APPENDIX 5: MITCHELL LANE BIORETENTION PROJECT MATERIALS

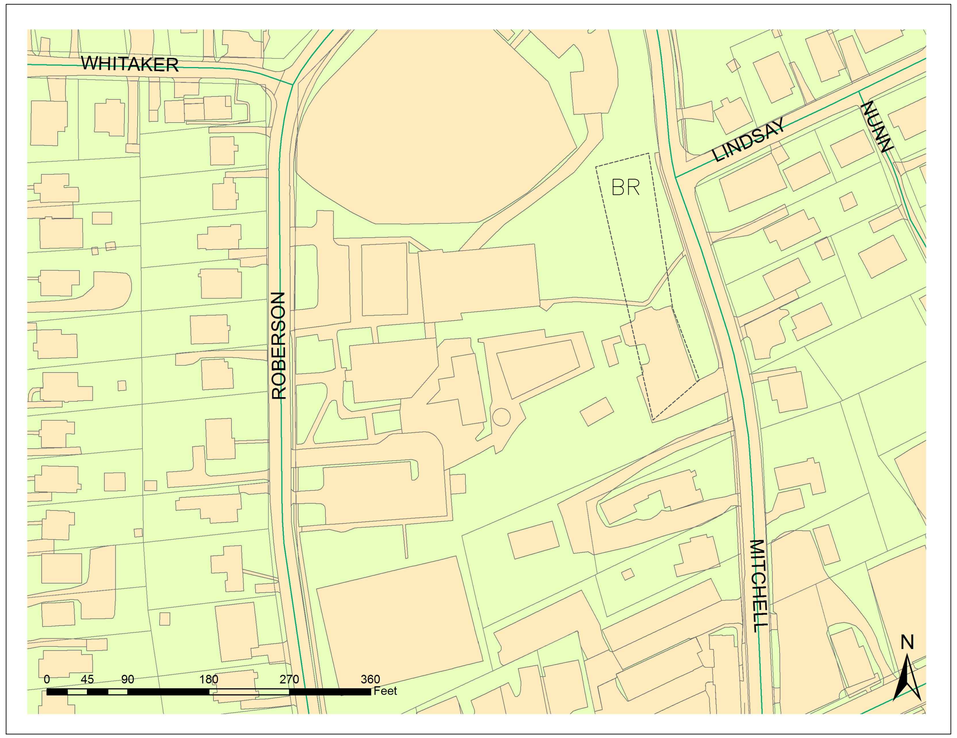
HARGRAVES COMMUNITY CENTER BIORETENTION RETROFIT

216 NORTH ROBERSON STREET
CHAPEL HILL, NORTH CAROLINA 27514
ORANGE COUNTY
CAPE FEAR RIVER BASIN

SCO NUMBER - _____

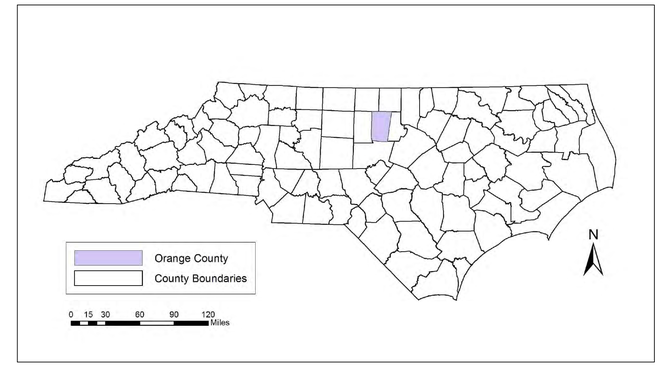
PREPARED FOR:
THE TOWN OF CHAPEL HILL
STORMWATER MANAGEMENT DIVISION
208 N. COLUMBIA STREET
CHAPEL HILL, NC 27514

PREPARED BY:
ANDREW R. ANDERSON, E.I.
North Carolina State University
Department of Biological and Agricultural Engineering
3100 FAUCETTE DR.
RALEIGH, NC 27695



VICINITY MAP

35.912617 deg lat
-79.063219 deg lon



BIORETENTION RETROFIT SITE - Mitchell Lane

TOWN OF CHAPEL HILL CONTACT:
PATRICIA D'ARCONTE - Project Manager
919-969-7202

NCSU CONTACTS:
ANDREW ANDERSON - DESIGN/CONSTRUCTION
919-515-8595

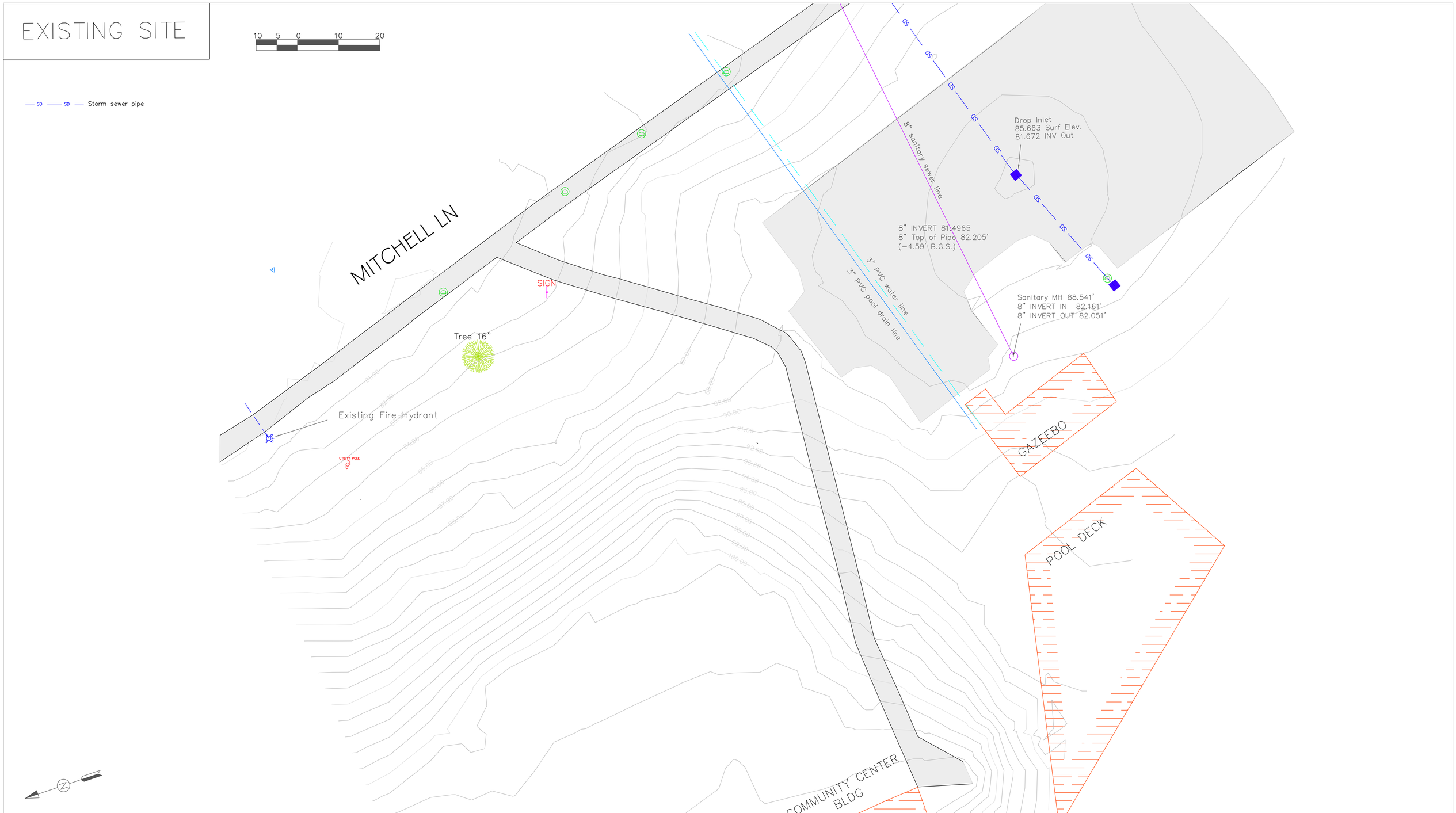
BILL HUNT - DESIGN
919-515-6751

INDEX OF SHEETS

1 COVER
2 EXISTING SITE
3 DRAINAGE AREA
4 PROPOSED PLAN
5 BIORETENTION DETAILS AND PROFILE
6 DETAILS

DATE PREPARED: 5-31-2012

EXISTING SITE



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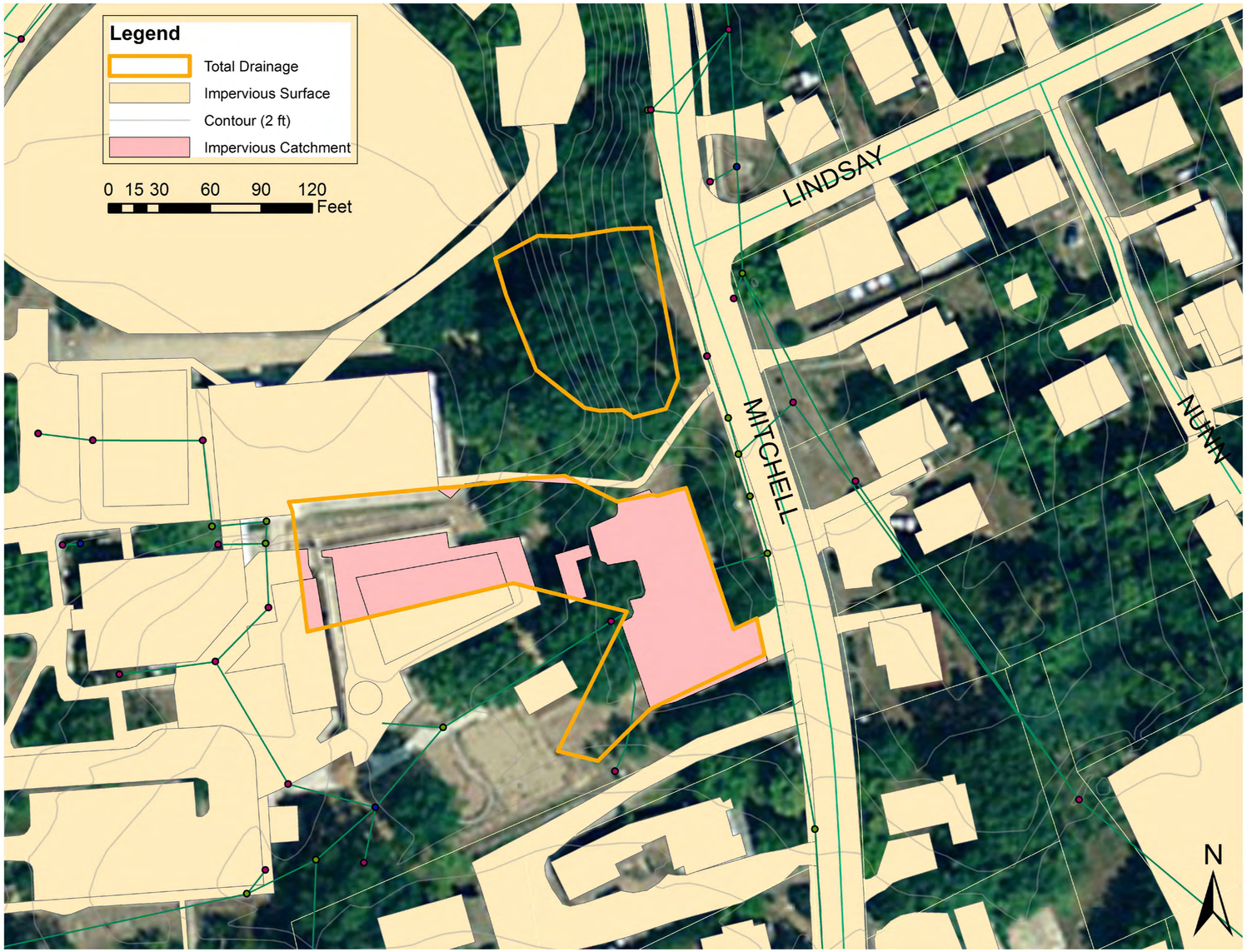
EXISTING SITE CONDITIONS

Designed By: ARA
Reviewed By: RJW, WFH

Date:
MAY 31, 2012

Scale
1" = 10 ft

Hargraves Community Center Bioretention Retrofit
216 N. Roberson St.
Chapel Hill, NC 27514



STORMWATER RUNOFF CALCULATIONS

Area (acre)	Area by Land Type (ac)			Design Storm (in.)	Runoff Vol (cu ft)
	CN = 69 ("Open", HSG B)	CN =79 ("Open", HSG C)	CN = 98 ("Paved", HSG D)		
0.98	0.0	0.65	0.33	1.0	1143

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DRAINAGE AREAS

Designed By: ARA
Reviewed By: RJW, WFH

Date:
MAY 31, 2012

Scale:
As Noted

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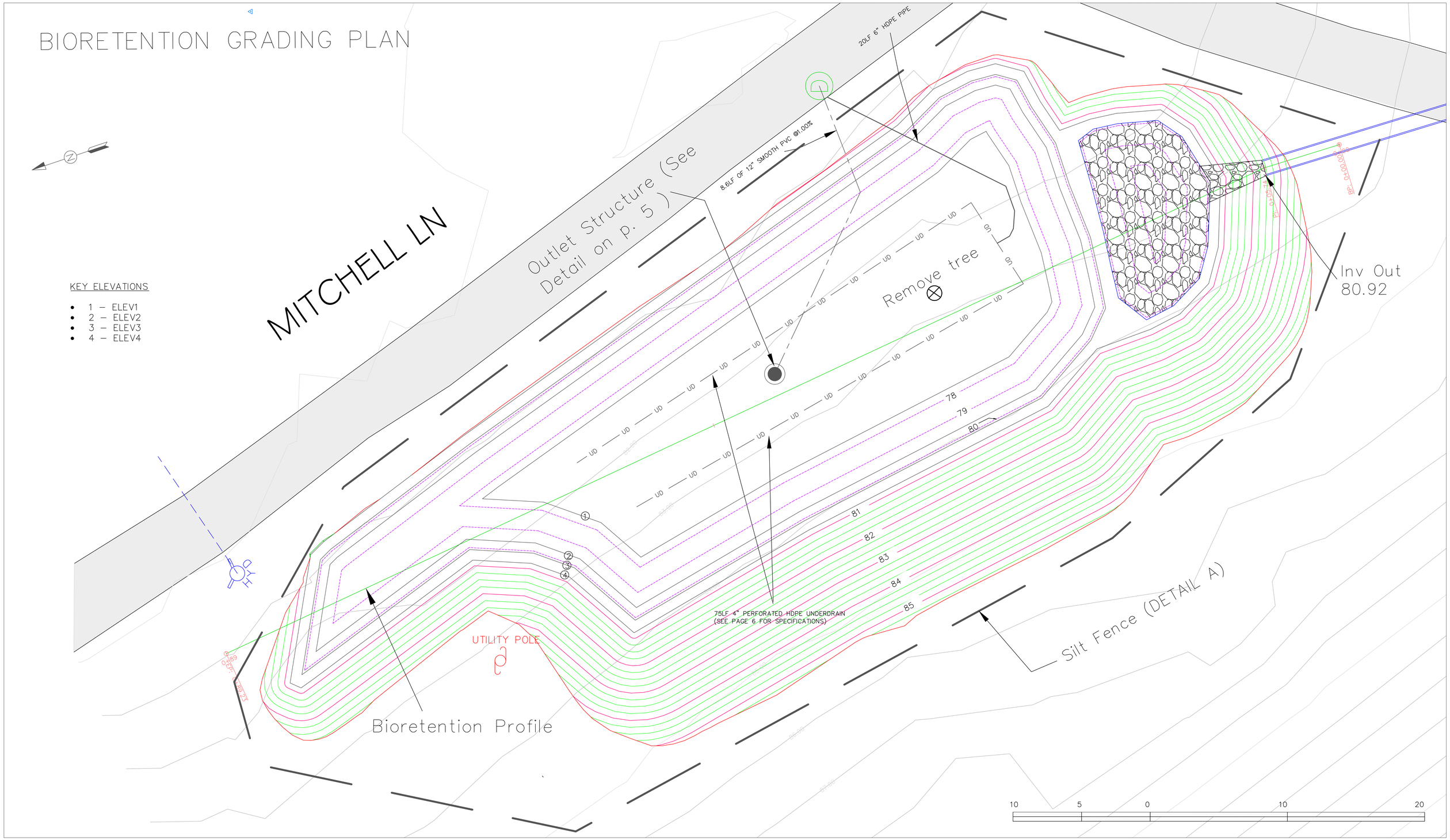
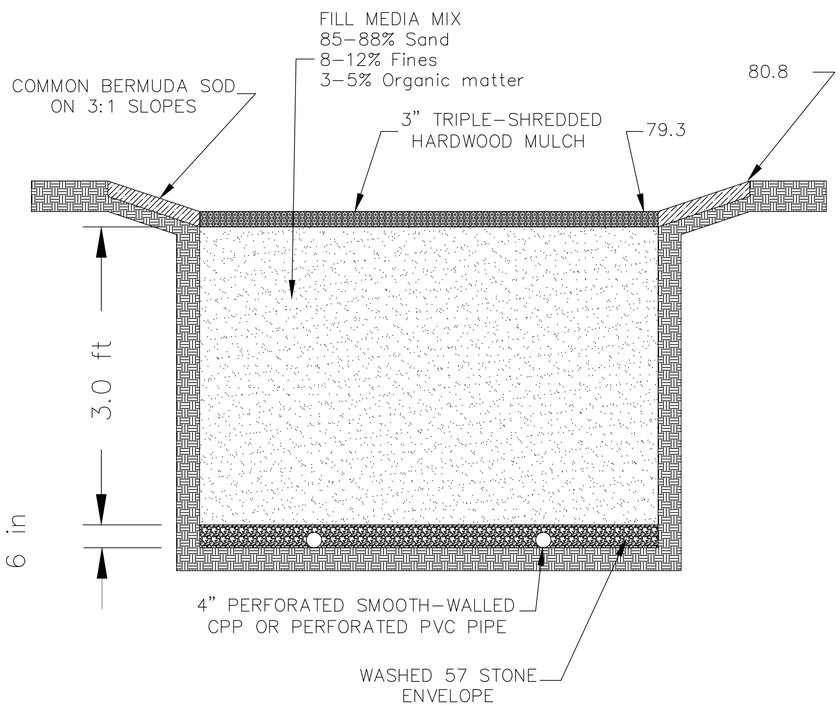
Chapel Hill, NC 27514

BIORETENTION GRADING PLAN

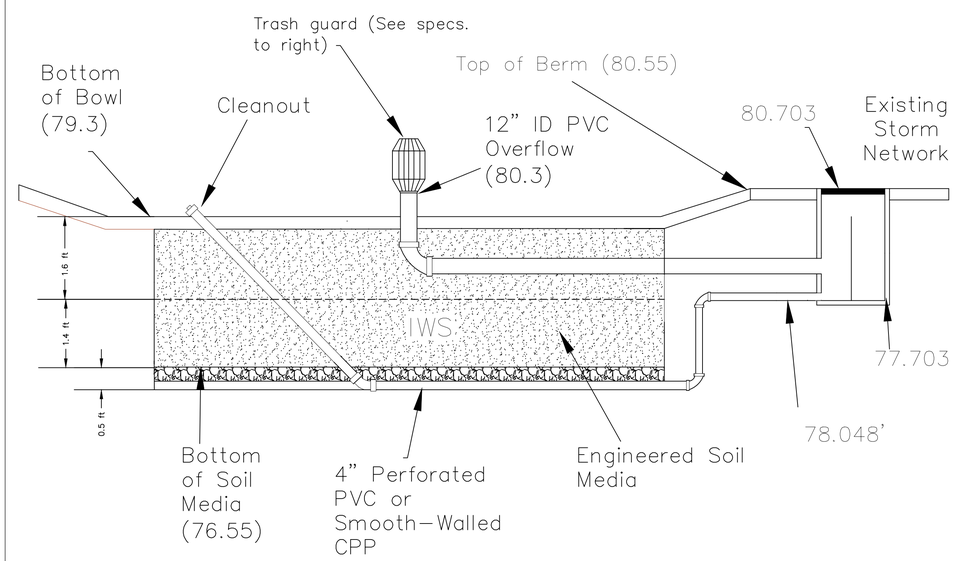


North Carolina State University Biological and Agricultural Engineering NCSU Box 7625 | Raleigh, N.C. 27695	PROPOSED CONSTRUCTION Designed By: ARA Reviewed By: RJW, WFH	Date: MAY 31, 2012	**Scale** 1" = 3 ft	Hargraves Community Center Bioretention Retrofit 216 N. Roberson St. Chapel Hill, NC 27514	Page Number 4 of 6

Bioretention Cross Section



Underdrain and Outlet Structure Detail



BIORETENTION FILL MEDIA SPECIFICATIONS

- 85–88% SAND
- 8–12% FINES (CLAY AND SILT)
- 3–5% ORGANIC MATTER
- P–INDEX FROM 10–30

THE SOIL MIX SHALL BE UNIFORM AND FREE OF STONES, STUMPS, ROOTS, OR OTHER AGGREGATE MATERIALS GREATER THAN 2 INCHES DIAMETER.

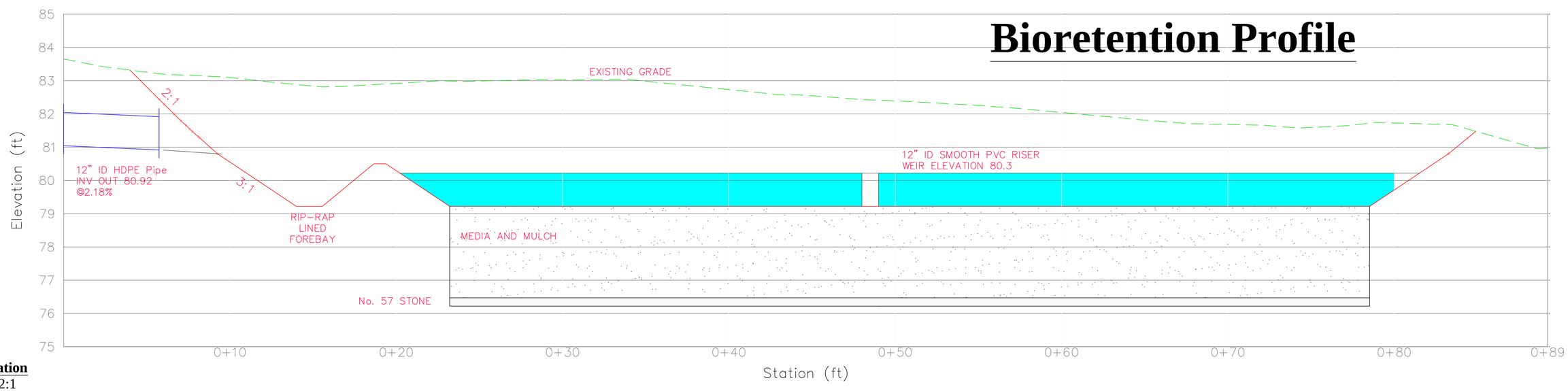
PROOF THAT THESE REQUIREMENTS HAVE BEEN MET MUST BE DOCUMENTED AND APPROVED BY PROJECT ENGINEER

OVERFLOW STRUCTURE SPECIFICATIONS

A 12" Bar Guard from Pond Dam Piping, Ltd. shall be used as a trash rack on the 12" PVC overflow pipe.

The invert of the 12" PVC overflow pipe shall be installed at 80.3' (1' above the mulch surface layer of the bioretention cell)

Bioretention Profile



Exaggeration
H:V = 2:1

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BIORETENTION DETAILS

Designed By: ARA
Reviewed By: RJW, WFH

Date: MAY 31, 2012

Scale: As Noted

Hargraves Community Center Bioretention Retrofit
216 N. Roberson St.
Chapel Hill, NC 27514

Underdrain Installation and Specifications

ALL UNDERDRAINS USED MUST BE CORRUGATED HDPE WITH A SMOOTH INNER WALL. THE DRAINS MUST BE INSTALLED AT THE SHOWN LOCATIONS AND GRADES. SOLID PIPE MUST BE USED IN THE SEGMENTS LEAVING THE BIORETENTION CELL. UNDERDRAIN PIPES SHOWN ARE 4 INCHES. AFTER THE TWO PARALLEL UNDERDRAIN LINES MEET, A TEE SHALL JOIN THEM, WITH A 6 INCH SOLID PIPE LEAVING TO TIE INTO THE JUNCTION BOX. SEWER CLEANOUTS MUST BE INSTLALED 45 DEGREE ANGLES AT THE UPSTREAM END OF EACH DRAIN (ONE PER UNDERDRAIN LINE, TOTALLING 2).

Planting Specifications

THREE TO SIX INCHES OF TOPSOIL MUST BE APPLIED TO ALL SITE DISTURBED AREAS, EXCEPT OVER THE BIORETENTION FILL MEDIA. DO NOT PLACE TOPSOIL OVER THE BIORETENTION FILL MEDIA.

Construction Sequencing

1. THE DRAINAGE AREA TO THE BASIN MUST BE STABILIZED BEFORE CONSTRUCTION BEGINS IN ORDER TO PREVENT CLOGGING OF THE BIORETENTION MEDIA.

2. INSTALL SEDIMENT FENCE AROUND AREA OUTLINED ON PROPOSED PLAN. INSTALL SEDIMENT FENCE ACCORDING TO DETAIL A. ALL SEDIMENT FENCE MUST BE INSTALLED BEFORE BEGINNING WORK. ALL SEDIMENT FENCE MUST BE INSTALLED WHEN WORK IS NOT TAKING PLACE.

3. THE CONTRACTOR SHALL CALL THE "CALL BEFORE YOU DIG" TOLL FREE NUMBER TO ENSURE THAT ALL UTILITES ARE LOCATED AND MARKED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES INCURRED DURING CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF UNEXPECTED FEATURES ARE DISCOVERD THAT WOULD NECESSITATE MODIFICATION TO THE ILLUSTRATED DESIGN.

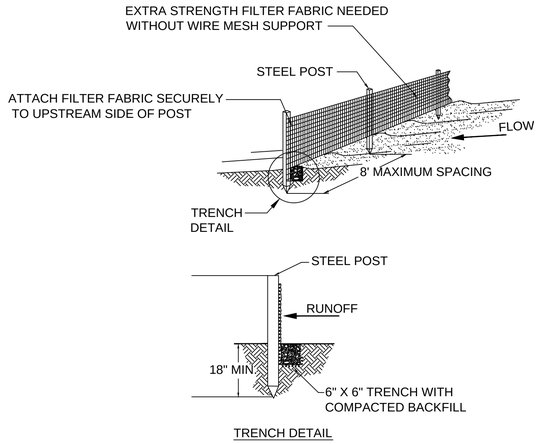
3. IT IS VERY IMPORTANT TO MINIMIZE COMPACTION OF IN-SITU SOIL AT THE BASE OF THE BIORETENTION CELL (BOTTOM OF THE EXCAVATION). USE EXCAVATION HOES TO REMOVE ORIGINAL SOIL. IF THE BIORETENTION AREAS ARE EXCAVATED USING A LOADER, THE CONTRACTOR SHOULD USE WIDE TRACK OR MARSH TRACK EQUIPMENT, OR LIGHT EQUIPMENT WITH TURF-TYPE TIRES. USE OF EQUIPMENT WITH NARROW TRACKS OR NARROW TIRES, RUBBER TIRES WITH LARGE LUGS, OR HIGH PRESSURE TIRES WILL CAUSE EXCESSIVE COMPACTION RESULTING IN REDUCED INFILTRATION RATES AND STORAGE VOLUMES, AND IS NOT ACCEPTABLE. COMPACTION WILL SIGNIFICANTLY CONTRIBUTE TO DESIGN FAILURE.

4. CONTRACTOR SHALL SCARIFY THE BOTTOM OF THE BIORETENTION EXCAVATION CUT WITH THE EXCAVATOR TEETH BEFORE THE ADDITION OF THE MEDIA.

3. ANY BIORETENTION FILL MEDIA INSTALLED MUST BE PROTECTED FROM FINE SEDIMENTS DURING CONSTRUCTION. AVOID COMPACTION BY ALLOWING TIME FOR NATURAL COMPACTION AND SETTLEMENT TO OCCUR. NO ADDITIONAL MANUAL COMPACTION OF SOIL IS NECESSARY. RAKE SOIL MATERIAL AS NEEDED TO LEVEL OUT. OVERFILL ABOVE PROPOSED SURFACE INVERT TO ACCOMMODATE NATURAL SETTLEMENT TO PROPER GRADE. DEPENDING UPON THE SOIL MATERIAL, UP TO 20% OF NATURAL COMPACTION MAY OCCUR.

Detail A

SEDIMENT FENCE DETAILS (N.T.S)



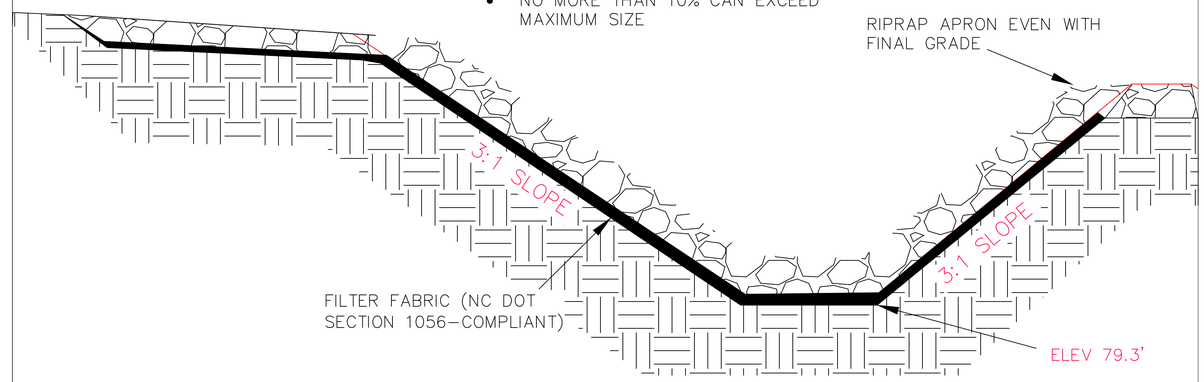
MAINTENANCE

INSPECT AND REPAIR FENCE EVERY 7 DAYS AND AFTER EACH STORM EVENT. REMOVE SEDIMENT WHEN NECESSARY, 6" MAXIMUM RECOMMENDED STORAGE HEIGHT.

Detail C

N.C. D.O.T. CLASS B RIPRAP SPECIFICATIONS

- MINIMUM 5" STONE DIAMETER
- D50 = 8"
- MAXIMUM 12" STONE DIAMETER
- NO MORE THAN 5% CAN BE LESS THAN MINIMUM SIZE
- NO MORE THAN 10% CAN EXCEED MAXIMUM SIZE



Detail B

CONSTRUCTION ENTRANCE (N.T.S)

I. CONSTRUCTION SPECIFICATIONS

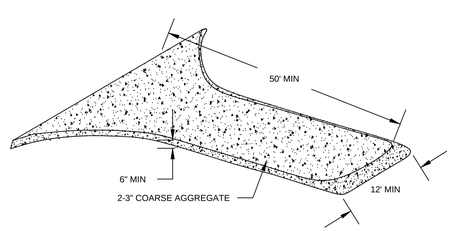
1. CLEAR THE AREA OF VEGETATION. REMOVE ALL ROOTS AND ORGANIC DEBRIS. GRADE ALONG THE INTENDED LENGTH OF THE ENTRANCE TO SMOOTH PROFILE. GRADE SUCH THAT WATER IS CARRIED TO DOWNSLOPE, BUT IS NOT CHANNELIZED.
2. PLACE THE GRAVEL TO THE DIMENSIONS AS SHOWN IN THE DETAIL.
* USE OF A GEOTEXTILE LAYER IS RECOMMENDED TO REDUCE MAINTENANCE AND IMPROVE THE PERFORMANCE OF THE ENTRANCE.

II. MAINTENANCE

1. PERIODIC TOP-DRESSING WITH TWO (2) INCH WASHED STONE MAY BE REQUIRED TO REDUCE THE TRANSPORT OF SEDIMENTS FROM THE CONSTRUCTION SITE.
2. AFTER EACH RAINFALL EVENT, INSPECT THE ROADWAY. IF STONE HAS BEEN DISPLACED OR A CHANNEL HAS BEEN FORMED, REPAIR IMMEDIATELY. DO NOT USE THE ENTRANCE FOR CONSTRUCTION TRAFFIC UNTIL THE ENTRANCE HAS BEEN REPAIRED.

III. REMOVAL

1. REMOVE THE CONSTRUCTION ENTRANCE AND SMOOTH THE DISTURBED AREA TO BLEND WITH THE SURROUNDING TOPOGRAPHY.



Forebay Installation Specifications

1. GRADE THE FOREBAY AS SHOWN ON THE PROPOSED SHEET

2. FILTER FABRIC CLOTH MUST BE PROPERLY PROTECTED FROM PUNCHING OR TEARING DURING INSTALLATION. REPAIR ANY DAMAGE BY REMOVING THE RIPRAP AND PLACING ANOTHER PIECE OF FILTER CLOTH OVER THE DAMAGED AREA. ALL OVERLAPPING SECTIONS SHOULD OVERLAP A MINIMUM OF 1 FOOT, WITH ANCHOR PINS SPACED EVERY 3 FEET ALONG OVERLAP. IF THE DAMAGE IS EXTENSIVE, REPLACE THE ENTIRE FILTER CLOTH.

3. GEOTEXTILE FABRIC MUST HAVE AN EOS NO LARGER THAN U.S. STANDARD SIEVE #70, A THICKNESS OF 20-60 MILS, A GRAB STRENGTH OF 90-120LB, AND MUST CONFORM TO ASTM D-1682 OR ASTM D-177.

4. SUBGRADE FOR GEOTEXTILE FABRIC SHOULD BE CLEARED AND GRUBBED TO REMOVE ALL ROOTS, VEGETATION, AND DEBRIS AND PREPARED TO THE LINES AND GRADES SHOWN ON THE PLAN.

5. EXCAVATE DEEP ENOUGH FOR BOTH FILTER AND RIPRAP.

6. ROCK AND/OR GRAVEL USED FOR RIPRAP SHALL CONFORM TO SPECIFIED GRADATION

7. VOIDS IN THE ROCK RIPRAP SHOULD BE FILLED WITH SPALLS AND SMALLER ROCKS.

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CITY OF CHAPEL HILL DETAILS

Designed By: ARA
Reviewed By: RJW, WFH

Date: MAY 31, 2012

Scale: Not Standard

Hargraves Community Center Bioretention Retrofit
216 N. Roberson St.
Chapel Hill, NC 27514

Along Mitchell Lane before construction

The parking lot, where we closed off the existing stormdrain and rerouted the runoff

Pre-construction view from the parking lot

The path for the pipe is laid out and underground utilities are measured to make sure we can clear them

The new stormdrain inlet is installed and a trench dug for the pipe to the bioretention

The parking lot was paved early so pool-users could park on the first day it opened

Excavation of the bioretention basin

Shaping the basin

Filling in the soil media

Laying the underdrains and the overflow drain

Filling in over the drains

Getting ready to put the mulch in

The forebay and stepp slope beside the bioretention basin

Ready for plants!

Planting day

Figuring out plant layout

Planting is done!

plants to add

(Ec) Eupatorium coelestinum (39)

(Ai) Asclepias incarnata (12)

(R) Rudbeckia fulgida (14)

Muhlenbergia capillaris (pink) (est 150) to fill in open areas of bioretention (1 to 1.5 ft apart) and to cover hillside

Already planted:

H Hamamelis virginiana (3)

J Juncus effusus

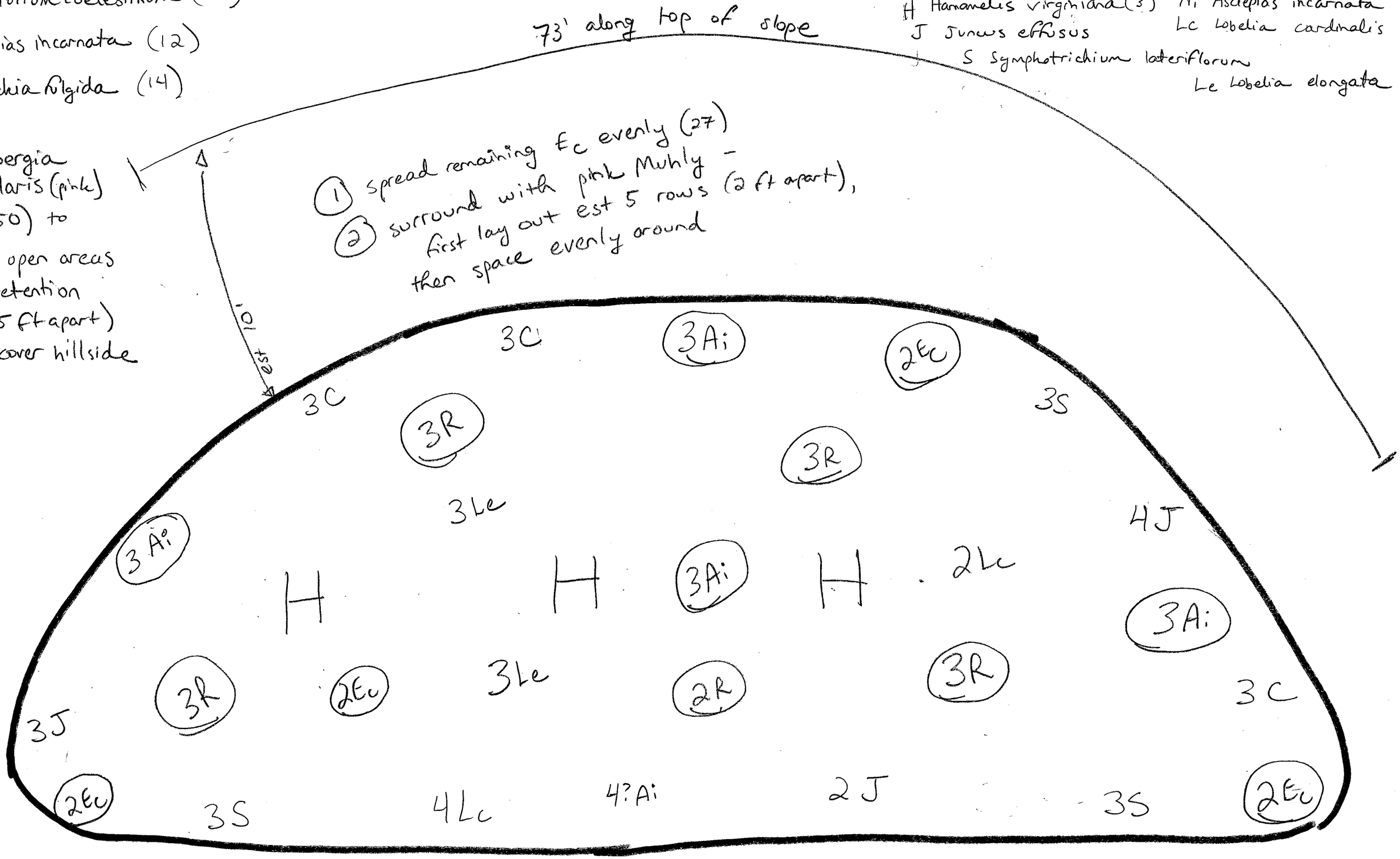
S Symphotrichium lateriflorum

C Chasmanthium latifolium

Ai Asclepias incarnata

Lc Lobelia cardinalis

Le Lobelia elongata



Project statistics on the Bolin Creek Chapel Hill EPA 319 Grant

Parameter	**Hargraves (Mitchell Ln.)**	**Dickerson Ct.**
Drainage area (acre)	0.98	0.55
BMP size (sf)	600	1195
WQ Storage depth (ft)	1.0	1.0
Media depth (ft)	3.0	3.0
IWS depth (ft)	1.4	2.0
Weir description	12” PVC stand pipe	Trapezoidal weir
Freeboard (ft)	0.25’	0.33’
TN load reduction (lb/yr)	1.88	4.42
TN post-BMP export (lb/yr)	3.48	8.19
TP load reduction (lb/yr)	0.25	0.60
TP post-BMP export (lb/yr)	0.31	0.74