Design Problem No. 1

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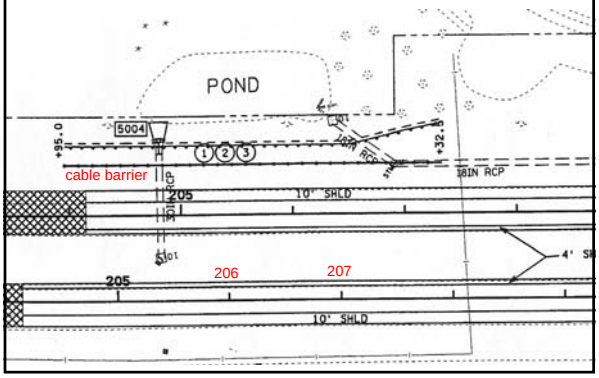
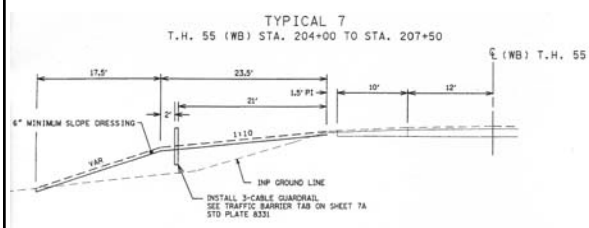
Design Problem No. 1

- Facts
  - 6-ft deep pond near and/or within clear zone
  - culvert at upstream end of pond
  - three cable barrier used to protect entire obstacle, including portions outside of clear zone
  - 10:1 approach slope to cable barrier
  - slope, varying from 2:1 to 5:1, begins 2-ft behind cable barrier posts
  - no accident history

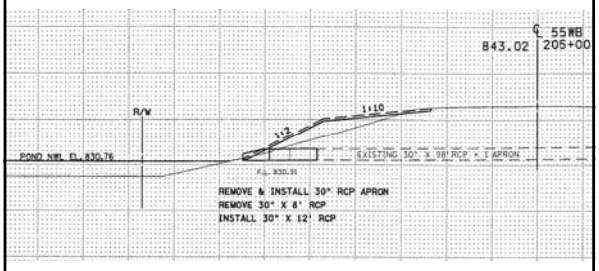
Plan view of pond, culvert, and cable barrier



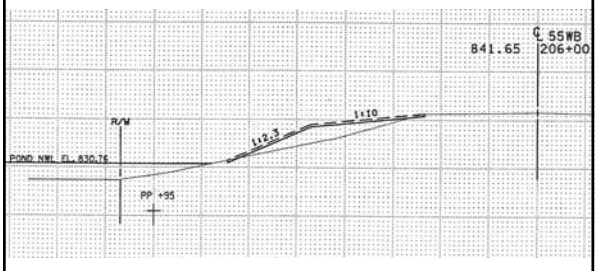
3-cable barrier with 10:1 approach slope and variable fill slope 2-ft behind posts



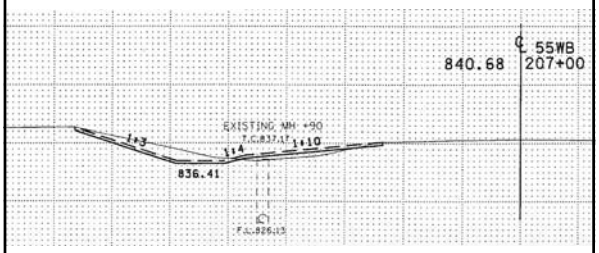
2:1 Fill slope at station 205+00



2.3:1 Fill slope at station 206+00



4:1 Fill slope at station 207+00



Treatment of Ponds Near Edge of Clear Zone

- Comments
  - three cable barrier incapable of redirecting 2000P vehicle impacting at TL-3 condition of NCHRP 350 when installed adjacent to 1.5:1 slope
  - TL-3 approved, strong-post, W-beam design variations exist when placed near or directly on 2:1 fill slope

Design Problem No. 1 (Continued)

- Conclusions
  - could conduct benefit-cost analysis to determine whether entire hazard required protection
  - extending protection to include entire hazard is reasonable and appropriate due to small increase in guardrail length
  - if MnDOT treats hazards entirely outside of clear zone, agency wide policy should be adopted
  - potential tort risk associated with inconsistent application of clear zone principles

Recommendations

- Cable guardrail may function in this application, but research not yet complete
- Simulation study indicates cable barrier should provide acceptable performance when placed 3’ in front of slope break point and post spacing reduced to 4’
- W-beam guardrail with 7’ posts on 3’-1.5” centers placed at the slope break point is an NCHRP Report 350 approved alternative