

Demonstration/Validation of Step Infiltration at a Southeastern Army Installation

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Report Documentation Page

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Energy Independence and Security Act of 2007

SEC. 438

STORM WATER RUNOFF REQUIREMENTS FOR FEDERAL DEVELOPMENT PROJECTS

“The sponsor of any development or redevelopment project involving a Federal facility with a footprint that exceeds 5,000 square feet shall use site planning, design, construction, and maintenance strategies for the property to maintain or restore, to the maximum extent technically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of flow.”

Wow! This is a really high hurdle...and it seems to conflict with 100+ years of drainage practice



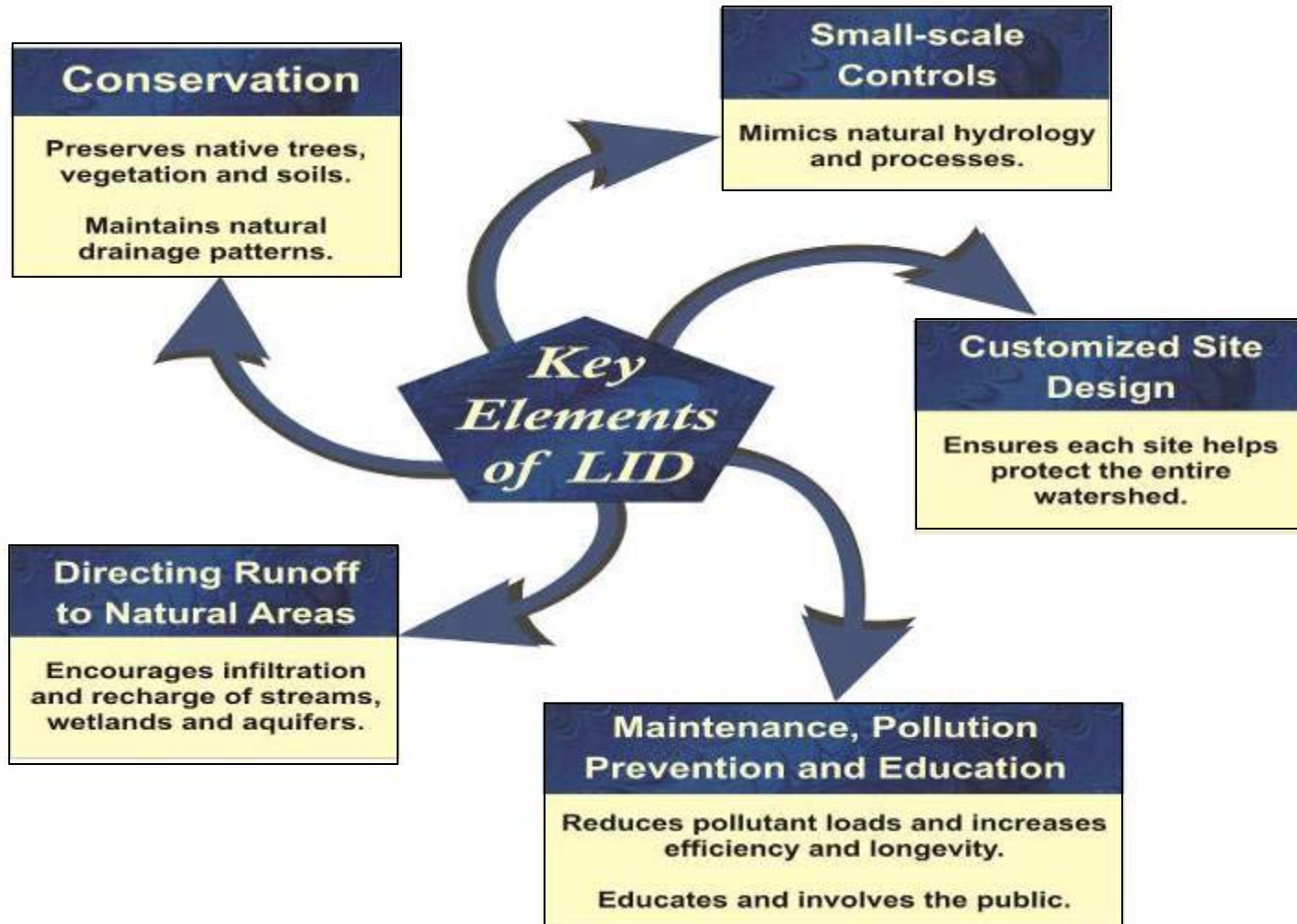
Principles of Low Impact Development (LID)

- EISA, Section 438 and other Army guidance promotes LID approaches over more traditional approaches for stormwater management.
- Manage stormwater close to where precipitation lands.
- Maintain or restore pre-development hydrology, reduce runoff volume and peak runoff rates and reduce potential transport of pollutants to receiving waters.
- Widely proven in nonmilitary applications.
- One limit to mass Army adoption has been lack of demonstrations while combating a perception of increased costs.



Low Impact Development (LID)

principles in a nutshell



But, ERDC and the Corps have already addressed the question!

(Before Section 438 was published)

PUBLIC WORKS TECHNICAL BULLETIN 200-1-36
30 SEPTEMBER 2005

SUSTAINABLE STORMWATER STORAGE
ALTERNATIVES FOR ARMY INSTALLATIONS

Find at:

http://www.wbdg.org/ccb/browse_cat.php?o=31&c=215

- Describes basic LID practices
- Many graphics showing techniques
- Relates to SPiRiT guidance, but LEED® adaptable



PWTB 200-1-36

PUBLIC WORKS TECHNICAL BULLETIN 200-1-62
1 OCTOBER 2008

LOW IMPACT DEVELOPMENT FOR
SUSTAINABLE INSTALLATIONS:
STORMWATER DESIGN AND PLANNING
GUIDANCE FOR DEVELOPMENT WITHIN
ARMY TRAINING AREAS

Find at:

http://www.wbdg.org/ccb/browse_cat.php?o=31&c=215

- Emphasizes non-cantonment training facilities
- Photos and graphics
- Shows possible LEED® credits



PWTB 200-1-62

Easiest technique is to search for PWTB by number

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Representative technologies

- ▶ Bioretention cells
- ▶ Permeable pavement
- ▶ Bioswales
- ▶ Rain gardens
- ▶ Others



LID Examples



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Project Emphasis

- Protect jurisdictional wetlands
- Address and mitigate impact on installation wetlands
- Implement corrective actions for outfalls which can degrade water quality and fill in wetlands
- Support Clean Water Act
- Original intent to upgrade structure, control runoff volume and reduce velocity of stormwater discharge
- Utilize LID with conventional approaches as needed
- Bioretention facilities, modifications to discharge channels, infiltration swales
- Expected results: filtration of metals and surfactants, reduction in quantity of runoff, improved quality of runoff
- Options for groundwater recharge
- Conduct demonstrations, monitor, collect data.



Focus Change

- State inspection prompted emphasis on one site
- Upstream tenant had constructed detention basin with inadequate design
- Also nearby landfill cap washout.
- Result – major erosion problem.





This is the start of
the problem



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30 inch drain from tenant's retention basin



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Siltation threatens wetland area



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Planning a Solution

- Selecting possible treatments
- Evaluating tenant's catchment outfall structure
 - ▶ Outlet non-functional
 - ▶ Redesign for staged release
- Reality check

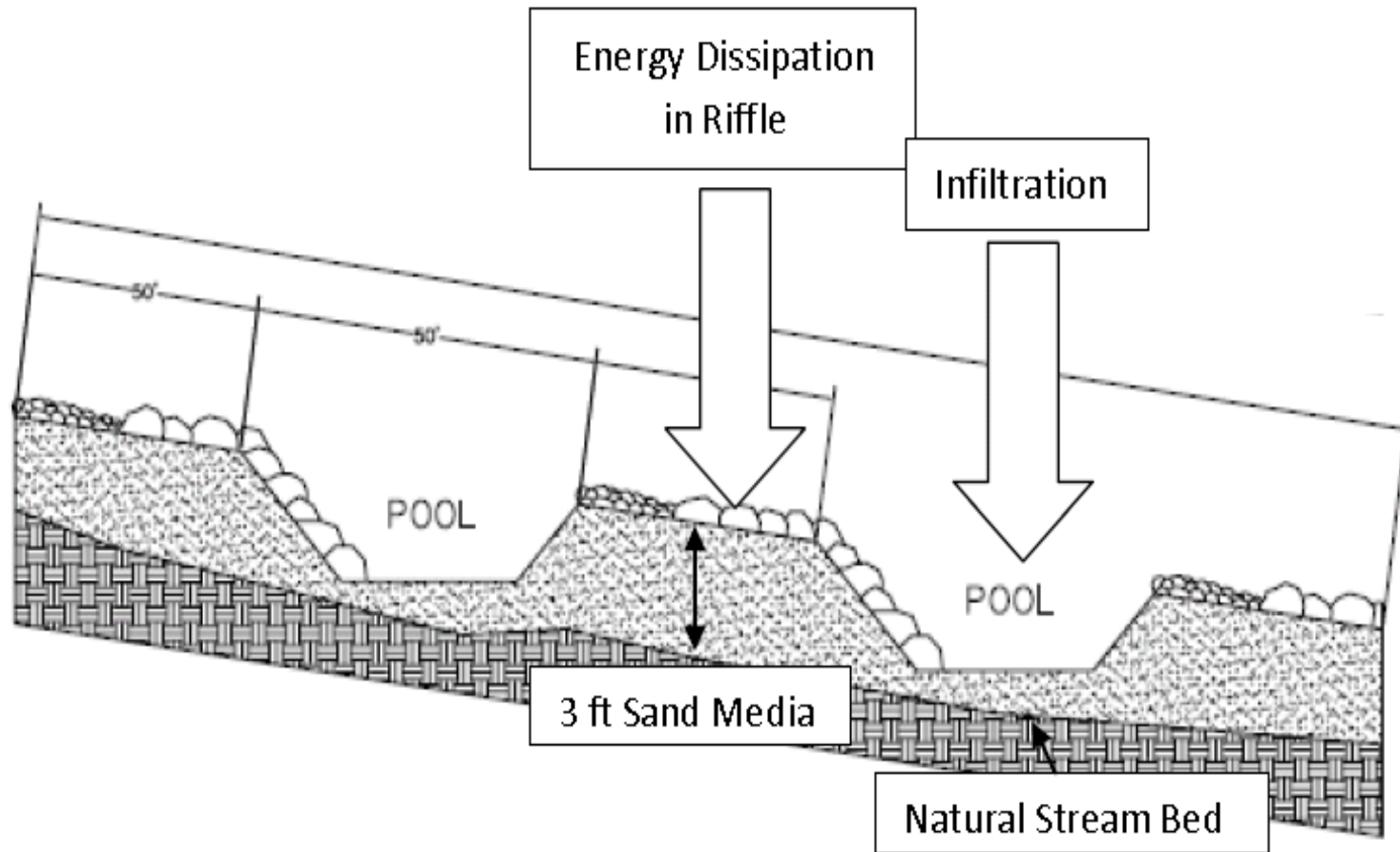


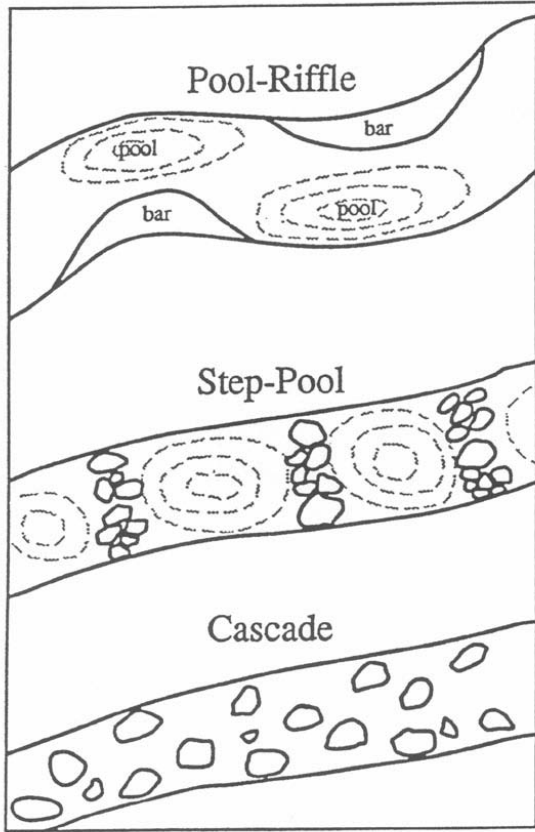
Step Infiltration Demonstration

- Step Pool Storm Conveyance
- LID open channel approach
- Best suited for ditches, outfalls, ephemeral and intermittent channels with slopes
- Improve infiltration, convert to groundwater flow
- Reduce risk of sedimentation from high intensity storm events
- Capture essential components, demonstrate, validate
- Adapt regional specifics
- Appropriate conditions for maximal effectiveness



Planning a Solution





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Step Infiltration – A Preferred Approach





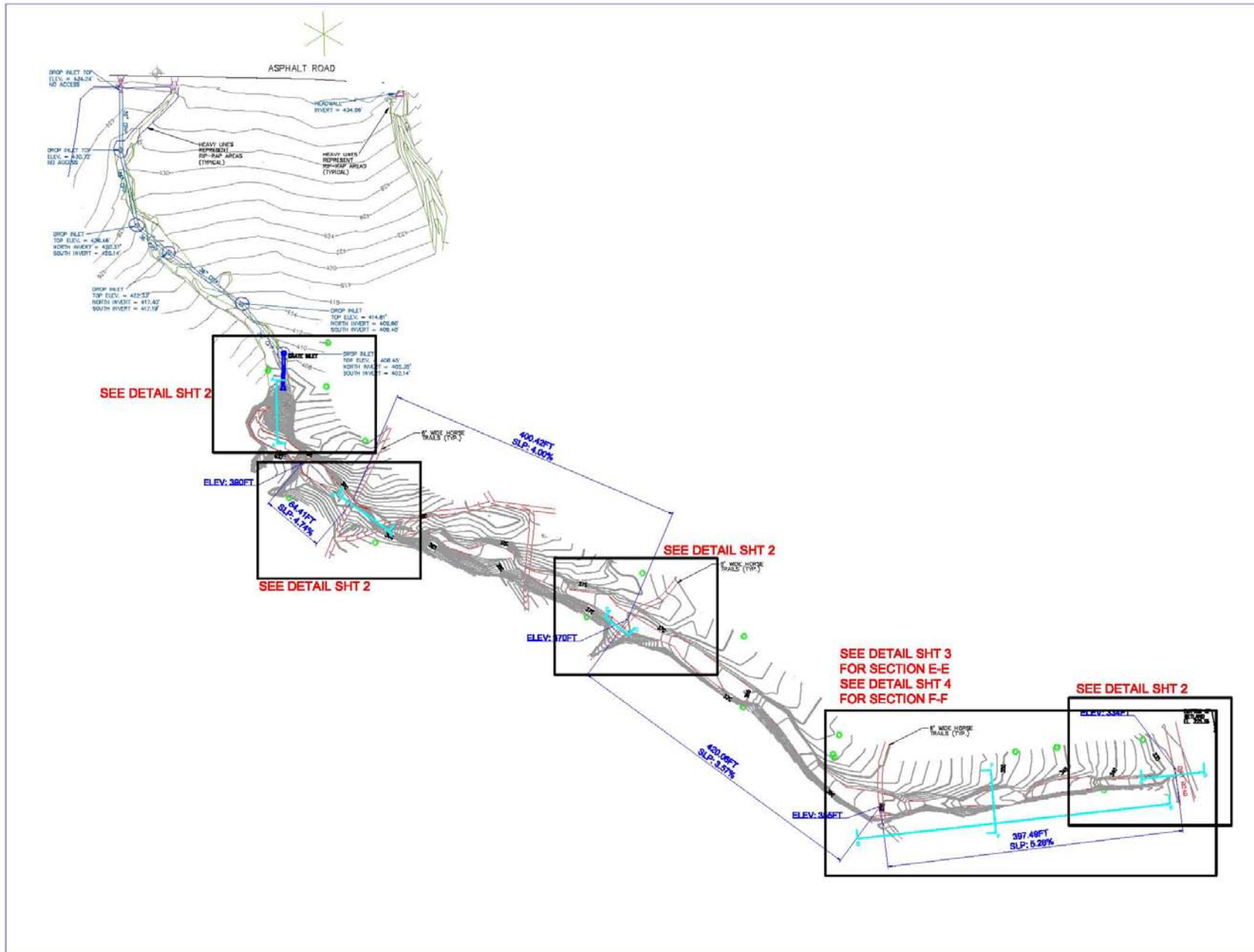
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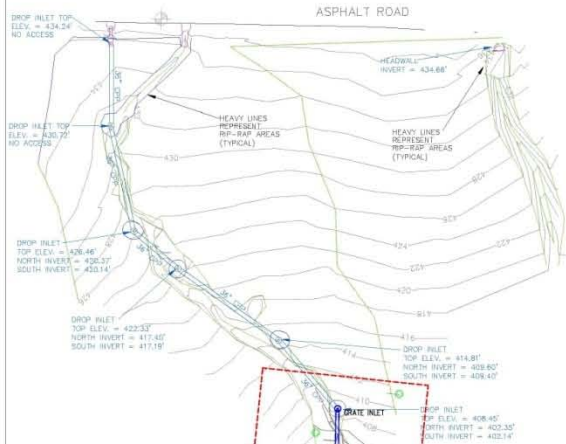
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PROPOSED CHANNEL DEVELOPMENT

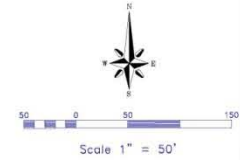


SURVEYOR'S NOTES:

1. NORTH IS BASED ON THE STATE PLANE COORDINATE SYSTEM FOR GEORGIA GRID, WEST ZONE, NAD83.
2. ELEVATIONS AS SHOWN HEREON ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).
3. NO UNDERGROUND INSTALLATIONS OR IMPROVEMENTS HAVE BEEN LOCATED EXCEPT AS SHOWN.
4. ALL MEASUREMENTS AND/OR ELEVATIONS WERE MADE IN ACCORDANCE TO UNITED STATES STANDARDS AND/OR UNITED STATES COAST AND GEODETIC DATUM, DISTANCES ARE IN FEET, TENTHS AND HUNDREDTHS OF A FOOT.

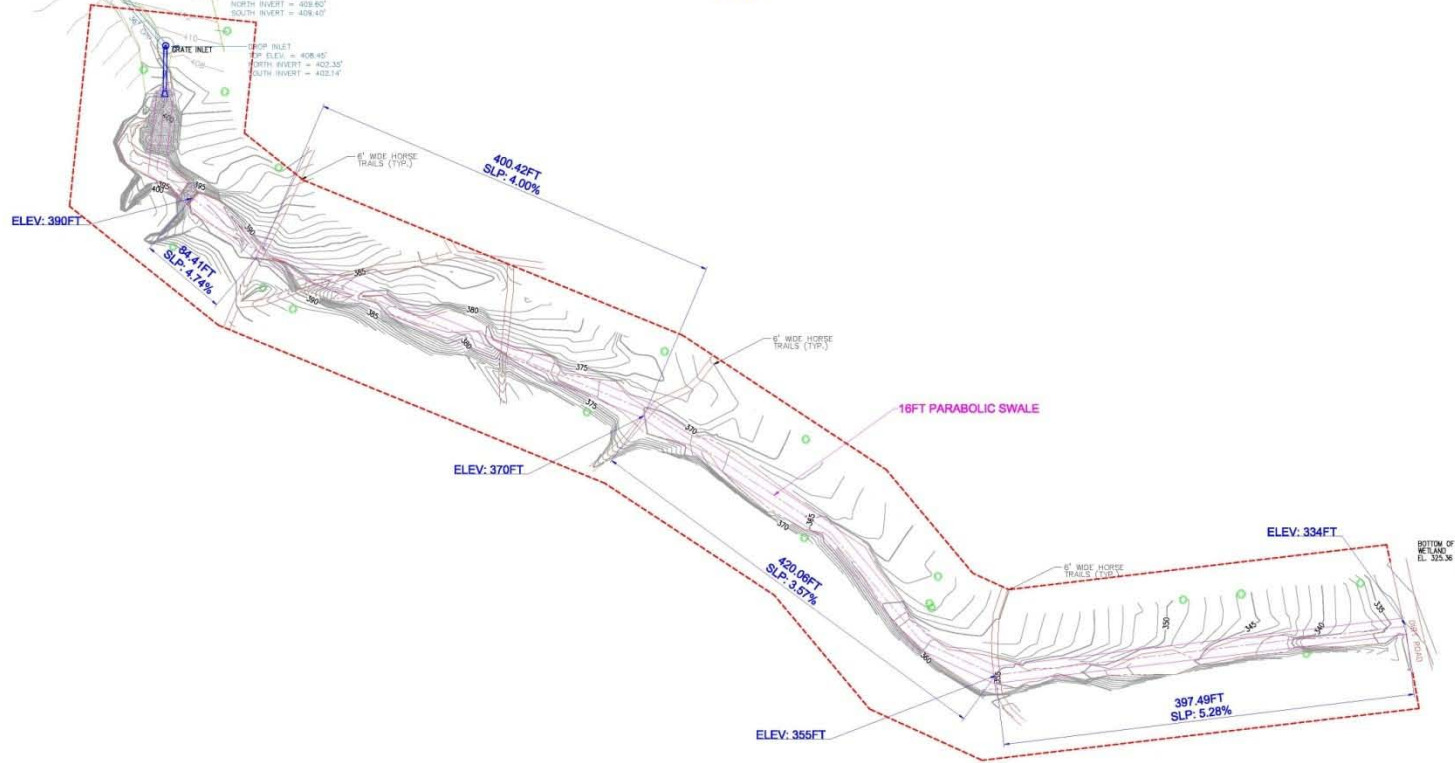
DRAFTER'S NOTES:

1. ALL DIMENSIONS AND SLOPES ARE APPROXIMATE.
2. AREA OF DISTURBANCE IS APPROXIMATELY 5.6 ACRES.
3. AREA OUTSIDE OF PROPOSED DITCH IS TO BE LEVELED TO GRADE WITH TURF APPLIED



LEGEND

- ☐ = STORM DRAIN
- ☒ = POWER POLE
- CONC. = CONCRETE
- = 2" PVC VENT PIPE
- ⊕ = GUY WIRE ANCHOR
- CMP = CORRUGATED METAL PIPE
- CPP = CORRUGATED PLASTIC PIPE
- RCP = REINFORCED CONCRETE PIPE
- (OH) = OVERHEAD UTILITY LINES
- = TREELINE
- ⊗ = LOCATION OF SPOT ELEVATION



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**FORT GORDON
 177H STREET LANDFILL
 AUGUSTA, GA**

DATE ISSUED:	DATE REV.	REV.	REVISION DESCRIPTION	FIELD BOOK	FIELD BOOK PAGES
10-07-13	09-24-13				
FIELD DATE:					
DRAWN BY:					
PROJECT:					
SUBPROJECT:					
NUMBER OF SHEETS:					
TOTAL SHEETS:					

**TOPOGRAPHIC SURVEY
 OF WASH OUT AREA**

SHEET TITLE:

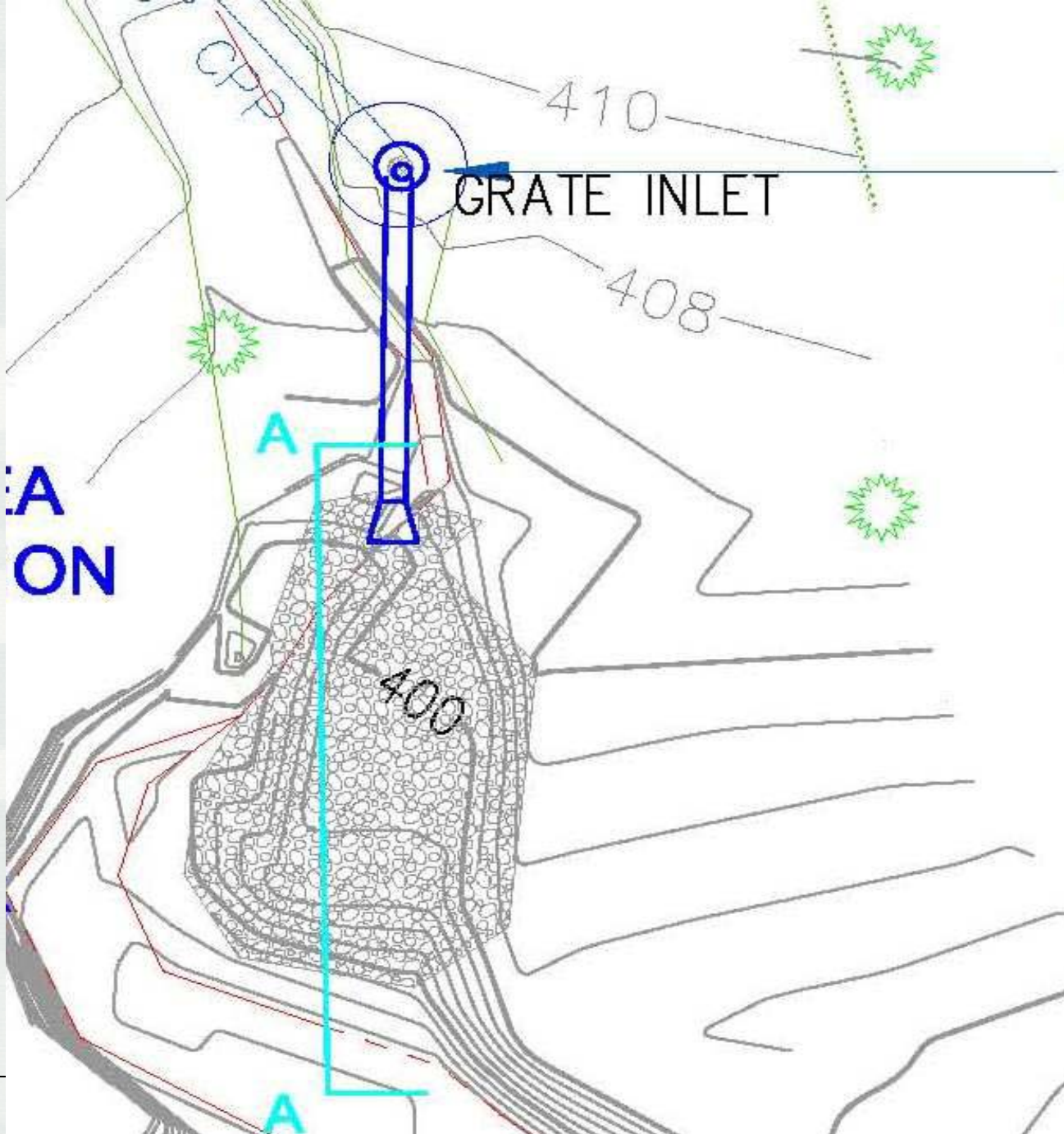
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1 OF 1

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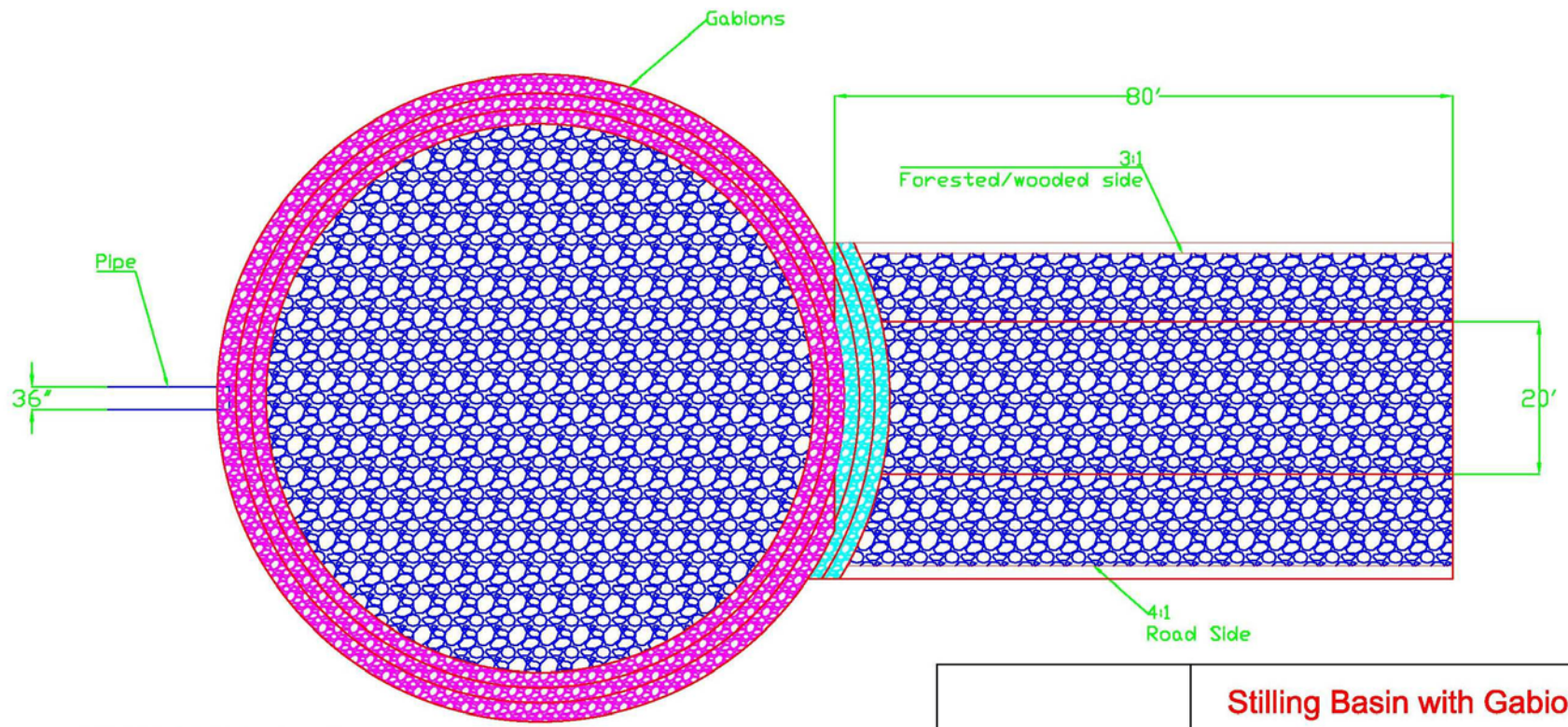
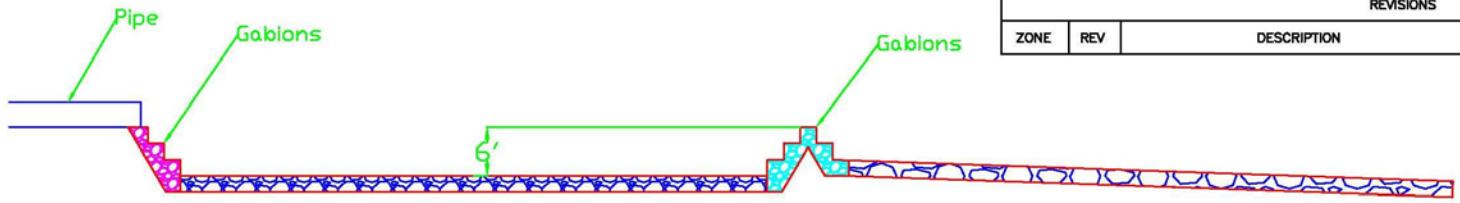


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REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROV

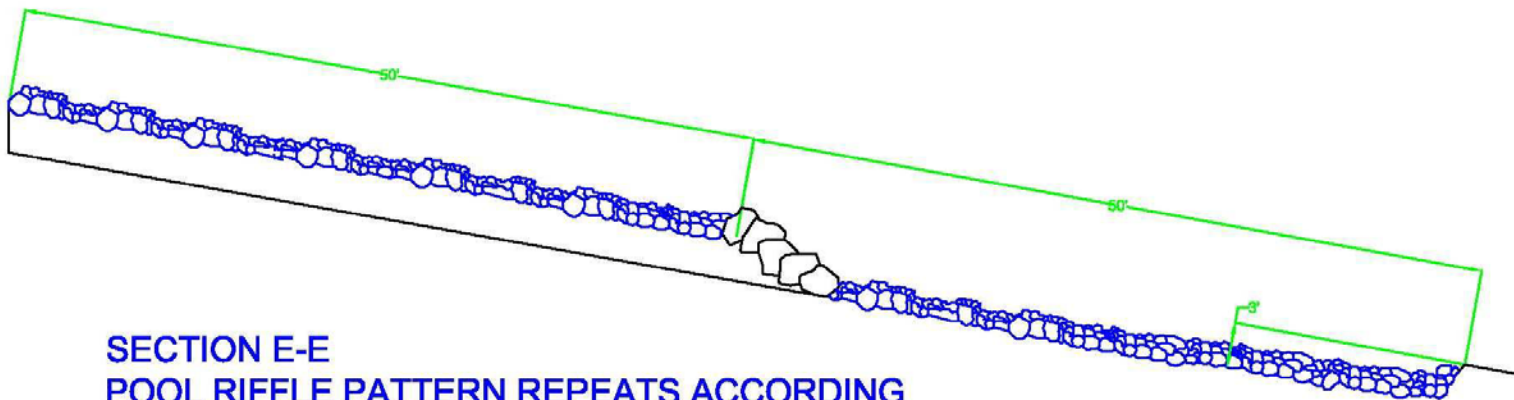
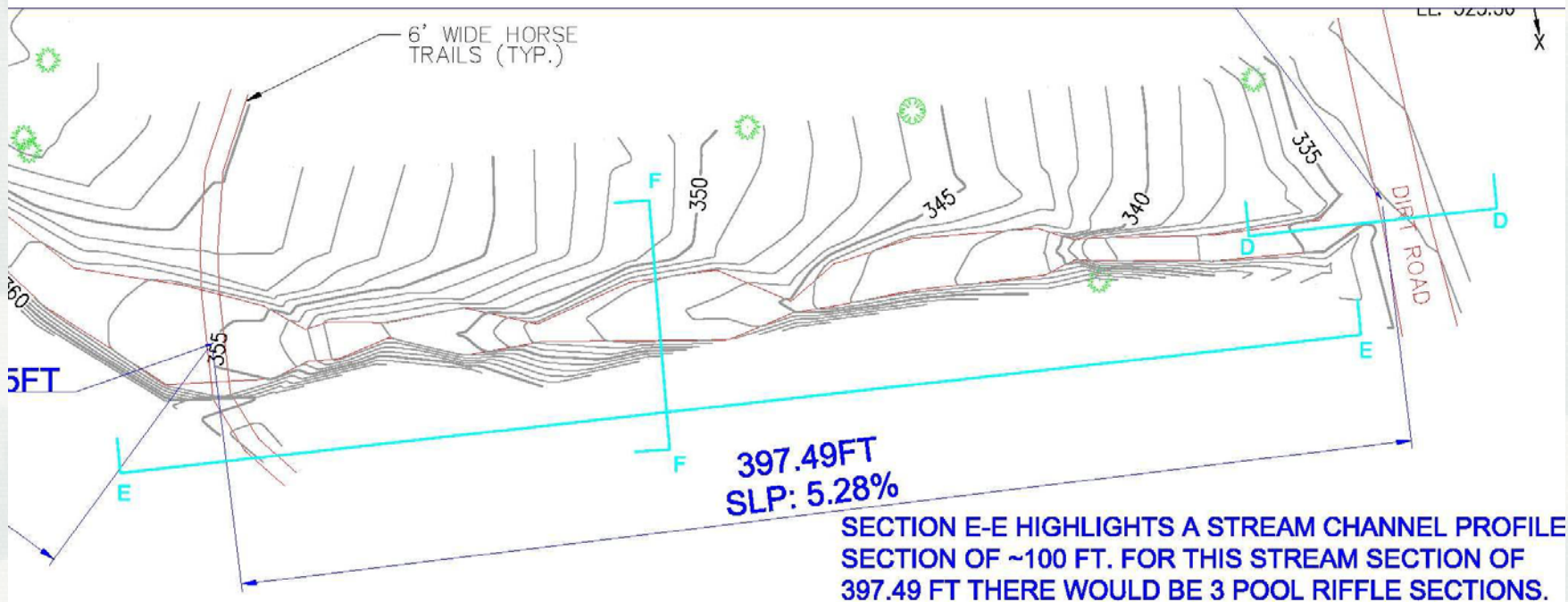


Stilling Basin with Gabion Walls



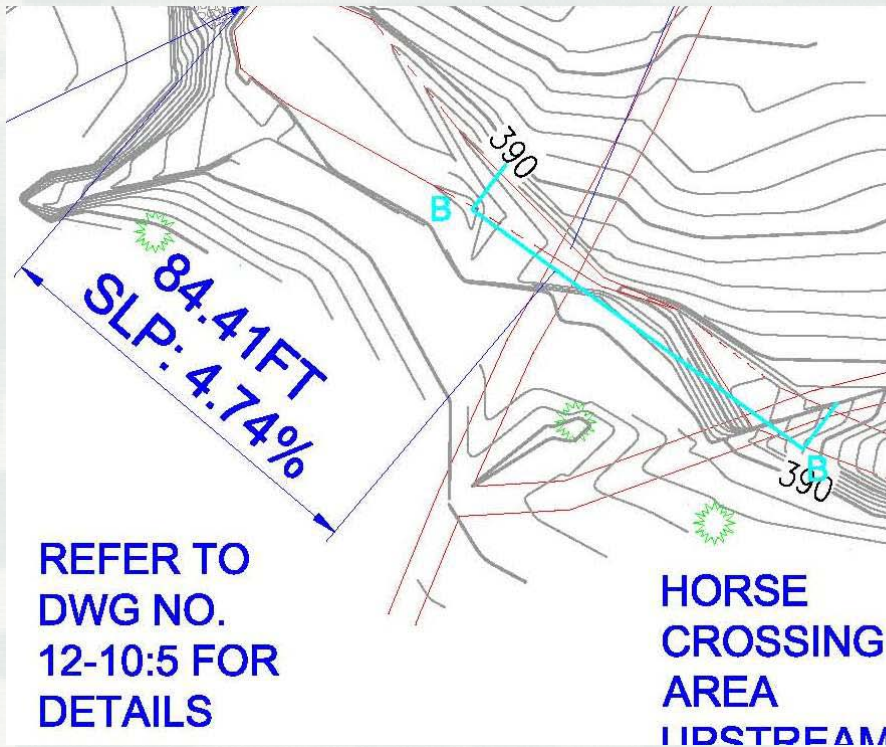


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SECTION E-E
POOL RIFFLE PATTERN REPEATS ACCORDING
TO DIMENSIONAL CONSTRAINTS OF STREAM
CHANNEL PROFILE ~50' (TYP.)

Planning a Solution



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Summary

- LID testbed demo needed validation
- Overcome by high priority problem
- Solutions must be compatible
 - ▶ Appropriate to magnitude of problem
 - ▶ Compatible with environmental setting
 - ▶ Step infiltration should take care of reduction in sediment and flow while recharging subsurface



Questions, Comments?

Contact information or for additional information or resources

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217-398-5590



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