



## COMPREHENSIVE STORMWATER MANAGEMENT PERMIT

### DRAINAGE PLAN

#### SECTION 1 – APPROVAL

Having reviewed the construction drawings, application and all supporting materials, the City of Wilmington has determined that the proposed development meets the requirements for Drainage Plan Approval through the City of Wilmington's Comprehensive Stormwater Ordinance.

PERMIT HOLDER: **New Hanover Regional Medical Center**  
PROJECT: **NHRMC Additional Parking - Medical Center Drive**  
ADDRESS: **1612 Medical Center Drive**  
PERMIT #: **2016022**  
DATE: **7/12/2016**

Therefore, the above referenced site is hereby approved and subject to all conditions set forth in Section 2 of this approval and all applicable provisions of the City of Wilmington Comprehensive Stormwater Management Ordinance.

This permit shall be effective from the date of issuance until modified or rescinded and shall be subject to the following specified conditions and limitations:

#### Section 2 - CONDITIONS

1. This approval is valid only for the stormwater management system as proposed on the approved stormwater management plans dated 7/7/2016.
2. The project will be limited to the amount and type of built-upon area indicated in Section IV of the Stormwater Management Application Form submitted as part of the approved stormwater permit application package, and per the approved plans.
3. This permit shall become void unless the facilities are constructed in accordance with the approved stormwater management plans, specifications and supporting documentation.
4. The permittee shall submit a revised stormwater management application packet to the City of Wilmington and shall have received approval prior to construction, for any modification to the approved plans, including, but not limited to, those listed below:
  - a. Any revision to any item shown on the approved plans, including the stormwater management measures, built-upon area, details, etc.
  - b. Redesign or addition to the approved amount of built-upon area.
  - c. Further subdivision, acquisition, lease or sale of any part of the project area.
  - d. Filling in, altering, or piping of any vegetative or piped conveyance shown on the approved plan.
  - e. Construction of any permitted future areas shown on the approved plans.
5. A copy of the approved plans and specifications shall be maintained on file by the Permittee.



**Public Services**

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

6. During construction, erosion shall be kept to a minimum and any eroded areas of the system will be repaired immediately.
7. All areas must be maintained in a permanently stabilized condition. If vegetated, permanent seeding requirements must follow the guidelines established in the North Carolina Erosion and Sediment Control Planning and Design Manual unless an alternative is specified and approved by the City of Wilmington.
8. All applicable operation & maintenance agreements pertaining to all pervious pavement systems shall be referenced on the final plat and recorded with the Register of Deeds upon final plat approval. If no plat is recorded for the site the operation and maintenance agreements shall be recorded with the Register of Deeds so as to appear in the chain of title of all subsequent purchasers under generally accepted searching standards.
9. The permittee shall at all times provide the operation and maintenance necessary to assure the pervious pavement system functions at optimum efficiency. The approved Operation and Maintenance Plan must be followed in its entirety and maintenance must occur at the scheduled intervals including, but not limited to:
  - a. Scheduled inspections
  - b. Sediment removal/vacuum sweep surface
  - c. Immediate repair of eroded areas adjacent to pervious pavement
10. Each component of the stormwater management system should be inspected once a quarter and within 24 hours after every storm event greater than 1.5 inches.
11. Records of inspection, maintenance and repair for the permitted pervious pavement system must be kept by the permittee for at least 5 years from the date of record and made available upon request to authorized personnel of the City of Wilmington. The records will indicate the date, activity, name of person performing the work and what actions were taken.
12. Upon completion of construction, before a Certificate of Occupancy shall be granted, and prior to operation of this permitted facility, the applicant shall submit to the City of Wilmington as-built plans for all stormwater management facilities. The plans shall show the field location, type, depth and invert of all devices, as-installed. A certification shall be submitted, along with all supporting documentation that specifies, under seal that the as-built stormwater measures, controls and devices are in compliance with the approved stormwater management plans. A final inspection by City of Wilmington personnel will be required prior to issuance of a certificate of occupancy or operation of the permitted facility.
13. This permit is not transferable except after application and approval by the City of Wilmington. In the event of a change of ownership, name change or change of address the permittee must submit a completed Name/Ownership Change form to the City of Wilmington at least 30 days prior to the change. It shall be signed by all applicable parties, and be accompanied by all required supporting documentation. Submittal of a complete application shall not be construed as an approved application. The application will be reviewed on its own merits by the City of Wilmington and may or may not be approved. The project must be in compliance with the terms of this permit in order for the transfer request to be considered. The permittee is responsible for compliance with all permit conditions until such time as the City of Wilmington approves the transfer request.



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14. Failure to abide by the conditions and limitations contained in this permit may subject the Permittee to enforcement action by the City of Wilmington, in accordance with Sections 18-52 and 18-53 of the Land Development Code.
15. The City of Wilmington may notify the permittee when the permitted site does not meet one or more of the minimum requirements of the permit. Within the time frame specified in the notice, the permittee shall submit a written time schedule to the City of Wilmington for modifying the site to meet minimum requirements. The permittee shall provide copies of revised plans and certification in writing to the City of Wilmington that the changes have been made.
16. The issuance of this permit does not preclude the Permittee from complying with any and all statutes, rules, regulations, or ordinances, which may be imposed by other government agencies (local, state, and federal) having jurisdiction.
17. In the event that the facilities fail to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective action, including those as may be required by the City of Wilmington, such as the construction of additional or replacement stormwater management systems.
18. The permittee grants City of Wilmington Staff permission to enter the property during normal business hours for the purpose of inspecting all components of the permitted stormwater management facility.
19. The permit issued shall continue in force and effect until revoked or terminated by the City of Wilmington. The permit may be modified, revoked and reissued or terminated for cause. The filing of a request for a permit modification, revocation and re-issuance or termination does not stay any permit condition.
20. The approved stormwater management plans and all documentation submitted as part of the approved stormwater management permit application package for this project are incorporated by reference and are enforceable parts of the permit.
21. If any one or more of the conditions of this permit is found to be unenforceable or otherwise invalidated, all remaining conditions shall remain in full effect.

Stormwater Management Permit issued this the 12<sup>th</sup> day of July, 2016.

  
\_\_\_\_\_  
for Sterling Cheatham, City Manager  
City of Wilmington

N&T #16031



**Public Services**  
Engineering  
414 Chestnut St, Suite 200  
Wilmington, NC 28401  
910 341-7807  
910 341-5881 fax  
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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.):

NHRMC Additional Parking - Medical Center Drive

2. Location of Project (street address):

1612 Medical Center Dive

City: Wilmington County: New Hanover Zip: 28401

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

From the intersection of S. 17th St. & Medical Center Dr. (in front of NHRMC), turn right onto Medical Center Dr. Project is approximately 300' on the left.

**II. PERMIT INFORMATION**

1. Specify the type of project (check one):  Low Density  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  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  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:

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**MAY - 5 2016**

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*\*unless noted otherwise*

**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: New Hanover Regional Medical Center

Signing Official & Title: Thomas Walsh, Vice President Facilities & Support Services

- a. Contact information for Applicant / Signing Official:

Street Address: 2212 S.17th Street

City: Wilmington State: NC Zip: 28401

Phone: 910-343-2788 Fax: 910-343-2413 Email: thomas.walsh@nhrmc.org cc: allen.harris@nhrmc.org

Mailing Address (if different than physical address): P.O. Box 9000

City: Wilmington State: NC Zip: 28402

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

- 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: Norris & Tunstall Consulting Engineers, P.C.

Signing Official & Title: T. Jason Clark, P.E.

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

Street Address: 902 Market Street

City: Wilmington State: NC Zip: 28401

Phone: 910-343-9653 Fax: 910-343-9604 Email: jclark@ntengineers.com cc: anorris@ntengineers.com

Mailing Address (if different than physical address): Same as Above

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

#### IV. PROJECT INFORMATION

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

Total new impervious will be below 10,000 SF. Parking spaces will be pervious, designed to State standards. Onsite infiltration rates are high.

2. Total Property Area: 19,960 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: 19,960 square feet.

6. Existing Impervious Surface within Property Area: 10,702 square feet

7. Existing Impervious Surface to be Removed/Demolished: 10,702 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	0
Impervious Pavement	8,284
Pervious Pavement (adj. total, with 75 % credit applied)	1,480
Impervious Sidewalks	116
Pervious Sidewalks (adj. total, with % credit applied)	0
Other (describe)	0
Future Development	0
<b>Total Onsite Newly Constructed Impervious Surface</b>	<b>9,880</b>

10. Total Onsite Impervious Surface

(Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) = 9,880 square feet

11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = 49 %

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

Impervious Pavement	475
Pervious Pavement (adj. total, with % credit applied)	0
Impervious Sidewalks	467
Pervious Sidewalks (adj. total, with % credit applied)	0
Other (describe)	0
<b>Total Offsite Newly Constructed Impervious Surface</b>	<b>942</b>

13. Total Newly Constructed Impervious Surface

(Total Onsite + Offsite Newly Constructed Impervious Surface) = 10822 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.

\* Pervious Concrete Pervious Concrete \*\*

Basin Information	(Type of BMP) BMP # PC-1	(Type of BMP) BMP # PC-2	(Type of BMP) BMP #
Receiving Stream Name	Silver Stream Branch	Silver Stream Branch	
Receiving Stream Index Number	18-76-1-1	18-76-1-1	
Stream Classification	C; Sw	C; Sw	
Total Drainage Area (sf)	2500	4000	0
On-Site Drainage Area (sf)	2500	4000	
Off-Site Drainage Area (sf)	0	0	
<b>Total Impervious Area (sf)</b>	<b>888</b>	<b>1175</b>	<b>0</b>
Buildings/Lots (sf)	0	0	
Impervious Pavement (sf)	0	0	
Pervious Pavement, <u>75</u> % credit (sf)	538	942	
Impervious Sidewalks (sf)	0	0	
Pervious Sidewalks, % credit (sf)	0	0	
Other (sf)	350	233	
Future Development (sf)	0	0	
Existing Impervious to remain (sf)	0	0	
Offsite (sf)	0	0	
Percent Impervious Area (%)	35.5%	29.4%	

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

\* PC-1 includes 2,150 SF of Pervious Concrete @ 75% BUA Credit = 538 SF Impervious Results

\*\* PC-2 includes 3,767 SF of Pervious Concrete @ 75% BUA Credit = 942 SF Impervious Results

## 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  
414 Chestnut Street, Suite 200  
Wilmington, NC 28402



**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: T. Jason Clark, P.E.

Consulting Firm: Norris & Tunstall Consulting Engineers, P.C.

a. Contact information for consultant listed above:

Mailing Address: 902 Market Street

City: Wilmington State: NC Zip: 28401

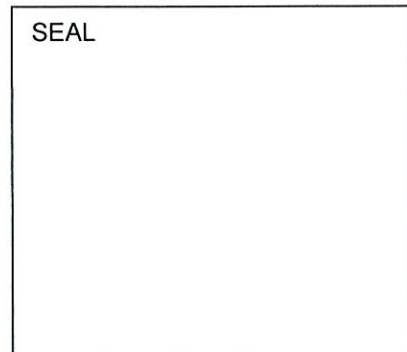
Phone: 910-343-9653 Fax: 910-343-9604 Email: jclark@ntengineers.com cc: anorris@ntengineers.com

**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.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

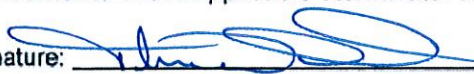


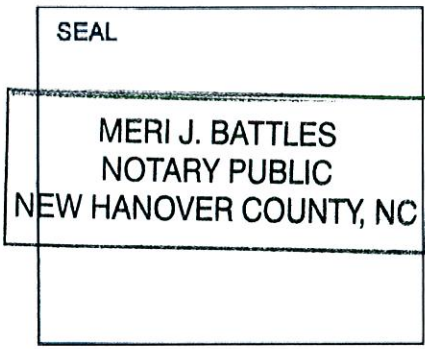
I, \_\_\_\_\_, a Notary Public for the State of \_\_\_\_\_, County of \_\_\_\_\_, do hereby certify that \_\_\_\_\_ personally appeared before me this day of \_\_\_\_\_, \_\_\_\_\_, and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,

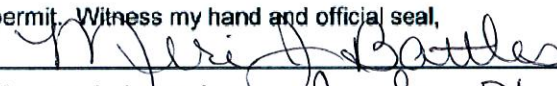
My commission expires: \_\_\_\_\_

**VIII. APPLICANT'S CERTIFICATION**

I, (print or type name of person listed in Contact Information, item 1) Thomas Walsh, VP Facilities & Support Services 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.

Signature:  Date: 4/20/16



I, Meri J Battles, a Notary Public for the State of North Carolina, County of New Hanover do hereby certify that Thomas Walsh personally appeared before me this day of 20 April 2016, and acknowledge the due execution of the application for a stormwater permit. Witness my hand and official seal,  
  
My commission expires: July 26, 2019



STORMWATER MANAGEMENT PERMIT APPLICATION FORM  
401 CERTIFICATION APPLICATION FORM  
**PERMEABLE PAVEMENT SUPPLEMENT**



N&T #16031

This form must be completely filled out, printed and submitted.  
The Required Items Checklist (Part III) must be printed, filled out and submitted along with all of the required information.

**I. PROJECT INFORMATION**

Project Name	NHRMC Additional Parking - Medical Center Drive
Contact Person	T. Jason Clark, P.E. / Norris & Tunstall Consulting Engineers, P.C.
Phone Number	910-343-9653
Date	30-Jun-16
Drainage Area	PC-1

**II. DESIGN INFORMATION**

Soils Report Summary			
Hydrologic soil group (HSG) of subgrade	A		
Infiltration rate	23.45	in/hr	(AVG) (10 in/hr used)
Pavement Design Summary			
Permeable Pavement (PP) design type	Infiltration - HSG A/B		
SA of PP being proposed (A <sub>p</sub> )	2,150	ft <sup>2</sup>	
Resulting BUA counted as impervious for main application form	538	ft <sup>2</sup>	
Adjacent BUA directed to PP (A <sub>c</sub> )	350	ft <sup>2</sup>	OK
Ratio of A <sub>c</sub> to A <sub>p</sub>	0.16	(unitless)	
Flow from pervious surfaces is directed away from PP?	Yes		OK
Design rainfall depth	1.5"	in	
Permeable pavement surface course type	PC		
Layer 1 - Washed aggregate size (ex. No. 57)	#57		
Layer 1 - Aggregate porosity (n)	0.40	(unitless)	OK
Layer 2 - Washed aggregate size (ex. No. 57)	#57		
Layer 2 - Aggregate porosity (n)	0.40	(unitless)	OK
Minimum total aggregate depth for design rainfall (D <sub>wq</sub> )	4.4	in	
Drawdown/infiltration time for D <sub>wq</sub>	0.0	days	OK
How is 10-yr, 24-hr storm handled?	infiltrated		
Aggregate depth to infiltrate 10-yr, 24-hr storm (D <sub>10</sub> )	-99.0	in	
Drawdown/infiltration time of 10-yr, 24-hr storm	0.17	days	
Actual provided total aggregate depth	4.4	in	OK
Top of aggregate base layer elevation	37.20	fmsl	
Storage elevation of design rainfall depth	37.20	fmsl	
Overflow elevation	37.70	fmsl	
Bottom elevation at subgrade	36.83	fmsl	#REF!
SHWT elevation	34.70	fmsl	
Underdrain diameter	N/A	in	

BUA Credit for Permeable Pavement Footprint:  
**75% BUA Credit**

**Detention Systems** (skip for infiltration systems)

Diameter of orifice	N/A	in
Coefficient of discharge (C <sub>D</sub> )	N/A	(unitless)
Driving head (H <sub>0</sub> )	N/A	ft
Storage volume discharge rate (through discharge orifice)	N/A	ft <sup>3</sup> /sec
Storage volume drawdown time	N/A	days
Pre-development 1-yr, 24-hr peak flow	N/A	ft <sup>3</sup> /sec
Post-development 1-yr, 24-hr peak flow	N/A	ft <sup>3</sup> /sec

Insufficient drawdown time. Must be within 2-5 days.

**Additional Information**

Slope of soil subgrade at bottom of permeable pavement	0.50	%	OK
Slope of the permeable pavement surface	2.00	%	OK
Construction sequence minimizes compaction to soils?	Yes		OK
Subsoil preparation specified (must select one)	scarified		
Meets industry standards for structural requirements?	Yes		OK
Washed stone is specified for the aggregate?	Yes		OK
Required signage specified on plans?	Yes		OK
Number of observation wells provided	1		OK
Distance to structure	14.00	ft	
Distance to surface waters	N/A	ft	OK
Distance to water supply well(s)	N/A	ft	OK

Min. (min. 1 per Terrace)

**III. REQUIRED ITEMS CHECKLIST**

Please indicate the page or plan sheet numbers where the supporting documentation can be found. **An incomplete submittal package will result in a request for additional information. This will delay final review and approval of the project.** Initial in the space provided to indicate the following design requirements have been met. If the applicant has designated an agent, the agent may initial below. **If a requirement has not been met, attach justification.**

1. Plans (1" = 50' or larger) of the entire site showing:
  - Design at ultimate build-out,
  - Off-site drainage (if applicable),
  - Delineated drainage basins (include Rational C coefficient per basin),
  - Location of permeable pavement,
  - Roof and other surface flow directed away from permeable pavement,
  - Location of the permeable pavement sign(s).
2. Section view of the permeable pavement (1" = 20' or larger) showing:
  - All layers (including details about the surface course), and
  - SHWT
3. A detail of what the permeable pavement sign.
4. A site specific soils report that is based upon an actual field investigation, soil borings, and infiltration tests within the footprint of the proposed permeable pavement. The soils investigation shall state the infiltration rate, SHWT elevation, and information about any confining layers. County soil maps are not an acceptable source of soils information.  
 (Projects in the WiRO - The results of the soils report must be verified in the field by DWQ, by completing & submitting the soils investigation request form )
5. A construction sequence that shows how the permeable pavement will be protected from sediment until the entire drainage area is stabilized.
6. The supporting calculations.
7. A copy of the signed and notarized operation and maintenance (O&M) agreement.
8. A copy of the deed restrictions (if required).

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Page/ Plan Sheet No.

I1 & C1-C3 And See Calculations
C5
C5
With Calculations
C2
Attached
Provided Previously



STORMWATER MANAGEMENT PERMIT APPLICATION FORM  
401 CERTIFICATION APPLICATION FORM  
**PERMEABLE PAVEMENT SUPPLEMENT**



N&T #16031

This form must be completely filled out, printed and submitted.

The Required Items Checklist (Part III) must be printed, filled out and submitted along with all of the required information.

**I. PROJECT INFORMATION**

Project Name	NHRMC Additional Parking - Medical Center Drive
Contact Person	T. Jason Clark, P.E. / Norris & Tunstall Consulting Engineers, P.C.
Phone Number	910-343-9653
Date	30-Jun-16
Drainage Area	PC-2

**II. DESIGN INFORMATION**

**Soils Report Summary**

Hydrologic soil group (HSG) of subgrade	A	
Infiltration rate	23.45	in/hr

(AVG) (10 in/hr used)

**Pavement Design Summary**

	Infiltration - HSG A/B		
Permeable Pavement (PP) design type			
SA of PP being proposed (A <sub>p</sub> )	3,767	ft <sup>2</sup>	
Resulting BUA counted as impervious for main application form	942	ft <sup>2</sup>	
Adjacent BUA directed to PP (A <sub>c</sub> )	233	ft <sup>2</sup>	OK
Ratio of A <sub>c</sub> to A <sub>p</sub>	0.06	(unitless)	
Flow from pervious surfaces is directed away from PP?	Yes		OK
Design rainfall depth	1.5"	in	
Permeable pavement surface course type	PC		
Layer 1 - Washed aggregate size (ex. No. 57)	#57		
Layer 1 - Aggregate porosity (n)	0.40	(unitless)	OK
Layer 2 - Washed aggregate size (ex. No. 57)	#57		
Layer 2 - Aggregate porosity (n)	0.40	(unitless)	OK
Minimum total aggregate depth for design rainfall (D <sub>wq</sub> )	4.0	in	
Drawdown/infiltration time for D <sub>wq</sub>	0.0	days	OK
How is 10-yr, 24-hr storm handled?	infiltrated		
Aggregate depth to infiltrate 10-yr, 24-hr storm (D <sub>10</sub> )	-100.8	in	
Drawdown/infiltration time of 10-yr, 24-hr storm	0.16	days	
Actual provided total aggregate depth	4.0	in	OK
Top of aggregate base layer elevation	37.30	fmsl	
Storage elevation of design rainfall depth	37.30	fmsl	
Overflow elevation	37.80	fmsl	
Bottom elevation at subgrade	36.96	fmsl	
SHWT elevation	34.70	fmsl	
Underdrain diameter	N/A	in	

BUA Credit for Permeable Pavement Footprint:  
**75% BUA Credit**

#REF!

**Detention Systems** (skip for infiltration systems)

Diameter of orifice	N/A	in
Coefficient of discharge (C <sub>d</sub> )	N/A	(unitless)
Driving head (H <sub>o</sub> )	N/A	ft
Storage volume discharge rate (through discharge orifice)	N/A	ft <sup>3</sup> /sec
Storage volume drawdown time	N/A	days
Pre-development 1-yr, 24-hr peak flow	N/A	ft <sup>3</sup> /sec
Post-development 1-yr, 24-hr peak flow	N/A	ft <sup>3</sup> /sec

Insufficient drawdown time. Must be within 2-5 days.

**Additional Information**

Slope of soil subgrade at bottom of permeable pavement	0.50	%	OK
Slope of the permeable pavement surface	2.00	%	OK
Construction sequence minimizes compaction to soils?	Yes		OK
Subsoil preparation specified (must select one)	scarified		
Meets industry standards for structural requirements?	Yes		OK
Washed stone is specified for the aggregate?	Yes		OK
Required signage specified on plans?	Yes		OK
Number of observation wells provided	2		OK
Distance to structure	49.00	ft	
Distance to surface waters	N/A	ft	OK
Distance to water supply well(s)	N/A	ft	OK

(min.) (min. 1 per Terrace)

**III. REQUIRED ITEMS CHECKLIST**

Please indicate the page or plan sheet numbers where the supporting documentation can be found. **An incomplete submittal package will result in a request for additional information. This will delay final review and approval of the project.** Initial in the space provided to indicate the following design requirements have been met. If the applicant has designated an agent, the agent may initial below. **If a requirement has not been met, attach justification.**

1. Plans (1" = 50' or larger) of the entire site showing:
  - Design at ultimate build-out,
  - Off-site drainage (if applicable),
  - Delineated drainage basins (include Rational C coefficient per basin),
  - Location of permeable pavement,
  - Roof and other surface flow directed away from permeable pavement,
  - Location of the permeable pavement sign(s).
2. Section view of the permeable pavement (1" = 20' or larger) showing:
  - All layers (including details about the surface course), and
  - SHWT
3. A detail of what the permeable pavement sign.
4. A site specific soils report that is based upon an actual field investigation, soil borings, and infiltration tests within the footprint of the proposed permeable pavement. The soils investigation shall state the infiltration rate, SHWT elevation, and information about any confining layers. County soil maps are not an acceptable source of soils information.  
 (Projects in the WiRO - The results of the soils report must be verified in the field by DWQ, by completing & submitting the soils investigation request form )
5. A construction sequence that shows how the permeable pavement will be protected from sediment until the entire drainage area is stabilized.
6. The supporting calculations.
7. A copy of the signed and notarized operation and maintenance (O&M) agreement.
8. A copy of the deed restrictions (if required).

Initials  
  
  
  
  
  


Page/ Plan Sheet No.
I1 C1-C3 And See Calculations
C5
C5
With Calculations
C2
Attached Provided Previously



## Permeable Pavement Operation and Maintenance Agreement

I will keep a maintenance record on this BMP. This maintenance record will 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 removal efficiency of the BMP.

N+T #16031

**Important operation and maintenance procedures:**

- Stable groundcover will be maintained in the drainage area to reduce the sediment load to the permeable pavement.
- The area around the perimeter of the permeable pavement will be stabilized and mowed, with clippings removed.
- Any weeds that grow in the permeable pavement will be sprayed with pesticide immediately. Weeds will not be pulled, since this could damage the fill media.
- Once a year, the permeable pavement surface will be vacuum swept.
- At no time shall wet sweeping (moistening followed by sweeping) be allowed as a means of maintenance.
- There shall be no repair or treatment of Permeable Pavement surfaces with other types of pavement surfaces. All repairs to Permeable Pavement surfaces must be accomplished utilizing permeable pavement which meets the original pavement specifications.
- Concentrated runoff from roof drains, piping, swales or other point sources, directly onto the permeable pavement surface shall not be allowed. These areas must be diverted away from the permeable pavement.

**Initial Inspection:** Permeable Pavements shall be inspected monthly for the first three months for the following:

BMP element:	Potential problem:	How to remediate the problem:
The perimeter of the permeable pavement	Areas of bare soil and/or erosive gullies have formed.	In the event that rutting or failure of the groundcover occurs, the eroded area shall be repaired immediately and permanent groundcover re-established. Appropriate temporary Erosion Control measures (such as silt fence) shall be installed in the affected area during the establishment of permanent groundcover, and any impacted area of permeable pavement is to be cleaned via vacuum sweeping.
The surface of the permeable pavement	Rutting / uneven settlement	This indicates inadequate compaction of the pavement base / sub-base. If rutting or uneven settlement on the order of 1/2 inch or greater occurs, permeable pavement shall be removed and base / sub-base re-compacted, smoothed, and permeable pavement shall then be re-installed. Base and sub-base compaction shall be monitored by a licensed geotechnical engineer to ensure that infiltration capacity of base and sub-base are not compromised by compaction and smoothing processes.
	The pavement does not dewater between storms, or water is running off.	Vacuum sweep the pavement. If the pavement still does not dewater, consult a professional.

Permit Number: \_\_\_\_\_  
 (to be provided by City of Wilmington)  
 Drainage Area / Lot Number: \_\_\_\_\_

The permeable pavement will be inspected **once a quarter and within 24 hours after every storm event greater than 1.5 inches**. 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.

<b>BMP element:</b>	<b>Potential problem:</b>	<b>How to remediate the problem:</b>
<b>The perimeter of the permeable pavement</b>	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.
	Vegetation is too short or too long.	Maintain vegetation at a height of 3 to 6 inches (remove clippings).
<b>The surface of the permeable pavement</b>	Trash/debris is present.	Remove the trash/debris.
	Weeds are growing on the surface of the permeable pavement.	Do not pull the weeds (may pull out media as well). Spray them with pesticide.
	Sediment is present on the surface.	Vacuum sweep the pavement.
	The structure is deteriorating or damaged.	Consult an appropriate professional. Damaged areas of the pavement shall be removed and repaired.
	The pavement does not dewater between storms.	Vacuum sweep the pavement. If the pavement still does not dewater, consult a professional. Permanently clogged pavement shall be removed and repaired.

Permit Number: \_\_\_\_\_  
(to be provided by City of Wilmington)

I acknowledge and agree by my signature below that I am responsible for the performance of the maintenance procedures listed above. I agree to notify City of Wilmington of any problems with the system or prior to any changes to the system or responsible party.

Project name: NHRMC Additional Parking - Medical Center Drive

BMP drainage area or lot number: #1 Pervious Pavement PC-1, PC-2

Print name: Thomas Walsh

Title: Vice President Facilities & Support Services

Address: P.O. Box 9000 Wilmington, NC 28402

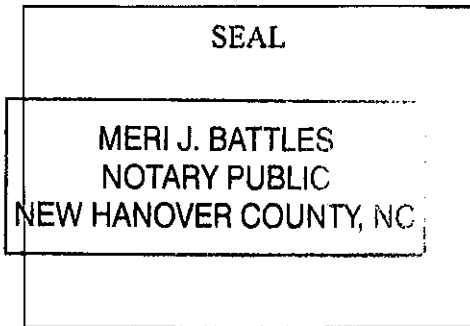
Phone: 910-343-2788

Signature: [Handwritten Signature]

Date: 4/28/16

Note: The legally responsible party should not be a homeowners association unless more than 50% of the lots have been sold and a resident of the subdivision has been named the president.

I, Meri J. Battles, a Notary Public for the State of North Carolina, County of New Hanover, do hereby certify that Thomas Walsh personally appeared before me this 28 day of April, 2016, and acknowledge the due execution of the forgoing permeable pavement maintenance requirements. Witness my hand and official seal,



My commission expires July 26, 2019