



**Public Services**

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

July 11, 2018

Mr. George Carr, Manager  
Shipyards Village Wilmington, LLC  
2100-D Cornwallis Drive  
Greensboro, NC 27408

**Subject: Stormwater Management Permit No. 2016042R1  
Shipyards Village Apartments  
High Density Development**

Dear Mr. Carr:

The City of Wilmington Engineering Division has received a request for a revision to the Stormwater Management Permit for Shipyards Village Apartments. 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:

- Addition of a swimming pool and associated impervious sidewalk and decking.
- No change to drainage area of Infiltration Basin #2. 1,757 sf of new impervious added to Basin #2. No change to Basin #2 required.

Please be aware all terms and conditions of the permit Issued on October 31, 2016 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,

A handwritten signature in blue ink, appearing to read 'SC'.

for Sterling Cheatham, City Manager  
City of Wilmington

cc: Barret A. Hagen, PE, Hagen Engineering, PA  
Brian Chambers, Senior Planner, City of Wilmington

**RECEIVED**

**JUL 11 2018**

**ENGINEERING**  
*unless noted otherwise*



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

## 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.):

Shipyard Village Apartments

2. Location of Project (street address):

2821 Carolina Beach Road

City: Wilmington County: New Hanover Zip: 28412

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

Project is located on the north side of Carolina beach road, 0.36 miles south of the Shipyard

Boulevard and carolina Beach Road (US421) intersection

### 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: 2016042 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:

Shipyard Village Apartments - NHC S&EC #16-16 issued 7/8/16

**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: Shipyard Village Wilmington, LLC

Signing Official & Title: George Carr, Beacon Management Corporation - Manager

- a. Contact information for Applicant / Signing Official:

Street Address: 2100-D Cornwallis Drive

City: Greensboro State: NC Zip: 27408

Phone: 336-282-7200 Fax: \_\_\_\_\_ Email: vernonbpowell@gmail.com

Mailing Address (if different than physical address): PO Box 29169

City: Greensboro State: NC Zip: 27429-9169

- 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: \_\_\_\_\_

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.

Stormwater will be treated using three infiltration basins and one infiltration trench

Previously all 4 devices were permitted. Impervious area is being added to Basin 2 and this

Application reflects the new proposed condition for Basin 2

2. Total Property Area: 313133 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: 313133 square feet.

6. Existing Impervious Surface within Property Area: 146,387 square feet

7. Existing Impervious Surface to be Removed/Demolished: 0 square feet

8. Existing Impervious Surface to Remain: 146,387 square feet

9. Total Onsite (within property boundary) Newly Constructed Impervious Surface (*in square feet*):

Buildings/Lots	
Impervious Pavement	
Pervious Pavement (adj. total, with % credit applied)	
Impervious Sidewalks	1757
Pervious Sidewalks (adj. total, with % credit applied)	
Other (describe)	
Future Development	
<b>Total Onsite Newly Constructed Impervious Surface</b>	<b>1757</b>

10. Total Onsite Impervious Surface  
(Existing Impervious Surface to remain + Onsite Newly Constructed Impervious Surface) = 148144 square feet

11. Project percent of impervious area: (Total Onsite Impervious Surface / Total Project Area) x100 = ~~0.47~~ %

47 7/11/18  
pac

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

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

13. Total Newly Constructed Impervious Surface

(Total Onsite + Offsite Newly Constructed Impervious Surface) = 1757 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.

See previous Application for Basins 1, 3 & 4

Basin Information	BMP #	BMP # 2	BMP #
Receiving Stream Name		Cape Fear	
Receiving Stream Index Number		18-(71)	
Stream Classification		SC	
Total Drainage Area (sf)		79083	
On-Site Drainage Area (sf)		79083	
Off-Site Drainage Area (sf)		0	
<b>Total Impervious Area (sf)</b>		46405	
Buildings/Lots (sf)			
Impervious Pavement (sf)			
Pervious Pavement (sf)			
Impervious Sidewalks (sf)		1757	
Pervious Sidewalks (sf)			
Other (sf)			
Future Development (sf)			
Existing Impervious to remain (sf)		44648	
Offsite (sf)			
Percent Impervious Area (%)		58.6	

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

NA

---

## 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: Barret A. Hagen, PE

Consulting Firm: Hagen Engineering, PA

a. Contact information for consultant listed above:

Mailing Address: 3859 Battleground Ave, Suite 300

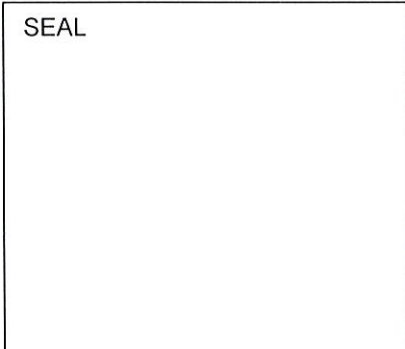
City: Greensboro State: NC Zip: 27410

Phone: 336-286-3350 Fax: \_\_\_\_\_ Email: bhagen@hagen-eng.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 \_\_\_\_\_

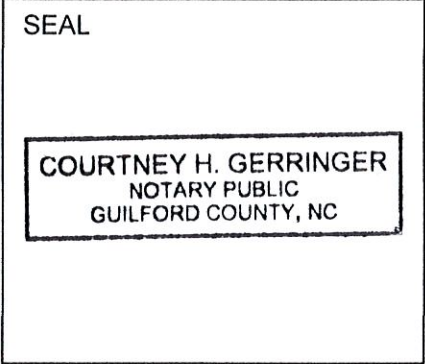
personally appeared before me this day of \_\_\_\_\_, \_\_\_\_\_.

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

Courtney H. Geringer  
My commission expires: December 10, 2019

**VIII. APPLICANT'S CERTIFICATION**

I, (print or type name of person listed in Contact Information, item 1), GEORGE CARR 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: George E Carr III  
Date: 6/19/18

I, Courtney H. Geringer, a Notary Public for the State of North Carolina, County of Guilford, do hereby certify that George E. Carr III personally appeared before me this day of June, 2018, and acknowledge the due execution of the application for a stormwater

permit. Witness my hand and official seal,

Courtney H. Geringer  
My commission expires: December 10, 2019



STORMWATER MANAGEMENT PERMIT APPLICATION FORM  
401 CERTIFICATION APPLICATION FORM

**INFILTRATION BASIN SUPPLEMENT**

This form must be 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	Shipyards Village Apartments
Contact Person	Tamara Murphy, PE
Phone Number	910-343-1048
Date	10/19/2016
Drainage Area Number	1

II. DESIGN INFORMATION	
------------------------	--

<b>Site Characteristics</b>		
Drainage area	32,018.00	ft <sup>2</sup>
Impervious area	21,164.00	ft <sup>2</sup>
Percent impervious	0.66	%
Design rainfall depth	1.50	in
<b>Peak Flow Calculations</b>		
1-yr, 24-hr rainfall depth	3.83	in
1-yr, 24-hr intensity	0.16	in/hr
Pre-development 1-yr, 24-hr discharge	0.00	ft <sup>3</sup> /sec
Post-development 1-yr, 24-hr discharge	1.38	ft <sup>3</sup> /sec
Pre/Post 1-yr, 24-hr peak flow control	1.38	ft <sup>3</sup> /sec
<b>Storage Volume: Non-SA Waters</b>		
Minimum design volume required	2,581.00	ft <sup>3</sup>
Design volume provided	5,261.00	ft <sup>3</sup>
		OK for non-SA waters
<b>Storage Volume: SA Waters</b>		
1.5" runoff volume		ft <sup>3</sup>
Pre-development 1-yr, 24-hr runoff volume		ft <sup>3</sup>
Post-development 1-yr, 24-hr runoff volume		ft <sup>3</sup>
Minimum required volume		ft <sup>3</sup>
Volume provided		ft <sup>3</sup>
<b>Soils Report Summary</b>		
Soil type	Wakulla sand, Wa	
Infiltration rate	25.40	in/hr
SHWT elevation	51.20	fmsl
<b>Basin Design Parameters</b>		
Drawdown time	0.29	days
Basin side slopes	3.00	:1
Basin bottom elevation	53.25	fmsl
Storage elevation	56.73	fmsl
Storage Surface Area	2,412.00	ft <sup>2</sup>
Top elevation	56.90	fmsl
<b>Basin Bottom Dimensions</b>		
Basin length	50.86	ft
Basin width	14.00	ft
Bottom Surface Area	712.00	ft <sup>2</sup>

**RECEIVED**  
**OCT 20 2016**  
**ENGINEERING**

**Additional Information**

Maximum runoff to each inlet to the basin?  
 Length of vegetative filter for overflow  
 Distance to structure  
 Distance from surface waters  
 Distance from water supply well(s)  
 Separation from impervious soil layer  
 Naturally occurring soil above shwt  
 Bottom covered with 4-in of clean sand?  
 Proposed drainage easement provided?  
 Capures all runoff at ultimate build-out?  
 Bypass provided for larger storms?  
 Pretreatment device provided

1.10	ac-in	OK
-	ft	OK
23.00	ft	OK
-	ft	OK
-	ft	OK
-	ft	OK
2.05	ft	OK
Y	(Y or N)	OK
Y	(Y or N)	OK
Y	(Y or N)	OK
Y	(Y or N)	OK
Catch basins		

**RECEIVED**  
**OCT 20 2016**  
**ENGINEERING**

Red triangles at the upper right hand corner indicate design comments

Please complete the yellow shaded items.

**STORMWATER MANAGEMENT PERMIT APPLICATION FORM  
 401 CERTIFICATION APPLICATION FORM  
 INFILTRATION BASIN SUPPLEMENT**

*This form must be 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	Shipyards Village Apartments
Contact Person	Barret A. Hagen, PE
Phone Number	336-286-3350
Date	6/18/2018
Drainage Area Number	2

**II. DESIGN INFORMATION**

**Site Characteristics**

Drainage area	79,083.00	ft <sup>2</sup>
Impervious area	46,405.00	ft <sup>2</sup>
Percent impervious	0.59	%
Design rainfall depth	1.50	in

**Peak Flow Calculations**

1-yr, 24-hr rainfall depth	3.83	in
1-yr, 24-hr intensity	0.16	in/hr
Pre-development 1-yr, 24-hr discharge	0.03	ft <sup>3</sup> /sec
Post-development 1-yr, 24-hr discharge	3.48	ft <sup>3</sup> /sec
Pre/Post 1-yr, 24-hr peak flow control	3.45	ft <sup>3</sup> /sec

**Storage Volume: Non-SA Waters**

Minimum design volume required	5,706.00	ft <sup>3</sup>
Design volume provided	18,407.00	ft <sup>3</sup>

OK for non-SA waters

**Storage Volume: SA Waters**

1.5" runoff volume		ft <sup>3</sup>
Pre-development 1-yr, 24-hr runoff volume		ft <sup>3</sup>
Post-development 1-yr, 24-hr runoff volume		ft <sup>3</sup>
Minimum required volume		ft <sup>3</sup>
Volume provided		ft <sup>3</sup>

**Soils Report Summary**

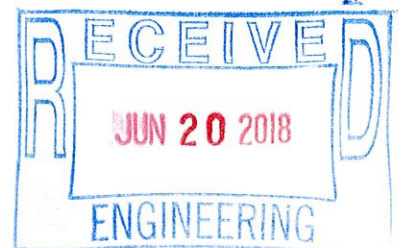
Soil type	Borrow Pits, BP
Infiltration rate	11.30 in/hr
SHWT elevation	49.00 fmsl

**Basin Design Parameters**

Drawdown time	0.25	days	OK
Basin side slopes	3.00	:1	OK
Basin bottom elevation	51.00	fmsl	OK
Storage elevation	54.50	fmsl	
Storage Surface Area	6,867.00	ft <sup>2</sup>	
Top elevation	54.50	fmsl	

**Basin Bottom Dimensions**

Basin length	85.00	ft
Basin width	43.00	ft
Bottom Surface Area	3,786.00	ft <sup>2</sup>



**Additional Information**

Maximum runoff to each inlet to the basin?	1.36	ac-in	OK
Length of vegetative filter for overflow		ft	
Distance to structure	20.00	ft	OK
Distance from surface waters		ft	
Distance from water supply well(s)		ft	
Separation from impervious soil layer		ft	
Naturally occurring soil above shwt	2.00	ft	OK
Bottom covered with 4-in of clean sand?	Y	(Y or N)	OK
Proposed drainage easement provided?	Y	(Y or N)	OK
Captures all runoff at ultimate build-out?	Y	(Y or N)	OK
Bypass provided for larger storms?	N	(Y or N)	Must provide bypass for larger flows
Pretreatment device provided			
Catch Basins	No Discharge for 10-year Storm, no Bypass		

STORMWATER MANAGEMENT PERMIT APPLICATION FORM  
 401 CERTIFICATION APPLICATION FORM

**INFILTRATION BASIN SUPPLEMENT**

This form must be 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	Shipyards Village Apartments
Contact Person	Tamara Murphy, PE
Phone Number	910-343-1048
Date	10/14/2016
Drainage Area Number	3

**II. DESIGN INFORMATION**

<b>Site Characteristics</b>		
Drainage area	32,549.00	ft <sup>2</sup>
Impervious area	25,798.00	ft <sup>2</sup>
Percent impervious	0.79	%
Design rainfall depth	1.50	in
<b>Peak Flow Calculations</b>		
1-yr, 24-hr rainfall depth	3.83	in
1-yr, 24-hr intensity	0.16	in/hr
Pre-development 1-yr, 24-hr discharge	0.00	ft <sup>3</sup> /sec
Post-development 1-yr, 24-hr discharge	1.94	ft <sup>3</sup> /sec
Pre/Post 1-yr, 24-hr peak flow control	1.94	ft <sup>3</sup> /sec
<b>Storage Volume: Non-SA Waters</b>		
Minimum design volume required	3,106.00	ft <sup>3</sup>
Design volume provided	8,851.00	ft <sup>3</sup>
		OK for non-SA waters
<b>Storage Volume: SA Waters</b>		
1.5" runoff volume		ft <sup>3</sup>
Pre-development 1-yr, 24-hr runoff volume		ft <sup>3</sup>
Post-development 1-yr, 24-hr runoff volume		ft <sup>3</sup>
Minimum required volume		ft <sup>3</sup>
Volume provided		ft <sup>3</sup>
<b>Soils Report Summary</b>		
Soil type	Wakulla sands, Wa	
Infiltration rate	18.50	in/hr
SHWT elevation	48.50	fmsl
<b>Basin Design Parameters</b>		
Drawdown time	0.16	days
Basin side slopes	0.00	:1 **
Basin bottom elevation	50.50	fmsl
Storage elevation	53.40	fmsl
Storage Surface Area	3,052.00	ft <sup>2</sup>
Top elevation	53.70	fmsl
Basin utilizes retaining walls, so no side slopes		
<b>Basin Bottom Dimensions</b>		
Basin length	130.00	ft
Basin width	23.50	ft
Bottom Surface Area	3,052.00	ft <sup>2</sup>

**RECEIVED**  
**OCT 14 2016**  
**ENGINEERING**

**Additional Information**

Maximum runoff to each inlet to the basin?	1.13	ac-in	OK
Length of vegetative filter for overflow	-	ft	OK
Distance to structure	80.00	ft	OK
Distance from surface waters	-	ft	OK
Distance from water supply well(s)	-	ft	OK
Separation from impervious soil layer	-	ft	OK
Naturally occurring soil above shwt	2.00	ft	OK
Bottom covered with 4-in of clean sand?	Y	(Y or N)	OK
Proposed drainage easement provided?	Y	(Y or N)	OK
Capures all runoff at ultimate build-out?	Y	(Y or N)	OK
Bypass provided for larger storms?	Y	(Y or N)	OK
Pretreatment device provided			
<b>Catch basins</b>			

STORMWATER MANAGEMENT PERMIT APPLICATION FORM  
401 CERTIFICATION APPLICATION FORM  
**INFILTRATION TRENCH SUPPLEMENT**

*This form must be 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	Shipyards Village Apartments
Contact person	Tamara Murphy, PE
Phone number	910-343-1048
Date	10/19/2016
Drainage area number	4

**II. DESIGN INFORMATION**

**Site Characteristics**

Drainage area	78,216.00	ft <sup>2</sup>
Impervious area	52,392.00	ft <sup>2</sup>
Percent impervious	67.0%	%
Design rainfall depth	1.50	in

**Peak Flow Calculations**

1-yr, 24-hr rainfall depth	3.83	in
1-yr, 24-hr intensity	0.16	in/hr
Pre-development 1-yr, 24-hr discharge	0.00	ft <sup>3</sup> /sec
Post-development 1-yr, 24-hr discharge	3.52	ft <sup>3</sup> /sec
Pre/Post 1-yr, 24-hr peak flow control	3.52	ft <sup>3</sup> /sec

**Storage Volume: Non-SA Waters**

Minimum volume required	6,383.00	ft <sup>3</sup>	
Volume provided	7,700.00	ft <sup>3</sup>	OK for non-SR waters

**Storage Volume: SA Waters**

1.5" runoff volume		ft <sup>3</sup>
Pre-development 1-yr, 24-hr runoff volume		ft <sup>3</sup>
Post-development 1-yr, 24-hr runoff volume		ft <sup>3</sup>
Minimum volume required		ft <sup>3</sup>
Volume provided		ft <sup>3</sup>

**Soils Report Summary**

Soil type	Wakulla sand, Wa
Infiltration rate	16.60 in/hr
SHWT elevation	48.50 fmsl

**Trench Design Parameters**

Drawdown time	0.12	days	OK
Perforated pipe diameter	42.00	in	
Perforated pipe length	96.00	ft	
Number of laterals	7		
Stone type (if used)	57		
Stone void ratio	0.4		
Stone is free of fines?	Y	(Y or N)	OK

**RECEIVED**  
**OCT 20 2016**  
**ENGINEERING**

**Trench Elevations**

Bottom elevation	50.50	fmsl	OK
Storage/overflow elevation	53.60	fmsl	
Top elevation	55.00	fmsl	

**Trench Dimensions**

Length (long dimension)	100.00	ft	
Width (short dimension)	39.00	ft	
Height (depth)	4.50	ft	OK

**Additional Information**

Maximum volume to each inlet into the trench?	1.35	ac-in	OK
Length of vegetative filter for overflow		ft	
Number of observation wells	1		OK
Distance to structure	18.00	ft	OK
Distance from surface waters	-	ft	OK
Distance from water supply well(s)	-	ft	OK
Separation from impervious soil layer	-	ft	OK
Depth of naturally occurring soil above SHWT	2.00	ft	OK
Bottom covered with 4-in of clean sand?	Y	(Y or N)	OK
Proposed drainage easement provided?	Y	(Y or N)	OK
Captures all runoff at ultimate build-out?	Y	(Y or N)	OK
Bypass provided for larger storms?	Y	(Y or N)	OK
Trench wrapped with geotextile fabric?	Y	(Y or N)	OK
Pretreatment device provided	Catch basins		

**RECEIVED**  
**NOV 20 2016**  
**ENGINEERING**



## Infiltration Basin 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.

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 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.

BMP element:	Potential problem:	How I will 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.

**RECEIVED**

**MAR 28 2016**

**ENGINEERING**

<b>BMP element:</b>	<b>Potential problem:</b>	<b>How I will remediate the problem:</b>
<b>The forebay</b>	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.
<b>The main treatment area</b>	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).
<b>The embankment</b>	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.
<b>The outlet device</b>	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.
<b>The receiving water</b>	Erosion or other signs of damage have occurred at the outlet.	Contact the NC Division of Water Quality 401 Oversight Unit at 919-733-1786.

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 the City of Wilmington of any problems with the system or prior to any changes to the system or responsible party.

Project name: Shipyard Village Apartments

BMP drainage basin number: 1, 2, and 3

Print name: Vernon Powell

Title: President

Address: 2100-D Cornwallis Drive, Greensboro, NC 27408

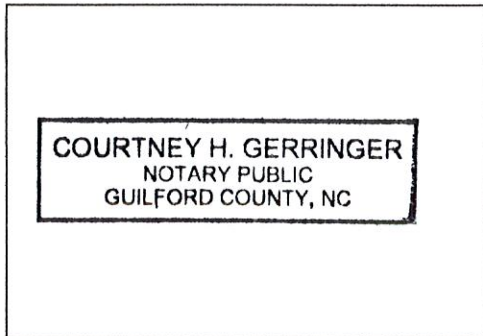
Phone: 336-282-7200

Signature: [Handwritten Signature]

Date: 3/16/16

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, Courtney H. Geringer, a Notary Public for the State of North Carolina, County of Guilford, do hereby certify that Vernon Powell personally appeared before me this 11<sup>th</sup> day of March, 2016, and acknowledge the due execution of the forgoing infiltration basin maintenance requirements. Witness my hand and official seal,



SEAL

My commission expires December 10, 2019

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

## Infiltration Trench 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.

Important maintenance procedures:

- The drainage area of the infiltration trench will be carefully managed to reduce the sediment load to the sand filter.
- The water level in the monitoring wells will be recorded once a month and after every storm event greater than 1.5 inches if in a Coastal County.

The infiltration trench 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.

BMP element:	Potential problem:	How I will remediate the problem:
The entire BMP	Trash/debris is present.	Remove the trash/debris.
The grass filter strip or other pretreatment area	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.
	Sediment has accumulated to a depth of greater than six inches.	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.
The flow diversion structure (if applicable)	The structure is clogged.	Unclog the conveyance and dispose of any sediment off-site.
	The structure is damaged.	Make any necessary repairs or replace if damage is too large for repair.

**RECEIVED**

**MAR 28 2016**

**ENGINEERING**

<b>BMP element:</b>	<b>Potential problem:</b>	<b>How I will remediate the problem:</b>
<b>The trench</b>	Water is ponding on the surface for more than 24 hours after a storm.	Remove the accumulated sediment from the infiltration system and dispose in a location that will not impact a stream or the BMP.
	The depth in the trench is reduced to 75% of the original design depth.	Remove the accumulated sediment from the infiltration system and dispose in a location that will not impact a stream or the BMP.
	Grass or other plants are growing on the surface of the trench.	Remove the plants, preferably by hand. If pesticide is used, wipe it on the plants rather than spraying.
<b>The observation well(s)</b>	The water table is within one foot of the bottom of the system for a period of three consecutive months.	Contact the DWQ Stormwater Unit immediately at 919-733-5083.
	The outflow pipe is clogged.	Provide additional erosion protection such as reinforced turf matting or riprap if needed to prevent future erosion problems.
	The outflow pipe is damaged.	Repair or replace the pipe.
<b>The emergency overflow berm</b>	Erosion or other signs of damage have occurred at the outlet.	The emergency overflow berm will be repaired or replaced if beyond repair.
<b>The receiving water</b>	Erosion or other signs of damage have occurred at the outlet.	Contact the NC Division of Water Quality 401 Oversight Unit at 919-733-1786.

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: Shipyard Village Apartments

BMP drainage basin number: 4

Print name: Vernon Powell

Title: President

Address: 2100-D Cornwallis Drive, Greensboro, NC 27408

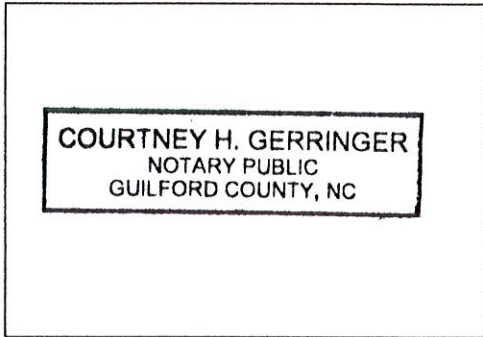
Phone: 336-282-7200

Signature: *Vernon Powell*

Date: 3/11/16

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, Courtney H. Geringer, a Notary Public for the State of North Carolina, County of Guilford, do hereby certify that Vernon Powell personally appeared before me this 11<sup>th</sup> day of March, ~~2014~~ 2016, and acknowledge the due execution of the forgoing infiltration trench maintenance requirements. Witness my hand and official seal,



SEAL

My commission expires December 10, 2019