CCE AWARDS SUBMISSION

BANK STABILIZATION – HOME ROAD

Golder Associates

PROJECT SUMMARY

In 2013, unprecedented flooding in Southern Alberta caused unstable, near-vertical bank slopes along Calgary's Bow River. The City of Calgary engaged Golder Associates to provide emergency flood response to triage affected areas, and design permanent bank restoration in one of the heaviest hit communities - Bowness. The overall valley wall failure could impact the river morphology causing the river to change course through the community. Priority was placed on protecting municipal infrastructure, public safety and environmental function.

PROJECT HIGHLIGHTS & INNOVATION

The June 2013 flood caused unstable, near-vertical bank slopes ranging from about 5 m to 15 m high along the Bow River near Home Road and 52nd Street in northwest Calgary. The flood damaged the existing bank protection (gabions), subsurface drains and pathways creating a safety hazard for local residents and properties. The flood damage was extensive. The City of Calgary (The City) engaged Golder Associates Ltd. (Golder) to provide emergency flood response to triage this site, to implement temporary stabilization, and provide design support for permanent bank restoration plus construction supervision.

More than 30 kilometres of riverbank along the Bow River was damaged by inundating flood waters. The City conducted site analysis and six critical sites were prioritized - Home Road and 52nd Street was one of them. Further failure of the valley wall at this location had the potential to alter local river morphology, resulting in the river changing course through the community of Bowness – on the opposite river bank. Time was of the essence. Work for this, and other critical sites, was scheduled to run through the cold winter months – when restoration work would not typically take place – to allow completion prior to the next season of run-off/ flood. "Damage to the riverbanks was extensive," says Frank Frigo, Leader of River Engineering for the City of Calgary. "Riverbank work is complex - we conduct hydraulic modeling to ensure we understand the impacts our project will have on the river and nearby infrastructure, utilities and properties."

It took a multidisciplinary team to provide the breadth of services necessary to deliver immediate services. Managing the rapid implementation necessary during emergencies, involved a wide range of specialist including engineers, scientists, landscape specialists, monitoring staff and surveyors.

The project scope of work included bathymetric and topographic surveys, site inspections, geotechnical assessment, drilling investigations, hydraulic analysis using one- and two-dimensional models, conceptual design, environmental assessment, landscaping, detailed design, community engagement, construction administration and supervision, environmental regulatory support, construction monitoring, and as-built reporting.

The rapid assembly of the teams necessary to provide this breadth of services, called for strong project management during a state of emergency – when Golder's staff resources were stretched with many urgent requests for assistance. In addition, the technical expertise we could provide, combined with the breadth of services we could deliver meant we were able to respond with the proficiency and the capability necessary to limit the extent of damage caused by the flood, and immediately get to work on reconstructing the banks affected.

COMPLEXITY

Rebuilding a failing slope is always risky. Bank design is complex, and there are many factors to consider. Golder's team collaborated with The City and contractors to provide safe and timely bank stabilization included the use of rip rap - loose stone layered to form a secure foundation - at the toe of the steep slopes to stabilize and prevent the soil from further bank erosion. In addition the unstable terrain posed accessibility challenges but the careful use of rip rap was used to create access to otherwise inaccessible areas. In some cases, ramps were needed to be cut into slopes.

From a geotechnical perspective, the area is also the site of an historic slide. Over time the large bank, shown in Figure 1, is moving into the river. Geotechnical services, including drilling investigations, were conducted to gain an appreciation of the bank stability to secure the morphology of the river for years to come. Figure 1 and 2, show the extent to which the river was inundated. This combined with the shift of the bank over time, posed increased challenges in ensuring immediate and future stability.

SOCIAL AND/OR ECONOMIC BENEFITS

Thousands of people were displaced from their homes, residential and commercial property was damaged and four people lost their lives in what was the worst flooding in southern Alberta in decades. As recovery efforts continue, the economic impact to the residents who are in the process of reconstructing their homes, or worse yet having to demolish and start again – is as difficult to measure as the emotional toll the flood has had on the many community families. Despite the impact of the flood, the community has persevered and rallied to rebuild.

Figure 1

Figure 2 Map data ©2015 Google

Golder worked tirelessly alongside The City to ensure residents could safely continue to live in and enjoy their surrounding parks, pathways, and river access.

ENVIRONMENTAL BENEFITS

The Bow River is a renowned for its trout population, and is teaming with many other species of fish and wildlife. An integrated team of fish biologists, river engineers, hydraulic modelers and soil experts worked to minimize further sediment deposition into the river to protect fish habitats. Frank Frigo from The City of Calgary explains that, “All of our native species are quite hearty, they know what to do during a flood, but certainly there have been some changes. The fish populations look to be quite intact but the way the regulatory framework works around habitat is if any person or organization causes an impact that impact has to be mitigated.”

MEETING CLIENT’S NEEDS

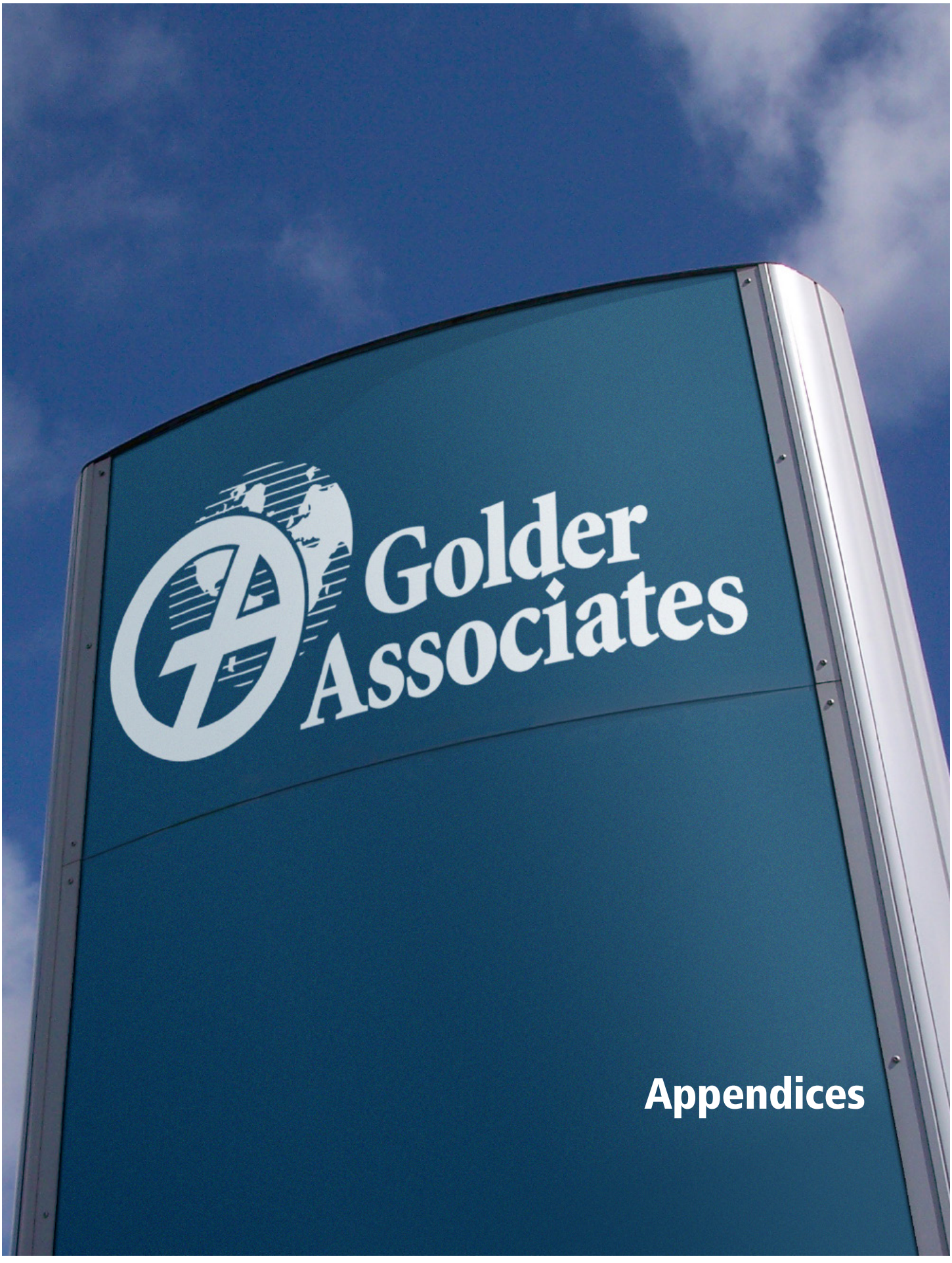
Along with six other critical bank restoration sites, eroded due to inundating flood water – Home Road and 52nd Street in northwest Calgary was classified an immediate priority. Timelines were expedited and immediate emergency response was required to stabilize the banks, and mitigate any further damage to persons or property. Golder worked closely with The City and contractors to ensure the affected site was triaged, temporary stabilization measures were in place and long term bank rehabilitation and stabilization was completed before June 2014. Our multi-disciplinary team meant we had the breadth of knowledge and expertise to complete the work required in a timely manner, and under emergency circumstances.

Photo 1

Photo 2

Photo 3

Photo 4



Appendices

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solutions@golder.com
www.golder.com

Africa	+ 27 11 254 4800	Europe	+ 44 1628 851851
Asia	+ 86 21 6258 5522	North America	+ 1 800 275 3281
Australasia	+ 61 3 8862 3500	South America	+ 56 2 2616 2000