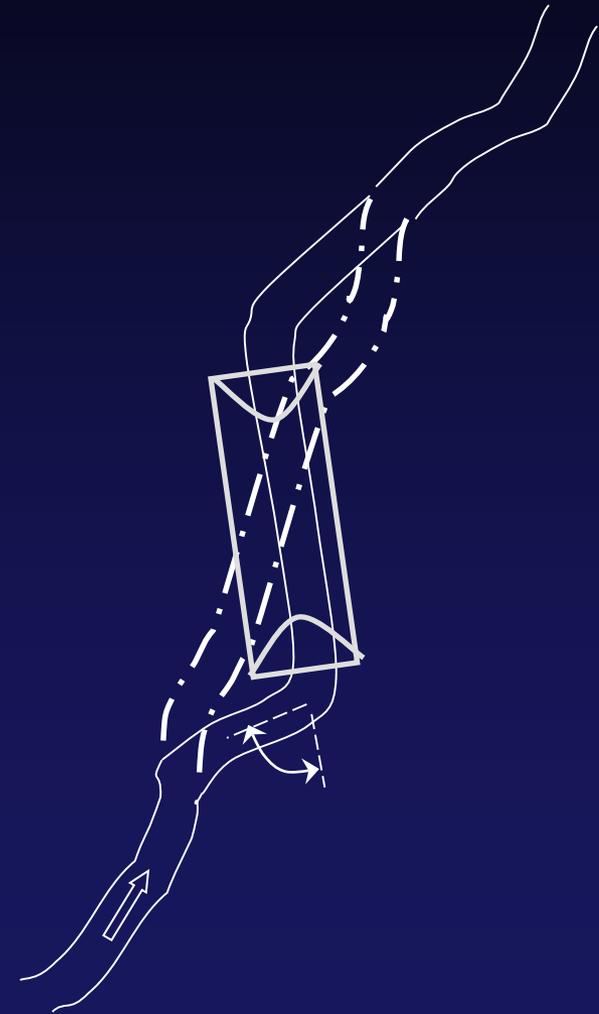
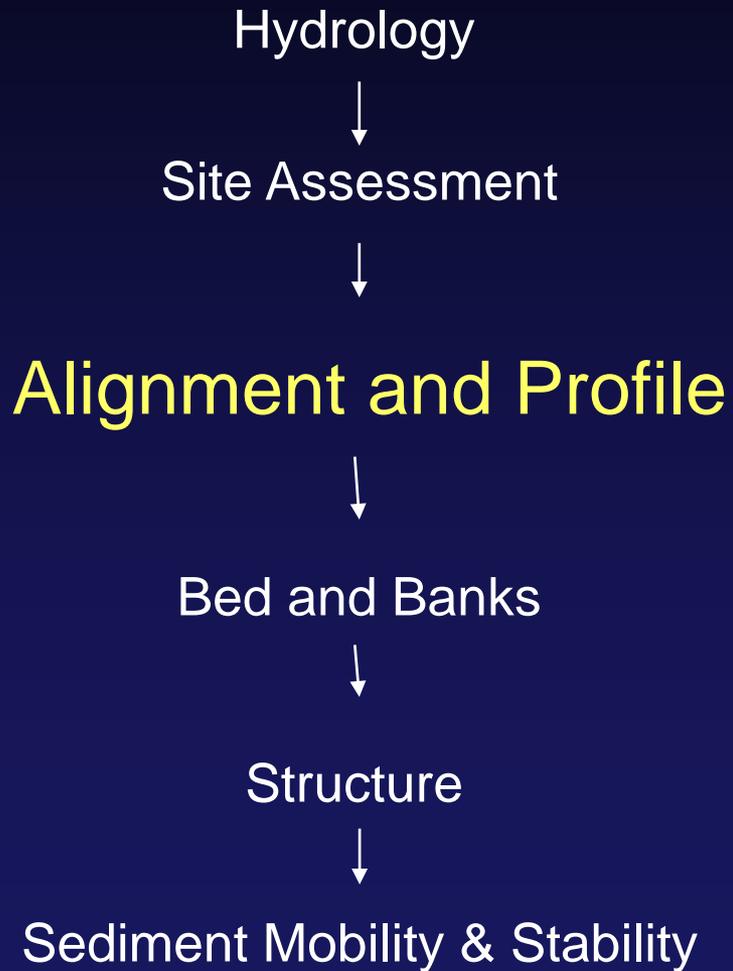


Culvert Design Process



Interpret longitudinal profile & alignment

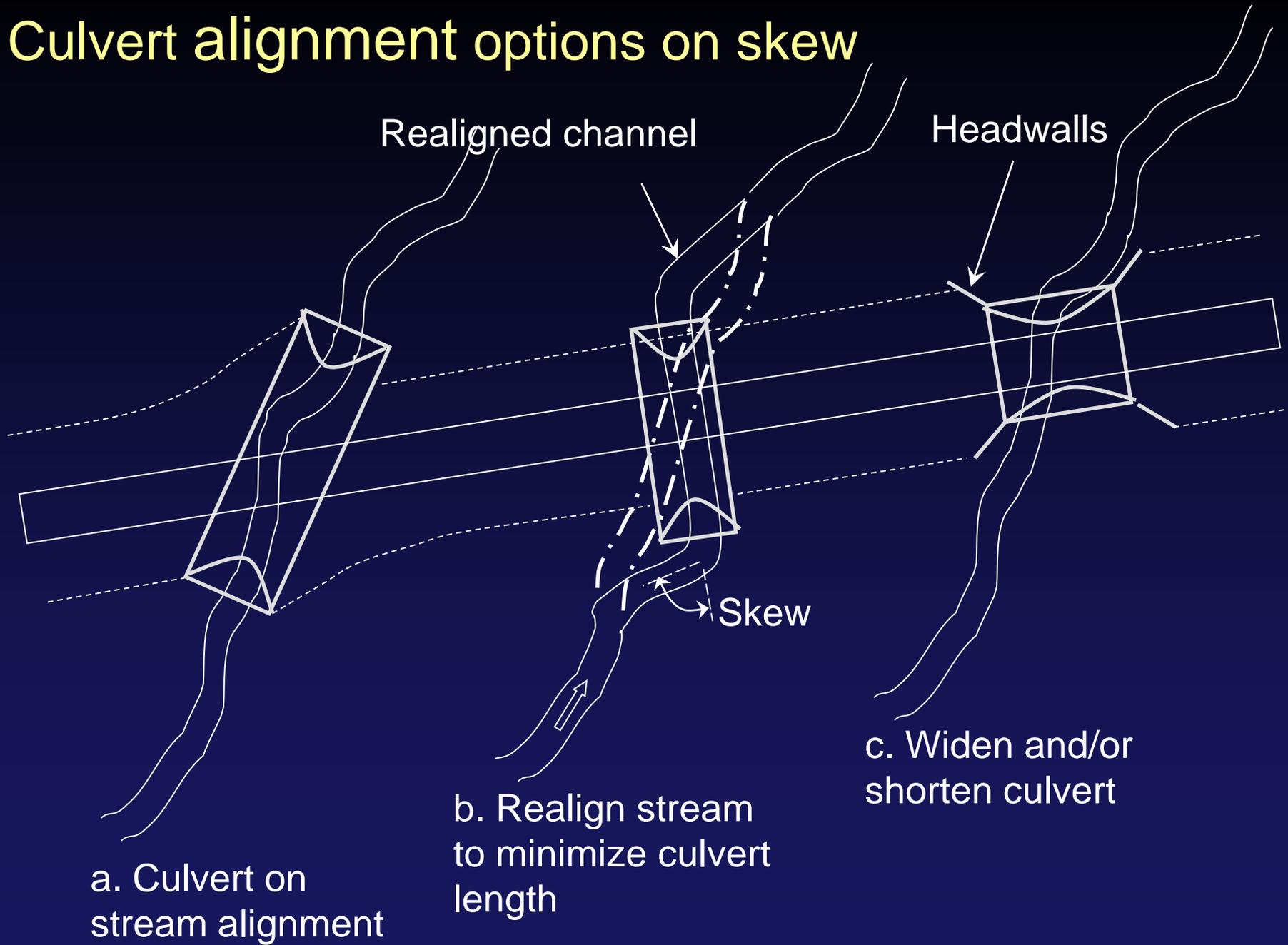
- Scour, incision or aggrading due to existing structure
- Channel effects to removal of existing pipe—head-cut potential
- Natural variability of bed elevation
- Channel restoration extent & feasibility

Alignment

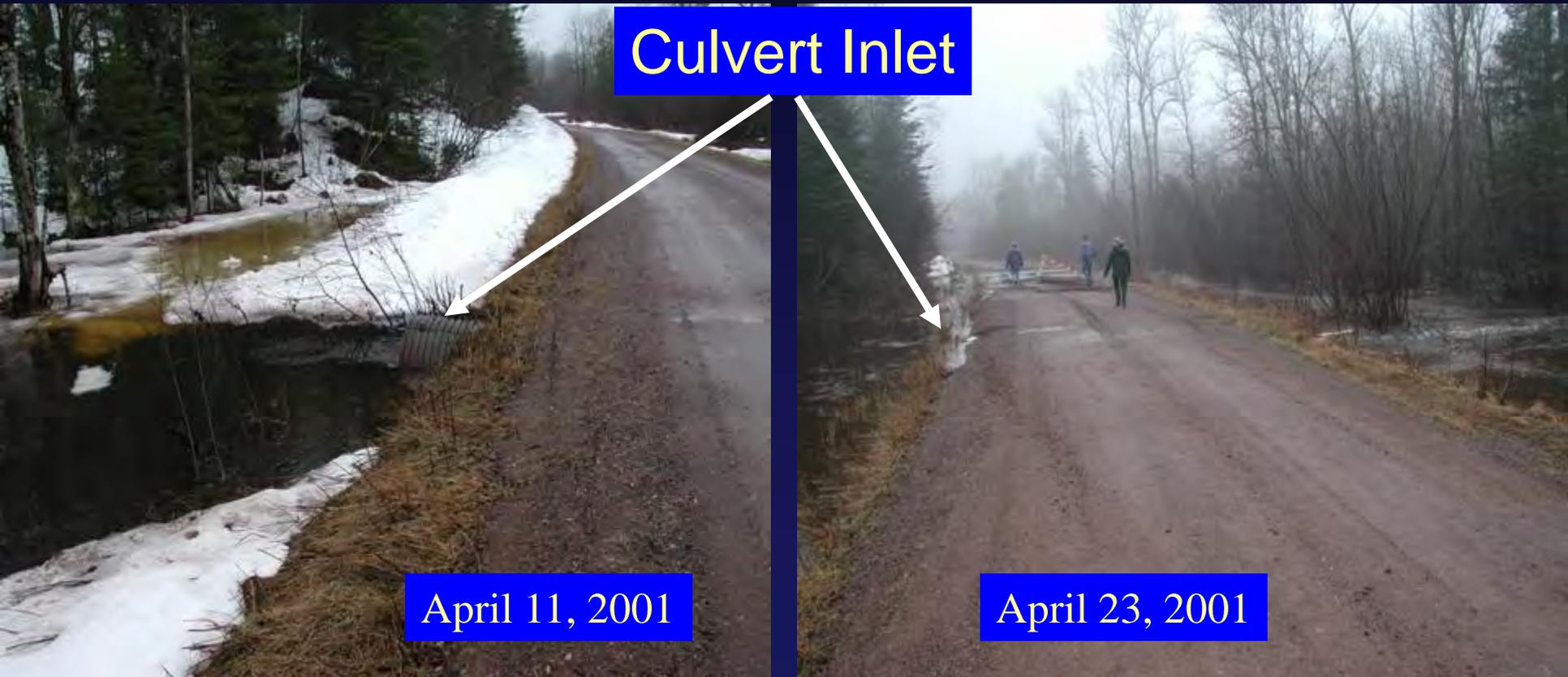
- Design alignment concurrently with profile
- Culvert skew affects length
- Culvert length may affect stream profile
- Important factor for debris blockage and failure
- Choose reasonable alignment for existing and **future** stream channel.
- Disturbance, stability, length, cost are often a compromise.



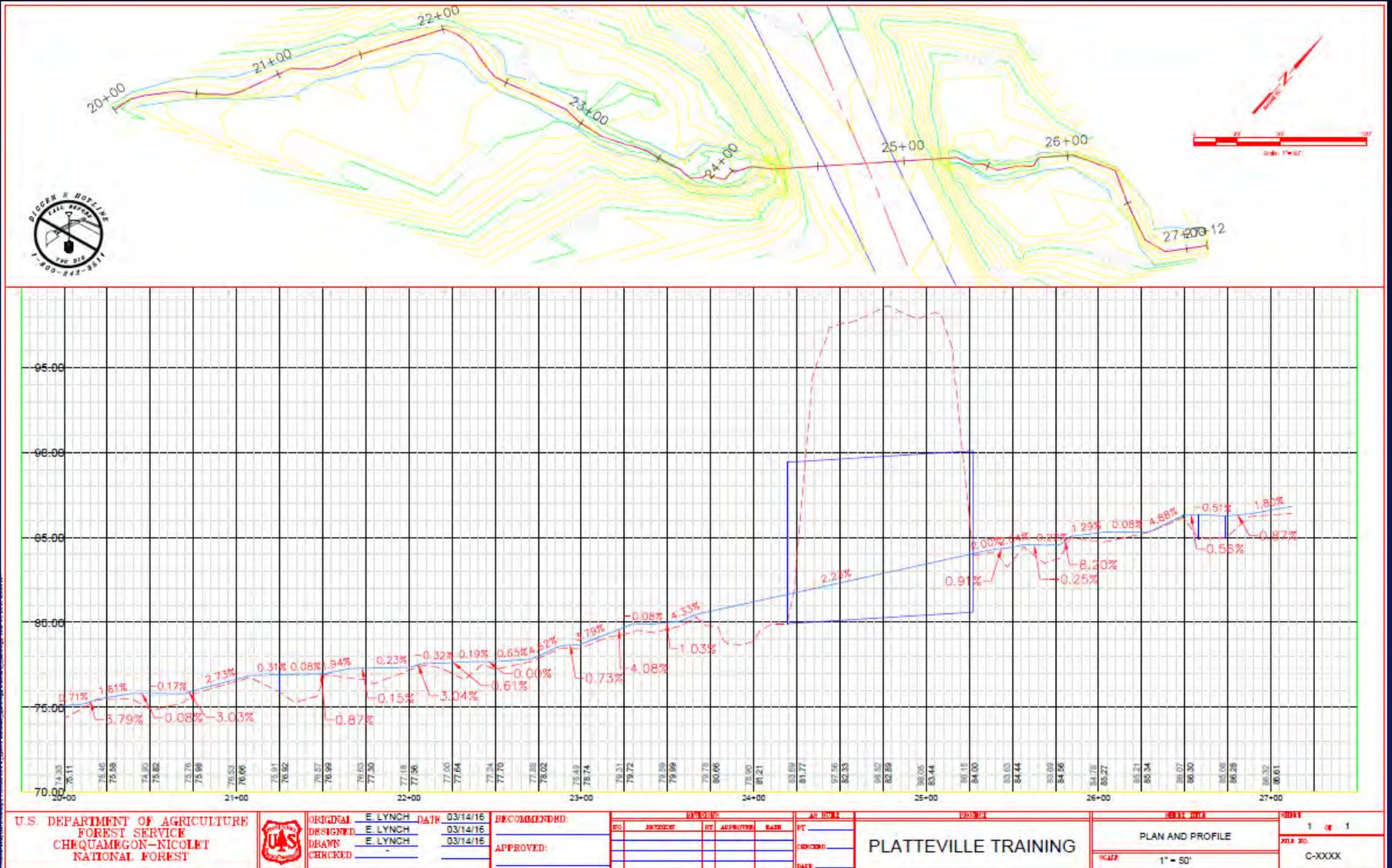
Culvert alignment options on skew



Problems with a realigned channel



Plan and profile, Rountree Trib.



U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
CHQUAMEGON-NICOLET
NATIONAL FOREST



ORIGINAL DESIGNED: E LYNCH DATE: 03/14/16
DRAWN: E LYNCH DATE: 03/14/16
CHECKED: -

RECOMMENDED:
APPROVED:

NO.	DATE	BY	FOR

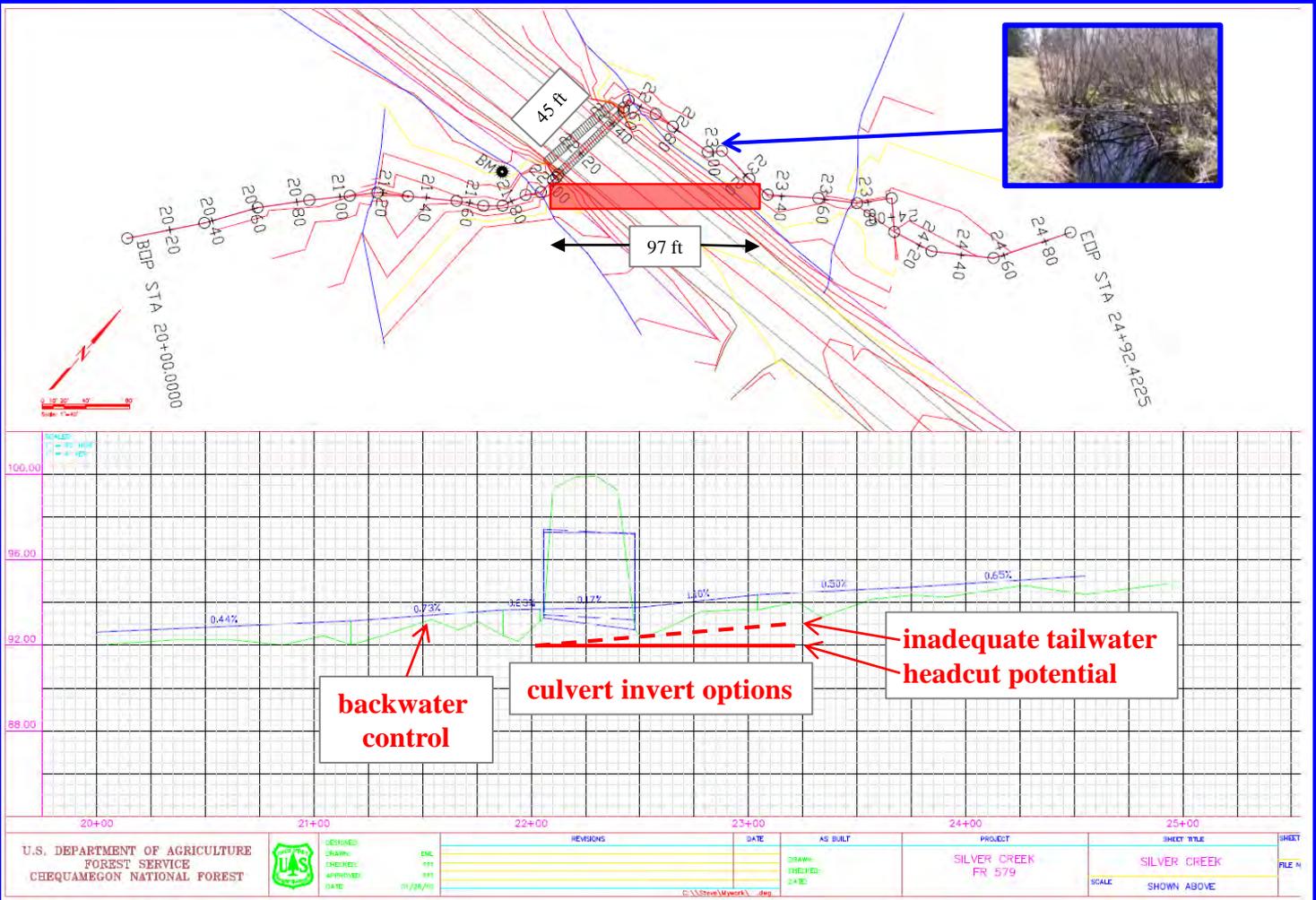
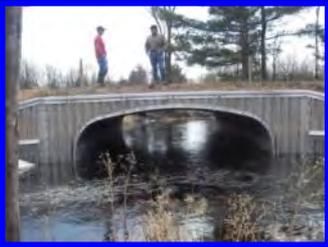
PLATTEVILLE TRAINING

PLAN AND PROFILE
SCALE: 1" = 50'

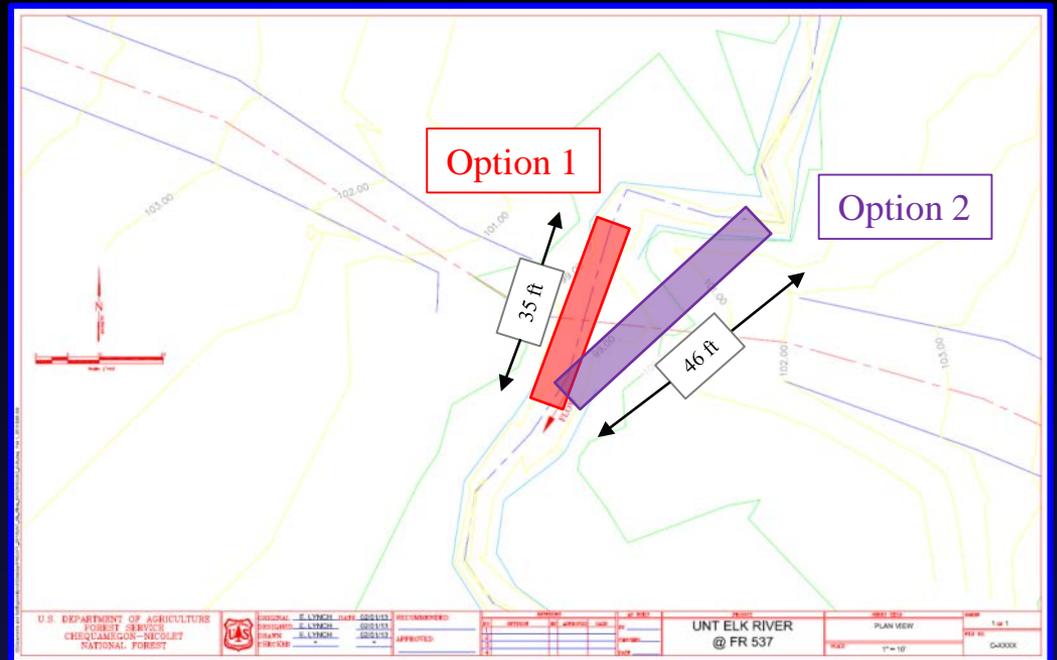
1 of 1
C-XXXX



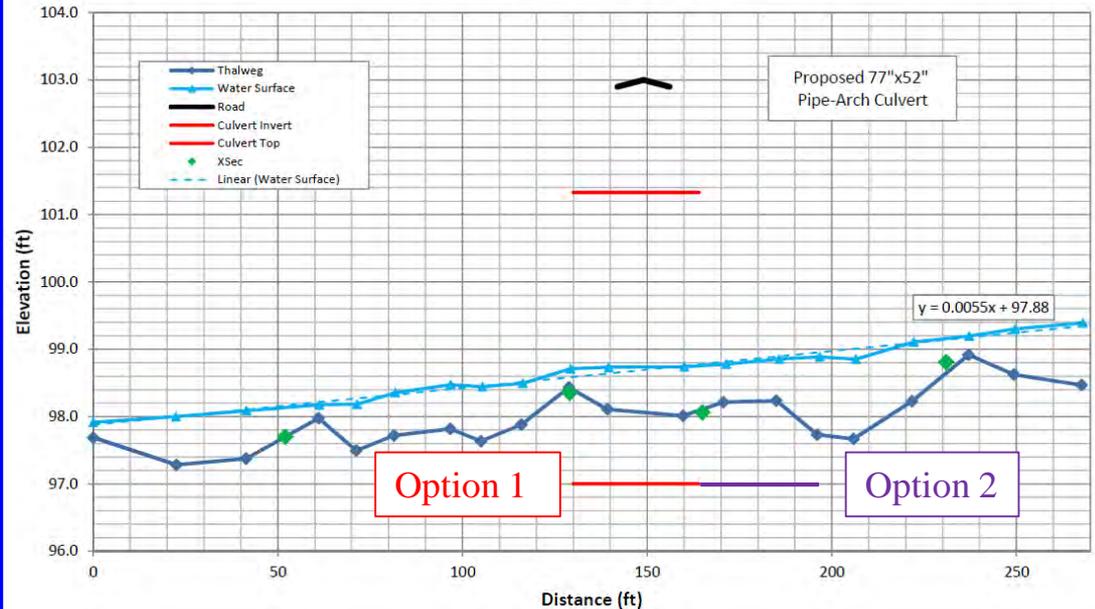
Culvert skew, length and stream profile



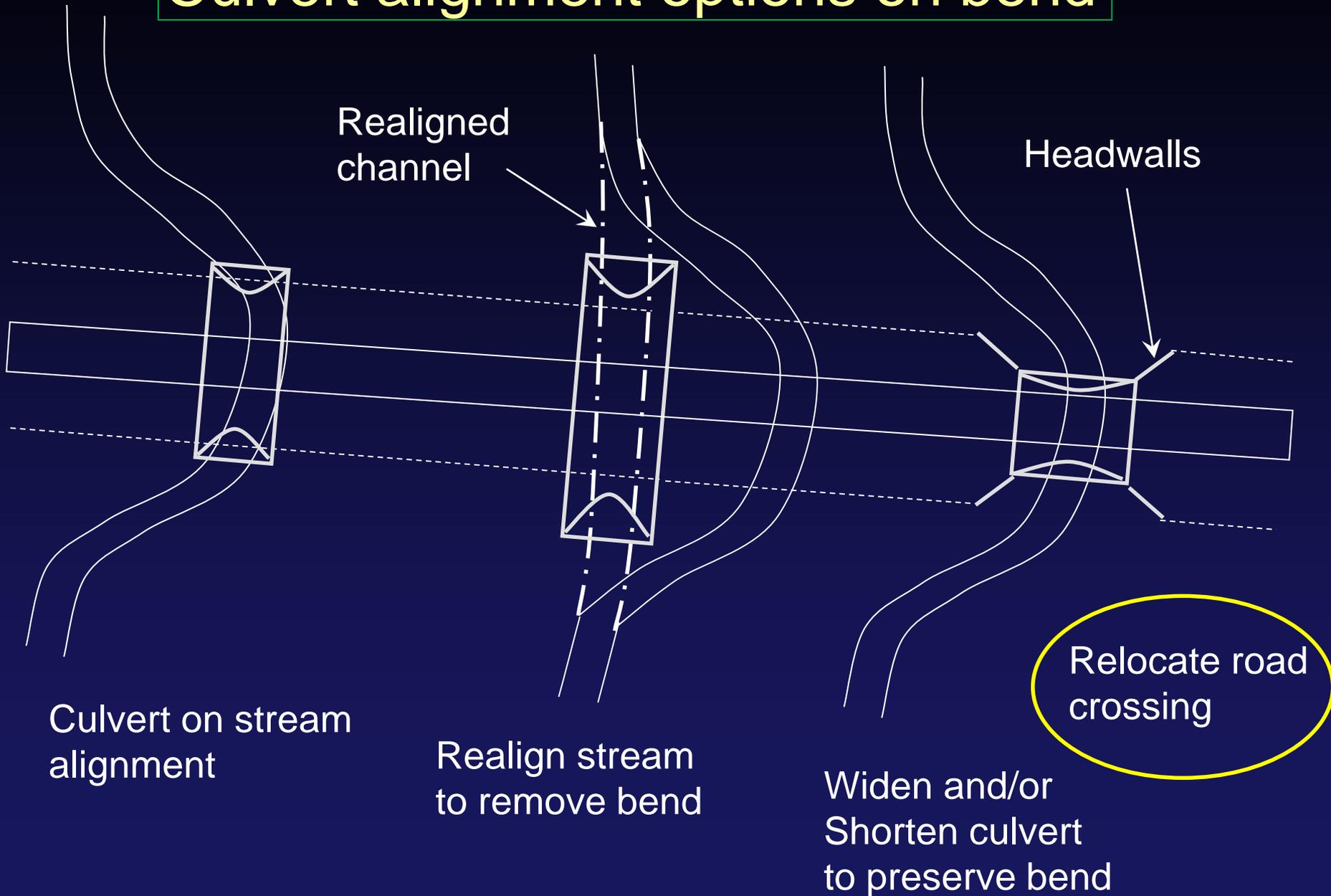
Culvert skew, length and stream profile



Unnamed Tributary to Elk R at FR 537



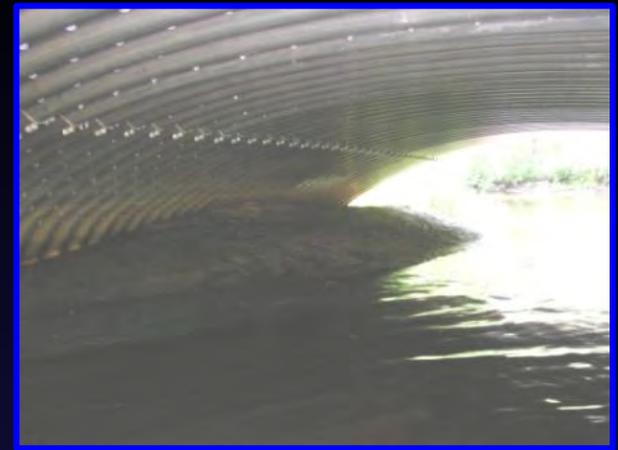
Culvert alignment options on bend



Culvert bend example short, wide box culvert w/HW

Waupee Cr at FR 2308

- Culvert Length/BF Width
- Drainage Area = 27 sq mi
- BFW = 34 ft (est eq)
- Culvert Length = 34 ft
- CL/BFW = 1.0



Culvert elevation

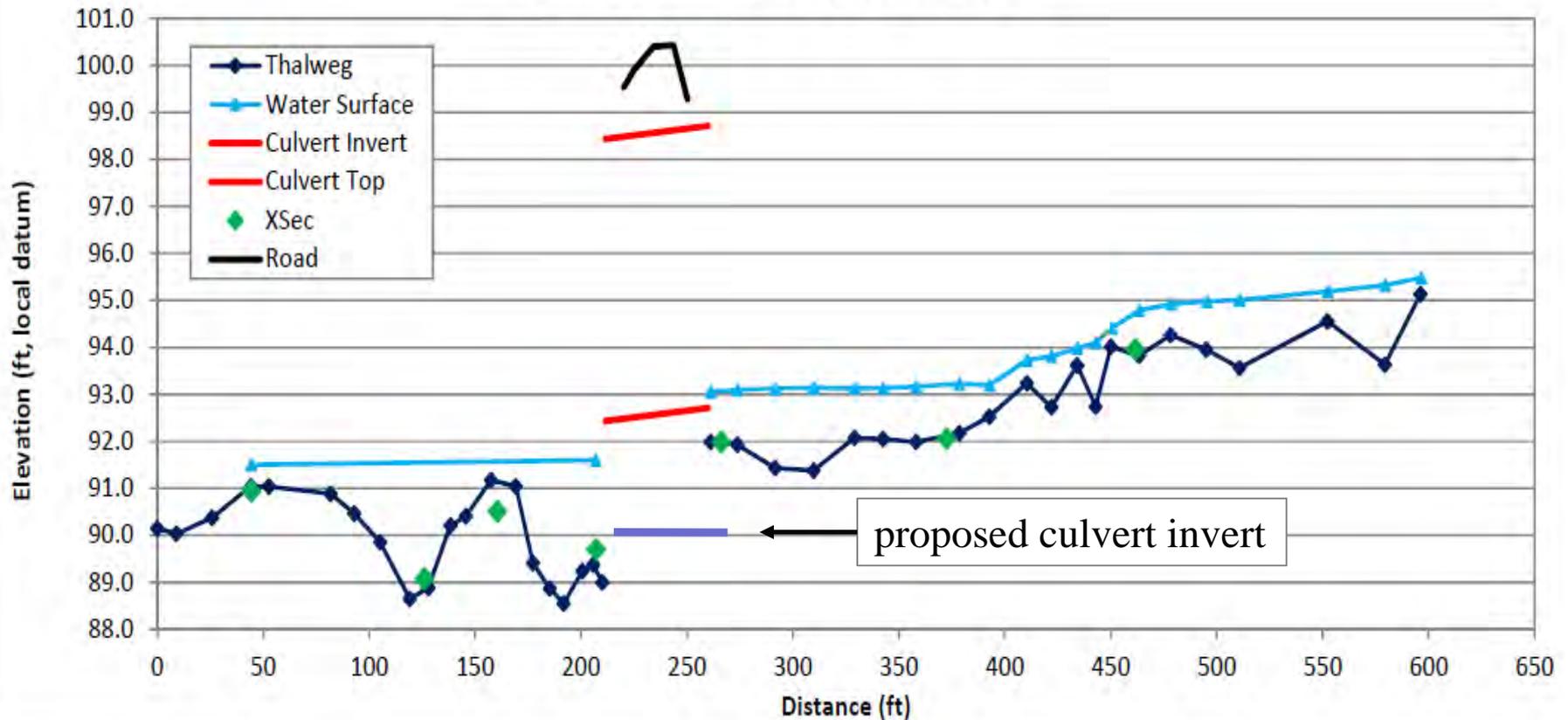
Bankfull width – Backwater control

- Set flat (on low gradient streams, except...)
- Check profile for channel morphology impacts
- Consider channel adjustment and restoration
- Consider plunge pool and backwater longevity
- Ensure backwater will provide good depth and low velocity in culvert
- Consider pool/run lengths relative to culvert length

Specify invert elevation

Bankfull width – Backwater control

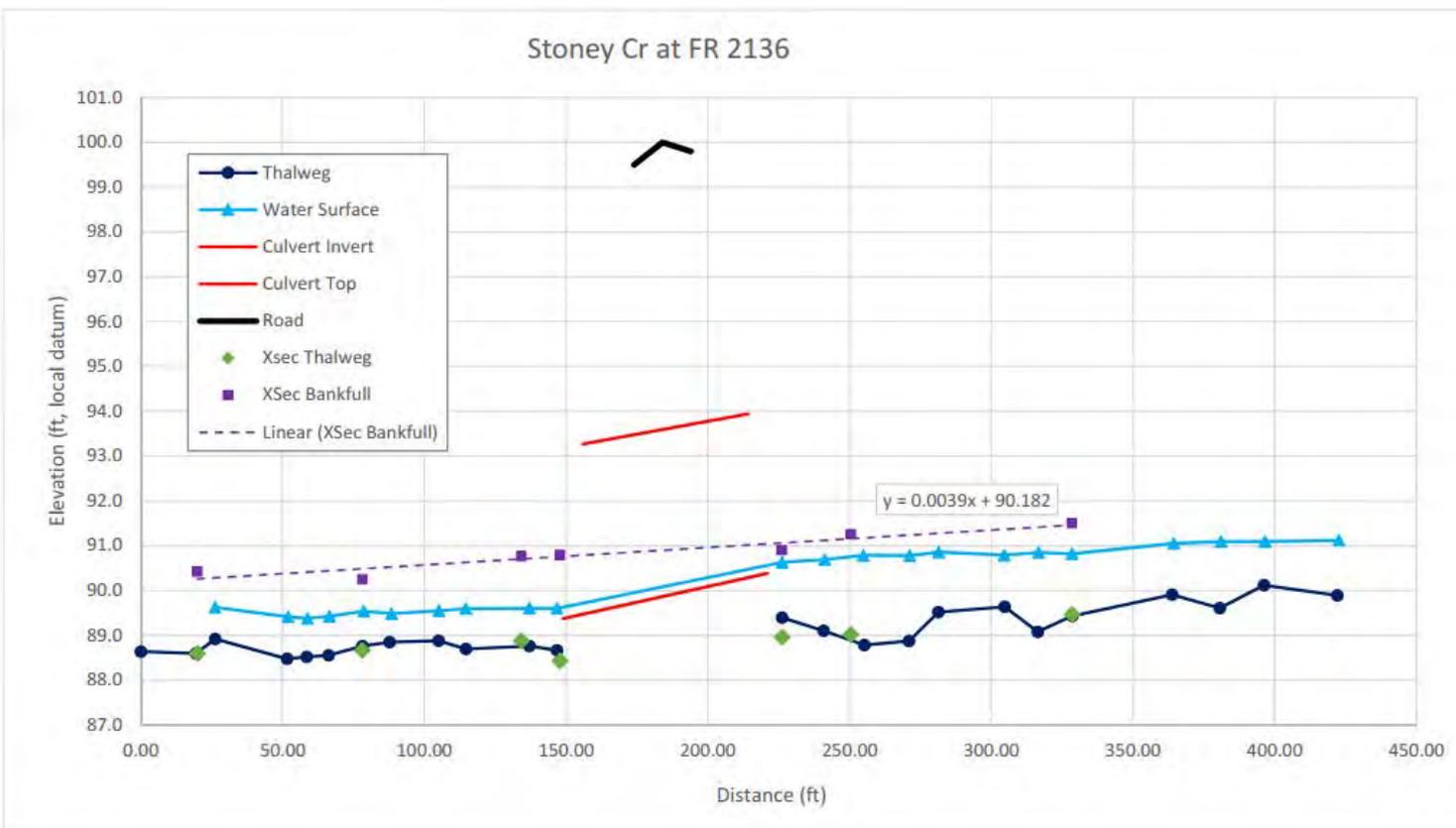
Snowden Trib at Rock Road





Specify culvert elevation

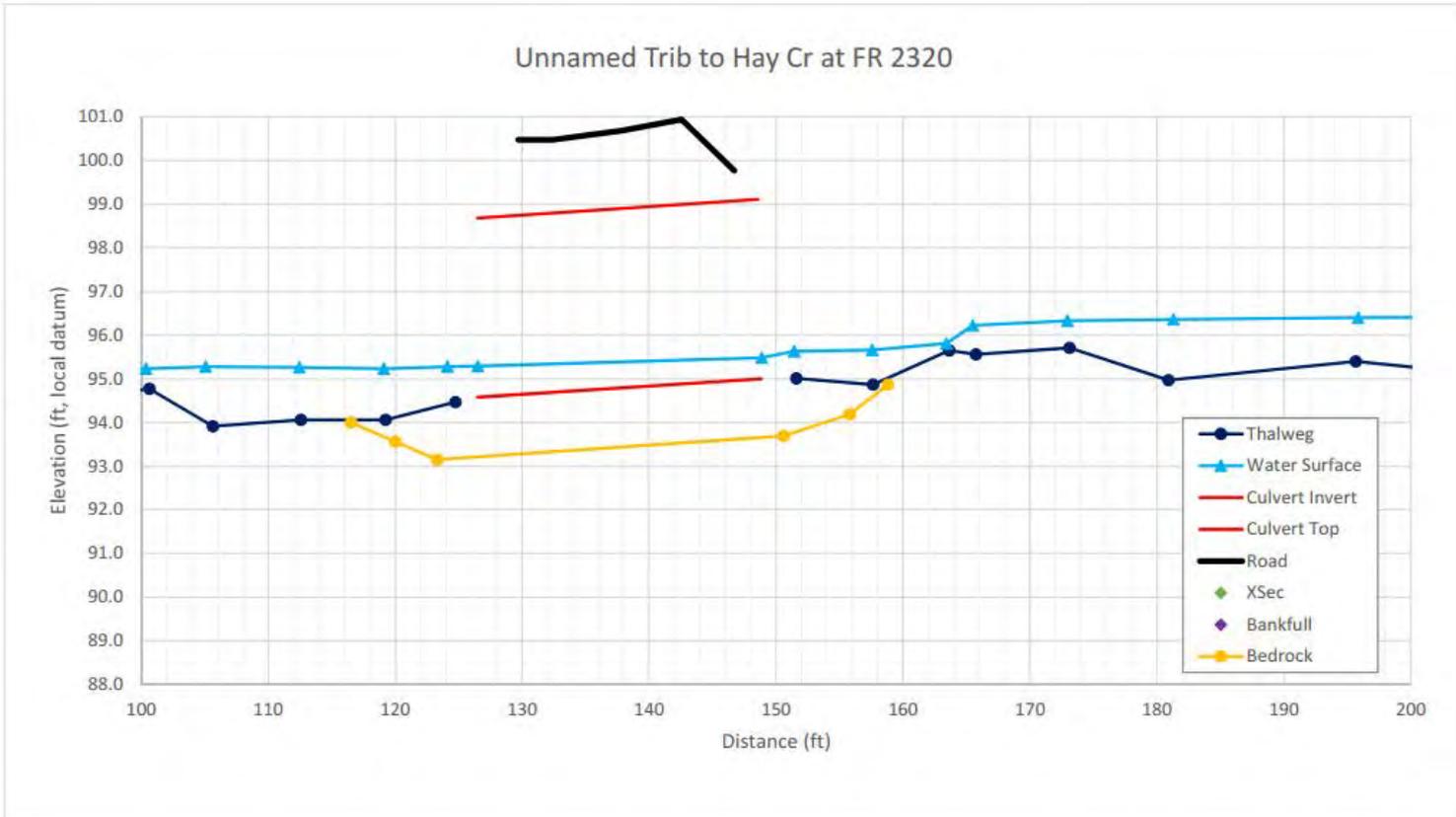
Low gradient culvert design





Specify culvert elevation

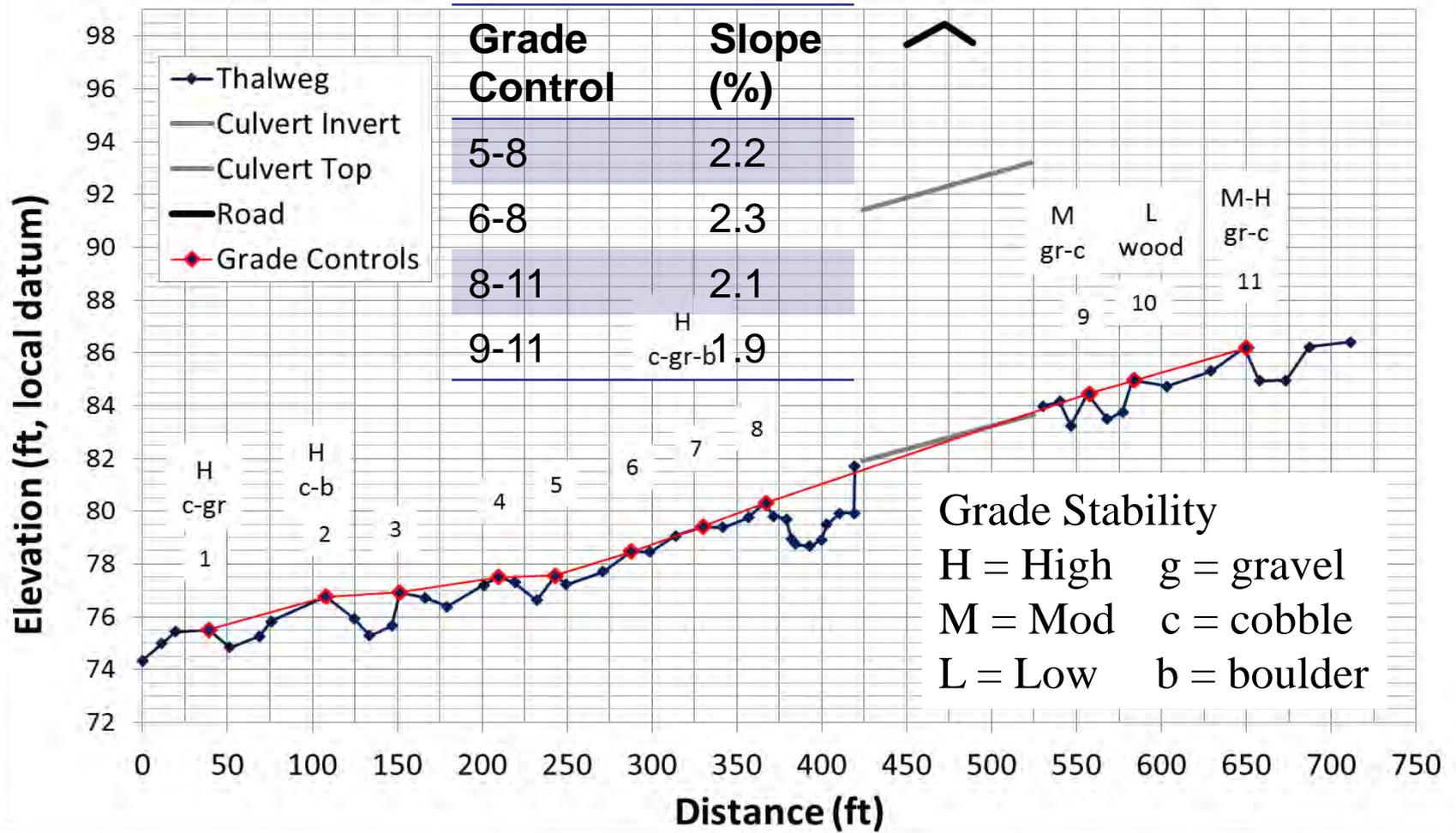
Low gradient culvert design



Specify culvert elevation



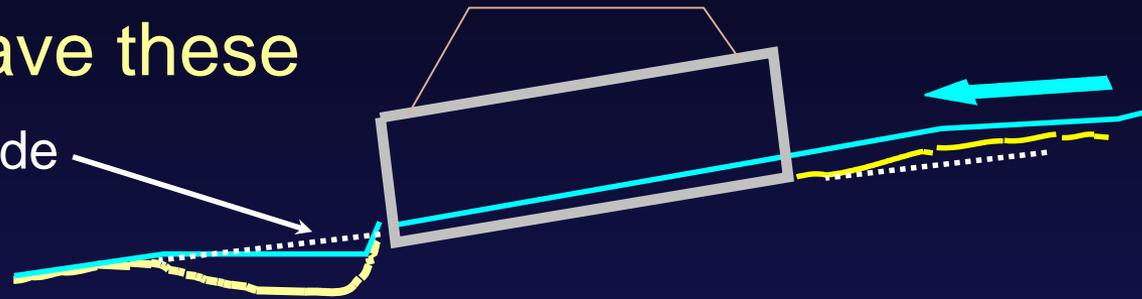
Rountree Tributary at W Main Street, Platteville, WI



Scour pool vs. incised channel

Outlet Scour – Most projects have these

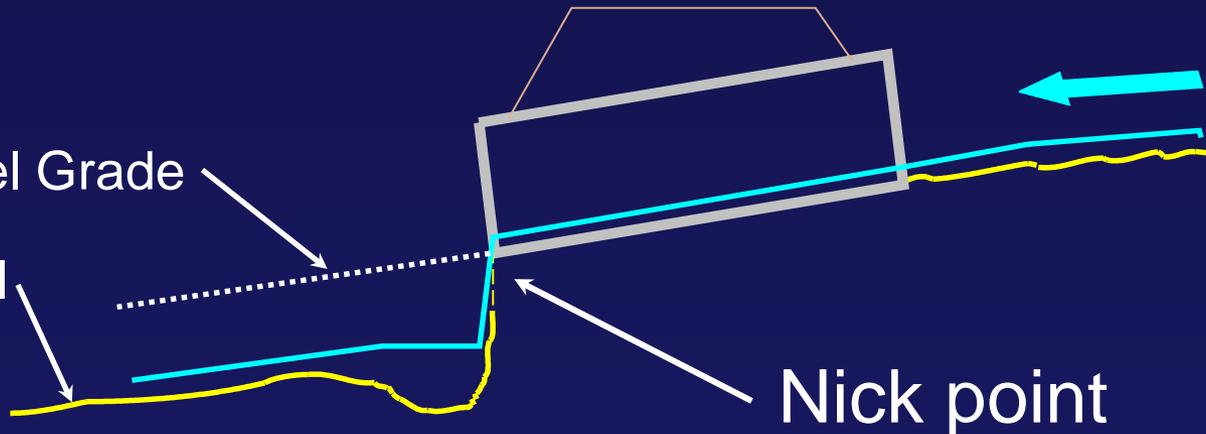
Original Channel Grade



Incised Channel – Some Channels

Original Channel Grade

Incised Channel Grade

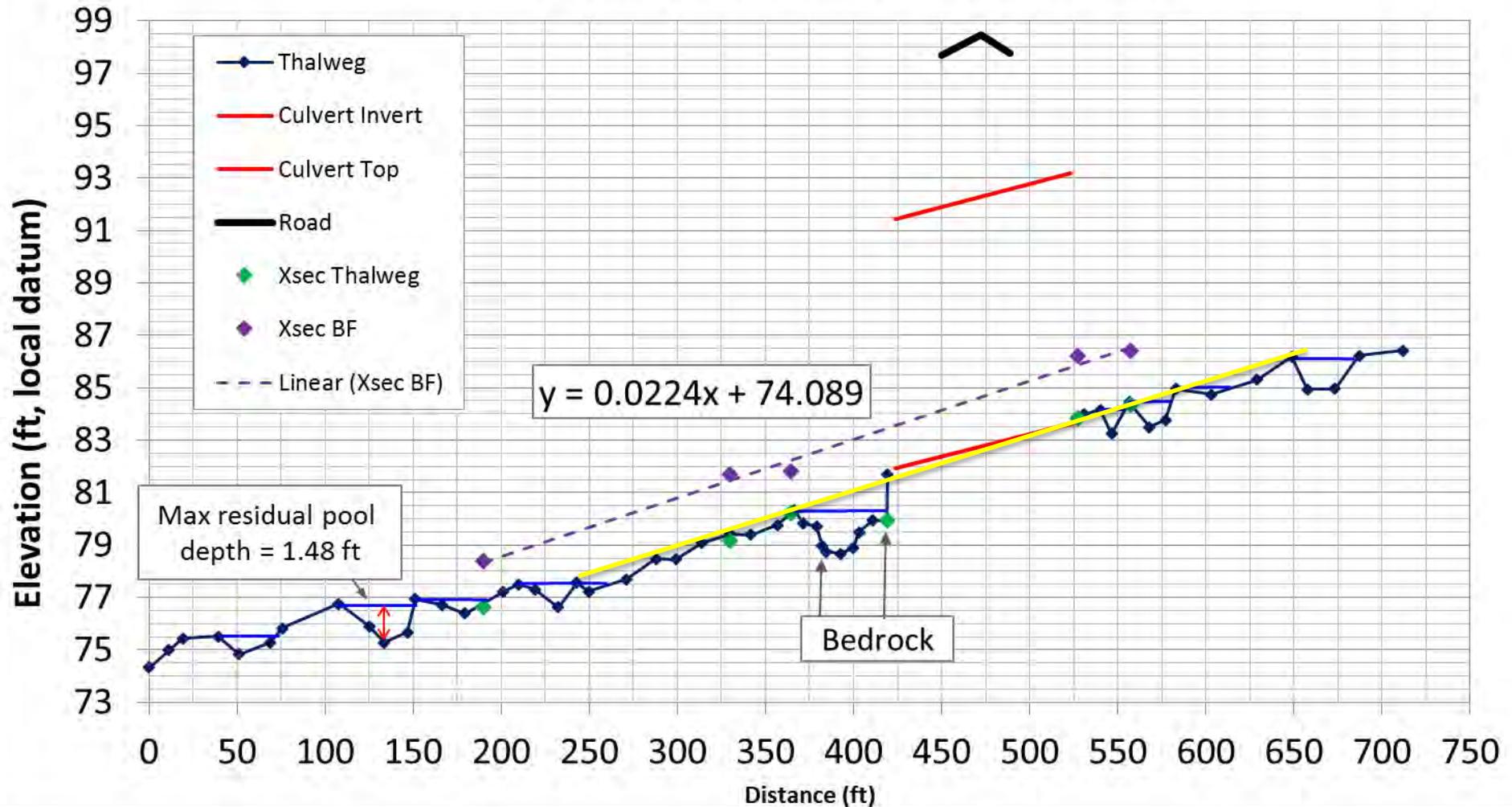


Example of a head-cut
causing instability
upstream



Vertical adjustment potential

Rountree Tributary at W Main Street, Platteville, WI



Vertical Adjustment Potential (VAP), alignment and culvert elevation exercise