NC DMS Closeout Report
Project Type: Nutrient Offset
2017

Project Name	BMP Cary Barnes & Noble
DMS Project ID	667
Full Delivery Contract #	NA
Institution/Contract Date	2/26/2007
Basin	Neuse
8-digit CU	03020201
County	Wake
Applicable Buffer Rule (s)	15A NCAC 02B.0240
Non-Diffuse Flow Area Removed: Memo or W.S. calculation	NA
Date Planted	7/2011
Date of Supplemental Plant	NA
Protection mechanism	Active link to PDF portfolio
Easement Acreage	2.738
Stewards	DEQ Stewardship
Encroachments & Resolution	N
Accepted for transfer to stewardship	Y

Asset Table

BMP Component	Treatment Area (ac.)	N Loading Rate (lbs./ac./yr.)	Removal Efficiency (%)	N removed/Yr. (lbs.)	Total N Removed over lifespan of BMP (lbs)	Notes: include methods
BMP: Extended Detention SW Wetland: N	46.3	12.9	36%	215.02	6,450.6	BMP efficiency rate: DEQ SW manual 30-year BMP lifespan
Totals					**6,450.6.2**	

Success Criterion		
Project Component	**Success Criteria per Approved Mitigation Plan**	**Success Criteria Met**
Extended Detention SW Wetland	Maintenance - as required Annual visual inspection	Yes – Maintenance records, photographs and Annual forms provided to DWR (Appendix B)

BMP Watershed, Data & Calculations:

Ryan A. Smith, PE
2904 Tractor Drive
Raleigh, NC 27603

August 6, 2013

NC Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

ATTN: Jeff Schaffer

Re: Barnes and Noble Extended Detention Stormwater Wetland pollutant removal calculations

Mr. Schaffer:

I am sending this letter in response to your request for information on the Barnes and Noble Extended Detention Stormwater Wetland design completed while I was employed by North Carolina State University. Enclosed with this letter is a document entitled "Barnes and Noble Extended Detention Stormwater Wetland Watershed and BMP Data," which provides a map of the watershed and information related to pollutant removal performance. Also enclosed is a printout from the "BMP Removal Calculation Worksheet" for the Piedmont of the Tar-Pamlico River Basin that supports the final nutrient removal calculations in the document first described.

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The "BMP Removal Calculation Worksheet" used standard methods accepted by the State for estimating pollutant loading from various surfaces, pollutant removal by various BMPs and then

pollutant export from the watershed /BMP system represented. At the time this work was performed, the spreadsheet was not available for the Neuse River Basin, the basin in which this project exists, but the calculation methods used and the BMP pollutant removal credit awarded in the Tar-Pamlico spreadsheet were applicable to either basin. The pollutant removal credits entered into the spreadsheet (36% for N, 32% for P) varied from the standard values because the retrofit BMP was undersized and could not receive full credit (see summary in previous paragraph).

Please feel free to contact me if you need further information.

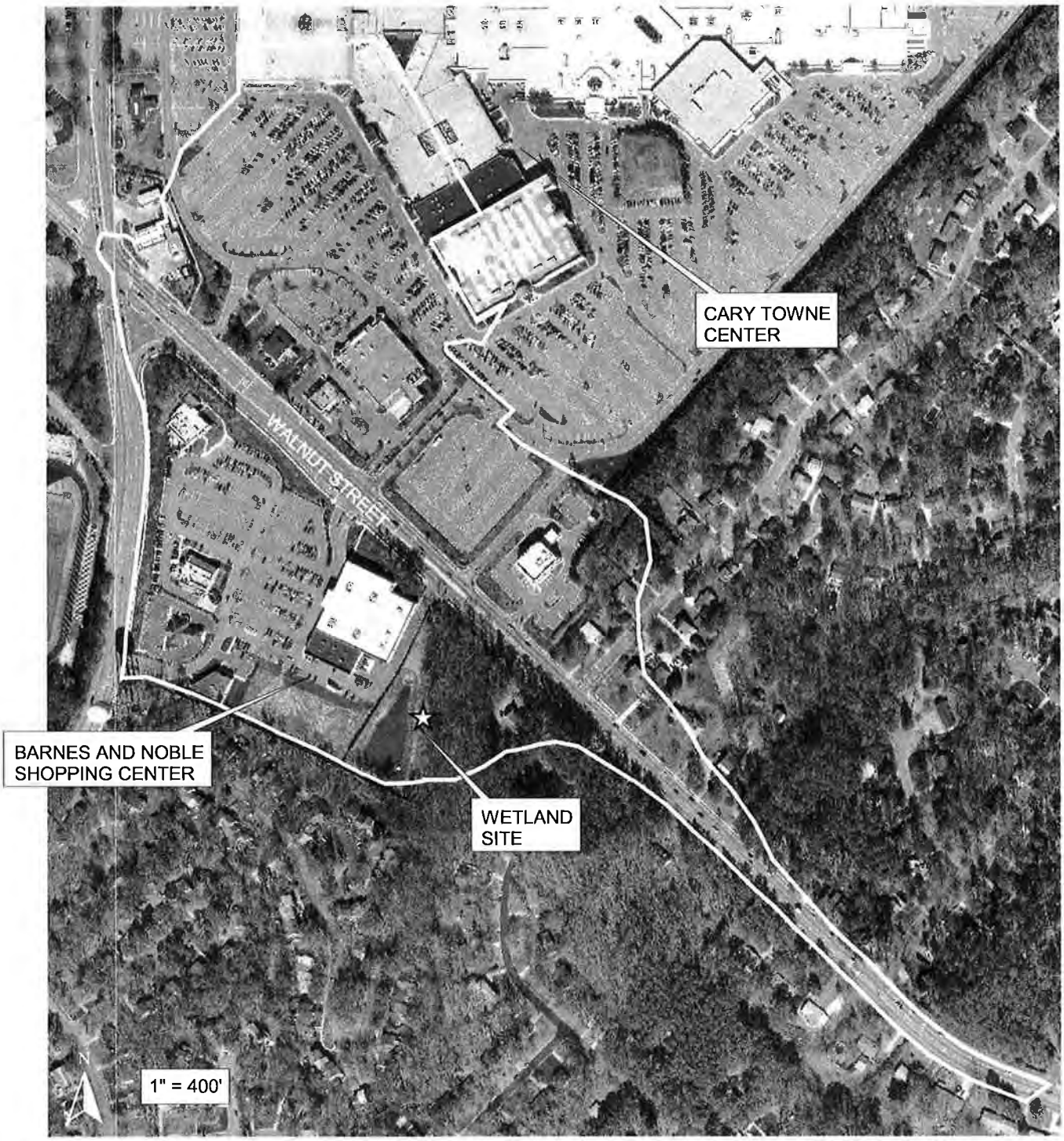
Sincerely,

Ryan A. Smith, PE
919-270-5396

Encl:

1. "Barnes and Noble Extended Detention Stormwater Wetland Watershed and BMP Data" document
2. "BMP Removal Calculation Worksheet" for the Piedmont of the Tar-Pamlico River Basin document

BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND
WATERSHED AND BMP DATA



WATERSHED CHARACTERISTICS

WATERSHED AREA - 46.3 ACRES
SOIL HYDROLOGIC GROUP - B
COMPOSITE CURVE NUMBER - 90

RUNOFF VOLUMES

RUNOFF FROM 1" RAIN - 53826 CF
ACTUAL WETLAND STORAGE VOLUME - 31590 CF
WETLAND STORAGE CAPACITY
COMPARED TO DESIGN VALUE- 60%
MAX STORM DEPTH CAPTURED BY BMP- 0.8 IN

NUTRIENT REMOVAL PERFORMANCE

TN LOADING - 12.9 LB/AC/YR
TN REMOVAL FROM FULL-SIZED WETLAND - 40%
*TN REMOVAL FROM UNDER-SIZED WETLAND - 40% X 0.9 = 36%
TN EXPORT - 8.3 LB/AC/YR
TN REMOVAL - 4.6 LB/AC/YR

TP LOADING - 1.2 LB/AC/YR
TP REMOVAL FROM FULL-SIZED WETLAND - 35%
*TP REMOVAL FROM UNDER-SIZED WETLAND - 35% X 0.9 = 32%
TP EXPORT - 0.8 LB/AC/YR
TP REMOVAL - 0.4 LB/AC/YR

* THE WETLAND WILL CAPTURE ALL RUNOFF FROM STORMS 0.8 INCHES AND SMALLER. THE ASSUMPTION IS MADE THAT 90% OF THE NUMBER OF STORMS WILL BE CAPTURED BY THE WETLAND COMPARED TO IF THE WETLAND WAS SIZED FOR THE 1-INCH RAIN EVENT.

Piedmont of the Tar-Pamlico River Basin:

Includes Oxford, Henderson, Rocky Mount and Tarboro as well as Franklin, Nash and Edgecome Counties

BMP Removal Calculation Worksheet (Automated)

Project Name: *BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND*
Date: *10/7/2008*
By: *RYAN SMITH* Checked By: _____

Directions:

> It may be advantageous to split the development into separate catchments to be handled by separate BMPs. The tables below allow the development to be split into as many as three catchments, and can be copied for greater than three. NOTE: Unless runoff flowing onto the development from offsite is routed separately around or through the site, the offsite catchment area draining in must be included in the acreage values of the appropriate land use(s) and treated.

> **Above each table:** Enter the catchment acreage in the top green blank. Based on a comparison of the post-development TN and TP export coefficients you calculated above to the rule requirements of 4.0 lb/ac/yr TN and 0.4 lb/ac/yr TP, select BMP(s) from the list for treating the catchment runoff. Enter the chosen BMP(s) nutrient removal rates in the green blanks. If more than one BMP is to be used in series, the combined removal rates will be calculated automatically in the blue blanks.

> **Catchment Tables:** Enter the acres of each type of land cover in the green boxes. The spreadsheet will calculate all of the light blue boxes. NOTE: Compare the Total Catchment Acreage for the Development (final table) to the value you established in the pre-BMP worksheet tables, and also to the site plans, for consistency. All of these values need to be the same

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	TN	TP	Design Standard
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Dry Detention	10	10	NC BMP Manual

Catchment 1:

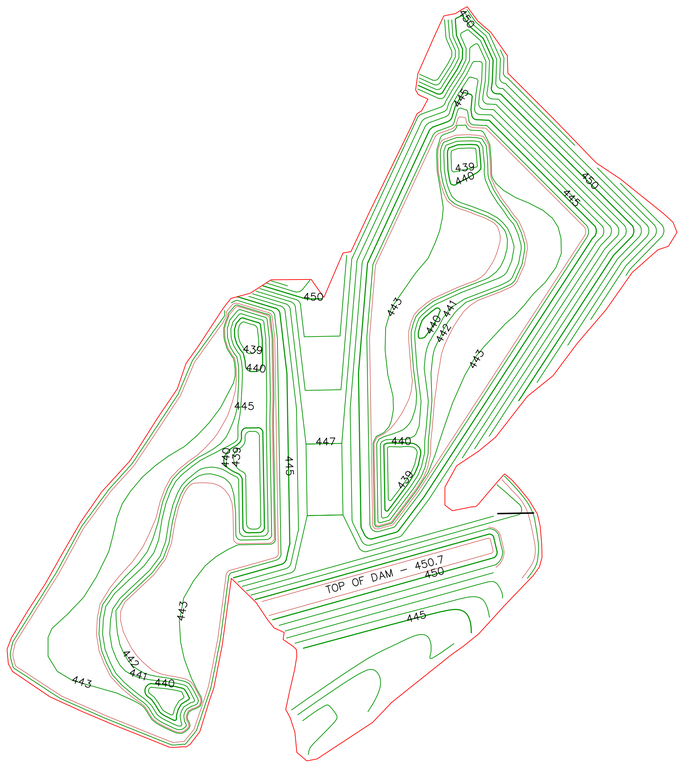
Total acreage of catchment 1 = 46.3 ac
First BMP's TN removal rate = 36 %
Second BMP's TN removal rate = %
Third BMP's TN removal rate = %
TOTAL TN REMOVAL RATE = 36 %

First BMP's TP removal rate = 32 %
Second BMP's TP removal rate = %
Third BMP's TP removal rate = %
TOTAL TP REMOVAL RATE = 32 %

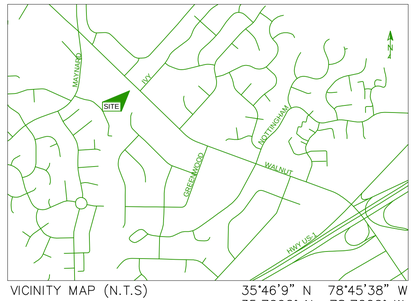
(1) Type of Land Cover	(2) Catchment Acreage	(3) S.M. Formula (0.46 + 8.31)	(4) Average EMC of TN (mg/L)	(5) Column (2) * (3) * (4)	(6) Average EMC of TP (mg/L)	(7) Column (2) * (3) * (6)
Transportation impervious	25.36	6.08	2.60	401.10	0.19	29.31
Roof impervious	5.97	6.08	1.95	70.82	0.11	3.99
Managed pervious	11.53	6.08	1.42	99.60	0.28	19.64
Wooded pervious	2.62	6.08	0.94	14.98	0.14	2.23
Area taken up by BMP	0.82	6.08	1.95	9.73	0.11	0.55
Fraction Impervious (I) =	0.68		Pre-BMP TN Load (lb/yr) =	596.22	Pre-BMP TP Load (lb/yr) =	55.72
Total Area of Development =	46.30		Pre-BMP TN Export (lb/ac/yr) =	12.88	Pre-BMP TP Export (lb/ac/yr) =	1.20
			Post-BMP TN Load (lb/yr) =	381.58	Post-BMP TP Load (lb/yr) =	37.89
			Post-BMP TN Export (lb/ac/yr) =	8.24	Post-BMP TP Export (lb/ac/yr) =	0.82

Appendix A: As-Builts

Proposed Contours:



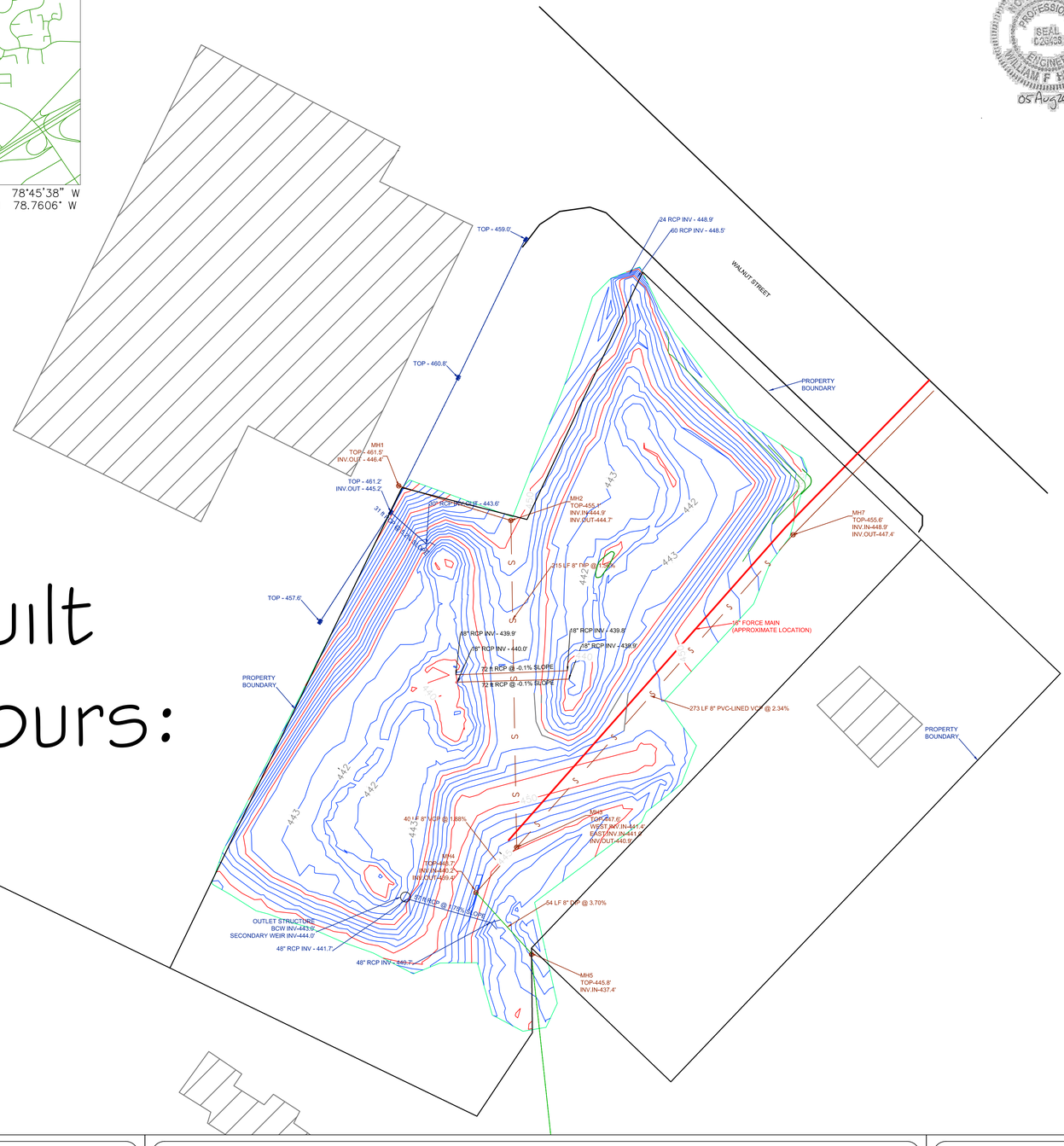
0 40' 80'



VICINITY MAP (N.T.S)

35°46'9" N 78°45'38" W
35.7692° N 78.7606° W

As-Built Contours:



North Carolina State University
Biological and Agricultural Engineering
NCSU Box 7625 | Raleigh, N.C. 27695

As-Built Sheet 1

Drawn By: RJW
Reviewed By: WFH RAS

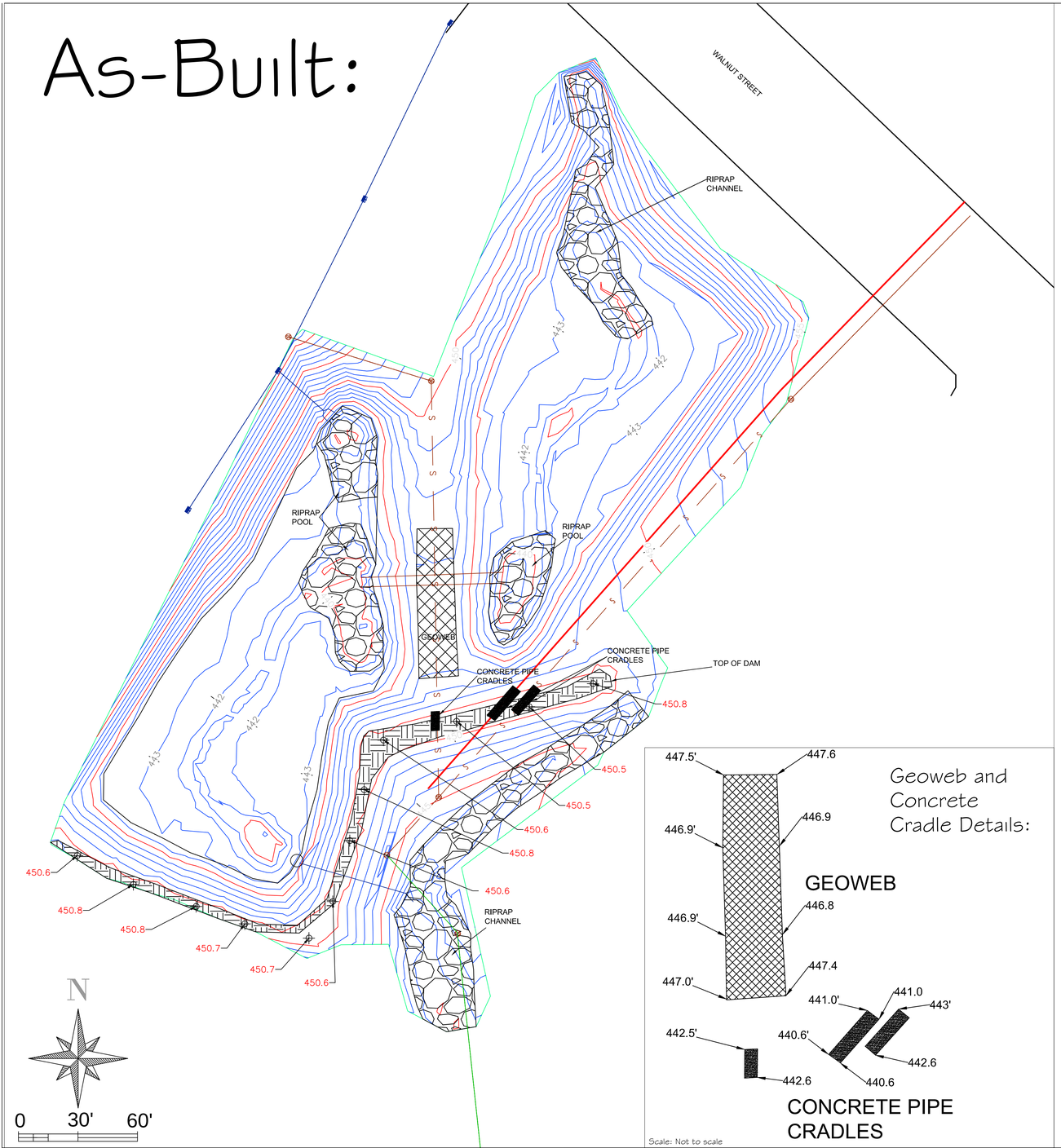
Date:
August 17, 2011

Scale:
1" = 40 ft

Barnes and Noble Extended Detention Stormwater Wetland

1208 Walnut Street
Cary, NC 27511
SCO No. 09-08224-01A and EEP No. 667

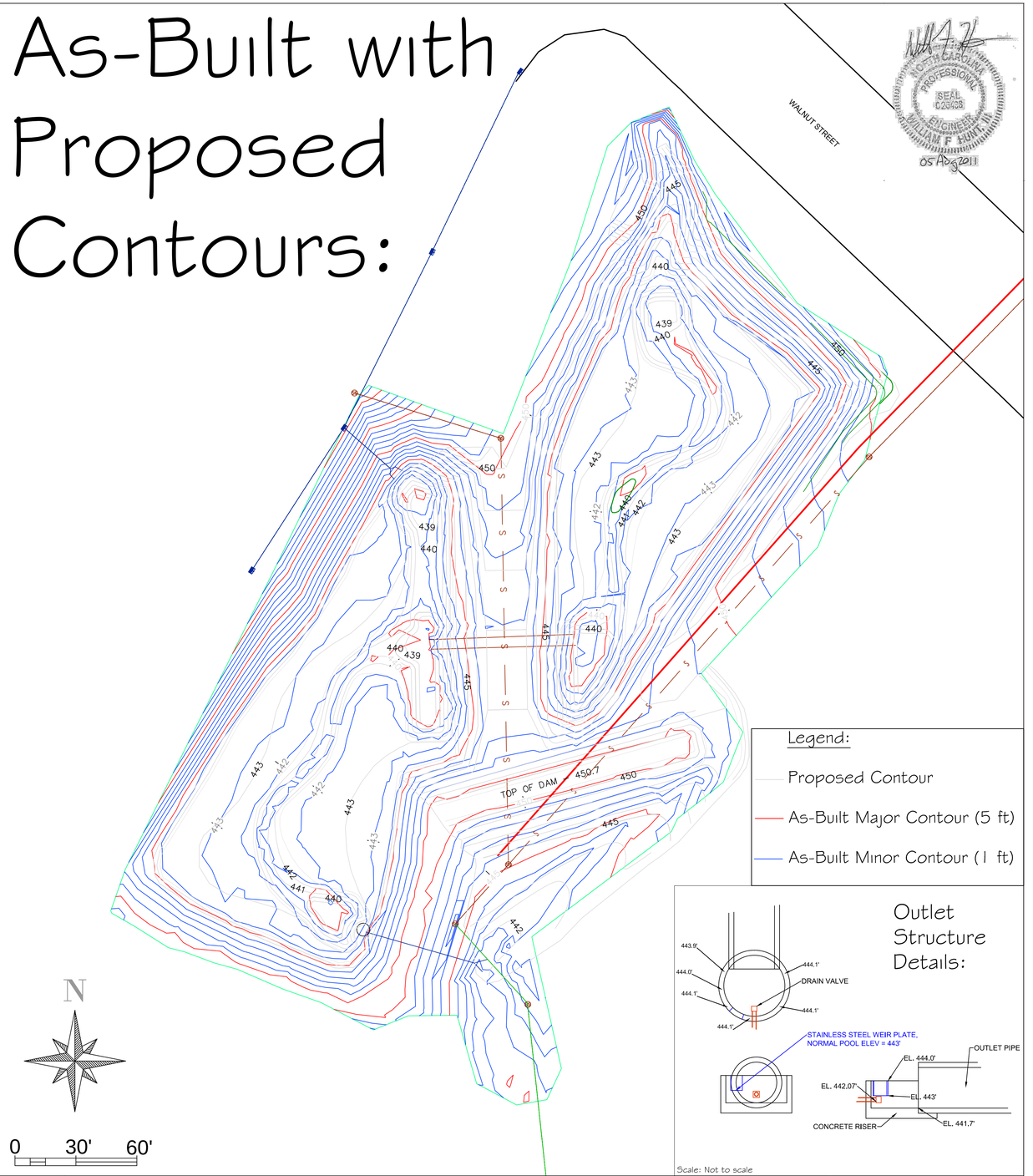
As-Built:



Geoweb and Concrete Cradle Details:

Scale: Not to scale

As-Built with Proposed Contours:



Legend:

- Proposed Contour
- As-Built Major Contour (5 ft)
- As-Built Minor Contour (1 ft)

Outlet Structure Details:

Scale: Not to scale

North Carolina State University
Biological and Agricultural Engineering
NCSU Box 7625 | Raleigh, N.C. 27695

As-Built Sheet 2

Drawn By: RJW
Reviewed By: WFH RAS

Date:
August 17, 2011

Scale:
1" = 30 ft

Barnes and Noble Extended Detention Stormwater Wetland
1208 Walnut Street
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SCO No. 09-08224-01A and EEP No. 667

Appendix B: Additional Data

Maintenance /Inspections Documents Provided to DWR during 5 Year Monitoring Period

MY	Document	Photos?	Prepared by	CY
1	Stormwater BMP Inspection and Reporting Form	Y	Town of Cary	2012
2	Stormwater BMP Annual Maintenance Inspection Report	Y	Town of Cary	2013
	Stormwater BMP Inspection and Reporting Form	Y	Town of Cary	
3	Stormwater BMP Inspection and Reporting Form	Y	Town of Cary	2014
4	Stormwater BMP Annual Maintenance Inspection Report	N	Town of Cary	2015
5	Stormwater SCM Annual Maintenance Inspection Report	Y	Town of Cary	2016
	Stormwater BMP Inspection and Reporting Form	N	Town of Cary	

See attached CD for pdf copies of the listed documents

Appendix C: Debit Ledger

EEP NUTRIENT OFFSET
PROJECT SUMMARY

Barnes & Noble (aka, Cary Commons) BMP
Extended Detention Stormwater Wetland
EEP #667

Synopsis

EEP's Barnes & Noble BMP site (EEP #667) is an extended detention stormwater wetland BMP located in Cary, North Carolina within the Neuse River basin CU 03020201. The project was initiated by NCEEP to offset nutrient loading as a third-party credit provider in the Neuse River basin (15A NCAC 02B .0240). The project was designed by the NC State Department of Biological and Agricultural Engineering, and involved retrofitting and expanding an existing wet detention BMP into an extended detention wetland BMP. Final construction and planting was completed in August 2011. The Town of Cary is currently maintaining the site per the BMP maintenance agreement (contained within the conservation easement held by the State of NC), for a 35-year period. The stormwater wetland is designed to remove 214.64 lbs/year of nitrogen, generating a 30-year credit value of 6439.2 lbs reduction of Total Nitrogen. Additionally, the project is designed to reduce 534.9 lbs of total phosphorous (TP) over 30 years; however, TP reduction credit is not available in the Neuse River basin.

Site Location

River Basin:	Neuse
CU:	03020201
14-digit HUC:	03-020201-1100-10
County:	Wake
Municipality:	Cary NC
Receiving Waters:	UT to Lynn Branch (Meadows Crk); 27-43-3; 03-04-02
Use Support Rating:	Lynn Branch = Not Rated

Project History

Memo of Agreement Signed:	May 26, 2006
Final Design:	January 2010
Recorded Conservation Easement:	April 28, 2010
Construction Completed:	July 2011
Planting Completed:	July 2011
As-Builts Submitted to DWQ:	August 2011
Annual Inspection Report:	January 2012

Project Participants

Source Agency: NC Ecosystem Enhancement Program
Project Management: NC Ecosystem Enhancement Program
Designer: NC State (Dept of Biological & Agricultural Engineering)
Construction: Hine Sitework Inc.
Landowner: Town of Cary NC
BMP Management: Town of Cary NC

BMP Design Parameters

BMP Type: Extended Detention Stormwater Wetland
Watershed Area: 46.3 acres
Watershed Description: Commercial development, shopping centers, parking lots, roadways
Percent Impervious: 68%
BMP Storage Volume: 31,590 cubic feet
Max Storm Depth Captured: 0.8 in rain event

Nutrient Removal (TN = Total Nitrogen; TP = Total Phosphorous)

Pre-BMP TN Loading: 596.22 lbs/yr (12.9 lbs/ac/yr)
Post-BMP TN Loading: 381.58 lbs/yr (8.24 lbs/ac/yr)
30-yr TN Removal: **6439.2 lbs** (214.64 lbs/yr)

Pre-BMP TP Loading: 55.72 lbs/yr (1.2 lbs/ac/yr)
Post-BMP TP Loading: 37.89 lbs/yr (0.82 lbs/ac/yr)
30-yr TP Removal: **534.9 lbs** (11.55 lbs/yr)

Property Protection & Maintenance

Property Protection Method: State of NC holds a 35-year Conservation Easement
Maintenance: Town of Cary conducts monthly maintenance/inspections and submits an annual report to EEP

Attachments:

- Site Location Map
- Watershed Map
- Site Map
- Sealed Design Calculations
- 2013 Photos
- Final Design Plan Sheets (with planting plan)
- Sealed As-Builts
- Inspection Forms
- Conservation Easement

MAPS

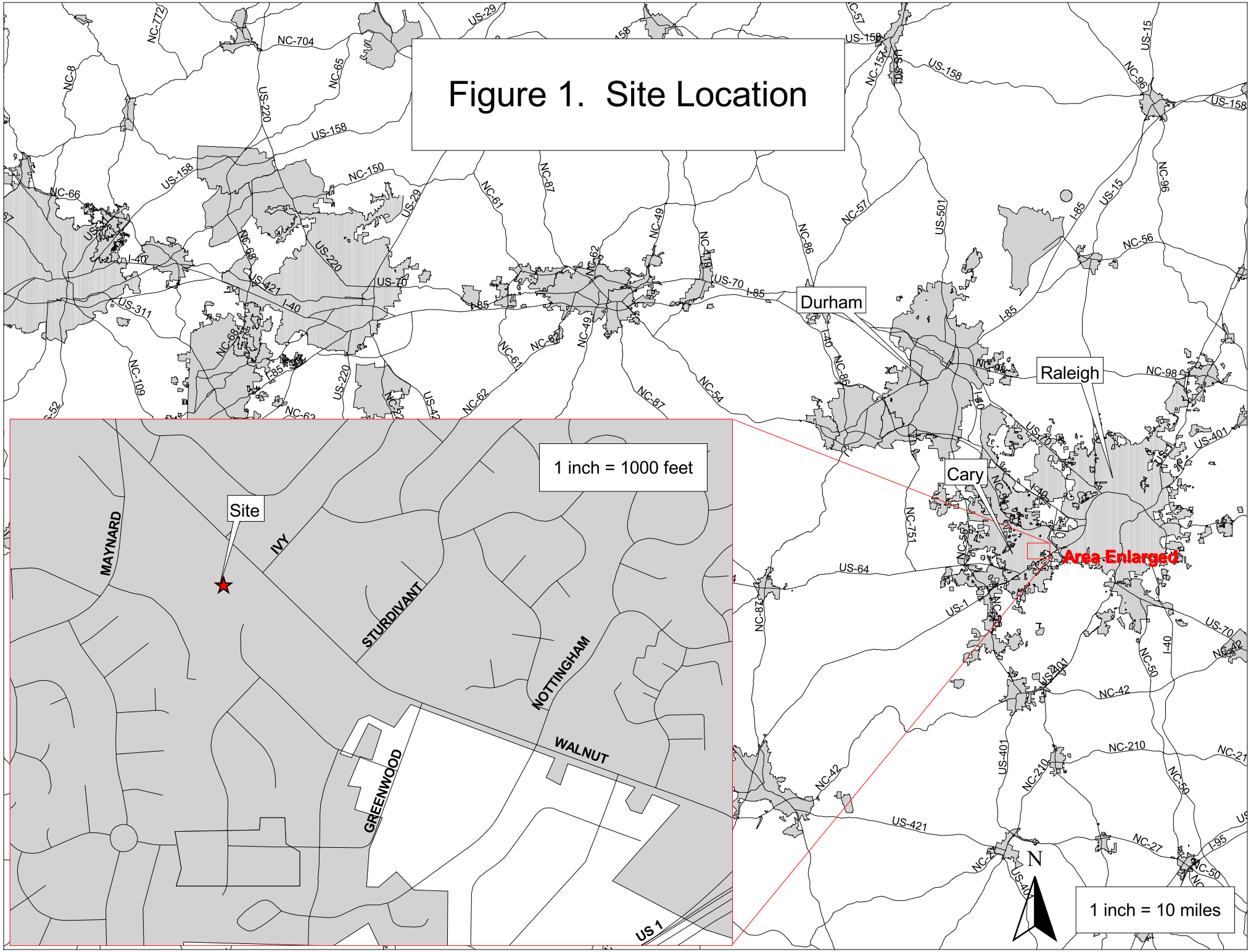
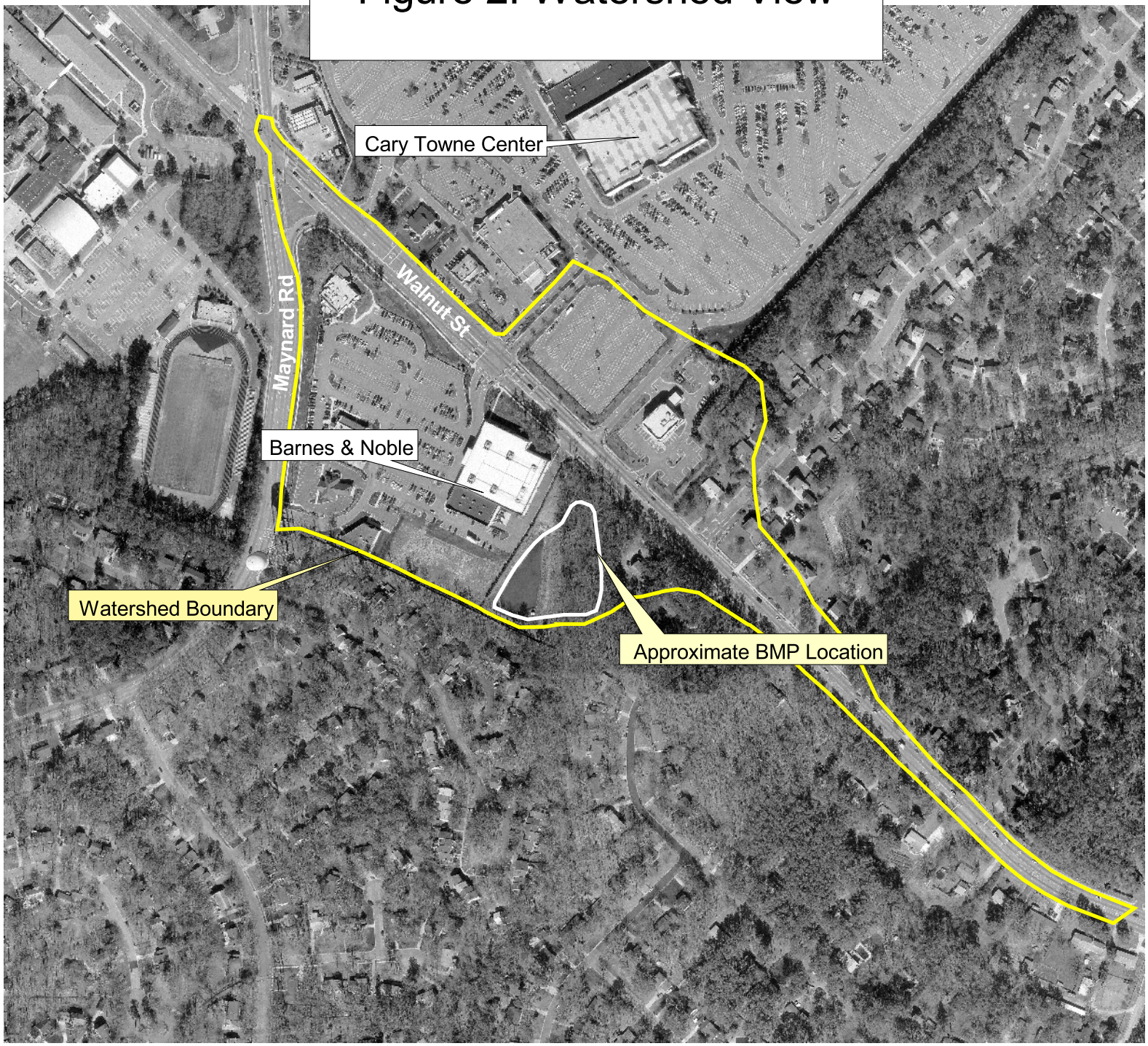


Figure 1. Site Location
Durham
Raleigh
Cary
Area Enlarged
1 inch = 1000 feet
Site
MAYNARD
IVY
STURDIVANT
NOTTINGHAM
WALNUT
GREENWOOD
US 1
N
1 inch = 10 miles

Figure 2. Watershed View



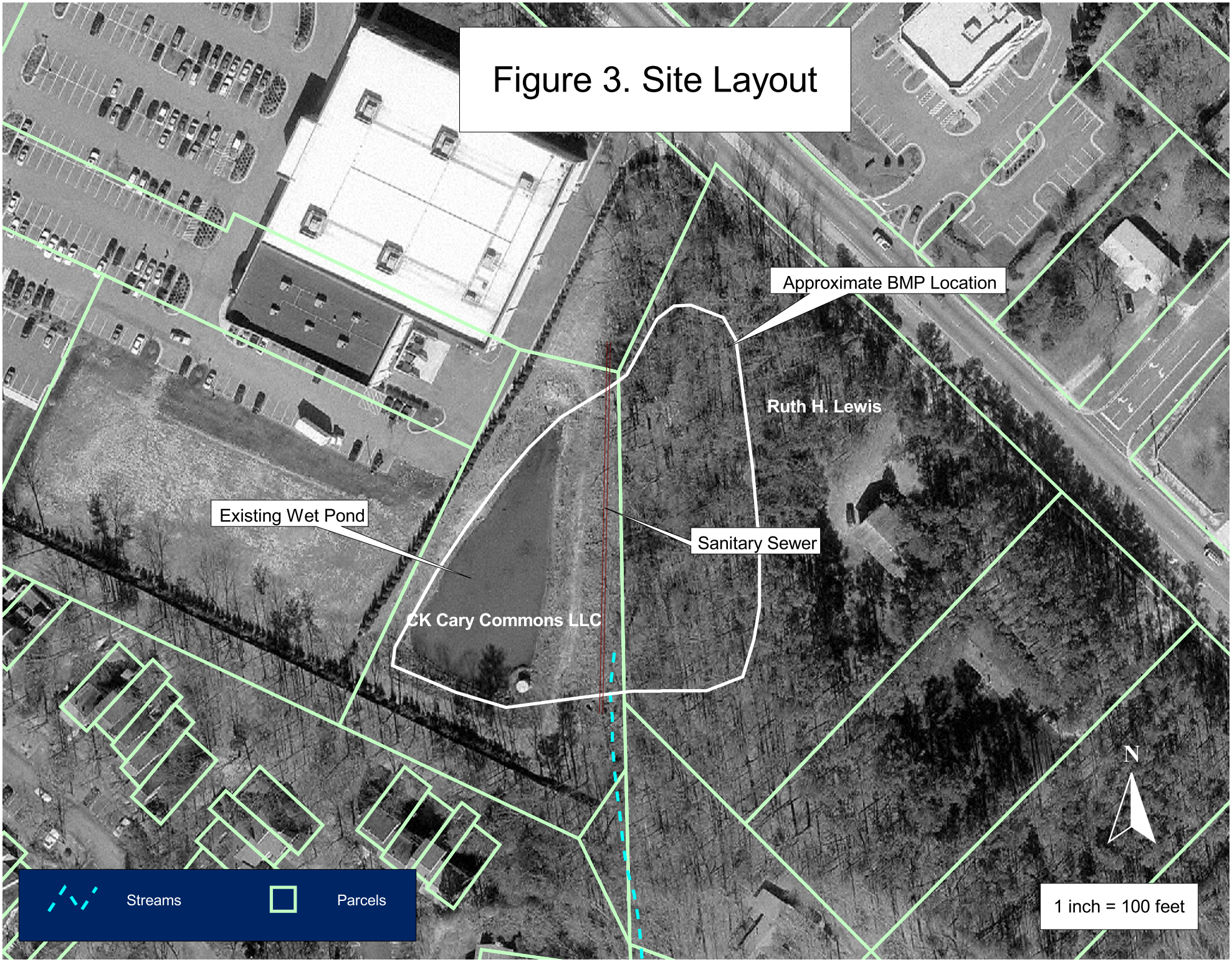


Figure 3. Site Layout
Approximate BMP Location
Ruth H. Lewis
Existing Wet Pond
Sanitary Sewer
CK Cary Commons LLC
N
Streams
Parcels
1 inch = 100 feet

PHOTOS

Current Photos (July 2013)

Walnut Street Inlet to Wetland Cell 1

Stormwater Wetland Cell 1

Interberm between BMP cells

Stormwater Wetland Cell 2

Shopping Center Inlet to Wetland Cell 2

DESIGN CALCULATIONS

Ryan A. Smith, PE
2904 Tractor Drive
Raleigh, NC 27603

August 6, 2013

NC Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

ATTN: Jeff Schaffer

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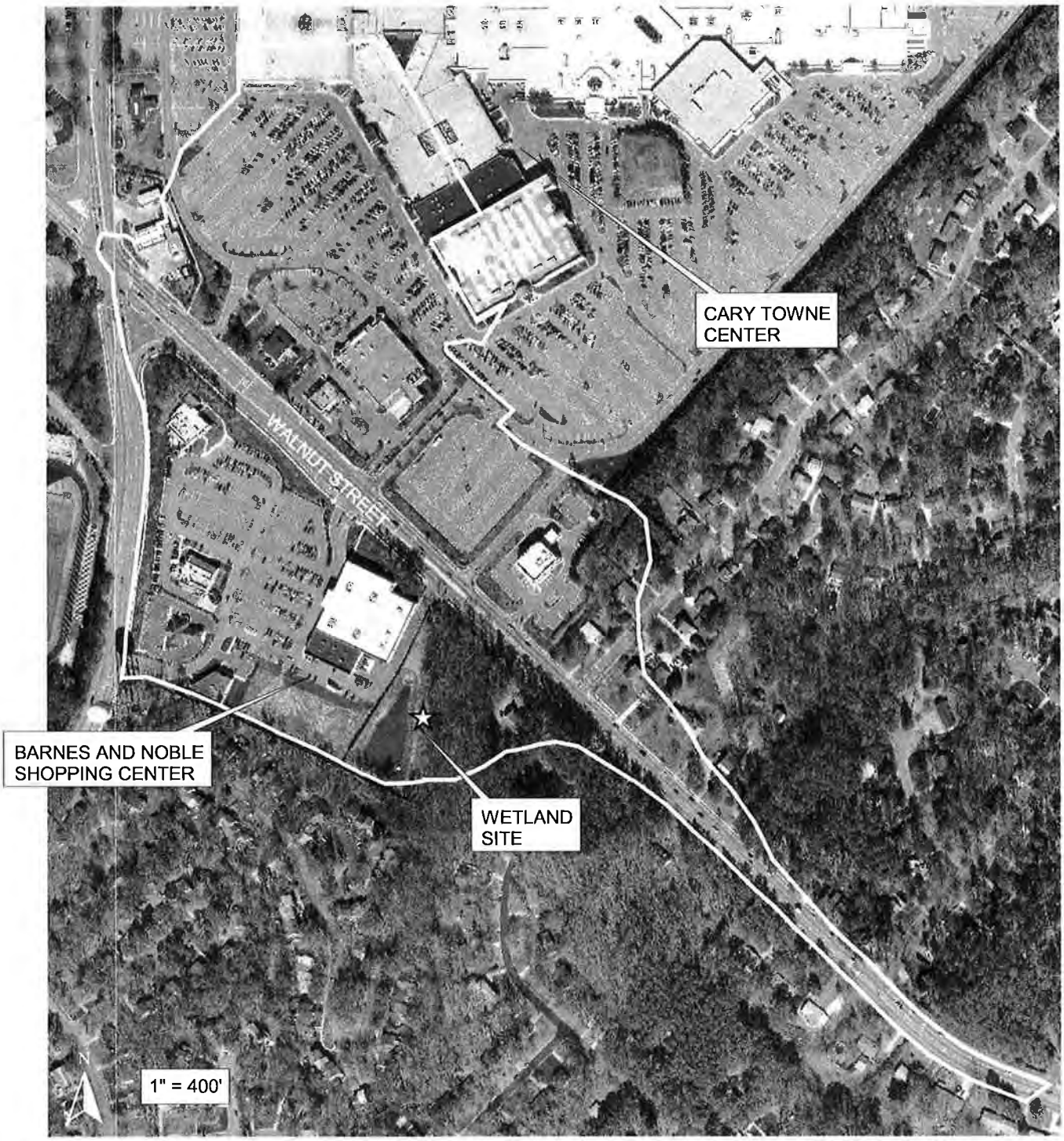
WATERSHED AND BMP DATA



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BMP Removal Calculation Worksheet (Automated)

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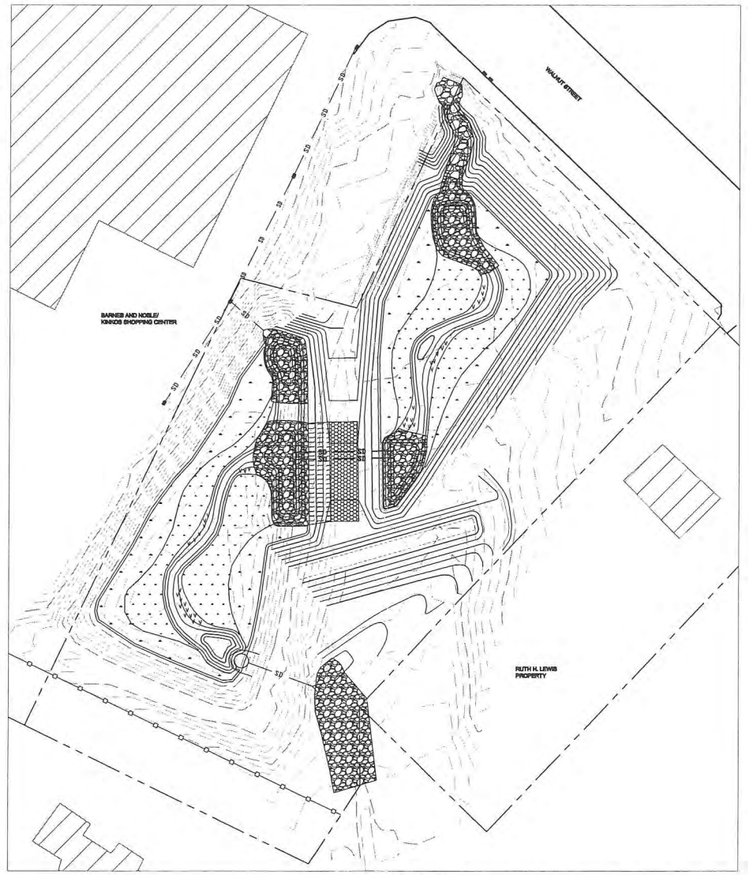
FINAL DESIGN SHEETS

BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND

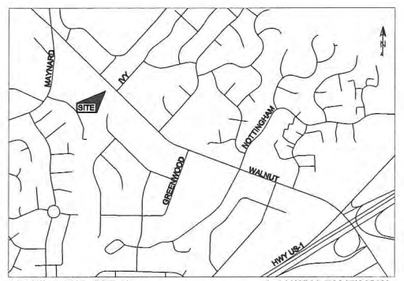
1208 WALNUT STREET
CARY, NORTH CAROLINA 27511
WAKE COUNTY
NEUSE RIVER BASIN

SCO NUMBER - _____



DISTURBANCE AREA = 2.57 AC

INDEX OF SHEETS



VICINITY MAP (N.T.S)

35°46'9" N 78°45'38" W
35.7692° N 78.7606° W

PREPARED FOR:
N.C. ECOSYSTEM ENHANCEMENT PROGRAM
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
2728 CAPITAL BLVD., SUITE 1H 103
RALEIGH, NC 27604

PREPARED BY:
NORTH CAROLINA STATE UNIVERSITY
DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING
3100 FAUCETTE DR.
RALEIGH, NC 27695

NC STATE UNIVERSITY
Biological & Agricultural Engineering

JEWELL ENGINEERING CONSULTANTS, PC
POST OFFICE BOX 2294 KERNERSVILLE, NORTH CAROLINA 27285
(336) 996-9974 FAX: (336) 996-9976

TOWN OF CARY CONTACT:
TOM HORSTMAN - STORMWATER
919.462.3932

NCEEP CONTACT:
TRACY MORRIS - PROJECT MANAGER
919.715.1658

NCSU BAE CONTACTS:
RYAN SMITH, P.E. - DESIGN/CONSTRUCTION
919.270.5396
BILL HUNT, PH.D, P.E. - DESIGN
919.515.6751

JEWELL ENGINEERING CONSULTANTS CONTACTS:
BETTY FARR, P.E. - EARTHEN DAM DESIGN
336.996.9974

DATE PREPARED - 12/20/2009

LEGEND:

- CURB INLET
- SANITARY SEWER MANHOLE
- BUILDING FOOTPRINT (APPROXIMATE)
- RIPRAP
- PROPRIETARY EROSION CONTROL COVER
- HDPE GRID SURFACE COVER
- WETLAND VEGETATION
- DEEP POOL WETLAND VEGETATION
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- MINOR CONTOUR EXISTING
- MAJOR CONTOUR PROPOSED
- MINOR CONTOUR PROPOSED
- PRECISION CONTOUR PROPOSED
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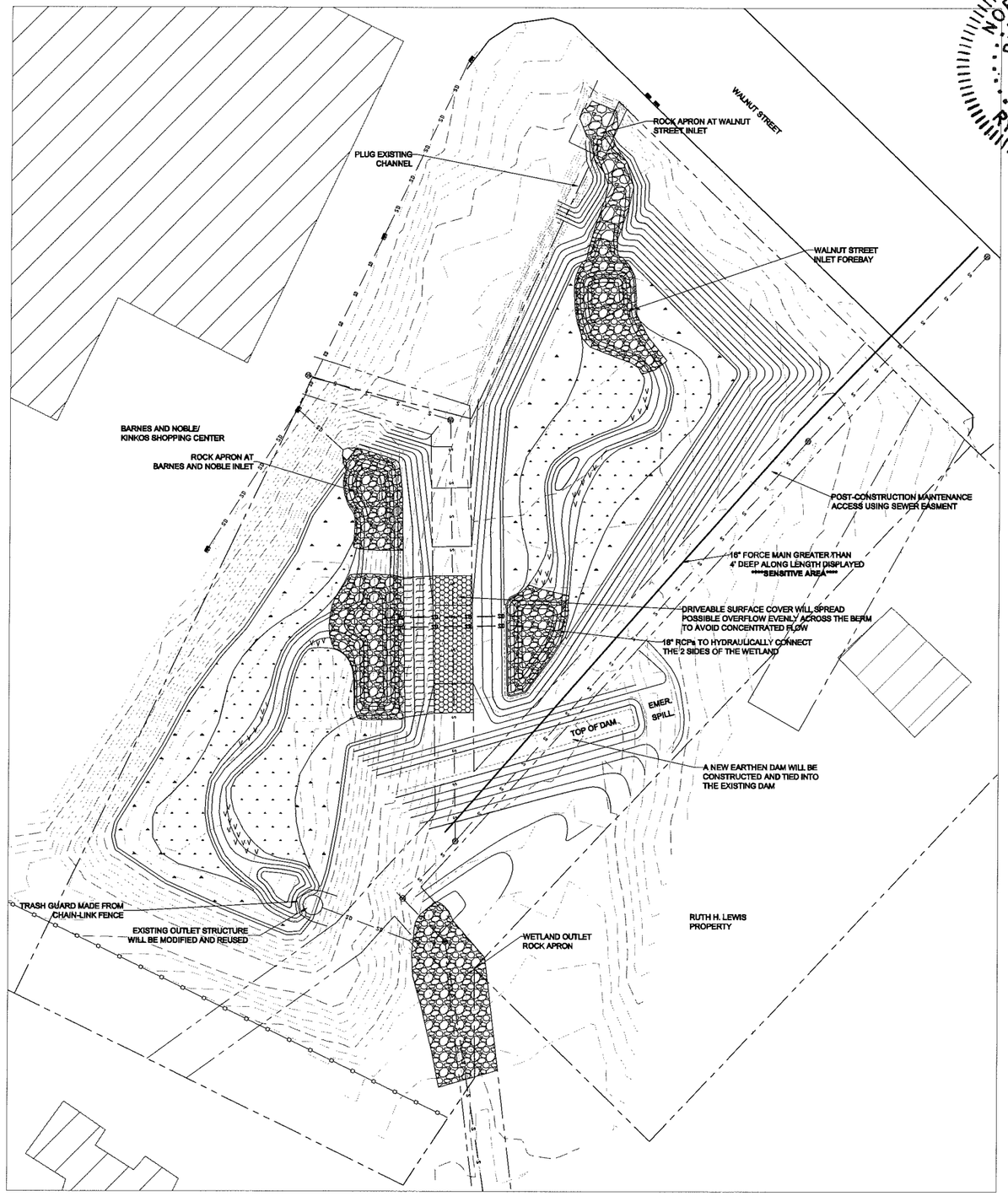
- CULVERT ADDED
- 16-IN FORCE MAIN (APPROXIMATE)
- EXISTING SANITARY SEWER (LOCATED)
- EXISTING SANITARY SEWER (UNABLE TO LOCATE)
- PROPERTY BOUNDARY
- EASEMENT
- WALNUT STREET TOC
- WOODEN FENCE
- SEDIMENT FENCE
- DISTURBANCE LIMIT

PROJECT NARRATIVE

THIS PROJECT WILL INVOLVE CREATING A STORMWATER WETLAND IN THE SWIFT CREEK WATERSHED, IN CARY, NC. THE PURPOSE OF THE PROJECT IS TO IMPROVE RUNOFF WATER QUALITY FROM THE UPSTREAM WATERSHED AND TO PROVIDE FLOOD MITIGATION DOWNSTREAM. THE WETLAND WILL RECEIVE FLOW FROM A RIPRAP CHANNEL AND DISCHARGE TO THE SAME CHANNEL. THE FIRST STREAM REACHED DOWNSTREAM OF THE SITE IS AN UNNAMED TRIBUTARY TO LYNN BRANCH (MEADOWS CREEK). THE WETLAND WILL TREAT APPROXIMATELY 46 ACRES OF DEVELOPED WATERSHED, INCLUDING A SECTION OF WALNUT STREET, THE SHOPPING CENTER CONTAINING BARNES AND NOBLE, AND A PORTION OF CARY TOWNE CENTER. THE PROPERTY IS OWNED BY THE TOWN OF CARY. THERE ARE ACTIVE GRAVITY SANITARY SEWER LINES AND FORCE MAINS AT THE SITE THAT WILL BE AVOIDED BY THE WETLAND. AN EXISTING DETENTION POND WILL BE MODIFIED TO BECOME PART OF THE WETLAND. A PORTION OF THE EARTHEN DAM OF THE POND WILL BE REMOVED AND A NEW SECTION CONSTRUCTED TO DETAIN WATER IN THE NEW, LARGER WETLAND.

DURING CONSTRUCTION AND FOR FUTURE MAINTENANCE, VEHICLES WILL ENTER THE SITE FROM WALNUT STREET INTO AN EXISTING SEWER EASEMENT ON SITE. SPACE IS LIMITED AT THE SITE DUE TO THE NEED TO KEEP THE WETLAND AS LARGE AS POSSIBLE AND BECAUSE OF THE LACK OF AVAILABLE LAND IN THE AREA. NO GRADING WILL TAKE PLACE IN THE SEWER EASEMENT AND IT WILL BE USED FOR STAGING AND FOR MATERIALS STORAGE. AS SPACE IS LIMITED, MATERIALS WILL BE REMOVED FROM THE SITE OR RE-USED REGULARLY. RUNOFF FROM THE WATERSHED UPSTREAM OF THE SITE WILL BE DIRECTED THROUGH THE SITE USING THE EXISTING DRAINAGE CHANNEL. WITHOUT CONTACTING DISTURBED AREAS, DURING MUCH OF THE CONSTRUCTION. PART WAY THROUGH CONSTRUCTION, FLOWS WILL BE ROUTED INTO THE EXISTING POND, THE EXISTING OUTLET STRUCTURE WILL BE MODIFIED TO HANDLE THE LARGER WATERSHED, AND A STONE FILTER WILL BE CONSTRUCTED AROUND THE STRUCTURE TO FILTER PONDED RUNOFF BEFORE DISCHARGE. MOST OF THE DISTURBED AREA DRAINS INTO THE AREAS BEING EXCAVATED, WHERE WATER CAN INFILTRATE OR BE PUMPED INTO THE EXISTING POND FOR FILTRATION AND DISCHARGE. THERE ARE SMALL AREAS ON THE SOUTH SIDE OF THE SITE THAT MAY BE DISTURBED AND DO NOT DRAIN INTO AN EXCAVATED AREA, AND WILL INSTEAD BE TREATED USING SEDIMENT FENCE. THE SAME SEDIMENT FENCE ALSO SERVES TO DIRECT A SMALL AMOUNT OF OFF-SITE RUNOFF AWAY FROM THE DISTURBED AREA.



NORTH CAROLINA PROFESSIONAL SEAL 032731 ENGINEER RYAN A. SMITH
6/7/10

NC STATE UNIVERSITY
DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING
www.bae.ncsu.edu

SEAL:

BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND

1208 WALNUT STREET
CARY, NORTH CAROLINA 27511

SCO NUMBER - _____

DRAWN BY: RAS
DESIGNED BY: RAS
REVIEWED BY: KLB, WFH

DATE: 12/2009
FILE NAME: final_barnes_noble.dwg
REVISIONS:

NC GRID NAD83/2001
ELEVATIONS NAVD88

SCALE: 1 IN = 30 FT
0 10 20 30 60

TITLE:

SCHEMATIC LAYOUT

SHEET:

2 / 12

LEGEND:

- CURB INLET
- SANITARY SEWER MANHOLE
- BUILDING FOOTPRINT (APPROXIMATE)
- RIPRAP
- PROPRIETARY EROSION CONTROL COVER
- HDPE GRID SURFACE COVER
- WETLAND VEGETATION
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- SEEDED AREA
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- DISTURBANCE LIMIT

GENERAL CONSTRUCTION SEQUENCE

PHASE 1

1. INSTALL CONSTRUCTION ENTRANCE PER DETAIL 8.3 AND INSTALL WARNING SIGNS ON WALNUT STREET STATING "TRUCKS ENTERING HIGHWAY" AS MANDATED IN THE MANUAL OF UNIFORM TRAFFIC CONTROL. THE WALNUT STREET PAVEMENT MUST BE KEPT FREE OF DIRT, MUD AND DEBRIS AT ALL TIMES. ALL CONSTRUCTION WORK MUST BE DONE WITHIN THE REQUIREMENTS OF ALL PROJECT PERMITS.
2. INSTALL SEDIMENT FENCE ACCORDING TO DETAIL 8.5, BUT DO NOT INSTALL THE SECTION OF FENCE DOWNSLOPE OF THE PROPOSED NEW DAM LABELED "PHASE 3 SEDIMENT FENCE" UNTIL PHASE 3 OF THE CONSTRUCTION SEQUENCE.
3. MODIFY THE EXISTING OUTLET STRUCTURE AS SHOWN IN DETAIL 7.3. REMOVE THE METAL COVER AND CUT AROUND THE PERIMETER OF THE CONCRETE RISER AT ELEVATION 446.3 FT. CUT THE RECTANGULAR ORIFICE AS DETAILED.
4. COVER THE RECTANGULAR ORIFICE WITH WIRE MESH WITH 1/2-INCH OPENINGS. PILE 57 STONE ON A 2:1 SLOPE AGAINST THE RISER AS SHOWN IN DETAIL 7.2.
5. CLEAR ALL VEGETATION IN THE PHASE 1 AREA AND REMOVE IT FROM THE SITE.
6. SCRAPE THE TOP 6 INCHES OF TOPSOIL IN THE PHASE 1 AREA AND STOCKPILE IT WITHIN THE AREA SHOWN, IN THE SEWER EASEMENT NEAR THE CONSTRUCTION ENTRANCE. TOPSOIL WILL LIKELY NEED TO BE PILED AND RE-APPLIED SYSTEMATICALLY, AS THERE IS LITTLE STORAGE SPACE ON SITE. SHOULD THE SOIL BE STOCKPILED FOR A LONG PERIOD OR WHEN HEAVY RAIN IS EXPECTED, INSTALL SEDIMENT FENCE AROUND THE PILE TO AVOID EROSION OF THE PILE INTO THE WETLAND EXCAVATION.
7. GRADE AND STABILIZE THE PHASE 1 AREA. WETLAND PLANTS SHALL NOT BE PLANTED UNTIL THE END OF THE PROJECT. STABILIZE THE SIDE SLOPES AS DESCRIBED IN THE SITE STABILIZATION REQUIREMENTS, AS THEY ARE COMPLETED. CONSTRUCT THE WALNUT STREET INLET FOREBAY AS SHOWN ON THIS SHEET AND IN DETAIL 9.1. THE WALNUT STREET ROCK APRON WILL BE CONSTRUCTED DURING PHASE 3. ANY WATER PUMPED FROM THE PHASE 1 AREA MUST BE RELEASED TO THE EXISTING POND.

PHASE 2

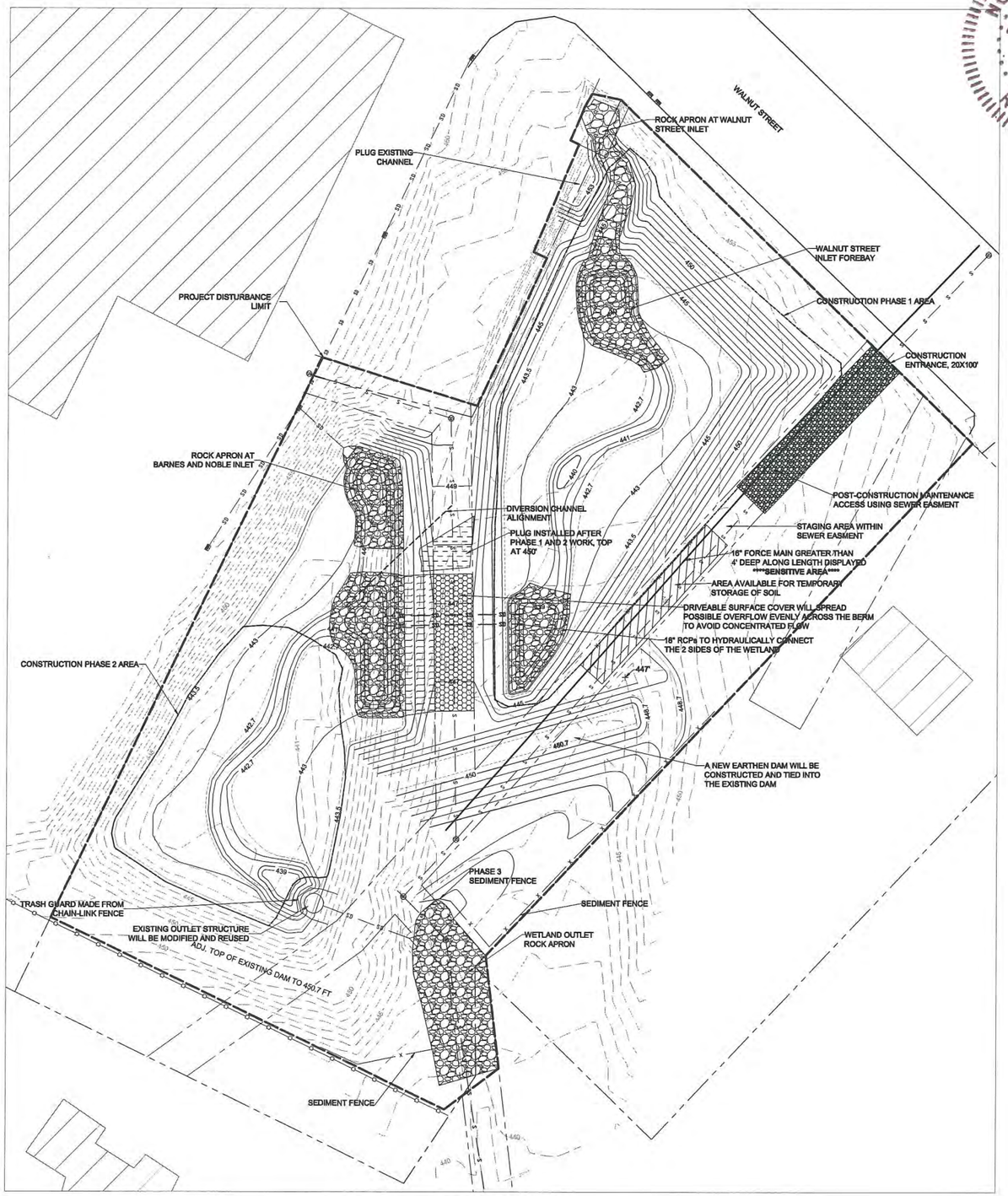
8. GRADE AND STABILIZE THE PHASE 2 AREA. THE EXISTING CHANNEL FROM WALNUT STREET WILL STILL BE USED TO BYPASS FLOW FROM WALNUT STREET DURING THIS PHASE. WETLAND PLANTS SHALL NOT BE PLANTED UNTIL THE END OF THE PROJECT. STABILIZE THE SIDE SLOPES AS DESCRIBED IN THE SITE STABILIZATION REQUIREMENTS, AS THEY ARE COMPLETED.
9. CONSTRUCT THE OUTLET ROCK APRON AS IN DETAILS 9.1 AND 12.1.

PHASE 3

10. DIVERT THE EXISTING DRAINAGE CHANNEL FROM WALNUT STREET INTO THE EXISTING POND ACCORDING TO THE ALIGNMENT SHOWN ON THIS SHEET AND THE CROSS-SECTION IN DETAIL 8.2, AND PLUG THE EXISTING CHANNEL, NEXT TO THE TEMPORARY DIVERSION CHANNEL, AS SHOWN ON THIS SHEET. WHEN PLUGGING THE EXISTING CHANNEL, CLEAR ALL VEGETATION AND DEBRIS FROM THE BANKS OF THE CHANNEL. ALL FILL SHOULD BE COMPACTED IN 8-INCH LIFTS BY DRIVING ON IT OR TAMPING.
11. INSTALL THE SECTION OF SEDIMENT FENCE DOWNSLOPE OF THE NEW EARTHEN DAM, LABELED "PHASE 3 SEDIMENT FENCE" ON THIS SHEET.
12. CONSTRUCT THE EARTHEN DAM AND SPILLWAY AS DETAILED ON SHEETS 11 AND 12. DURING THIS CONSTRUCTION, ALL RUNOFF THROUGH THE SITE WILL BE ROUTED THROUGH THE EXISTING OUTLET STRUCTURE THAT HAS BEEN MODIFIED.
13. INSTALL THE 18-IN CULVERTS CONNECTING THE 2 SIDES OF THE WETLAND AS SHOWN IN DETAIL 8.1.
14. GRADE THE BERM AREA OVER THE CULVERTS. INSTALL THE HDPE GRID PRODUCT AS SHOWN IN THE PLAN VIEW, OVER THE TOP OF THE BERM, AND ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS . INSTALL THE EROSION CONTROL BLANKET ON THE DOWNSTREAM SIDE OF THE BERM AS SHOWN IN DETAIL 9.2.
15. COMPLETE THE GRADING AND STABILIZATION OF THE WALNUT STREET INLET AREA. THE CHANNEL SIDE SLOPES SHALL BE STABILIZED AS SHOWN IN DETAIL 9.2. THE ROCK APRON SHALL BE CONSTRUCTED AS SHOWN IN DETAIL 9.1.
16. PLUG THE EXISTING CHANNEL NEAR WALNUT STREET AS SHOWN IN THE GRADING PLAN. CLEAR ALL VEGETATION AND DEBRIS FROM THE BANKS OF THE EXISTING CHANNEL. ALL FILL SHALL BE COMPACTED IN 8-INCH LIFTS BY DRIVING ON IT OR TAMPING.
17. COMPLETE THE REMAINING GRADING AND STABILIZATION ON THE REST OF THE SITE. ALL ROCK APRONS SHALL BE CONSTRUCTED AS DETAILED IN 9.1. ALL SLOPES SHALL BE STABILIZED AS DETAILED IN 9.2.
18. CUT THE OUTLET STRUCTURE TO FINAL DIMENSIONS AS SHOWN IN DETAIL 7.4.
19. CONSTRUCT THE OUTLET TRASH GUARD FROM ALUMINUM CHAIN-LINK FENCE, PER THE CONSTRUCTION SPECIFICATIONS.
20. COMPLETE OR REPAIR ANY FINE GRADING, AS NECESSARY.
21. THE SITE MUST BE STABILIZED WITHIN 15 WORKING DAYS OF GRADING COMPLETION.
22. AFTER PROJECT COMPLETION AND THE SITE HAS BEEN STABILIZED, REMOVE ALL SEDIMENT FENCE INSTALLED AND REMOVE THE CONSTRUCTION ENTRANCE PER DETAIL 8.3.
23. PLANT ALL WETLAND VEGETATION AFTER JUNE 1, PER THE WETLAND PLANTING PLAN.
24. ANY CURB AND GUTTER OR DRAINAGE STRUCTURES DAMAGED DURING CONSTRUCTION SHALL BE REPLACED.
25. ANY DAMAGE TO EXISTING ASPHALT ON WALNUT STREET SHALL BE REPAIRED ACCORDING TO NCDOT STANDARDS.

SITE STABILIZATION REQUIREMENTS

ALL SLOPES 2:1 THROUGH 5:1 MUST BE COVERED WITH EROSION CONTROL BLANKET RATED FOR 2:1 SLOPES. STRAW SHALL BE APPLIED UNDER ALL EROSION CONTROL BLANKETS AT A RATE OF 50 BALES PER ACRE, UNLESS DETERMINED TO BE DETRIMENTAL TO THE PERFORMANCE OF A SPECIFIC PRODUCT. ALL SLOPES LESS STEEP THAN 5:1 SHALL BE SEEDED AND COVERED WITH STRAW AT A RATE OF 75 BALES PER ACRE. ALL OTHER EROSION CONTROL MATERIALS AND DEVICES MUST BE INSTALLED AS SPECIFIED. ALL EROSION CONTROL PRODUCTS MUST BE APPROVED BY THE PROJECT ENGINEER AND PRODUCT SPECIFICATIONS VERIFIED. ALL EROSION CONTROL BLANKETS MUST BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS. ALL EROSION CONTROL BLANKETS MUST BE BIODEGRADABLE, UNLESS OTHERWISE APPROVED BY THE ENGINEER. THREE TO SIX INCHES OF TOPSOIL MUST BE APPLIED TO ALL SITE DISTURBED AREAS AND THE SURFACE ROUGHENED. ALL DISTURBED AREAS MUST BE BROADCAST LIMED AT A RATE OF 40 LB/ 1000 SF. WITH NO RAIN IMMINENT, ALL DISTURBED AREAS MUST BE BROADCAST FERTILIZED USING 10-10-10 FERTILIZER AT A RATE OF 20 LB/1000 SF. DURING THE WARM SEASON (MAY-JUL), APPLY BROWN TOP MILLET SEED AT A RATE OF 0.5 LB/ 1000SF (23 LB/AC) AND COMMON BERMUDA SEED AT 1 LB/1000 SF (40 LB/AC) . DURING THE COLD SEASON (OCT-FEB), APPLY WINTER RYE SEED AT A RATE OF 1 LB/1000SF (40 LB/AC) AND TALL FESCUE AT A RATE OF1.8 LB/1000SF (80 LB/AC). DURING THE TRANSITION MONTHS (MAR,APR,AUG,SEPT), APPLY A COMBINATION OF THE SPECIFIED WARM AND COLD SEASON MIXES. THE SITE MUST BE STABILIZED WITHIN 15 WORKING DAYS OF GRADING COMPLETION



DISTURBANCE AREA = 2.57 AC

NORTH CAROLINA PROFESSIONAL SEAL 032731 ENGINEER RYAN A. SMITH
6/7/10

NC STATE UNIVERSITY
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SEAL:

BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND

1208 WALNUT STREET
CARY, NORTH CAROLINA 27511

SCO NUMBER - _____

DRAWN BY: RAS
DESIGNED BY: RAS
REVIEWED BY: KLB, WFH

DATE: 12/2009
FILE NAME: final_barnes_noble.dwg

REVISIONS:

NC GRID NAD83/2001
ELEVATIONS NAVD88

SCALE: 1 IN = 30 FT
0 10 20 30 60

TITLE:

EROSION AND SEDIMENT CONTROL

SHEET:

3 / 12

LEGEND:

- CURB INLET
- SANITARY SEWER MANHOLE
- BUILDING FOOTPRINT (APPROXIMATE)
- RIPRAP
- PROPRIETARY EROSION CONTROL COVER
- HDPE GRID SURFACE COVER
- WETLAND VEGETATION
- DEEP POOL WETLAND VEGETATION
- SEEDED AREA
- MAJOR CONTOUR EXISTING
- MINOR CONTOUR EXISTING
- MAJOR CONTOUR PROPOSED
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- EXISTING STORM SEWER
- CULVERT ADDED
- 18-IN FORCE MAIN (APPROXIMATE)
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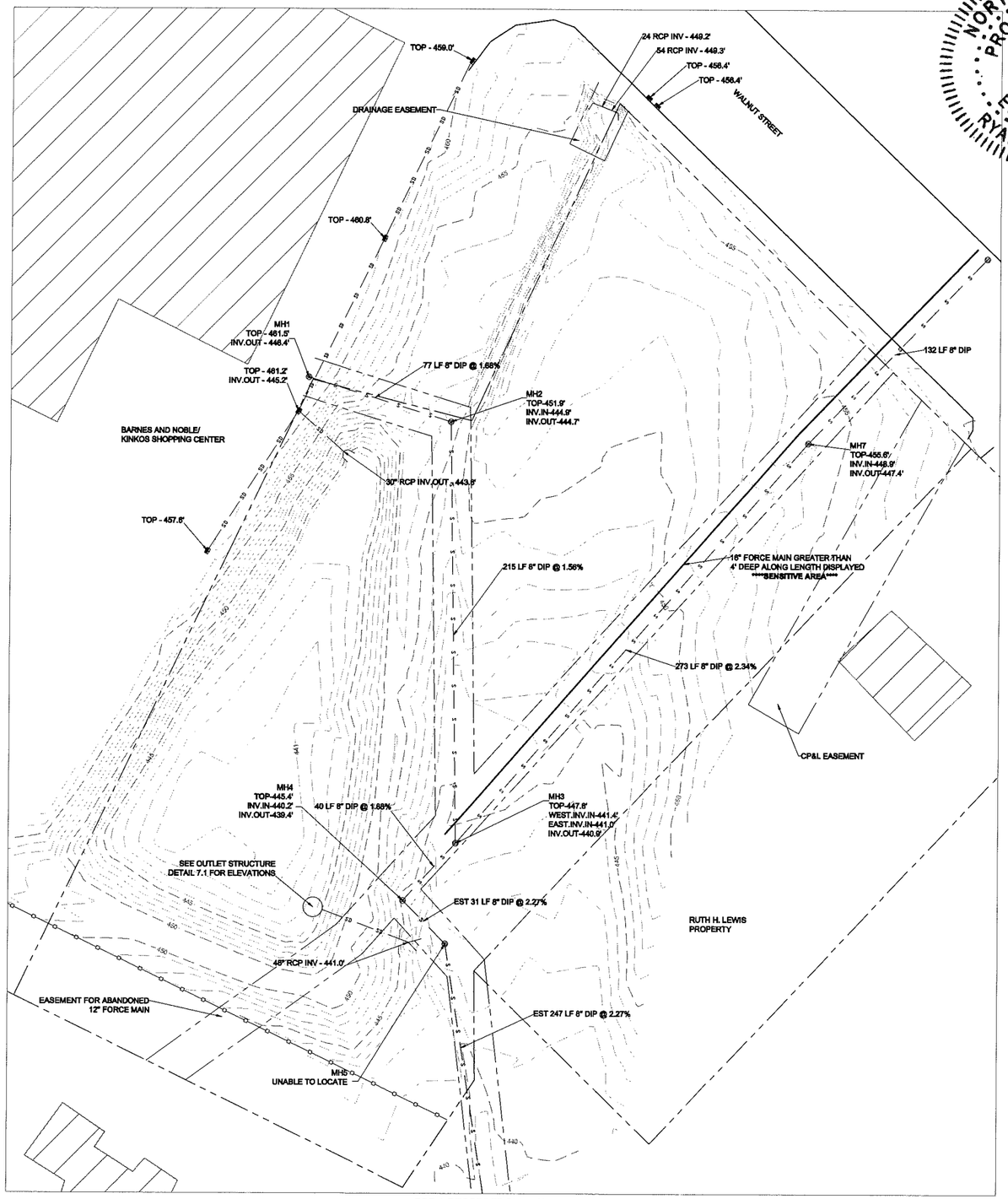
- PROPERTY BOUNDARY
- EASEMENT
- WALNUT STREET TOC
- WOODEN FENCE
- SEDIMENT FENCE
- DISTURBANCE LIMIT

NOTES:

THE CONTRACTOR SHALL CALL THE "CALL BEFORE YOU DIG" TOLL FREE NUMBER TO MAKE SURE THAT ALL UTILITIES ARE LOCATED AND MARKED.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGES INCURRED DURING CONSTRUCTION.

THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF UNKNOWN FEATURES ARE DISCOVERED THAT WOULD NECESSITATE MODIFICATION TO THE ILLUSTRATED DESIGN.



FOR A RECORDED PLAT, SEE
WAKE COUNTY BM2007, PG00354

NORTH CAROLINA PROFESSIONAL SEAL 032731 ENGINEER RYAN A. SMITH

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TITLE:

EXISTING SITE

SHEET:

4 / 12

LEGEND:

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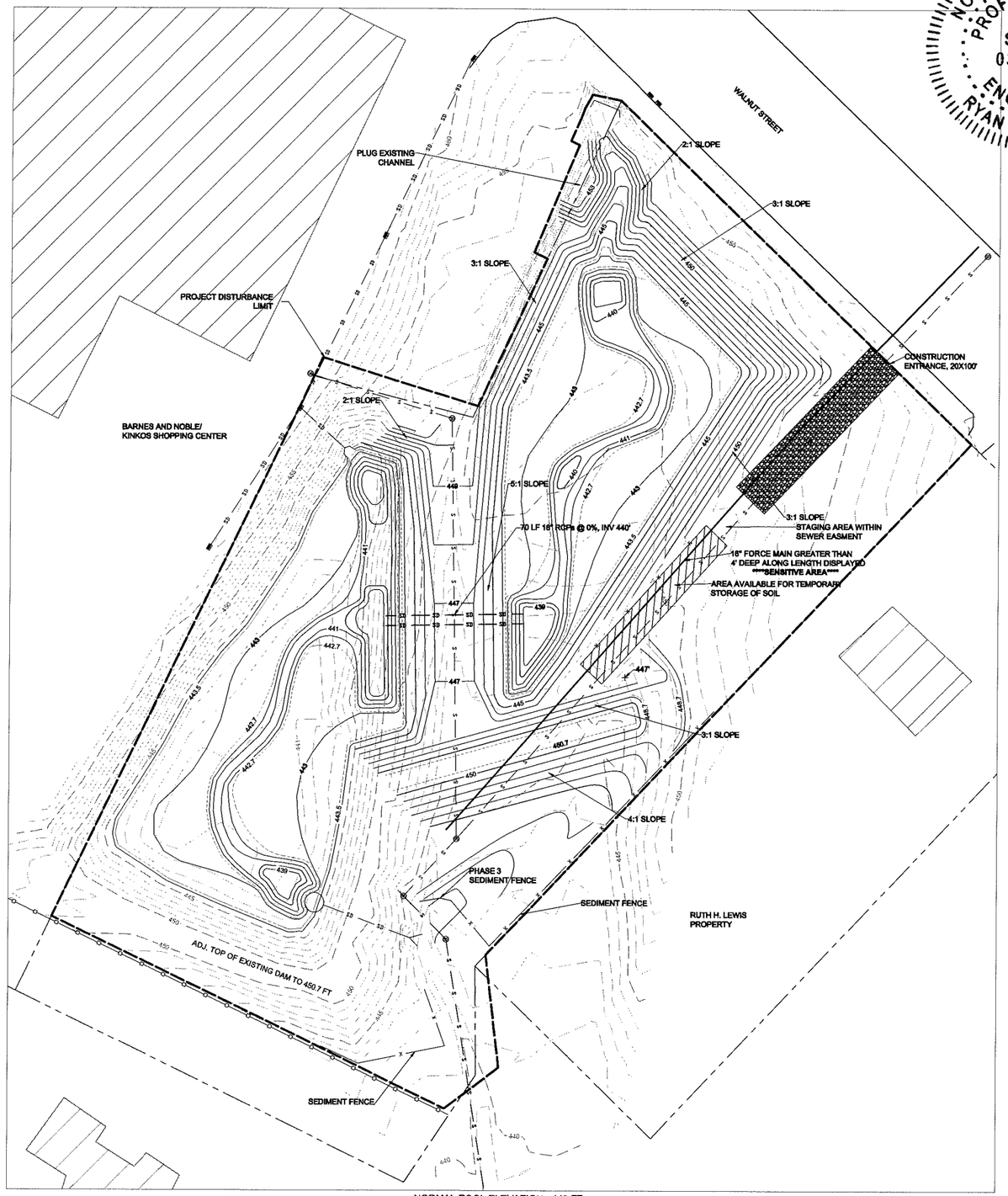

NORMAL POOL ELEVATION - 443 FT
FLOOD POOL ELEVATION - 444 FT
WATER QUALITY VOLUME STORED - 31590 CF

SOIL VOLUME HAULED FROM SITE - 6350 CY

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0 10 20 30 60

TITLE:

GRADING PLAN

SHEET:

5 / 12

LEGEND:

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WETLAND PLANTING PLAN

PLANT ALL WETLAND VEGETATION AFTER JUNE 1.

***IN THE DEEP POOLS, PLANT WATER LILY (NYMPHAEA ODORATA) AND SPATTERDOCK (NUPHAR LUTEA), 8 OF EACH PER POOL AREA SHOWN.**

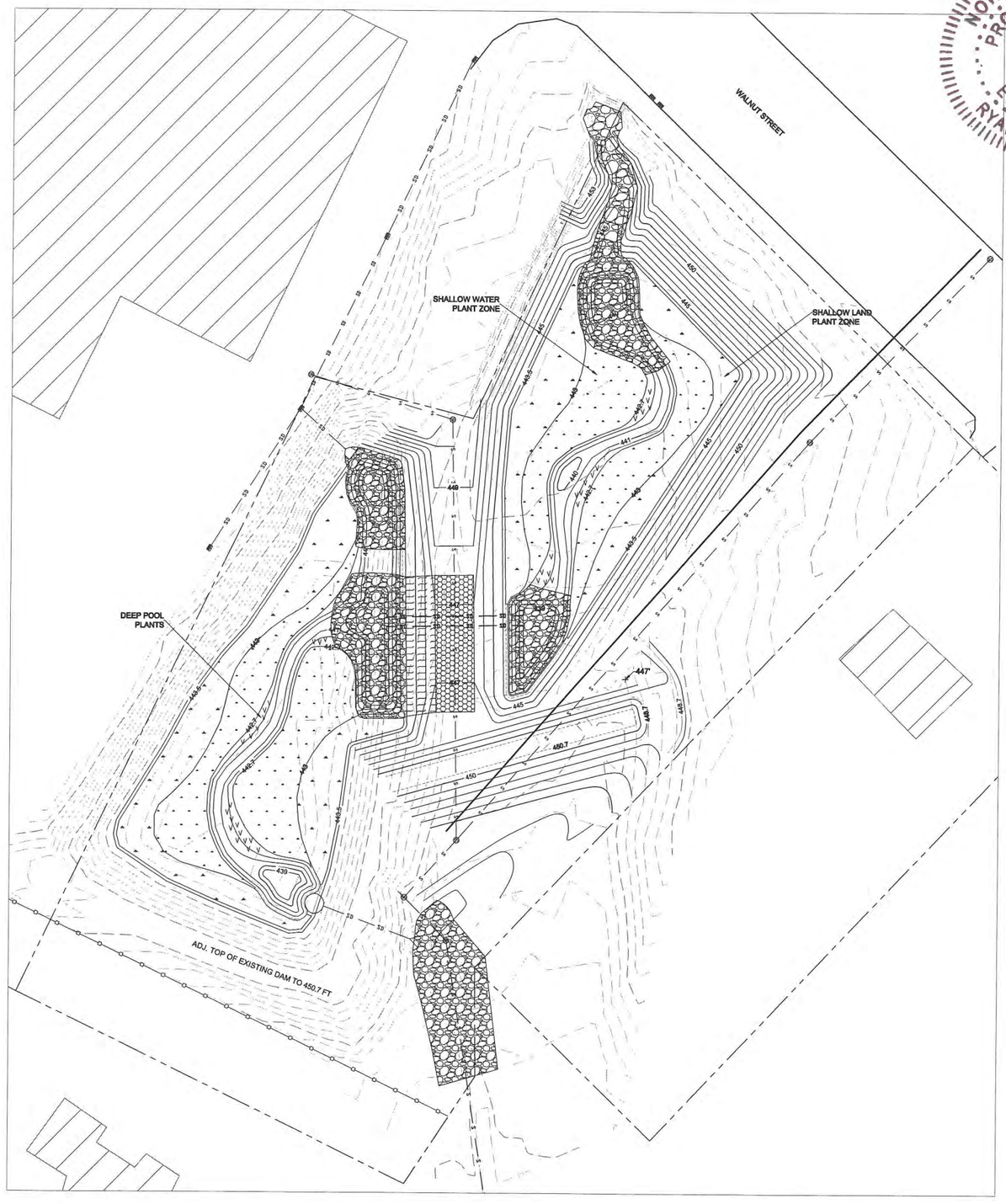
***IN THE SHALLOW WATER ZONES, PLANT PICKERELWEED (PONTEDERIA CORDATA), LIZARD'S TAIL (SAURURUS CERNUUS), ARROW ARRUM (PELTANDRA VIRGINICA), DUCK POTATO (SAGITTARIA LATIFOLIA), BLUE FLAG IRIS (IRIS VIRGINICA), SOFT STEM BULRUSH (SCIRPUS VALIDUS). PLANT ON 2-FT CENTERS IN GROUPS OF 7 TO 10 AND RANDOMIZE THE GROUPS.**

***IN THE SHALLOW LAND ZONES, PLANT SOFT RUSH (JUNCUS EFFUSUS), WOOLGRASS (SCIRPUS CYPERINUS), LURID SEDGE (CAREX LURIDA), CARDINAL FLOWER (LOBELIA CARDINALIS), ROSE MALLOW (HIBISCUS MOSCHEUTUS). PLANT ON 2-FT CENTERS IN GROUPS OF 7 TO 10 AND RANDOMIZE THE GROUPS.**

FERTILIZE WITHIN 24 HOURS OF PLANTING, WITH NO IMMINENT RAINFALL, USING 10-10-10 AT 20 LBS PER 1000 SF.

WETLAND PLANT QUANTITIES

PLANTING ZONE	SCIENTIFIC NAME	COMMON NAME	CLASSIFICATION	TYPE	TOTAL STEM COUNT
A. DEEP POOL	NYMPHAEA ODORATA	WATER LILY	AQUATIC	PLUG	48
	NUPHAR LUTEA	SPATTERDOCK	AQUATIC	PLUG	48
B. SHALLOW WATER	PONTEDERIA CORDATA	PICKERELWEED	EMERGENT	PLUG	530
	SAURURUS CERNUUS	LIZARD'S TAIL	EMERGENT	PLUG	400
	PELTANDRA VIRGINICA	ARROW ARRUM	EMERGENT	PLUG	450
	SAGITTARIA LATIFOLIA	DUCK POTATO	EMERGENT	PLUG	450
	IRIS VIRGINICA	BLUE FLAG IRIS	EMERGENT	PLUG	480
	SCIRPUS VALIDUS	SOFT STEM BULRUSH	EMERGENT	PLUG	420
C. SHALLOW LAND	JUNCUS EFFUSUS	SOFT RUSH	EMERGENT	PLUG	750
	SCIRPUS CYPERINUS	WOOLGRASS	EMERGENT	PLUG	850
	CAREX LURIDA	LURID SEDGE	EMERGENT	PLUG	810
	LOBELIA CARDINALIS	CARDINAL FLOWER	EMERGENT	PLUG	120
	HIBISCUS MOSCHEUTUS	ROSE MALLOW	EMERGENT	PLUG	150



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0 10 20 30 60

TITLE:

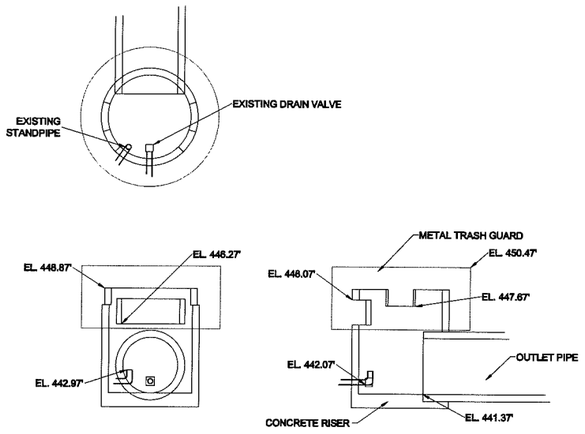
WETLAND PLANTING PLAN

SHEET:

6 / 12

7.1

EXISTING OUTLET STRUCTURE (N.T.S)



7.2

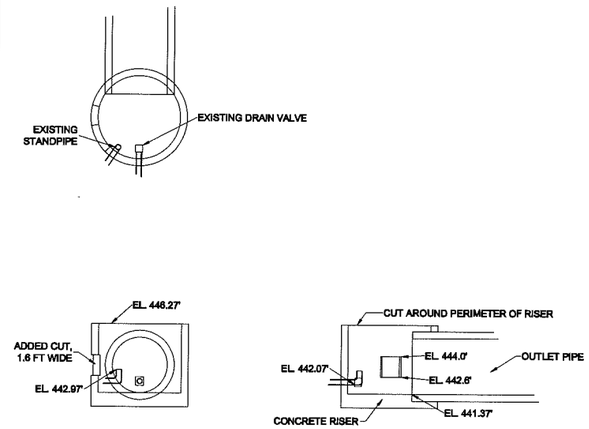
STONE SEDIMENT FILTER ON MODIFIED OUTLET STRUCTURE (SEE DETAIL 7.3) (N.T.S)

STONE FILTER MAINTENANCE

INSPECT FILTER AFTER EACH PERIOD OF SIGNIFICANT RAINFALL. REMOVE SEDIMENT AND TRASH AS NECESSARY TO ALLOW PROPER DRAINAGE THROUGH THE FILTER. PLACE SEDIMENT THAT IS REMOVED IN THE DESIGNATED DISPOSAL AREA AND REPLACE THE CONTAMINATED PART OF THE GRAVEL.

7.3

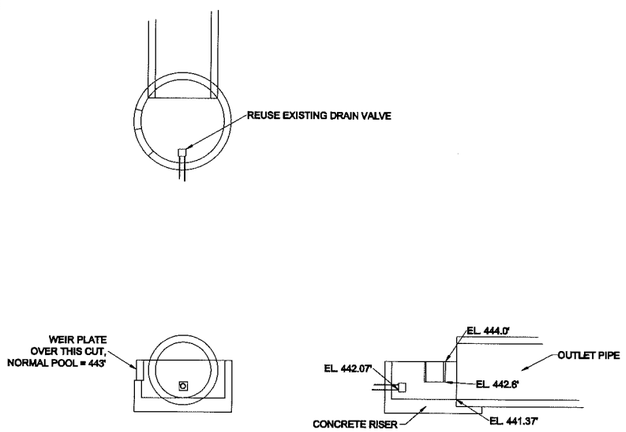
EXISTING OUTLET STRUCTURE WITH TEMPORARY MODIFICATIONS (N.T.S)



THE OUTLET STRUCTURE WILL BE MODIFIED AS SHOWN FOR USE DURING CONSTRUCTION. THE METAL TRASH GUARD WILL BE REMOVED. THE TOP PORTION OF THE RISER WILL BE CUT OFF AND REMOVED. A RECTANGULAR ORIFICE WILL BE CUT IN THE RISER AS SHOWN. A STONE SEDIMENT FILTER WILL BE CONSTRUCTED OVER THE ADDED ORIFICE AS IN DETAIL 7.2

7.4

FINAL OUTLET STRUCTURE (N.T.S)



A STAINLESS STEEL PLATE WILL BE CONSTRUCTED AND INSTALLED BY THE ENGINEER, WITH A 1-FT VERTICALLY BY 1-FT HORIZONTALLY RECTANGULAR OPENING. THE INVERT OF THE WEIR PLATE WILL SET NORMAL POOL ELEVATION AT 443 FEET. THE FINAL MODIFICATIONS ARE TO PLUG THE EXISTING STANDPIPE WITH HYDRAULIC CEMENT AND CUT AROUND THE PERIMETER OF THE RISER AT THE ELEVATION SHOWN.

NORTH CAROLINA PROFESSIONAL SEAL 032731 ENGINEER RYAN A. SMITH 6/7/10

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SEAL:

BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND
1208 WALNUT STREET
CARY, NORTH CAROLINA 27511

SCO NUMBER - _____

DRAWN BY: RAS
DESIGNED BY: RAS
REVIEWED BY: KLB, WFH

DATE: 12/2009
FILE NAME: final_barnes_noble.dwg

REVISIONS:

SCALE: SEE DETAILS

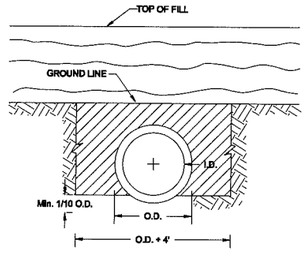
TITLE:

OUTLET STRUCTURE DETAILS

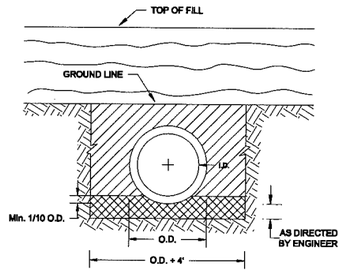
SHEET:

8.1

STORM SEWER PIPE INSTALLATION (N.T.S)



NORMAL EARTH FOUNDATION
(PIPE IN TRENCH)

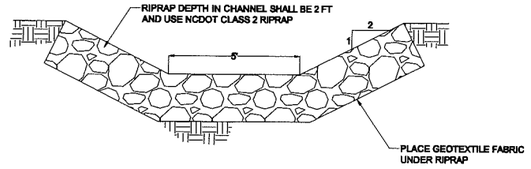


UNSUITABLE MATERIAL FOUNDATION
(PIPE IN TRENCH)

*PIPES CROSSING THE SANITARY SEWER ARE 18-IN RCPs WITH INVERT ELEVATIONS AT 440 FT. THE PIPES WILL HAVE NO SLOPE.

8.2

TEMPORARY DIVERSION CHANNEL (N.T.S)



DIVERSION CHANNEL NOTES:

1. ALIGN THE CHANNEL AS SHOWN ON THE EROSION AND SEDIMENT CONTROL SHEET.
2. FILTER 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 SHALL OVERLAP A MINIMUM OF 1 FT. IF THE DAMAGE IS EXTENSIVE, REPLACE THE ENTIRE FILTER CLOTH.
3. GEOTEXTILE FABRIC MUST HAVE AN EOS NO LARGER THAN US STANDARD SIEVE #70, A THICKNESS OF 20-80 MILS, A GRAB STRENGTH OF 90-120 LB, AND MUST CONFORM TO ASTM D-1682 OR ASTM D-177

8.3

CONSTRUCTION ENTRANCE (N.T.S)

I. CONSTRUCTION SPECIFICATIONS

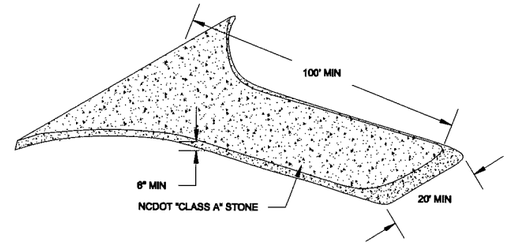
1. CLEAR THE AREA OF VEGETATION. REMOVE ALL ROOTS AND ORGANIC DEBRIS. GRADE ALONG THE INTENDED LENGTH OF THE ENTRANCE TO SMOOTH PROFILE. GRADE SUCH THAT WATER IS CARRIED TO DOWNSLOPE, BUT IS NOT CHANNELIZED.
2. PLACE THE GRAVEL TO THE DIMENSIONS AS SHOWN IN THE DETAIL.
* USE OF A GEOTEXTILE LAYER IS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

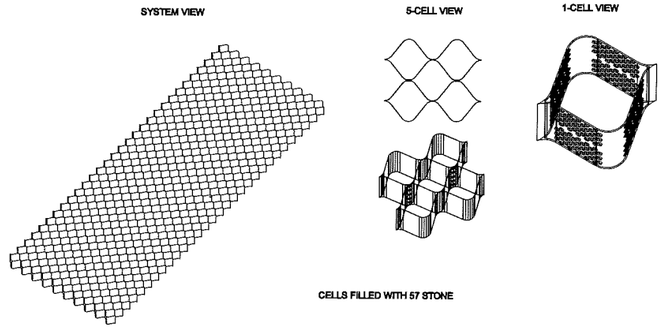
III. REMOVAL

1. REMOVE THE CONSTRUCTION ENTRANCE AND SMOOTH THE DISTURBED AREA TO BLEND WITH THE SURROUNDING TOPOGRAPHY. SEED AND STRAW THE AREA PER THE SITE STABILIZATION REQUIREMENTS ON SHEET 3.



8.4

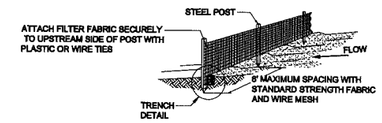
EXAMPLE HDPE GRID (N.T.S)

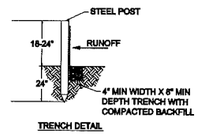


*HDPE GRID MUST BE 6 INCHES TALL OR GREATER. GRID MUST BE PROPERLY SUPPORTED TO ALLOW H20 LOADING (AS DEFINED BY AASHTO) , USING HIGH-STRENGTH FABRIC.

8.5

SEDIMENT FENCE INSTALLATION (N.T.S)





TRENCH DETAIL

MAINTENANCE

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

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NORTH CAROLINA PROFESSIONAL SEAL 032731 ENGINEER RYAN A. SMITH
6/7/10

SEAL:

BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND

1208 WALNUT STREET
CARY, NORTH CAROLINA 27511

SCO NUMBER - _____

DRAWN BY: RAS
DESIGNED BY: RAS
REVIEWED BY: KLB, WFH

DATE: 12/2009
FILE NAME: final_barnes_noble.dwg

REVISIONS:

SCALE: SEE DETAILS

TITLE:

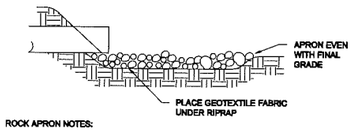
DETAILS (1)

SHEET:

8 / 12

9.1

ROCK APRON
PROFILE VIEW (N.T.S)



ROCK APRON NOTES:

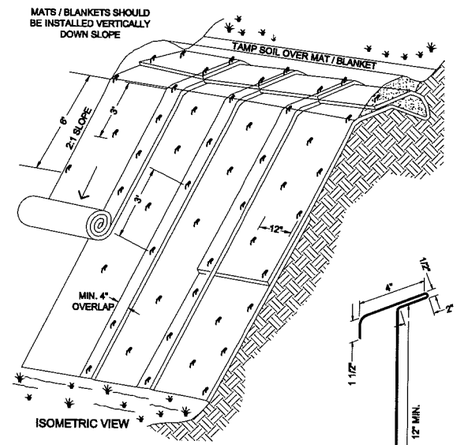
1. LAY THE APRON OUT AS SHOWN ON THE EROSION AND SEDIMENT CONTROL SHEET.
2. FILTER CLOTH MUST BE PROPERLY PROTECTED FROM PUNCHING OR TEARING DURING INSTALLATION. REPAIR ANY DAMAGE BY REMOVING THE RIPRAP AND PLACING ANOTHER PIECE OF FILTER CLOTH OVER THE DAMAGED AREA. ALL OVERLAPPING SECTIONS SHOULD OVERLAP A MINIMUM OF 1 FT. IF THE DAMAGE IS EXTENSIVE, REPLACE THE ENTIRE FILTER CLOTH.
3. GEOTEXTILE FABRIC MUST HAVE AN EOS NO LARGER THAN US STANDARD SIEVE #70, A THICKNESS OF 20-60 MILS, A GRAB STRENGTH OF 90-120 LB, AND MUST CONFORM TO ASTM D-1682 OR ASTM D-177

ROCK APRON SPECIFICATIONS

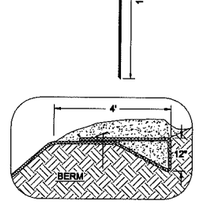
APRON LOCATION	RIPRAP SIZE	APRON DEPTH	LENGTH	WIDTH
WALNUT STREET INLET FOREBAY	NCDOT CLASS 2	2 FT	70 FT	30 FT
WALNUT STREET INLET APRON	NCDOT CLASS 2	3 FT	50 FT	13.5 FT
BARNES AND NOBLE INLET APRON	NCDOT CLASS 1	1 FT	45 FT	7.5 FT
SANITARY SEWER CROSSING	NCDOT CLASS 1	1 FT	70 FT	30 FT
WETLAND OUTLET APRON	NCDOT CLASS 2	3 FT	44 FT	12 FT

9.2

EROSION CONTROL BLANKET INSTALLATION (N.T.S)



TYPICAL SLOPE
SOIL STABILIZATION



NOTES:

1. SLOPE SURFACE SHALL BE FREE OF ROCKS CLODS, STICKS AND GRASS. MATS / BLANKETS SHALL HAVE GOOD SOIL CONTACT.
2. APPLY PERMANENT SEEDING BEFORE PLACING BLANKETS.
3. LAY BLANKETS LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH THE SOIL. DO NOT STRETCH.

EROSION CONTROL BLANKET SPECIFICATIONS

THE EROSION CONTROL PRODUCT USED TO STABILIZE THE SANITARY SEWER CROSSING MUST BE RATED TO HANDLE A VELOCITY OF 10 FPS WHEN VEGETATED.

ALL SLOPES 2:1 THROUGH 5:1 MUST BE COVERED WITH EROSION CONTROL BLANKET RATED FOR 2:1 SLOPES. STRAW SHALL BE APPLIED UNDER ALL EROSION CONTROL BLANKETS AT A RATE OF 50 BALES PER ACRE, UNLESS DETERMINED TO BE DETRIMENTAL TO THE PERFORMANCE OF A SPECIFIC PRODUCT. ALL SLOPES LESS STEEP THAN 5:1 SHALL BE SEEDED AND COVERED WITH STRAW AT A RATE OF 75 BALES PER ACRE. ALL OTHER EROSION CONTROL MATERIALS AND DEVICES MUST BE INSTALLED AS SPECIFIED. ALL EROSION CONTROL PRODUCTS MUST BE APPROVED BY THE PROJECT ENGINEER AND PRODUCT SPECIFICATIONS VERIFIED. ALL EROSION CONTROL BLANKETS MUST BE INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS. ALL EROSION CONTROL BLANKETS MUST BE BIODEGRADABLE, UNLESS OTHERWISE APPROVED BY THE ENGINEER. THREE TO SIX INCHES OF TOPSOIL MUST BE APPLIED TO ALL SITE DISTURBED AREAS AND THE SURFACE ROUGHENED. ALL DISTURBED AREAS MUST BE BROADCAST LIMED AT A RATE OF 40 LB/ 1000 SF. WITH NO RAIN IMMINENT, ALL DISTURBED AREAS MUST BE BROADCAST FERTILIZED USING 10-10-10 FERTILIZER AT A RATE OF 20 LB/1000 SF. DURING THE WARM SEASON (MAY-JUL), APPLY BROWN TOP MILLET SEED AT A RATE OF 0.5 LB/ 1000SF (23 LB/AC) AND COMMON BERMUDA SEED AT 1 LB/1000 SF (40 LB/AC) . DURING THE COLD SEASON (OCT-FEB), APPLY WINTER RYE SEED AT A RATE OF 1 LB/1000SF (40 LB/AC) AND TALL FESCUE AT A RATE OF1.8 LB/1000SF (80 LB/AC). DURING THE TRANSITION MONTHS (MAR,APR,AUG,SEPT), APPLY A COMBINATION OF THE SPECIFIED WARM AND COLD SEASON MIXES. THE SITE MUST BE STABILIZED WITHIN 15 WORKING DAYS OF GRADING COMPLETION

NORTH CAROLINA PROFESSIONAL SEAL 032731 ENGINEER RYAN A. SMITH

6/7/10

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REVISIONS:

SCALE: SEE DETAILS

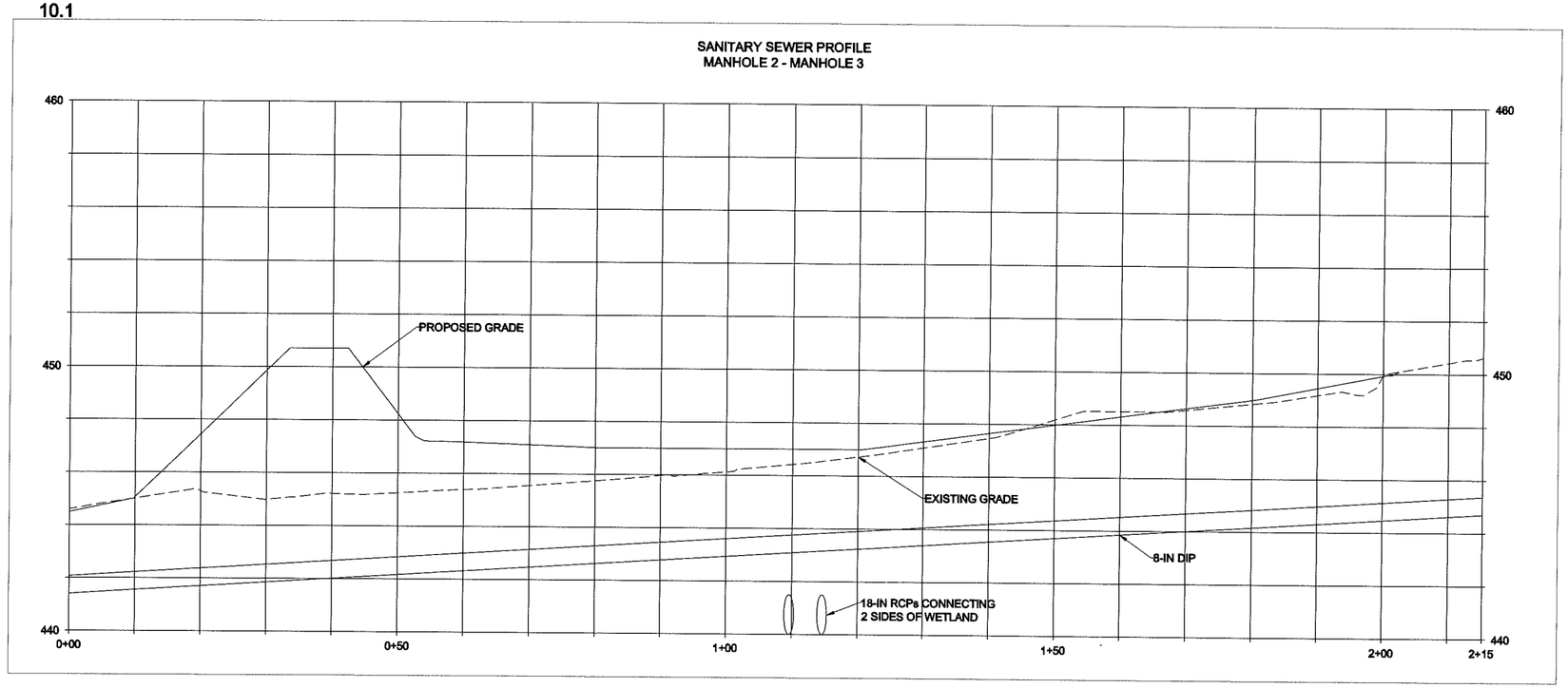
TITLE:

DETAILS (2)

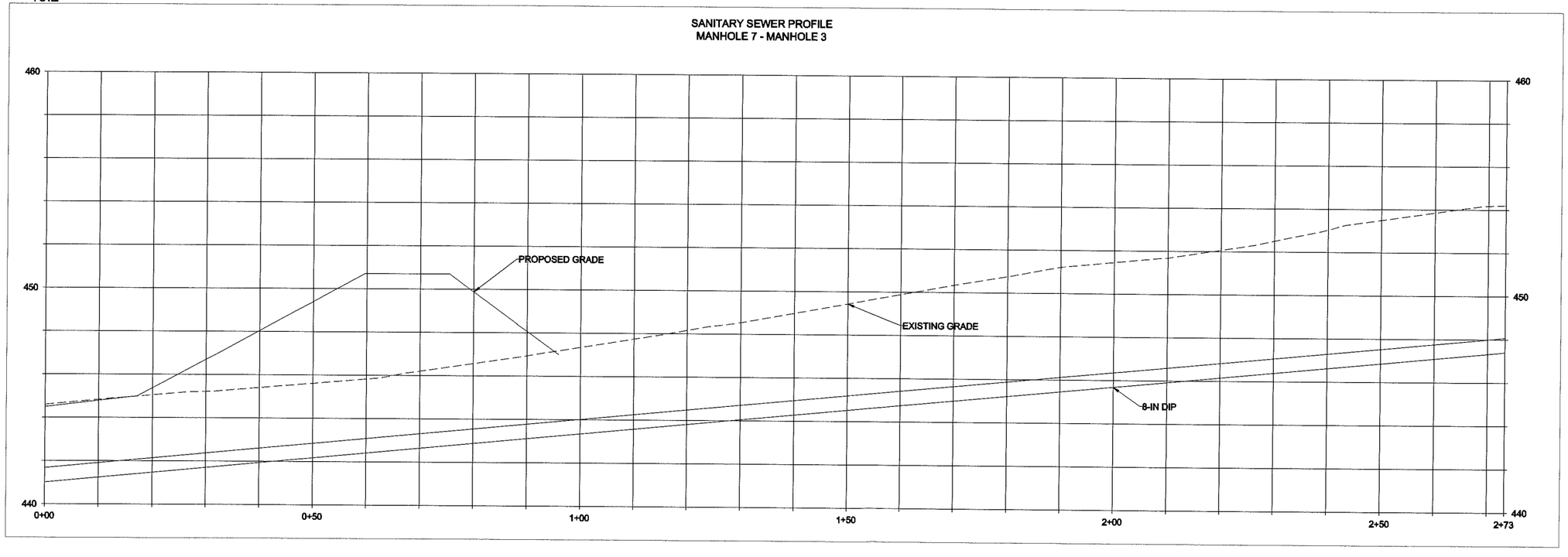
SHEET:

9 / 12

10.1



10.2



NORTH CAROLINA PROFESSIONAL SEAL 032731 ENGINEER RYAN A. SMITH
6/7/13

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SEAL:

BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND
1208 WALNUT STREET
CARY, NORTH CAROLINA 27511

SCO NUMBER - _____

DRAWN BY: RAS
DESIGNED BY: RAS
REVIEWED BY: KLB, WFH

DATE: 12/2009
FILE NAME: final_barnes_noble.dwg

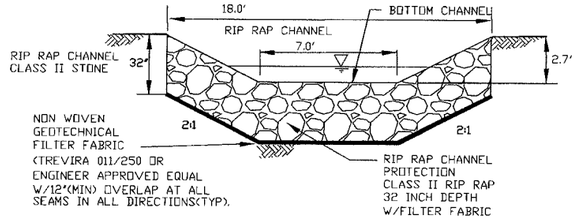
REVISIONS:

SCALE:
H. 1 IN = 10 FT
V. 1 IN = 2.5 FT

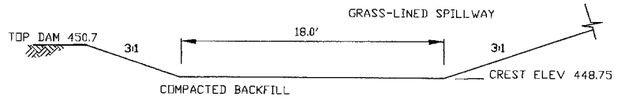
TITLE:

SANITARY SEWER PROFILES

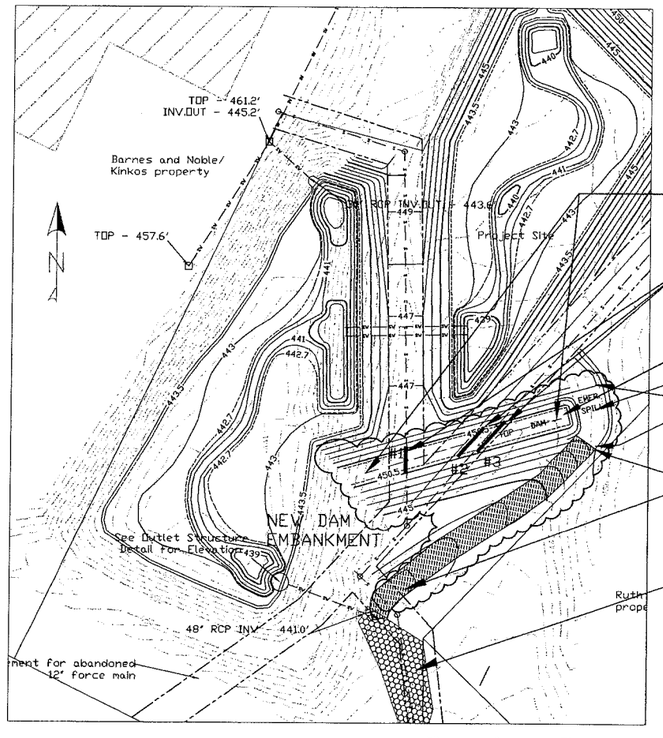
SHEET:



1/11 EMERGENCY SPILLWAY CHANNEL SECTION
N.T.S.



4/11 ELEVATION: EMERGENCY SPILLWAY
N.T.S.



3/11 SEEPAGE CUTOFF

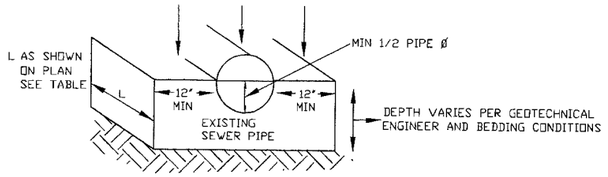
2/11 CONCRETE CRADLE

TOP OF DAM 450.7
CREST ELEV 448.75

4/11 EMERGENCY SPILLWAY
GRASS-LINED

1/11 EMERGENCY SPILLWAY
CHANNEL(SEE SECTION)

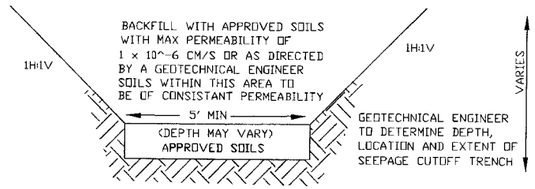
1/9 1/12 ROCK APRON
DETAIL



CONCRETE CRADLE TABLE

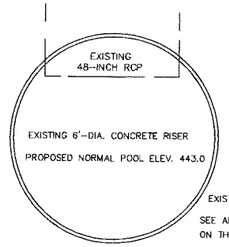
ID	LENGTH	COMMENT
# 1	10.0'	GRAVITY SANITARY SEWER
# 2	18.0'	FORCE MAIN SAN. SEWER
# 3	18.0'	GRAVITY SANITARY SEWER

2/11 CONCRETE CRADLE
N.T.S.

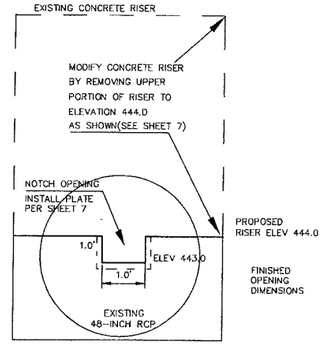


3/11 SEEPAGE CUTOFF
N.T.S.

1. EXISTING RISER TO BE MODIFIED TO ELEVATION 444.0
2. NOTCH TO BE CUT IN RISER PER OUTLET STRUCTURE DETAILS, SHEET 7.
3. CONFIRM STRUCTURAL SOUNDNESS OF EXISTING CONCRETE RISER REPLACE OR REPAIR AS NECESSARY.



EXISTING RISER PLAN VIEW
NOT TO SCALE

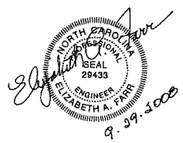


RISER SECTION VIEW
NOT TO SCALE

5/11 OUTLET MODIFICATION DETAILS (SEE ALSO SHEET 7)
N.T.S.

WETLAND FLOW/STAGE DATA (DEPTH IN REFERENCE TO NORMAL POOL ELEV. 443.0)

PRECIP. EVENT	RUNOFF DEPTH INCHES	PEAK DISCH. (CFS)	PEAK WSEL (ELEV)	TIME 3 (HRS) DEPTH (FT)	6 (HRS) DEPTH (FT)	9 (HRS) DEPTH (FT)	12 (HRS) DEPTH (FT)	PEAK DEPTH (FT)	16 (HRS) DEPTH (FT)	20 (HRS) DEPTH (FT)	24 (HRS) DEPTH (FT)	30 (HRS) DEPTH (FT)
< 1-YR	2.00	50	445.50	0.03	0.32	0.54	2.28	2.50	0.92	0.78	0.51	0.05
< 1-YR	2.50	70	445.98	0.09	0.43	0.64	2.71	2.96	0.98	0.74	0.58	0.05
1-YR	2.86	81	446.25	0.13	0.50	0.71	2.99	3.25	1.01	0.79	0.63	0.06
2-YR	3.46	97	446.74	0.20	0.56	0.84	3.42	3.74	1.03	0.87	0.71	0.07
10-YR	5.03	129	448.01	0.43	0.76	1.09	4.51	5.01	1.10	1.00	0.89	0.08
25-YR	5.96	140	448.74	0.52	0.89	1.13	5.12	5.74	1.13	1.02	0.97	0.08
100-YR	7.47	208	449.71	0.61	1.06	1.18	6.11	6.71	1.17	1.06	1.02	0.09



The Professional Engineer representing JEWELL Engineering Consultants, PC, certifies only the following information related to these drawings:

1. Hydrologic and hydraulic analyses as relative to design of the primary and emergency spillways and dam embankment height. Note, hydrologic analysis was based on data provided by NCSU BAE department.
2. Interpretation of Geotechnical Engineering Report and incorporation of recommendations in design of the NEW DAM EMBANKMENT and EMERGENCY SPILLWAY shown in plan view on Sheet 11.
3. Details 1,2,3,4, and 5 as shown on Sheet 11.
4. WETLAND OUTLET FLOW/STAGE DATA on sheet 11.
5. CONSTRUCTION NOTES AND SPECIFICATIONS, and Sections 1 and 2 on Sheet 12.

EMERGENY SPILLWAY & RISER OUTLET DETAILS

Sheet 11

REVISIONS

SYM.	DESCRIPTION	DATE
1		
2		
3		
4		
5		

JEWELL
ENGINEERING CONSULTANTS PC
POST OFFICE BOX 234
KERNERSVILLE, NORTH CAROLINA 27285
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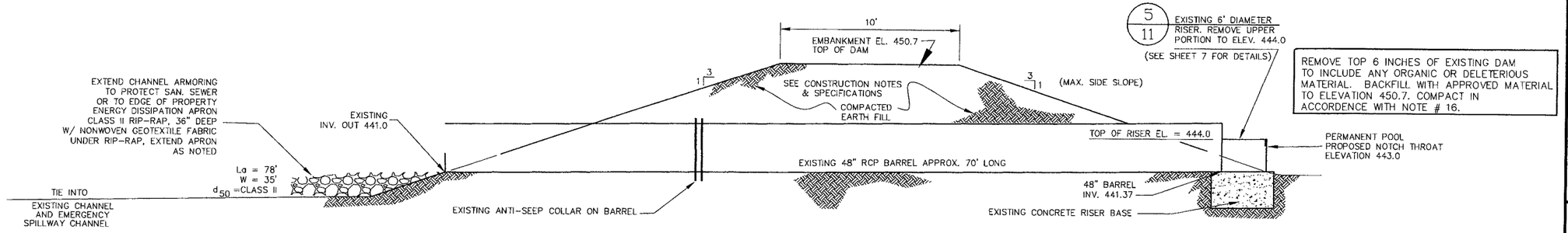
BIOLOGICAL AND AGRICULTURAL ENGINEERING
RALEIGH, NORTH CAROLINA 27607

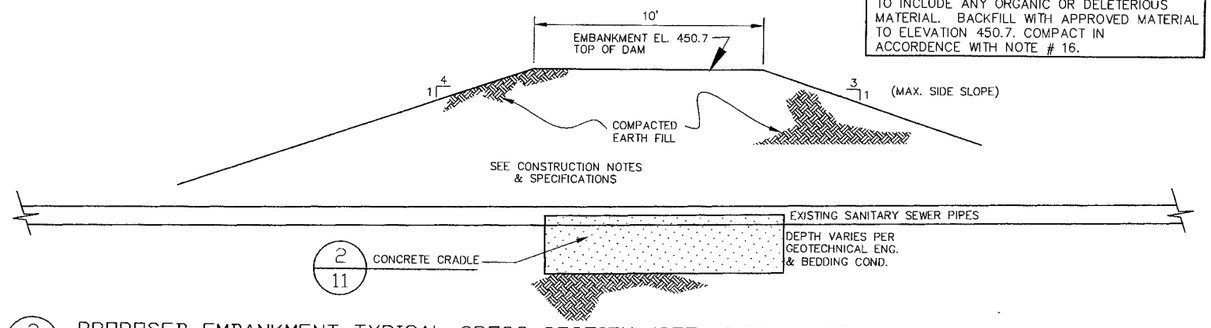
STORMWATER WETLAND
BARNES AND NOBLE BERM DESIGN
CARY, NC - WAKE COUNTY

EMERGENCY SPILLWAY DETAILS

DATE:	SEPTEMBER-2008
DESIGNED:	BAF
DRAWN:	BAF
CHECKED:	CDJ
SCALE:	VARIES
JEC NO.:	08.162.005.001
SHEET NO.	11
OF	12



1/12 EXISTING EMBANKMENT TYPICAL CROSS SECTION AND DETAILS (SEE ALSO SHEET 8)
N.T.S.



2/12 PROPOSED EMBANKMENT TYPICAL CROSS SECTION (SEE ALSO SHEETS 4 & 11)
N.T.S.

CONSTRUCTION NOTES AND SPECIFICATONS

1. CONTRACTOR SHALL PERFORM ALL WORK ACCORDING TO CURRENT OSHA SAFETY REGULATIONS. PROTECTION OF PUBLIC HEALTH, SAFETY AND WELFARE IS THE MOST IMPORTANT PART OF THIS PROJECT.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND FIELD VERIFYING ALL UNDERGROUND FEATURES. ADDITIONALLY, THE CONTRACTOR SHALL BE RESPONSIBLE FOR EXERCISING REASONABLE EFFORTS TO PROTECT ANY KNOWN OR UNKNOWN UNDERGROUND FEATURES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF UNKNOWN FEATURES ARE DISCOVERED THAT WOULD NECESSITATE MODIFICATION TO THE ILLUSTRATED DESIGN.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL ADJACENT PROPERTIES, THE GENERAL PUBLIC, AND ALL OF THE OWNER'S FACILITIES. SHOULD DAMAGES OCCUR, THE CONTRACTOR SHALL REPAIR IMMEDIATELY TO THE SATISFACTION OF THE OWNER AND THE ENGINEER.
4. THE CONTRACTOR SHALL HOLD HARMLESS THE OWNER AND THE ENGINEER FOR DAMAGES, INJURIES, OR OTHER ACCIDENTS WHICH OCCUR DURING THESE CONSTRUCTION ACTIVITIES.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SECURITY OF THE CONSTRUCTION SITE, INCLUDING BUT NOT LIMITED TO: HIS EQUIPMENT, IN PROGRESS AND COMPLETED WORK, STAGED MATERIALS, AND SITE ACCESS BY AUTHORIZED AND UNAUTHORIZED PERSONS.
6. TREES AND EXISTING LANDSCAPING NOT DESIGNATED FOR REMOVAL SHALL BE PROTECTED DURING CONSTRUCTION.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SCHEDULING AND COORDINATION OF ALL ILLUSTRATED CONSTRUCTION ACTIVITIES AT THE JOB SITE.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL DAMAGES DURING CONSTRUCTION AND SHALL MAKE REPAIRS AT HIS EXPENSE.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION ADJUSTMENTS OF ANY EXISTING VAULTS (REGARDLESS OF FUNCTION), METER BOXES, FIRE HYDRANTS, CLEAN OUTS, MANHOLES, ETC., TO MATCH FINISHED GRADES AND SITE PLAN. ALL SUCH WORK SHALL BE COORDINATED WITH THE ENGINEER PRIOR TO PERFORMING LOCATION ADJUSTMENTS.
10. THE CONTRACTOR SHALL UTILIZE SIGNS, BARRICADES, FLAG MEN, OR GUARDS AS REQUIRED TO ENSURE THE SAFETY OF ALL VEHICULAR AND PEDESTRIAN TRAFFIC DURING ALL CONSTRUCTION ACTIVITIES.
11. THE CONTRACTOR SHALL COORDINATE WITH THE ENGINEER, THE OWNER, AND ADJACENT PROPERTY OWNERS AS REQUIRED FOR WORK OUTSIDE OF PROPERTY LINES.
12. UNDER ABSOLUTELY NO CIRCUMSTANCES SHALL ANY UNMANNED EXCAVATION BE LEFT OPEN OR UNPROTECTED DURING NON-WORKING HOURS. CONTRACTOR SHALL UTILIZE SIGNS, BARRICADES, ETC., TO ENSURE THE SAFETY OF THE GENERAL PUBLIC.
13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT OF ALL WORK AS ILLUSTRATED ON PLANS. IF EXISTING CONDITIONS DIFFER FROM THOSE ILLUSTRATED ON PLANS, CONTRACTOR SHALL NOTIFY ENGINEER PRIOR TO CONSTRUCTION.
14. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND GRADES AT THE JOB SITE. IF DIFFERENCES ARE FOUND, CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY SO THAT MODIFICATIONS TO THESE DRAWINGS CAN BE MADE.
15. SOILS TO BE USED FOR FILL SHALL BE PLACED AT MOISTURE CONTENTS 2% DRY OF OPTIMUM TO 4% WET OF OPTIMUM AND COMPACTED TO A MINIMUM OF 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY.
16. WET ONSITE SOILS SHALL BE DRIED TO OPTIMUM MOISTURE PRIOR TO PLACING AND APPROVED BY GEOTECH. FILL SHALL BE PLACED IN LOOSE LIFTS OF NO MORE THAN 8 INCHES THICKNESS.
17. DURING SITE WORK, GEOTECHNICAL ENGINEER WILL DETERMINE IF ANY SOILS AT FOUNDATION LEVEL MUST BE UNDERCUT, REMOVED AND REPLACED WITH SUITABLE SOILS. GEOTECH WILL DETERMINE LOCATION AND DEPTH OF REQUIRED REPAIR.
18. THE CONTRACTOR HEREBY WARRANTS HIS WORK FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER, AGAINST ANY DEFECTS DUE TO FAULTY MATERIALS OR WORKMANSHIP.

CONSTRUCTION NOTES AND SPECIFICATONS (CONT.)

19. OWNER WILL PROVIDE SUITABLE FILL ON SITE FOR CONSTRUCTION OF THE EMBANKMENTS. CONTRACTOR SHALL ACCEPT ALL RESPONSIBILITY FOR PROTECTION, PLACEMENT, PROPER COMPACTION, REPLACEMENT OF BACKFILL MATERIAL, AND SELECT BACKFILL IF NEEDED.
20. THE CONTRACTOR SHALL MAINTAIN A SET OF RECORD DRAWINGS SHOWING ANY FIELD CHANGES. THE CONTRACTOR IS NOT AUTHORIZED TO MAKE FIELD CHANGES WITHOUT THE APPROVAL OF THE ENGINEER.
21. THE CONTRACTOR SHALL NOTIFY THE ENGINEER (24 HOUR NOTICE) FOR INSPECTIONS FOR ALL FOUNDATIONS, REBAR PLACEMENT, EARTHFILL PLACEMENT AND COMPACTION AND SUBSTANTIAL COMPLETION. CONTRACTOR SHALL NOT PLACE CONCRETE, BACKFILL OR COVER ANY FOUNDATION, REBAR, AND/OR STRUCTURE UNTIL SUCH HAS BEEN OBSERVED AND APPROVED BY THE ENGINEER.
22. AT LEAST 10 DAYS PRIOR TO STARTING CONSTRUCTION, CONTRACTOR SHALL PROVIDE TO THE ENGINEER A WRITTEN CONSTRUCTION PROCEDURE WITH APPROXIMATE TIMES/DATES. THIS PROCEDURE SHALL SPECIFY SEQUENCES OF CONSTRUCTION, SEQUENCES OF EROSION AND SEDIMENT CONTROL, AND SEQUENCES OF WATER PASSAGE AND MANAGEMENT.
23. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF THE PROJECT FROM EFFECTS OF FLOOD AND STORM EVENTS, INCLUDING BUT NOT LIMITED TO WORK IN PROGRESS, COMPLETED WORK, EQUIPMENT, MATERIALS, UTILITIES, WITHIN THE PROJECT AREA OR AFFECTED BY THE PROJECT OR DAMAGED AS A RESULT OF THE PROJECT.
24. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF PUBLIC SAFETY ON THE SITE DURING THE PERIOD OF CONSTRUCTION (INCLUDING WEEKENDS AND HOLIDAYS).
25. CONTRACTOR SHALL BE RESPONSIBLE FOR MATERIALS AND CONSTRUCTION OF WATER MANAGEMENT FEATURES SUCH AS DIVERSION STRUCTURES AND THE LIKE.
26. ALL CONTRACTORS SHALL BE PROPERLY LICENSED UNDER THE STATE LAWS GOVERNING THEIR TRADE.

NORTH CAROLINA PROFESSIONAL SEAL 29433 ENGINEER ELIZABETH A. FAIR
9-29-2008

The Professional Engineer representing JEWELL Engineering Consultants, PC, certifies only the following information related to these drawings:

1. Hydrologic and hydraulic analyses as relative to design of the primary and emergency spillways and dam embankment height. Note, hydrologic analysis was based on data provided by NCSU BAE department.
2. Interpretation of Geotechnical Engineering Report and incorporation of recommendations in design of the NEW DAM EMBANKMENT and EMERGENCY SPILLWAY shown in plan view on Sheet 11.
3. Details 1,2,3,4, and 5 as shown on Sheet 11.
4. WETLAND OUTLET FLOW/STAGE DATA on sheet 11.
5. CONSTRUCTION NOTES AND SPECIFICATIONS, and Sections 1 and 2 on Sheet 12.

EMBANKMENT DETAILS, NOTES & SPECIFICATIONS

Sheet 12

REVISIONS

SYM.	DESCRIPTION	DATE	BY
1			
2			
3			
4			
5			

JEWELL ENGINEERING CONSULTANTS, PC
KENNERSVILLE, NORTH CAROLINA 27284
PHONE (336) 996-2220
FAX (336) 996-5976

NC STATE UNIVERSITY
BIOLOGICAL AND AGRICULTURAL ENGINEERING
RALEIGH, NORTH CAROLINA 27607

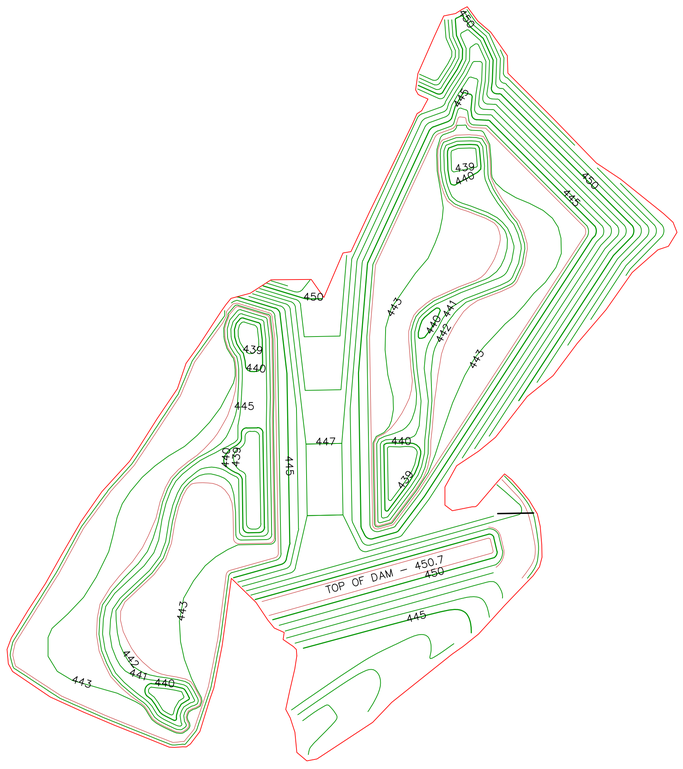
STORMWATER WETLAND
BARNES AND NOBLE BERM DESIGN
CARY, NC - WAKE COUNTY

EMBANKMENT DETAILS, NOTES + SPECIFICATIONS

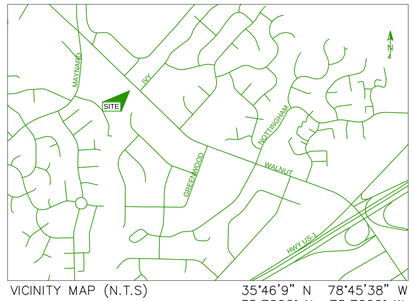
DATE:	SEPTEMBER-2008
DESIGNED:	BAF
DRAWN:	BAF
CHECKED:	CDJ
SCALE:	NO SCALE
JEC NO.:	08.162.005.001
SHEET NO.	12
OF:	12

AS-BUILTS

Proposed Contours:



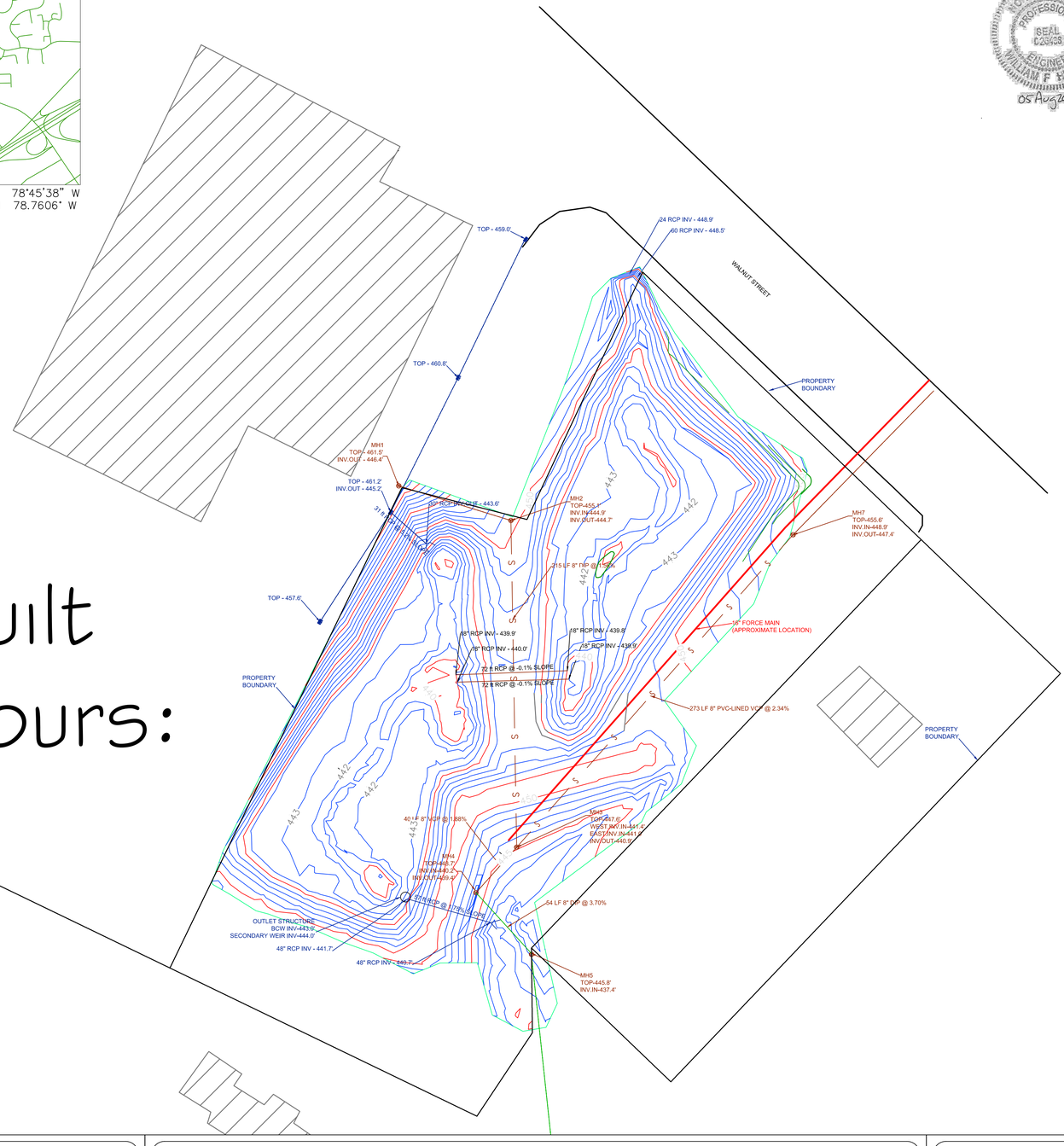
0 40' 80'



VICINITY MAP (N.T.S)

35°46'9" N 78°45'38" W
35.7692° N 78.7606° W

As-Built Contours:



North Carolina State University
Biological and Agricultural Engineering
NCSU Box 7625 | Raleigh, N.C. 27695

As-Built Sheet 1

Drawn By: RJW
Reviewed By: WFH RAS

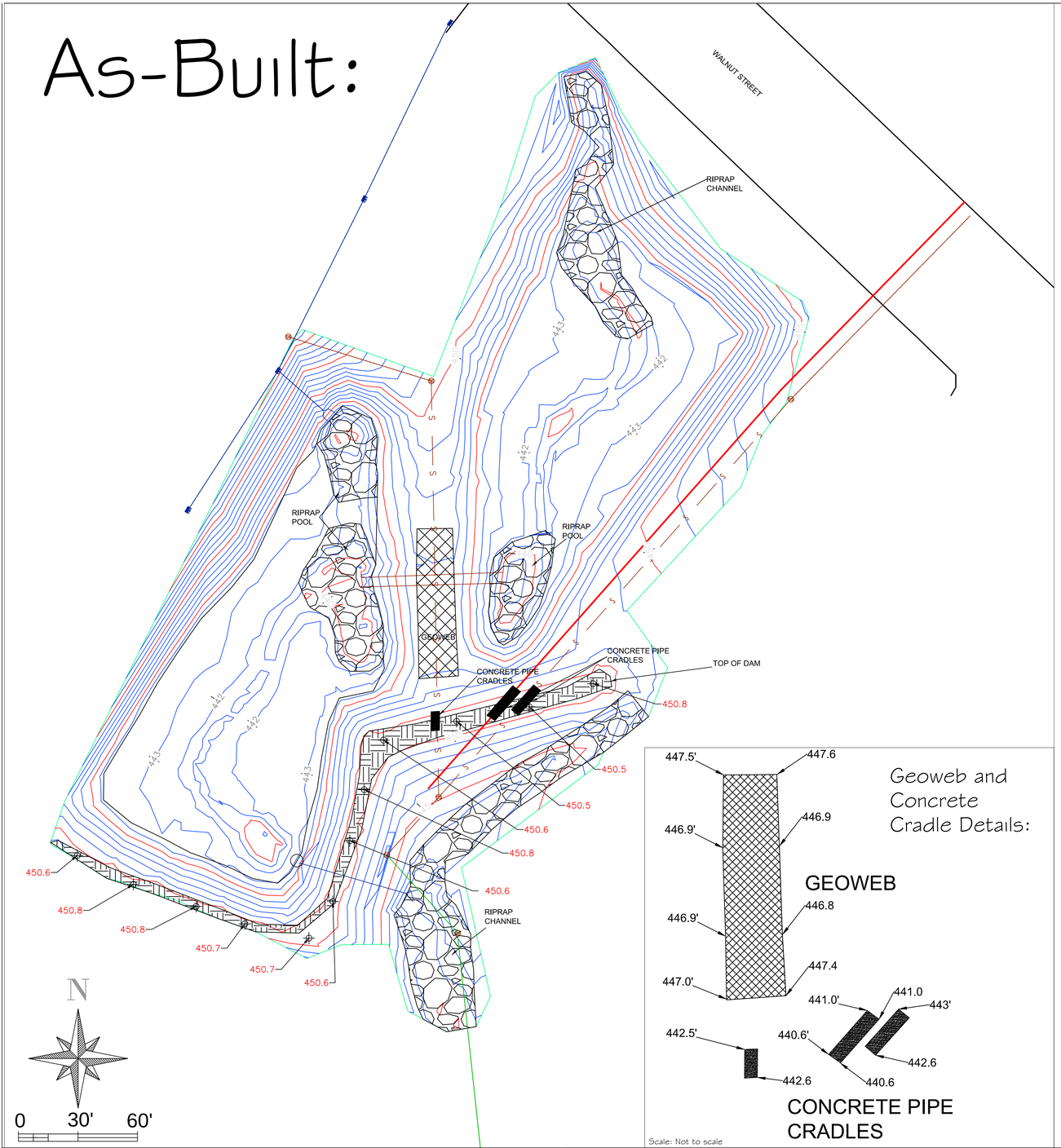
Date:
August 17, 2011

Scale:
1" = 40 ft

Barnes and Noble Extended Detention Stormwater Wetland

1208 Walnut Street
Cary, NC 27511
SCO No. 09-08224-01A and EEP No. 667

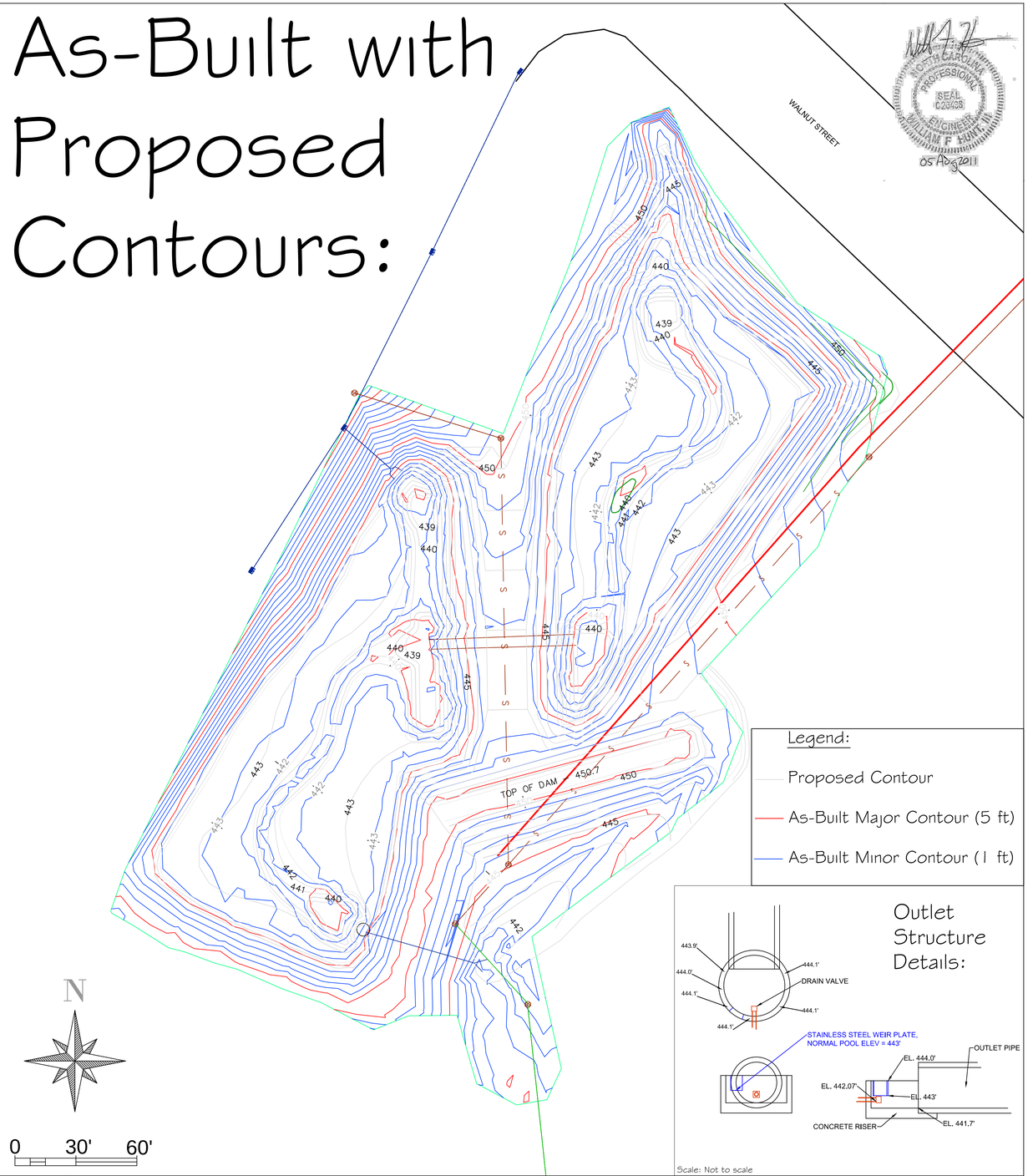
As-Built:



Geoweb and Concrete Cradle Details:

Scale: Not to scale

As-Built with Proposed Contours:



Legend:

- Proposed Contour
- As-Built Major Contour (5 ft)
- As-Built Minor Contour (1 ft)

Outlet Structure Details:

Scale: Not to scale

North Carolina State University
Biological and Agricultural Engineering
NCSU Box 7625 | Raleigh, N.C. 27695

As-Built Sheet 2

Drawn By: RJW
Reviewed By: WFH RAS

Date:
August 17, 2011

Scale:
1" = 30 ft

Barnes and Noble Extended Detention Stormwater Wetland
1208 Walnut Street
Cary, NC 27511
SCO No. 09-08224-01A and EEP No. 667

INSPECTION FORMS

EEP Stormwater BMP Inspection and Reporting Form
IMS Project ID# 667

Location: Cary Commons (Barnes and Noble), Cary

Date: 2/24/2012 **Time:** 2:00 pm **Recent Weather:** 0.4" rain yesterday

Inspector: Ryan A. Smith, PE

Type of BMP: Stormwater Wetland

Date of Construction: July 2011

****

To answer these questions completely and thoroughly, visually inspect the entire BMP as closely as possible. Take notes and photographs.

Depth of water in forebay: 4 feet

Is erosion present? No **If yes, where:** **(include photos)**

Is the outlet (orifice) obstructed, or can water flow freely out? The outlet is unobstructed

Are plants alive and thriving? The shallow water plants needs to be replanted this May **(include photos)**

Are non-native plants present? No **(include photos)**

Is mowing occurring inside the boundaries of the BMP? No **(include photos)**

Are beavers and/or muskrats present? No **(include photos)**

Is floating trash/debris present? Minimal

Stormwater BMP Maintenance

Task	Completed?	Notes
Clear outlet/orifice so water can exit freely	**Y or N**	Y
Remove non-native plants only	**Y or N**	Y
Remove beaver dams	**Y or N**	Y
Remove floating trash/debris	**Y or N**	Y
Remove accumulated sediment from forebay	**Y or N**	Y

STORMWATER BMP ANNUAL MAINTENANCE INSPECTION REPORT

Post-Construction Maintenance Report Form (Revised January 1, 2010)
(All previous versions of this form are invalid)

Town of Cary, North Carolina **Inspection Date:** 2/24/2012

The Town of Cary Land Development Ordinance (4.4.6) requires that Stormwater BMP runoff control devices/structures be inspected annually to insure they are being maintained properly and are functioning as originally designed and intended.

A. *USE **General Information: (Fill out ALL information)** ONLY ONE INSPECTION FORM PER SITE WITH AS MANY ACCOMPANYING BMP CHECKLIST ATTACHMENT SHEETS (AS NEEDED. IF MULTIPLE BMP'S EXIST AT A SITE, SUBMIT MULTIPLE CHECK-OFF ATTACHMENT SHEETS ALONG WITH THE STANDARD 2-PAGE FORM. ALSO, ATTACH DIGITAL PHOTOGRAPHS OF THE SITE, STRUCTURES, AND DEVICES AS APPLICABLE. COMPLETE ALL BOXES – LEAVE NOTHING BLANK!

Original Project Name: (as found in Town of Cary Files) **CARY COMMONS STORMWATER WETLAND**	**Legal Owner of Record: (**Name from Wake County Real Estate/Tax Website or from the owner if more recently updated): **TOWN OF CARY**
Current Name/Modified Name: **CARY COMMONS STORMWATER WETLAND**	**Legal Owner of Record Address:**: (from Wake County Real Estate/Tax Website or from the owner if more recently updated): **TOWN OF CARY**
Physical Address/Location of BMP: **1208 WALNUT STREET**	**Owner Name:** **TOWN OF CARY**
Town of Cary Site Plan # **N/A**	**Owner Telephone Number w/ Area Code:** **(919) 469-4362**
Site Contact Entity: **TOWN OF CARY**	**Name of Inspection Company:** **WATER OAK ENGINEERING**
Site Contact Person Name/Title: **Carolyn Lewis**	**BMP Inspector Name:** (a person's name - not a company name) RYAN A. SMITH, PE
Site Contact Entity Mailing Address: **400 James Jackson Avenue, Cary 27513**	**Mailing Address of Inspection Company:** **2904 TRACTOR DRIVE** **RALEIGH, NC 27603**
Site Contact Person Telephone Number: **(919) 469-4362**	**Qualification//Credentials of Inspector:** **Type / Name of Entity / State / #** **PE / NCBELS / NC / 032731** **Registration:** **Licensure:** **Certification:** **NCSU BMP Maintenance and Inspection Seminar** **Year of Certification 2010 Certification # 1305**
Site Contact Person e-mail address: **carolyn.lewis@townofcary.org**	**BMP Inspector Telephone Number: (919) 270-5396** **BMP Inspector e-mail Address:** RYAN_SMITH@H2OAK.COM

B. Stormwater BMP device checklists to be used & attached to this report. Use one checklist per each BMP type.

Bioretention Areas
Constructed Wetlands X
Dry Ponds
Grass Swales
Level Spreaders
Sand Filters
Wet Detention Ponds/Basins
Other: Ex: Rain Garden, Green Roofs, Infiltration Basins, Cisterns, Permeable Pavement (Describe)

Use ONE BMP checklist sheet for each specific type of BMP device found at each BMP site location. As an example: if a given site has four dry ponds and four level spreaders, you need to submit one standard form (this 2-page form) along with four Dry Pond sheets and four Level Spreader sheets. Fill-in the actual number of BMP devices on the table below that exist at a given site. Attach digital low-res color photos as appropriate, to show areas of interest or areas that need attention.

Device Type	Number of BMP's per Site	Describe (only if needed)
Bioretention Areas		
Constructed Wetlands	1	
Dry Ponds		
Grass Swales		
Level Spreaders		
Proprietary Device (*Must receive DWQ/TOC advance approval)		
Riparian Buffers		
Sand Filter		
Underground Detention/Storage		
Wet Ponds		
Other (Ex: Rain Garden, Green Roofs, Infiltration Basins, Cisterns, Permeable Pavement (Describe)		

Note #1: Inspections With Deficiencies "The "FAIL" box should be checked under item "C" (below). The failed inspection form along with the specific BMP check-off attachment sheets and confirmatory digital photographs summarizing required repairs must be submitted to the TOC within 48-hours following completion of the preliminary inspection. Re-inspection and certification will be required after satisfactory completion of all repairs. The Owner has a maximum of 30-days from the date of the preliminary inspection to make all repairs, correct all deficiencies, and submit a certification to the TOC in order to avoid automatic enforcement actions. *It is strongly encouraged that the inspector be part of the repair and maintenance process in a QA/QC role in order to ensure that repairs are being performed properly.*

Note #2: Inspections With No Deficiencies – "The "PASS" box should be checked under item "C." (below). The inspection form should be signed, stamped, and sealed by the appropriate professional and submitted to the TOC within the same month of, on or before the established inspection due date. Attach the applicable BMP check-off sheets and confirmatory digital photographs accordingly.

C. The results of this inspection are as follows:

☐ **FAIL**
VISUAL INSPECTION FOUND APPARENT PROBLEMS WHICH NEED IMMEDIATE ATTENTION. COMPLETE THE REPAIR AND/OR MAINTENANCE ITEMS INDICATED ON THE ATTACHED CHECKLISTS WITHIN 30-DAYS OF THE DATE OF THIS REPORT. RE-INSPECTION AND CERTIFICATION PRIOR TO OR AT THE 30-DAY INTERVAL WILL FOLLOW SATISFACTORY COMPLETION OF ALL REPAIRS AND MAINTENANCE. REPORTS NOT RECEIVED WITHIN 30-DAYS WILL AUTOMATICALLY DEFAULT INTO ENFORCEMENT ACTIONS. SEE ITEM "D" BELOW REGARDING ENFORCEMENT.

☒ **PASS/CERTIFIED** (CHECK HERE AFTER INITIAL FAILURE IF THIS IS A RE-INSPECTION) ☐
VISUAL INSPECTION FOUND NO APPARENT PROBLEMS, (CERTIFICATION BELOW; SEE ITEM "E").

D. Enforcement Actions. Enforcement is triggered as follows:

1) When an annual inspection is 30-days past due and no efforts have been documented (submitted) to the TOC indicating that the inspection has taken place; or
2) When a site inspection does take place but fails, and the follow-on 30-day repair time period outlined above elapses and no repairs and/or follow-on certification is received by the TOC;
3) When a site inspection does take place but fails and then, after 30-days, only some (but not all) of the necessary repairs have been rectified.

E. Certification (is only performed when BMP is functional and has no outstanding repair or maintenance issues)

I, Ryan A. Smith, as a duly registered Professional in the State of North Carolina, herby state that, to the best of my abilities the stormwater best management practice (bmp) device(s) is/are fully functioning and operating as designed and intended.

NORTH CAROLINA PROFESSIONAL ENGINEER RYAN A. SMITH 032431

Seal/Signature
Inspection by: _____ Date: 3/12/2012

Constructed Wetland Checklist for Annual BMP Report

Town of Cary, North Carolina ***(Revised January 1, 2010)***

BMP Site Name CARY COMMONS STORMWATER WETLAND **Date** 2/24/2012

Date/Amount of last rain event: 2/23/2012 -- 0.4 INCHES

FF	**Fully Functional (No Repairs Needed) = Pass for Inspection**
PF	**Partially Functional (Repairs Needed) = Fail the Inspection**
NF	**Not Functional (Repairs Needed) = Fail the Inspection**
MON	**Monitor (Monitor for a period of time – perhaps until the next inspection)**
N/A	**Not Applicable**

INFLOW POINTS

Assessment	Code Status	Comments
Obstruction: vegetation.debris/sediment	**FF**	
Erosion/undercutting	**FF**	
Displacement/sedimentation of fabric or rip-rap	**FF**	
Pipe condition	**FF**	
Other (Describe)		

FOREBAY/DEEP POOL AT OUTLET STRUCTURE

Assessment	Code Status	Comments
Sediment/debris accumulation	**FF**	
Bare soil/erosion on side slopes	**FF**	
Invasive Vegetation	**FF**	
Side slopes maintained/mowed	**FF**	
Other (Describe)		

MAIN TREATMENT AREA

Assessment	Code Status	Comments
Returns to permanent pool elevation (>5-days after storm)	**FF**	
Sediment/debris accumulation	**FF**	
Plants are dead, diseased, or dying (*Replace such plants as necessary per original approved construction plans*)	**MON**	Shallow water plants will be replanted this May, under warranty
Side slopes maintained as mowed	**FF**	
Bare soil/erosion on side slopes	**MON**	Side slopes are stable and mostly vegetated. Thinly vegetated areas are not yet established and will be reseeded this Spring. Erosion control blanket is currently stabilizing these areas well.
Invasive vegetation (%)	**0**	
Algae cover (%)	**0**	
Emergency spillway properly armored and free of woody vegetation	**FF**	
Other (Describe)		

Constructed Wetland Checklist for Annual BMP Report

Town of Cary, North Carolina (Continued) ***(Revised January 1, 2010)***

BMP Site Name CARY COMMONS STORMWATER WETLAND **Date** 2/24/2012

Date/Amount of last rain event: 2/23/2012 -- 0.4 INCHES

FF	**Fully Functional (No Repairs Needed) = Pass for Inspection**
PF	**Partially Functional (Repairs Needed) = Fail the Inspection**
NF	**Not Functional (Repairs Needed) = Fail the Inspection**
MON	**Monitor (Monitor for a period of time – perhaps until the next inspection)**
N/A	**Not Applicable**

EMBANKMENT

Assessment	Code Status	Comments
Bare soil/erosion/loss of dam material	**MON**	Side slopes are stable and mostly vegetated. Thinly vegetated areas are not yet established and will be reseeded this Spring. Erosion control blanket is currently stabilizing these areas well.
Shrubs/trees present	**FF**	
Animal burrows	**FF**	
Signs of structural failure: i.e., horizontal or vertical cracks	**FF**	
Upslope, top, and downslope maintained as mowed	**FF**	
Other (Describe)		

OUTLET DEVICE

Assessment	Code Status	Comments
Obstruction: vegetation/debris/sediment	**FF**	
Erosion/undercutting	**FF**	
Joint failure/loss of joint material/soil piping	**FF**	
Leaking device	**FF**	
Structural Condition	**FF**	
Sediment in Pipe	**FF**	
Displacement of fabric/rip-rap	**FF**	
Other (Describe)		

MISCELLANEOUS

Assessment	Code Status	Comments
Trash/debris	**FF**	
Access	**FF**	
Evidence of routine maintenance being performed?	**FF**	
Fence condition (if applicable)	**N/A**	
Other (Describe)		

Constructed Wetland Checklist for Annual BMP Report

Town of Cary, North Carolina (Continued) ***(Revised January 1, 2010)***

BMP Site Name CARY COMMONS STORMWATER WETLAND **Date** 2/24/2012

PHOTOGRAPHS

Attach low-resolution, digital color photographs of the site and BMP features (*2-3 per page- no more, no less on any one page*). Include captions describing the photographs.

ADDITIONAL COMMENTS

Outlet repairs took place just before the time of the inspection, which required the maintenance valve to be opened to drain the wetland. The water surface in the wetland in the attached photos was approximately 9 inches lower than normal pool.

Cary Commons Stormwater Wetland Photos – 2/24/2012

Figure 1. Northern half of the wetland

Figure 2. Southern half of the wetland

Figure 3. Walnut Street inlets

Figure 4. Cary Commons inlet

Figure 5. Primary outlet structure and trash rack

Figure 6. Emergency spillway

Figure 7. Primary wetland outlet pipe

CONSERVATION EASEMENT

BK013931PG01009

04/06/10

WAKE COUNTY, NC 248
LAURA M RIDDICK
REGISTER OF DEEDS
PRESENTED & RECORDED ON
05/04/2010 AT 14:16:11

BOOK:013931 PAGE:01009 - 01039

STATE OF NORTH CAROLINA

WAKE COUNTY

SPO File Number 092-ACQ
EEP # 667

Conservation Easement for Stormwater Best Management Practice (BMP)

Prepared by: Office of the Attorney General
Property Control Section
Return to: NC Department of Administration
State Property Office
1321 Mail Service Center
Raleigh, NC 27699-1321

THIS CONSERVATION EASEMENT DEED, pursuant to the provisions of N.C. General Statutes Chapter 121, Article 4 and made this 28th day of April 2010, 2010, by The Town of Cary, ("**Grantor**"), whose mailing address 316 N. Academy St., Cary, NC 27513, and the State of North Carolina, ("**Grantee**"), whose mailing address is State of North Carolina, Department of Administration, State Property Office, 1321 Mail Service Center, Raleigh, NC 27699-1321. The designations Grantor and Grantee as used herein shall include said parties, their heirs, successors, and assigns, and shall include singular, plural, masculine, feminine, or neuter as required by context.

WITNESSETH:

WHEREAS, pursuant to the provisions of N.C. Gen. Stat. § 143-214.8 et seq., the State of North Carolina has established the Ecosystem Enhancement Program (formerly known as the Wetlands Restoration Program) within the Department of Environment and Natural Resources for the purposes of acquiring, maintaining, restoring, enhancing, creating and preserving wetland

and riparian resources that contribute to the protection and improvement of water quality, flood prevention, fisheries, aquatic habitat, wildlife habitat, and recreational opportunities; and

WHEREAS, The State of North Carolina is qualified to be the Grantee of a Conservation Easement pursuant to N.C. Gen. Stat. § 121-35; and

WHEREAS, the Ecosystem Enhancement Program in the Department of Environment and Natural Resources has approved acceptance of this instrument; and

WHEREAS, the Department of Environment and Natural Resources, the North Carolina Department of Transportation and the United States Army Corps of Engineers, Wilmington District, entered into a Memorandum of Agreement, (MOA), duly executed by all parties in Greensboro, NC, on July 22, 2003. This MOA recognizes that the Ecosystem Enhancement Program is to provide for compensatory mitigation by effective protection of the land, water and natural resources of the State by restoring, enhancing and preserving ecosystem functions; and

WHEREAS, the acceptance of this instrument for and on behalf of the State of North Carolina was granted to the Department of Administration by resolution as approved by the Governor and Council of State adopted at a meeting held in the City of Raleigh, North Carolina, on the 8th day of February 2000; and

WHEREAS, Grantor owns in fee simple certain real property situated, lying, and being in the Town of Cary, Wake County, North Carolina (the "**Property**"), and being more particularly described as follows: Being all of Tract 1 of Plat entitled "Recombination Survey & Buffer Relocation, Property of Ruth H. Lewis, CK Cary Commons" recorded in Map Book 2007, Pages 353 and 354 of the Wake County Registry. A copy of the plat is attached hereto as Exhibit A and incorporated herein by reference; and

WHEREAS, Grantor is willing to grant a Conservation Easement over the Property, thereby restricting and limiting the use of the included areas of the Property to the terms and conditions and purposes hereinafter set forth, and Grantee is willing to accept such Conservation Easement. This Conservation Easement shall be for the protection and benefit of the waters of the Neuse River, and its tributaries; and

WHEREAS, the Ecosystem Enhancement Program intends to construct, at its own expense, a stormwater retention wetland on the Property, as more particularly described below and in Exhibit B, attached hereto and incorporated herein by reference, which will reduce nitrogen and phosphorus discharge into surface waters within the watershed; and

WHEREAS, Grantor agrees to maintain, at its own expense, for a period of thirty years, the stormwater retention wetland, as described in the *Memorandum of Agreement, NC Ecosystem Enhancement Program and Town of Cary,* DENR Contract D06126, attached hereto as Exhibit C and incorporated herein by reference.

NOW, THEREFORE, in consideration of the mutual covenants, terms, conditions, and restrictions hereinafter set forth, Grantor unconditionally and irrevocably hereby grants and conveys unto Grantee, its successors and assigns, for a period of 35 years a Conservation Easement of the nature and character and to the extent hereinafter set forth, for the benefit of

water quality and for the people of North Carolina, in respect to the Easement Area described as follows:

> Being all of Tract 1 of plat entitled "Recombination Survey & Buffer Relocation, Property of Ruth H. Lewis, CK Cary Commons," containing 2.378 acres, more or less, and recorded in Map Book 2007 Pages 353 and 354 of the Wake County Registry.

This conveyance is made subject to all easements and leases of record or leases in effect by prescriptive rights as of the date hereof, specifically including the existing utility easements as shown in above referenced Exhibit A.

I. DURATION OF EASEMENT

This Conservation Easement shall be for a period of 35 years commencing from the date of execution of this document, and it shall run with, and be a continuing restriction upon the Property, and it shall be enforceable by the Grantee against the Grantor and against Grantor's heirs, successors and assigns, personal representatives, agents, lessees, and licensees during that time period.

The purposes of this Conservation Easement are to maintain, restore, enhance, create and preserve wetland and/or riparian resources in the Easement Area that contribute to the protection and improvement of water quality, and to maintain the Easement Area in its condition, consistent with these purposes; and to prevent any use of the Easement Area that will significantly impair or interfere with these purposes. To achieve these purposes, the following conditions and restrictions are set forth:

II. GRANTOR RESERVED USES AND RESTRICTED ACTIVITIES

The Easement Area shall be restricted from any development or usage that would impair or interfere with the purposes of this Conservation Easement. Unless expressly reserved as a compatible use herein, any activity in, or use of, the Easement Area by the Grantor, Grantee, or Ecosystem Enhancement Program is prohibited as inconsistent with the purposes of this Conservation Easement. The Grantor expressly agrees to maintain and repair the stormwater retention wetland as described in Exhibit C for a period of 30 years after the completion of construction and approval and acceptance of the stormwater retention wetland by the Grantee. The Grantor also agrees to provide for the general maintenance and upkeep of the Easement Area. Without limiting the generality of the foregoing, the following specific uses are prohibited, restricted, or reserved as indicated:

A. **Motorized Vehicles.** Usage of motorized vehicles in the Easement Area is prohibited, except as they are used for the construction, management, maintenance, or stewardship of the stormwater retention wetland or the Property; the construction, management, maintenance or stewardship of the Town of Cary Greenway trail described more particularly in section II(I); or the construction, management, or maintenance of allowed utilities.

B. **Educational Uses.** The Grantor reserves the right to engage in and permit others to engage in educational uses in the Easement Area not inconsistent with this Conservation

Easement, and the right of access to the Easement Area for such purposes including organized educational activities such as site visits and observations. Educational uses of the Property shall not alter vegetation, hydrology or topography of the site.

C. **Vegetative Cutting.** Except as related to the removal of non-native plants, diseased or damaged trees, and vegetation that obstructs, or destabilizes the Easement Area, all cutting, removal, mowing, harming, or destruction of any trees and vegetation is prohibited, except as necessary to provide for the expressly allowed uses in the Easement Area. All vegetative cutting shall be done in a manner that maintains the integrity of the Easement Area.

D. **Embankments/Berms:** Grass on the banks of the stormwater retention wetland may be mowed at the discretion of the Grantor, but it is not a requirement. All woody vegetation should be cut and carefully removed from embankments and new earthen dam (see Exhibit C).

E. **Shallow Water Areas:** Other than invasive exotic plant management, no cutting of vegetation shall be allowed in the shallow water areas. Shallow water areas are defined as those areas inside the pond, below the sloped banks. These areas are also identified on the plan sheet below elevation "445 msl". These areas are also referred to as the riparian exclusion zone, since invasive exotic plants are to be excluded from this zone.

F. **Industrial, Residential and Commercial Uses.** All are prohibited in the Easement Area.

G. **Agricultural Use.** All agricultural uses within the Easement Area including any use for cropland, waste lagoons, or pastureland are prohibited.

H. **New Construction**. There shall be no building, facility, mobile home, antenna, utility pole, tower, or other structure constructed or placed in the Easement Area.

I. **Roads and Trails; Signs.** The Grantor reserves the right to construct, maintain and operate a 10' wide paved or unpaved greenway trail within the Easement Area. When required by the terrain, the trail construction may include boardwalks, bridges, ramps, handrails, and/or steps. The Grantor also reserves the right to open the trail to public access in accordance with Town of Cary Greenway rules and regulations. The construction plans for the greenway trail through the Easement Area shall be reviewed by the Ecosystem Enhancement Program prior to final greenway plan design. Except as permitted for the greenway trail, there shall be no construction of roads, trails, walkways, or paving in the Easement Area. No signs shall be permitted in the Easement Area except interpretive signs describing restoration activities and the conservation values of the Easement Area; trail/feature/education signs along the greenway trail; signs identifying the owner of the Property and the holder of the Conservation Easement; signs giving directions; or signs prescribing rules and regulations for the use of the Easement Area.

J. **Dumping or Storing.** Dumping or storage of soil, trash, ashes, garbage, waste, abandoned vehicles, appliances or machinery, or other material in the Easement Area is prohibited.

K. Grading, Mineral Use, Excavation, Dredging. There shall be no grading, filling, excavation, dredging, mining, or drilling; no removal of topsoil, sand, gravel, rock, peat, minerals, or other materials, unless specifically required to provide for the expressly allowed uses in the Easement Area..

L. Water Quality and Drainage Patterns. There shall be no diking, draining, dredging, channeling, filling, leveling, pumping, impounding or diverting, causing, allowing or permitting the diversion of surface or underground water. No altering or tampering with water control structures or devices, or disruption or alteration of the restored, enhanced, or created drainage patterns is allowed. All removal of wetlands, polluting or discharging into waters, springs, seeps, or wetlands, or use of pesticide or biocides is prohibited.

M. Utilities. Through, over, under and across the Easement Area, the following utility uses are allowed within the existing utility easements, and conditioned as follows:

1) Grantor reserves the current sewer easements within Easement Area as shown on plat entitled "Recombination Survey & Buffer Relocation, Property of Ruth H. Lewis, CK Cary Commons" recorded in Map Book 2007, Pages 353 and 354 of the Wake County Registry, for its use in maintaining and repairing the City's existing sewer line.

2) Previously recorded utility easements on the Property for a 30 foot CP&L easement (Deed Book 4157, Page 869 of the Wake County Registry and a variable width storm drainage easement (Deed Book 4299, Page 610 of the Wake County Registry) as shown on above referenced plat shall be maintained within said easement areas.

3) All disturbed facilities, features and vegetation will be restored to their original condition to the greatest extent reasonably practicable. Due to the environmental sensitivity of the Easement Area, any disturbed and removed vegetation in access areas, staging areas, constructed areas, excluding the existing utility easements described in paragraphs 1 and 2 above, will be replaced with herbaceous species such that the Property achieves a rapid recovery from the disturbance. The existing utility easements shall be planted with suitable grass vegetation which shall be restored when disturbed.

4) Erosion control devices must be utilized in conjunction with construction and maintenance work to contain all disturbed materials and conform to State requirements.

5) Reasonable signage may be erected to identify the owner of the utility lines and to provide safety information.

6) No new utilities are permitted outside the existing utility easements.

N. **Subdivision and Conveyance.** Grantor voluntarily agrees that no subdivision, partitioning, or dividing of the underlying fee that is subject to this Easement is allowed. Unless agreed to by the Grantee in writing, any future conveyance of the underlying fee for the Easement Area and the rights as conveyed herein shall be as a single block of property. Any future transfer of the fee simple shall be subject to this Conservation Easement. Any transfer of the fee is subject to the Grantee's right of unlimited and repeated ingress and egress over and across the Property to the Easement Area for the purposes set forth herein.

O. **Development Rights.** The Grantor hereby agrees that all development rights that are now or hereafter inherent in the Easement Area may not be used on or transmitted to any other party for the duration of this Conservation Easement.

P. **Permissions.** The Grantor may request permission to vary from the above restrictions for good cause shown, provided that any such request is consistent with the purposes of this Conservation Easement. The Grantor shall not vary from the above restrictions without first obtaining written approval from the N.C. Ecosystem Enhancement Program, whose mailing address is 1652 Mail Services Center, Raleigh, NC 27699-1652.

III. GRANTEE RESERVED USES

A. **Ingress, Egress, and Inspection.** The Grantor conveys to the Grantee, its employees and agents, successors and assigns, including the Ecosystem Enhancement Program, for a period of 35 years, the right of unlimited and repeated ingress and egress to the Easement Area over the Property at reasonable times to undertake any activities to construct, restore, manage, maintain, enhance, and monitor the stormwater retention wetland and riparian resources of the Easement Area, in accordance with restoration activities or a long-term management plan. Unless otherwise specifically set forth in this Conservation Easement, the rights granted herein do not include or establish for the public any access rights.

B. **Restoration Activities.** These activities include planting of trees, shrubs and herbaceous vegetation, installation of monitoring wells, utilization of heavy equipment to grade, fill, and prepare the soil, modification of the hydrology of the site, and installation of natural and manmade materials as needed to direct in-stream, above ground, and subterraneous water flow.

C. **Construction of stormwater retention wetland.** Grantee, through the Ecosystem Enhancement Program is hereby authorized to construct the stormwater retention wetland as described in Exhibit B.

IV. ENFORCEMENT AND REMEDIES

A. **Enforcement.** To accomplish the purposes of this Conservation Easement, Grantee is allowed to prevent any activity within the Easement Area that is inconsistent with the purposes of this Easement and to require the restoration of such areas or features of the Easement Area that may have been damaged by such activity or use. Upon any breach of the terms of this Conservation Easement by Grantor, their successors or

assigns, which comes to the attention of the Grantee, the Grantee shall, except as provided below, notify the Grantor, their successors or assigns in writing of such breach. The Grantor shall have ninety (90) days after receipt of such notice to correct the conditions constituting such breach. If the breach remains uncured after ninety (90) days, the Grantee may enforce this Conservation Easement by appropriate legal proceedings including damages, injunctive and other relief. The Grantee shall also have the power and authority, consistent with its statutory authority: (a) to prevent any impairment of the Easement Area by acts which may be unlawful or in violation of this Conservation Easement; (b) to otherwise preserve or protect its interest in the Property; or (c) to seek damages from any appropriate person or entity. Notwithstanding the foregoing, the Grantee reserves the immediate right, without notice, to obtain a temporary restraining order, injunctive or other appropriate relief if the breach of the term of this Conservation Easement is or would irreversibly or otherwise materially impair the benefits to be derived from this Conservation Easement. The Grantor and Grantee acknowledge that under such circumstances damage to the Grantee would be irreparable and remedies at law will be inadequate. The rights and remedies of the Grantee provided hereunder shall be in addition to, and not in lieu of, all other rights and remedies available to Grantee in connection with this Conservation Easement.

B. Inspection. The Grantee, its employees and agents, successors and assigns, have the right, with reasonable notice, to enter the Easement Area over the Property at reasonable times for the purpose of inspection to determine whether the Grantor, their successors or assigns are complying with the terms, conditions and restrictions of this Conservation Easement.

C. Costs of Enforcement. Beyond regular and typical monitoring, any costs incurred by Grantee in enforcing the terms of this Conservation Easement against Grantor, their successors or assigns, including, without limitation, any costs of restoration necessitated by Grantor's acts or omissions in violation of the terms of this Conservation Easement, shall be borne by Grantor to the extent permitted by law.

D. Liability of Grantee. As between Grantor and Grantee, Grantee shall be liable for any and all claims of personal injury or damage to property, accruing or resulting to any employee, contractor or agent of the Grantee arising out of work related to access, construction, maintenance and/or monitoring of a stream and/or wetland restoration project on Grantor's premises, provided the claims of personal injury or damage to property are the result of negligence or intentional, tortious acts of the Grantee's employees, contractors, or agents. Additionally, to the extent permitted by law, Grantee shall be liable for any and all claims of personal injury or damage to property, both real and personal, accruing to or resulting to the Grantor or any employee, contractor or agent of the Grantor, arising out of work related to access, construction, maintenance and/or monitoring of a stream and/or wetland project on Grantor's premises, provided the claims of personal injury or damage to property are solely the result of negligence or intentional, tortious acts of the Grantee's employees, contractors, or agents. Further, Grantee shall require each of its contractors to maintain such policies of insurance, including commercial liability insurance, as are required by the North Carolina Office of State Construction. With respect to any third party claims arising out of work related to the access, construction, maintenance and/or monitoring of a stream and/or wetland

restoration project on Grantor's premises, Grantee shall be liable to the extent provided by the North Carolina Tort Claims Act.

E. **No Waiver.** Enforcement of this Easement shall be at the discretion of the Grantee and any forbearance, delay or omission by Grantee to exercise its rights hereunder in the event of any breach of any term set forth herein shall not be construed to be a waiver by Grantee.

V. MISCELLANEOUS

A. **Entire Agreement.** This instrument sets forth the entire agreement of the parties with respect to the Conservation Easement and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Easement. If any provision is found to be invalid, the remainder of the provisions of the Conservation Easement, and the application of such provision to persons or circumstances other than those as to which it is found to be invalid, shall not be affected thereby.

B. **Notices.** Any notices shall be sent by registered or certified mail, return receipt requested to the parties at their addresses shown above or to other address(es) as either party establishes in writing upon notification to the other.

C. **Transfer.** Grantor shall notify Grantee in writing of the name and address of any party to whom the Property or any part thereof is to be transferred at or prior to the time said transfer is made. Grantor further agrees to make any subsequent lease, deed, or other legal instrument by which any interest in the Property is conveyed subject to the Conservation Easement herein created.

D. **Merger.** The Grantor and Grantee agree that the terms of this Conservation Easement shall survive any merger of the fee and easement interests in the Property or any portion thereof.

E. **Amendments.** This Conservation Easement may be amended, but only in writing signed by all parties hereto, and provided such amendment does not affect the qualification of this Conservation Easement or the status of the Grantee under any applicable laws, and is consistent with the purposes of the Conservation Easement. Notwithstanding the foregoing, pursuant to Section II(P) above, Grantor may request, and the Ecosystem Enhancement Program may grant, permission to vary from the restrictions contained in Section II for good cause shown.

The parties recognize and agree that the benefits of this Conservation Easement are in gross and assignable provided, however, that the Grantee hereby covenants and agrees, that in the event it transfers or assigns this Conservation Easement, the organization receiving the interest will be a qualified holder under N.C. Gen. Stat. § 121-34 et seq. and § 170(h) of the Internal Revenue Code, and the Grantee further covenants and agrees that the terms of the transfer or assignment will be such that the transferee or assignee will be required to continue in perpetuity the conservation purposes described in this document.

VI. QUIET ENJOYMENT/GRANTOR'S RIGHTS

Grantor reserves all remaining rights accruing from ownership of the Property, including the right to engage in or permit or invite others to engage in only those uses of the Easement Area that are expressly reserved herein, not prohibited or restricted herein, and are not inconsistent with the purposes of this Conservation Easement. Without limiting the generality of the foregoing, the Grantor expressly reserves to the Grantor, and the Grantor's invitees and licensees, the right of access to the Easement Area, and the right of quiet enjoyment of the Easement Area. Unless otherwise specified herein, nothing in this Conservation Easement shall require the Grantor to take any action to restore the condition of the Easement Area after any Act of God.

TO HAVE AND TO HOLD the said rights and easements perpetually unto the State of North Carolina for the aforesaid purposes.

AND Grantor covenants that Grantor is seized of said premises in fee and has the right to convey the permanent Conservation Easement herein granted; that the same are free from encumbrances except easements and leases of record or in effect by prescriptive rights as of the date hereof, and that Grantor will warrant and defend title to the same against the claims of all persons whomsoever.

IN TESTIMONY WHEREOF, the Grantor has hereunto set his hand and seal, the day and year first above written.

Grantor - Town of Cary

By: Harold Weinbrecht Jr
Mayor
(Print name) Harold Weinbrecht, Jr.

(Corporate SEAL)

Attested by: Karen C Gray

Print Name: Karen C. Gray

Title: Deputy Town Clerk

STATE OF North Carolina

COUNTY OF Wake

I, Mary I. Fealey, a Notary Public in and for the County and State aforesaid, do hereby certify that Karen C. Gray, Deputy Town Clerk, personally appeared before me this day and acknowledged that he/she is Town Clerk of the Town of Cary, and as the act of the Town of Cary, the foregoing instrument was signed in its name by its Mayor, sealed with its official seal and attested by himself/herself as its City Clerk.

Witness my hand and notarial seal this 28th day of April, 2010.

(Notary Seal)

MARY I. FEALEY
NOTARY PUBLIC
WAKE COUNTY, NC

Mary I. Fealey
Signature of Notary

Mary I. Fealey, NotaryPublic
Printed or typed name

My commission expires: 12/06/2014.

Exhibits

(to be inserted)

Exhibit A	copy of Plat Book 2007 Pages 353 and 354 showing perimeter of CE area and existing utilities
Exhibit B	copy of Wetland Map provided by NCSU
Exhibit C	copy of MOU between EEP and Cary
Exhibit D	NCSU maintenance plan

BKBM2007PG00353

"Exhibit A"

Photo copy of

RECOMBINATION SURVEY & BUFFER RELOCATION

PROPERTY OF
RUTH H. LEWIS
CK CARY COMMONS
CARY TOWNSHIP, TOWN OF CARY, WAKE COUNTY, N.C.
PREPARED FOR
TOWN OF CARY ENGINEERING DEPARTMENT

(for illustration purposes only)

SOURCE OF TITLE

MAP REFERENCES

EASEMENTS OF RECORD

OWNERS

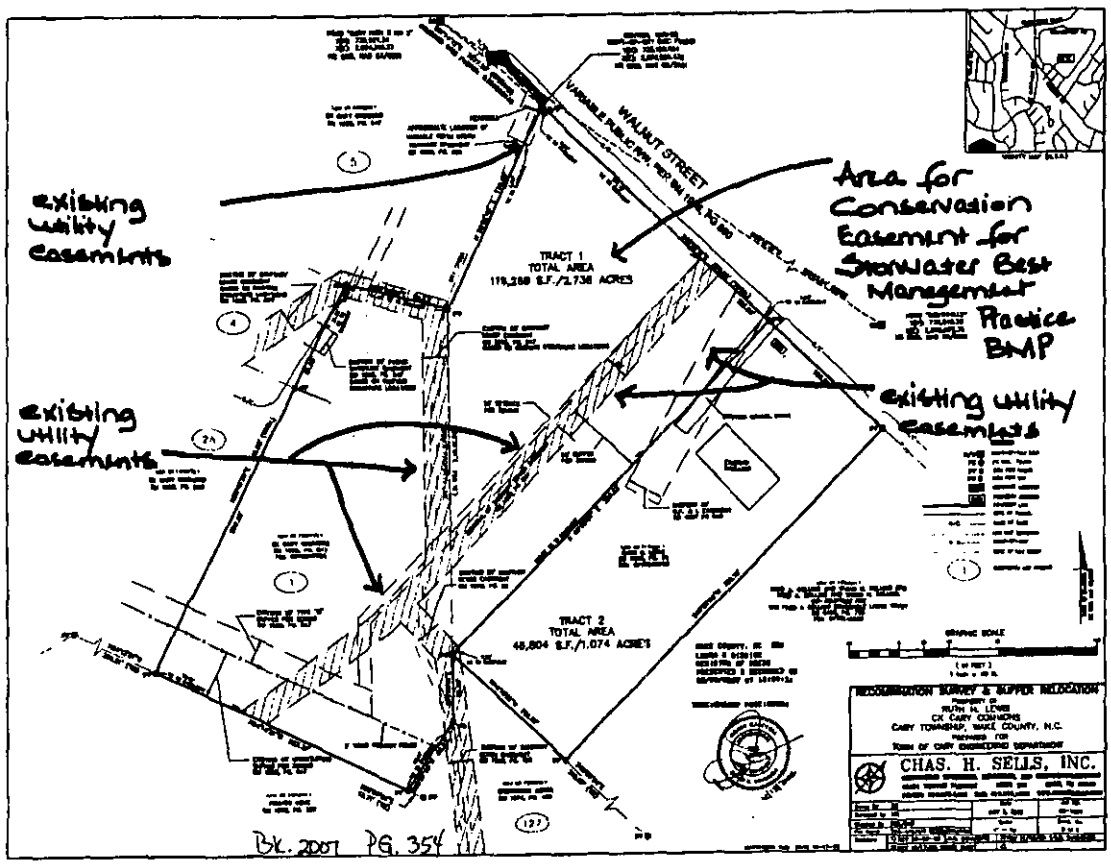
Grant E. McAlister, Mayor

Ruth H. Lewis Estate
by Victoria Voyles Executor

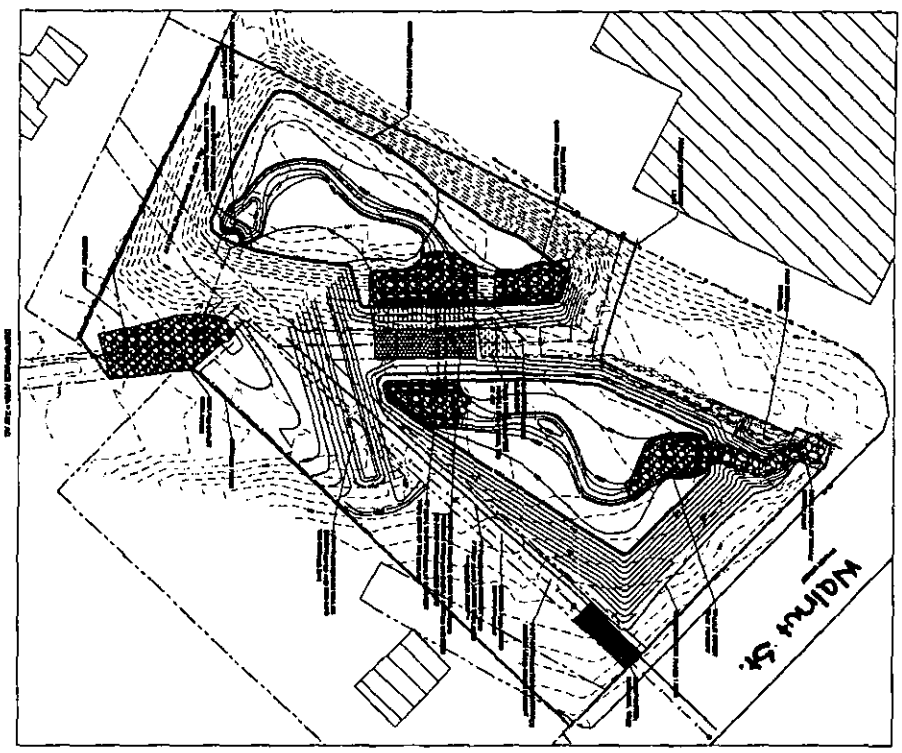
RECORDED IN BOOK OF MAPS 2007 PAGE 353

This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations.

BKBM2007PG00354



"Exhibit B"
(for illustration purposes only)



This map is not a certified survey and has not been reviewed by a local government agency for compliance with any applicable land development regulations

3/12	EROSION AND SEDIMENT CONTROL			BARNES AND NOBLE EXTENDED DETENTION STORMWATER WETLAND 1208 WALNUT STREET CARY, NORTH CAROLINA 27511 SCO NUMBER - _____		

BMP Cary Barnes + Noble EEP ID 667

D06126

Exhibit C

Memorandum of Agreement

NC Ecosystem Enhancement Program
and
Town of Cary

A. Introduction

The mission of the NCDENR Ecosystem Enhancement Program (EEP) is to restore, enhance, and preserve wetlands, streams, and riparian buffer areas, and to reduce the discharge of nutrients into surface waters throughout North Carolina's 17 major river basins with the overall goals of improving water quality, in-stream and riparian habitat. EEP is interested in restoring and protecting the watershed functions of the Neuse River Drainage area, which includes the Town of Cary (TOC). The construction of stormwater treatment systems, commonly referred to as Stormwater Best Management Practices (Stormwater BMPs) is an accepted method of improving water quality by reducing nutrient discharges into surface waters of the State. This Memorandum of Agreement (MOA) between EEP and TOC for a Stormwater BMP to be located on two parcels to be purchased by TOC.

B. Background

The purpose of this MOA is to define and set forth the responsibilities of TOC and EEP for the property acquisition, design, construction and maintenance of a Stormwater BMP. The entire costs associated with the design and construction of the Stormwater BMP will be funded by EEP through other contracts. The TOC will fund acquisition of the land for a 30-year conservation easement. Maintenance of the Stormwater BMP to ensure proper function will be the responsibility of TOC and no monies will be paid to TOC. The Stormwater BMP will be constructed on two parcels of land located near the intersection of Walnut Road and Maynard Road in Cary, Wake County, North Carolina. The project site is identified as PIN # 077313047725 (currently owned by CK Cary Commons LLC) and PIN # 077313049865 (currently owned by Ruth H. Lewis) in the Wake County Register of Deeds.

The Project is intended to enhance water quality within the Neuse River Drainage Area (Cataloging Unit # 03020201, Hydrologic Unit 03020201110010) through the reduction of nitrogen and phosphorous discharges into surface waters within the watershed. This reduction is to be accomplished through the use of a Stormwater Wetland BMP as outlined in the BARNES AND NOBLE PROJECT STATEMENT, a copy of which is attached hereto as ATTACHMENT 1. It is anticipated that the Stormwater Wet Pond BMP will reduce Total Nitrogen discharges from the 31 acre sub-watershed by approximately 25%, or 282 pounds per year, and Total Phosphorous discharges by approximately 40%, or 22 pounds per year.

Exhibit C

C. Scope of Work

Tasks and Responsibilities for TOWN OF CARY

The Project is currently located entirely on two private parcels owned by CK Cary Commons LLC (PIN # 077313047725) and Ruth H. Lewis (PIN # 077313049865). The TOC shall acquire the conservation easement of 30 years by July 15, 2006. acq Feb07

The primary responsibilities of TOC during and after construction of the Project will be:

1. To provide a designated contact person from TOC to coordinate and review all aspects of the Project with EEP and its contractors or consultants. TOC will respond in writing to any Project approval request within thirty (30) days from the date of request. If TOC fails to respond within thirty (30) days of the request, the request will be deemed approved by the TOC.

2. Both entities also agree to work cooperatively to develop a remedial action plan (RAP) that is agreeable to both entities in the event that post-construction remedial activities are necessary. Details related to the implementation of the RAP will be jointly discussed by both entities as necessary.

3. To provide and ensure that EEP, its contractors and its consultants will be allowed reasonable access to the Stormwater BMP Project work site during normal working hours.

4. To provide for public safety and work place security by keeping work areas closed to the public as necessary throughout the constructions phases of the Project. Contractors will follow standard OSHA guidelines and will post the construction site.

5. TOC will designate a contact person and/or Public Information Officer that will notify or consult with EEP prior to issuing news releases relating to the Project.

6. To meet with EEP and/or its contractors and consultants at least every two months to review and assess the Project's plans and progress.

7. TOC will submit a Stormwater BMP maintenance and inspection report to EEP every one (1) year for a period of thirty (30) years at no cost to EEP.

8. TOC will maintain the Stormwater BMP to ensure functionality for a period of 30-years at no cost to EEP.

Exhibit C

Tasks and Responsibilities for Ecosystem Enhancement Program

The primary responsibilities of EEP during and after this project will be:

1. To design and construct the stormwater BMP at no cost to TOC.

2. Both entities also agree to work cooperatively to develop a remedial action plan (RAP) that is agreeable to both entities in the event that post-construction remedial activities are necessary. Details related to the implementation of the RAP will be jointly discussed by both entities as necessary.

3. To consult with TOC's designated contact person and/or Public Information Officer and staff prior to issuing news releases relating to the Project.

4. To meet with TOC staff to review and assess the project's progress, as specified in Section 3, item No. 5 of this MOA. A minimum of four (4) meetings will be held with TOC to discuss the Project and receive input. These meetings will be held after preparation of the Draft Design Plan (30% complete design), after preparation of the Final Design Plan, prior to the Pre-Construction Meeting and prior to the Post-Construction Meeting.

5. To obtain any state, federal or local permits necessary for construction of the Project.

D. Timeline and Duration of this Agreement

The Project shall commence on the date a Memorandum of Agreement (MOA) is signed by all parties. The site maintenance phase of the Project will commence upon completion of the Stormwater BMP construction. TOC agrees to maintain the constructed Stormwater BMP site for a 30-year period and submit site maintenance and inspection reports to EEP every one (1) year for a period of thirty (30) years following completion of the construction phase of the project.

E. Limitations

1. This MOA will not transfer the ownership of the land or the management and maintenance responsibilities for the Project from TOC to EEP. All provisions of this MOA will be consistent with such understanding.

2. If either party fails to perform or comply with any condition of this MOA, and should such failure continue more than 30-days after written notice from the other party, and if the non-compliant party should not within 30-days commence to cure the failure with due diligence, the aggrieved party may terminate this MOA on written notice to the non-compliant party, termination to be effective not less than 15 days from the date of the written termination notice.

Exhibit C

3. The failure of either party to insist on strict performance of any condition of this MOA shall not be construed as a waiver of the right to insist on the performance of that condition in any other instance.

4. This MOA may be modified or terminated by mutual agreement of the parties as long as such modification or termination is made in writing and signed by authorized officers or agents for each of the parties.

Exhibit C

IN TESTIMONY WHEREOF, the Town has caused this instrument to be executed in its name by its Manager and attested by its Clerk, and its Seal affixed thereto by authority duly given.

William B Coleman

~~Mayor~~ ~~On behalf of the Town Council~~ William B. Coleman, Jr.
Town Manager

Karen C Gray

~~Clerk~~ Deputy Town Clerk

(SEAL)

STATE OF NORTH CAROLINA
TOWN OF CARY

I, Donna Carpenelli Torrisi, a Notary Public in and for the County and State aforesaid, do hereby certify that Karen C. Gray personally came before me this day and acknowledged that ~~he~~ she is ~~(TITLE)~~ Deputy Town Clerk, and that by authority duly given and as an act of Town of Cary, the foregoing instrument was signed by William B. Coleman, its Town Manager, attested by ~~himself~~ herself as Deputy Town Clerk, and sealed with the common seal of said County.

IN WITHNESS WHEREOF, I have hereunto set my hand and Notarial Seal this the 19th day of May, 2006.

Donna Carpenelli Torrisi
Notary Public

My commission expires: 6/26/2010

DONNA CARPENELLI TORRISI
Notary Public, North Carolina
Wake County
My Commission Expires
6/26/2010

CERTIFICATE OF TOWN OF CARY FINANCE OFFICER

Provision for the payment of the monies to fall due under this agreement has been made by appropriation duly made or by bonds or notes duly authorized, as required by the "Municipal Fiscal Control Act."

5/12/2006 Cheryl J Spivey
Date Deputy Finance Officer

Exhibit C

IN TESTIMONY WHEREOF, the State has caused this instrument to be executed in its name by its Ecosystem Enhancement Program and attested by its Director of Operations, and its Seal affixed thereto by authority duly given.

Suzanne Klimek

Print Name & Title: Suzanne Klimek
North Carolina Department of Environment and Natural Resources, EEP

STATE OF NORTH CAROLINA
Wake COUNTY

I, Jeffrey M. Horton, a Notary Public in and for the County and State aforesaid, do hereby certify that Suzanne Klimek personally came before me this day and acknowledged that she is Director of Operations, and that by authority duly given and as an act of NC DENR EEP, the foregoing instrument was signed by Suzanne Klimek, its D.O.O.

IN WITHNESS WHEREOF, I have hereunto set my hand and Notarial Seal this the 25th day of May, 2006.

Jeffrey M Horton
Notary Public

My commission expires:

2/5/2011

JEFFREY M. HORTON NOTARY PUBLIC BERTIE COUNTY, NC

Exhibit D

URBAN Waterways

Maintenance of Stormwater Wetlands and Wet Ponds

Stormwater management practices must be kept in proper working order to maintain their intended functions and aesthetic appeal.

This publication presents maintenance guidelines for stormwater wetlands and wet ponds, two stormwater practices that are being constructed across North Carolina.

OVERVIEW

As its name implies, a *stormwater wetland* is a wetland system designed to treat stormwater runoff. Wetlands typically have shallow water (except for intermittent deep pools) and dense vegetation. A well-functioning stormwater wetland will be a diverse ecosystem that includes many plant and animal species. It will also do an excellent job of removing pollution from stormwater runoff—its intended function. Stormwater wetlands are very efficient at nutrient removal. Recent studies conducted by North Carolina State University researchers indicate that a stormwater wetland removes 40 to 80 percent of all nitrogen and 50 to 70 percent of all phosphorus entering the wetland. Figure 1 depicts some wetlands located across North Carolina. (For more information on stormwater wetlands, see *Designing Stormwater Wetlands for Small Watersheds*, AG-588-02, in the Urban Waterways fact sheet series.)

Wet ponds are typically much deeper than stormwater wetlands—their average depth ranges from 4 to 8 feet. They are designed so that most of the pond is open water. Wet ponds are the most common stormwater management practice in North Carolina and have been constructed since the 1970s in some parts of the state. More recent pond configurations incorporate wetland features, such as an aquatic shelf (or wetland bench) and a forebay.

An *aquatic shelf* is a shallow-water zone of a pond, usually along the bank edges, planted with wetland vegetation. These shelves flood during storms. A *forebay* is a pool where inflow first enters the pond, and heavier pollutants, such as sediment, initially settle there. Research conducted across the United States shows that wet ponds effectively remove sediment and the pollutants associated with it from stormwater. Both wet ponds and stormwater wetlands can

NC STATE UNIVERSITY
A&T STATE UNIVERSITY
COOPERATIVE EXTENSION
Helping People Put Knowledge to Work

Exhibit D

Figure 1. Stormwater wetlands across North Carolina: (A) Brevard College in the mountains; (B) Hillandale Golf Course in Durham; (C) Carteret-Craven Electric Cooperative near Morehead City; and (D) Smithfield-Selma Senior High School in Johnston County.

be used for flood control as well. For more information on stormwater practices, see *Urban Stormwater Structural Best Management Practices (BMPs)* in the Urban Waterways series (AG-588-01).

MAINTENANCE GOALS

Maintenance of stormwater wetlands and wet ponds is performed to achieve four goals: efficient hydraulic flow and pollutant removal, aesthetic appeal, safety, and mosquito control. Most of the maintenance activities associated with wetlands and wet ponds pertain to two or more of these goals. The following activities should be performed regularly to maintain stormwater wetland and wet pond efficiency:

- Remove sediment and gross solids from forebays.
- Keep the orifice (the drawdown hole) free-flowing.
- Clean away floating trash and debris.
- Remove vegetation along the dam face.
- Remove invasive plant species.
- Mow the perimeter of wet ponds.
- Control pests, such as muskrats and beavers.

REMOVE SEDIMENT AND GROSS SOLIDS FROM FOREBAYS

Forebays are located at the inlets to stormwater wetlands and wet ponds. They are designed to slow incoming water, dissipating the water's energy, and to provide a location for sediment and other gross solids (such as leaves, other tree debris, cigarette butts, and trash) to settle and accumulate.

A forebay is typically 2 feet deep in a stormwater wetland and sometimes deeper in a wet pond. If the forebay fills with sediment and gross solids, these materials will bypass the forebay and begin to accumulate in other portions of the wetland or wet pond that may be more ecologically sensitive.

To check sediment levels inside the forebay, record the depth of the forebay at the same time each year. Depending on the size of the forebay, a fish finder can be used from a small boat or someone can survey the depth along a grid of the forebay with a rod (Figure 2). If the forebay water is clear, the depth can often be determined visually.

Once the forebay is half full of sediment or the average sediment level is within 1 foot of the water

Exhibit D

Figure 2. Inspection (A) of sediment depth and cleaning or "dipping" (B) of forebays. A long boom on the excavator is sometimes essential to access sediment collected in the middle of the forebay.

surface, remove the sediment and gross solids. This task is typically accomplished by a track hoe or backhoe (Figure 2). The water level inside the wet pond or stormwater wetland can be lowered, if needed, to aid excavation of the forebay. Depending upon the size of the forebay, cleaning it can require anywhere from a day to a week.

Once the excavated soil (or *spoils*) from the dredging has begun to dry, either spread it in the watershed away from the banks of the wetland or wet pond and seed it, or take it to a landfill. Consider the location when disposing of the soil. Spoils from wet ponds downstream of industrial facilities may contain pollutants that need to be disposed of in a landfill, while those from a residential wetland or wet pond may not. If there is any concern as to proper disposal, samples of the excavated soil should be sent to a laboratory for chemical analysis. This can be costly.

A recent study by N.C. State researchers indicates that sediment and gross solids from forebays typically need to be removed (also known as *dipped* or *dredged*) once every 5 to 10 years. If wet ponds and stormwater wetlands are located in watersheds with active construction, however, spoils may need to be removed as often as once a year.

Like the forebay, the final *deep pool* of the pond or wetland near the outlet also must be inspected and maintained. The major difference between the two is that the final deep pool takes longer to fill with soil. The drawdown hole (located at the outlet and described in the next section) is where captured stormwater slowly drains from the wetland or wet pond. It must be free of accumulated debris and sediment to work properly. Remove sediment and gross solids from the deep pool near the outlet whenever the material is within 1 vertical foot of the drawdown hole.

What Designers Can Do To Make Forebay Cleanout Easier

Access to older wet ponds and stormwater wetlands is often a problem. New design recommendations can make forebay cleanout easier by improving accessibility:

- Include reinforced paths that give heavy equipment easy access to the forebay (Figure 3). Sometimes the path doubles as a separation between the forebay and the remainder of the pond.
- Make forebays relatively long and narrow. A narrow forebay makes it easier for a trackhoe or backhoe arm to reach at least to the middle of the forebay from either side.

Figure 3. A wide path is provided for heavy equipment to access the forebay (located to the right of the path).

Exhibit D

Figure 4. A small orifice allows slow release of captured stormwater (A), but can easily clog due to its size. A clogged orifice can affect plant communities inside the wetland or wet pond (B).

KEEP THE ORIFICE (DRAWDOWN HOLE) FREE FLOWING

Wetlands and wet ponds are designed to capture and detain stormwater from 2 to 5 days. On smaller ponds and wetlands, a relatively small hole or *orifice* is used to detain water for this period. The diameter of the orifice can be as small as 2 inches, which makes it susceptible to clogging (Figure 4). Because many ponds and all wetlands contain vegetation, dead plants can float to and clog the orifice. Moreover, floating trash and debris (see the next section) will potentially clog the orifice.

A clogged drawdown hole poses several problems, including the loss of storage to capture later storms and flooding of desirable plant species. When water levels remain too deep for the desirable plants to survive, stronger, usually invasive, plant species take over. The aesthetics and performance of the practice can suffer when the plant community changes.

The wetland or wet pond needs to store water between storms to perform its intended function. It cannot store water from the next storm effectively if the orifice is clogged and the wetland is continually full.

Unclogging the orifice is relatively simple. Clean the hole with a stick, a piece of wire, a pole, or your hand. Inspect it regularly—the drawdown hole can clog at any time. Visit the site once a month to make sure water is flowing freely through the orifice, and inspect the outlet after every rainfall event exceeding 2 inches.

WHY SUCH A SMALL HOLE?

A large opening would release the water too quickly and not provide adequate time for treatment. Stormwater wetlands and wet ponds are designed to capture the first flush (or water quality volume) from their upstream drainage areas. The first flush is runoff generated by a 1 to 1.5 inch storm. The total volume of water can range up to several acre-feet. Once the first flush is captured in the wetland or wet pond, it must be slowly released to allow time for sediment and other gross solids to settle. Design standards require that the first-flush volume be kept for at least 2 days, with a recommended 3- to 4-day retention time. To release this water slowly, a small hole is often necessary. When the hole is only 2, 3, or 4 inches in diameter, clogging is a significant concern.

CLEAN AWAY FLOATING DEBRIS AND TRASH

Stormwater wetlands and wet ponds are located in low elevations of the landscape. All water from several acres drains to wetlands and wet ponds. With this water comes trash and other debris, called *floatage*. It must be removed from wetlands and wet ponds for several reasons:

- It is unsightly, particularly when the wetland or wet pond is designed to be an attractive amenity.
- Floating trash, such as cups or plastic bags, often store small amounts of water in a sheltered environment. Studies have shown that mosquito larvae are more likely to be protected inside floating trash than in the exposed pond.
- Trash and other floating debris can clog the drawdown hole (the orifice), which is often used to slowly release captured runoff (Figure 5).

Inspect wet ponds and wetlands for trash regularly and frequently—typically once a month but occasionally once a week. On smaller wetlands and wet ponds, collect trash by simply wading along the edges. With

Exhibit D

Figure 5. Trash floats to the drawdown hole, where it can clog the small hole, restricting flow. Removing the trash is often very simple, but essential.

larger facilities, a small boat or vac truck may be required. Because most trash follows the movement of water, it tends to collect near the outlet of the wetland or wet pond. This makes trash easier to collect, but it increases the risk of clogging the drawdown orifice.

REMOVE VEGETATION ALONG THE DAM FACE

Dam inspection officials require earthen dams to be free of large shrubs and trees. Roots can conduct water through the dam from the open pond to the downstream side of the embankment. The movement of water along the roots is called *piping*, which can eventually lead to soil erosion and, if unchecked, dam failure. Piping tends to be a problem for large ponds and wetlands that have a large dam face. Some small wetlands and wet ponds and those with concrete dams do not have this problem. If a dam face is vegetated, it should be grassed exclusively.

Inspect the dam once a year, and remove all shrubs and trees from the dam top and both faces. If the wetland or wet pond has been regularly maintained and any shrubs and trees growing are juvenile, simply mowing the bank is sufficient. Otherwise, a weed wiper, which applies herbicides to plants more than 12 inches tall, can be used along the bank. The weed wiper will kill any plant it touches or scrapes.

If a bank is severely overgrown, trees and shrubs should be cut down and removed. A systemic herbicide can be applied to the freshly cut stumps, which will kill the root systems. This is a laborious process. If the dam face is heavily overgrown, a contractor who specializes in removal should be consulted. Because dams of larger ponds and wetlands are responsible for retaining large volumes of water, dam failure can be catastrophic if homes, businesses, or roads are downstream.

REMOVE INVASIVE PLANT SPECIES

Stormwater wetlands and wet ponds with aquatic shelves can become overgrown with invasive plants. The most common invasive plant is the cattail (*Typha* species, Figure 6). Cattails, while native to North Carolina, crowd out other, more desirable plants. Cattails tolerate a variety of conditions and do a good job of pollutant removal. From this functional standpoint, cattails can be considered good plants to have in a wetland. *However,* cattail monocultures fail to meet two very important design goals: aesthetics and mosquito control.

A wetland or wet pond that is overgrown with cattails is not a diverse ecosystem. Ecosystem diversity is critical for mosquito control. Cattails provide a safe environment for mosquito larvae to mature to adulthood. When cattails go dormant in the fall, some of the fronds will form a protective thicket for mosquitoes. For more information on mosquito control in wetlands and wet ponds, see *Mosquito Control for Stormwater Practice Designers and Managers* (AGW-588-04) in the Urban Waterways series.

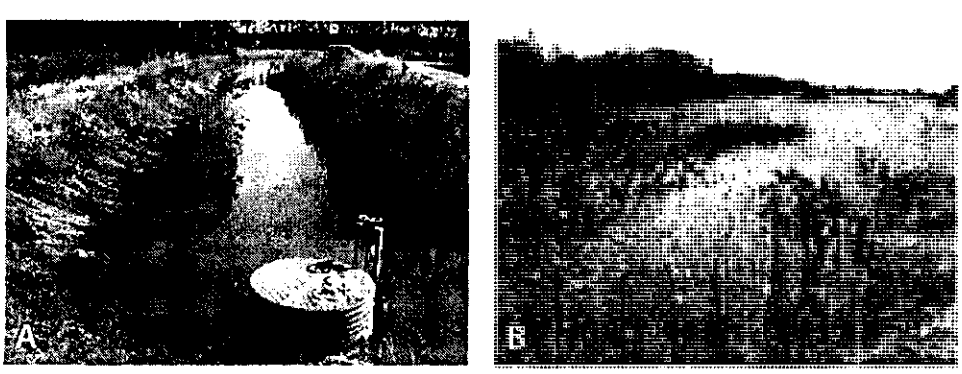


Figure 6. (A) Cattails (*Typha* sp.) and (B) common reeds (*Phragmites* sp.) are very aggressive invasive species. Once established, each plant will crowd out more desirable plant species.

Exhibit D

Figure 7. Aquatic glyphosate (herbicide) can be applied via direct contact (a protected hand) or via a small weed-wipe pole (A). Stroking individual cattail fronds sends the herbicide down the shoot and reaches tubers located in the soil (B). Once the herbicide reaches the tubers, the cattails will die within 2-3 days (C). The herbicide can also be applied with a small brush. *(Franklin County Cooperative Extension Center)*

Removing cattails can be challenging. It is almost impossible to remove a mass of cattails by hand. Cattails grow from tubers that spread, and they also spread by seed. If a piece of cattail is left in the wetland or wet pond after removal, the stand will probably re-establish. Use a backhoe for mass cattail removal when a wet pond or wetland is completely overgrown by cattails.

If a wetland or wet pond has a variety of vegetation but cattails are beginning to colonize it, use an alternative form of cattail removal, such as applying an aquatic formulation of the herbicide glyphosate (one trade name for this is Rodeo). Wear a chemical-resistant glove underneath a cloth glove. Soak the cloth glove in 2 percent glyphosate, and stroke the cattail leaves. Or brush the herbicide onto the leaves with a small weed wiper. Not every leaf needs to be touched by the herbicide because many of the cattails are connected by tubers. Within 10 to 12 days, the cattails fronds will wither and die (Figure 7).

The herbicide must be applied by hand rather than by broadcast spray because it will kill every herbaceous plant it touches. Use only aquatic formulations of glyphosate because they do not harm fish and other aquatic species.

The frequency of cattail removal can vary. Several factors influence the need to apply herbicide to cattails: the density at which the wetland is planted with desirable species, the time of year the wetland is planted, and the maturity of the wetland. During the first year or two after wetland construction, remove cattails twice a year. As the wetland matures and desirable species begin to dominate, reduce the maintenance frequency to once a year. The amount of time needed to remove unwanted vegetation (via the glyphosate wipe) varies, but a well-maintained, mature wetland requires visits of about 2 hours per acre of wetland.

Other unwanted plant species include common reed (*Phragmites* species, Figure 6), various noxious floating aquatics (such as parrot feather, *Myriophyllum aquaticum,* and giant salvinia, *Salvina* spp.), and Asiatic dayflower (*Murdannia keisak*). *Phragmites* species can be removed in a manner similar to that described for cattails. Noxious floating aquatics may require careful chemical or physical removal. If you observe these exotic invasive species, contact your county Extension center.

MOW THE PERIMETER OF WET PONDS

Stormwater wetlands are not mowed to the water's edge and tend to be surrounded by mature grasses. As a result, mowing the perimeter of wetlands is not a typical stormwater wetland maintenance activity. Many wet ponds, however, do have a grassed perimeter that needs to be maintained. Mowing maintenance is almost purely aesthetic. The type of grass used, its growing season, and pond aesthetics dictate the height and frequency of mowing:

- Mow cool-season grasses to a recommended height of 4 inches and no lower than 2.5 inches. Cool-season grasses, such as fescue, tend to be used west of Interstate 95 in North Carolina.
- Mow warm-season grasses to a recommended

Exhibit D

height of 2.5 inches and no lower than 1.5 inches. Warm season grasses include centipede, Bermuda, and zoysia, and are principally found in eastern North Carolina.

- Mow every one to three weeks during the growing season when the wet pond is part of an accessible landscape or treated as an amenity.
- Mow wet ponds that are located out-of-sight once or twice a year.

The size and severity of slopes along the wet pond determine the type of mower to use. For small ponds, a standard push mower is often adequate. Larger ponds or ponds with steep banks will probably require a specialized pond mower.

Grass clippings can be left adjacent to the pond to provide organic matter that encourages grass to grow. Do not discharge grass clippings into the water, as this will encourage the growth of algae and could potentially clog the drawdown hole.

CONTROL PESTS

Rodents such as muskrats and beavers are attracted to stormwater wetlands and wet ponds (Figure 8). Once there, they can damage the stormwater management practice.

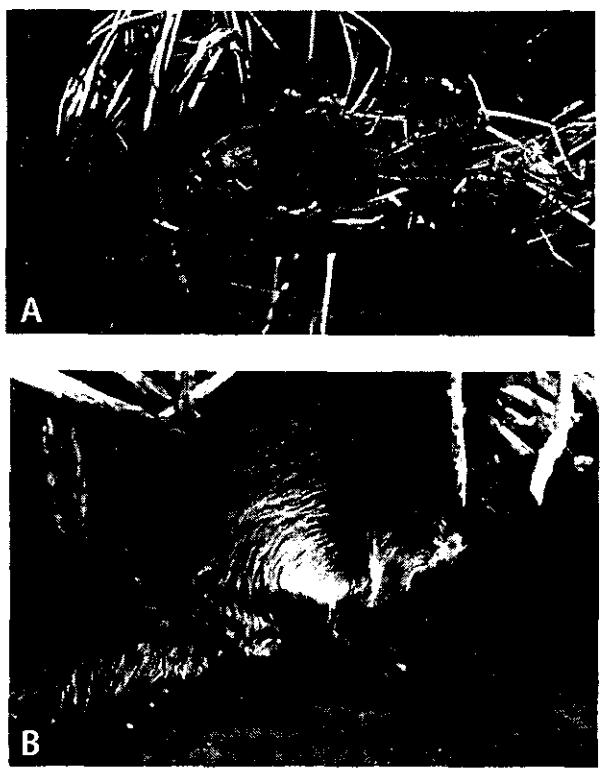


Figure 8. (A) Muskrat *(Ondatra zibethicus)*. (B) Beaver *(Castor canadensis)*. *(U.S. Fish and Wildlife Service)*

Figure 9. Muskrat holes along the perimeter of the wetland or wet pond are a sign of infestation. Destroying the holes is a simple way of forcing muskrats to move, if the population is limited.

Muskrats eat aquatic vegetation and burrow holes in the deeper pools. When muskrats actively burrow near the outlet of a wetland or wet pond, they will add sediment and increase turbidity to the outflow, increasing the release of pollutants from the wetland or wet pond. Moreover, muskrats will sometimes burrow holes around and through dams. These muskrat holes artificially lower the water level inside the pond or wetland, causing some plant species to die. At worst, the holes can lead to dam failure.

Beavers are attracted to the sound of running water. Once a beaver colonizes a wet pond or stormwater wetland, it will remove trees and shrubs surrounding the stormwater practice to build its lodge and dam. Beaver activity will clog or block the drawdown structure, thus raising the height of water inside the pond or wetland. This change in the depth of water inside wet ponds with aquatic shelves and stormwater wetlands will alter the types of vegetation that survive in the practice. Usually this change is undesirable.

Muskrat infestation is a difficult maintenance problem that usually must be addressed only when a pond or wetland has suffered from neglect. If the practice is infested, muskrats can be trapped under water, where they drown. Muskrats frequently escape traps, however, which makes live trapping difficult. Hire a licensed, experienced trapper who takes care to place traps where pets cannot be trapped by mistake. Once muskrats have been removed from the pond, their dwelling holes should be destroyed.

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KEEP GEESE AWAY FROM WET PONDS AND STORMWATER WETLANDS

Canada geese are attracted to an open body of water with good visibility around the perimeter, and they enjoy eating grass. This describes many "old-design" wet ponds that are mowed to the edge, allowing geese easy access in and out of the pond. Designers can include features in a wet pond to prevent Canada geese from taking up residence:

- Build a visual barrier along the pond perimeter—the aquatic shelf. By taking away good visibility, geese will not feel as safe. Most newly designed ponds include some aquatic shelf.
- Place shiny objects, such as silver tape, around the perimeter of the pond if building an aquatic shelf is not feasible.
- Place a grid of string across the wet pond to prevent easy waterfowl water landing. This string can also have shiny tape attached to it (Figure 10).

You can also bring a dog to the pond regularly to scare the geese. Geese do not like certain species of dogs, particularly border collies. If they often encounter a frightening dog, the Canada geese will eventually move elsewhere.

Figure 10. A grid of fishing line adorned with silver tape has been strung across this wet pond to prevent geese from making it their home. The string grid makes water landing more difficult, and geese do not like shiny or flashy objects like windblown silver tape.

If the stormwater practice has been regularly maintained, muskrat populations can more easily be controlled. Encourage muskrats to move away from the wetland or wet pond by making it an uncomfortable place to live. If muskrat holes are observed around the perimeter of a wet pond or stormwater wetland, destroy them or fill them with soil (Figure 9). Identify and destroy muskrat holes during any regular maintenance activity: whenever the wetland or pond is being inspected to verify that the drawdown is freely flowing and during mowing and trash removal.

Removing beavers is more difficult that removing muskrats. If a beaver is observed living in or around a stormwater wetland or wet pond, contact a professional trapper who specializes in beaver removal.

SUMMARY

Well-designed stormwater wetlands and wet ponds remove pollutants and mitigate floods. To accomplish these goals and remain safe, aesthetically pleasing, and free of mosquitoes, they must be maintained properly to meet their design goals. Most stormwater wetland and wet pond maintenance activities are simple and inexpensive. But without them, the effectiveness of these stormwater management practices will decline.

Exhibit D

TABLE 1. STORMWATER WETLAND AND WET POND MAINTENANCE TASKS AND FREQUENCIES

Task	Frequency	Notes
Remove sediment from forebay and deep pool (dredging/ dipping).	Varies. In stable watersheds, once every 5 to10 years is typical.	In unstable watersheds (those with active construction), the frequency increases to once a year, assuming the forebay is correctly sized.
Monitor sediment depth in forebay and deep pools.	Once a year.	In a large pond or wetland, a small boat may be needed.
Maintaining free-flowing orifice (drawdown hole).	Once per month and after every storm exceeding 2 inches.	Perform inspection regularly. Unclog-ging the hole when needed is simple.
Remove floating trash and debris.	Depends on design aesthetics: once a week to once a month.	Remove trash whenever the drawdown hole is being inspected. Inspect for trash more often if necessary, and remove as needed.
Remove vegetation from dam top and faces.	Once a year.	Dam top and faces should consist of mowed grass, if vegetated.
Remove invasive species (particularly cattails).	In years 1 and 2, twice a year (spring and fall). From year 2 onward, once a year (spring).	If spread of cattails is somewhat limited, use the glyphosate-wipe method.
Mow the wet pond perim-eter.	Depends on design aesthetics. Ranges from every 1 to 3 weeks to once a year.	Wet ponds that are a design amenity will require more frequent mowing (every 1 to 3 weeks).
Remove muskrats and beavers.	Muskrat hole inspection and destruc-tion should occur every time the wetland or wet pond is visited (at least once a month).	Contact a professional beaver trapper to remove beavers. Use muskrat traps to remove muskrats, or contact a profes-sional trapper.

RESOURCES

Fact sheets in the Urban Waterways series, North Carolina Cooperative Extension, N.C. State Univer-sity:

Hunt, W. F. *Urban Stormwater Structural Best Man-agement Practices (BMPs).* AG-588-01. Online: http://www.bae.ncsu.edu/stormwater/PublicationFiles/UrbanBMPs1999.pdf

Hunt, W. F., and B. A. Doll. *Design of Stormwater Wetlands for Small Watersheds.* AG-588-02. Online:http://www.bae.ncsu.edu/stormwater/PublicationFiles/SWwetlands2000.pdf

Hunt, W. F., C. A. Apperson, and W G. Lord. *Mosqui-to Control for Stormwater Facilities.* AG-588-04. Online: http://www.bae.ncsu.edu/stormwater/PublicationFiles/Mosquitoes2005.pdf

Hunt, W. F., and W.G. Lord. *Bioretention Perfor-mance, Design, Construction, and Maintenance.* AGW-588-05. Online: http://www.bae.ncsu.edu/stormwater/PublicationFiles/Bioretention2006.pdf

Rodewald, A. D. *Nuisance Canada Geese: How to Deal with the Problem.* Ohio State University Extension publication no. W-3-2001. Online: http://ohioline.osu.edu/w-fact/003.html

BAE Stormwater Group Web site:
www.bae.ncsu.edu/stormwater
Obtain information on upcoming workshops (including BMP Inspection and Maintenance Certification Courses), publications, PowerPoint presentations, images to download, and design and construction specifications.

State of North Carolina Stormwater Web site:
www.ncstormwater.org

ACKNOWLEDGEMENTS

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Exhibit D

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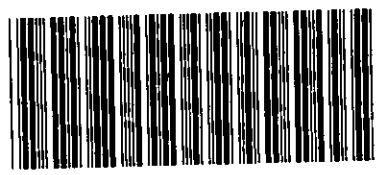

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NORTH CAROLINA PROFESSIONAL SEAL L-2968 LAND SURVEYOR DAVID K. BRUBAKER

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___1. THAT THIS PLAT IS OF A SURVEY THAT CREATES A SUBDIVISION OF LAND WITHIN THE AREA OF A COUNTY OR MUNICIPALITY THAT HAS AN ORDINANCE THAT REGULATES PARCELS OF LAND;
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___3. THAT THIS PLAT IS OF A SURVEY OF AN EXISTING PARCEL OR PARCELS OF LAND;
_V_4. THAT THIS PLAT IS OF A SURVEY OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT ORDERED SURVEY, OR OTHER EXCEPTION TO THE DEFINITION OF SUBDIVISION;
___5. THAT THE INFORMATION AVAILABLE TO THIS SURVEYOR IS SUCH THAT I AM UNABLE TO MAKE A DETERMINATION TO THE BEST OF MY PROFESSIONAL ABILITY AS TO THE PROVISIONS CONTAINED IN 1 THROUGH 4 ABOVE.

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RECOMBINATION SURVEY & BUFFER RELOCATION

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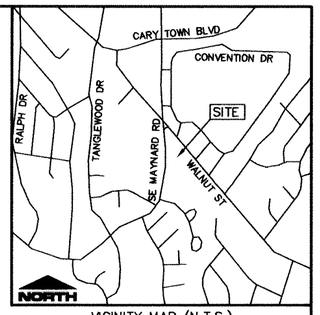

VICINITY MAP (N.T.S.)

GENERAL NOTES:

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PROPERTY SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD

LINES NOT SURVEYED ARE SHOWN AS BROKEN LINES FROM INFORMATION REFERENCED ON THE FACE OF THIS PLAT

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ALL DISTANCES ARE HORIZONTAL GROUND DISTANCES IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED

BASIS OF BEARINGS: NCGS GRID COORDINATES, NAD 83/2001 DATUM

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LOCATION OF UTILITIES, WHETHER PUBLIC OR PRIVATE, IS BASED UPON FIELD LOCATION OF VISIBLE APPURTENANCES IN CONJUNCTION WITH INFORMATION PROVIDED BY THE OWNERS OF SAID UTILITIES AND ARE APPROXIMATE ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY LOCATION PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION. CHAS H. SELLS, INC. CANNOT ASSUME RESPONSIBILITY FOR MIS-IDENTIFICATION OR OMISSION OF UNDERGROUND UTILITIES. DUE TO OSHA REQUIREMENTS PERTAINING TO CONFINED SPACE ENTRY, PIPE SIZES, INVERT ELEVATIONS, ETC., WILL ONLY BE PROVIDED IF ABLE TO OBTAIN WITHOUT BREAKING THE PLANE OF THE TOP OF THE STRUCTURE

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SOURCE OF TITLE

DB 6248, PG 801
WAKE CO. PIN #: 0773-04-7725
DB 2026, PG 54
WAKE CO. PIN # 0773-04-9865

MAP REFERENCES

BM 1996, PG 860
BM 1973, PG 297
BM 1995, PG 547

EASEMENTS OF RECORD

BM 1995, PG 547
BM 1996, PG 860
BM 1975, PG 82
BM 1972, PG 419
BM 1980, PG 105
DB 4299, PG 616
DB 4095, PG 629
DB 4299, PG. 610
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CERTIFICATE OF APPROVAL AND ACCEPTANCE OF DEDICATIONS

I, Sue Rowland, TOWN CLERK / DEPUTY TOWN CLERK OF CARY, NC CERTIFY THAT THE TOWN OF CARY APPROVED THIS PLAT OR MAP AND ACCEPTED THE DEDICATION OF THE STREETS, EASEMENTS, RIGHTS-OF-WAY, AND PUBLIC PARKS SHOWN THEREON, BUT ASSUME NO RESPONSIBILITY TO OPEN OR MAINTAIN THE SAME UNTIL, IN THE OPINION OF THE GOVERNING BODY OF THE TOWN OF CARY, IS IT IN THE PUBLIC INTEREST TO DO SO.

Sue Rowland — TOWN CLERK / DEPUTY TOWN CLERK
2/8/07 — DATE

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I HEREBY CERTIFY THAT THE SUBDIVISION PLAT SHOWN HEREON HAS BEEN FOUND TO COMPLY WITH THE SUBDIVISION REGULATIONS OF THE TOWN OF CARY WITH THE EXCEPTION OF SUCH VARIANCES, IF ANY, AND CONDITIONS OF APPROVAL AS ARE NOTED IN THE MINUTES OF THE TOWN COUNCIL AND OR THE ZONING BOARD OF ADJUSTMENT AND THAT HAS BEEN APPROVED FOR RECORDING IN THE OFFICE OF THE COUNTY REGISTER OF DEEDS.

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STORMWATER MANAGEMENT CERTIFICATE

I CERTIFY THAT THE PLAT SHOWN HERON COMPLIES WITH 4.4.6: WATERSHED PROTECTION OVERLAY DISTRICT OF THE TOWN OF CARY LAND DEVELOPMENT ORDINANCE AND IS APPROVED FOR RECORDING IN THE REGISTER OF DEEDS OFFICE. NOTICE: THIS PROPERTY IS LOCATED WITHIN A PUBLIC DRINKING WATER SUPPLY WATERSHED. DEVELOPMENT RESRICTIONS MAY APPLY.

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STORMWATER MANAGEMENT ENGINEER:

CERTIFICATE OF OWNERSHIP AND DEDICATION

THIS CERTIFIES THAT THE UNDERSIGNED (IS) (ARE) THE OWNER(S) OF THE PROPERTY SHOWN ON THIS MAP OR PLAT, HAVING ACQUIRED TITLE THERETO BY DEED(S) RECORDED IN THE OFFICE OF THE REGISTER OF DEEDS OF WAKE COUNTY, NORTH CAROLINA, OR OTHERWISE AS SHOWN BELOW AND THAT BY SUBMISSION OF THIS PLAT OR MAP FOR APPROVAL, (I) (WE) DO DEDICATE TO THE TOWN OF CARY FOR PUBLIC USE ALL STREETS, EASEMENTS, RIGHTS-OF-WAY, AND PARKS SHOWN THEREON FOR ALL LAWFUL PURPOSES TO WHICH THE TOWN MAY DEVOTE OR ALLOW THE SAME TO BE USED AND UPON ACCEPTANCE THEREOF AND IN ACCORDANCE WITH ALL TOWN POLICIES, ORDINANCES, AND REGULATIONS OR CONDITIONS OF THE TOWN OF CARY FOR THE BENEFIT OF THE PUBLIC, SAID DEDICATION SHALL BE IRREVOCABLE (PROVIDED DEDICATIONS OF EASEMENTS FOR STORM DRAINAGE ARE NOT MADE TO THE TOWN OF CARY, BUT ARE IRREVOCABLY MADE TO THE SUBSEQUENT OWNERS OF ANY AND ALL PROPERTIES SHOWN HEREON FOR THEIR USE AND BENEFIT). ALSO, ALL PRIVATE STREETS SHOWN ON THIS MAP, IF ANY, ARE TO BE AVAILABLE FOR PUBLIC USE.

BOOK NO.: 12391
PAGE NO.: 2314
SIGNATURE(S) OF PROPERTY OWNER(S):

Ernest F. Mc Alister, Mayor

NORTH CAROLINA, Wake COUNTY

I, A NOTARY PUBLIC OF THE COUNTY AND STATE AFORESAID, CERTIFY THAT THE ABOVE NAMED PERSONALLY APPEARED BEFORE ME THIS DAY AND ACKNOWLEDGED THE EXECUTION OF THE FOREGOING INSTRUMENT. WITNESS MY HAND AND OFFICIAL STAMP OR SEAL THIS 8 DAY OF February, 2007

Karen C. Gray
NOTARY PUBLIC - Karen C. Gray

12/6/2011
MY COMMISSION EXPIRES

KAREN C. GRAY NOTARY PUBLIC WAKE COUNTY, NC

CERTIFICATE OF OWNERSHIP AND DEDICATION

THIS CERTIFIES THAT THE UNDERSIGNED (IS) (ARE) THE OWNER(S) OF THE PROPERTY SHOWN ON THIS MAP OR PLAT, HAVING ACQUIRED TITLE THERETO BY DEED(S) RECORDED IN THE OFFICE OF THE REGISTER OF DEEDS OF WAKE COUNTY, NORTH CAROLINA, OR OTHERWISE AS SHOWN BELOW AND THAT BY SUBMISSION OF THIS PLAT OR MAP FOR APPROVAL, (I) (WE) DO DEDICATE TO THE TOWN OF CARY FOR PUBLIC USE ALL STREETS, EASEMENTS, RIGHTS-OF-WAY, AND PARKS SHOWN THEREON FOR ALL LAWFUL PURPOSES TO WHICH THE TOWN MAY DEVOTE OR ALLOW THE SAME TO BE USED AND UPON ACCEPTANCE THEREOF AND IN ACCORDANCE WITH ALL TOWN POLICIES, ORDINANCES, AND REGULATIONS OR CONDITIONS OF THE TOWN OF CARY FOR THE BENEFIT OF THE PUBLIC, SAID DEDICATION SHALL BE IRREVOCABLE (PROVIDED DEDICATIONS OF EASEMENTS FOR STORM DRAINAGE ARE NOT MADE TO THE TOWN OF CARY, BUT ARE IRREVOCABLY MADE TO THE SUBSEQUENT OWNERS OF ANY AND ALL PROPERTIES SHOWN HEREON FOR THEIR USE AND BENEFIT). ALSO, ALL PRIVATE STREETS SHOWN ON THIS MAP, IF ANY, ARE TO BE AVAILABLE FOR PUBLIC USE.

BOOK NO.: 2026
PAGE NO.: 54
SIGNATURE(S) OF PROPERTY OWNER(S):

Ruth H. Lewis Estate
by Victoria Voight Executor

NORTH CAROLINA, _____ COUNTY

I, A NOTARY PUBLIC OF THE COUNTY AND STATE AFORESAID, CERTIFY THAT THE ABOVE NAMED PERSONALLY APPEARED BEFORE ME THIS DAY AND ACKNOWLEDGED THE EXECUTION OF THE FOREGOING INSTRUMENT. WITNESS MY HAND AND OFFICIAL STAMP OR SEAL THIS _____ DAY OF _____, 20____.

NOTARY PUBLIC

MY COMMISSION EXPIRES

STATE OF NORTH CAROLINA
COUNTY OF WAKE

I, Dan Mathis, REVIEW OFFICER OF CARY N.C. IN WAKE COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

DATE: 2-6-07
REVIEW OFFICER'S SIGNATURE

CARY 30 DAY RECORDING LIMIT

THIS PLAT NOT TO BE RECORDED AFTER THE 1 DAY OF March, 2007.

THIS PLAT IS [M] INSIDE - [ ] OUTSIDE OF THE CARY CITY LIMITS.

TOWN OF CARY HTE # 96-1857 COUNTY TRACKING # CA0003607

ADDRESSING SPECIALIST — DATE: 2/7/07

FILED FOR REGISTRATION

DATE

LAURA M. RIDDICK, REGISTER OF DEEDS
WAKE COUNTY

BY: _____
ASST. / DEPUTY

TIME: _____

WAKE COUNTY, NC 344
LAURA M RIDDICK
REGISTER OF DEEDS
PRESENTED & RECORDED ON
02/09/2007 AT 13:09:31

BOOK:BM2007 PAGE:00353

RECORDED IN BOOK OF MAPS 2007 PAGE 353

RECOMBINATION SURVEY & BUFFER RELOCATION
PROPERTY OF
RUTH H. LEWIS
CK CARY COMMONS
CARY TOWNSHIP, WAKE COUNTY, N.C.
PREPARED FOR
TOWN OF CARY ENGINEERING DEPARTMENT

CHAS. H. SELLS, INC.
CONSULTING ENGINEERS, SURVEYORS, AND PHOTOGRAMMETRISTS
15401 WESTON PARKWAY SUITE 100 CARY, NC 27513
PHONE: 919.678.0035 FAX: 919.678.0206 WWW.CHASHSELLS.COM

Drawn By	DB	Date	Job No.
Surveyed by	MH	MAY 5, 2006	06-7055
Checked By	CEB/DKB	Scale	Drwg. No.
File Name	TOC-WALNUT RECOMBINATION	1" = 40'	1 of 2
Revisions	1) REV 08-07-06 T.O.C. COMMENTS	3) REV 11/03/06 T.O.C. COMMENTS	
	2) REV 10/17/06 COVER SHEET	4)	

NCGS "CARY HIGH 2 RM 2"
Y(N): 739,927.54
X(E): 2,064,919.27
NC GRID, NAD 83/2001

GS
S51°14'12"E 7677.95' (GROUND)
COMBINED GRID FACTOR: 0.99989646

CONTROL CORNER
RIGHT-OF-WAY DISC FOUND
Y(N): 735,120.864
X(E): 2,070,905.436
NC GRID, NAD 83/2001

R/W

WALNUT STREET
VARIABLE PUBLIC R/W, PER BM 1996, PG 860

N55°15'39"W 1296.84' (GRID)

GS
NCGS "SOUTHHILLS"
Y(N): 732,540.20
X(E): 2,075,572.36
NC GRID, NAD 83/2001

CARY TOWN BLVD
CONVENTION DR
SITE
RALPH DR
TANGLEWOOD DR
SE MAYNARD RD
WALNUT ST
NORTH
VICINITY MAP (N.T.S.)

NOW OR FORMERLY
CK CARY COMMONS
BM 1995, PG. 547

HEADWALL

APPROXIMATE LOCATION OF VARIABLE WIDTH STORM DRAINAGE EASEMENT
DB 4299, PG. 610

5.63' TIE TO EASEMENT

177.19' TIE TO EASEMENT

4.59' TIE TO EASEMENT

N 25°02'48" E 179.00'

DRY CREEK

TRACT 1
TOTAL AREA
119,268 S.F./2.738 ACRES

S46°08'11"E 378.62' (TOTAL)

253.05'

4.63' TIE TO EASEMENT

EXISTING 20' SANITARY SEWER EASEMENT
BASED ON EXISTING STRUCTURE LOCATIONS
BM 1995, PG. 547

PK

S75°42'31"E 84.57'

84.23' TIE TO EASEMENT

15.96'

21.58' TIE TO EASEMENT

IPS

EXISTING 20' SANITARY SEWER EASEMENT
BM 1995, PG. 547
BASED ON EXISTING STRUCTURE LOCATIONS

EXISTING 20' PUBLIC WATERLINE EASEMENT
BM 1995, PG. 547
BASED ON EXISTING STRUCTURE LOCATIONS

91.95'

IPF

B/C

N25°46'29"E 349.50' (TOTAL)

257.55'

2A

NOW OR FORMERLY
CK CARY COMMONS
BM 1996, PG. 860

1206

126.57'

IPF

B/C

R/W

20'

10' SETBACK PER ZONING

65' BUFFER PER ZONING

EXISTING GRAVEL DRIVE

EXISTING DWELLING

EXISTING 30' C.P. & L EASEMENT
DB 4157 PG 869

FORMER PROPERTY LINE (S00°10'39"E 280.78')

EXISTING 20' SANITARY SEWER EASEMENT
BM 1972, PG 419

NOW OR FORMERLY
CK CARY COMMONS
BM 1995, PG. 547
PIN: 0773047725

1

EXISTING 20' SANITARY SEWER EASEMENT
BM 1975, PG. 82

226.58' TIE TO EASEMENT

N 43°39'07" E 369.83'

NOW OR FORMERLY
RUTH H. LEWIS
DB 2026, PG. 54
PIN: 0773049865

S43°39'09"W 369.76'

NOW OR FORMERLY
FRED A. COLLINS AND VIVIAN M. COLLINS AND
FRED A. COLLINS AND VIVIAN M. COLLINS,
CO-TRUSTEES FOR
THE FRED A COLLINS REVOCABLE LIVING TRUST
DB 6418, PG. 793
PIN: 0773141608

TRACT 2
TOTAL AREA
46,804 S.F./1.074 ACRES

IPF

N64°13'31"W 338.21' (TIE)

76.01' TIE TO EASEMENT

EXISTING 20' TYPE "C" BUFFER PER ZONING
BM 1995, PG. 547

N64°13'31"W 223.33'

EXISTING 40' UNDISTURBED BUFFER PER ZONING
BM 1995, PG. 547

6' WOOD PRIVACY FENCE

7.83' TIE TO EASEMENT

S00°36'01"E 55.55'

IPS

53.51' TIE TO EASEMENT

S33°37'29"W 65.63'

IPF

S83°59'06"E 13.71' (TIE)

IPF

EXISTING 20' SANITARY SEWER EASEMENT
BM 1980, PG. 105

N46°10'05"W 126.57'

IPF

S45°56'24"E 212.87' (TIE)

IPF

NOW OR FORMERLY
PIRATES COVE
BM 1973, PG. 297

NOW OR FORMERLY
GREENWOOD ACRES
BM 1974, PG. 459

127

LEGEND:
- R/W ◉ RIGHT-OF-WAY DISC
- PK ◉ PK NAIL FOUND
- IPF ● IRON PIPE FOUND
- IPS ● IRON PIPE SET
- CONCRETE SIDEWALK
- 2600 PROPERTY ADDRESS
- PROPERTY LINE
- EDGE OF GRAVEL
- B/C BACK OF CURB
- LINE NOT SURVEYED
- R/W RIGHT-OF-WAY
- EDGE OF DRY CREEK
- 1 SUBDIVISION LOT NUMBER

BASIS OF BEARINGS: NC GRID, NAD 83/2001

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

WAKE COUNTY, NC 350
LAURA M RIDDICK
REGISTER OF DEEDS
PRESENTED & RECORDED ON
02/09/2007 AT 13:09:31

BOOK:BM2007 PAGE:00354

NORTH CAROLINA PROFESSIONAL SEAL L-2908 LAND SURVEYOR DAVID K. BRUBAKER
12/19/2006

MAPCHECK: CEB DATE 10-17-06

RECOMBINATION SURVEY & BUFFER RELOCATION

PROPERTY OF
RUTH H. LEWIS
CK CARY COMMONS
CARY TOWNSHIP, WAKE COUNTY, N.C.
PREPARED FOR
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BK. 2007 PG. 354