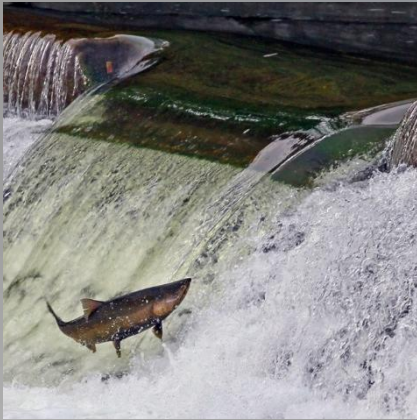


# Sitlika Creek: the Bad, the Ugly and the Really Ugly

Brad Fairley, MES



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RESTORATION INC.

- Background
- The Bad
- The Ugly
- The Really Ugly
- Lessons

Outline



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Background

# Background

- Fairley was a National Director of the NGO
- NGO identified culvert under abandoned rail line as a significant barrier to salmon migration
- NGO worked with First Nations and RR to develop a design to improve fish passage
- NGO and RR worked together to construct the project
- 5SSR was put under contract by the RR later in the project



Figure 1-5: Aerial view of channel flowing into culvert inlet



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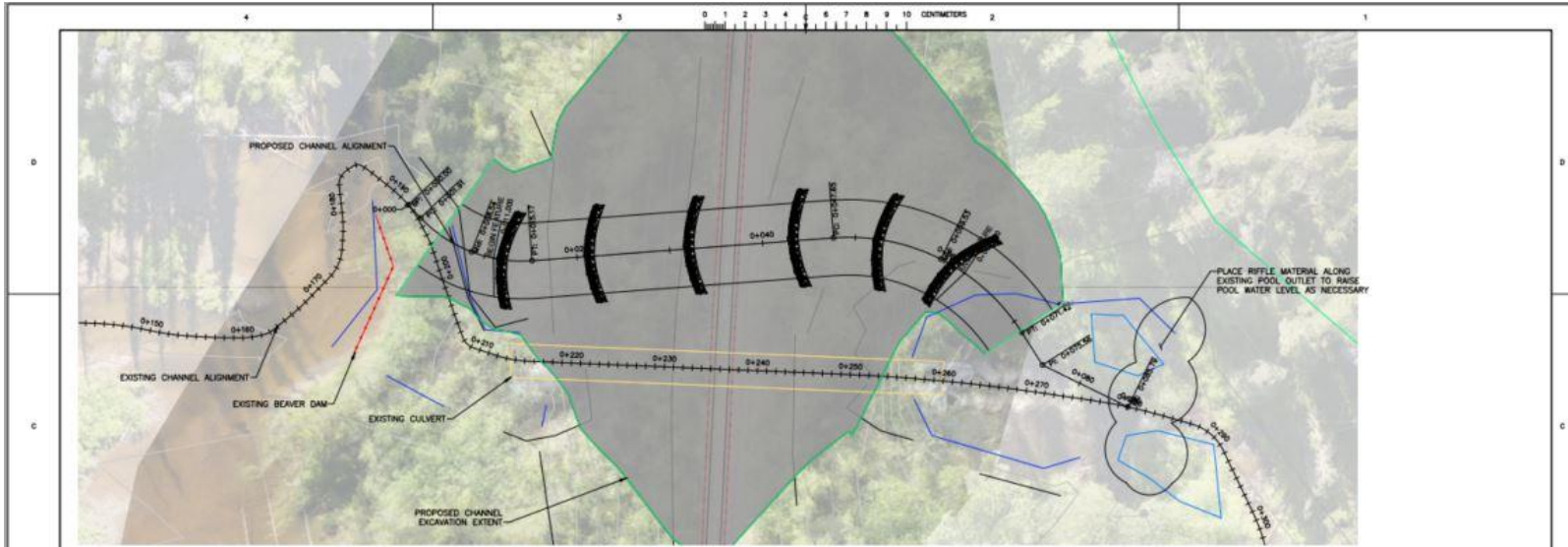


Mile 205.6. Sitlika Creek. May 24, 2021. Upstream view showing the railway culvert outlet.

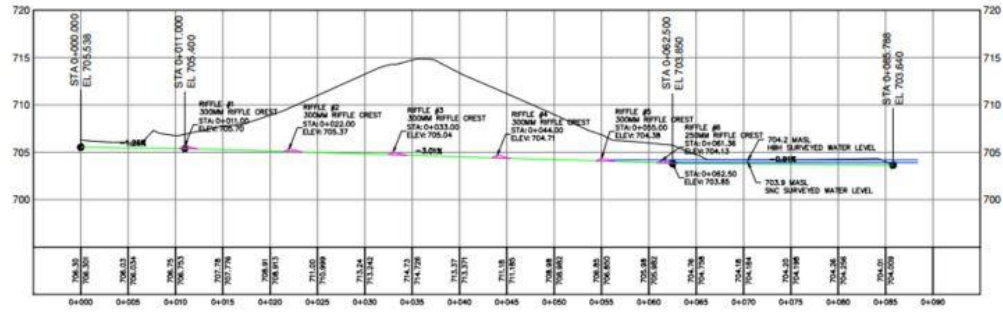


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The Bad



PLAN VIEW  
1:200



PROFILE VIEW  
1:200

- NOTES:**
1. SLOPE OF THE PROPOSED CHANNEL IS ESTIMATED AT 3%.
  2. A TOTAL OF FIVE (5) 300MM RIFFLES ARE PROPOSED AT A SPACING OF ROUGHLY 11m. FROM RIFFLE CREST TO RIFFLE CREST WITH A SIXTH 250MM RIFFLE AT THE DOWNSTREAM END IN FRONT ADJACENT TO THE EXISTING PLUNGE POOL.
  3. AT THE DISCRETION OF THE ENVIRONMENTAL MONITOR AND AS NECESSARY, PLACEMENT OF RIFFLE STONE IN THE DOWNSTREAM EXISTING PLUNGE POOL OUTLET CAN BE COMPLETED MANUALLY TO RAISE WATER LEVELS IN THE POOL TO ENHANCE VOLUNTARY FISH PASSAGE DURING LOW FLOWS.

NO.	DATE	BY	CHKD	APP'D	REVISION	DESCRIPTION
1	2021-07-20					
2	2021-07-29					

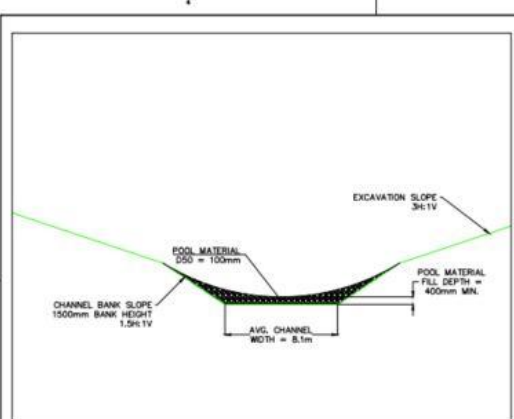
NO.	DATE	BY	CHKD	APP'D	REVISION	DESCRIPTION

NO.	DATE	BY	CHKD	APP'D	REVISION	DESCRIPTION

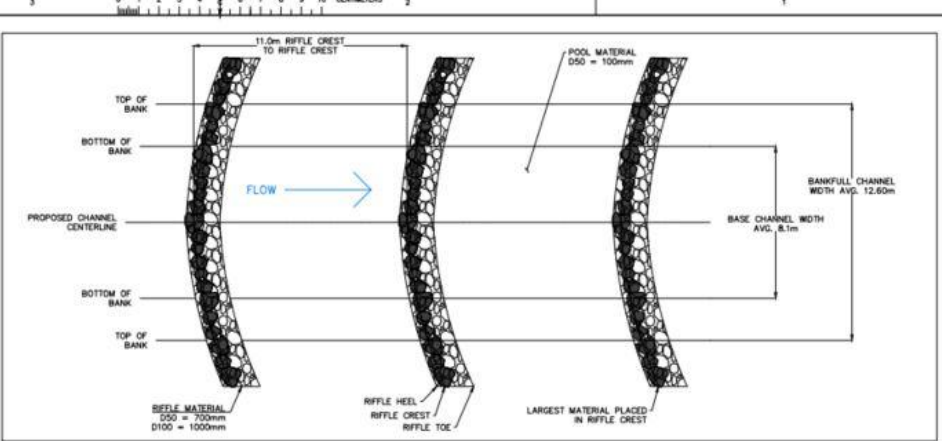
<b>PREPARED BY</b> RICH-LITTLE 688885		<b>APPROVAL</b> PROJECT NUMBER 4100	
<b>DATE</b> 2021-07-20		<b>CLIENT</b> CANADIAN WILDLIFE FEDERATION	
<b>PROJECT NAME</b> SILINA CREEK ON RAILWAY CROSSING RESTORATION		<b>PROJECT NUMBER</b> 4100	
<b>SCALE</b> AS SHOWN		<b>DATE</b> 2021-07-20	
<b>PROJECT NO.</b> 688885		<b>ISSUE NO.</b> 0002	



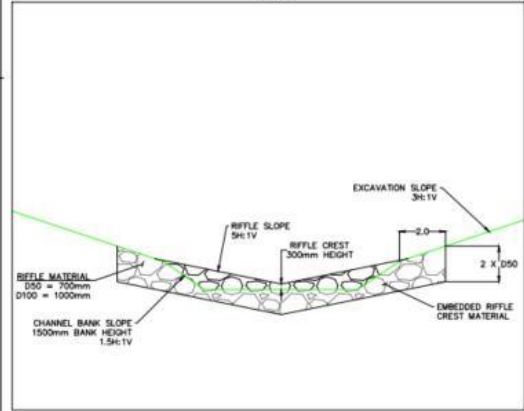
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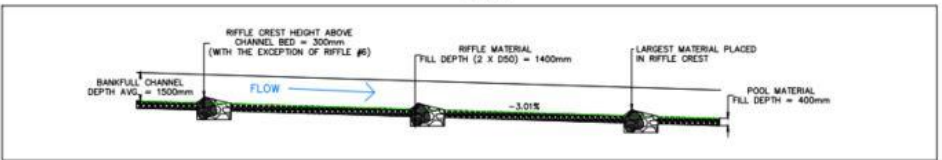
TYPICAL POOL SECTION VIEW  
1:100



TYPICAL CHANNEL PLAN VIEW  
1:100



TYPICAL RIFFLE SECTION VIEW  
1:100



TYPICAL CHANNEL PROFILE VIEW  
1:100

**NOTES:**

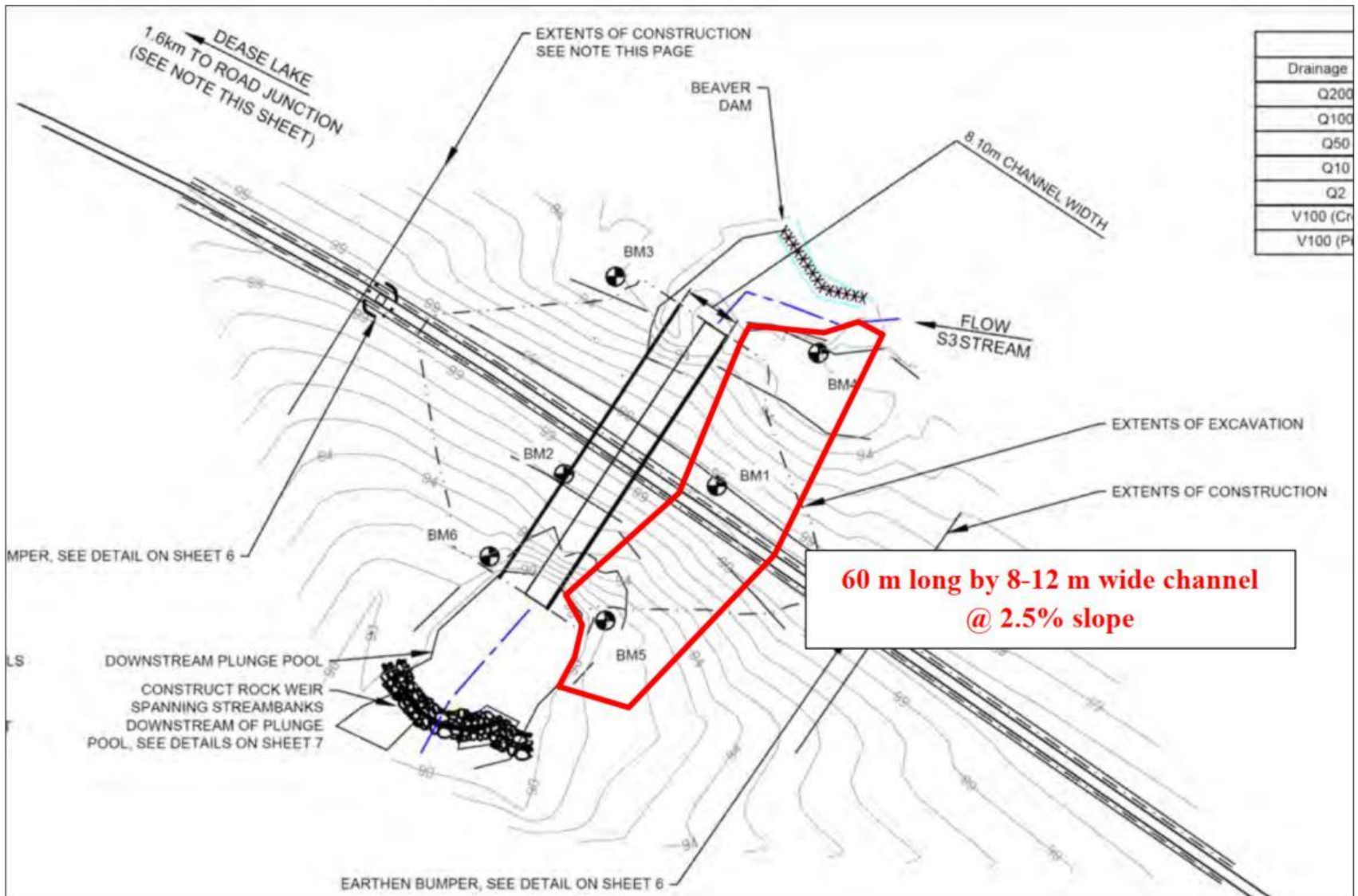
1. RIFFLE AND POOL MATERIAL SHALL BE NATURAL OR PROCESS GRAVEL AND CORBELS, ROUNDED OR SUB-ROUNDED, AND WASHED AND FREE FROM OVERBURDEN, SPOIL, SILT, CLAY, OR ORGANIC MATERIAL BEFORE PLACEMENT IN THE CHANNEL.
2. RIFFLE MATERIAL SHOULD HAVE A D50 OF 700MM AND A D100 OF 1000MM.
3. RIFFLE MATERIAL SHALL BE PLACED TO A MINIMUM THICKNESS OF 2 X D50, OR 1400MM.
4. POOL MATERIAL SHOULD HAVE A D50 OF 100MM.
5. POOL MATERIAL SHOULD BE PLACED TO A MINIMUM THICKNESS OF 400MM.
6. RIFFLE AND POOL MATERIAL SHALL CONSIST OF A WELL GRADED MIXTURE SUCH THAT 50% BY WEIGHT SHALL BE LARGER THAN THE D50 AND 50% BY WEIGHT SHALL BE SMALLER THAN THE D50.
7. THE SMALLEST GRAIN SIZE SHOULD BE NO FINER THAN 10MM FOR BOTH RIFFLE AND POOL MATERIAL.
8. RIFFLE CREST SHOULD BE CONSTRUCTED OF THE LARGEST STONES (1000MM) ARCHING IN A DOWNSTREAM DIRECTION.
9. FROM THE CENTERLINE OF THE CHANNEL EACH RIFFLE STONE SHOULD BE PLACED DOWNSTREAM SUPPORTING THE STONE ABOVE IT.

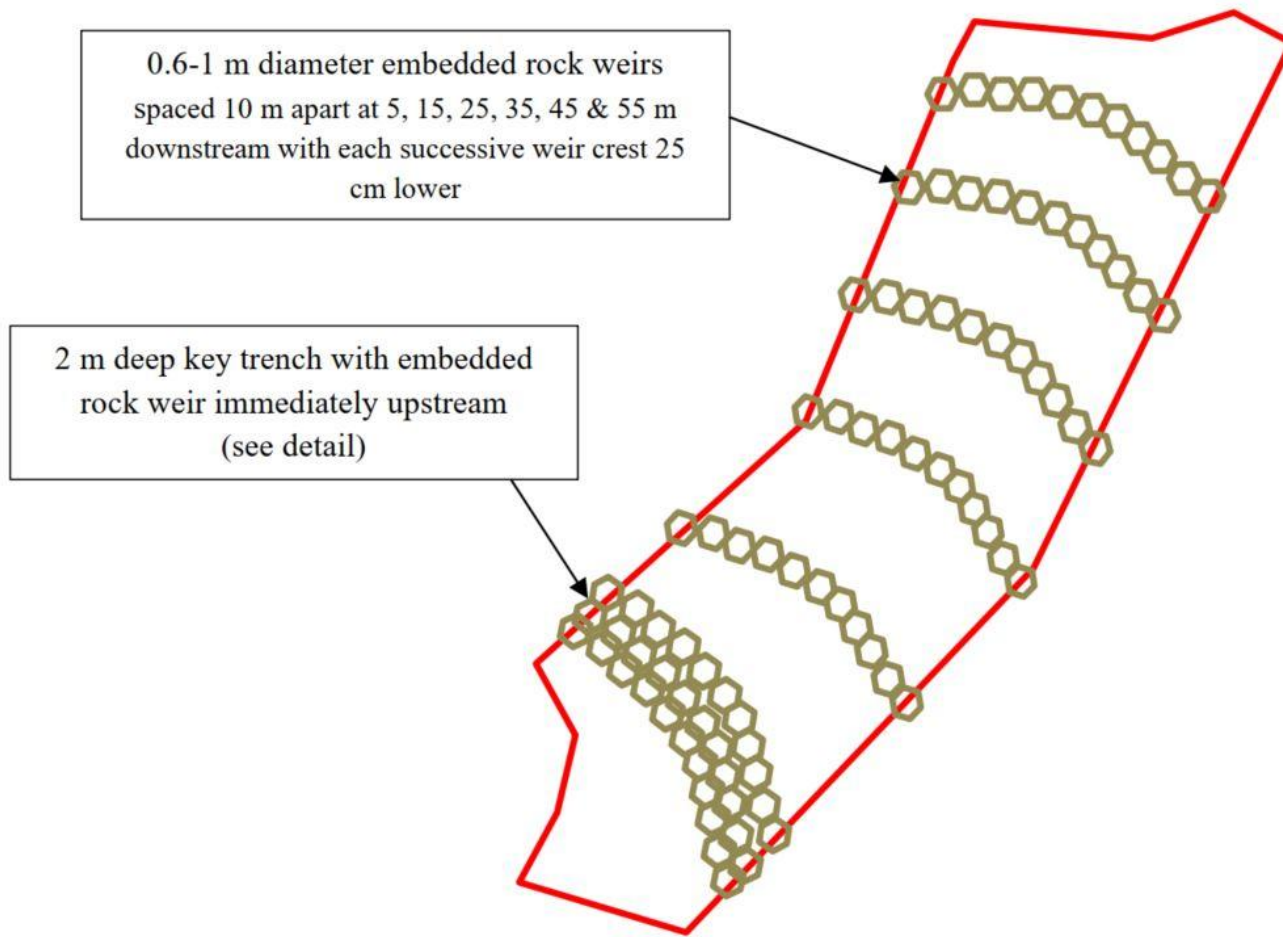
NO.	REV.	DATE	BY	CHKD.	DESCRIPTION
2	1	2021 07 26			READY FOR PERMITTING
1	5	2021 07 26			READY FOR REVIEW

		<b>CANADIAN WILDLIFE FEDERATION</b>	
PREPARED BY DATE 2021 07 26	PROJECT NUMBER 68385	APPROVAL PROJECT NUMBER 41 00	SHEET 01



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**Plan view general arrangement of new channel.**



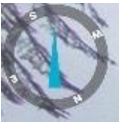


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The Ugly



2022-10-04 16:14  
208° SW  
Sasuchan Environmental LP



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RESTORATION INC.



2022-10-04 16:16  
39° NE  
Sasuchan Environmental LP



5 | SMOOTH STONES  
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2022-10-04 16:19

126° SE

Sasuchan Environmental LP



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# Why did it fail?

- RR asked 5SSR to do a post-mortem
- Issues
  - Dimension (trapezoidal channel with an ER of 1)
  - Pattern (pool spacing was 2X the existing stream)
  - Profile (too steep)
  - Structures (too small, not keyed into the bed or banks, did not centre the flow)
  - Erosion control measures were inadequate



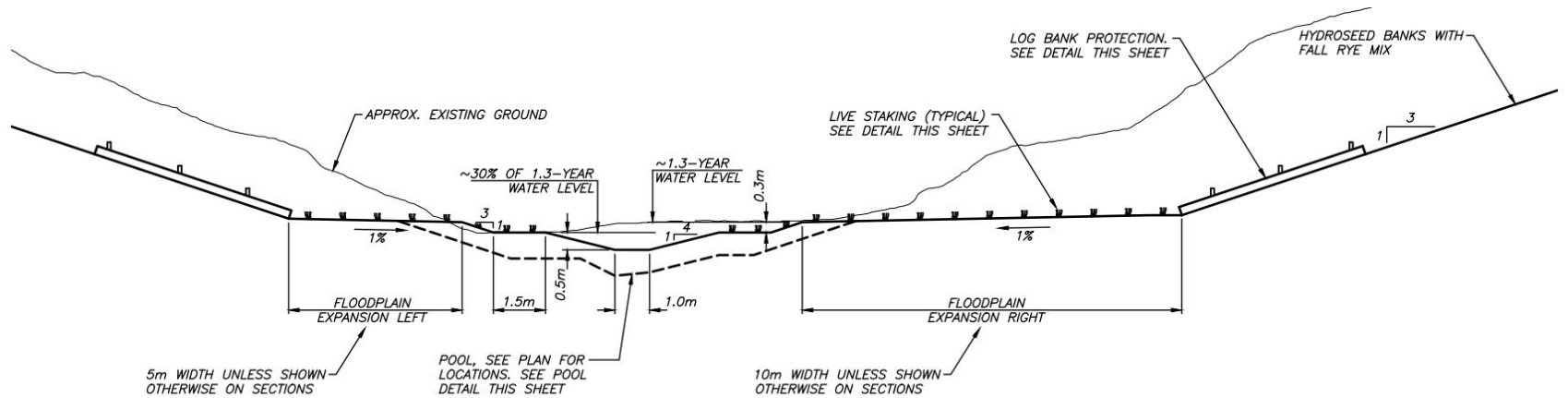
The Really Ugly

## RR and NGO Decided to Try Again

- After the problems with the first design, I offered to give the staff at the NGO a list of firms that were qualified to do the project
- Instead, the NGO hired a firm that was recommended by a person who knows Bob Newbury
- The firm's website identifies them as municipal engineers

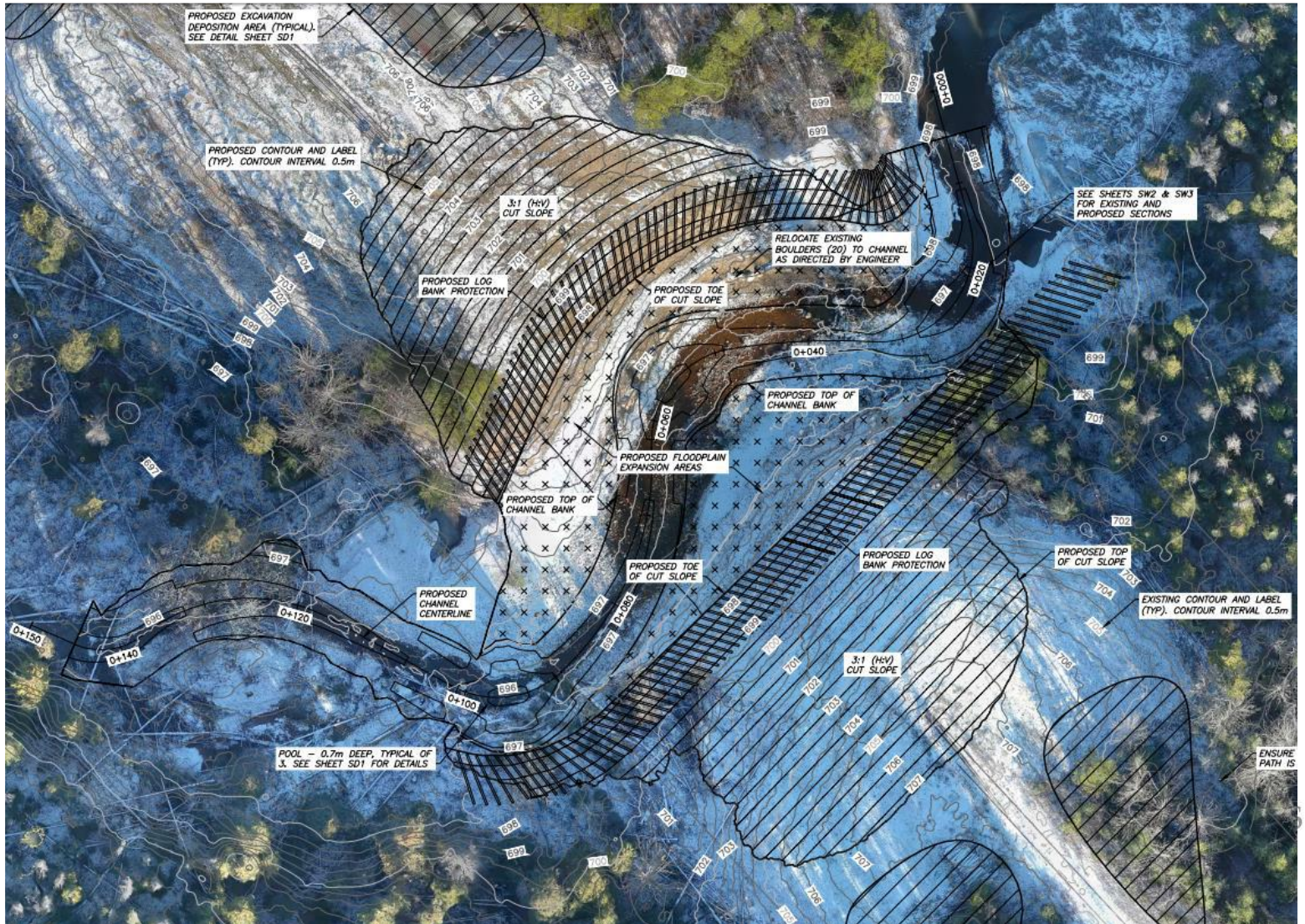


# Design



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# Design



# New Design

- RR asked 5SSR to coach the designer
- Improvements
  - Added a floodplain
  - Flattened the slope on the cut through the embankment
- Issues
  - No change in slope / no grade control
  - Channel is too large
  - Nothing to hold TOB
  - Scour on the floodplain
- Conclusion: It would fail if constructed





# Lessons for Owners (NGO and RR)

- Hire a qualified firm
- Use the same firm for design and construction administration
- Get the design sealed by a licenced professional
- Learn from your mistakes
- Be open to advice



# Lessons for Designers (3 of them)

- Do not take on a project for which you are not qualified
  - Lawsuit
  - TRIECA presentation
- Do not alter the design to fit the budget
- Better to go to the owner and recommend that they not construct than to construct a design that will fail
- Be open to advice



# Lessons for DFO

- Do not permit bad designs
  - Get some training or hire someone to review designs
  - Do not need to be able to know how to design, but asking the right questions can be useful
- If it goes badly make them fix it



# Lessons for Industry

- Need to help designers realize what they are qualified to do and what they are not qualified to do
- Bad projects reflect poorly on the stream restoration community
- NC: in 1990's a series of bad projects almost killed the stream restoration business
- Professionals (Engineers & Geoscientists) need to regulate themselves more effectively



# Questions?

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**Director**

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