



St. Andrew's Wesley United Church

Heritage Conservation & Seismic Upgrade

The restoration of one of the City of Vancouver's most prominent historic churches.

UNCOVERING OPPORTUNITY

Located at Nelson and Burrard, the St. Andrew's Wesley United Church, designed by prominent architects Twizell and Twizell, is a remarkable example of gothic revival style traditional to Europe in Vancouver and Western Canada.

Originally built between 1930 and 1933, the heritage church features locally sourced materials such as Nelson Island granite and Haddington Island stone, a soaring vaulted timber roof on the interior, and distinguished French and Italian stained windows.

Unfortunately, the historic stone-clad concrete structure has suffered years of natural wear, and due to the Great Depression,

The Church's past is considered throughout the conservation process, maintaining its character while providing a revitalized modern-day structure.

was not built to proper standards in the early 1930s. In addition, over time, long-term and reoccurring roof leaks began negatively impacting the interior plaster elements.

Initially, the renovation project entailed a roof replacement; however, upon further review of the damage to interior plaster elements and opening of the walls, additional deficiencies to the structure were discovered. The hazard of falling debris from the crumbling plaster and clay tile that lined the church's interior initiated a broader investigation of opportunities for conservation, including a large-scale seismic upgrade.

Early on, the team understood that the project outcome must pay homage to the church's heritage. The goal was to maintain the church's history at the heart of the conservation process, respecting its character and charm while offering a rejuvenated, durable structure for years to come.



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COLLABORATIVE SOLUTION

RJC Engineers has been working with St. Andrew's Wesley United Church since the mid-1990s, assisting with masonry repairs, roofing replacement, seismic evaluations, leak investigations, plaster stabilization, and capital planning. The structural and enclosure upgrades dominated the final form of the church, and as such, it was decided to have RJC be the prime consultant and coordinating registered professional, leading the project team.

Teaming up with Ryder Architecture, established in the United Kingdom in 1953, Donald Luxton & Associates, and a team of experienced electrical (AES Engineering), mechanical (AME Group), code (GHL), and acoustic consultants (BLK), the team embarked on a large-scale restoration of one of the City of Vancouver's most prominent designated heritage buildings.

TECHNICAL EXCELLENCE

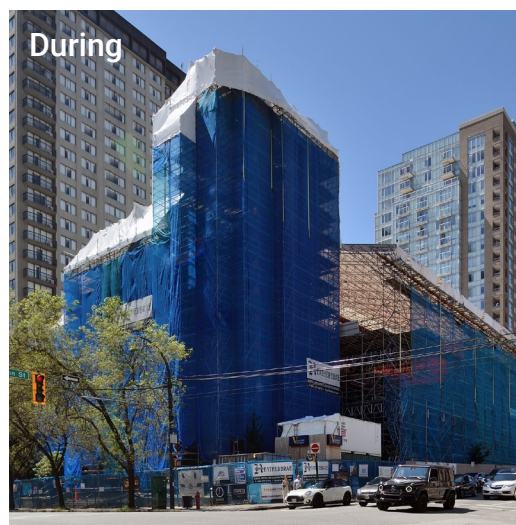
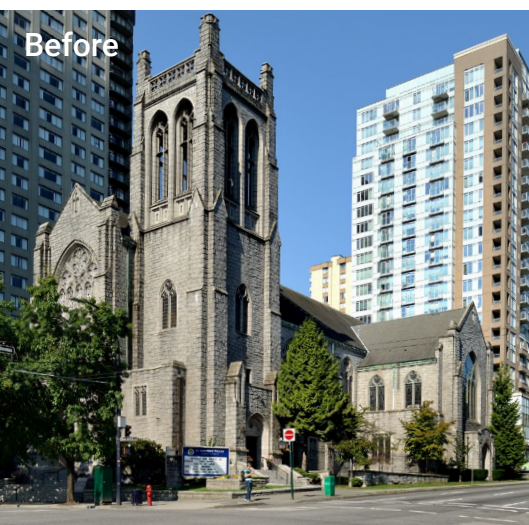
The project's comprehensive scope involved the seismic upgrade of the primary structure to 100% of the 2015NBCC; seismic upgrade of the façade; a copper roof in keeping with the heritage roots of the building; replacement of all mechanical and electrical systems; and a complete replacement and restoration of all the interior plaster surfaces. The Interior functional layout was also reimagined and modernized to suit the variety of church functions.

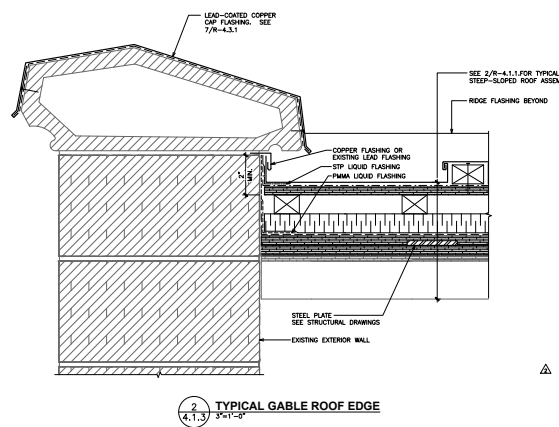
The building interior was completely stripped back to its underlying and under-reinforced concrete structure. A temporary roof covering was utilized to protect the exposed roof throughout construction and provide controlled conditions for the stone masonry and terra cotta repointing and seismic restraint scope. Ryder's architectural scope focused heavily on the plaster restoration, which included match casting new plaster shells to replicate all the interior surfaces of the sanctuary. The castings were mechanically restrained and field-finished to integrate seamlessly with its past.

The Exterior

Designated an "A" heritage building by the City of Vancouver, the church's exterior is clad with random-coursed, rough-dressed granite and smooth terracotta trim. Asphalt shingles replaced the slate tiles of the original building's roof in the early 1990s. Much exterior maintenance had been deferred, resulting in accumulating deterioration of the stone and terracotta and leakage through the roof.

As such, the roofing replacement was carried out concurrently with an extensive masonry restoration program on the exterior walls. The Nelson Island granite was fully repointed, the masonry was seismically restrained, and the damaged terracotta was patched to provide a refreshed external appearance for those visiting and passing by.





Copper roofing at the gable end

While reviewing roofing material options, the team selected copper for its durability, lightweight, elegance, and heritage value. Behind its beauty, the new copper-clad roof is reinforced with plywood and steel, designed to resist seismic forces and provide a durable protection system for years to come. The batten seam style is period-appropriate for a building of its time, constructed in the 1930s in Vancouver, and many of the church's original gutters and downpipes were copper. Staying true to design, the gutters and downpipes were replaced to replicate the original church.

The stone parapets at gable-ends and roof perimeters were initially capped with terracotta coping. Since previous attempts to address water ingress at these locations had limited success, lead-coated copper cap flashings were installed over the terracotta to provide additional protection against water ingress, providing an aesthetic and functional option to surround the building.

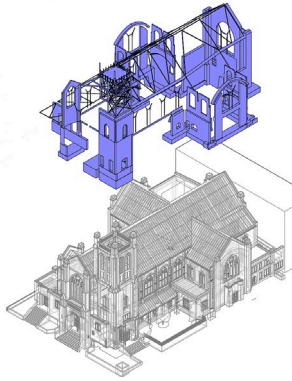
The exterior materials selection was made meticulously with the church's past in mind. As a result, the design stays true to its past and provides a long-lasting and durable enclosure system.

The Interior

Upon initial review, the lack of steel reinforcement in the concrete structure throughout the 1930s building was a considerable surprise to our team. The majority of the walls and columns in the building were unreinforced. The concrete was primarily a mass fill between the interior and exterior masonry instead of a reinforced structural wall column over-clad with masonry. This lack of reinforcement meant installing new reinforced concrete elements detailed for seismic resiliency while protecting the main gravity load structure from drift effects. The decision was made to limit the drift to 0.5% based on the number and location of new reinforced concrete wall overlays that could be installed.

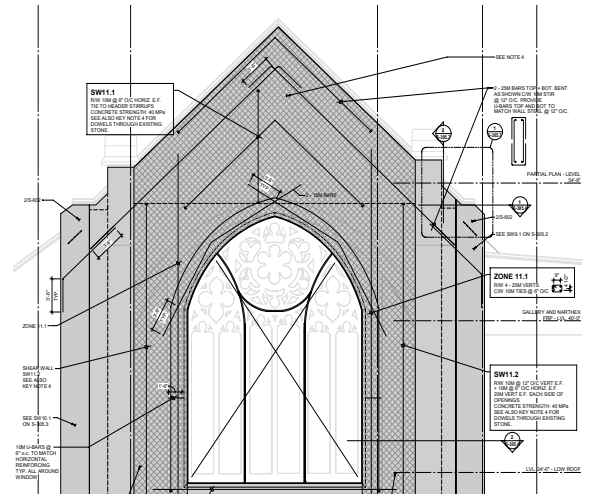
New structural reinforced concrete walls of various thicknesses were overlaid against existing walls taking up space that was previously filled with the terracotta tile used to support the plaster. This resulted in months of preparing the existing walls, which required the installation of over 27,000 dowels for the project upgrades. The bell tower alone saw the addition of nearly 400,000lbs of new reinforced concrete wall and foundation.

Our longstanding working relationship with the church allowed us to envision a holistic approach to the large-scale restoration. Ryder Architecture leveraged point cloud scanning data, original analog building drawings, and endless days in the field to create a detailed REVIT model that was key to making decisions throughout the construction process. With a clear and informed vision, the design was fast-tracked, with construction starting less than nine months after the go-ahead for design.

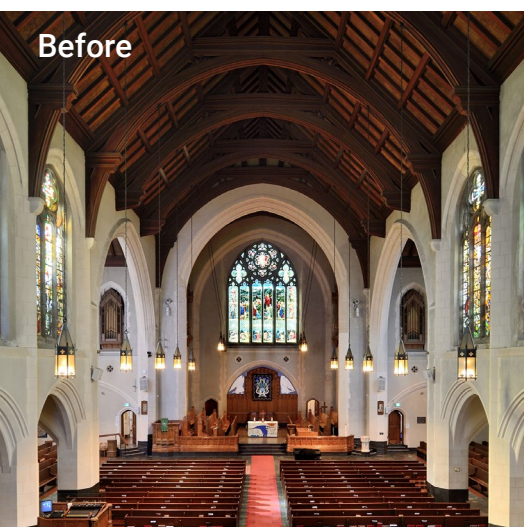


Among the decisions made during design was creating a new functional space plan in the main sanctuary. This decision allowed the construction of four new visible shear walls to create “quiet rooms” for parishioners with small children or those overcome by emotion at the moment. Spaces in the bell tower were repurposed as well, allowing for changes in access requirements. The steel framing woven into the bell tower remains concealed in shadows, awaiting a future bell installation expected to celebrate the church’s centennial.

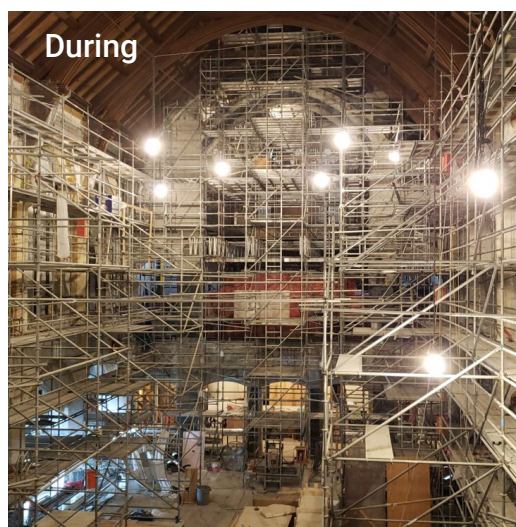
Walls, columns, and the great arches that span over the transept and chancel were wrapped with Fibre Reinforced



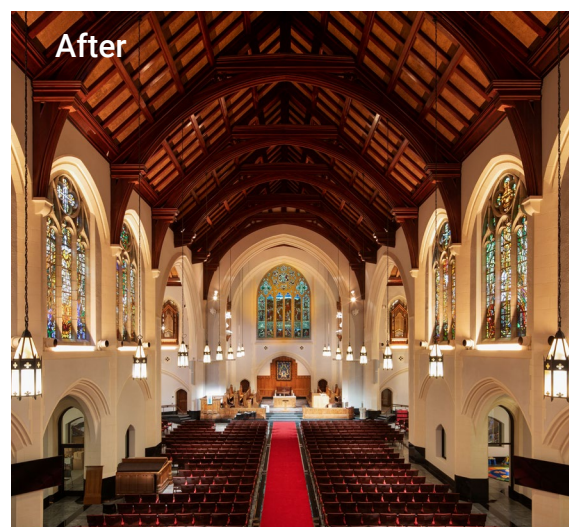
Polymer sheets to enhance seismic performance. The enormous columns sections were under very low stress but were in danger of uncontrolled cracking. The FRP was thin enough to be hidden by the seismically restrained plaster, replicating the original wall linings down to every joint and reveal. This exact replication was made possible by the detailed oversight provided by Ryder Architecture, and the world craftsmanship of the trades that match cast every interior surface. These match castings resulted in creating plaster shells that were individually fixed to the interior walls and columns, creating an impressive replica of the original.



Before



During



After

The exterior materials selection was made meticulously with the church's past in mind. As a result, the design stays true to its past and provides a long-lasting and durable enclosure system.



The revitalized community venue builds resiliency while staying true to its rich heritage.

CONSERVING A SOCIAL LANDMARK

The Church was challenged to re-imagine itself given that redevelopment of the site was not an option to preserve the existing structure. Unlike other similar locations in the City, the St. Andrew's site precluded typical redevelopment-based conservation plans. A bespoke plan was needed for the Church to continue to be a significant community fixture. Adam James, Principal at Ryder Architecture, describes the process as "using a 21st-century skill set to analyze and facilitate remediation and upgrades that retain the building's heritage value for the next hundred years."

Among the decisions made during design was creating a new functional space plan for the main sanctuary. The new space plan allowed for a more efficient structural design and included replacing the original pews with chairs for a more adaptable and flexible layout for community functions, weddings and concerts. Changes also included

renovations to meeting and multi-purpose rooms to accommodate additional programming needs, and further new implementations include improved accessibility and mobility aids such as ramps and upgrades to audio and visual systems. These new additions and changes create a more versatile and inclusive facility that continue to respect its character and charm while offering the amenities of a revitalized modern-day building.

Most importantly, the project continues to support the faith-based community and the City of Vancouver, who puts a high focus on social values. Throughout design and construction, the renovations thoughtfully considered the Church's promise, "no matter who you are, no matter who you love, all of you is welcome here,"

BUILDING RESILIENCY IN DESIGN

The uncovering of the 1930's building opened up several opportunities to explore options to improve the church's environmental impact. The design team worked closely to explore where sustainability through resiliency and upgrades in design.

Building resiliency, by definition, is an environmental benefit by reducing the future need to invest more embodied carbon into repairs and lifecycle replacements. Restoring the roof with copper utilizes a 100% recyclable roofing material with indefinite service life. In addition, the roofing is matched with a high-performance assembly, with an emphasis on obtaining air-tightness at roof level will significantly reduce heating and cooling demands.





The seismic and structural upgrading is expected to give the building a degree of earthquake resiliency similar to buildings constructed today and assume life-safe performance. Thereby reducing repair and downtime costs should we be subject to the design earthquake in the current NBCC.

While extensive use of reinforced concrete was necessary to build in the seismic resiliency, the embodiment of energy and carbon is offset by the 100-year design service life adapted for this project. At the end of its service life, we can only presume that the building's new bones of concrete and steel will remain viable for another 100-years.

RESULTS: PAST AND PRESENT CONSIDERED

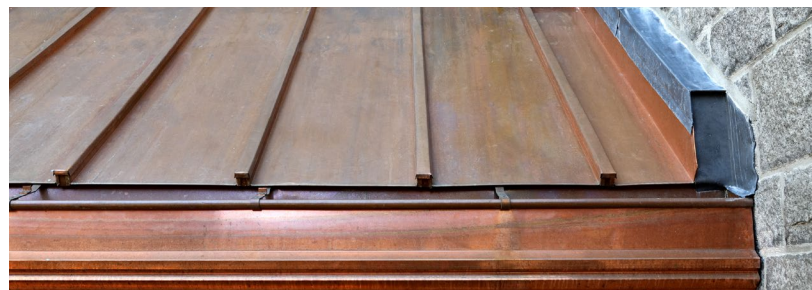
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An important note on the project team's success centres on collaboration and working cohesively. Integrated working sessions allowed consultants to piece and reshape the restoration puzzle throughout the project, establishing a design that would provide longevity to the building while maintaining its character and aesthetic.

The Church's past was considered throughout the project, maintaining its character and fabric where practical while providing a revitalized modern-day structure. The granite and terracotta façades were repaired, restored, and seismically restrained on the exterior, and a new insulated copper roof offers a lifetime of durability. The interior structural work remains largely concealed within the walls of the Church, resulting in a safe, aesthetic heritage structure that met our client's goal.

The renewal of this significant civic and architectural landmark celebrates the Church's rich history while preserving the long-term future of the structure through substantial improvements to seismic resiliency, envelope performance, occupant safety, and accessibility.

Overall, the client was pleased with the results, "navigating the complexity of the project and delivering a beautiful result that the church can be immensely proud of" – Diane Mitchell, Executive Director, St. Andrew's Wesley United Church.





This project was completed in collaboration with

St. Andrew's Wesley United Church - Owner

Architect - Ryder Architecture

Heritage - Donald Luxton & Associates

Mechanical - AME Group

Electrical/Lighting - AES Engineering

Code - GHL Consultants

Acoustics - BKL Consultants

Audio/Visual - MC Squared

Geotechnical - GeoPacific

Creative Thinking **Practical Results**