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Thorvaldson Building
1. Statement of Significance

Originally named the Chemistry Building, the Thorvaldson Building was designed by Architect David R. Brown of Montreal. Hugh Vallance, Brown's former partner, left the firm in March of 1923 to form his own practice. Although preliminary drawings for the building were completed in 1913, the structure was not built until 1924 due to the disruption of the First World War, followed by economic constraints. The building as realized reflects the affluence of the roaring twenties in its ambitious scale, rich materials and detailed execution. In these respects, it also represents the apex of the Collegiate Gothic phase of architecture at the University of Saskatchewan. The building is of significant heritage value by virtue of its age, historical importance and the high quality of its design and craftsmanship. In 1966, the building was expanded and renamed in honour of Thorbergur Thorvaldson, whose research into the chemical and material properties of concrete resulted in important advancements to this construction material. (Additions carried out to the building in 1966, 1988 and 2003 are beyond the scope of this report).
Note: The Thorvaldson Building is configured with floors numbered Basement, Ground Floor, Second Floor, etc... This report follows the same convention.

2. Character - Defining Elements

2.1 Materials

‘Greystone’, in a buff color with scatterings of pink and purple, is the principal exterior material of the Thorvaldson Building. This material is significant both for its local origin and because it characterizes the early architecture of the University of Saskatchewan campus. A fine-grained grey granite forms the building’s base, as well as the stairs leading to its grand main entrance. Doors and windows are trimmed in Indiana limestone, which is also used for various other decorative stone elements. All of the stone materials have heritage value as elements defining the character of the building. The stone of the Thorvaldson Building generally remains in a state of excellent commemorative integrity. (For further information on building stones used at the U of S, refer to 'Appendix: Stone').

Figure 2. The Thorvaldson Building, 1924. Photo A-3923, retrieved from http://scaa.usask.ca/gallery/uofs_buildings/

Figure 3. Slate tile roofing, lead covered louvres on exterior venting.

Figure 4. Replacement windows in the northern annex.
Pitched roofs were originally clad in slate, and most remain so, although it is not known how much original material remains. Roof flashings and ridge caps were formed from copper. Some of these elements have been replaced with prefinished steel, but much of the copper remains in a good state of commemorative integrity (Figure 3). The east wing of the building originally featured a saw-tooth roof with skylights, but this feature has been removed and replaced with a conventional flat roof. Ventilation louvers on the back side of the tower were clad in lead, which remains in place (Figure 3).

The windows of the building are generally single-glazed steel-framed casements of which there is both an exterior and an interior set. These remain in excellent condition with the exception of the east wing. There, the original double-height steel framed windows have been replaced with aluminum framed windows (Figure 4).

The main entrance of the Thorvaldson building features an elaborate portico, with a carved limestone archway leading to a vestibule formed by two sets of oak doors. The exterior doors are replicas of the original oak doors, made in 2011, and mounted in the original oak frame. The interior doors are set into an intricate oak frame and transom, carved with various gothic motifs. This feature is a striking piece of artistry and is in very good condition (Figure 5).

The finish materials of the interior of the building exist in varied states of commemorative integrity. Many of the original oak doors remain, including their brass hardware, and are generally in good condition (Figure 6). Although some have been removed or replaced. Public corridors have red clay terracotta floor tile which is generally in good condition. In the basement some replacements have occurred. In the public corridors and many other rooms, walls are of painted plaster, with brick wainscoting (Figure 6). These character-defining materials are generally in excellent commemorative condition where they have survived.
The main stairs of the Thorvaldson Building are a grand feature dominating the entrance hall. The stairs are formed of slate treads, with painted steel stringers, a cast and wrought iron balustrade and a bronze handrail (Figure 7). In 2012, the slate treads and landings on the staircase were replaced with new slate matching the original material.

In the laboratories, classrooms and offices, some material integrity has been lost. Originally the building featured birch flooring in its laboratories and classrooms, but none remains. The laboratories featured stone sinks made of New York granite with porcelain covers. These have been replaced with stainless steel sinks such as the one shown in Figure 8. Blackboards were specified for all labs and classrooms; three chalkboards of slate and oak remain and are in good condition. The largest of these boards is the sliding chalkboard which is still used in the auditorium today. The oak chart frames in the auditorium space have also been maintained. The brick wainscoting, steel and brass window hardware and wooden trim of the windows has been maintained in the classrooms, labs and many offices (Figure 9).

The auditorium or ‘Airplane Room’ is well-known at the university both for its striking form and for its historical integrity. Its materials are largely unchanged. Painted plaster and brick walls are well-maintained and original. The steel and wood tablet arm chairs are original but are in poor commemorative condition. The tablets record decades of student graffiti with dates as far back as 1933. The concrete of the tiered floor has been covered by vinyl composition tile (VCT), but the risers have their original concrete finish. The brass ventilation grilles have been well maintained (Figure 11). The domed ceiling of the Airplane Room has long been covered in a spray-applied acoustical material. An alumnus who attended class in the space from 1947-1950 recalls that the ceiling was, “like the rest of the ceilings in the building,” and that the asbestos finish on the dome came later (Tom Jasienuk, personal communication, August 17, 2012). With this information it can be assumed that the dome was finished in plaster. Ceramic tiles are still visible in the flat ceiling surrounding the dome. (Structure discussed in section 2.5 Systems). The oak-framed windows remain in excellent commemorative condition. The bottom row of windows have been rendered opaque with the addition of dark steel panels into the window frame as shown in Figure 11. Underneath the large windows is an oak cupboard with brass screens which houses cast-iron radiators. The commemorative integrity of this cabinet is intact (Figure 12).
2.2 Form & Style

The Thorvaldson Building, in its form and detail, illustrates the European and ecclesiastical roots of the Collegiate Gothic architectural style perhaps better than any other building at the University of Saskatchewan. Compare, for example, the Thorvaldson Building (Figure 13) to the chapel of King’s College Cambridge (Figure 14). The imposing scale of the Thorvaldson Building, its verticality, the character of its grand entrance, and its stylistic references to architectural elements such as flying buttresses, spires, and church portals make clear reference to this and other precedents in European Christian architecture.

The Thorvaldson Building was never completed as planned; it was originally designed to have a north wing that would have made it symmetrical. In the original design, intended to be realized in two stages, the large tower element containing the main entrance and the auditorium was a central volume connecting two lower classroom and laboratory wings. Figure 15 shows the building as it stood at the completion of its first phase. The form of the Thorvaldson Building maintains its commemorative integrity, since little of the original building has been removed; however, over the years it has been expanded significantly.

Figure 12. Painted cast iron radiators in original oak cabinet with brass screen.

Figure 13. The Thorvaldson Building, ca. 1930. Photo A-10983, retrieved from http://sain.scaa.sk.ca/items/index.php/chemistry-building-5;rad


Figure 15. 1924, the original form of the Chemistry Building. Photo A-249 retrieved from http://sain.scaa.sk.ca/items/index.php/university-of-saskatchewan-archives;isdiah
The cut and carved limestone reliefs and sculptures on the Chemistry Building differ from those of its predecessors in that they are generally not figural representations, but instead represent purely architectural motifs. For example, there are examples of gothic arches, stylized flying buttresses, battlements, finials and trefoil motifs, but no human figures, gargoyles or grotesques. A unique character-defining element of this building, visible in Figure 16, is its tracery on the large panel of glazing on the front elevation. This carved stone element is a subtle representation of a series of flying buttresses, compressed into the thickness of the window opening. The most exuberant examples of carved stone decoration are found above and surrounding the principal entrance. A ribbed arch forms the entrance, in the manner of a cathedral portal. A brick vault, laid up in a herringbone pattern, separates the portal from the doors (Figure 17). Collegiate Gothic decoration is to be found on virtually all of the building’s exterior surfaces. Greystone quoining defines the corners of the building and a crenellated parapet forms its roofline. The uppermost windows are all shaped as gothic arches, as shown in Figure 18. These windows have been maintained in a good state of commemorative integrity. The central wing of the building features a row of double-height arched windows (Figure 4), which are also character-defining elements.
The interior of the building also contains many character-defining stylistic elements. The main entrance has an intricate carved wooden screen surrounding the doors (Figure 5). In the foyer, the ceiling is in the form of a series of intersecting plaster vaults (Figure 18). This staircase, in slate, cast and wrought iron, is a significant character-defining element. (Refer to Section 2.2) The balustrades of the staircase are supported by ornate wrought iron brackets shown in Figure 19.

Figure 18 shows the brick wainscoting lining corridors and the arched transoms above doorways on the 1st and 2nd floors. (The transoms of the third floor are not arched). All of the corridor ceilings, with the exception of those in the basement, are vaulted. Most of the arched transoms exist in a good state of commemorative integrity with the exception of the basement level, where a dropped ceiling now obscures these character-defining elements, as shown in Figure 21. In some places transoms have also been replaced with an opaque material.

The auditorium of the Thorvaldson Building, also known as the Airplane Room, exhibits many character-defining elements of style. The most obvious element is the 68 foot dome which crowns the room. The dome remains in good commemorative condition. Its form has been maintained, and although the ceiling has been covered with a fibrous fireproofing material, that material has itself acquired its own historical significance, as discussed in Section 2.8. The location and volume of the Airplane Room are registered on the front elevation of the building, by the large panel of windows above the main entrance. These soaring windows and of the scale of the space itself contribute greatly to the grand style of the building, reinforcing the imposing impression of the stone exterior (Figure 22).
2.3 Location

The Thorvaldson Building does not appear on the original Brown and Vallance plan of 1909 (Figure 23), but was added at a later date. It first appears in its final configuration on a 1924 revision to the master plan, drawn while the building was under construction. David Brown included this revised plan in an article for the Journal of the Royal Architectural Institute of Canada, describing the architecture of the campus. Figure 24 shows the 1924 plan with the Thorvaldson Building included. The orientation of the building distinguished it from its predecessors; the Thorvaldson Building did not face inward, toward the ‘Bowl,’ but outward, towards the river and the growing city of Saskatoon.
2.4 Spatial Configuration

The Thorvaldson Building as originally conceived has an unusual floor plan, shaped in the form of an arrow, with three wings intersecting at 45 degree angles, at the main entrance. This plan was never fully realized, and is missing its north wing, but the shape and configuration of the other two original wings have been maintained to a good degree of commemorative integrity, despite later additions. Figure 25 illustrates the original ground floor plan, with the missing north wing shown in outline. Figures 26 and 27 illustrate an early version of the building that was eventually discarded in favour of the current design.
The laboratories and classrooms of the Thorvaldson Building were configured along double-loaded corridors, with the exception of the large auditorium and the central laboratory wing. The corridors remain very much intact, but the rooms arrayed along the corridors have been changed in many instances. In the late 1940's, there were about 5,000 students attending classes on campus. The population was large relative to the space available on campus and so labs in the Thorvaldson building were converted into lecture rooms to alleviate the situation. The problem was so severe that the university brought in old aircraft annexes from the airport to serve as laboratory space (Tom Jasienuk, personal communication, August 17, 2012). Aerial photos of the campus show that the annexes appeared in 1946, were reconfigured in 1965 and had been removed by the spring of 1977 (University of Saskatchewan Archives, Photo B-545). The labs of the basement floor were enlarged by the removal of partition walls.

Figure 26. Early elevations show a window configuration different from the one existing today. The entrance in this version is also more simple. Retrieved from Facilities Management Division Asset Record System, File TB-34-T.
The double loaded configuration of the corridors remains and is a character-defining element. The rooms arranged along these corridors have seen much renovation. The configuration of many rooms has changed to accommodate evolving spatial requirements. Some rooms have been subdivided by the addition of partition walls and others have been combined to create larger spaces through the removal of walls. In order to accommodate the new spatial configurations, some doors in the corridors have been removed and replaced with display cases as shown in Figure 28.

The spatial configuration of the large auditorium, or Airplane Room, has not changed and has a high degree of commemorative integrity. Its volume is based on an almost cubic proportion, bisected by the tiered floor of the seating, such that its height and width are equal, although it is slightly longer than it is wide. The room is crowned with a shallow dome.

The public spaces of the Thorvaldson Building, such as the corridors and the grand staircase, have maintained their commemorative integrity. The arrangement of these spaces has not changed, except where original corridors connect to newer additions. An overhead walkway from the Geology Building now enters the building immediately east of the grand staircase. Also, a large addition was appended to the west side of the building in 1966. The east wing has also been extended slightly, with the addition of a fire stair.
2.5 Systems

The dome of the Airplane Room is a feature of particular heritage significance. This dome is an example of the ‘Guastavino Tile Vault System’, a system for the construction of thin-shelled structural vaults and domes patented in 1885 by a Spanish-American architect and builder named Rafael Guastavino (1842–1908). The Guastavino system was briefly popular in buildings of the Beaux-Arts style at the turn of the 20th century. It was used in prominent buildings such as New York’s Grand Central Station and Toronto’s Union Station. The system used standardized terracotta tiles and layers of mortar, laid up in an interlocking herringbone pattern, to form a thin, self-supporting shell about 4 tiles deep. The tiles were laid flat and parallel to the arc of the vault, rather than perpendicular to the curve, as in the Roman fashion. The terracotta tiles were about 10 mm thick, and approximately 150 mm by 300 mm in dimension.
The dome of the Thorvaldson Building auditorium constitutes a character-defining element, both as a structural system particular to the historical period of its construction and as a prominent aesthetic feature. As a structural system, the Guastavino tile dome has commemorative integrity, although its original appearance has been compromised. The dome would likely have been finished originally in painted plaster, but is now covered with a spray-on acoustic material. This was done in order to mitigate an echo problem associated with the domed shape, but interestingly, has also contributed to the heritage value of the room in other ways, discussed in Section 2.7.

From the original architectural drawings, the structure of the building appears to be a hybrid system, with a structural steel frame encased in cast-in-place concrete on the interior, and exterior walls consisting of cast-in-place concrete, brick and stone. The roof structures typically consist of concrete slabs supported on steel trusses, with the notable exception of the Guastavino dome. Although a dropped ceiling has been installed in the attic, some of the steel structure at this level is visible. Floors are typically cast-in-place concrete, with embedded hollow clay tile, a system seen also in the Physics Building. The drawings indicate cast-in-place concrete foundation walls and footings.
The ventilation and plumbing systems in the Thorvaldson Building were considered state-of-the-art at the time of their construction. All fume hoods and vents were covered in an acid proof lining. Labs came equipped with distilled water cabinets made of porcelain and stone. Parts of these oak cabinets still exist, and are visible above their newer counterparts (Figure 8). Labs also were built with sand baths which would put out a fire with a shower of sand if needed. As an additional precaution, water baths were also installed. (The sand baths no longer exist and the water baths have now been replaced). The plumbing at the work benches was specified in the best chemically-resistant materials available at the time: soapstone sinks and ceramic pipes. Figure 32 illustrates the details of the stone sink and ceramic waste trap. This system has been replaced, but some of the original stone sinks has been saved and at the time of this report are located in the sub-basement (Figure 32). The original plans indicated the provision of speaking tubes near the elevator, but these also no longer exist. The labs were equipped with two plumbing lines; one provided water and the other provided a solution of 80% alcohol intended for sterilizing equipment. Former student Tom Jasienuk recalls, “they rarely used the alcohol to sterilize and would fill bottles with it and go party. They’d have to cut it with 7-Up, juice or water because it was too strong…they frequented that tap a lot” (personal communication, August 17, 2012). With the removal of the lab spaces to the annexes the alcohol line was disconnected.

The original heating system of cast iron radiators, shown in Figure 12, was common at this time. The building’s radiators remain in good condition and are still in service.
A unique apparatus was designed to operate the curtains and blinds of the high windows in the auditorium. The oak window surrounds were built to contain a system of gears that would allow for the curtain to be drawn from below the window. This system is no longer used, but the apparatus may still be in existence within the oak window frame (Figure 34).

Blinds were also installed in the auditorium, as well as over the door transoms in the basement laboratories. When not in use, the blinds retracted into recessed pockets above the window frames. It is unknown whether they still exist within the frame of the auditorium windows, but the blinds do still exist in some cases in the laboratories (Figure 35). ‘Pantasote’ was the material used for these blinds. Pantasote was a leather substitute common in the early twentieth century, created by gluing together two layers of fabric with Pantasote gum. The surviving blinds are character-defining elements.

2.6 Use(s)

The Thorvaldson building was originally referred to as the Chemistry Building, replacing the makeshift labs in the basement of the MacKinnon Building that had up until that time housed the Chemistry Department. The building was also originally home to the Colleges of Home Economics and Pharmacy. The Thorvaldson Building now houses labs for chemistry and is also home to the Computer Science Department. The original plans for the building show that it was composed of several small labs, classrooms, store rooms and an auditorium. Labs, classrooms and the auditorium are all therefore character-defining elements. The ground floor was originally home to several labs, but is now almost exclusively offices. The use of the basement for laboratories is historically consistent. The second and third floors are home to computer labs, offices and seminar rooms. The use of the auditorium has never changed and its commemorative integrity as a lecture theatre remains intact.

When a member of the University of Saskatchewan community dies, the flag on the Thorvaldson building is flown at half mast.
2.7 Cultural & Chronological Associations

The Thorvaldson Building was the most elaborate of the early campus buildings, reflecting the confidence of the early 1920’s (Figure 37). “It faced not inward toward The Bowl and the original buildings, but outward to what was expected to be an expanding future”, (University of Saskatchewan Archives, retrieved 2012, Campus Buildings: Thorvaldson Building). However, the fact the north wing was never realized perhaps reflects the effect of the stock market crash of 1929, and the subsequent Great Depression.

The lecture hall, or Airplane Room, in the Thorvaldson Building is a particularly rich focus of cultural memory at the University of Saskatchewan. Over many years, students have affixed paper clips, pens or keys to paper airplanes and have flung them up to the ceiling where the planes stick in the material lining the dome. A story circulates around the university that during the Second World War, young airmen receiving pilot training in the room wrote their names on paper airplanes and tossed them up to the dome. When the pilots went off to war, it was rumored that some families would visit frequently to see if their son’s plane was still stuck to the ceiling. The story goes that if the paper plane fell, it meant the pilot had died in action. Although there is no evidence to suggest families came regularly to check on the paper planes, the story gives the lecture hall its nickname, the ‘Airplane Room’.

The University Archives has a collection of 366 paper planes retrieved prior to the removal of asbestos from the ceiling in 1995, the oldest one dating from 1961. However, some undated ones are yellowed and brittle with age, and could be older. One states: “By the time you read this, I’ll be rich.” Another unsigned missile was apparently a suicide note reading: “After this message was written, a young gentleman committed suicide.” The room is an important element defining the character of the university and associating it with a significant historical event.

The Thorvaldson Building is named after Thorbergur Thorvaldson, former head of the Department of Chemistry at the U of S, and inventor of sulfate-resistant cement. Early in the Twentieth Century, a problem emerged in Western Canada related to the corrosive action of sulfates, often present in soil and groundwater, on concrete structures. Over time, this emerged as a major concern for engineers, when structural failures began to occur in otherwise well-designed concrete structures. In 1919, a team lead by C.J. Mackenzie, Dean of Engineering, and Thorbergur Thorvaldson, conducted research on the causes of this phenomenon. Thorvaldson devised technique that changed the crystalline structure of concrete, rendering it immune to sulfate damage. The manufacturing process for cement was changed as a result of his work, and the durability of concrete structures significantly improved.
Gerhard Herzberg can also be associated with the Chemistry Department and the Thorvaldson Building. He won a Nobel Prize in Chemistry in 1971 for his contributions to the knowledge of electronic structure and geometry of molecules. Herzberg was a member of faculty in the Physics Department from 1935-1945.

Two plaques in the building vestibule honor Nobel Prize winners Gerhard Herzberg and Henry Taube. (See Figures 40 and 41).

The Chemistry Building, as it was originally known, was officially opened in August 1924 during a special meeting of the British Association for the Advancement of Science. Representing both British and Canadian members, a group belonging to “all sections of the association,” took part in a CPR rail tour in order to get a “comprehensive view of the west,” (Hayes, 2007). The Association’s chemical section met in Saskatoon where the Chemistry Building was formally opened. Figure 42 depicts the scene.

3. Associated Objects

The paper airplanes in the ceiling of the Airplane Room, and those stored in the University Archives are character-defining elements of the Thorvaldson Building.

The remaining slate chalkboards and chart frames in the auditorium and laboratories are associated historical objects, as they are original to the building. The stone sinks that have been removed from use, but are being stored at the time of this report in the sub-basement, are also associated historical objects.
4. Supporting Documents


Facilities Management Division (2011). Asset Resource Database [Data File]. Retrieved from \usask\fmddfs\files\iis\IIS_Public\ARS


Jasienuk, T., personal communication, August 17, 2012.


University of Saskatchewan Archives. Buildings and Grounds Department Series I. Chemistry Building.


Figure 42. August 22, 1924. The Chemistry Building (later known as the Thorvaldson building) was opened by the Premier of Saskatchewan, C.A. Dunning. Other dignitaries on the steps of the Chemistry Building include W.C. Murray, F.W.G. Haultain, S. Basterfield, Sir D. Bruce, W.R. Motherwell and S.J. Latta. Photo A-241, retrieved from http://sain.scaa.sk.ca/items/index.php/university-of-saskatchewan-archives;isdiah
5. Summary of Character - Defining Elements

Materials
- greystone walls
- Indiana limestone trim and decoration
- granite base and exterior stairs
- red terracotta floor tile
- cast iron radiators
- main stair: cast and wrought iron balustrade, bronze handrail, slate treads
- slate chalkboards
- slate roof tiles
- slate thresholds
- quarter-sawn oak doors, trim, and millwork
- lead-covered ventilation louvres
- brass screen and ventilation grilles in Airplane Room

Form & Style
- original building is distinct from later additions, and visible on three sides.
- central volume with wings
- carved stone detailing
- gothic arches
- Guastivino dome
- vaults
- tower
- parapet
- crenellation
- quoining
- spandrels
- plaques

Location
- original location and orientation

Spatial Configuration
- wings with double loaded corridors
- triple height auditorium with dome
- central staircase
- original plan never realized
Structural Systems

- Guastavino dome
- Steel trusses in attic

Uses

- Chemistry Department
- Laboratories, classrooms, lecture theatre & offices
- Flag protocol

Cultural & Chronological Associations

- Thorbergur Thorvaldson, inventor of sulphate-resistant concrete
- Nobel Prize Winner Henry Taube