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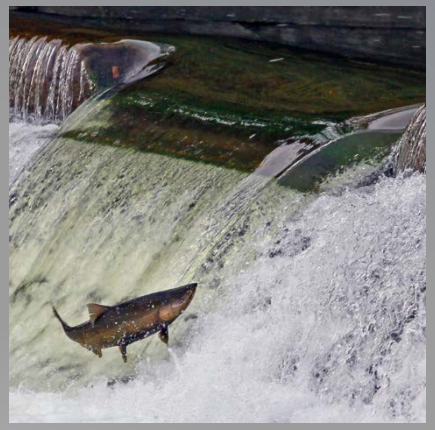
Farewell Creek Design-Build: Lessons Learned

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Presenters:

Brad Fairley, BSc, MES
5 Smooth Stones Restoration Inc.

Ed Gazendam, PhD, PEng
Water’s Edge Environmental Solutions Team Ltd.

Fairley

- Background
- Lessons Learned by Owner

Gazendam

- Lessons Learned by Designer
- Lessons Learned by Contractor

Background

DBB vs DB

- Majority of stream restoration projects in Canada are delivered using a Design-Bid-Build Process
- Few stream restoration projects delivered using Design-Build (e.g., I am aware of 3)
- Usually as part of a larger project (e.g., road, bridge) that is being delivered using DB
- Mixed results
- More commonly used in the US by State In-lieu Fee Programs (Full Delivery Projects)
- US has proved that DB can be an efficient method for delivering stream projects

City of Oshawa

- Completed several stream restoration projects
- All done using DBB
- Problems with contractors
- Many had gone badly
- Lots of change orders
- Projects failing
- LOC tied up until projects fixed
- Farewell Creek
- Wanted to explore DB approach

Farewell Creek (Palmer)

- Channel migrating
  - Steep eroding embankments upstream and downstream
  - Sediment loadings
- Gabion wall failing
  - Risk to fish passage (trout stream)
  - Threat to private property

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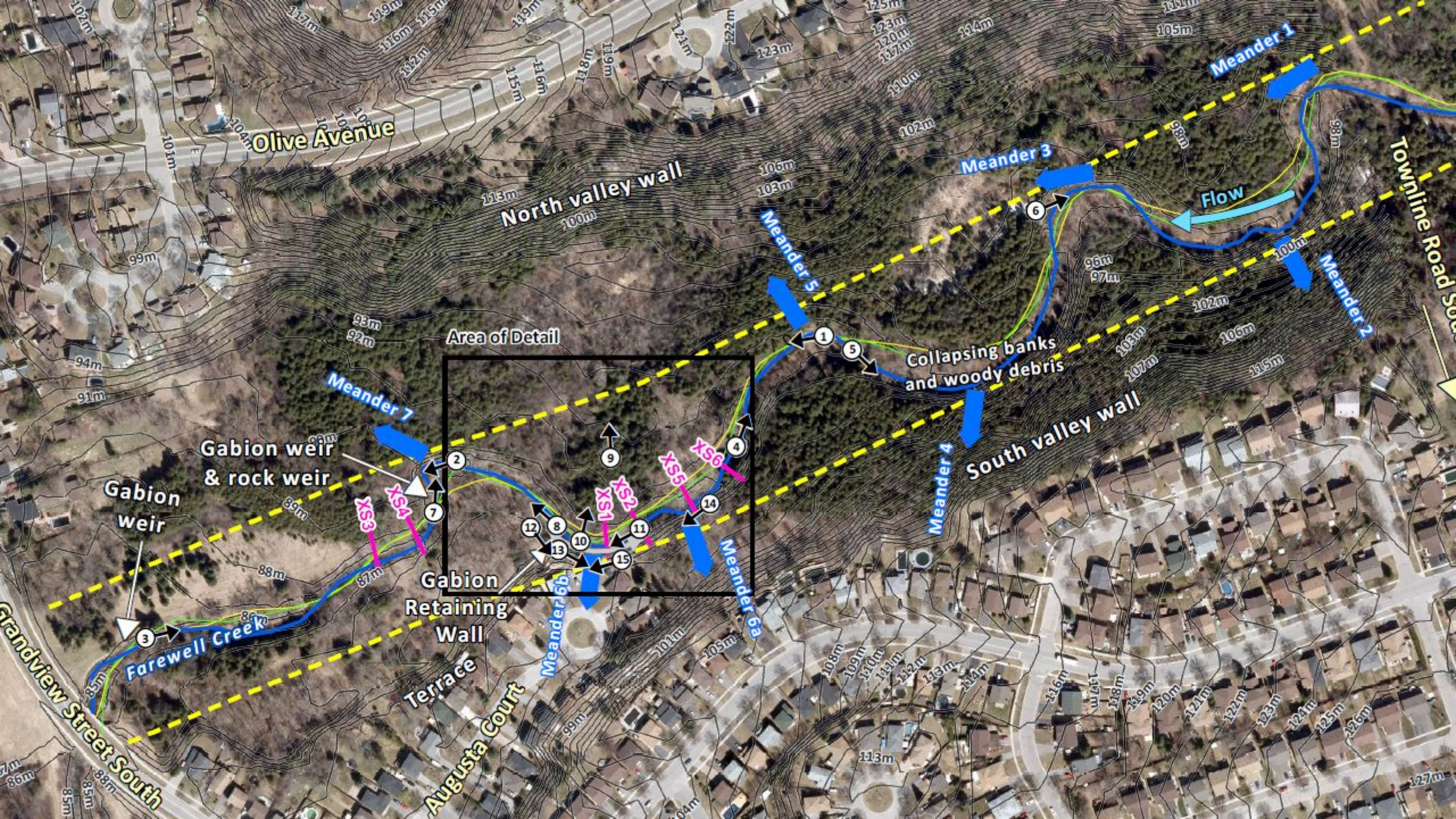
Olive Avenue
North valley wall
Meander 1
Meander 3
Meander 2
Meander 5
Meander 4
Meander 7
Meander 6a
Meander 6b
Flow
Townline Road South
Area of Detail
Collapsing banks and woody debris
South valley wall
Gabion weir & rock weir
Gabion weir
Gabion Retaining Wall
Terrace
Farewell Creek
Grandview Street South
Augusta Court
XS1
XS2
XS3
XS4
XS5
XS6
1
2
3
4
5
6
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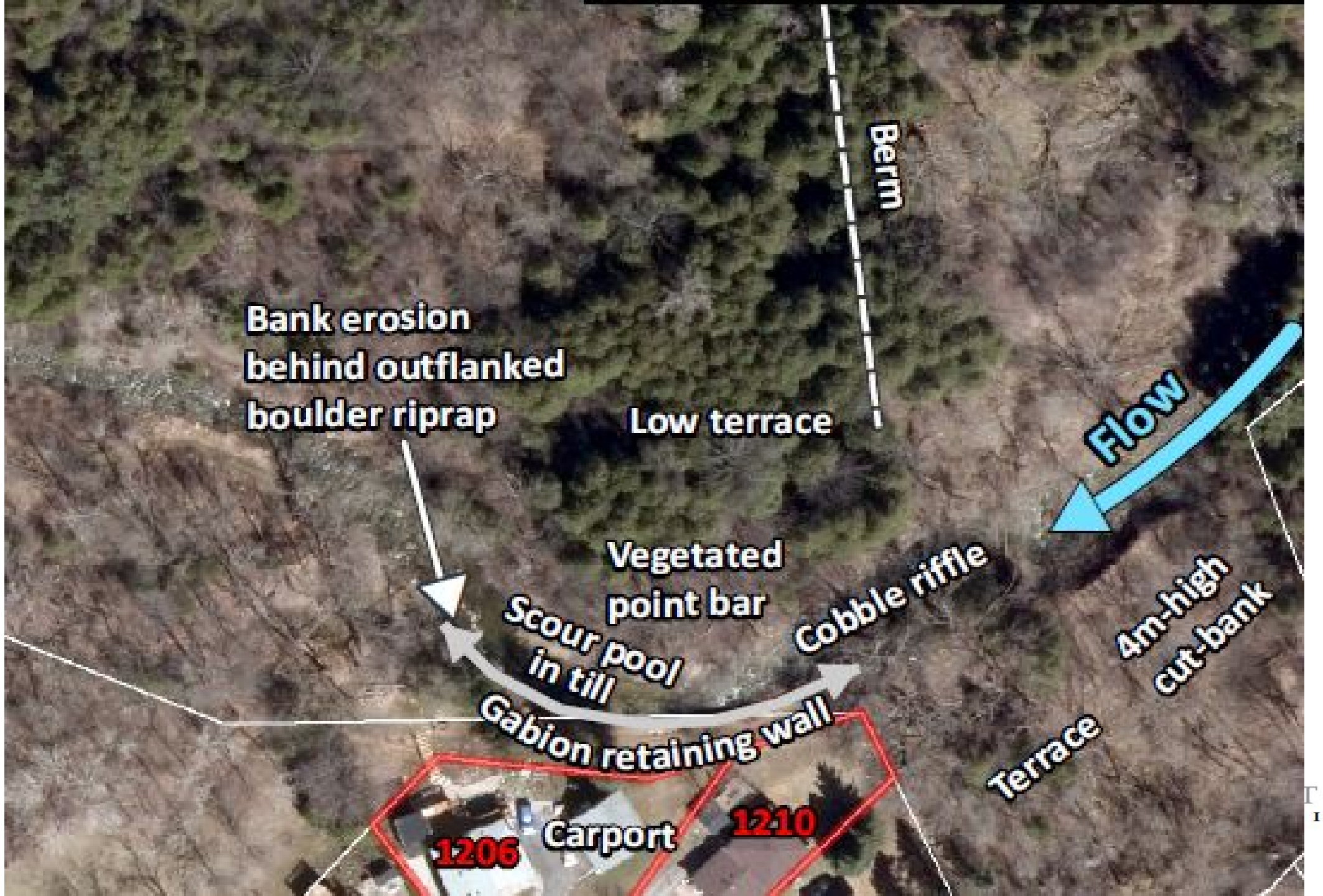
Berm
Bank erosion
behind outflanked
boulder riprap
Low terrace
Flow
Vegetated
point bar
Scour pool
in till
Cobble riffle
4m-high
cut-bank
Gabion retaining wall
Terrace
1206
Carport
1210

Farewell Creek (Palmer)

- Palmer Options for Restoration
  1. Do Nothing
  2. Wall replacement
  3. Vegetated boulder revetment
  4. Meander realignment
- City Option (wanted a more permanent solution)
  5. Creek realignment

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DB Project Delivery

- Decided to retain a firm to guide them through the DB Process
- Hired 5SSR to work with the City:
  - Develop a Multi-Criteria Decision Matrix to select the preferred option for Farewell Creek
  - Write the RFP
  - Evaluate the proposals
  - Conduct a pre-bid meeting
  - Provide support during construction

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Lessons Learned by Owner/Owner Rep.

Owner Lesson 1: RFP

- 5SSR wrote the RFP and provided it to City for them to add boiler plate
- Both included a request for references but they requested different information
- Some DB Teams failed to respond to both requests
- The requests should have been rationalized

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Owner Lesson 2: LOC required by DFO

- City wanted to transfer risk to contractor
- Expected contractors to provide LOC
- 5SSR did some homework and concluded that the contractors would not respond to the RFP if LOC was a requirement
- Contractors had never dealt with DFO and assumed it was risky
- Not worried about project failing just thought DFO might not give them their money back
- Unfortunate because cost of money was very low in 2022

Owner Lesson 3: Pre-bid Meeting

- 5SSR recommended an on-site pre-bid to make sure the DB Teams knew what was expected
- City cancelled because of Covid
- Distributed RFP
- 5SSR and the City thought that the RFP was clear that the City wanted the stream significantly realigned
- Only 1 DB Team submitted a proposal to do a significant realignment
- Apples and Oranges
- Left with only 1 responsive bidder

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Owner Lesson 4: Milestone Payments

- Contract specified that the City would pay 20% of total project budget over 3 years of post-construction monitoring (i.e., 5%, 5%, 10%)
- Did this in order to maintain leverage with contractor
- Learned contractors do not want to wait to be paid
- Inflated price of the project
- With only 1 responsive bidder, the City paid too much for the project

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Owner Lesson 5: Owner Involvement

- City was intimately involved in project and had a consultant assist them:
  - DB Team selection
  - Contract administration
  - Construction administration
- City failed to reap some of the benefits of DB project delivery (streamlining)

Lessons Learned by Designer

Designer Lesson 6: Pay Attention and Build on That

- City issued RFP for channel realignment and slope stabilization
- Previous reports had identified a possible realignment
- We noticed existing bankfull bench in the field and used that to place the actual alignment
- City had identified vegetation removal and re-use so we included a lot of woody debris in the design
- Also identified a by-pass channel location that effectively allowed for the construction of the entire channel off-line

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Designer Lesson 7: Trusting the Contractor

- DB team includes the designer and the contractor
- Implies that the team has great chemistry
- Also implies that the team trusts each other
- However, reality is that each member has a skill set and knows their respective area
- Designer still needs to have oversight which includes regular inspections
- But Contractor does have a great deal of independence in the construction process
- Designer has to build the relationship

  to create necessary trust

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Designer Lesson 8: E&S Still Needs to be Inspected

- DB team prepared and implemented an effective Erosion & Sediment Control Plan
- DB Team still needs to inspect the controls regularly
- Everyone does what they do best and focus can deviate from the mundane
- While the contractor is on site, designer still needed to be on site to inspect

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Lessons Learned by Contractor

Contractor Lesson 9:

- Design intent was to have **Live Branches** incorporated in the stone
- During the install of the live branches and stone, it is imperative to install a large amount of branches
- During the install of stone and future flows, a lot of the live branches will be broken, lost/ dried up and can look very sparse.

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Contractor Lesson 10:

- **Woody Toe Debris** was part of the design
- When installing the logs in the woody debris toe bank protection, its always important to make sure logs are locked in/lodged into the soil
- Therefore, it is important to keep logs as long as possible when cutting
- After the install, some longer logs may pose a risk to collect debris, and so some logs were cut shorter.

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Contractor Lesson 11:

- **Bypass Channel** was key component of the construction process
- Effectively by-passed flow to enable offline construction of the channel
- However, during a large storm event, an area of the plastic was damaged and caused a small washout of existing clay
- Using a thicker plastic or doubling up on the liner would be good practice in areas of high flows

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Summary

Summary:

- DB is relatively new to stream restoration in Canada
- Lost of Lessons:
  - Owner
  - Designer
  - Contractor
- DB is coming to stream restoration, so get ready
- Despite all of the learning, the City got a great project!

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Questions?

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