin architectural collaborative inc.
205 9th Avenue SE, Suite 100
Calgary, AB, T2G 0R3
Contact: Richard Cotter BUILDING/FIRE CODE DFS Inc Architecture & Design 400 Boulevard de Maisonneuve O Jensen Hughes 5855 9 St SE #106, Calgary, AB T2H 1Z9 Contact: Kyle Duckworth Montréal, QC H3A 1L4 Contact: Evan Oxland

COST BTY Group 404 6 Ave SW #645, Calgary, AB T2P 0R9 Contact: Michael Gabert Saucier + Perrotte Architectes 7043 Waverly St, Montreal, QC H2S 3J1 Contact: Anne-Marie Saucier STRUCTURAL/CIVIL/BUILDING ENVELOPE

Read Jones Christoffersen Ltd 17415 102 Ave NW #100, Edmonton, AB T5S 1J8 Naheyawin 1205 - 10903 103 Ave NW, Edmonton, Alberta, T5K 2X6 Contact: Frank Cavaliere (S), John Balla (C), Nick Trovato (BE)

CONSULTANT PROJECT 20008

PRELIMINARY NOT FOR CONSTRUCTION

Edmonton

ROSSDALE POWER PLANT ADVANCED ASSESSMENT AND PRIORITY REHABILITATION -HISTORIC BUILDING RECORD

CP-9496

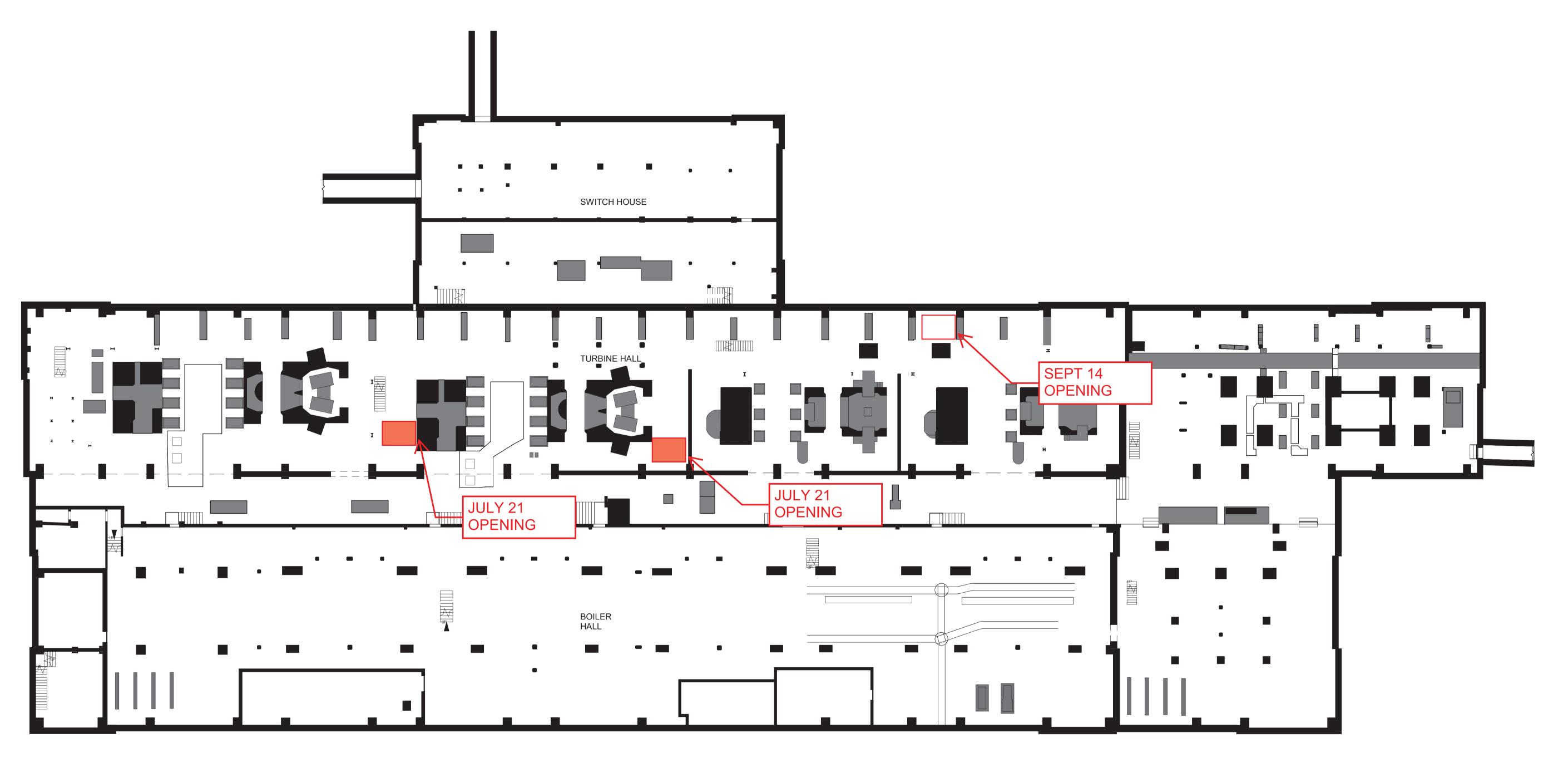
Department INTEGRATED INFRASTRUCTURE SERVICES

Description	Date
BUILDING RECORD	2021-02-03
BUILDING RECORD	2021-02-19
BUILDING RECORD	2021-03-12
	BUILDING RECORD

Location ID

LOW PRESSURE PLANT -**BUILDING RECORD**

PRESSURE PLANT - FLOOR PLANS

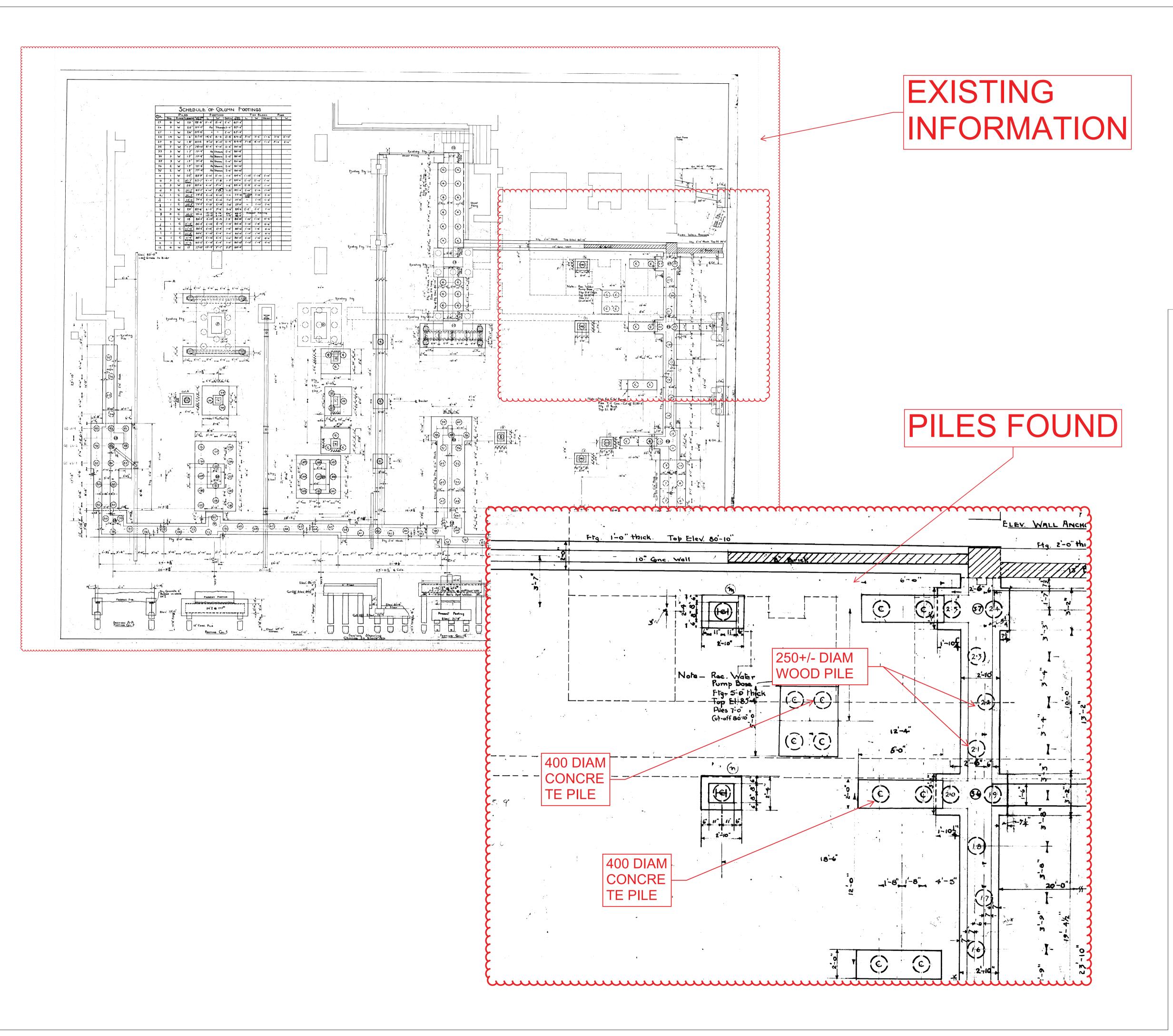


RJC: MDF AREA OF INVESTIATION



PRESSURE PLANT - FLOOR PLANS

Discipline		Drawn	BD
Volume		Dunasia a	
Sheet	H200	Drawing Number	
File			



HATCH LEGEND

CONCRETE

METAL

PLYWOOD

OPEN TO BELOW

MASKED REGION

PROJECTING SURFACE

Consultant

PRIME CONSULTANT/ARCHITECTURAL the marc boutin architectural collaborative inc. 205 9th Avenue SE. Suite 100 Calgary, AB, T2G 0R3 Contact: Richard Cotter

HERITAGE
DFS Inc Architecture & Design 400 Boulevard de Maisonneuve O, Montréal, QC H2A 114 Contact: Evan Oxland

ARCHITECTURAL Contact: Evan Oxland

ARCHITECTURAL Saucier + Perrotte Architectes 7043 Waverly St, Montreal, QC H2S 311 Contact: Anne-Marie Saucier

STRUCTURAL/CIVIL/BUILDING ENVELOPE Read Jones Christofferson Ltd 17415 102 Ave NW #100. Edmonton, AB TSS 138 Contact: Frank Cavaliere (S), John Balla (C), Nick Troyato (BE)

CONSULTANT PROJECT 20008

Seal

MECHANICAL/ELECTRICAL Williams Englineering Canada Inc. 10065 Jasper Ave #200, Edmonton, AB TS 138 IS Contact: Sheldon Samborsky (M), Ben Rajewski (E)

BUILDING/FIRE CODE Jemsen Hughes 5855 9 St SE #106, Contact: Kyle Duckworth

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404 6 Ave SW #645, Calgary, AB T2P DR9 Contact: Michael Gabert

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Permit

PRELIMINARY NOT FOR CONSTRUCTION



ROSSDALE POWER PLANT ADVANCED ASSESSMENT AND PRIORITY REHABILITATION -HISTORIC BUILDING RECORD

CP-9496

Department INTEGRATED INFRASTRUCTURE SERVICES

No.	Description	Date
1	BUILDING RECORD	2021-02-03
2	BUILDING RECORD	2021-02-19
3	BUILDING RECORD	2021-03-12

Location ID

LOW PRESSURE PLANT -BUILDING RECORD

PRESSURE PLANT - FLOOR PLANS

Discipline		Drawn	BD
Volume		Drowing	
Sheet	H200	Drawing Number	
File			



Engineering Services Transportation Services 11004 – 190Street NW Edmonton, AB T5S 0G9

CORE TEST RESULTS

LOCATION OF CONSTRUCTION SITE:		Rossdale Power Plant					
TYPE OF STRUCTURE			COMPRESSIVE STREM	NGTH			
CORED:	Footing		REQUIRED:		Unknown		
DATE PLACED:	Unknown	CONTRACTOR:	Clark Builders	CLIENT:	Chelsea Burden		
DATE CORED:	September 15	DATE TESTED:	September 19, 2022	-			

2022

Certified Tech:

Coring Location	Asphalt (mm)	Concrete (mm)	Core Diameter (mm)	Capped Height (mm)	Age (Days)	Compressive Strength (MPa)	Corrected Compressive Strength (MPa)	Density Kg/m³	Moisture Condition Hrs.
Unknown	1.21	210	96	199		44.7	44.7	2289	24
Unknown		201	96	154		45.2	43.8	2331	24
	Location Unknown	Coring Asphalt (mm) Unknown	Location (mm) (mm) Unknown 210	Core Length Core Length Asphalt (mm) Core Diameter (mm) Unknown 210 96	Coring Location Core Length Asphalt (mm) Concrete (mm) Core Diameter (mm) Core Diameter (mm) Core Diameter (mm) Height (mm) 210 96 199	Coring Location Core Length Asphalt (mm) Concrete (mm) Core Diameter (mm) Core Diameter (mm) Core Diameter (mm) Age (Days) Core Diameter (mm) Age (Days)	Coring Location Core Length Asphalt (mm) Concrete (mm) Core Diameter (mm) Core Diameter (mm) Core Diameter (mm) Capped Height (mm) Capped Height (mm) Strength (MPa) Compressive Strength (MPa)	Coring Location Core Length Asphalt (mm) Concrete (mm) Core Diameter (mm) Concrete (mm) Core Diameter (mm) Core Diameter (mm) Compressive Strength (MPa) Compressive Strength (MPa) Compressive Strength (MPa) Age (Days) Compressive Strength (MPa) Age (Days) Compressive Strength (MPa)	Coring Location Core Length Asphalt (mm) Concrete (mm) Core Diameter (mm) Concrete (mm) Core Diameter (mm) Concrete (mm) Core Diameter (mm) Core Diameter (mm) Age (Days) Strength (MPa) Compressive Strength (MPa) Strength (MPa) Compressive Strength (MPa) Age (Days) Strength (MPa) Compressive Strength (MPa) Compressive Strength (MPa) Compressive Strength (MPa)

REMARKS: Copy to:

TESTED ACCORDING TO CAN3-A23.2-14C

Unit Supervisor

G:\Engineering Services\Quality Group\Concrete\2019 Test Results\Cores\Precast Tunnel Segments.docm

This information is being collected under the Authority of Section 33(c) of the Freedom of Information and Protection of Privacy Act (F.O.I.P.) and will be used for the business of the City of Edmonton. It is protected by the privacy provisions of the F.O.I.P. Act. If you have any questions about the collection of this data, please contact the Streets Engineering Branch's Administrative Assistant, 944-7657.

Consultant Responses to CP-9582 RPP Detailed Structural Investigation - Architectural Review

2020-09-13

COMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
01	Detailed Structural Investigation	4	Re: lessons learned from other recent COE heritage projects (Ironworks) Design Team should connect with CWB on welding procedures for historical steel. As learned on Ironworks, the approved strategy may have a significant cost impact on the project. Understanding what the CWB will require for testing and the final approved strategy sooner than later will help us to see a fuller cost picture.	Our experience on historical projects (Ironworks notwithstanding) has been relatively smooth for getting welding procedures in these conditions. The age of the steel in the Ironworks building is not the same as that in the Power Plant, so it is not an entirely direct comparison. We do agree that it is worthwhile for the City to engage a welding expert prior to the development of any rehabilitative design work for primary structural system. Given the multiple phases of construction, several areas would need to be tested.
02	Detailed Structural Investigation	Page 20 5.3.2	Explication of main building structure relative to secondary (mezzanine and other) framing will be required to further the architectural design of the space. While not necessarily within the scope of this report, determining what can and cannot be removed (from both a structural and heritage perspective) will be essential in developing the interior spacesparticularly in the boiler hall.	Yes, this is beyond the scope of this report, but agree that it will be necessary once design of the structural rehabilitation work commences.

Consultant Responses to CP-9582 RPP Detailed Structural Investigation - GoA/EPCOR/IIS Review 2020-09-13

COMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
01	Section 4.1 - Summary of Testing	10	It is understood that concrete core samples were taken at the basement level slab (pile excavation) test locations - would this call for a future edit of this paragraph if tests are performed?	Results will be included once they provided. We will follow up.
			Steel testing noted as not performed due to existing reports which stated that "demand exceeded capacity" - some clarification might be advisable to confirm if it is referring to the size/thickness of the steel members, density of the steel (i.e. material strength), or both and how close to a possible failure are some of these elements if reinforcements or load transfers are not implemented.	Updated to material testing.
02	Section 5.3.1 - Roof (Boiler Hall)	19	It might be helpful to get a clarification as to what is being referred to as "the hanging non-structural steel" from the trusses - could these be considered/utilized as reinforcements vs. removed to decrease the demand?	Clarified with reference to photos 29 and 30.
03	Section 6.0 - Summary	02	Sentence "Replacement will be required" should probably be removed as any remaining elements (i.e. stairs/catwalks) that will not be re-used will either be sympathetically upgraded/replaced, left in-situ as a static element or carefully removed as needed if in conflict with new design/reinforcing elements.	Updated.
04	Appendix F - Structural Upgrades - General	N/A	As with the comment from Item 3 above, the word "replace" would need to be used more carefully within the provincially designated areas.	Updated to "repair or replace". Some items will need to be replaced given their condition.
	Plan		Note regarding "New stair/elevator shaft(s) for lateral support" is not in line with previous reports which recommended using the central openings where the boilersused to be. Alternate bracing is mentioned earlier in this report.	We will update the report to identify options for lateral bracing.
			Note regarding "Add framing down center of roof peak" is not described earlier in the report and would be of concern in terms of how it could be implemented/supported.	Understood. The existing condition is varied and appears to be deficient. Refer to information in Appendix C: #34.

COMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
05	Section 3.2.1 - Key Findings	7	Would it make sense here to reference the fact that it has been several years since the high temperature-generating equipment has been in operation (i.e. since the decommissioning of the LPP), and make any comment related to snow loads?	Yes, we will update with related comments.
06	Section 6.0 - Summary	22	While some of the existing stairs/catwalks might need to be removed, from a preservation perspective, and given the designation of the building, the main approach will be to retain as many of these items as possible and rehabilitate them where possible for reuse, or retain them as interpretive features.	Understood. Some of the items would need stabilization/ upgrading even if maintained as interpretive elements. We will update the summary to reflect this approach.
07	N/A	1	Title should be either Rossdale Low Pressure Power Plant of Rossdale Low Pressure Plant – the latter is used throughout the document.	We will update to delete "power".
08	Paragraph 1	5	"Except Perhaps under specific temporary conditions" The perhaps should be removed as there are examples of the AHJ having approved activities under specific temporary conditions.	Yes, we will update.
09	2.2	7	The LPP was decommissioned in the 1990s not the 2000s, with the LPP decommissioning completed in 1998.	We will update.
10	2.2.33	9	Prior to the steel deck replacement in 2015, the deck was a gypsum based decking	Noted, comment added.
11	2.2.3		Reason should not be appears. To ensure that future users have the necessary information the reasoning should be determined.	Reworded to reference comments from previous reports regarding reasoning.
12	2.3	10	Again, using appears, details should be determined.	Updated.
13	3.2.1	13	All LPP buildings were decommissioned in the 1990's. However, office space continued to be utilized in the Switch House until 2014.	Updated.
14	3.2.1	13	The only structural changes made to the building after 1998 was the removal of the Gas Turbine hall, some repairs made to structure in the boiler hall as part of decommissioning and the 2015 structural work. None of this work impacted the structure of the Turbine hall or switch house.	Updated.
15	4.0	14	Details of testing and measurements taken should be provided for future work to prevent the need to repeat the work. Need to ensure that Appendix D information is complete and available in electronic forms.	We will review and determine what can be added.

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OMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
16	5.1.1	17	The Switch House has been in operation similar use since its original construction and there are no recorded structural changes. This means that the roof has been performing for 70+ years. For both or the floor discussions, the fact that the use is not changing and the surface has been performing has been used to indicate that other than minor upgrades are acceptable. Why can this not be applied to the Switch House roof as well?	The National Building Code 2019 Alberta Edition does not recommend this approach. The complex was designed prior to implementation of requirements for snow drifts in the Code. The structure was analyzed for snow drift capacity and was found to be deficient. We do not recommend seeking an alternative solution based on past performance.
17	5.2.1		Similar to 5.1.1 the Turbine Hall was decommissioned by 1998. Since that time the building has been operating with limited heating, significantly less than while the plant is operational. While 24 years are insufficient to meet Commentary L, it is likely the City will not be completing sufficient work in the next budget cycle to allow full occupancy, which lasts until 2026, by the time work is completed in the following cycle, 30 years will have been reached. Can performance of the roof structure be monitored until that time to reduce the need for invasive changes?	We have found deficiencies during the course of this investigation. While the City of Edmonton will ultimately decide what to upgrade, it is our recommendation, that despite performance, the structural system would not meet standard of safety for current codes. The Boiler Hall has also had recent changes to provide additional reinforcement. Ultimately, the future change in use (most likely to an assembly occupancy) would make upgrades to current codes inevitable.
18			The 2015 Dialog design was intended to address the lateral issues in the boiler hall. This should be confirmed with Dialog and any discrepancies resolved.	The 2015 lateral bracing in the Boiler Hall did not fully address the issues with the lateral system. This has been confirmed through correspondence with Dialog. At the time, the fact that the building would remain unoccupied was used to justify the approach to not fully resolving the deficiency.
19	Appendix B	59	Structural Drawings should be listed for easy reference	Considered, but elected not to take this approach.
20	Appendix C	62	Description appears incorrect.	Updated, thanks.
21	Appendix C	64	Most stairs are blocked to limit public access during use, not for specific deficiencies.	Updated.
22	Appendix C	64	Description appears incorrect.	Updated.
23	Appendix F	N/A	More detail on proposed scope would be necessary to review for approval and costing.	Noted.
24	General Note	N/A	Wordsmithing throughout the document.	Noted, to be edited for clarity prior to issuing final report.
25	Paragraph 1	ii	"(and by previous Engineers)" make note to refer to Appendix B for list of drawings and reports	Updated.
26	Summary of Testing	9	Provide a summary results of initial pile testingor provide elsewhere in the document.	We were waiting on the results of the additional test location to include in the final report.
27	Section 6.0	27	Consider rewording the first sentence to make it clearer this is referencing all three buildings.	Updated.
28	Section 7.0	28	What is considered a significant contingency? Based on RJC's experience with historical buildings can this be identified?	We will provide a proposed range with feedback from cost consultant and construction manager.

the marc boutin architectural collaborative inc. marc boutin, Architect, AAA, FRAIC, RCA, Principal studio@the-mbac.ca www.the-mbac.ca

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111 forge road southeast calgary alberta canada T2H 0S9

COMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
29	Section 7.2	30	It notes that RJC is working with Clark Builders to develop a cost, but is the cost estimate currently being worked on? I have not seen any correspondence to Clark Builders with the scopes noted in Appendix C and E, or a request to get pricing.	The project team has engaged BTY to provide costing input.

Consultant Responses to CP-9582 RPP Detailed Structural Investigation - GoA/EPCOR/IIS Review

2020-09-13

COMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
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04	Appendix F - Structural Upgrades - General Plan	N/A	As with the comment from Item 3 above, the word "replace" would need to be used more carefully within the provincially designated areas.	Updated to "repair or replace". Some items will need to be replaced given their condition.
			Note regarding "New stair/elevator shaft(s) for lateral support" is not in line with previous reports which recommended using the central openings where the boilersused to be. Alternate bracing is mentioned earlier in this report.	We will update the report to identify options for lateral bracing.
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COMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
16	5.1.1	17	The Switch House has been in operation similar use since its original construction and there are no recorded structural changes. This means that the roof has been performing for 70+ years. For both or the floor discussions, the fact that the use is not changing and the surface has been performing has been used to indicate that other than minor upgrades are acceptable. Why can this not be applied to the Switch House roof as well?	The National Building Code 2019 Alberta Edition does not recommend this approach. The complex was designed prior to implementation of requirements for snow drifts in the Code. The structure was analyzed for snow drift capacity and was found to be deficient. We do not recommend seeking an alternative solution based on past performance.
17	5.2.1		Similar to 5.1.1 the Turbine Hall was decommissioned by 1998. Since that time the building has been operating with limited heating, significantly less than while the plant is operational. While 24 years are insufficient to meet Commentary L, it is likely the City will not be completing sufficient work in the next budget cycle to allow full occupancy, which lasts until 2026, by the time work is completed in the following cycle, 30 years will have been reached. Can performance of the roof structure be monitored until that time to reduce the need for invasive changes?	We have found deficiencies during the course of this investigation. While the City of Edmonton will ultimately decide what to upgrade, it is our recommendation, that despite performance, the structural system would not meet standard of safety for current codes. The Boiler Hall has also had recent changes to provide additional reinforcement. Ultimately, the future change in use (most likely to an assembly occupancy) would make upgrades to current codes inevitable.
18			The 2015 Dialog design was intended to address the lateral issues in the boiler hall. This should be confirmed with Dialog and any discrepancies resolved.	The 2015 lateral bracing in the Boiler Hall did not fully address the issues with the lateral system. This has been confirmed through correspondence with Dialog. At the time, the fact that the building would remain unoccupied was used to justify the approach to not fully resolving the deficiency.
19	Appendix B	59	Structural Drawings should be listed for easy reference	Considered, but elected not to take this approach.
20	Appendix C	62	Description appears incorrect.	Updated, thanks.
21	Appendix C	64	Most stairs are blocked to limit public access during use, not for specific deficiencies.	Updated.
22	Appendix C	64	Description appears incorrect.	Updated.
23	Appendix F	N/A	More detail on proposed scope would be necessary to review for approval and costing.	Noted.
24	General Note	N/A	Wordsmithing throughout the document.	Noted, to be edited for clarity prior to issuing final report.
25	Paragraph 1	ii	"(and by previous Engineers)" make note to refer to Appendix B for list of drawings and reports	Updated.
26	Summary of Testing	9	Provide a summary results of initial pile testingor provide elsewhere in the document.	We were waiting on the results of the additional test location to include in the final report.
27	Section 6.0	27	Consider rewording the first sentence to make it clearer this is referencing all three buildings.	Updated.

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COMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
28	Section 7.0	28	What is considered a significant contingency? Based on RJC's experience with historical buildings can this be identified?	We will provide a proposed range with feedback from cost consultant and construction manager.
29	Section 7.2	30	It notes that RJC is working with Clark Builders to develop a cost, but is the cost estimate currently being worked on? I have not seen any correspondence to Clark Builders with the scopes noted in Appendix C and E, or a request to get pricing.	The project team has engaged BTY to provide costing input.

Consultant Responses to CP-9582 RPP Detailed Structural Investigation - Structural Review

2020-09-13

COMMENT#	REFERENCE	PAGE	COMMENT	CONSULTANT'S RESPONSE
01	Detailed Structural Investigation	i	"except under specific temporary conditions." Can we rephrase this to allow a reader to understand that "temporary" is measured in hours, not days or weeks.	Updated, please refer to final report when it is issued.
02	Detailed Structural Investigation	5	The upgrades to the Boiler Hall were not only limited in scope, but in load evaluation as well.	Updated, please refer to final report when it is issued.
03	Photos	Multiple	Consider adding more explanation to the damage shown in the photos. Potentially speak to the limitations of the element given the damage shown and the likely repair approach.	Expanded comments related to photos as requested. Please refer to final report when it is issued.
04	Detailed Structural Investigation	N/A	Looking forward to reviewing the final report. Thank you.	Thanks.