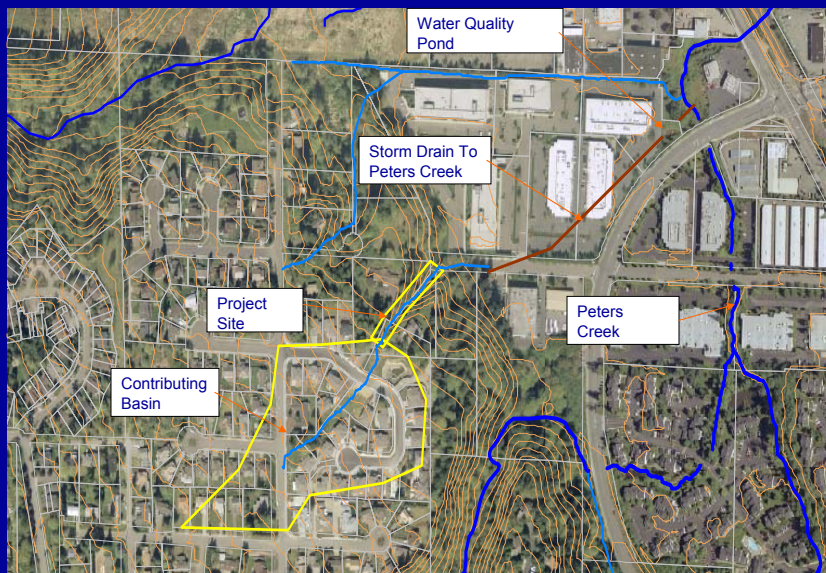


NE 87th Street Tributary To Peter's Creek - Stream Enhancement -

Presented by: Peter Stringer, P.E. (CDM)
Roger Dane, ASLA (City of Redmond)
& Nils Lindwall, P.E. (CDM)



Vicinity Map



Site Map

Site Conditions

- Steep wooded draw between houses
- Stream gradient 18% average
- New residential development upstream accelerated erosion
- Stream segment isolated by storm system
- Flashy



Project Goals:

- Reduce erosion and the associated sediment in the stream.
- Reduce the risk of slope failures.
- Enhance the riparian buffer and upland habitat.



Design Considerations

- Water Quality
- Slope Stabilization
- Bioengineering
- Limited Budget
- Urban Environment
- Design/Build



Improve Water Quality

- Reduce erosion of existing channel and banks using:
 - Streambank logs
 - Deflector logs
 - Log weirs
 - Native planting
 - Wattles / fascines



Bank Erosion

- The most critical areas were targeted for work
- Undercut banks, small sloughs & slides



Bank Erosion

- Some banks undercut 3'

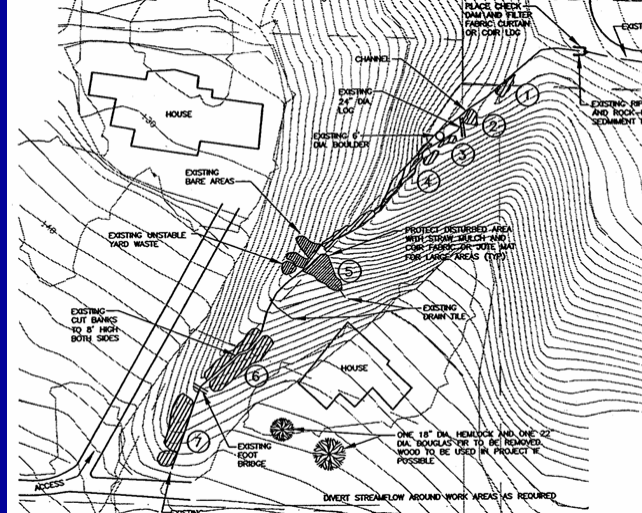


Slide Area

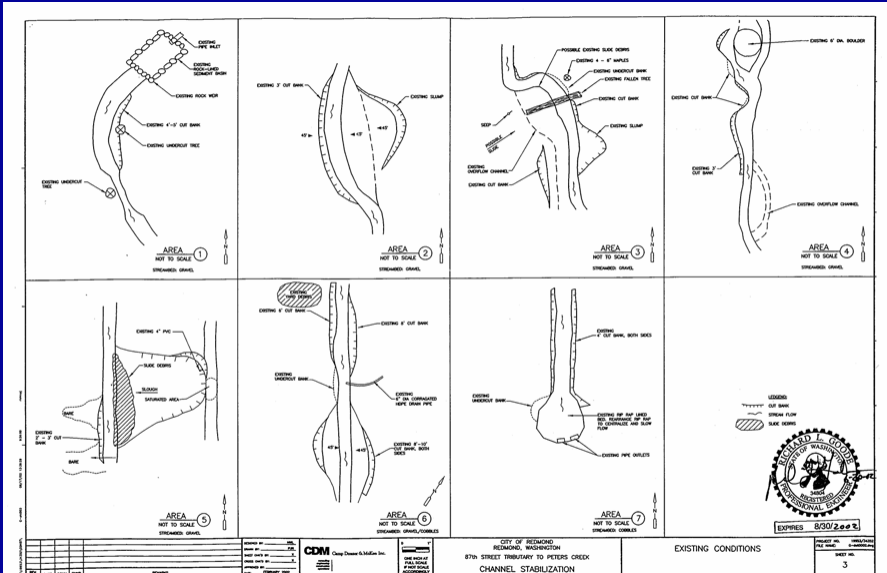
- Saturated slope
- Recent slide 25' high adding sediment to stream



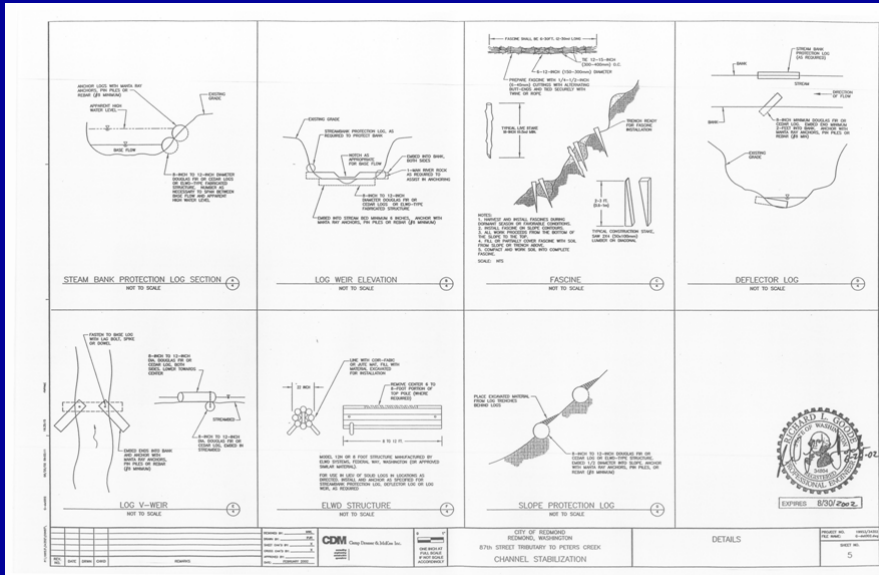
Existing Conditions



Existing Conditions

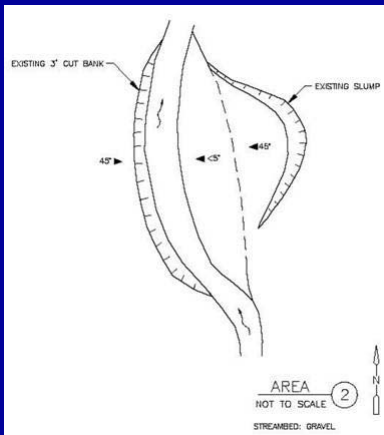


Details

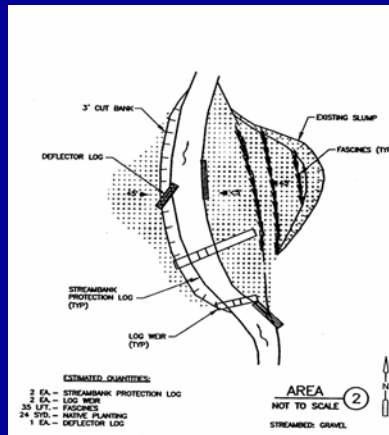


Area 2

- Pre-Design

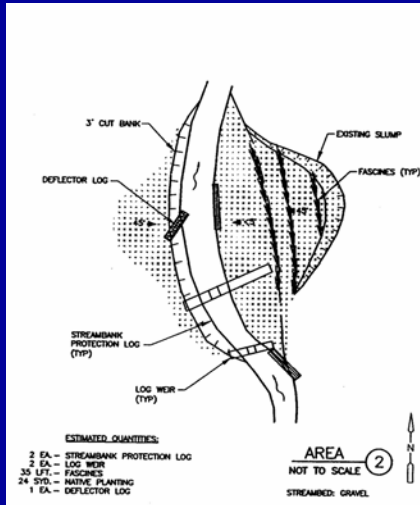


- Design

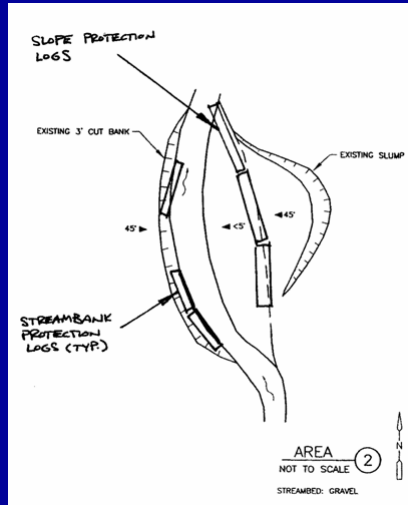


Area 2

- Design

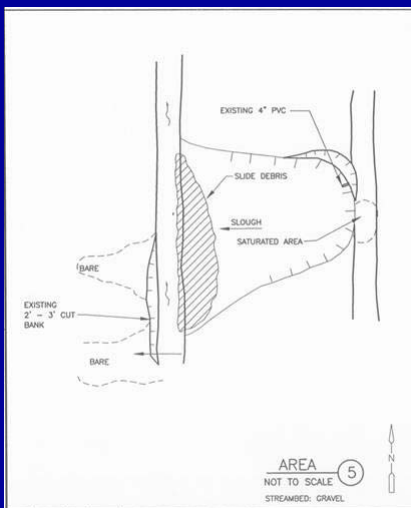


- As-built

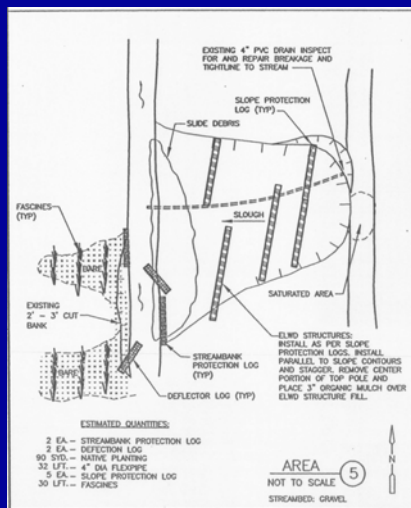


Area 5

- Pre-Design

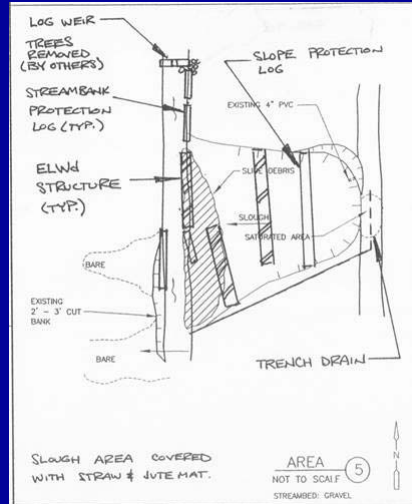
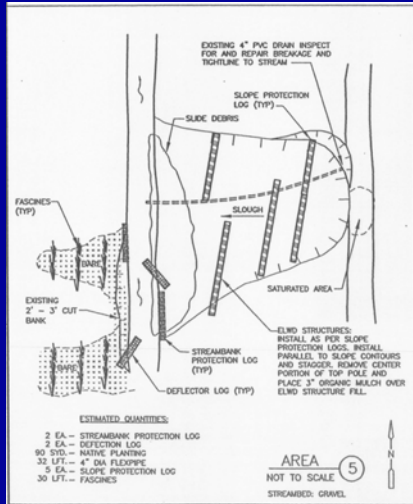


- Design



Area 5

- Design
- As-Built



ELWd as Streambank Protection Logs

- Engineered Large Woody Debris (ELWd) is used to increase the required log diameter for difficult access areas
- Habitat Structure



ELWd Structure Fabrication

- Dowels
- Wedges
- Jute Mat



Anchoring Structures



Slope Failure/Hydraulic Loading



- Seep located near top of failure
- Constructed new drainage at top to convey water from impacted area

Slide Area

- Saturated soil
- Stream undercutting toe of slope
- Previous grading across slope
- Yard waste and construction debris added to slope loading



Slope Stability and ELWd

- ELWd is used to stabilize saturated slope, & create planting pockets



Bioengineering

- Tree falling for under-planting
- Dense plant spacing
- Shade tolerant species



Buffer Planting

- Dense planting
- Conifers and low trees on slope



ELWd Planting

- Shrubs & groundcover planted inside ELWd



Design/Build Benefits

- Engineers, owner & constructors working together
- Flexibility
- Quality assurance
- Lower cost



Flexibility w/ Design/Build

- Trees for planned high-line blew down before construction
- Limited Changed Conditions for Owner



Unanticipated Design/Build Opportunity



- Demolition of property owner's structure became enhancement area

Construction Methods

- Bypass stream flow during reach construction and limit erosion
- No equipment
- Limit impact to local residences and business
- Field discussion daily



Temporary Erosion and Sedimentation Control

- Existing settlement pond secured with triangular silt dikes and wattles



- Water bypassed in construction zones

Hand Placement of Structures



- Areas of severe erosion targeted for protection

Results

- Sediment during fall storms
- Less erosion and improved water quality during rain events this winter
- Good plant survival even with summer installation (shade & moist site)



Questions:

