

# CITY OF CALGARY 9<sup>TH</sup> AVENUE BRIDGE REPLACEMENT

2023 CANADIAN CONSULTING ENGINEERING  
AWARDS

PROJECT SUMMARY REPORT

APRIL 2023



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## Executive Summary

This report summarizes the background, technical challenges, innovations and result of the design and construction administration of the 9<sup>th</sup> Avenue Bridge Replacement. This report is submitted by WSP Canada, in partnership with COWI North America and Tetra Tech Canada as ACEC member firms, for consideration under the **Transportation** category for the 2023 Canadian Consulting Engineering Awards. In reviewing this report, it is demonstrated that:

- The original 9<sup>th</sup> Avenue Bridge, crossing the Elbow River, is located within a complex brownfield site with multiple constraints and staging considerations that impacted construction planning and execution.
- The design of the replacement bridge is a technical and architectural feat for The City of Calgary (The City), and a first-of-its-kind roadway arch typology, that has been met with universal acclaim.
- The completed project celebrates the significance of the original crossing and significantly improves the overall resiliency, functionality, connectivity and safety of the 9<sup>th</sup> Avenue corridor.

## Project Background

Situated at the natural boundary between downtown Calgary (East Village) and Inglewood-Ramsay, the 9<sup>th</sup> Avenue Bridge crossing the Elbow River is a vital link between these communities. The crossing is of great historical significance, with a riveted camelback through-truss serving in place since 1909 (see figures, below). By 2017, the original 1909 historical camelback truss had reached the end of its practical service life and required in situ replacement without disrupting traffic flow to more than 20,000 vehicles and bus routes that travel along the 9<sup>th</sup> Avenue corridor daily.



Original 9<sup>th</sup> Avenue Camelback Truss



The original camelback truss also had numerous functional and structural deficiencies (including substandard lane and pathway widths, substandard overhead vertical clearances and substandard barrier protection). Significant expenditure would be required to rehabilitate the structure to an acceptable service life, a cost that was comparable with a replacement structure. Rehabilitation would not, however, address the inherent functional issues of the original truss geometry, nor maintain its historical character. **As the project owner, The City recommended the replacement of the old structure with a new structure, with improved geometry and appropriate architectural form.**

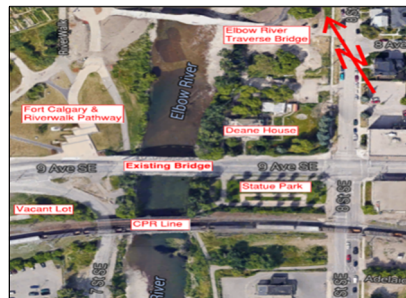
## PROJECT SITE

The original camelback truss was situated along the 9<sup>th</sup> Avenue SE corridor, west of the adjacent communities of Inglewood and Ramsay and between 7<sup>th</sup> Street SE and 8<sup>th</sup> Street SE. The original truss was a single-span structure carrying three traffic lanes and connecting sidewalks. The main confluence to the Bow River is approximately 175m north of the existing bridge site. The main Fort Calgary grounds / building attractions, and a connecting plaza to the RiverWalk pathway system, are west of the bridge site. Northeast of the bridge site is Deane House, a Fort Calgary historical property and adjoining regional pathway.

Southeast of the site is a City of Calgary Public Park (Statue Park) and connections to the Elbow River pathway system. A two track Canadian Pacific Railway (CPR) line is situated south of the bridge site, while the recently constructed Elbow River Traverse Bridge, for pedestrian and cycle traffic, is located north of the site.



Project Site & Major Features





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## TEAM STRUCTURE

After a QBS RFP selection process, The City retained WSP Canada Inc. as Prime Consultant to lead the replacement bridge design and construction administration. WSP's project team was strategically selected with a balance of engineering and architectural specialists through key subconsultant roles: Collectively, the partnership of WSP, COWI, Tetra Tech and MP&P, as consultant engineers, combined with the architectural expertise of Sturgess, W and DLA, provided The City with an integrated team to provide sound design solutions for the replacement bridge while remaining sensitive to the needs of local stakeholders and historical significance of the site. PCL Construction Management (PCL) worked shoulder-shoulder with The City and WSP team as construction manager for the demolition of the original camelback truss and replacement bridge construction and associated civil works.

- **WSP Canada (Prime Consultant)**
- Project Management
- Construction Administration
- Bridge Structural Design (Independent Design Reviewer)
- Municipal Roadway Design
- Construction Staging Design
- Utilities Coordination
- Landscape Architecture Design
- **COWI North America (COWI)**
- Existing Bridge Assessment
- Bridge Structural Design
- Construction Staging Design
- **Sturgess Architecture (Sturgess)**
- Bridge Architectural Design
- **Maskell Plenzik & Partners (MP&P)**
- Bridge Lighting Design
- Streetlighting Design
- **Tetra Tech Canada (Tetra Tech)**
- Geotechnical Coordination
- Hydrotechnical Design
- Regulatory Approvals
- Contamination Management
- Ecology Restoration
- **W Architecture (W)**
- Landscape Architecture Design
- **Donald Luxton & Associates (DLA)**
- Heritage Interpretation

## EXECUTION AND JUDGING QUESTIONS

Delivery of this technically complex project required holistic consideration of numerous challenges of not only the engineering design and construction staging, but also the needs of numerous stakeholders in maintaining the functionality and architectural form of the crossing site. A summary of these challenges and solutions, employed by the WSP team, are summarized per CCE judging questions for *Complexity, Innovation, Social & Economic Benefits, Environmental Benefits, and Meeting Client Needs*.

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## PROJECT EXPECTATIONS

At the initial onset of design and construction planning, The City set forth numerous key principles and expectations that would define project success that included the following:

- **Architectural Realm** | The original camelback truss was visible from several aspects of the public realm and was an architectural symbol of the history of Fort Calgary, and the neighbouring communities. The replacement bridge had to embody this symbolism and continue to provide a distinctive transition between the two realms. The proposed form of the replacement bridge had to also be acceptable to the neighbouring community groups and other public stakeholders.
- **Multimodal Needs** | While meeting the demands of current and future vehicular traffic and widened cross-section (three lanes widened to four lanes), the replacement bridge must embrace increased pedestrian and cyclist activity and connectivity to the existing Elbow River pathway system. Pedestrian views, up and down the Elbow River, must also be preserved.
- **Flood Resiliency** | The Bow and Elbow Rivers saw extensive flooding damage in 2013 that put the 9<sup>th</sup> Avenue corridor at risk. This is especially critical for emergency responders and evacuation events that use 9<sup>th</sup> Avenue as the primary route in / out of Inglewood and Ramsay. The replacement bridge must be resilient against a 100-year flood event and with sufficient freeboard clearance.
- **Traffic Accommodation** | Outright closure of 9<sup>th</sup> Avenue for an extended construction duration (i.e., one to two years) would generate an unacceptable impact to adjacent communities and was not considered a viable traffic accommodation strategy. Staging design of the replacement bridge must ensure that traffic flow is maintained at acceptable service levels during construction.
- **Design Life** | The replacement bridge must have durability and maintainability for a 100-year service life. This is an especially important factor in the selection of superstructure and deck finishes.

*"Replacing the 9<sup>th</sup> Avenue Bridge will meet the needs of people travelling throughout the area, now as well as for the next 100 years"* Evan Fer, Project Manager – City of Calgary

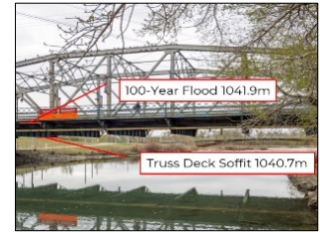


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## QUESTION #1 - COMPLEXITY

The existing 9<sup>th</sup> Avenue crossing site is a **highly complex** engineering and construction staging challenge bounded by numerous constraints that had to be considered in the design. These included the following:

- **Flood Elevation** | Initial hydrotechnical modelling at design onset revealed that the **deck structure of the original camelback truss was within the 100-year flood level of the Elbow River**. This condition mandated that the replacement bridge must be constructed to a significantly higher deck elevation to provide sufficient flood clearance, with the **complete re-grading and reconstruction of the 9<sup>th</sup> Avenue corridor**.
- **Neighbouring Historic Properties** | The northwest corner of the bridge crossing borders on Fort Calgary and its parking lot access, while the immediate northeast corner of the bridge crossing borders on the Deane House, a historic property also owned by Fort Calgary. The required re-grading of 9<sup>th</sup> Avenue created extensive elevation conflicts with both property boundaries. **This condition meant that the replacement bridge must have a thinner deck profile to minimize the grade conflicts at Fort Calgary and Deane House.**
- **Overhead Utility Conflict** | An existing 138kV ENMAX transmission line spans directly over the 9<sup>th</sup> Avenue Bridge and created a significant clearance issue for the height of any proposed replacement bridge superstructure, as well as for the placement of any overhead cranes, during construction. The high voltage rating of the line stipulated an especially high clearance envelope (> 4.5m).
- **Underground Utility Conflicts** | The four corners of the replacement bridge include an **extensive nest of dry and wet underground utilities in tight proximity**. Each conflict came with its own set of utility stakeholder requirements that had to be accommodated in design and construction staging. Natural gas and telecom conflicts were especially critical with the presence of a large diameter gas line along the south side of the bridge supplying gas service to downtown Calgary, and a 911 telecom fibre line that crossed the Elbow River along the underside of the original bridge. Subsequent relocation and protection measures required extensive coordination with respective utility owners.
- **Elbow River Restricted Periods** | The Elbow River is considered a fish-bearing waterbody with a strict Restricted Activity Period (RAP) to protect fish breeding and hatching seasons that is strictly monitored by Alberta Environment as a regulatory authority and key stakeholder. Construction work had to be scheduled such that no instream piling, dredging, or soil disturbance work occurred during the RAP.
- **Foundation Strata Variabilities** | Initial geotechnical borehole investigations showed that the elevation of bedrock strata at the crossing site varied significantly within the proposed bridge abutment footprints. This presented a high degree of variability and uncertainty in final pile lengths and available bearing capacities that would be encountered during actual foundation construction.
- **CP Rail Mainline** | The existing CP Rail mainline to the south is in tight proximity to the bridge crossing (<25 m at the narrowest location). Vacant land parcels, also immediately south of 9<sup>th</sup> Avenue, are owned and operated by CP Rail. This created a significant potential challenge in providing sufficient construction laydown space and working within proximity to live freight traffic (necessitating extensive preplanning with CP Rail and the use of flaggers).
- **Site Contamination** | Initial Phase I Environmental Site Assessment (ESA) due diligence assessments revealed the strong likelihood of encountering extensive contaminated material during construction. This included the risk of creosote from the adjacent CP Rail mainline and hydrocarbons from a previous gas/service station within the redeveloped Statue Park footprint.



Overall, it is evident that delivering a suitable design and successful construction outcome for the 9<sup>th</sup> Avenue Bridge was complex undertaking with numerous technical challenges that the WSP design team and PCL had to carefully consider.

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## QUESTION #2 – INNOVATION

Given the numerous constraints of the existing crossing site, and the City's overall project expectations, various replacement bridge geometries and typologies were considered by the WSP team throughout the preliminary design in 2016, with a Shallow Frame, Arch, or Truss being identified as potential options.

This multi-option approach allowed for full consideration of all design possibilities as opposed to jumping to a preferred typology and “putting the solution in a single box”. After an extensive public engagement and stakeholder consultation in 2017, a **canted tied arch typology** was selected by the City. The final tied arch designed by the WSP team conveys numerous technical benefits that address the various site challenges and project success criteria including the following:

- **Resilient Superstructure** | An arch typology places most fracture-critical superstructure elements above the deck surface and thereby outside of the flood elevation and flood freeboard; the only fracture-critical elements remaining in the flood elevation are the arch tie beams. The placement of the superstructure above the deck also preserves the “gateway” aesthetic form of the original truss bridge without copying it and providing unobstructed views along the structure elevation.
- **Canted Profile** | The arches are designed with an inwards 1:8 canting for aesthetic appeal. The bottom end of each arch is in turn fixed to the deck stringers and deck slab in a unique “knuckle” shape to prevent undue transverse movement or rotation.
- **Minimal Deck Profile** | Compared to other typologies, an arch profile with closely spaced hangers allows for a minimal deck thickness of 1.00m (3.28 ft) from the bottom soffit to the top of the deck wearing surface. This in turn significantly minimizes the required extent of re-grading of the 9<sup>th</sup> Avenue corridor and impact to neighbouring Fort Calgary and Deane House properties.
- **Adjustable Hangers** | Each arch hanger is designed with adjustable top and bottom turnbuckles, allowing for ease of adjustment and “fine-tuning” during erection and accommodating the natural deflection of the deck under traffic live loading. The hangers also allow for ease of shaping the deck profile into a crest curve, again minimizing the amount of re-grading and fill required for the 9<sup>th</sup> Avenue corridor compared to a constant longitudinal grade and fill embankment at either side.
- **Fabrication Packaging** | The proposed arch design also allows for ease of separating the various arch elements into independent and parallel packages (i.e., separate arch rib, tie beam, and deck stringer packages), thereby providing greater flexibility in fabrication and construction scheduling.

A key issue that the WSP design team also had to address was minimizing the impact on 9<sup>th</sup> Avenue traffic during replacement bridge construction. After considering available detour routing and respective traffic impacts, a unique detour span with connecting detour road solution was implemented. Detour staging under this configuration utilized a temporary Acrow-type bridge to support traffic across the Elbow River and connecting to a temporary detour road immediately south of 9<sup>th</sup> Avenue. The detour staging was designed using an innovative **jump span arrangement**, whereby smaller span segments branching off the main Acrow-span could clear span across numerous utilities at either corner of the replacement bridge, thereby minimizing the risk of any temporary foundation conflicts.

*A tied arch roadway bridge is the first of its kind in the history of Calgary and is a significant technical milestone. The final arch design reflects the combined efforts of numerous specialists on the WSP team to deliver a unique structure that enhances the gateway status of the site*

The WSP team utilized numerous innovative techniques to ensure an integrated and smooth design and construction assembly of the replacement bridge structure. This included the following:

- **3D Modelling Charettes** | At key preliminary and detailed design milestones, the bridge architectural and engineering leads co-located for extended collaborative roundtable charette sessions to share and visualize design options. This was enhanced with the use of a full 3D Rhino model of the project site to allow for real-time parametric modification of various bridge elements (i.e., member lengths and widths, superstructure heights, canting angles, etc.) and arrive at preferred design solutions faster.
- **Over the Shoulder Sessions** | A key value-add technique employed by WSP in the design management was the utilization of “Over the Shoulder (OTS)” sessions with City representatives and approval authorities. These sessions were used to provide an advance in-person review of and page-turn of given design packages and lend additional context to the design intent before submission, thereby minimizing back-forth comments and/or misunderstandings.
- **Bridge Steel Tekla Modelling** | During construction, a full 3D twin model of the replacement bridge steel structure was also developed in Tekla and shared between the PCL and WSP construction team. This allowed for faster identification of potential fit-up issues and minimized back-forth coordination spent on subsequent shop drawing approvals before the start of steel fabrication.
- **CISC Industry Workshops** | In a departure from the typical design-bid-build procurement process, prospective steel fabricators were invited to an early review of steel design elements at 60% and 90% of design milestones. These sessions, hosted by the Canadian Institute for Steel Construction (CISC), allowed for valuable feedback on the constructability of numerous fit-up and welding details in an open town hall environment without creating unfair advantages in subsequent tendering.
- **Mass Concrete Monitoring** | The abutments of the replacement bridge are in excess of 2.8 m in longitudinal thickness, prompting concern about significant thermal cracking during concrete curing. WSP worked closely with PCL before the abutment pours to develop an optimal thermal control plan and placement of temperature monitoring sensors, allowing for the completion of abutment concrete without any cracking or honeycombing issues upon completion.

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### QUESTION #3 – SOCIAL & ECONOMIC BENEFITS

The completed 9th Avenue Bridge Replacement project represents a significant improvement to the safety, resiliency, functionality, aesthetics, and connectivity of the existing crossing of 9th Avenue at the Elbow River and overall benefit to the public at large. Several of these specific benefits included the following:

- **Improved Cross-Section** | The widened cross-section of the replacement bridge (four lanes with standard 3.3 m widths) improves traffic flow and reduces the risk of sideswipe and head-on collisions compared to the original truss. The widened cross-section also allows for the new 4<sup>th</sup> lane to be utilized as a dedicated BRT / HOV-only lane and improve BRT / HOV flow along 9<sup>th</sup> Avenue. The cross-section also includes new 3.3 m multi-use pathways on both north and south elevations to allow for enhanced pedestrian connectivity and safety. Lastly, WSP coordinated closely with the City to provide a split-directional cycle track in the revised cross-section of 9<sup>th</sup> Avenue, west of the replacement bridge, improving cyclist, pedestrian and motorist safety.
- **ACRP Funding** | The project received an award of an Alberta Community Resiliency Program (ACRP) grant for the additional expenditure in raising the soffit elevation of the replacement bridge and associated re-grading of 9<sup>th</sup> Avenue. This included submitting detailed application summaries demonstrating the resiliency needs and benefits of the project that WSP assisted The City in submitting.
- **Enhanced Flood Resiliency** | The soffit of the replacement bridge is set to an elevation of 1042.2 m at its lowest point at the top of bearings, a full 1.5 m higher than the soffit of the original truss and outside of the 100-year flood level with sufficient freeboard. The hydraulic opening of the new bridge is also over 50 m in width compared to 46 m for the original truss with enhanced riprap abutment protection. **This greatly minimizes flood risk to The City in terms of potential damage or washout of a vital link between communities.**
- **Emergency Access** | The replacement bridge and reconfigured 9<sup>th</sup> Avenue corridor have been heralded by the Calgary Fire Department in eliminating the previous bottleneck of the original truss and improving response times for emergencies in Inglewood and Ramsay. This is especially critical for medical emergencies when seconds and minutes can make all the difference in saving lives. The replacement bridge also improves evacuating routing, out of Inglewood and Ramsay, in the event of future flooding or emergency events.
- **Arch Cladding** | The canted geometry of the arch ribs necessitated installing cladding panels along the outside arch face to prevent debris build-up inside the arch web. The cladding panels are fastened in place with external bolts to provide a “riveted façade” that fits the form of the original bridge.
- **Heritage Interpretation** | In addition to providing interpretative signage and commemorative design, select artifacts of the existing bridge were repurposed. This included salvaging existing balustrades for installation at the neighbouring Jack Long Park and installing a new gateway structure within Statue Park using original riveted truss members and Inglewood signage. In honouring Canadian engineering tradition, select elements of the original truss were also refurbished and donated to the local Camp 18 of the Seven Wardens for use in future iron ring ceremonies.

The completed 9<sup>th</sup> Avenue Bridge Replacement project not only enhances and celebrates the significance of the original crossing, but also improves the overall resiliency, functionality, connectivity, and safety of the 9<sup>th</sup> Avenue corridor.

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### QUESTION #4 – ENVIRONMENTAL BENEFITS

The completed project safely and successfully removed over **500 m<sup>3</sup>** of contaminated material from the 9<sup>th</sup> Avenue corridor, including isolation and removal of an abandoned diesel tank that was seeping into the surrounding soil strata and groundwater table.

Both Elbow riverbanks were protected with habitat restoration features tailored for aquatic and terrestrial species within the site. The reconstructed Statue Park includes a reconfigured footprint with enhanced sightlines, improved SW-NE connectivity, and elimination of previously unsafe pedestrian desire lines across 9<sup>th</sup> Avenue.

More importantly, the project was completed without any undue disruption or distress to existing fish habitats. To address the significant schedule constraint of the Elbow River RAP, WSP and Tetra Tech sought and obtained special approval from Alberta Environment to allow for supervision by a Qualified Aquatic Environmental Specialist (QAES) for instream works during the RAP. This added measure allowed for the acceleration of the construction schedule without the trade-off of impacting existing habitats.



## QUESTION #5 – MEETING CLIENT NEEDS

Ultimately, the 9<sup>th</sup> Avenue Bridge Replacement was an innovative success for The City, WSP and PCL. The completed tied arch bridge now stands as a new architectural landmark of Calgary and maintains the historical significance of the crossing site and symbolism as the gateway into Inglewood and Ramsay. Circling back to the previously stated client expectations at the start of this report, it is evident that all project goals were met by WSP:

- **Architectural Realm** | The final tied arch design balances constructability with celebrating the significance of the crossing site and is a stand-out addition to Calgary's architectural landscape. More importantly, the final design is accepted and celebrated by adjacent communities and other public stakeholders.
- **Multimodal Needs** | The expanded bridge cross-section to four (4) traffic lanes significantly improves traffic flow and emergency access and safely separates pedestrian and cyclist traffic with dedicated and highly functional multiuse pathways along the entire reconstructed 9<sup>th</sup> Avenue corridor.
- **Flood Resiliency** | The raised soffit of the replacement bridge and riprap measures significantly improve the flood resiliency of the crossing and safety to the public. This was self-evident in the Project being awarded an additional ACRP grant for enhancing community resiliency.
- **Traffic Accommodation** | Design and construction of the temporary detour exceeded all expectations and operated for throughout construction with no traffic fatalities, major accidents, or stakeholder complaints. Traffic flow was consistently maintained with no impact or undue lost time to the travelling public
- **Design Life** | The replacement bridge places the majority of the superstructure outside of corrosion-prone areas and uses state of the art coating, joint, and membrane protection systems. The hanger system design in particular allows for ease of maintainability and replaceability without the full shutdown of the bridge.

Completion of the 9<sup>th</sup> Avenue Bridge Replacement in 2022 was met with universal acclaim and celebration from City of Calgary administration and City Council stakeholders as summarized below:



***“Bridge projects of this type and scale have very unique challenges and opportunities, which makes achieving this milestone all the more rewarding for the entire team”*** – Evan Fer, Project Manager – City of Calgary



***“The new bridge provides greatly improved accessibility for all users, improved flood resilience, and continues to serve as a key connection between our communities”*** – Kerensa Fromherz, Director, City of Calgary



***“The 9<sup>th</sup> Avenue Bridge is significant in so many ways...It is an important connection between communities while serving as an unmistakable part of Calgary's diverse urban landscape. This new landmark bridge will continue to serve Calgarians for the next 100 years”*** – Gian Carlo Carra, City Councillor, Ward 9



***“Parallel to the Canadian Pacific rail tracks, 9<sup>th</sup> Avenue Bridge reflects the history of confluence of community and culture – east to west – for people local and from afar...This new bridge will expand the opportunities for intersection and collaboration”*** – Terry Wong, City Councillor, Ward 7

The 9<sup>th</sup> Avenue Bridge Replacement project is the culmination of technical excellence, meticulous construction staging, diligent stakeholder management, and open collaboration and teamwork between The City, PCL and the WSP team. The completed structure stands as a testament to these elements and to the historical legacy of the original crossing.

## **Appendix A - Project Summary Board**



# 9th Avenue Bridge Replacement

A Signature Bridge Crossing at the Confluence of Community and Culture

 Calgary, Alberta



wsp.com



Situated at the natural boundary between downtown Calgary (East Village) and Inglewood-Ramsay, the 9th Avenue Bridge crossing the Elbow River is a vital link between these communities. The crossing is of great historical significance, with a riveted camelback through-truss serving in place since 1909. By 2017, the original 1909 historical camelback truss had reached the end of its practical service life and required in situ replacement without disrupting traffic flow to more than 20,000 vehicles and bus routes that travel along 9th Avenue daily.

The crossing site is a significant engineering and construction staging challenge bounded by numerous constraints including historic Fort Calgary and Deane House properties, a Canadian Pacific Railway mainline, extensive underground and overhead utility conflicts (including a major natural gas pipeline, 911 telecom fibre lines, and a 138kV power distribution line), sensitive aquatic habitats, restricted work periods within the Elbow River, and contaminated soils.

These challenges were further exacerbated by initial hydrotechnical modelling indicating that the elevation of the existing camelback through-truss was within the 1-100 year flood level of the Elbow River. This condition mandated that the replacement bridge must be constructed to a higher deck elevation to provide sufficient flood clearance. A higher deck elevation also required the completed re-grading of the 9th Avenue corridor connection to neighbouring properties.

WSP as Prime Consultant to the City of Calgary led an integrated multidisciplinary team of engineers (COWI, Tetra Tech, MP&P) and architects (Sturgess, W Architecture) to deliver the design and construction oversight of the replacement bridge structure and associated civil works. Design of a replacement bridge required careful balancing in selecting a structural form that was constructible but also celebrates the significance of the crossing as a natural gateway.

Ultimately a tied arch structure, the first of its kind in Calgary for a roadway bridge, was selected as the preferred option by The City. Selecting an arch structure also allowed for the design team to shift most of the superstructure material above the deck, thereby maximizing flood clearance while minimizing deck thickness.

A thinner deck structure therefore minimized the required extent of re-grading of 9th Avenue and impact to neighbouring properties. The arch also allowed for ease of construction staging with a temporary detour bridge crossing to maintain traffic accessibility.

Opened to vehicle traffic in 2022, the completed bridge stands as a landmark structure in Calgary and will serve as a resilient connection for future generations.

### Project Benefits

1. First of-its-kind signature canted roadway arch bridge in Calgary.
2. Expansion and improved flood resiliency of a vital link between neighbouring communities and downtown Calgary for transit, multimodal users, and emergency services.
3. Revitalization of the 9th Avenue corridor and enhanced gateway connection into the adjacent Inglewood and Ramsay communities.

### Client Testimonial

*“Bridge projects of this type and scale have very unique challenges and opportunities, which makes achieving this milestone all the more rewarding for the entire team”* - Evan Fer, Project Manager – City of Calgary

*“The new bridge provides improved accessibility for all users, improved flood resilience, and to continues to serve as akey connection between our communities”* – Kerensa Fromherz, Director, City of Calgary

- 01 Original Camelback Truss Bridge
- 02 Replacement Bridge Aerial View
- 03 Replacement Bridge Pedestrian Pathway View
- 04 Replacement Bridge River Elevation View
- 05 Final Ribbon Cutting Ceremony

**Client:**  
City of Calgary

- Services:**
- Project Management
  - Construction Administration
  - Bridge Structural Design
  - Bridge Architecture
  - Bridge Lighting Design
  - Roadway Design
  - Stormwater Design
  - Streetlighting Design
  - Utilities Coordination
  - Environmental Coordination
  - Landscape Architecture
  - Traffic Management
  - Hydrotechnical Design
  - Geotechnical Coordination
  - Heritage Interpretation

### Partnering Subconsultants:



W Architecture and Landscape Architecture, LLC

