



The Highlands Ravine Stabilization Channahon, IL



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Introduction

Pre-Development Site (1994):

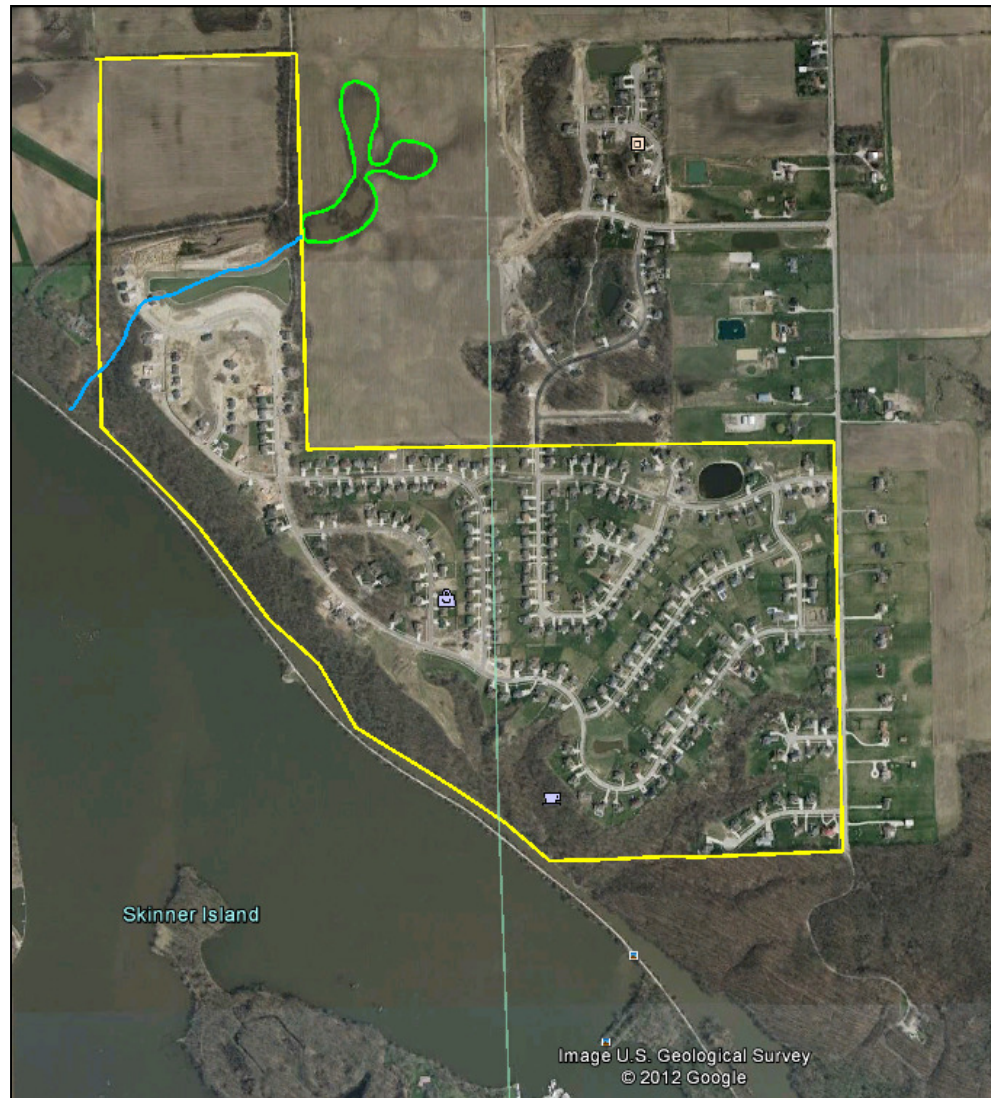
- Farm
- Ponds
- Swales/Field Tiles
- Bluff/Ravine



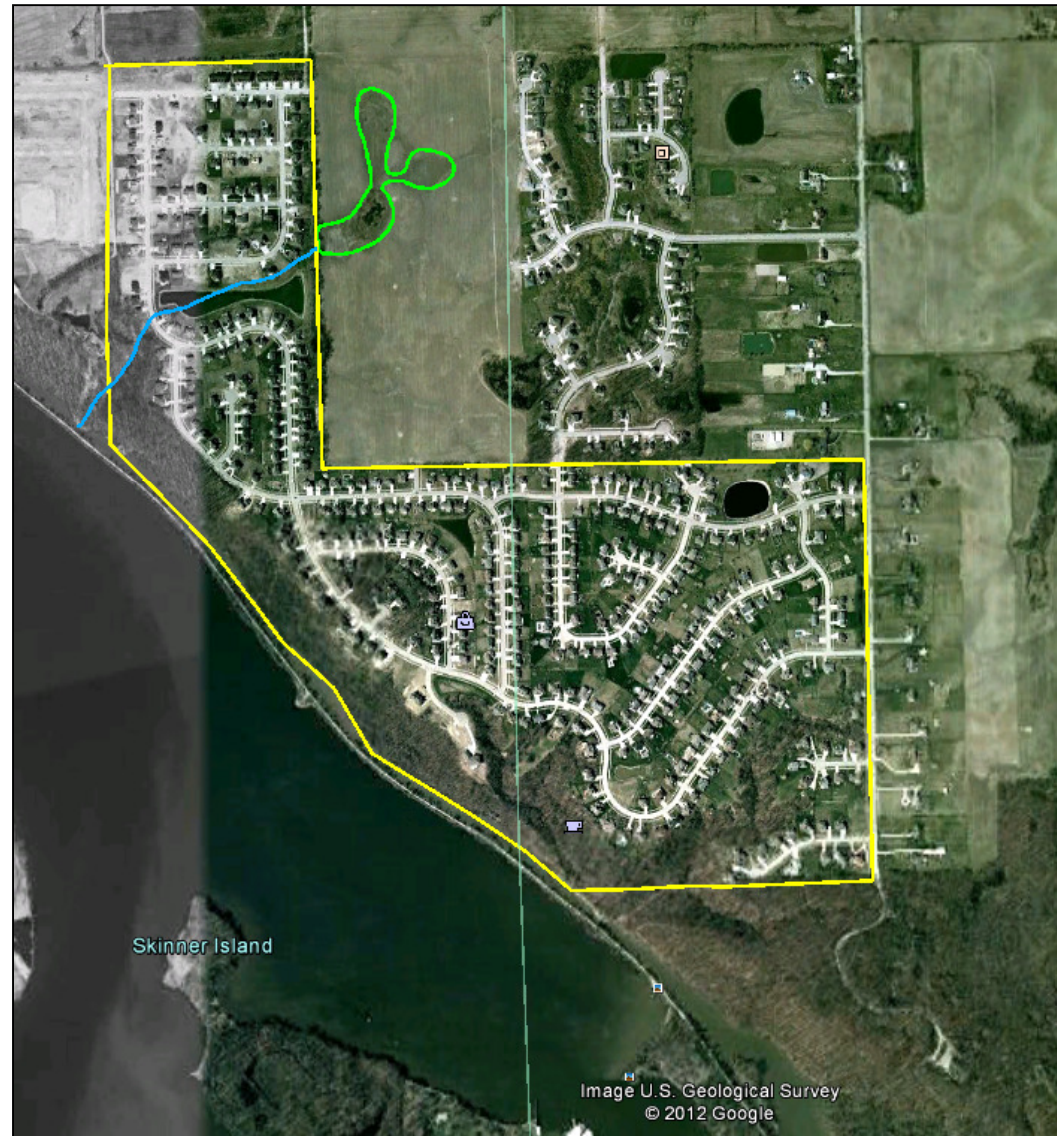
Development History: 1998



Development History: 2002



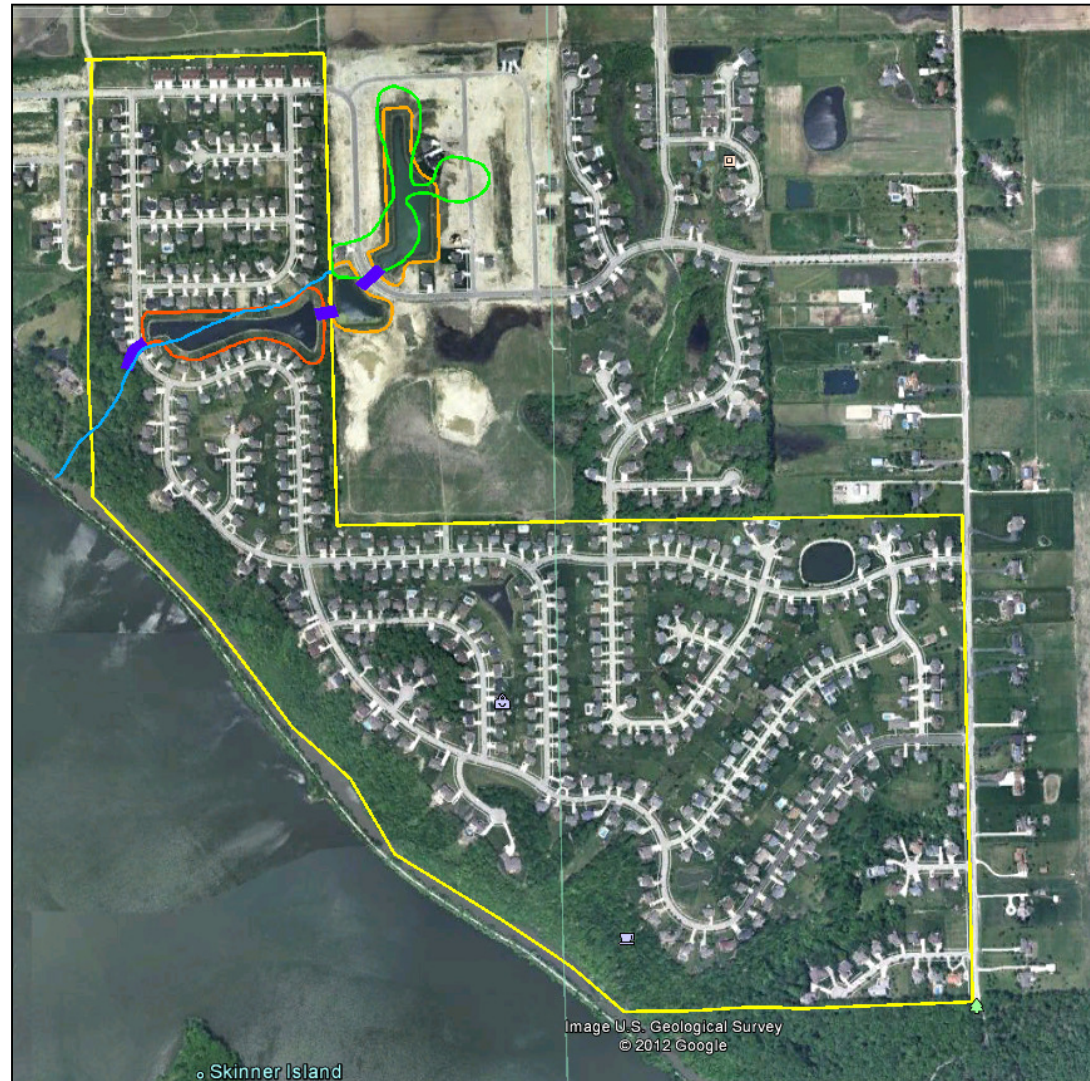
Development History: 2005



Development History: 2006

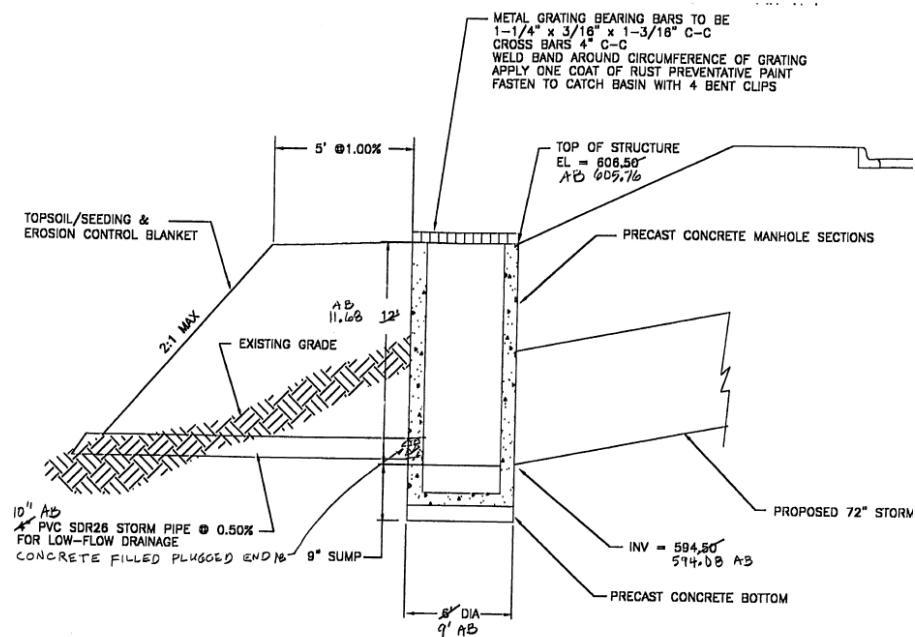


Development History: 2007



Development Design

- Detention Not Required by Ordinance: Direct Discharge to Illinois River
 - 10-year volume released at 0.04 cfs/acre (3 cfs)
 - 7" restrictor
 - 10.2 acre-feet of storage
 - Piped overflow system for 100-year event (156 cfs): 42" pipe
 - Stilling Well per FHWA HEC-14
 - Low-flow pipe installed to empty stilling basin



STILLING WELL DETAIL #36

Unforeseen Impacts

- High-velocity discharge through small restrictor
- Erosion begins during construction:
 - Low-flow pipe increased in size
 - Low-flow pipe plugged; then unplugged
 - Slope armored with rip-rap, etc.
- Constant flow from sump pump discharges
- Downstream sedimentation



Hydraulic Efficiency



Unforeseen Impacts



Ad-Hoc Erosion Control



Continued Erosion



Property Damage (Real and Threatened)



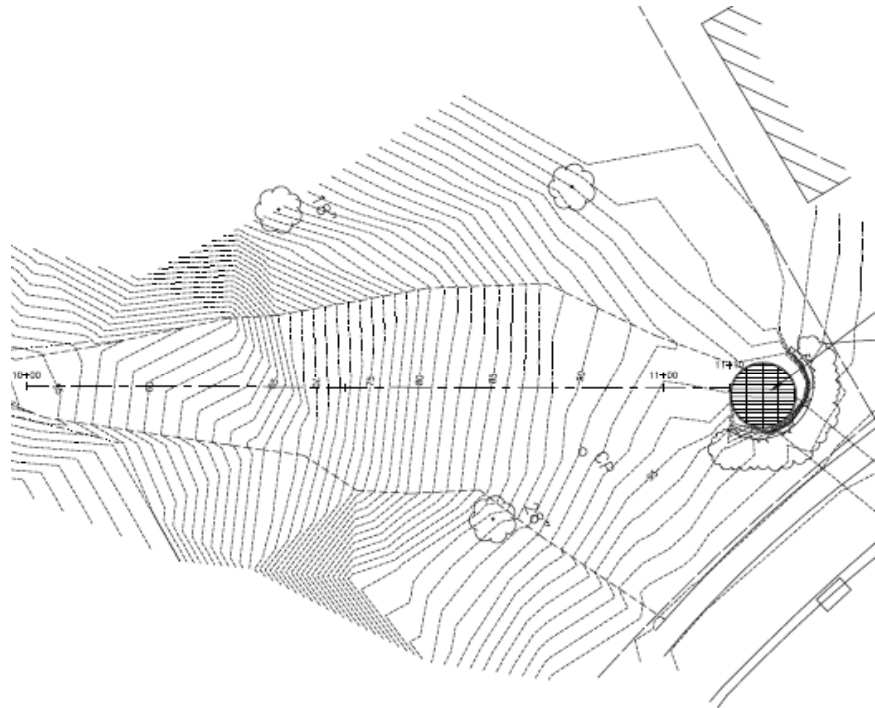
Analysis

- Met with Village Staff
- Visited site
- Reviewed subdivision design and calculations
- Topographic survey
- Reviewed context-sensitive improvement alternatives

Improvement Alternatives

Alternative #1: Native vegetation

- Steep slope
- Poor lighting
- Wet conditions
- Planting area
 - Poor soils
 - Existing rip-rap



Improvement Alternatives

Alternative #2: Hardscape

- Considered rip-rap, gabions, flume, drop pipe, fabric-formed concrete
- Negative impacts to ravine's natural aesthetics
- Construction challenges:
 - Steep slope
 - Existing trees
 - Adjacent homes
 - Limited working area

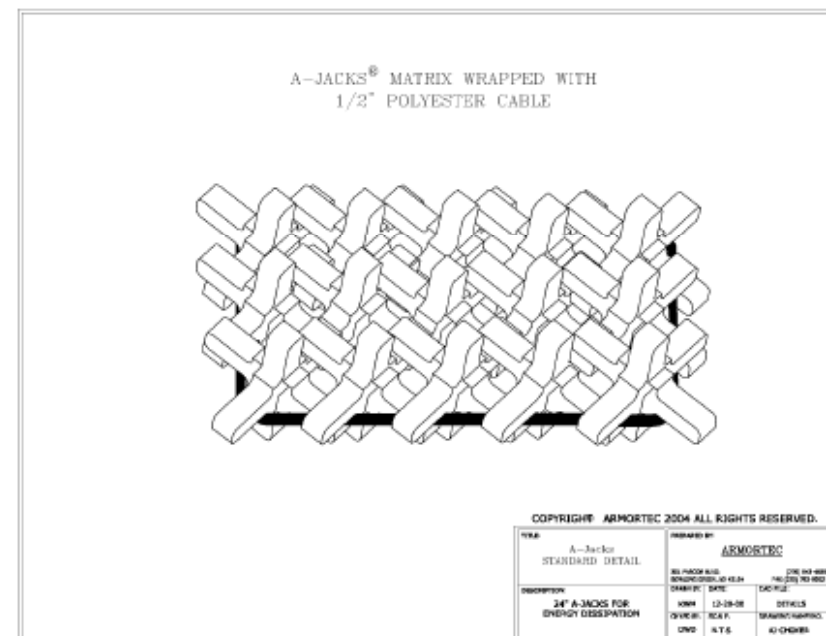
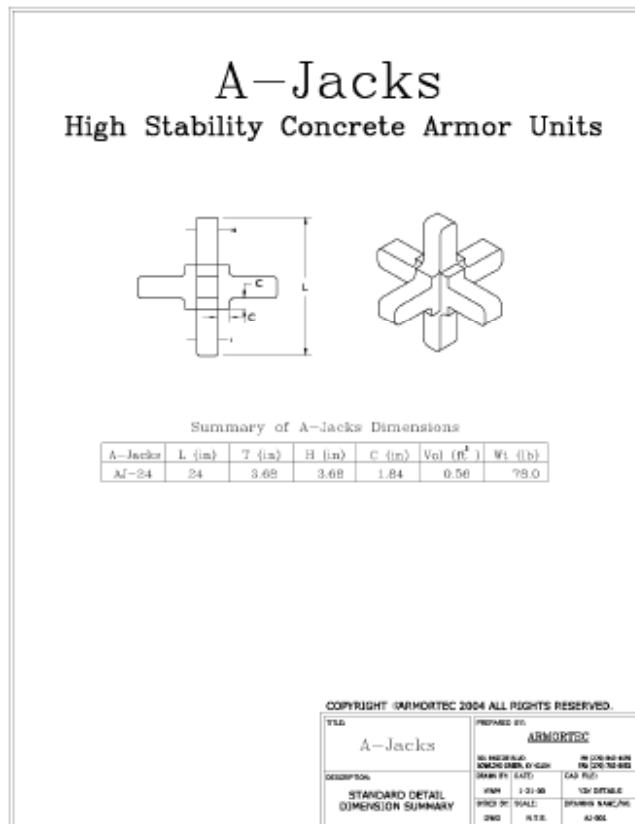
Improvement Alternatives

Alternative #3: Hybrid

- Flexible hardscape with plantings
 - Concrete armor units
 - Articulated concrete block mats
- Stepped profile for energy dissipation
 - Stilling pools
 - Cascades
- Vegetation in block openings

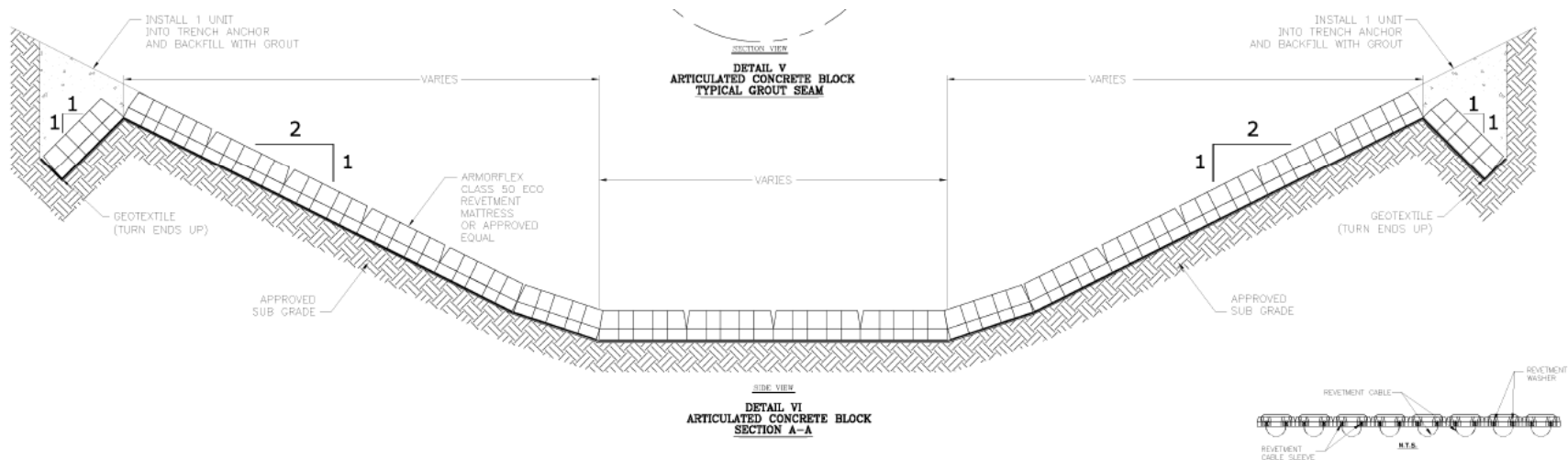
Improvement Alternative #3

“A-Jacks” Concrete Armor Units by Armortec

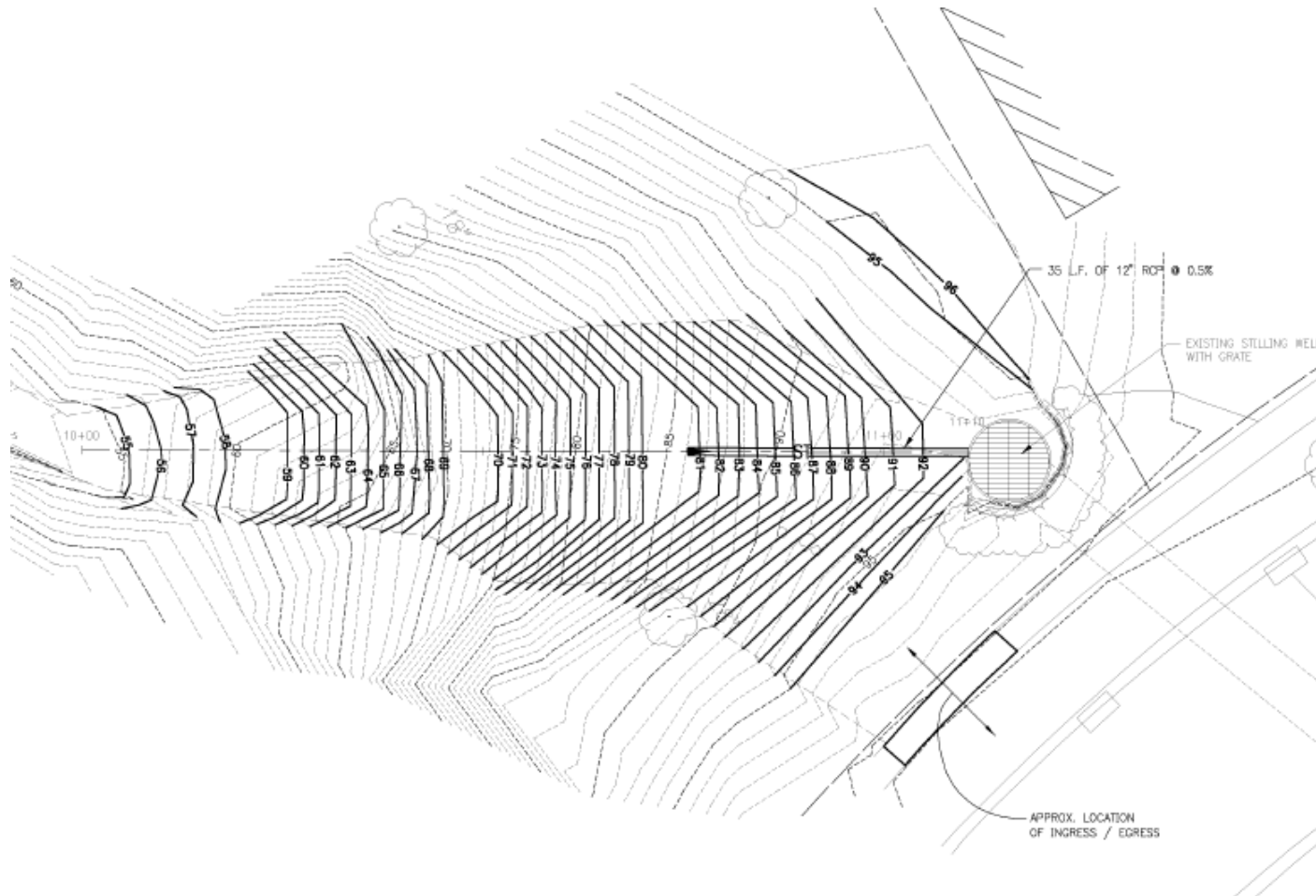


Improvement Alternative #3

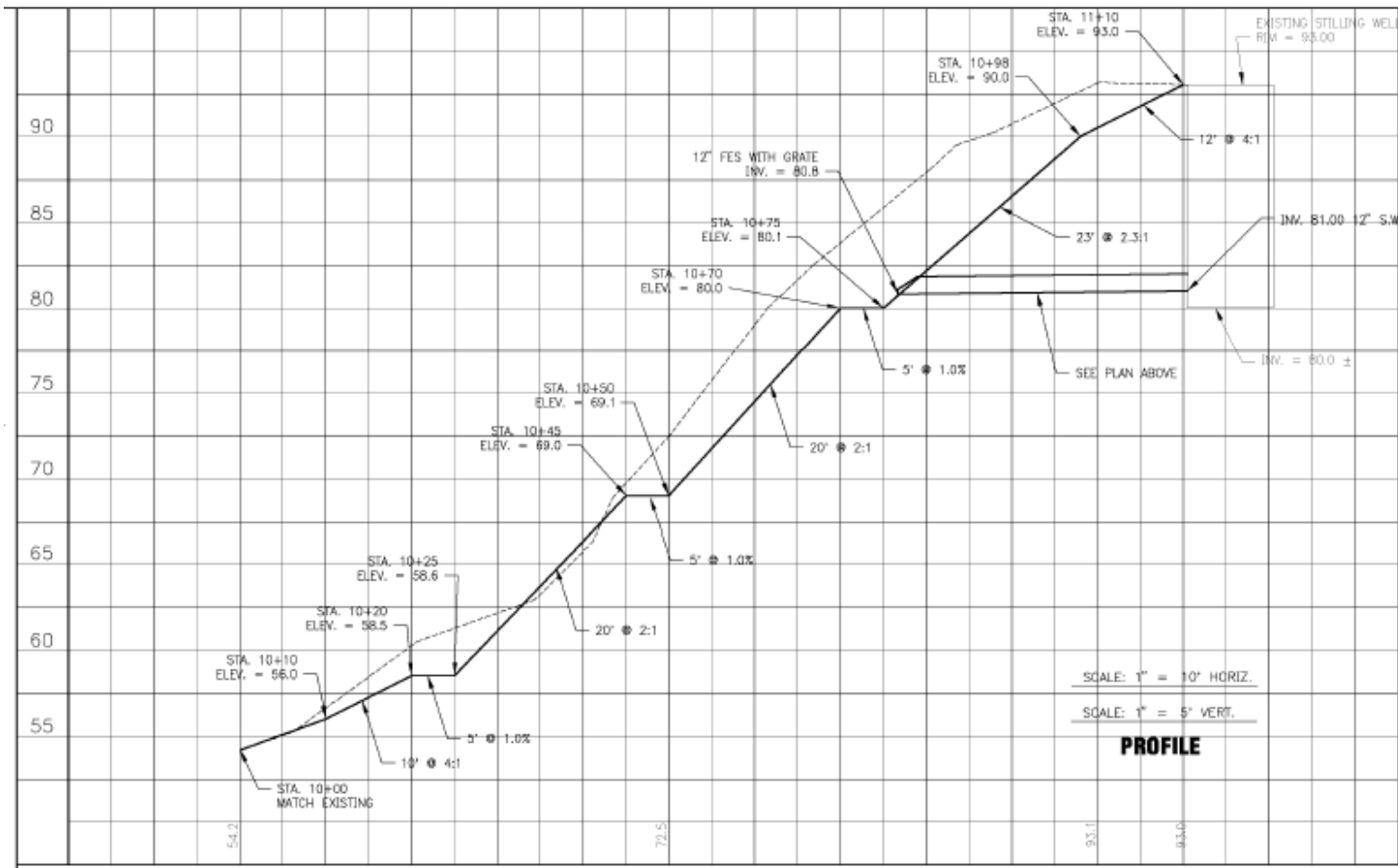
“Armorflex” Articulated Concrete Blocks by Armortec



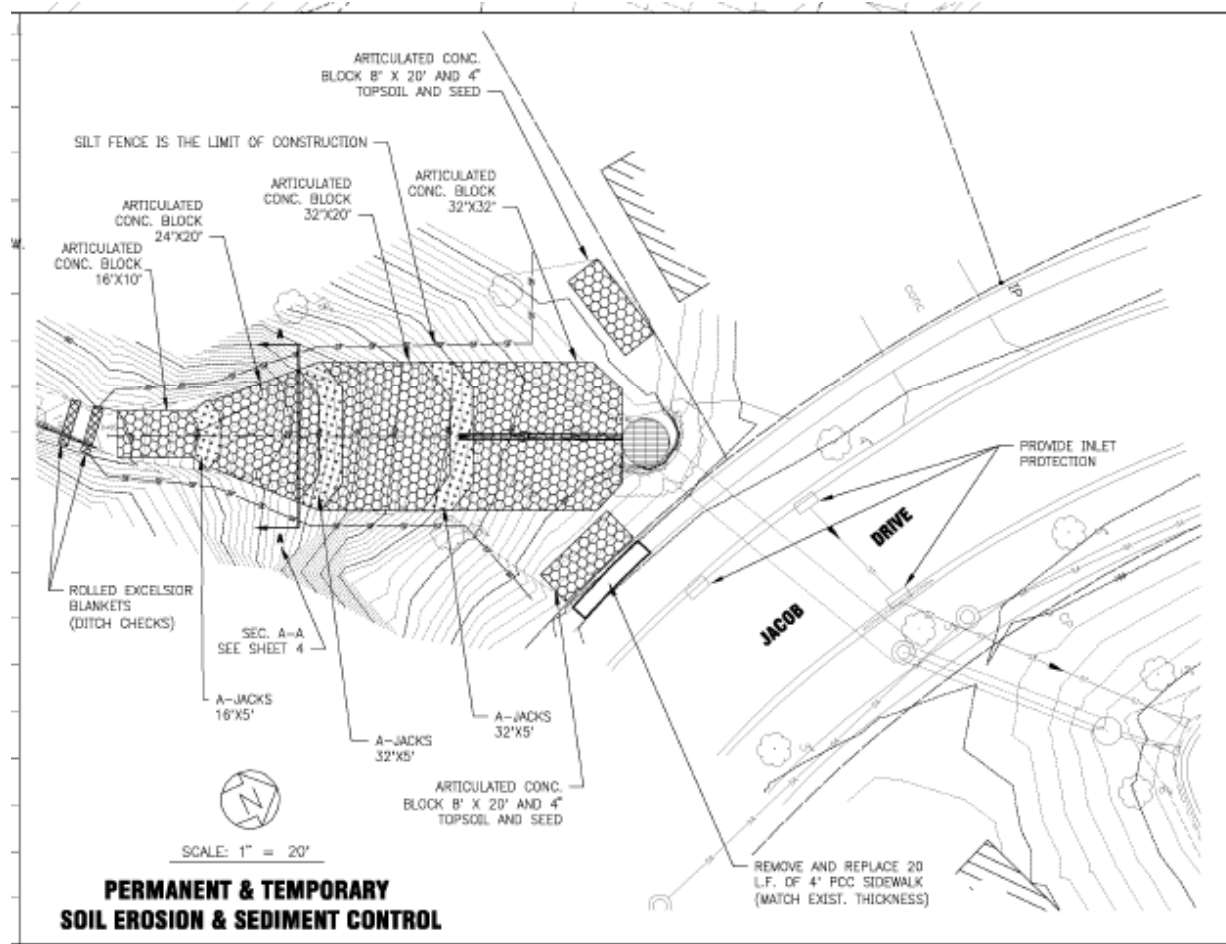
Grading Plan



Profile



Plan



Construction



Construction



Construction



Completion



Completion



Completion



Long-Term Success



Long-Term Success



Long-Term Success



Long-Term Success



Long-Term Success





Questions?

Thank you!

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