Culvert design methods

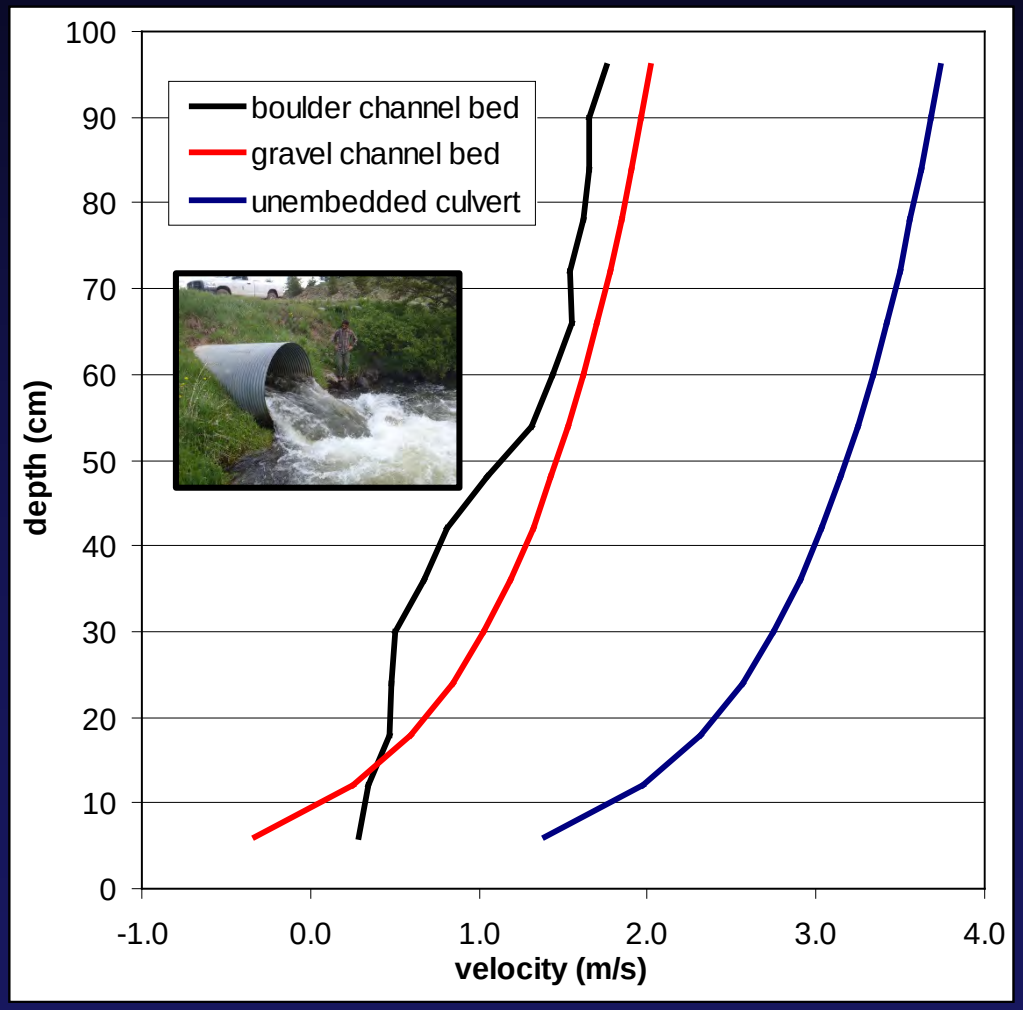
Culvert design methods

- Traditional hydrology & hydraulics (H&H)
- Baffles for fish passage
- Roughened channel for fish passage
- HEC-26 FHWA Culvert Design for Aquatic Organism Passage
- Stream Simulation

Traditional hydrology and hydraulics

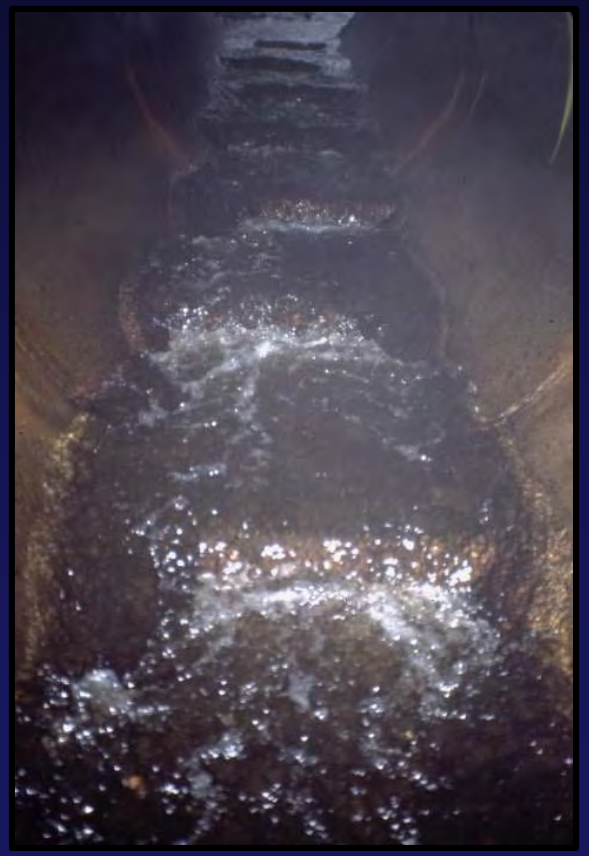
- Select and estimate design discharge
- Hydraulic analysis to minimize culvert size
- Velocity and depth for target fish sometimes
- No geomorphic considerations—bankfull characteristics, profile or sediment transport
- Results: high headwater, upstream deposition, high velocity, culvert abrasion, downstream scour, maintenance problems, increased risk of failure

Traditional hydrology and hydraulics



Traditional H&H with Baffles

- Baffles to create turbulence, reduce velocity and facilitate fish passage



Roughened channel

- Rock to create turbulence, reduce velocity and facilitate fish passage (start of stream simulation)

HEC-26

Publication No. FHWA-HIF-11-008
October 2010

U.S. Department of Transportation
Federal Highway Administration

Hydraulic Engineering Circular No. 26, First Edition

CULVERT DESIGN FOR AQUATIC ORGANISM PASSAGE

HEC-26

- 13-step roughened channel approach
- Hydrology for passage and flood flows
- Project reach and channel stability evaluation
- Initial culvert design including bed material
- Hydraulic analysis for bed stability, velocity and depth
- No requirement for bankfull width or banks

Stream simulation

- Culvert width $\geq$ bankfull width
- Natural channel constructed in culvert
- Reference reach (bfw, slope, bed material)
- Passes all aquatic species and life stages

Stream simulation

- A channel that will present no more of a challenge to organisms than the natural channel.