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Regina Public Library – Central Branch
Interim Existing Facility Analysis

This report has been prepared prior to the results of the overall Central Branch programming analysis and development expansion options being completed. At this time the report only deals with the existing conditions. Modification to recommendations may occur in the final report depending on the direction selected for the redevelopment of the Central Branch.

1.0 Executive Summary

Built environments are a combination of both art and technology. This report deals with the technology component of the Central Branch of the Regina Public Library.

While the library has been well maintained over the years, in general, the technology of the Regina Public Library is outdated and time expired. Constructed in 1962 the building has not had a major general renovation since its original construction. The building was originally constructed of long term durable materials and in general they are in good condition throughout.

In particular the technology associated with our current definition of sustainability. Insulation levels for the entire exterior building envelope are very low by today's standards. Mechanical and electrical systems are much more efficient today than the current building equipment and systems.

Structural systems according to recent reports are all in good condition. If suitable for potential redevelopment the structural systems could be reused. Specific investigation on reuse of structural systems will be on hold until further design work occurs on the redevelopment options for the site.

1.1 Background

Originally constructed in 1962 the Regina Public Library comprises approximately 70,000 square feet on 3 levels (basement, main and second). The building area for building code application (main floor foot print) is 26,319 square feet (2445 square metres).

2.0 Architectural Assessment

The building has been generally well maintained over the years and at the time of its construction utilized high quality durable materials. In the last 47 years since its original construction the technology that we apply to building construction has changed dramatically. Exterior envelopes in particular are much improved over the current Central Branch. Walls systems incorporating high insulation values, high quality air barriers and rain screen principles are all standard for high quality buildings today. All of these design components are lacking in the existing building.

2.1 Significant Issues

2.1.1 Building Envelope

.1 Wall System Insulation

All areas of the exterior building envelope have poor thermal insulation values. The existing drawings show the walls having 2 inches of Rockwool insulation supported in a 2"x2" wood strapping system. With an R value of 5 at most, the building wall system has an insulation value of less than 25% of what it should be. Current LEED designed buildings generally have R25 to R30 values of insulation in the walls. There are also significant areas where no insulation occurs on the wall such as at the floor slab edges and roof structure overhangs. (Refer to sketches in section 3.1) The location of the insulation within the wall is also poor as it occurs at the inside of the system. Insulation located nearer the outside of the wall provides more thermal mass inside the insulation line and results in improved wall performance. Refer to the section drawings for additional information on the wall system insulation.

.2 Roofing System

Roofing is the original built up asphalt roof system that has been patched as required over the years to maintain water tightness. Forty-seven years is long past the expected life of a conventional built up asphalt roof. The original drawings show 2" of insulation. This potentially R6 or R7 insulation value is likely reduced due to moisture infiltration over the years. Typically roofs of LEED quality buildings have approximately R40 insulation values in our climate.

. 3 Windows and Curtain Wall

Exterior curtain walls – poor frames and poor glass. All seals at their current age will be brittle and not performing as intended. The glass units themselves are conventional double glazed sealed units of clear glass. (current glazing offers a minimum of 167% better thermal resistance and 250% better resistance to solar heat

load (shading coefficient)) In addition, the existing frames were installed backwards for aesthetic reasons. What should be the interior of the frame is infact installed to the exterior. This had water infiltration and drainage implications for the frames.

. 4 Granite Cladding

In at least 2 locations the granite cladding has fallen off of the building. The Retro-Specs report discusses these events in detail but does not speculate on whether the cause of the failure is a generalized condition throughout the building. In other buildings built during this period the steel elements that support the stone were not typically provided with corrosion protection. Currently steel supports for stone on exterior walls require a minimum of galvanized anchors and many are constructed with stainless steel anchors to prevent support failures. With the supports identified as steel without protection and showing corrosion it is only a matter of time until general remediation is required to the exterior stonework. This would involve removing all the stone and replacing the anchors with stainless steel anchors. Specific site investigation including removal of some of the stone panels will be required to completely assess this situation.

. 5 Air Barrier

The existing exterior wall has no air barrier as currently required by the National Building Code of Canada 2008.

.6 Support for Special Interior Environments

In total, the current exterior building envelope system as described above will function to support more conventional office and general environmental requirements but does not effectively support special environments that should be provided for spaces like the Dunlop Art Gallery and any rooms storing significant rare collections. These special spaces need, in particular, very controlled humidity levels that are only economically achievable in spaces with tightly constructed moisture, thermal and air barriers.

2.1.2 Building Code Requirements

This section identifies discrepancies with respect to current building code requirements. The majority of these code deficiencies result from changes in the building codes that have occurred between the original construction in 1962 and the current building codes. The Authorities having Jurisdiction generally only require upgrades to current codes be made during major renovations to a building. Minor renovation work will not generally evoke the requirement to update to current code requirements. It is assumed that the scale of

renovation contemplated in the current study will require upgrades to the current building code requirements. Major building code issues are advised in the following list

.1 Fire Protection Sprinklers

The Central Branch is classified under the National Building Code of Canada as a Group A2 occupancy. The NBCC 2005 requires that this building type be provided with a complete fire protection sprinklering system per code section 3.2.2.24.

.2 Environmental Envelope

The existing Central Branch building envelope does not meet NBCC part 5 environmental envelope requirements. Minimum energy use performance is also required by the National Model Energy Code and we can say with confidence that the library does not meet these energy use requirements and in fact our current building designs typically use between 30% and 50% less energy than allowed by the model energy code. As an example every LEED certified building must be a minimum of 25% more efficient than required by the Model Energy Code.

.3 Handicapped Accessibility

Handicapped accessibility requirements. While most of the high priority handicapped accessibility issues have been addressed over the years in the Central Branch .

.4 Fall Arrest Systems

The current building contains no engineered fall arrest system on the roof. In accordance with Saskatchewan OH&S regulations all buildings require fall arrest systems for workers accessing roof areas.

.5 Exiting

The main building Boiler room is located under main entrance which is an exit for the building. This is not allowed by NBCC 3.6.2.2 if the boilers operate at pressures exceeding 100 kPa.

2.1.3 Exterior Finishes

The exterior finishes of the Central Branch are typically long term high quality finishes. The two main exterior building finishes are granite and aluminum/glass window systems. These materials as finishes are extremely durable and appear to be in good condition throughout

the building. Refer to section 2.1.1 for information on problems with these materials related to the exterior envelope.

2.1.4 Interior Constructions

The interior construction of any building is typically not the driver to assess the need to conduct a major renovation. Depending on the building type and the initial quality of finishes some facilities will replace soft flooring finishes, soft ceilings and other finishes on a 10-20 year schedule. Some of this work has occurred over the years at the Central Library over its 47 year life span. More long term interior finishes such as masonry and hard flooring surfaces can last indefinitely. The walls, doors, stairs, millwork and similar constructions are often inappropriately located for new programming requirements. As well new mechanical and electrical systems also can have a significant impact on the ability to maintain the existing interior architectural construction of a building.

Removal of the remaining asbestos material located within the building will also have an impact on the ability to maintain any existing interior construction. A final analysis of the interior of the building will be conducted once the program requirements have been defined and whether the new program would be compatible with the existing building layouts.

2.1.4 Other Issues

.1 Hazardous Materials

Asbestos – from the previous reports some asbestos remains in the building. The May 2006 report by Ground Engineering recommended some action with regards to friable asbestos containing materials. It is recommended that all asbestos containing materials be removed from the building during future renovations in order to remove the danger and ongoing maintenance associated with this problem.

Lead Paint – Buildings of this age will contain lead based paints. This will have to be addressed in any renovation plans for the building.

2.2 Issues associated with correction of identified problems

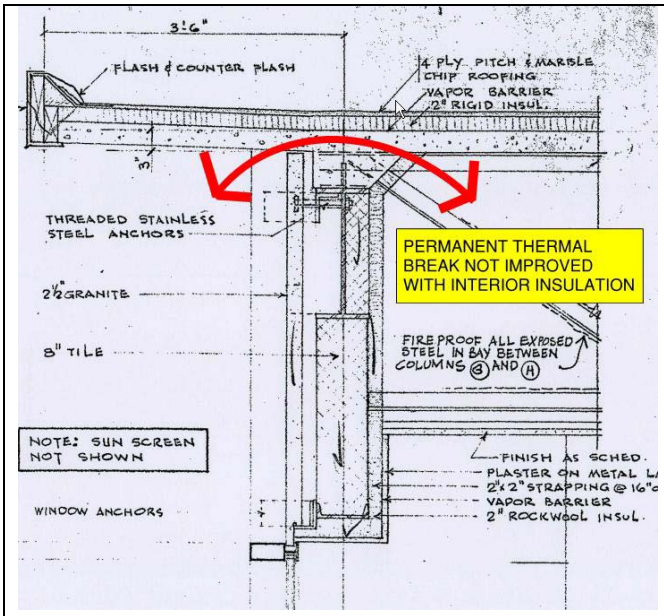
The major architectural issues identified in this report are all potentially correctable under various renovation scenarios. Some of the issues maybe only partially correctable depending on the renovation scenario. This section identifies those issues.

2.2.1 Building Envelope

The roof replacement and roof insulation upgrade can be conducted effectively under any renovation scenario. The existing roof and insulation would be removed and replaced with a new roof system incorporating appropriate insulation values.

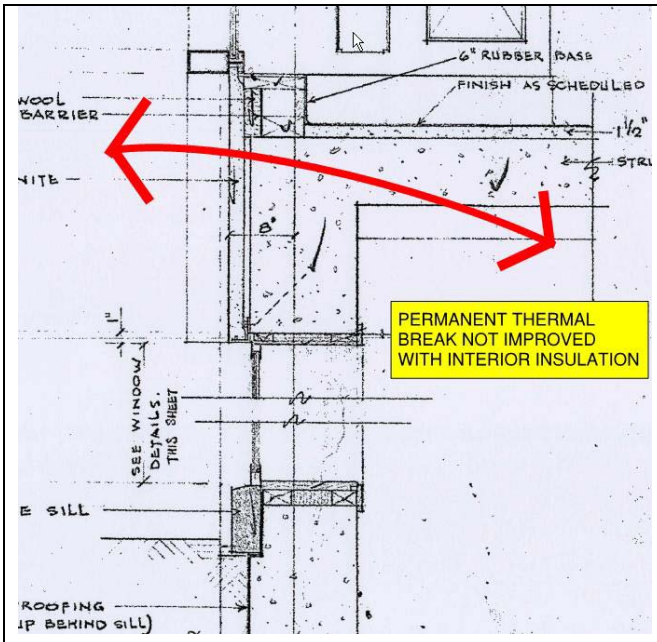
The exterior walls create a bigger challenge to upgrade if all or portions of the exterior walls are to remain in place and be retained in the renovation. The windows and curtain wall areas are fairly straightforward and can be replaced with improved glazing and framings systems independent of other work. The solid portions of the exterior wall, if the exterior finishes are to remain during the renovation, can only be improved by adding insulation on the inside of the wall. This results in the existing thermal breaks that occur at the floors and roof line remaining with no option to improve the condition. See sketches below for additional explanation.

The sketch at right shows the thermal break that will remain if the exterior wall remains in place and additional insulation is provided at the inside of the wall only. The increased insulation on the inside of the wall will increase the potential for frost and condensation to form at the thermal break. i.e. on the inside surfaces of the thermal break.



WALL SECTION @ TOP OF EXTERIOR WALL

Similar to the sketch above a thermal break at the floor line also occurs and would continue if the exterior walls are left in place.
Another problem with the interior insulation renovation is the lack of a high quality air barrier. Interior insulation can only add a vapour barrier on the inside of the new insulation. A cavity wall system as described below is technically a far superior wall construction that incorporates a vapour barrier and an air barrier into one element that allows proper venting of the insulation space.



WALL SECTION @ BASE OF EXTERIOR WALL

The above noted insulation conditions can only be improved with the implementation of a cavity type wall on the exterior walls. Cavity walls are comprised of an exterior finish, a vented air space, insulation, air barrier and interior wall structure. The existing wall construction can not be retrofitted to a cavity wall without a complete dismantling of the wall and reconstructing a new wall.

3.0 Structural

3.1 Description

The structural systems for the existing Regina Central Library Building consist of both concrete and steel framing. The building is supported on end bearing concrete belled piles with their base at approximately 50 feet below grade. The foundation walls are reinforced concrete and the lower floor system is a 5" thick concrete slab cast on compacted fill. The theatre area consists of a stepped cast-in-place concrete slab supported on concrete beams. The piles support concrete columns that run to the main floor level. The columns support steel columns above that support the second floor and roof systems.

The main floor construction is a cast-in-place concrete slab and beam system over part of the floor and a two-way, flat slab over the remaining area. The second floor

is steel framed using steel beams, joists and metal deck. The deck supports a thin concrete slab. The original construction drawings indicate that the second floor design loading is 150 psf.

The roof is framed with steel similar to the second floor. The framing consists of steel beams, joists and metal deck and the deck supports a thin concrete slab. The design load for the roof is 35 psf.

3.2 Inspection

J.C. Kenyon Engineering performed an inspection of the building on July 14, 2009. Our inspection was visual in nature only and no testing or analysis was undertaken regarding the building structure. The basic structural systems were for the most part covered with building finishes and could not therefore be directly inspected.

In general the structural systems for the building appeared to be performing satisfactorily. We did not observe any significant structural distress in the form of major cracks or deflections in any structural members. We did observe some minor cracks in some of the concrete beams below the main floor and in some of the perimeter concrete walls. These cracks appeared to be the result of normal loading conditions.

The one significant issue in the building is the movement of the lower level floor slab. As mentioned previously, this slab is supported on a compacted fill which is subsequently supported on the clay soil below. The slab has settled at the northwest corner of the building and appears to have heaved in other areas. The slab movement is not a structural issue as such but is the result of changes to the supporting soil below it. Slab heaving is common in Regina and results from swelling of the clay soil when subjected to an increase in moisture content. Slab settlement is less common and would normally be caused by subsidence of the backfill.

The slab movement at the Library has resulted in unlevel floors and some cracks in interior wall finishes. We note that soil subsidence has occurred to some extent around the perimeter of the building at grade level.

The exterior of the building includes a stone veneer cladding. The system used for anchoring and supporting the stone cladding is unknown however it likely consists of steel support along the base and pins connected back to structure behind the stone. An inspection of the stone around the building did not reveal any unusual shifting or tilting of the panels. There is one location along the south side of the

building at the base of the wall where a panel has fallen off. The panels along this wall appear to be braced back to the wall by a clip angle attached to the vertical mullion of the metal screen wall. It appears that at this location the clips may have been omitted.

4.0 Mechanical

4.1 General

Following is a brief assessment of the existing mechanical systems at the Regina Public Library Main Branch. In summary, with the exception of the chiller, cooling tower and related pumps that were replaced in 2007, all mechanical systems have surpassed their predicted service life and are not suitable for reuse.

4.2 Systems Description

Fire Protection: Building is not equipped with sprinklers. The building is equipped with a combination standpipe / firehose system.

The Computer Room is protected with a Halon fire suppression system. Halon systems are no longer acceptable by code.

Ventilation: The building is equipped with multizone constant volume air handling systems. Economizing sections allow the use of outside air free-cooling.

The Gallery area is not equipped with an independent ventilation system and is not able to maintain typical gallery temperature & humidity conditions.

The outside air intakes have been retrofitted so that ventilation air is drawn from roof intakes rather than street facing louvers with the addition of surface-mounted ductwork.

Heating: The building is equipped with two natural gas fired forced draft low pressure steam boilers that are original to the building. Steam to hot water convertors provide heating water for perimeter radiation.

Cooling: The original chiller, cooling tower, chilled water pump and condenser pump were replaced in 2007 with a new 255 ton centrifugal 134A chiller and draw-thru cooling tower.

Humidification: The building is equipped with steam to steam humidifiers which use boiler plant steam as the heat source to provide humidification steam which is injected into the ventilation systems.

Plumbing: The plumbing systems and fixtures are generally original to the building and not suitable for reuse.

Controls: The building mechanical systems are generally pneumatically controlled.

Site Services: The building is serviced as follows: Storm service: 10" service to storm main in lane.

Sanitary service: 6" service to sanitary main on Lorne St.
Water service: 4" service from water main on Lorne St.
Natural gas service: serviced from gas main on Lorne St.

5.0 Electrical

5.1 Electrical Overview

The majority of the electrical equipment is original to building construction in 1962. The building has a 4160volt electrical service entry from SaskPower which terminates in the main electrical switchgear which is located in the basement electrical room.

Breaker panels are distributed throughout the facility. A 50kVA natural gas generator is located in the boiler room.

The motor control centres, interior lighting, and fire alarm system are at the end of their operable life. The exit signs have been upgraded in the last year and are in good condition.

The building electrical systems are maintained but no major electrical upgrades have occurred since the original building construction.

5.2 Main Electrical Distribution

The main high voltage switchgear consists of 200amp rated main load break switch, SaskPower high voltage metering section, and a 600kVA dry type transformer to step down the voltage from 4160volts to 120/208volts.

The library electrical meter operates at 4160volt which provides a different electrical rate structure through SaskPower. It was normal SaskPower practice at the time of

building construction to have the customer provide their own step-down transformation.

The 120/208volt distribution consists of molded case breakers and is at full capacity. There is no space for expansion.

The clearance in front of the electrical switchgear and distribution is not sufficient and contravenes the 2009 Canadian Electrical Code (C.E.C.) which requires a minimum of 1.5m for the current electrical room layout.

There is also concern regarding the location of the basement electrical room. The centrally located electrical room requires the 4160volt SaskPower conductors to be installed underground from the south into a small void under the basement. These conductors are non-accessible and would not meet current SaskPower requirements.

5.3 Breaker Panels

The breaker panels are original to building construction and are at the end of their serviceable life. All breaker panels should be replaced.

5.4 Distribution Wiring

The distribution wiring is concealed within walls, above ceilings, and within conduit raceways. There have been no major renovations to the building so it is likely that the majority of the wiring is also original. Considering the age of the building, it is recommended that all distribution wiring be replaced as renovations occur.

5.5 Branch Wiring

The branch wiring is also concealed and could not be visibly reviewed. Replacement of all branch wiring should occur during renovations.

5.6 Wiring Devices

The wiring devices including the light switch and receptacles are aged and should be replaced as renovations occur.

5.6 Emergency Power

The building has a 40kW (50kVA) 120/208volt 3 phase natural gas emergency generator which is located in the basement boiler room. The unit is in fair condition but is unlikely to meet future needs. An upgrade is recommended.

5.8 Interior Lighting

The interior lighting consists of surface mounted and recessed T-12 fluorescent fixtures. Lighting levels are good but the T-12 fixtures are aged and not energy efficient compared with modern fixtures. We recommend a complete lighting upgrade.

Due to the age of the building, all T-12 fixtures should be reviewed to determine if the ballasts contain PCB.

The low voltage lighting control system was manufactured by GE is also at the end of its serviceable life. Some lights are controlled by circuit breakers which is not the intended use of circuit breakers.

5.9 Exterior Lighting

The exterior lighting consists of metal halide and high pressure sodium type fixtures. There are canopy down lights, wall mounted fixtures above the exit doors, and pole mounted fixtures along the west side of the building. There have been upgrades to the exterior lighting and lighting levels are generally good.

5.10 Fire Alarm System

The Edwards 6500 zoned fire alarm control panel is located in the boiler room with a remote annunciator panel at the main entrance. There is a fire alarm control panel outside the server room which controls the server room fire suppression system.

The fire alarm system is obsolete and should be upgraded as soon as possible. Replacement parts are difficult to source and any repairs will be costly.

5.11 Emergency Lighting

Strategic light fixtures are connected to emergency power to illuminate the means of egress. Some areas had battery power emergency light fixtures to supplement the emergency lighting.

We were unable to review the emergency lighting coverage without simulating a power outage but this should be closely reviewed with any renovations.

5.12 Exit Signs

The exit signs have been upgraded in the last year and are in good condition. No concerns were noted.

5.13 Telephone and Data System

The telephone system enters the building from the 12th Avenue. A fibre optic service cable has also been brought to the building by SaskTel.

The data system has a mixture of Category 5 and Category 5e type cabling. The main server room is located in the basement.

There were no concerns noted with the telephone or data system as they appear to be well maintained.

6.0 Acknowledgements

The following listed previous reports prepared for the Regina Public Library have been reviewed and utilized in the preparation of this report;

1. Central Library Feasibility Study - 2007 – Stantec
2. Building Envelope Investigation Phase 1 –September 2007 - Retro-Specs Consultants Ltd.
3. Phase 1 Environmental Site Assessment – April 2007 - Stantec
4. Inspection of Asbestos containing Materials – May 2006 - Ground Engineering.
5. Central Library Building Assessment – 1997 – Stone Hutchinson Architects
6. Review of the Regina Public Library Expansion Proposals March 1997 – Regina Chamber of Commerce.
7. Building Assessment Study Central Library 1995 – Arnott Kelley O'Connor & Associates.