

International Erosion Control Association

EVALUATION OF INLET PROTECTION PRACTICES USING LARGE SCALE TESTING TECHNIQUES

M.A. Perez, W.C. Zech, and X. Fang - Department of Civil Engineering, Auburn University



AUBURN
UNIVERSITY

TESTING SELECTION

Stormdrain inlet protection is a key component of a Stormwater Pollution Prevention Plan, as unprotected inlets become a point source for contaminants and sediments to be released into the stormwater conveyance system. Inlet protection can act as a "last chance" defense against discharging eroded sediments into receiving waterways from construction sites. It is generally more cost efficient to prevent pollution from entering a waterway and a strong, effective, inlet protection plan will minimize sediment deposition into aquatic ecosystems by controlling the direct input source. Inlet protection is intended to reduce sediment discharge and typically consists of a sediment filter installed around a storm drain drop inlet or curb inlet. This approach prevents sediments from entering drainage systems during construction and pre-stabilization phases.

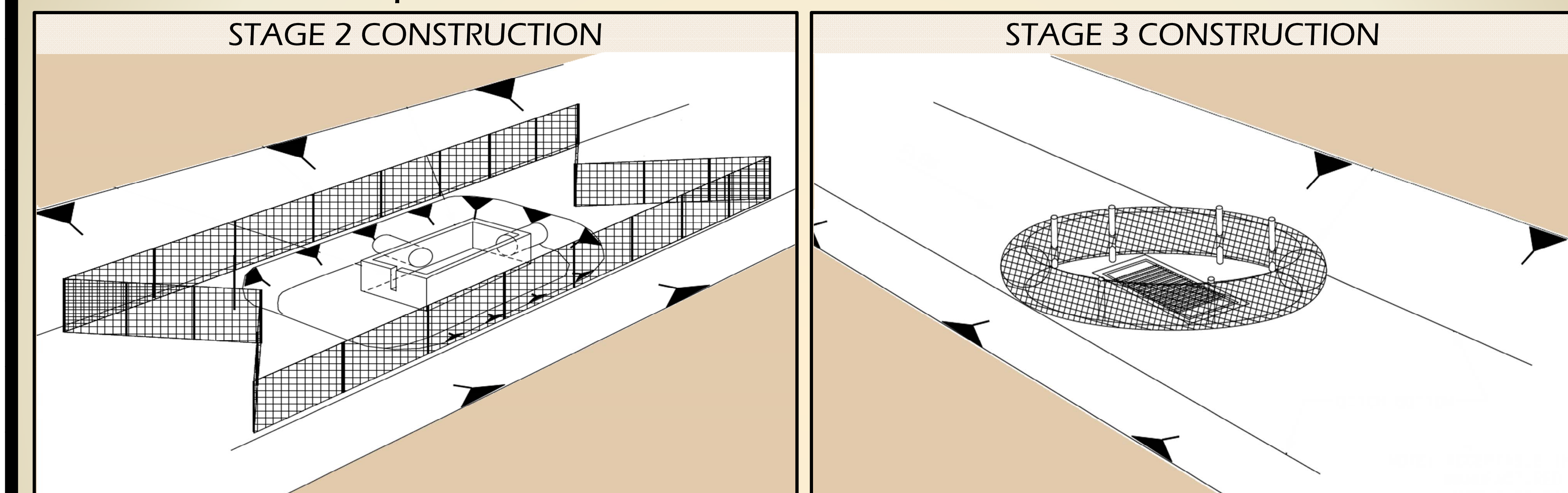
RESEARCH OBJECTIVES

The Auburn University Erosion and Sediment Control Facility (AU-ESCTF) is currently assessing the performance of drop inlet protection standards developed by the Alabama Department of Transportation (ALDOT). The intent of this study is to:

- Evaluate the performance of current inlet protection practices
- Provide recommendations & improvements on current practices
- Establish testing protocols and thresholds for future product approval
- Provide training for installers and inspectors

INTRODUCTION

ALDOT categorizes inlet protection into four separate categories depending on the stage of construction (i.e., Stage 1-4). The focus of the research effort will be on Stage 2 and Stage 3 inlet protection practices used in earthen medians prior to stabilization.

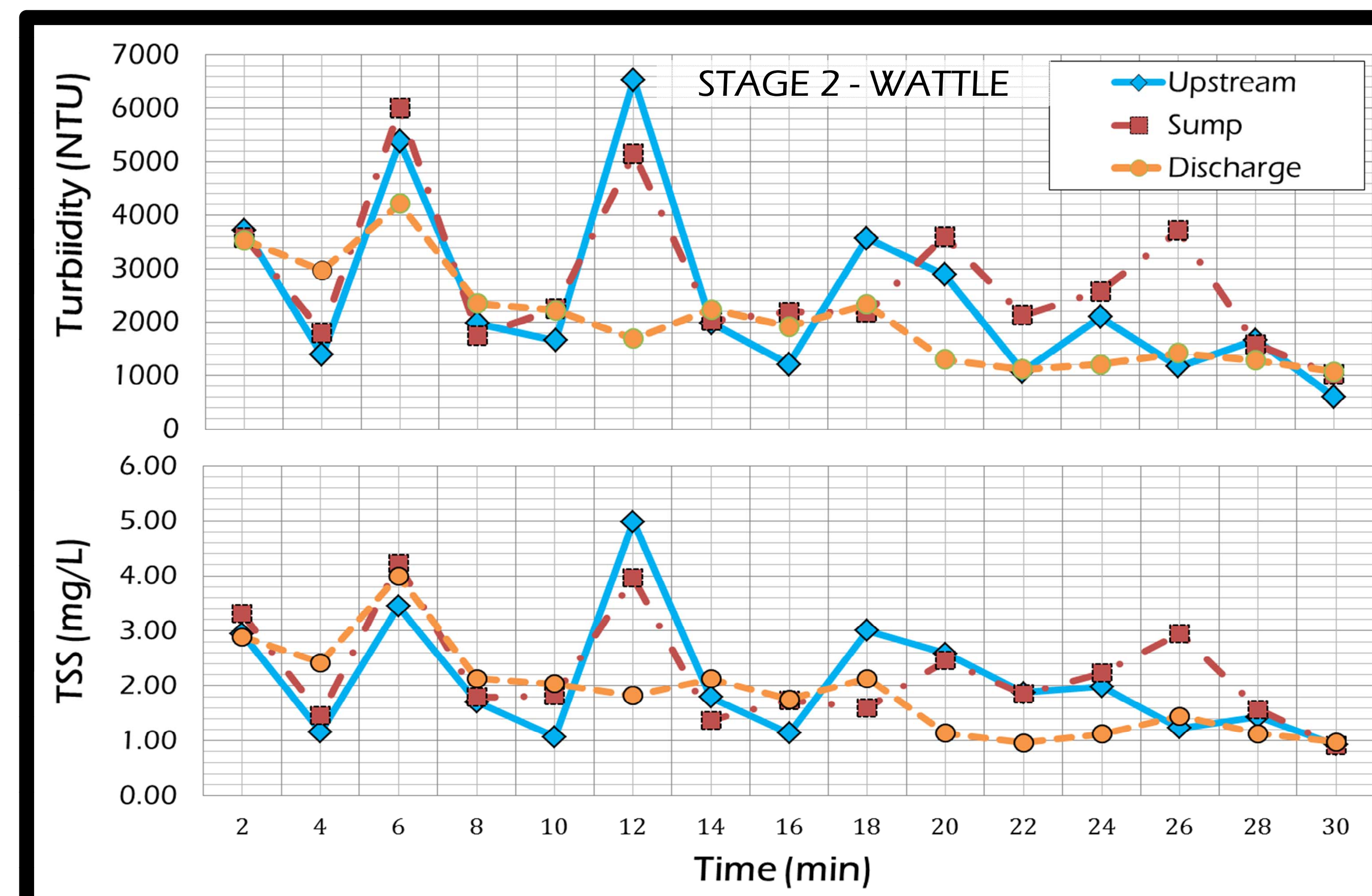
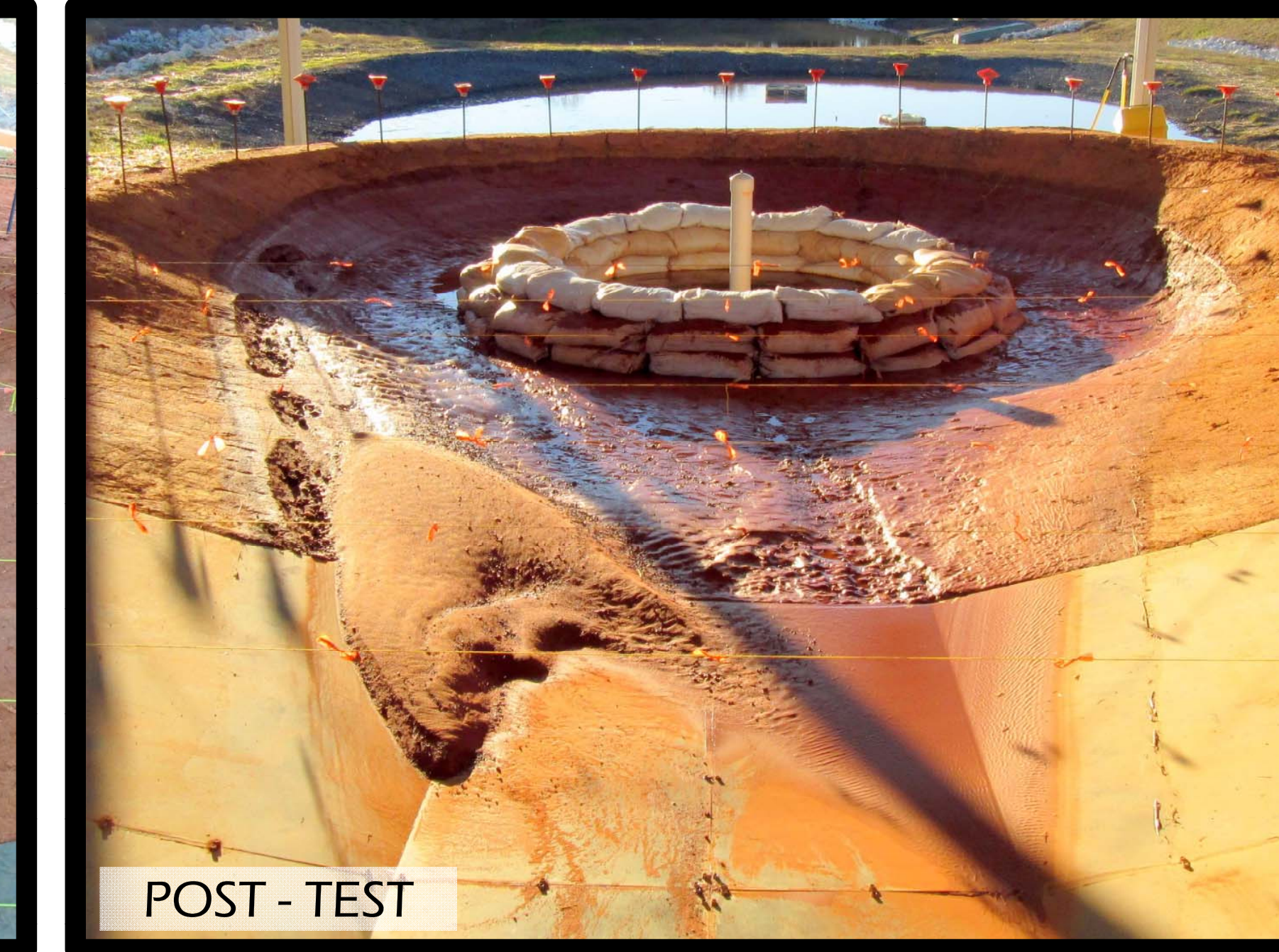


Stage 2 Inlet Protection

- Installed after inlet is constructed and prior to backfilling
- Protection measures include: (1) silt fence and (2) wattles

Stage 3 Inlet Protection

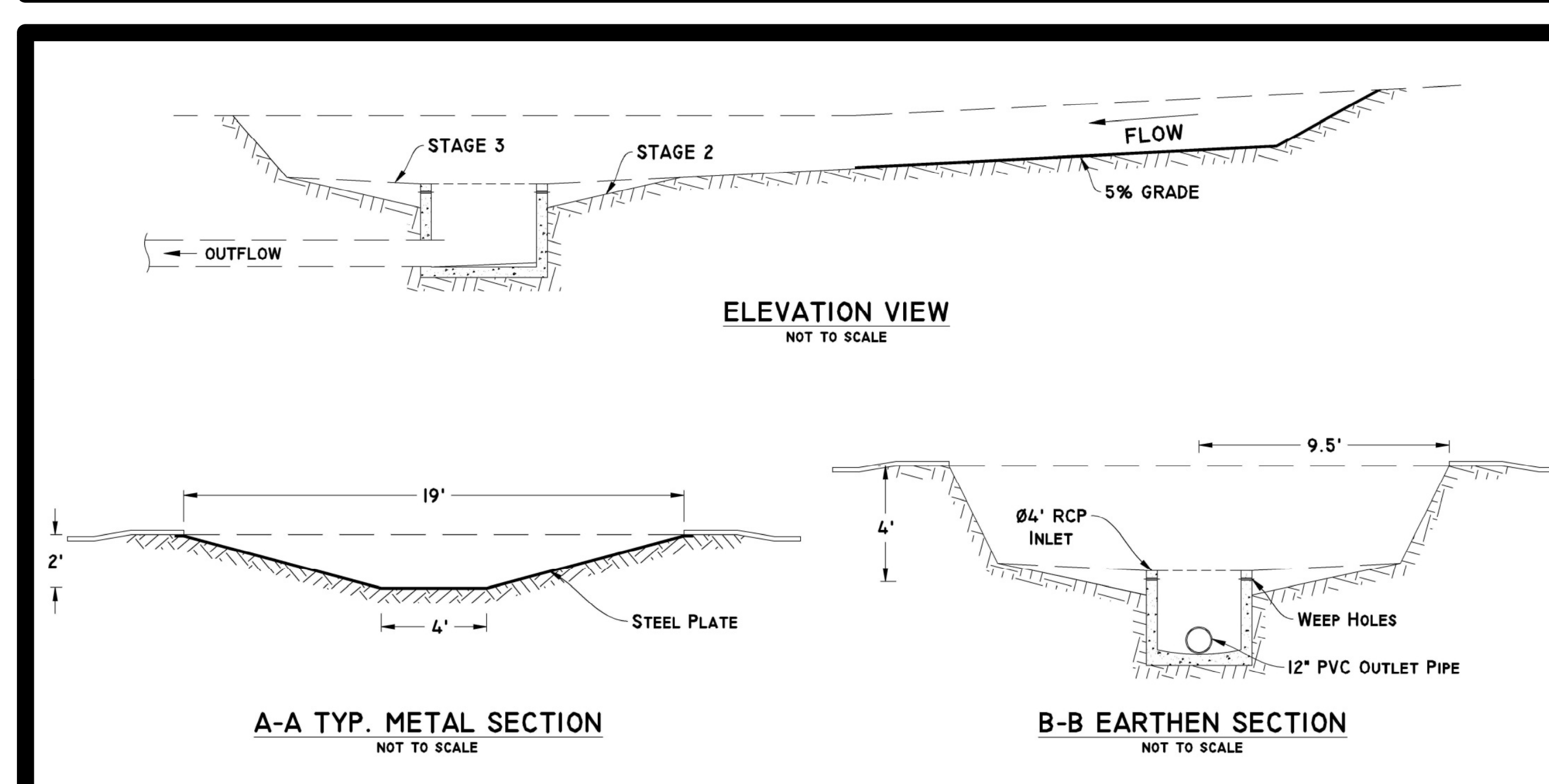
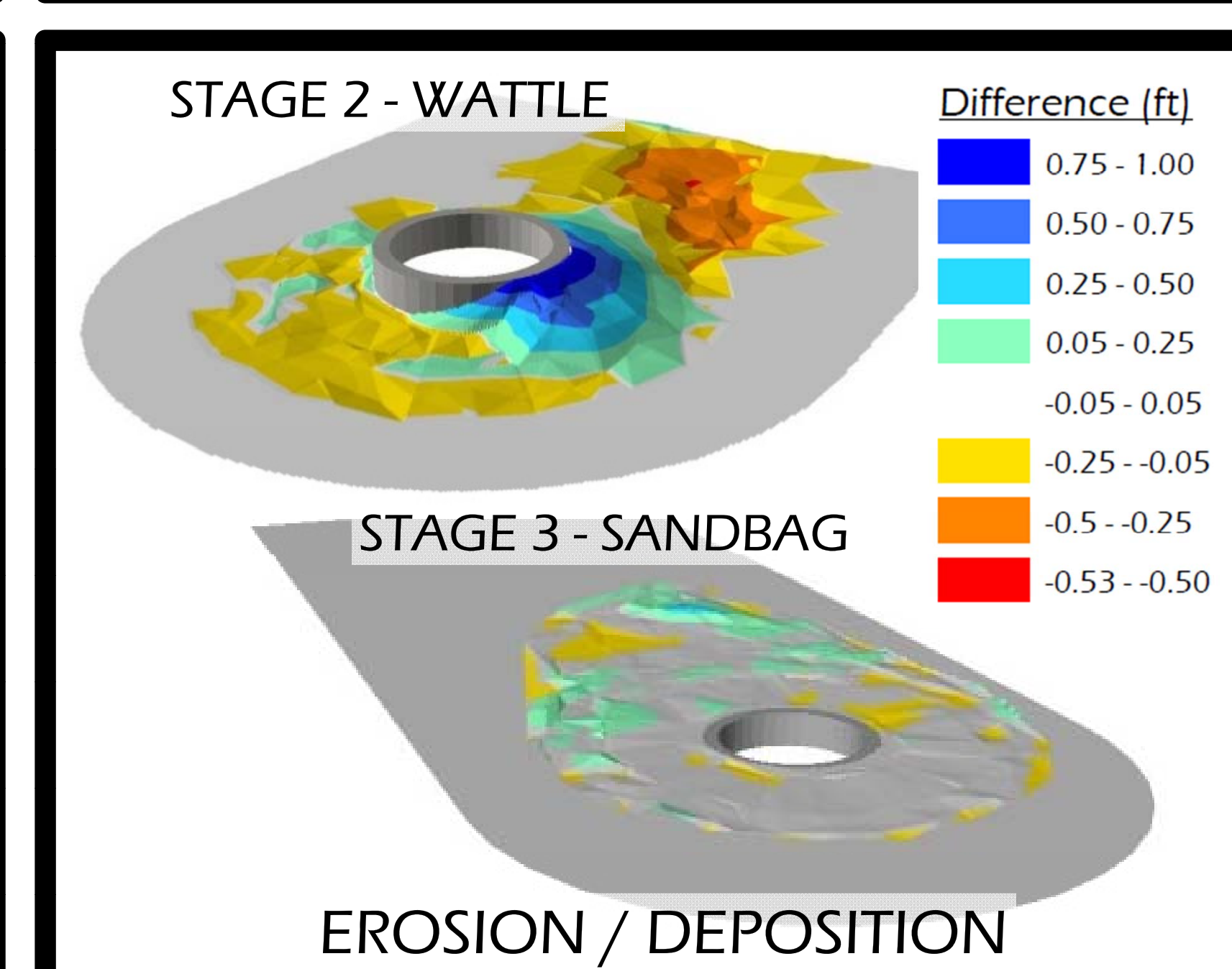
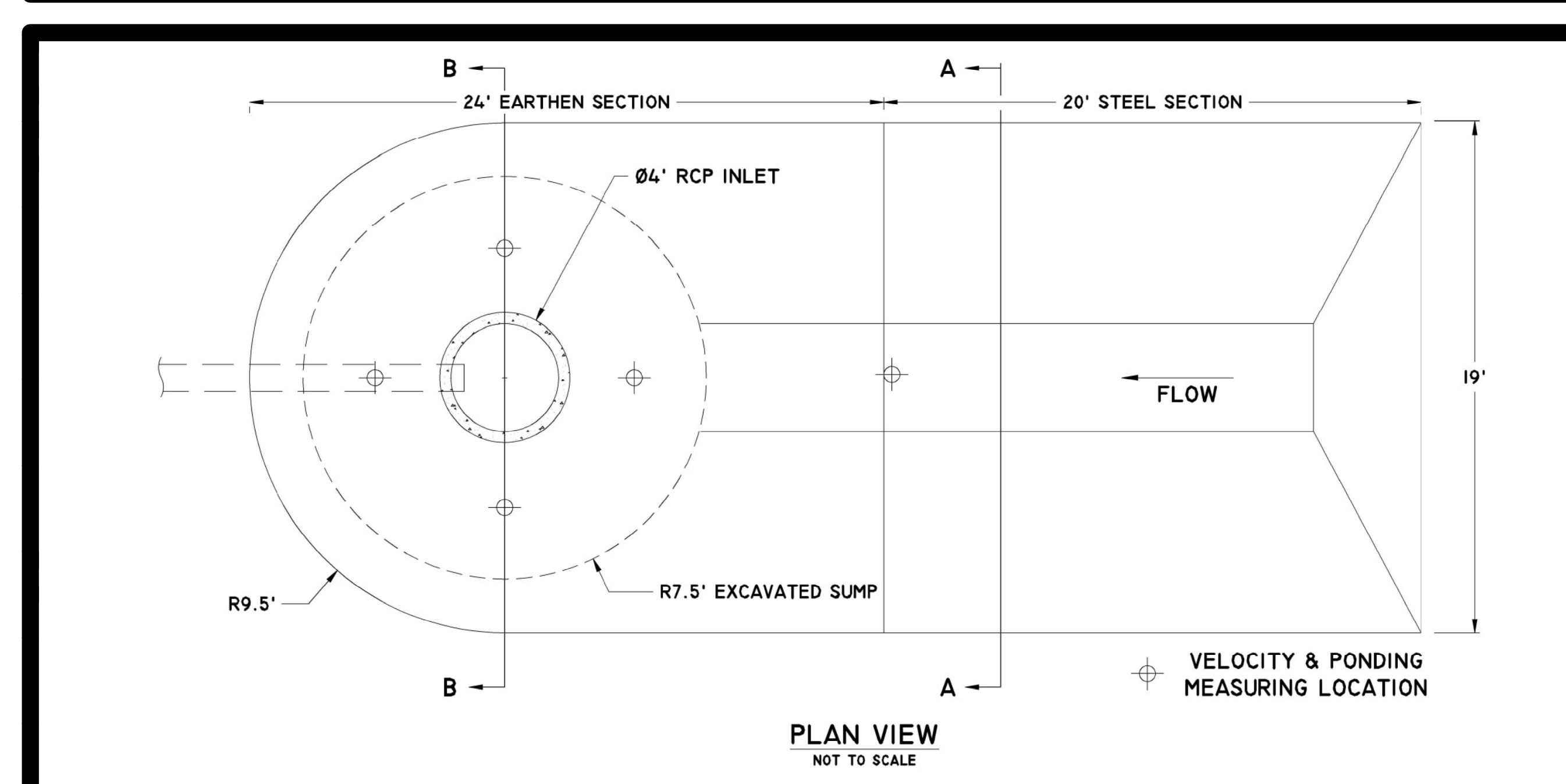
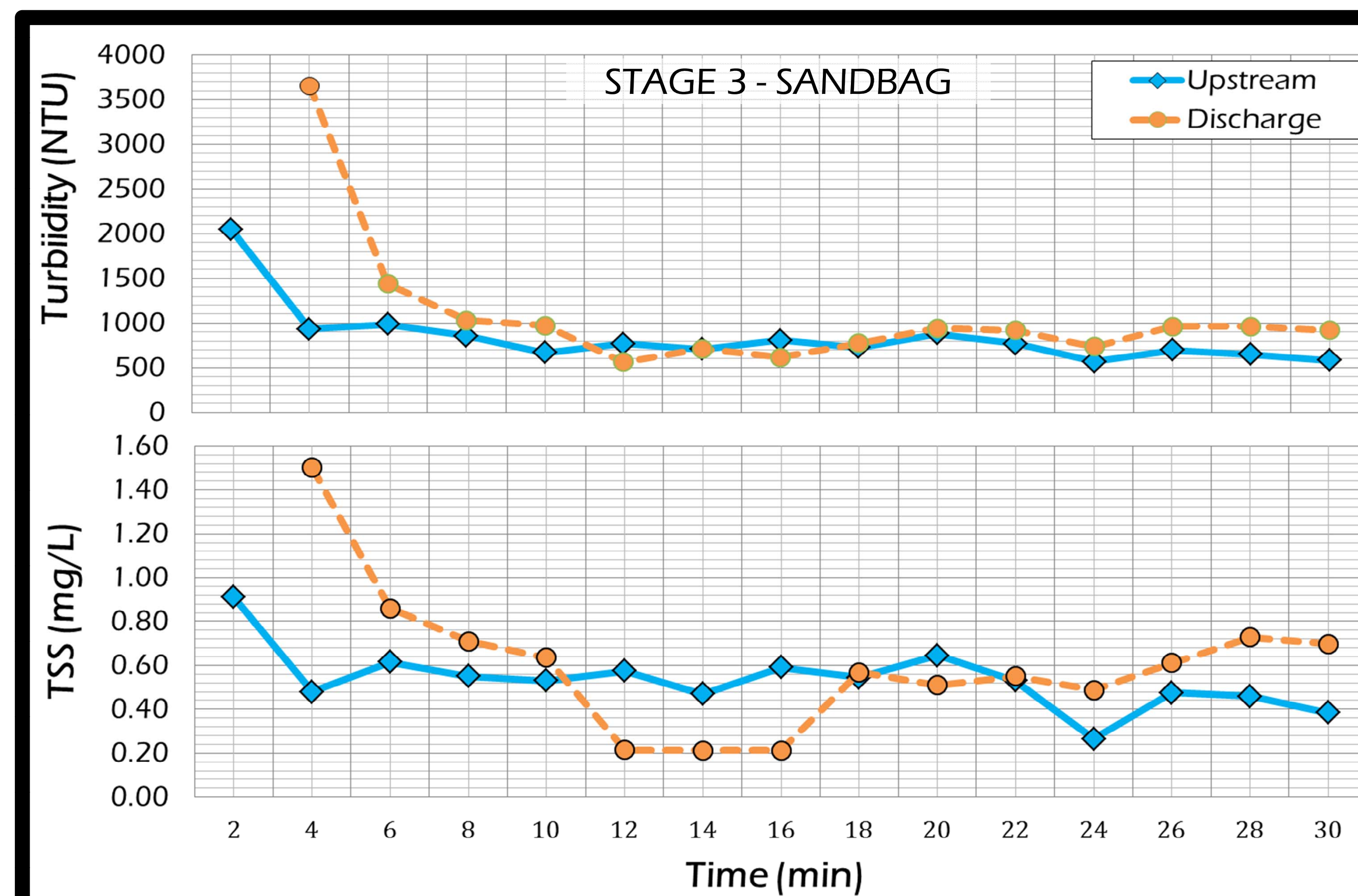
- Required after inlets are completed through grate installation and prior to complete stabilization of the surrounding area
- Protection measures include: (1) manufactured inlet protection devices, (2) coarse aggregate, (3) wattles, and (4) sand bags



RESULTS SUMMARY

S-2 Wattle vs. S-3 Sandbags

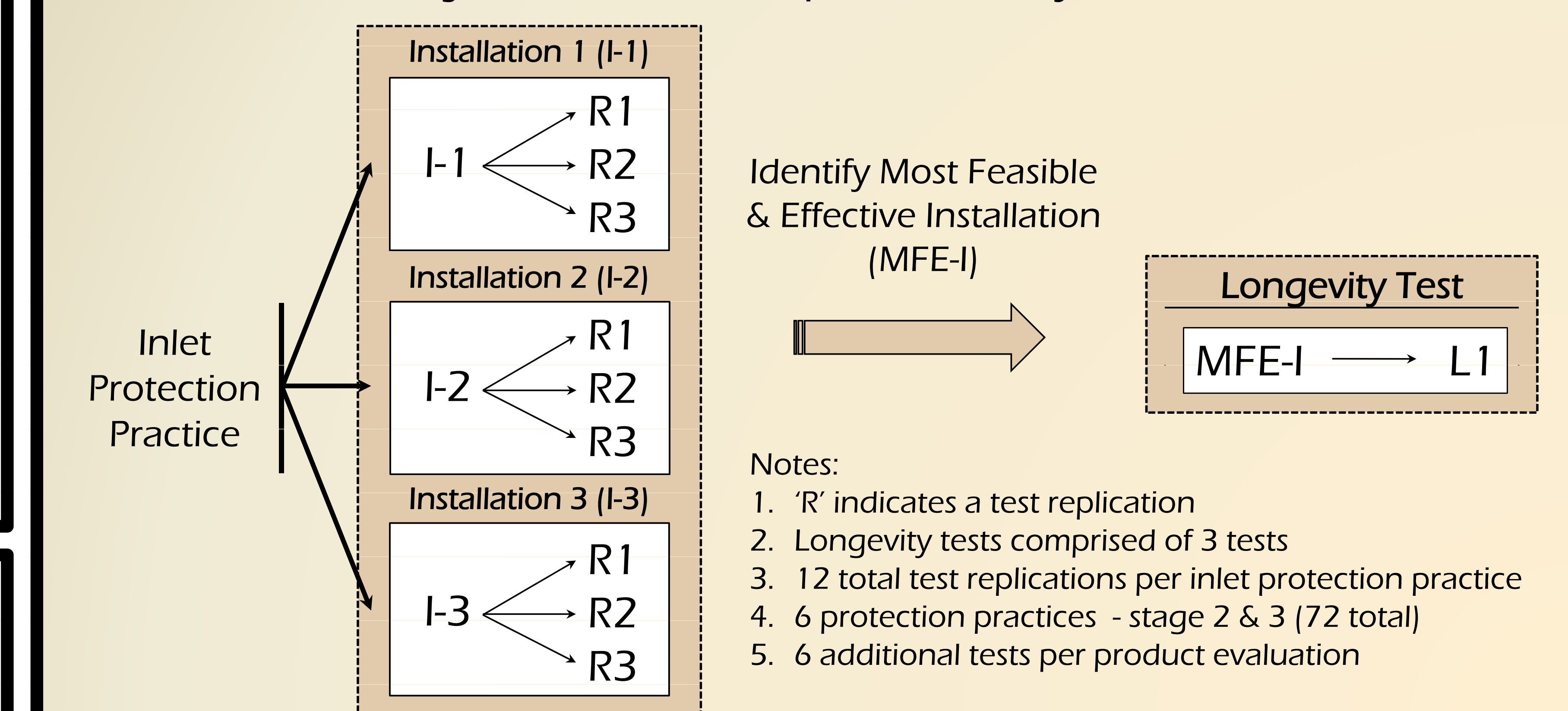
Turbidity (NTU) & TSS (mg/L)				
NTU	TSS	Averages	NTU	TSS
2462	2.08	Upstream	843	0.53
2059	1.87	Discharge	1086	0.61
16.4%	10.2%	% Removal	-28.7%	-13.4%
Erosion / Deposition (ft ³)				
6.70	Introduced	6.70		
17.55	Erosion	4.26		
11.35	Deposition	6.14		
-12.90	Yield	-4.82		



TESTING METHODOLOGY

Large scale testing will be performed on ALDOT specified inlet protection installations following modified procedures from the ASTM standard D7351-07, entitled "Standard Test Method for Determination of Sediment Retention Device (SRD) Effectiveness in Sheet Flow Applications".

- Inlet protection practices will be installed to ALDOT specifications and constant flow, sediment-laden tests will be replicated three times
- Two alternative installations to improve the specified specification will be tested and replicated three times per inlet protection practice tested
- The Most Feasible and Effective Installation (MFE-I) will be selected from the three installation configurations for longevity testing
- The longevity test is comprised of three high flow, sediment-laden, back-to-back experiments, with the purpose to evaluate the practice's structural rigor and overall response to a build-up of sediment clogging, mimicking an installation subjected to three sequential heavy rain events



DATA COLLECTION & ANALYSIS

- The inlet testing channel is surveyed via robotic total station for erosion and deposition (pre and post-test surveys). These surveys are used to determine performance based on the quantity of sediment eroded or deposited as a result of the installed protective practice measure.
- Grab samples are taken up and downstream of the inlet protection for Total Suspended Solids (TSS) and Turbidity analyses. These water quality measures evaluate the performance of inlet protection practices in reducing suspended sediment in discharge waters.
- Velocities and ponding depths are recorded throughout the channel to evaluate the impoundment capabilities and dewatering rate of practices.

ACKNOWLEDGEMENTS

This presentation is based on a study sponsored by the Alabama Department of Transportation (ALDOT) located in Montgomery, Alabama. The support provided is gratefully acknowledged.