CITY OF WILMINGTON
NORTH CAROLINA

Public Services
Engineering
212 Operations Center Drive
Wilmington, NC 28412
910 341-7807
910 341-5881 fax
wilmingtonnc.gov
Dial 711 TTY/Voice

September 11, 2019

Mr. John S. Anderson, LLC
Bradley Creek Station, LLC
10 S. Cardinal Drive
Wilmington, NC 28403

Subject: **Stormwater Management Permit No. 2019014R1**
Bradley Creek Station
High Density Development

Dear Mr. Anderson:

The City of Wilmington Engineering Division has received a request for a revision to the Stormwater Management Permit for Bradley Creek Station. Having reviewed the application and all supporting materials, the City of Wilmington has determined that the proposed revision meets the requirements of the City of Wilmington's Comprehensive Stormwater Ordinance.

The revisions include:

- Relocation of the dumpster pad
- Shifted three (3) parking spaces
- No changes to impervious surface area square footage.
- See approved plans dated September 11, 2019.

Please be aware all terms and conditions of the permit Issued on March 12, 2019 remain in full force and effect. Any additional changes to the approved plans must be approved by this office prior to construction. The issuance of the plan revision does not preclude the permittee from complying with all other applicable statutes, rules, regulations or ordinances which may have jurisdiction over the proposed activity, and obtaining a permit or approval prior to construction.

The revised stamped, approved stormwater management drawings will be released for construction by the Wilmington Planning Division under separate cover. Please replace any old plan sheets from the approved set with the new, revised sheet. An electronic copy of the approved drawing set, permit, application and supplementary documents will be maintained by the Wilmington Engineering Division. If you have any questions, or need additional information, please contact Richard Christensen at (910) 341-7813 or richard.christensen@wilmingtonnc.gov

Sincerely,

for Sterling Cheatham, City Manager
City of Wilmington

cc: Phillip G. Tripp, PE, Tripp Engineering, P.C.
Brian Chambers, Senior Planner, City of Wilmington

CITY OF WILMINGTON
NORTH CAROLINA

*unless noted otherwise

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STORMWATER MANAGEMENT PERMIT APPLICATION FORM
(Form SWP 2.2)

I. GENERAL INFORMATION

1. Project Name (subdivision, facility, or establishment name - should be consistent with project name on plans, specifications, letters, operation and maintenance agreements, etc.):

   Bradley Creek Station

2. Location of Project (street address):

   5815 Oleander Drive

   City: Wilmington County: New Hanover Zip: 28403

3. Directions to project (from nearest major intersection):

   From the intersection of US 76 (Oleander Drive) and SR 1411 (Wrightsville Ave.), travel approx. 1.18 miles southwest on Oleander Drive. Site is on the right.

II. PERMIT INFORMATION

1. Specify the type of project (check one): Low Density X High Density
   Drains to an Offsite Stormwater System Drainage Plan Other
   If the project drains to an Offsite System, list the Stormwater Permit Number(s):

   City of Wilmington: _____ State – NCDENR/DWQ: _____

2. Is the project currently covered (whole or in part) by an existing City or State (NCDENR/DWQ) Stormwater Permit? Yes X No
   If yes, list all applicable Stormwater Permit Numbers:

   City of Wilmington: _____ State – NCDENR/DWQ: _____

3. Additional Project Permit Requirements (check all applicable):
   CAMA Major X Sedimentation/Erosion Control
   NPDES Industrial Stormwater 404/401 Permit: Proposed Impacts: _____
   If any of these permits have already been acquired please provide the Project Name, Project/Permit Number, issue date and the type of each permit:

   _____

III. CONTACT INFORMATION

1. Print Applicant / Signing Official's name and title (specifically the developer, property owner, lessee, designated government official, individual, etc. who owns the project):

   Applicant / Organization: Bradley Creek Station, LLC

   Signing Official & Title: John S. Anderson, Member Manager

   a. Contact information for Applicant / Signing Official:

   Street Address: 10 S. Cardinal Drive

   City: Wilmington State: NC Zip: 28403

   Phone: 616-0483 Fax: _____ Email: sa@ec.rr.com

   Mailing Address (if different than physical address): _____

   City: _____ State: _____ Zip: _____

   b. Please check the appropriate box. The applicant listed above is:

   X The property owner (Skip to item 3)
   Lessee* (Attach a copy of the lease agreement and complete items 2 and 2a below)
   Purchaser* (Attach a copy of the pending sales agreement and complete items 2 and 2a below)
   Developer* (Complete items 2 and 2a below.)

2. Print Property Owner's name and title below, if you are the lessee, purchaser, or developer. (This is the person who owns the property that the project is on.)

   Property Owner / Organization: _____

   Signing Official & Title: _____

   a. Contact information for Property Owner:

   Street Address: _____

   City: _____ State: _____ Zip: _____

   Phone: _____ Fax: _____ Email: _____

   Mailing Address (if different than physical address): _____

   City: _____ State: _____ Zip: _____

3. (Optional) Print the name and title of another contact such as the project's construction supervisor or another person who can answer questions about the project:

   Other Contact Person / Organization: _____

   Signing Official & Title: _____

a. Contact information for person listed in item 3 above:

Street Address: _____

City: _____ State: _____ Zip: _____

Phone: _____ Fax: _____ Email: _____

Mailing Address (if different than physical address): _____

City: _____ State: _____ Zip: _____

IV. PROJECT INFORMATION

1. In the space provided below, briefly summarize how the stormwater runoff will be treated.

   Underground infiltration

2. Total Property Area: 256,710 square feet
3. Total Coastal Wetlands Area: 0 square feet
4. Total Surface Water Area: 0 square feet
5. Total Property Area (2) – Total Coastal Wetlands Area (3) – Total Surface Water Area (4) = Total Project Area: 256,710 square feet.
6. Existing Impervious Surface within Property Area: 30,315 square feet
7. Existing Impervious Surface to be Removed/Demolished: 30,315 square feet
8. Existing Impervious Surface to Remain: 0 square feet
9. Total Onsite (within property boundary) Newly Constructed Impervious Surface (*in square feet*):

Buildings/Lots	26,235
Impervious Pavement	134,608
Pervious Pavement (adj. total, with 100 % credit applied)	0 (15,552 sf)
Impervious Sidewalks	6,000
Pervious Sidewalks (adj. total, with % credit applied)	-
Other (describe)	-
Future Development	-
Total Onsite Newly Constructed Impervious Surface	166,843

10. Total Onsite Impervious Surface
    (Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) = 166,843 square feet
11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = 65 %

12. Total Offsite Newly Constructed Impervious Area (improvements made outside of property boundary, *in square feet*):

Impervious Pavement	10,720
Pervious Pavement (adj. total, with % credit applied)	-
Impervious Sidewalks	4,650
Pervious Sidewalks (adj. total, with % credit applied)	-
Other (describe)	-
Total Offsite Newly Constructed Impervious Surface	15,370

13. Total Newly Constructed Impervious Surface
(Total Onsite + Offsite Newly Constructed Impervious Surface) = 182,213 square feet

14. Complete the following information for each Stormwater BMP drainage area. If there are more than three drainage areas in the project, attach an additional sheet with the information for each area provided in the same format as below. Low Density projects may omit this section and skip to Section V.

Basin Information	BMP # 1	BMP # 2	BMP # 3
Receiving Stream Name	UT Bradley Creek	UT Bradley Creek	UT Bradley Creek
Receiving Stream Index Number	18-87-24-4-(1)	18-87-24-4-(1)	18-87-24-4-(1)
Stream Classification	SC;HQW:#	SC;HQW:#	SC;HQW:#
Total Drainage Area (sf)	87,388	128,345	24,284
On-Site Drainage Area (sf)	87,388	128,345	24,284
Off-Site Drainage Area (sf)	-	-	-
Total Impervious Area (sf)	60,953	105,890	4,640
Buildings/Lots (sf)	-	26,235	-
Impervious Pavement (sf)	60,953	73,655	4,640
Pervious Pavement (sf) 100% Credit	0	-	-
Impervious Sidewalks (sf)	-	6,000	126
Pervious Sidewalks (sf)	-	-	-
Other (sf)	-	-	-
Future Development (sf)	-	-	-
Existing Impervious to remain (sf)	-	-	-
Offsite (sf)	-	-	-
Percent Impervious Area (%)	70	83	19

15. How was the off-site impervious area listed above determined? Provide documentation:

N/A

V. SUBMITTAL REQUIREMENTS

1. Supplemental and Operation & Maintenance Forms - One applicable City of Wilmington Stormwater BMP supplement form and checklist must be submitted for **each** BMP specified for this project. One applicable proposed operation and maintenance (O&M) form must be submitted for **each type** of stormwater BMP. Once approved, the operation and maintenance forms must be referenced on the final plat and recorded with the register of deeds office.

2. Deed Restrictions and Restrictive Covenants - For all subdivisions, outparcels, and future development, the appropriate property restrictions and protective covenants are required to be recorded prior to the sale of any lot. Due to variability in lot sizes or the proposed BUA allocations, a table listing each lot number, lot size, and the allowable built-upon area must be provided as an attachment to the completed and notarized deed restriction form. The appropriate deed restrictions and protective covenants forms can be downloaded at the link listed in section V (3). Download the latest versions for each submittal.

   In instances where the applicant is different than the property owner, it is the responsibility of the property owner to sign the deed restrictions and protective covenants form while the applicant is responsible for ensuring that the deed restrictions are recorded.

   By the notarized signature(s) below, the permit holder(s) certify that the recorded property restrictions and protective covenants for this project, if required, shall include all the items required in the permit and listed on the forms available on the website, that the covenants will be binding on all parties and persons claiming under them, that they will run with the land, that the required covenants cannot be changed or deleted without concurrence from the City of Wilmington, and that they will be recorded prior to the sale of any lot.

3. Only complete application packages will be accepted and reviewed by the City. A complete package includes all of the items listed on the City Engineering Plan Review Checklist, including the fee. Copies of the Engineering Plan Review Checklist, all Forms, Deed Restrictions as well as detailed instructions on how to complete this application form may be downloaded from:

   http://www.wilmingtonnc.gov/PublicServices/Engineering/PlanReview/StormwaterPermits.aspx

   The complete application package should be submitted to the following address:

   City of Wilmington – Engineering
   Plan Review Section
   212 Operations Center Dr
   Wilmington, NC 28412

VI. CONSULTANT INFORMATION AND AUTHORIZATION

1. Applicant: Complete this section if you wish to designate authority to another individual and/or firm (such as a consulting engineer and /or firm) so that they may provide information on your behalf for this project (such as addressing requests for additional information).

   Consulting Engineer: Phillip G. Tripp, P.E.

   Consulting Firm: Tripp Engineering, P.C.

   a. Contact information for consultant listed above:

   Mailing Address: 419 Chestnut Street

   City: Wilmington State: NC Zip: 28401

   Phone: 763-5100 Fax: 763-5631 Email: office@trippengineering.com

VII. PROPERTY OWNER AUTHORIZATION (If Section III(2) has been filled out, complete this section)

I, (*print or type name of person listed in Contact Information, item 2*)_____, certify that I own the property identified in this permit application, and thus give permission to (*print or type name of person listed in Contact Information, item 1*)_____ with (*print or type name of organization listed in Contact Information, item 1*) _____ to develop the project as currently proposed. A copy of the lease agreement or pending property sales contract has been provided with the submittal, which indicates the party responsible for the operation and maintenance of the stormwater system.

As the legal property owner I acknowledge, understand, and agree by my signature below, that if my designated agent (*entity listed in Contact Information, item 1*) dissolves their company and/or cancels or defaults on their lease agreement, or pending sale, responsibility for compliance with the City of Wilmington Stormwater Permit reverts back to me, the property owner. As the property owner, it is my responsibility to notify the City of Wilmington immediately and submit a completed Name/Ownership Change Form within 30 days; otherwise I will be operating a stormwater treatment facility without a valid permit. I understand that the operation of a stormwater treatment facility without a valid permit is a violation of the City of Wilmington Municipal Code of Ordinances and may result in appropriate enforcement including the assessment of civil penalties.

SEAL

Signature: _____

_____Date:_____

I, _____, a Notary Public for the State of _____, County of _____, do hereby certify that _____ personally appeared before me this day of _____, _____,

and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

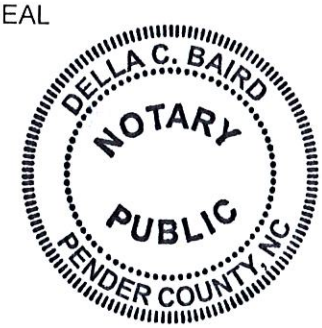
_____

My commission expires: _____

VIII. APPLICANT'S CERTIFICATION

I, *(print or type name of person listed in Contact Information, item 1)* , John S. Anderson certify that the information included on this permit application form is, to the best of my knowledge, correct and that the project will be constructed in conformance with the approved plans, that the required deed restrictions and protective covenants will be recorded, and that the proposed project complies with the requirements of the applicable stormwater rules under.

SEAL



Signature: _____

Date: 6/7/18

I, Della C. Baird, a Notary Public for the State of North Carolina, County of Pender, do hereby certify that John S. Anderson personally appeared before me this 7 day of June, 2018, and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

Della C Baird

My commission expires: 10-15-21

SUPPLEMENT-EZ FORM COVER PAGE

Please indicate the types, quantities and locations of SCMs that will be used on this project:

	Quantity	Location(s)
Infiltration System	2	under parking lot
Bioretention Cell		
Wet Pond		
Stormwater Wetland		
Permeable Pavement	1	northern area of parking lot
Sand Filter		
Rainwater Harvesting		
Green Roof		
Level Spreader-Filter Strip		
Disconnected Impervious Surface		
Treatment Swale		
Dry Pond		

Project Name:

Bradley Creek Station

Address

5815 Oleander Drive

City / Town

Wilmington

Designer information for this project:

Name and Title:	Phillip G. Tripp, P.E.
Organization:	Tripp Engineering, P.C.
Street address:	419 Chestnut Street
City, State, Zip:	Wilmington, NC 28401
Phone number(s):	910-763-5100
Email:	office@trippengineering.com

Applicant:

Company:	Bradley Creek Station, LLC
Contact:	Steve Anderson
Mailing Address:	10 S. Cardinal Drive
City, State, Zip:	Wilmington, NC 28403
Phone number(s):	910-616-0483
Email:	sa@ec.rr.com

Designer

NORTH CAROLINA PROFESSIONAL SEAL 17374 ENGINEER PHILLIP GREGORY TRIPP Seal

Signature of Designer

10.25.18

Date

Certification Statement:

I certify, under penalty of law: that this Supplement-EZ form and all supporting information were prepared under my direction or supervision;

- that the information provided in the form is, to the best of my knowledge and belief, true, accurate, and complete; and

- that the engineering plans, specifications, operation and maintenance agreements and other supporting information are consistent with the information provided here.

I am aware that there are significant penalties for submitting false information including the possibility of fines and imprisonment for knowing violations as well as a report being made to my professional board.

RECEIVED OCT 29 2018 ENGINEERING

INFILTRATION SYSTEMS

THE DRAINAGE AREA

1

Drainage area number	1
Total coastal wetlands area (sq ft)	sf
Total surface water area (sq ft)	sf
Total drainage area (sq ft)	87388 sf
BUA associated with existing development (sq ft)	sf
Proposed new BUA (sq ft)	60593 sf
Percent BUA of drainage area	70%

Break down of BUA in the drainage area (both new and existing):	
- Parking / driveway (sq ft)	60953 sf
- Sidewalk (sq ft)	sf
- Roof (sq ft)	sf
- Roadway (sq ft)	sf
- Other, please specify in the comment box below (sq ft)	sf
Total BUA (sq ft)	60593 sf

COMPLIANCE WITH THE APPLICABLE STORMWATER PROGRAM

Stormwater program(s) that apply (please specify):
City of Wilmington

Design rainfall depth (in)	1.5 in
Minimum volume required (cu ft)	9085 cf
Design volume of SCM (cu ft)	40913 cf

GENERAL MDC FROM 02H .1050

#1 Is the SCM sized to treat the SW from all surfaces at build-out?	Yes	#7 If applicable, with the SCM be cleaned out after construction?	No
#2 Is the SCM located on or near contaminated soils?	No	#8 Does the mainetenance access comply with General MDC (8)?	Yes
#3 What are the side slopes of the SCM (H:V)?	na	#9 Does the drainage easement comply with General MDC (9)?	Yes
#3 Does the SCM have retaining walls, gabion walls or other engineered side slopes?	No	#10 If the SCM is on a single family lot, does the plat comply with General MDC (10)?	No
#4 Are the inlets, outlets, and receiving stream protected from erosion (10-year storm)?	Yes	#11 Is there an O&M Agreement that complies with General MDC (11)?	Yes
#5 Is there a a bypass for flows in excess of the design flow?	Yes	#12 Is there an O&M Plan that complies with General MDC (12)?	Yes
#6 What is the method for dewatering the SCM for maintenance?	Pump (preferred)	#13 Was the SCM designed by an NC licensed professional?	Yes

INFILTRATION SYSTEM MDC FROM 02H .1051

#1 SHWT elevation (fmsl)	17.4	#5 Length (ft)	varies-see plan
#1 Was the soil investigated in the footprint and at the elevation of the infiltration system?	Yes	#5 Width (ft)	varies-see plan
#1 Soil infiltration rate (in/hr)	0.74	#5 Depth/Height (ft)	1.44
#1 Briefly describe the hydraulic properties and characteristics of the soil profile:		#5 Surface area of the bottom of the infiltration system (sq feet)	28412 sf
sandy soils with moderate permeability		#5 Ponding depth of the design volume (in)	3.71
		#5 Estimated dewatering time (hours)	23.35
		#5 For trenches only: Perforated pipe diameter, if applicable (inches)	
#2 SHWT elevation (fmsl)	17.4	#5 For trenches only: Number of laterals	
#2 Bottom of the Infiltration system (fmsl)	19.4	#5 For trenches only: Stone type, if applicable	
#2 Is a detailed hydrogeologic study attached if the separation is between 1 and 2 feet?	na	#5 For trenches only: Stone void ratio (%)	
#3 Proposed slope of the subgrade surface (%)	0%	#5 For trenches only: Is stone free of fines?	Yes
#3 Are terraces or baffles provided?	No	#5 For trenches only: Is the stone wrapped in geotextile fabric?	Yes
#4 Describe the pretreatment that will be provided:		#6 Is the infiltration system located underground?	Yes
permanent inlet protection		#6 If so, has at least one infiltration port been provided?	Yes

ADDITIONAL INFORMATION

Please use this space to provide any information about this infiltration system that you think is relevant to the review:

INFILTRATION SYSTEMS

THE DRAINAGE AREA			2
Drainage area number	2	Break down of BUA in the drainage area (both new and existing):	
Total coastal wetlands area (sq ft)	sf	- Parking / driveway (sq ft)	73655 sf
Total surface water area (sq ft)	sf	- Sidewalk (sq ft)	6000 sf
Total drainage area (sq ft)	128345 sf	- Roof (sq ft)	26235 sf
BUA associated with existing development (sq ft)	sf	- Roadway (sq ft)	
Proposed new BUA (sq ft)	105890 sf	- Other, please specify in the comment box below (sq ft)	
Percent BUA of drainage area	83%	**Total BUA (sq ft)**	105890 sf

COMPLIANCE WITH THE APPLICABLE STORMWATER PROGRAM		
Stormwater program(s) that apply (please specify):	Design rainfall depth (in)	1.5 in
City of Wilmington	Minimum volume required (cu ft)	12574 cf
	Design volume of SCM (cu ft)	50599 cf

GENERAL MDC FROM 02H .1050			
#1 Is the SCM sized to treat the SW from all surfaces at build-out?	Yes	#7 If applicable, with the SCM be cleaned out after construction?	No
#2 Is the SCM located on or near contaminated soils?	Yes	#8 Does the mainetenance access comply with General MDC (8)?	Yes
#3 What are the side slopes of the SCM (H:V)?	na	#9 Does the drainage easement comply with General MDC (9)?	Yes
#3 Does the SCM have retaining walls, gabion walls or other engineered side slopes?	No	#10 If the SCM is on a single family lot, does the plat comply with General MDC (10)?	No
#4 Are the inlets, outlets, and receiving stream protected from erosion (10-year storm)?	Yes	#11 Is there an O&M Agreement that complies with General MDC (11)?	Yes
#5 Is there a a bypass for flows in excess of the design flow?	Yes	#12 Is there an O&M Plan that complies with General MDC (12)?	Yes
#6 What is the method for dewatering the SCM for maintenance?	Pump (preferred)	#13 Was the SCM designed by an NC licensed professional?	Yes

INFILTRATION SYSTEM MDC FROM 02H .1051			
#1 SHWT elevation (fmsl)	15.38	#5 Length (ft)	varies-see plan
#1 Was the soil investigated in the footprint and at the elevation of the infiltration system?	Yes	#5 Width (ft)	varies-see plan
#1 Soil infiltration rate (in/hr)	1.5 in/hr	#5 Depth/Height (ft)	2.82
#1 Briefly describe the hydraulic properties and characteristics of the soil profile:		#5 Surface area of the bottom of the infiltration system (sq feet)	17943 sf
sandy soils with moderate permeability		#5 Ponding depth of the design volume (in)	8.73
		#5 Estimated dewatering time (hours)	22.56
		#5 For trenches only: Perforated pipe diameter, if applicable (inches)	
#2 SHWT elevation (fmsl)	15.38	#5 For trenches only: Number of laterals	
#2 Bottom of the Infiltration system (fmsl)	17.38	#5 For trenches only: Stone type, if applicable	
#2 Is a detailed hydrogeologic study attached if the separation is between 1 and 2 feet?	na	#5 For trenches only: Stone void ratio (%)	
#3 Proposed slope of the subgrade surface (%)	0%	#5 For trenches only: Is stone free of fines?	Yes
#3 Are terraces or baffles provided?	No	#5 For trenches only: Is the stone wrapped in geotextile fabric?	Yes
#4 Describe the pretreatment that will be provided:		#6 Is the infiltration system located underground?	Yes
permanent inlet protection		#6 If so, has at least one infiltration port been provided?	Yes

ADDITIONAL INFORMATION
Please use this space to provide any information about this infiltration system that you think is relevant to the review:

PERMEABLE PAVEMENT

Bradley Creek Station

THE DRAINAGE AREA			1
Drainage area number	1	**Break down of BUA in the drainage area (both new and existing):**	
Total coastal wetlands area (sq ft)		- Parking / driveway (sq ft)	4514 sf
Total surface water area (sq ft)		- Sidewalk (sq ft)	126 sf
Total drainage area (sq ft)	24284 sf	- Roof (sq ft)	
BUA associated with existing development (sq ft)		- Roadway (sq ft)	
Proposed new BUA (sq ft)	4640 sf	- Other, please specify in the comment box below (sq ft)	
Percent BUA of drainage area	19.0	**Total BUA (sq ft)**	4640 sf

COMPLIANCE WITH THE APPLICABLE STORMWATER PROGRAM			
Stormwater program(s) that apply (please specify):		Design rainfall depth (in)	1.5 in
City of Wilmington		Minimum volume required (cu ft)	2524 cf
		Design volume of SCM (cu ft)	4038 cf

GENERAL MDC FROM 02H .1050			
#1 Is the SCM sized to treat the SW from all surfaces at build-out?	No	#7 If applicable, with the SCM be cleaned out after construction?	
#2 Is the SCM located on or near contaminated soils?	No	#8 Does the mainetenance access comply with General MDC (8)?	
#3 What are the side slopes of the SCM (H:V)?	N/A	#9 Does the drainage easement comply with General MDC (9)?	
#3 Does the SCM have retaining walls, gabion walls or other engineered side slopes?	No	#10 If the SCM is on a single family lot, does the plat comply with General MDC (10)?	
#4 Are the inlets, outlets, and receiving stream protected from erosion (10-year storm)?	Yes	#11 Is there an O&M Agreement that complies with General MDC (11)?	Yes
#5 Is there a a bypass for flows in excess of the design flow?	Yes	#12 Is there an O&M Plan that complies with General MDC (12)?	Yes
#6 What is the method for dewatering the SCM for maintenance?	Pump (preferred)	#13 Was the SCM designed by an NC licensed professional?	Yes

PERMEABLE PAVEMENT MDC FROM 02H .1055			
#1 Was the soil investigated in the footprint and at the elevation of the infiltration system?	No	#6 How will the pavement surface be tested?	
#1 Briefly describe the hydraulic properties and characteristics of the soil profile:		NCSU Simple Infiltration Test	
sandy soils with moderate permeability			
		#7 Area of permeable pavement to be installed (square feet)	15552 sf
		#7 Area of screened roof runoff that is directed to pavement (square feet)	
#2 SHWT elevation (fmsl)	18.08	#7 Area of additional built-upon area runoff that is directed to pavement (square feet)	4640 sf
#2 Top of the subgrade (fmsl)	23.00	#7 Will runoff from pervious surfaces be directed away from the pavement?	Yes
#2 Storage elevation of the design rainfall depth (fmsl)	22.10	#8 Dewatering time (hours)	3.6
#2 Is a detailed hydrogeologic study attached if the separation is between 1 and 2 feet?	No	#8 Is additional media being added to the soil profile?	No
#3 Will toxic pollutants be stored or handled on or near the permeable pavement?	No	#9 Is at least one observation well per terrace been provided at the low point(s)?	Yes
#4 Proposed slope of the subgrade surface (%)	1.67	#10 Is this a detention permeable pavement system?	No
#4 Are terraces or baffles provided?	No	#10 If so, what is the drawdown time for the design storm?	
#5 Size of aggregate to be used in the subbase	#57	#11 Have edge restraints been provided?	Yes
#5 Aggregate depth (in)	6 in	#12 Will the subgrade be graded when dry?	Yes
#5 Aggegate porosity (n)	40	#13 Will the permeable pavment be protected from sediment during construction?	Yes
#5 Will the aggregate be washed?	Yes	#13 Will an in-situ permeability test be conducted after site stabilization	Yes

ADDITIONAL INFORMATION

Please use this space to provide any additional information about this permeable pavement design that you think is relevant to the review:

Operation & Maintenance Agreement

Project Name:	**Bradley Creek Station**
Project Location:	**5815 Oleander Drive**

Cover Page

Maintenance records shall be kept on the following BMP(s). This maintenance record shall be kept in a log in a known set location. Any deficient BMP elements noted in the inspection will be corrected, repaired, or replaced **immediately.** These deficiencies can affect the integrity of structures, safety of the public, and the pollutant removal efficiency of the BMP(s).

The BMP(s) on this project include (check all that apply & corresponding O&M tables will be added automatically):

Bioretention Cell	Quantity:		Location(s):	
Dry Detention Basin	Quantity:		Location(s):	
Grassed Swale	Quantity:		Location(s):	
Green Roof	Quantity:		Location(s):	
Infiltration Basin	Quantity:		Location(s):	
Infiltration Trench	Quantity:	2	Location(s):	Under parking lot
Level Spreader/VFS	Quantity:		Location(s):	
Permeable Pavement	Quantity:	1	Location(s):	Rear of site
Proprietary System	Quantity:		Location(s):	
Rainwater Harvesting	Quantity:		Location(s):	
Sand Filter	Quantity:		Location(s):	
Stormwater Wetland	Quantity:		Location(s):	
Wet Detention Basin	Quantity:	0	Location(s):	
Disconnected Impervious Area	Present:	No	Location(s):	
User Defined BMP	Present:	No	Location(s):	

I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed for each BMP above, and attached O&M tables. I agree to notify NCDENR of any problems with the system or prior to any changes to the system or responsible party.

* Responsible Party:	**John S. Anderson**
Title & Organization:	**Member Manager, Bradley Creek Station, LLC**
Street address:	**10 S. Cardinal Drive**
City, state, zip:	**Wilmington, NC 28403**
Phone number(s):	**910-616-0483**
Email:	**sa@ec.rr.com**

Signature: _____ Date: 9/6/18

I, Della C. Baird, a Notary Public for the State of North Carolina

County of Pender, do hearby certify that John S. Anderson

personally appeared before me this 6 day of September, 2018 and

acknowledge the due execution of the Operations and Maintenance Agreement .

Witness my hand and official seal, Della C Baird.

DELLA C. BAIRD NOTARY PUBLIC PENDER COUNTY, NC

Seal

My commission expires 10-15-21

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Infiltration System Maintenance Requirements

Important maintenance procedures:

- The drainage area will be carefully managed to reduce The sediment load to The infiltration basin.
- Immediately after the infiltration basin is established, the vegetation will be watered twice weekly if needed until the plants become established (commonly six weeks).
- No portion of the infiltration basin will be fertilized after the initial fertilization that is required to establish the vegetation.
- The vegetation in and around the basin will be maintained at a height of approximately six inches.

After the infiltration basin is established, it shall be inspected **once a quarter and within 24 hours after every storm event greater than 1.0 inches (or 1.5 inches if in a Coastal County)**. Records of operation and maintenance shall be kept in a known set location and shall be available upon request.

Inspection activities shall be performed as follows. Any problems that are found shall be repaired immediately.

BMP element:	Potential problem:	How to remediate the problem:
The entire BMP	Trash/debris is present.	Remove the trash/debris.
The perimeter of the infiltration basin	Areas of bare soil and/or erosive gullies have formed.	Regrade the soil if necessary to remove the gully, and then plant a ground cover and water until it is established. Provide lime and a one-time fertilizer application.
The inlet device: pipe or swale	The pipe is clogged (if applicable).	Unclog the pipe. Dispose of the sediment off-site.
	The pipe is cracked or otherwise damaged (if applicable).	Replace the pipe.
	Erosion is occurring in the swale (if applicable).	Regrade the swale if necessary to smooth it over and provide erosion control devices such as reinforced turf matting or riprap to avoid future problems with erosion.
The forebay	Sediment has accumulated and reduced the depth to 75% of the original design depth.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the BMP.
	Erosion has occurred or riprap is displaced.	Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.
	Weeds are present.	Remove the weeds, preferably by hand. If pesticides are used, wipe them on the plants rather than spraying.
The main treatment area	A visible layer of sediment has accumulated.	Search for the source of the sediment and remedy the problem if possible. Remove the sediment and dispose of it in a location where it will not cause impacts to streams or the BMP. Replace any media that was removed in the process. Revegetate disturbed areas immediately.
	Water is standing more than 5 days after a storm event.	Replace the top few inches of filter media and see if this corrects the standing water problem. If so, revegetate immediately. If not, consult an appropriate professional for a more extensive repair.
	Weeds and noxious plants are growing in the main treatment area.	Remove the plants by hand or by wiping them with pesticide (do not spray).
The embankment	Shrubs or trees have started to grow on the embankment.	Remove shrubs or trees immediately.
	An annual inspection by an appropriate professional shows that the embankment needs repair.	Make all needed repairs.
The outlet device	Clogging has occurred.	Clean out the outlet device. Dispose of the sediment off-site.
	The outlet device is damaged	Repair or replace the outlet device.
The receiving water	Erosion or other signs of damage have occurred at the outlet.	Contact the local NC Department of Environment and Natural Resources Regional Office.

Permeable Pavement Maintenance Requirements

At all times, the pavement shall be kept free of:

- Debris and particulate matter through frequent blowing that removes such debris, particularly during the fall and spring.
- Piles of soil, sand, mulch, building materials or other materials that could deposit particulates on the pavement.
- Piles of snow and ice.
- Chemicals of all kinds, including deicers.

The permeable pavement will be inspected **once a quarter**. Records of operation and maintenance will be kept in a known set location and will be available upon request.

Inspection activities shall be performed as follows. Any problems that are found shall be repaired immediately.

BMP element:	Potential problem:	How to remediate the problem:
The entire BMP	Trash/debris is present.	Remove the trash/debris.
The perimeter of the permeable pavement	Areas of bare soil and/or erosive gullies	Regrade the soil if necessary to remove the gully, then plant ground cover and water until established.
	A vegetated area drains toward the pavement.	Regrade the area so that it drains away from the pavement, then plant ground cover and water until established.
The inlet device	The pipe is clogged.	Unclog the pipe. Dispose of the sediment off-site.
	The pipe is cracked or otherwise damaged.	Replace the pipe.
	Erosion is occurring in the swale.	*Regrade the swale if necessary to smooth it over and provide erosion* control devices such as reinforced turf matting or riprap to avoid future problems with erosion.
	Stone verge is clogged or covered in sediment (if applicable).	Remove sediment and replace with clean stone.
The surface of the permeable pavement	Trash/debris present	Remove the trash/debris.
	Weeds	Do not pull the weeds (may pull out media as well). Spray them with a systemic herbicide such as glyphosate and then return within the week to remove them by hand. (Another option is to pour boiling water on them or steam them.)
	Sediment	Vacuum sweep the pavement.
	Rutting, cracking or slumping or damaged structure	Consult an appropriate professional.
Observation well	Water present more than five days after a storm event	Clean out clogged underdrain pipes. Consult an appropriate professional for clogged soil subgrade.
Educational sign	Missing or is damaged.	Replace the sign.
The outlet device	Clogging has occurred.	Clean out the outlet device. Dispose of the sediment off-site.
	The outlet device is damaged	Repair or replace the outlet device.
The receiving water	Erosion or other signs of damage have occurred at the outlet.	Contact the local NC Department of Environment and Natural Resources Regional Office.