

TRIECA | 2018 CONFERENCE

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Reaching Consensus...

...to Benefit River Systems

...& the Industry

7th Annual TRIECA Conference
March 21-22, 2018

Sound Familiar?

How many submissions does it take to get design approvals?

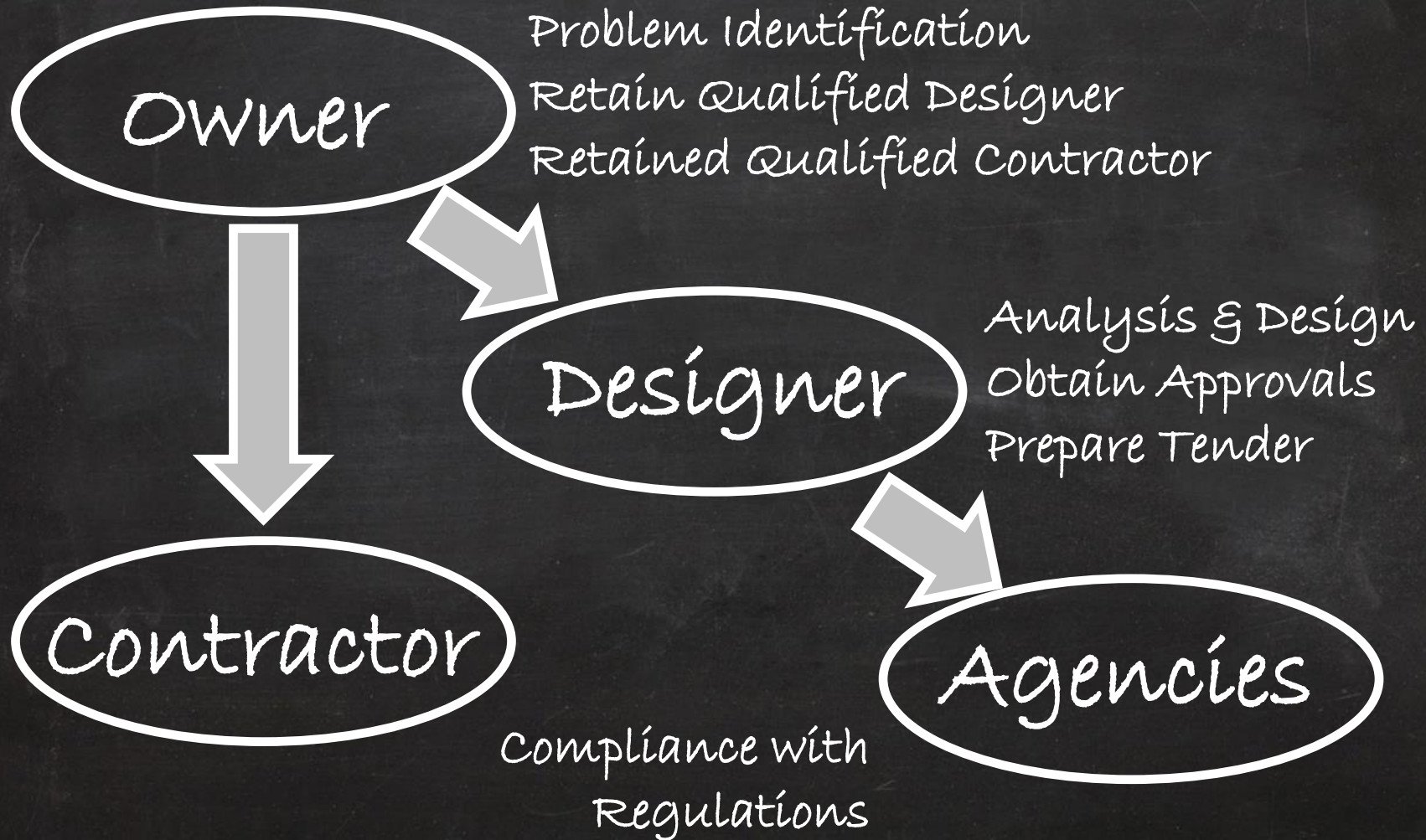
Designer...

- How much time to budget for "Approvals"?
- Received pressure from client - "why so many questions from Agencies?"

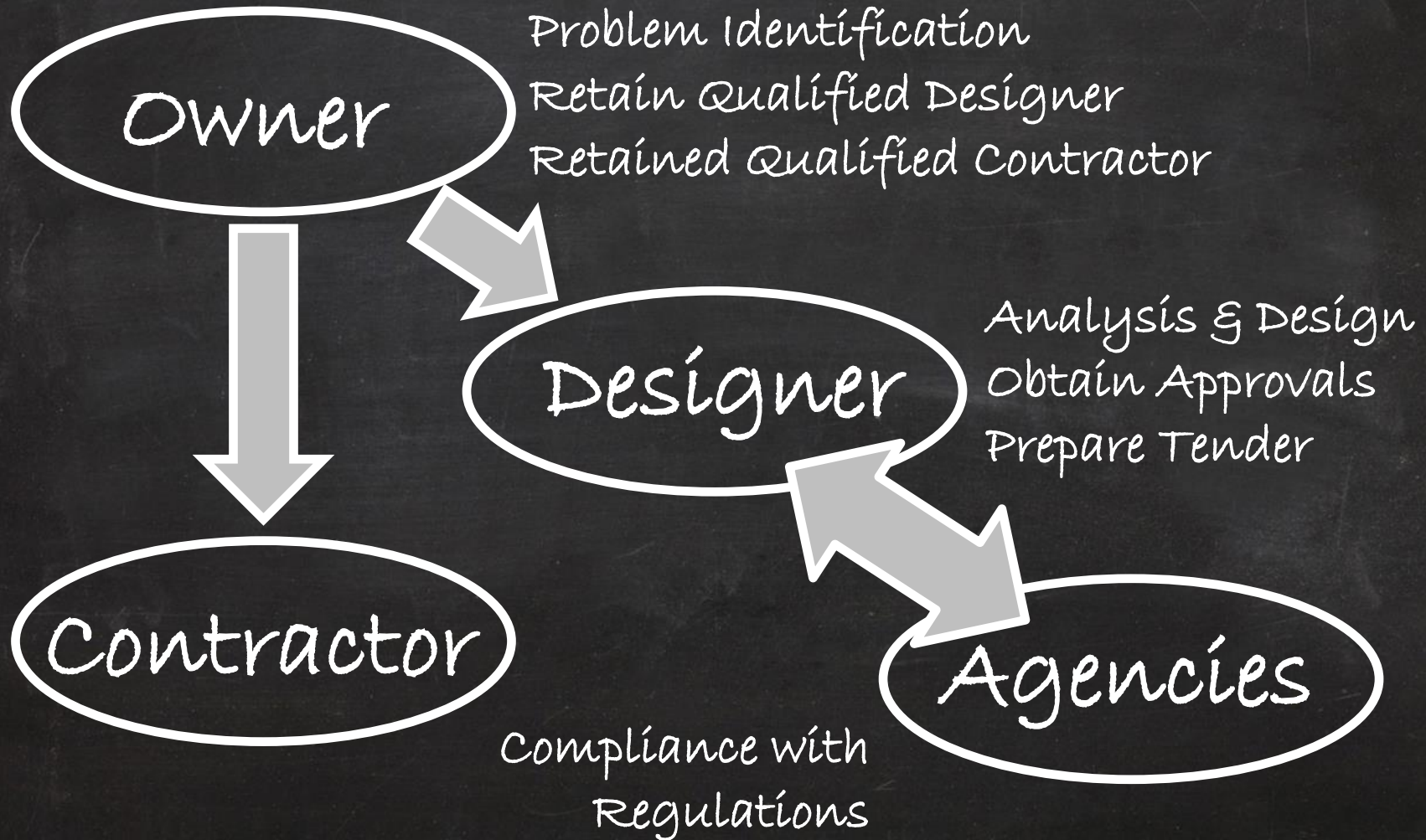
Contractor...

- Challenges interpreting design details?
- Sufficient clarity to provide "accurate" quote?

Typical NCD Project



Typical NCD Project



Reaching Consensus

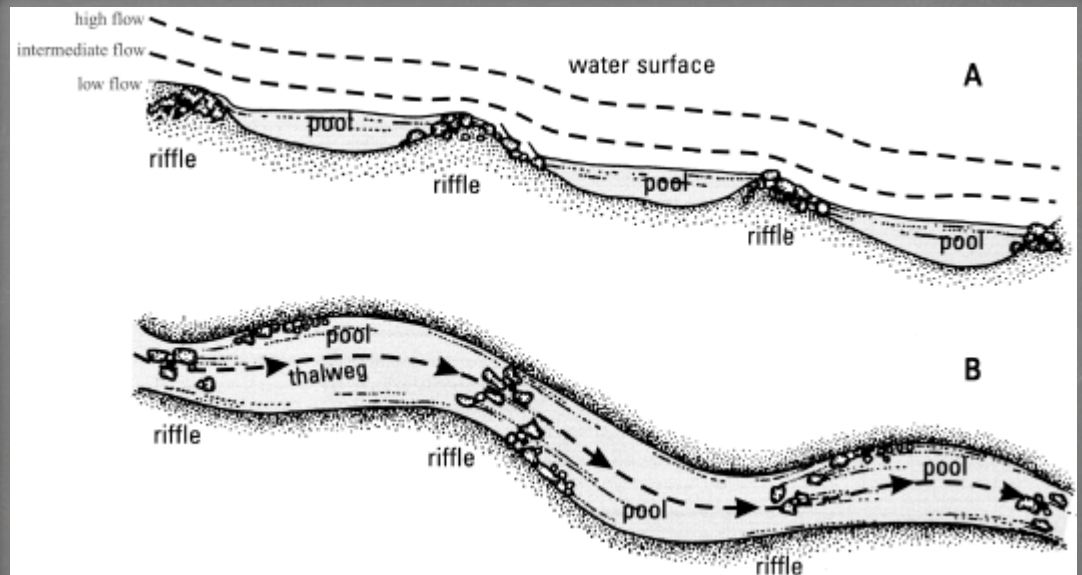
...Designer - Agency

Points to Cover...

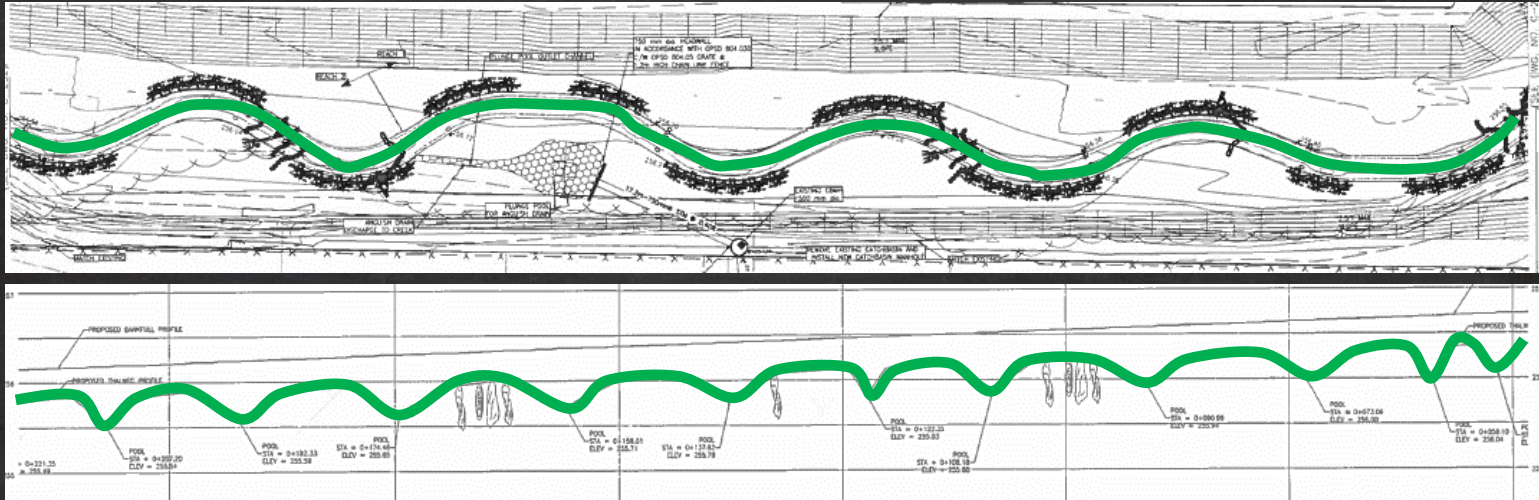
1. Current State of Submissions
2. Compare to Stormwater & Natural Hazard "Cousins"
3. Suggest Path Forward

Progress in Channel Design

- Been designing/building “natural” channels for almost 25yrs
- Fluvial geomorphology – many contributions
- Hard boundaries unacceptable
- Fish habitat integrated into design



Submission Package



Plan

Profile

Analysis & Design Report

Design Objectives

Existing Conditions

Design of Proposed Channel

Construction

Post-Construction Monitoring

Design Drawings

Plan & Profile - Ex & Prop

Cross-sections - Ex & Prop

Grading - local cut/fill

Details

ESC + Water Management

Agency Review

Regulations:

1. Conservation Authority Act / Regulation (CA)
2. Lakes & Rivers Improvement Act (MNRF)
3. Fisheries Act (1st reading - Feb 2018) (DFO)

Technical Guidelines:

...for Watercourse Alteration (NCD)

Technical Guidance?

1. Planning & Procedure Manual

a) Stormwater

...Erosion Analysis to determine site-appropriate erosion threshold

...RGA/RSAT

b) "Channel Modification" Checklist...

...to ensure the design of a stable channel based on natural channel design principles

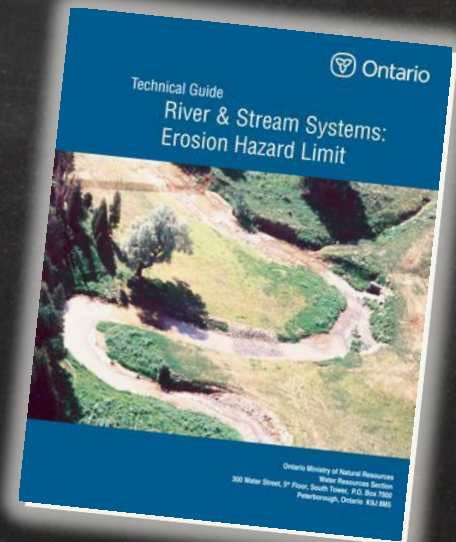


2. Erosion Hazard Limit Technical Guide

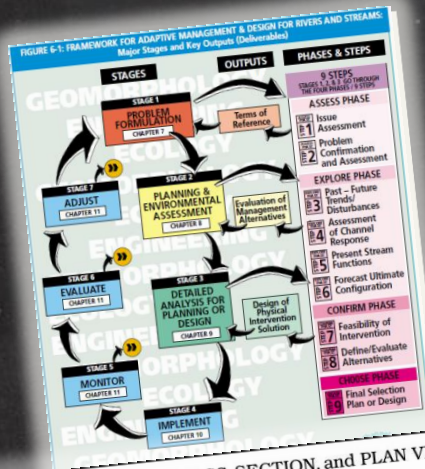
...Confined & Unconfined Systems

Toe erosion + Stable Slope + Erosion Access

Flood Hazard or Meander Belt + Erosion Access



Technical Guidance?



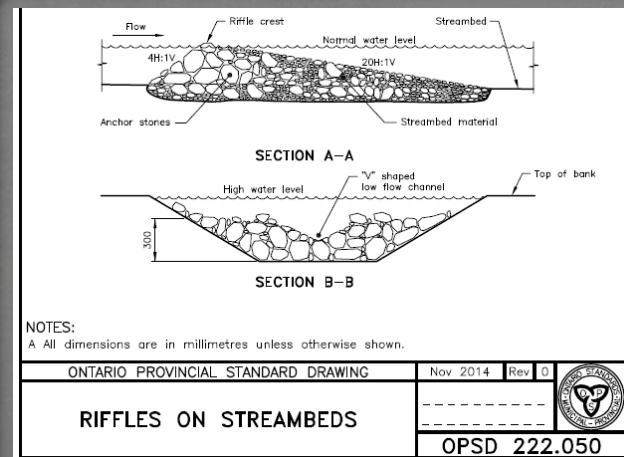
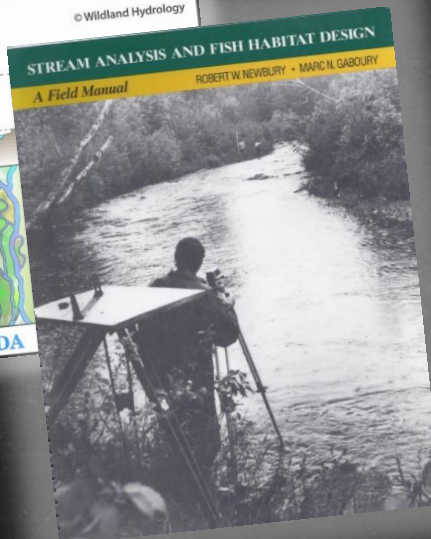
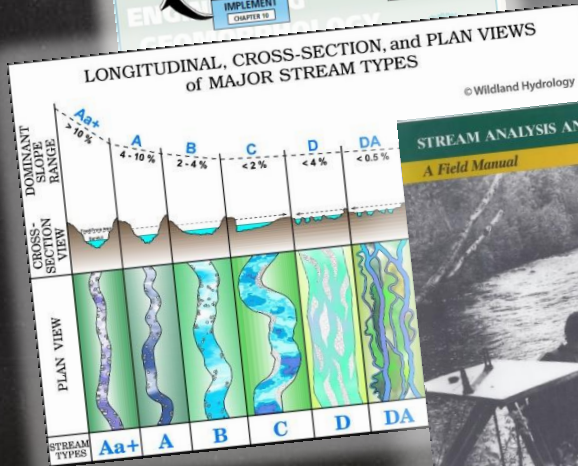
3. MNR 2002 "Adaptive Management of Stream Corridors"...

4. Rosgen Classification

5. Newbury Design

6. "Standard Drawings" (OPSD 222's)

222.100 "Local Vegetation Block" (Nov '17)



Common Elements

1. Flow regime
2. Sediment characteristics
3. Geomorphological features
4. Hydraulic characteristics

1. Flow Regime

Max Design Q

Channel-Forming Q

Return Period? (2, 1.5)

3. Geomorphology

RGA, RSAT

Reference Reach

Stable - Unstable?

Bedform sequences

3D geometry

2. Sediment

Pebble Count

Bulk Samples

"Stone size"?

Existing vs Proposed

4. Hydraulics

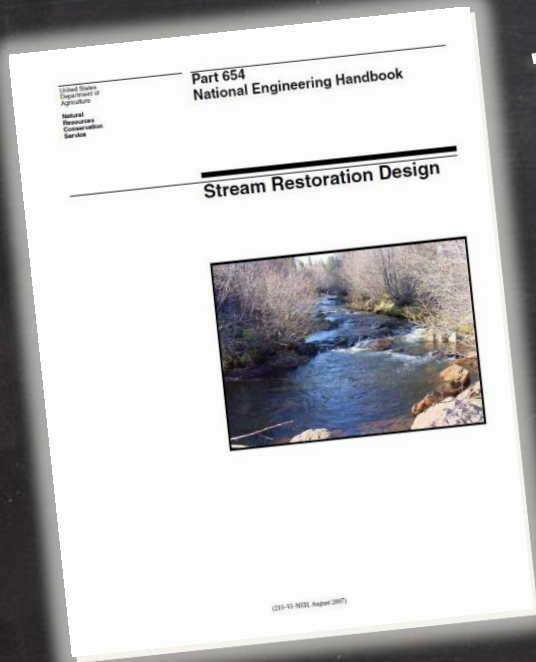
Average velocity?

Critical depth

Bed vs Bank

Allowable shear?

Channel Types & Design Methods



1. Threshold Channels
2. Alluvial Channels
 - A. Analogy Method
 - B. Hydraulic Geometry Method
 - C. Analytical Method

Threshold Channels – boundary material has no significant movement during the design flow

Alluvial Channels – bed & banks formed of material transported under present flow conditions

Design Methods

A. Analogy Method

- Reference Reach copied to project
- Xsection dimensions, possibly planform

B. Hydraulic Geometry Method

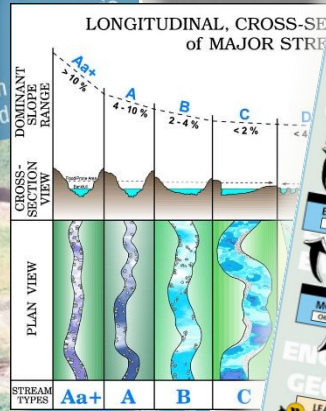
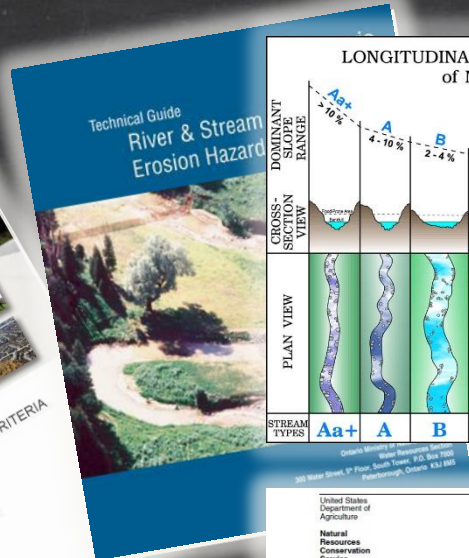
- $W = a(BF_Q)^b$, geo-transferable?

C. Analytical Method

- Width from A or B
- Depth/Slope from resistance/sediment eqns.



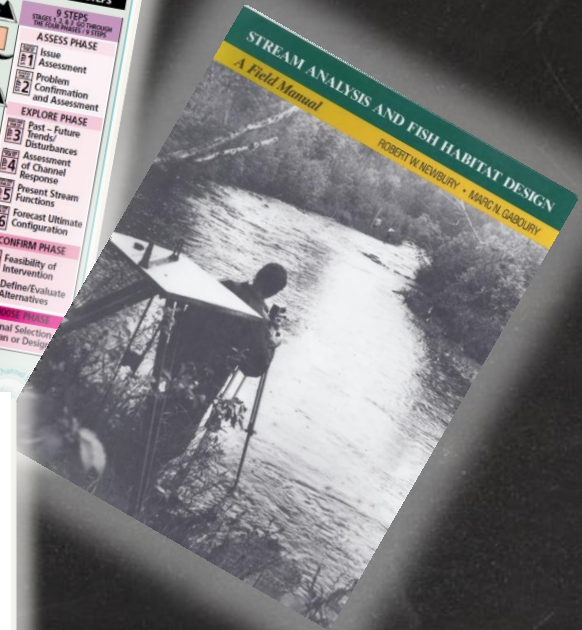
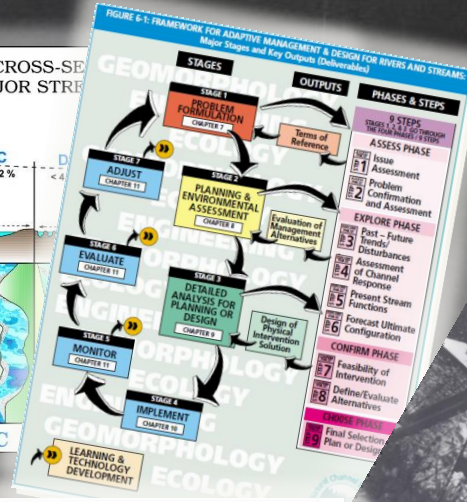
Components of Framework



United States
Department of
Agriculture
Natural
Resources
Conservation
Service

Part 654
National Engineering Handbook

Stream Restoration Design



Reaching Consensus!

- Can it be done? – Yes !
- Considerable depth of knowledge & experience
- Components of Framework already in circulation

How many submissions does it
take to get design approvals?

2

“...it seems probable that in the future a closer co-ordination of the two fields [engineering & geomorphology] will exist to the advantage of both”

Lane (1954) “The Importance of Fluvial Morphology in Hydraulic Engineering”



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