

STORMWATER SYSTEM & EROSION CALCULATIONS

Ashes Drive Office Building

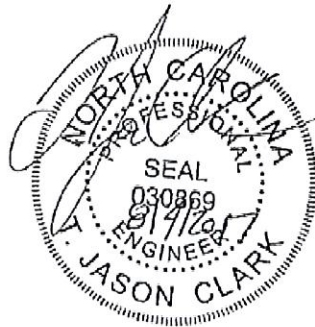
1010 Ashes Drive

Wilmington, North Carolina

For

TCG Holding Company
1111 Military Cutoff Road, Suite 191
Wilmington, NC 28405

910-799-2295



Final SW Calcs
SWP 2017037
9/1/17
pae

Revised August 2017 (C.O.W. SW Response)

June 2017

Prepared by:

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License # C-3641
N&T Project No. 16127

Attachment A
Impervious Area Master Table
SW8 990306 - Westfall Office Park
June 2017

| | Tract Number | Pond 1 | Pond 2 | Pond 3 | Pond 4 |
|--|------------------------------------|---------|---------|---------|---------|
| Maximum Allocated Impervious Total: | | 205,644 | 589,464 | 285,841 | 710,028 |
| Future Allocation Available: | | 103,495 | 168,075 | 237,038 | 89,354 |
| Offsite Permits' Allocated Impervious Total: | | 102,149 | 421,389 | 48,803 | 620,674 |
| SW8 000210 | Pharma Research | | 197,737 | | |
| SW8 010703 | Rx Express Marketing | | 18,457 | | |
| SW8 040807 | Atlantic Animal Hospital | | 20,400 | | |
| SW8 050321 | FNB Properties | 44,056 | 105,785 | | |
| SW8 060944 | Gateway Bank | | | 48,803 | |
| SW8 070409 | The Pines | | | | 281,074 |
| SW8-090237 ² | Westfall Medical Offices | | | | 0 |
| SW8 090421 | Wilmington Board of Realtors | | | | 61,012 |
| SW8 131009 | Goodwill | 58,093 | | | |
| SW8 140107 | Springhill Suites ¹ | | 79,010 | | |
| SW8 090337 | Mayfair Flats I | | | | 124,385 |
| SW8 161108 | FLATS on Main ³ | | | | 154,203 |
| | Ashes Office Building ³ | | 43,041 | | |

<----- Permit Rescinded Aug 2015

<----- Replaced Rescinded Westfall Medical Offices Permit

<---- Added June 2017

¹Includes 8,000sf of offsite BUA from the road extension.

²This permit was rescinded on January 8, 2016 and was replaced by SW8 150804.project.

³Doesn't include the 8,000sf of impervious, that was permitted as off-site with the Springhill Suites¹ (43,041 sf = 51,041 sf -8,000 sf)

Drainage Area Table

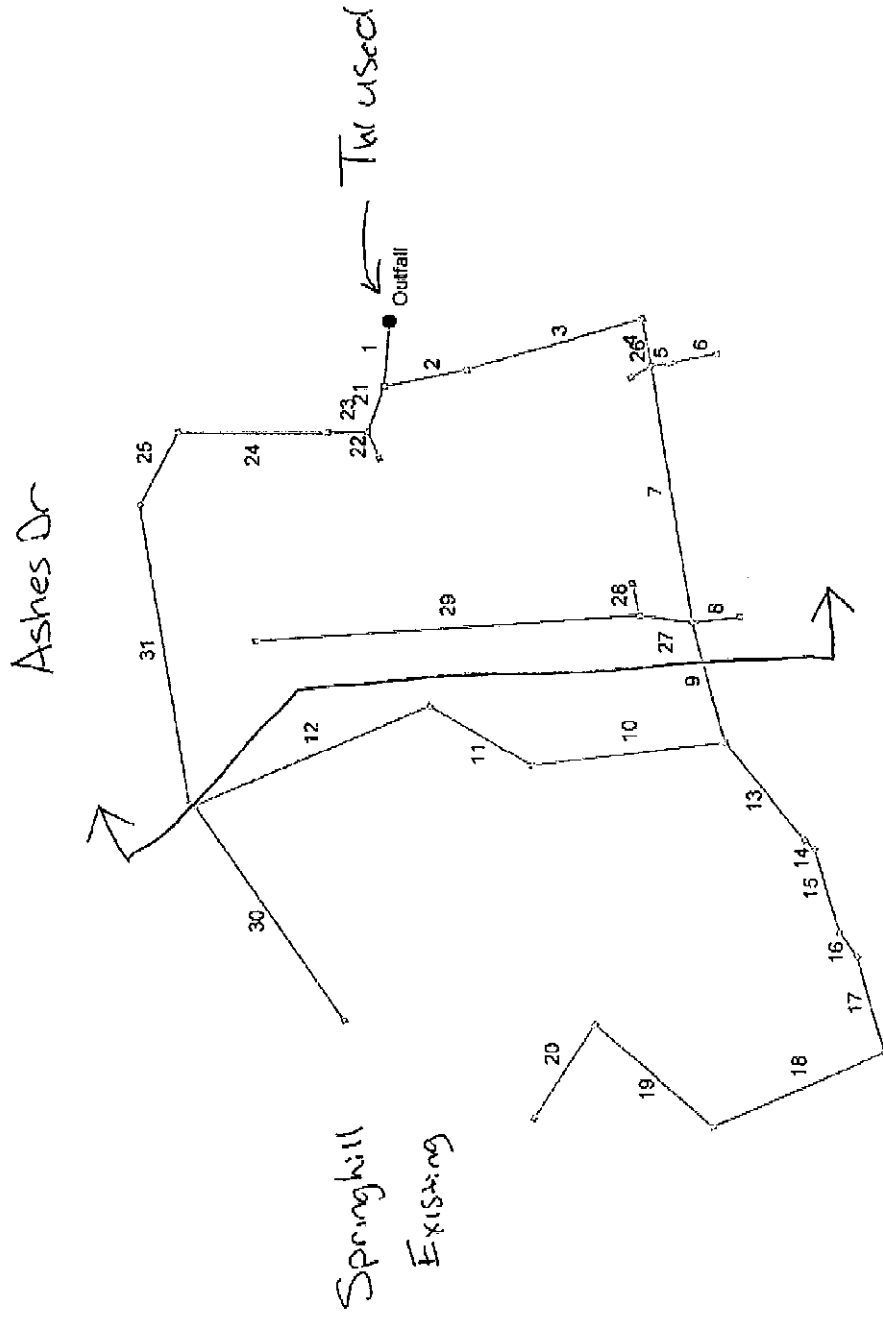
| Drainage Area | Total Area | | Impervious Area | | | | Total | | Rational | |
|---------------|------------|------|-----------------|----------|-------------------|----------|-------|------|----------|--|
| | SF | AC | Asphalt C&G | Sidewalk | Pervious Concrete | Building | SF | AC | 'C' | |
| | | | SF | SF | SF | SF | | | | |
| DA-1 | 5760 | 0.13 | 2491 | 344 | 2397 | 0 | 5231 | 0.12 | 0.89 | |
| DA-2 | 2987 | 0.07 | 0 | 0 | 0 | 2987 | 2987 | 0.07 | 0.95 | |
| DA-3 | 4550 | 0.10 | 0 | 0 | 0 | 4550 | 4550 | 0.10 | 0.95 | |
| DA-4 | 3211 | 0.07 | 0 | 0 | 0 | 3211 | 3211 | 0.07 | 0.95 | |
| DA-5 | 2494 | 0.06 | 0 | 835 | 0 | 0 | 835 | 0.02 | 0.52 | |
| DA-6 | 2881 | 0.07 | 1296 | 434 | 1151 | 0 | 2881 | 0.07 | 0.95 | |
| DA-7 | 3497 | 0.08 | 1544 | 634 | 1200 | 0 | 3378 | 0.08 | 0.93 | |
| DA-8 | 3339 | 0.08 | 1323 | 1001 | 863 | 0 | 3187 | 0.07 | 0.92 | |
| DA-9 | 2039 | 0.05 | 1040 | 223 | 771 | 0 | 2034 | 0.05 | 0.95 | |
| DA-10 | 17681 | 0.41 | 9155 | 1004 | 0 | 0 | 10159 | 0.23 | 0.67 | |
| DA-11 | 7387 | 0.17 | 7387 | 0 | 0 | 0 | 7387 | 0.17 | 0.95 | |
| DA-12 | 1108 | 0.03 | 539 | 157 | 254 | 0 | 950 | 0.02 | 0.86 | |
| DA-13 | 4835 | 0.11 | 2734 | 549 | 1008 | 0 | 4291 | 0.10 | 0.88 | |
| DA-14 | 3030 | 0.07 | 2236 | 794 | 0 | 0 | 3030 | 0.07 | 0.95 | |
| DA-15 | 5226 | 0.12 | 1667 | 1297 | 1872 | 0 | 4836 | 0.11 | 0.90 | |
| DA-16 | 7640 | 0.18 | 3322 | 733 | 2597 | 0 | 6652 | 0.15 | 0.87 | |

Drainage Area Table (Existing)

| Drainage Area | Total Area | | Impervious Area | | Rational 'C' |
|---------------|------------|------|-----------------|------|--------------|
| | SF | AC | Total | | |
| | | | SF | AC | |
| Exist DA-1 | 16200 | 0.37 | 14904 | 0.34 | 0.90 |
| Exist DA-2 | 9151 | 0.21 | 8510 | 0.20 | 0.90 |
| Exist DA-3 | 16910 | 0.39 | 15557 | 0.36 | 0.90 |
| Exist DA-4 | 988 | 0.02 | 296 | 0.01 | 0.50 |
| Exist DA-5 | 6090 | 0.14 | 4975 | 0.11 | 0.83 |
| Exist DA-6 | 20542 | 0.47 | 19800 | 0.45 | 0.93 |
| Exist DA-7 | 3080 | 0.07 | 1683 | 0.04 | 0.66 |
| Exist DA-8 | 6225 | 0.14 | 4305 | 0.10 | 0.75 |

| Storm Drain Line ID | Per Storm Sewer | Contributing Drainage Areas | Total Area (AC) | Total IMP (AC) | Rational 'C' |
|---------------------|-----------------|-----------------------------|-----------------|----------------|--------------|
| 1 | | (1/2) DA 10 | 0.20 | 0.12 | 0.67 |
| 2 | | - | - | - | - |
| 3 | | - | - | - | - |
| 4 | | - | - | - | - |
| 5 | | (3/4) DA 13 | 0.08 | 0.07 | 0.88 |
| 6 | | (3/4) DA 14 | 0.05 | 0.05 | 0.95 |
| 7 | | (1/4) DA 13 | 0.03 | 0.02 | 0.88 |
| 8 | | (1/4) DA 14 | 0.02 | 0.02 | 0.95 |
| 9 | | EX DA 8 & DA 12 | 0.17 | 0.17 | 0.95 |
| 10 | | EX DA 6 & DA 15 | 0.59 | 0.57 | 0.92 |
| 11 | | - | - | - | - |
| 12 | | (1/2) of EX DA 5 & DA 16 | 0.16 | 0.14 | 0.90 |
| 13 | | - | - | - | - |
| 14 | | EX DA 7 | 0.07 | 0.04 | 0.66 |
| 15 | | - | - | - | - |
| 16 | | EX DA 4 | 0.02 | 0.01 | 0.50 |
| 17 | | - | - | - | - |
| 18 | | EX DA 3 | 0.39 | 0.36 | 0.90 |
| 19 | | - | - | - | - |
| 20 | | EX DA 2 | 0.21 | 0.20 | 0.90 |
| 21 | | (1/2) DA 10 | 0.20 | 0.12 | 0.67 |
| 22 | | DA 7 | 0.08 | 0.08 | 0.93 |
| 23 | | DA 9 | 0.08 | 0.07 | 0.92 |
| 24 | | DA 9 | 0.05 | 0.05 | 0.95 |
| 25 | | DA 1 | 0.13 | 0.12 | 0.89 |
| 26 | | DA 6 | 0.07 | 0.07 | 0.95 |
| 27 | | - | - | - | - |
| 28 | | DA 5 | 0.06 | 0.02 | 0.52 |
| 29 | | DA 2, 3, 4 | 0.25 | 0.25 | 0.95 |
| 30 | | EX DA 1 | 0.37 | 0.34 | 0.90 |
| 31 | | (1/2) of EX DA 5 & DA 16 | 0.15 | 0.14 | 0.90 |

Ashes Drive Office



Project File: Sd's Test 8-2017 50 yr slm

Number of lines: 31

Date: 8/2/17

Storm Sewer Tabulation

| Station | Line To Line | Len (ft) | Drng Area | | Rnoff coeff (C) | Area x C | | Tc | | Rain (l) | Total flow (cfs) | Cap full (cfs) | Vel (fps) | Pipe | | Invert Elev | | HGL Elev | | Grnd / Rim Elev | | Line ID |
|---------|--------------|----------|-----------|------------|-----------------|----------|-------|-------------|------------|----------|------------------|----------------|-----------|-----------|-----------|-------------|---------|----------|---------|-----------------|---------|--------------|
| | | | Incr (ac) | Total (ac) | | Incr | Total | Inlet (min) | Syst (min) | | | | | Size (in) | Slope (%) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | |
| 1 | End | 34 | 0.20 | 3.59 | 0.67 | 0.13 | 3.13 | 5.0 | 10.4 | 6.2 | 19.58 | 17.35 | 6.95 | 24 | 0.59 | 15.40 | 15.60 | 16.99 | 17.39 | 19.27 | 19.27 | EXIST CI-1 |
| 2 | 1 | 42 | 0.00 | 2.54 | 0.00 | 0.00 | 2.28 | 5.0 | 10.2 | 6.3 | 14.27 | 15.99 | 4.54 | 24 | 0.50 | 15.60 | 15.81 | 17.73 | 17.90 | 19.27 | 19.73 | EXIST SDMH 1 |
| 3 | 2 | 92 | 0.00 | 2.54 | 0.00 | 0.00 | 2.28 | 5.0 | 9.9 | 6.3 | 14.39 | 4.08 | 4.58 | 24 | 0.03 | 15.81 | 15.84 | 17.90 | 18.27 | 19.73 | 20.44 | EXIST SDMH 2 |
| 4 | 3 | 25 | 0.00 | 2.54 | 0.00 | 0.00 | 2.28 | 5.0 | 9.8 | 6.3 | 14.43 | 24.78 | 4.59 | 24 | 1.20 | 15.84 | 16.14 | 18.27 | 18.37 | 20.44 | 20.99 | EXIST SDMH 3 |
| 5 | 4 | 10 | 0.08 | 0.13 | 0.88 | 0.07 | 0.12 | 5.0 | 6.4 | 6.9 | 0.82 | 14.58 | 0.57 | 15 | 5.10 | 16.69 | 17.20 | 18.69 | 18.69 | 20.99 | 20.30 | EX CI |
| 6 | 5 | 24 | 0.05 | 0.05 | 0.95 | 0.05 | 0.05 | 5.0 | 5.0 | 7.2 | 0.34 | 7.22 | 0.28 | 15 | 1.25 | 17.20 | 17.50 | 18.70 | 18.70 | 20.30 | 20.37 | EX CI |
| 7 | 4 | 136 | 0.03 | 2.34 | 0.88 | 0.03 | 2.09 | 5.0 | 9.3 | 6.4 | 13.43 | 9.70 | 4.28 | 24 | 0.18 | 16.14 | 16.39 | 18.42 | 18.90 | 20.99 | 21.82 | CI T-1 |
| 8 | 7 | 24 | 0.02 | 0.02 | 0.95 | 0.02 | 0.02 | 5.0 | 5.0 | 7.2 | 0.14 | 8.74 | 2.20 | 15 | 1.83 | 19.14 | 19.58 | 19.25 | 19.72 | 21.82 | 22.15 | EX CI-4 |
| 9 | 7 | 65 | 0.17 | 1.98 | 0.95 | 0.16 | 1.78 | 5.0 | 9.0 | 6.5 | 11.50 | 7.42 | 3.66 | 24 | 0.11 | 16.39 | 16.46 | 18.97 | 19.14 | 21.82 | 21.92 | DI |
| 10 | 9 | 98 | 0.59 | 1.12 | 0.92 | 0.54 | 1.02 | 5.0 | 7.8 | 6.7 | 6.81 | 7.58 | 2.17 | 24 | 0.11 | 16.46 | 16.57 | 19.27 | 19.36 | 21.92 | 21.57 | DI |
| 11 | 10 | 60 | 0.00 | 0.53 | 0.00 | 0.00 | 0.48 | 5.0 | 7.3 | 6.8 | 3.23 | 8.47 | 1.83 | 18 | 0.65 | 16.57 | 16.96 | 19.38 | 19.44 | 21.57 | 22.26 | SDMH |
| 12 | 11 | 129 | 0.16 | 0.53 | 0.90 | 0.14 | 0.48 | 5.0 | 6.1 | 7.0 | 3.33 | 5.06 | 1.89 | 18 | 0.23 | 16.96 | 17.26 | 19.44 | 19.57 | 22.26 | 20.27 | CI |
| 13 | 9 | 65 | 0.00 | 0.69 | 0.00 | 0.00 | 0.60 | 5.0 | 8.5 | 6.5 | 3.91 | 6.38 | 2.21 | 18 | 0.37 | 16.46 | 16.70 | 19.27 | 19.36 | 21.92 | 23.35 | SDMH |
| 14 | 13 | 7 | 0.07 | 0.69 | 0.66 | 0.05 | 0.60 | 5.0 | 8.5 | 6.6 | 3.91 | 9.72 | 2.21 | 18 | 0.86 | 16.70 | 16.76 | 19.36 | 19.37 | 23.35 | 22.76 | DI |
| 15 | 14 | 45 | 0.00 | 0.62 | 0.00 | 0.00 | 0.55 | 5.0 | 8.1 | 6.6 | 3.64 | 6.26 | 2.06 | 18 | 0.36 | 16.76 | 16.92 | 19.38 | 19.44 | 22.76 | 23.38 | SDMH |
| 16 | 15 | 16 | 0.02 | 0.62 | 0.51 | 0.01 | 0.55 | 5.0 | 8.0 | 6.6 | 3.65 | 11.14 | 2.07 | 18 | 1.13 | 16.92 | 17.10 | 19.44 | 19.46 | 23.38 | 22.90 | DI |
| 17 | 16 | 52 | 0.00 | 0.60 | 0.00 | 0.00 | 0.54 | 5.0 | 7.6 | 6.7 | 3.63 | 5.45 | 2.05 | 18 | 0.27 | 17.10 | 17.24 | 19.46 | 19.52 | 22.90 | 22.84 | SDMH |
| 18 | 17 | 95 | 0.39 | 0.60 | 0.90 | 0.35 | 0.54 | 5.0 | 7.1 | 6.8 | 3.68 | 3.18 | 3.00 | 15 | 0.24 | 17.24 | 17.47 | 19.52 | 19.83 | 22.84 | 19.95 | CI |
| 19 | 18 | 80 | 0.00 | 0.21 | 0.00 | 0.00 | 0.19 | 5.0 | 5.9 | 7.0 | 1.33 | 5.31 | 1.09 | 15 | 0.68 | 17.47 | 18.01 | 19.95 | 19.98 | 19.96 | 21.26 | SDMH |
| 20 | 19 | 58 | 0.21 | 0.21 | 0.90 | 0.19 | 0.19 | 5.0 | 5.0 | 7.2 | 1.37 | 2.94 | 1.11 | 15 | 0.21 | 18.01 | 18.13 | 19.98 | 20.01 | 21.26 | 20.12 | CI |
| 21 | 1 | 25 | 0.20 | 0.85 | 0.67 | 0.13 | 0.72 | 5.0 | 7.5 | 6.7 | 4.87 | 23.07 | 1.55 | 24 | 1.04 | 15.60 | 15.86 | 18.03 | 18.04 | 19.27 | 20.20 | DI T-11 |

Ashes Drive Office

Number of lines: 31

Run Date: 8/2/17

NOTES: Intensity = 121.80 / (Inlet time + 23.50) ^ 0.84; Return period = Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

| Station Line | To Line | Len (ft) | Drng Area | | Rnoff coeff | Area x C | | Tc | | Rain (ft) | Total flow (cfs) | Cap full (cfs) | Vel (ft/s) | Pipe | | Invert Elev | | HGL Elev | | Grnd / Rim Elev | | Line ID |
|--------------|---------|----------|-----------|------------|-------------|----------|-------|-------------|------------|-----------|------------------|----------------|------------|-----------|-----------|-------------|---------|----------|---------|-----------------|---------|---------|
| | | | Incr (ac) | Total (ac) | | Incr | Total | Inlet (min) | Syst (min) | | | | | Size (in) | Slope (%) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | Dn (ft) | Up (ft) | |
| 22 | 21 | 15 | 0.08 | 0.08 | 0.93 | 0.07 | 0.07 | 5.0 | 5.0 | 7.2 | 0.54 | 13.45 | 1.67 | 12 | 14.27 | 15.86 | 18.00 | 18.07 | 18.30 | 20.20 | 21.50 | CIT-3 |
| 23 | 21 | 20 | 0.08 | 0.57 | 0.92 | 0.07 | 0.52 | 5.0 | 7.4 | 6.7 | 3.48 | 4.79 | 2.84 | 15 | 0.55 | 15.86 | 15.97 | 18.04 | 18.10 | 20.20 | 21.50 | CIT-4 |
| 24 | 23 | 75 | 0.05 | 0.49 | 0.95 | 0.05 | 0.44 | 5.0 | 6.9 | 6.8 | 3.03 | 4.60 | 2.47 | 15 | 0.51 | 15.97 | 16.35 | 18.13 | 18.30 | 21.50 | 21.80 | CIT-5 |
| 25 | 24 | 43 | 0.13 | 0.44 | 0.89 | 0.12 | 0.39 | 5.0 | 6.6 | 6.9 | 2.72 | 4.62 | 2.22 | 15 | 0.51 | 16.35 | 16.57 | 18.31 | 18.39 | 21.80 | 21.80 | DI T-6 |
| 26 | 4 | 12 | 0.07 | 0.07 | 0.95 | 0.07 | 0.07 | 5.0 | 5.0 | 7.2 | 0.48 | 11.77 | 0.72 | 12 | 10.92 | 16.69 | 18.00 | 18.69 | 18.69 | 20.99 | 21.00 | CIT-2 |
| 27 | 7 | 27 | 0.00 | 0.31 | 0.00 | 0.00 | 0.27 | 5.0 | 6.0 | 7.0 | 1.89 | 10.33 | 3.18 | 12 | 8.41 | 16.39 | 18.56 | 19.09 | 19.24 | 21.82 | 22.80 | JB T-8 |
| 28 | 27 | 17 | 0.06 | 0.06 | 0.52 | 0.03 | 0.03 | 5.0 | 5.0 | 7.2 | 0.23 | 3.10 | 1.29 | 10 | 2.00 | 18.66 | 19.00 | 19.47 | 19.21 | 22.80 | 23.10 | YI T-7 |
| 29 | 27 | 193 | 0.25 | 0.25 | 0.95 | 0.24 | 0.24 | 5.0 | 5.0 | 7.2 | 1.72 | 2.20 | 3.91 | 10 | 1.01 | 18.66 | 20.60 | 19.33 | 21.19 | 22.80 | 23.30 | RD |
| 30 | 12 | 135 | 0.37 | 0.37 | 0.90 | 0.33 | 0.33 | 5.0 | 5.0 | 7.2 | 2.41 | 3.85 | 1.96 | 15 | 0.36 | 17.26 | 17.74 | 19.57 | 19.76 | 20.27 | 20.30 | EX CI |
| 31 | 25 | 155 | 0.31 | 0.31 | 0.90 | 0.28 | 0.28 | 5.0 | 5.0 | 7.2 | 2.02 | 4.27 | 1.64 | 15 | 0.44 | 16.57 | 17.26 | 18.43 | 18.58 | 21.80 | 20.27 | EX CI |

Ashes Drive Office
 Number of lines: 31
 Run Date: 8/2/17

NOTES: Intensity = 121.60 / (inlet time + 23.50) ^ 0.84; Return period = Yrs. 10 ; c = cir e = ellip b = box

Storm Sewer Tabulation

| Station Line | To Line | Len (ft) | Drng Area (ac) | | Rnoiff coeff (C) | Area x C | | Tc (min) | | Rain (l) (in/hr) | Total flow (cfs) | Cap full (cfs) | Vel (ft/s) | Pipe | | Invert Elev (ft) | | HGL Elev (ft) | | Grnd / Rim Elev (ft) | | Line ID |
|--------------|---------|----------|----------------|-------|------------------|----------|-------|----------|------|------------------|------------------|----------------|------------|-----------|-----------|------------------|-------|---------------|-------|----------------------|-------|--------------|
| | | | Incr | Total | | Incr | Total | Inlet | Syst | | | | | Size (in) | Slope (%) | Dn | Up | Dn | Up | Dn | Up | |
| 1 | End | 34 | 0.20 | 3.59 | 0.67 | 0.13 | 3.13 | 5.0 | 9.4 | 8.0 | 24.94 | 17.35 | 8.14 | 24 | 0.59 | 15.40 | 15.60 | 17.21 | 17.70 | 19.27 | 19.27 | EXIST CI-1 |
| 2 | 1 | 42 | 0.00 | 2.54 | 0.00 | 0.00 | 2.28 | 5.0 | 9.2 | 8.0 | 18.17 | 15.99 | 5.78 | 24 | 0.50 | 15.60 | 15.81 | 18.16 | 18.43 | 19.27 | 19.27 | EXIST SDMH 1 |
| 3 | 2 | 92 | 0.00 | 2.54 | 0.00 | 0.00 | 2.28 | 5.0 | 9.0 | 8.0 | 18.28 | 4.08 | 5.82 | 24 | 0.03 | 15.81 | 15.84 | 18.43 | 19.03 | 19.73 | 19.73 | EXIST SDMH 2 |
| 4 | 3 | 25 | 0.00 | 2.54 | 0.00 | 0.00 | 2.28 | 5.0 | 8.9 | 8.0 | 18.31 | 24.78 | 5.83 | 24 | 1.20 | 15.84 | 16.14 | 19.03 | 19.20 | 20.44 | 20.44 | EXIST SDMH 3 |
| 5 | 4 | 10 | 0.08 | 0.13 | 0.88 | 0.07 | 0.12 | 5.0 | 6.2 | 8.6 | 1.01 | 14.58 | 0.83 | 15 | 5.10 | 16.69 | 17.20 | 19.71 | 19.72 | 20.99 | 20.99 | EX CI |
| 6 | 5 | 24 | 0.05 | 0.05 | 0.95 | 0.05 | 0.05 | 5.0 | 5.0 | 8.9 | 0.42 | 7.22 | 0.34 | 15 | 1.25 | 17.20 | 17.50 | 19.73 | 19.73 | 20.30 | 20.30 | EX CI |
| 7 | 4 | 136 | 0.03 | 2.34 | 0.88 | 0.03 | 2.09 | 5.0 | 8.5 | 8.1 | 16.99 | 9.70 | 5.41 | 24 | 0.18 | 16.14 | 16.39 | 19.27 | 20.04 | 20.99 | 20.99 | CI T-1 |
| 8 | 7 | 24 | 0.02 | 0.02 | 0.95 | 0.02 | 0.02 | 5.0 | 5.0 | 8.9 | 0.17 | 8.74 | 0.16 | 15 | 1.83 | 19.14 | 19.58 | 20.48 | 20.48 | 21.82 | 21.82 | EX CI-4 |
| 9 | 7 | 65 | 0.17 | 1.98 | 0.95 | 0.16 | 1.78 | 5.0 | 8.3 | 8.2 | 14.52 | 7.42 | 4.62 | 24 | 0.11 | 16.39 | 16.46 | 20.15 | 20.43 | 21.82 | 21.92 | DI |
| 10 | 9 | 98 | 0.59 | 1.12 | 0.92 | 0.54 | 1.02 | 5.0 | 7.3 | 8.4 | 8.53 | 7.58 | 2.71 | 24 | 0.11 | 16.46 | 16.57 | 20.65 | 20.79 | 21.92 | 21.57 | DI |
| 11 | 10 | 60 | 0.00 | 0.53 | 0.00 | 0.00 | 0.48 | 5.0 | 6.9 | 8.5 | 4.03 | 8.47 | 2.28 | 18 | 0.65 | 16.57 | 16.96 | 20.82 | 20.91 | 21.57 | 22.26 | SDMH |
| 12 | 11 | 129 | 0.16 | 0.53 | 0.90 | 0.14 | 0.48 | 5.0 | 5.9 | 8.7 | 4.13 | 5.06 | 2.34 | 18 | 0.23 | 16.96 | 17.26 | 20.91 | 21.11 | 22.26 | 20.27 | CI |
| 13 | 9 | 65 | 0.00 | 0.69 | 0.00 | 0.00 | 0.60 | 5.0 | 7.9 | 8.2 | 4.92 | 6.38 | 2.78 | 18 | 0.37 | 16.46 | 16.70 | 20.64 | 20.78 | 21.92 | 23.35 | SDMH |
| 14 | 13 | 7 | 0.07 | 0.69 | 0.66 | 0.05 | 0.60 | 5.0 | 7.8 | 8.3 | 4.92 | 9.72 | 2.79 | 18 | 0.86 | 16.70 | 16.76 | 20.78 | 20.80 | 23.35 | 22.76 | DI |
| 15 | 14 | 45 | 0.00 | 0.62 | 0.00 | 0.00 | 0.55 | 5.0 | 7.5 | 8.3 | 4.57 | 6.26 | 2.59 | 18 | 0.35 | 16.76 | 16.92 | 20.81 | 20.90 | 22.76 | 23.38 | SDMH |
| 16 | 15 | 16 | 0.02 | 0.62 | 0.51 | 0.01 | 0.55 | 5.0 | 7.4 | 8.3 | 4.58 | 11.14 | 2.59 | 18 | 1.13 | 16.92 | 17.10 | 20.90 | 20.93 | 23.38 | 22.90 | DI |
| 17 | 16 | 52 | 0.00 | 0.60 | 0.00 | 0.00 | 0.54 | 5.0 | 7.1 | 8.4 | 4.54 | 5.45 | 2.57 | 18 | 0.27 | 17.10 | 17.24 | 20.93 | 21.03 | 22.90 | 22.84 | SDMH |
| 18 | 17 | 95 | 0.39 | 0.60 | 0.90 | 0.35 | 0.54 | 5.0 | 6.7 | 8.5 | 4.58 | 3.18 | 3.74 | 15 | 0.24 | 17.24 | 17.47 | 21.03 | 21.51 | 22.84 | 19.96 | CI |
| 19 | 18 | 80 | 0.00 | 0.21 | 0.00 | 0.00 | 0.19 | 5.0 | 5.7 | 8.7 | 1.65 | 5.31 | 1.34 | 15 | 0.68 | 17.47 | 18.01 | 21.70 | 21.75 | 19.96 | 21.26 | SDMH |
| 20 | 19 | 58 | 0.21 | 0.21 | 0.90 | 0.19 | 0.19 | 5.0 | 5.0 | 8.9 | 1.68 | 2.94 | 1.37 | 15 | 0.21 | 18.01 | 18.13 | 21.75 | 21.79 | 21.26 | 20.12 | CI |
| 21 | 1 | 25 | 0.20 | 0.85 | 0.67 | 0.13 | 0.72 | 5.0 | 7.1 | 8.4 | 6.09 | 23.07 | 1.94 | 24 | 1.04 | 15.60 | 15.86 | 18.62 | 18.64 | 19.27 | 20.20 | DI T-11 |

Ashes Drive Office

Number of lines: 31

Run Date: 8/2/17

NOTES: Intensity = 171.29 / (Inlet time + 27.30) ^ 0.85; Return period = Yrs. 50 ; c = cir e = ellip b = box

Storm Sewer Tabulation

| Station Line | To Line | Len (ft) | Drng Area (ac) | | Rnoff coeff (C) | Area x C | | Tc (min) | | Rain (in/hr) | Total flow (cfs) | Cap full (cfs) | Vel (ft/s) | Pipe | | Invert Elev (ft) | | HGL Elev (ft) | | Grnd / Rim Elev (ft) | | Line ID |
|--------------|---------|----------|----------------|-------|-----------------|----------|-------|----------|------|--------------|------------------|----------------|------------|-----------|-----------|------------------|-------|---------------|-------|----------------------|-------|---------|
| | | | Incr | Total | | Incr | Total | Inlet | Syst | | | | | Size (in) | Slope (%) | Dn | Up | Dn | Up | Dn | Up | |
| 22 | 21 | 15 | 0.08 | 0.08 | 0.93 | 0.07 | 0.07 | 5.0 | 5.0 | 8.9 | 0.66 | 13.45 | 1.00 | 12 | 14.27 | 15.86 | 18.00 | 18.69 | 18.68 | 20.20 | 21.50 | CIT-3 |
| 23 | 21 | 20 | 0.08 | 0.57 | 0.92 | 0.07 | 0.52 | 5.0 | 7.0 | 8.4 | 4.35 | 4.79 | 3.54 | 15 | 0.55 | 15.86 | 15.97 | 18.64 | 18.73 | 20.20 | 21.50 | CIT-4 |
| 24 | 23 | 75 | 0.05 | 0.49 | 0.95 | 0.05 | 0.44 | 5.0 | 6.6 | 8.5 | 3.77 | 4.60 | 3.07 | 15 | 0.51 | 15.97 | 16.35 | 18.78 | 19.03 | 21.50 | 21.80 | CIT-5 |
| 25 | 24 | 43 | 0.13 | 0.44 | 0.89 | 0.12 | 0.39 | 5.0 | 6.3 | 8.6 | 3.38 | 4.62 | 2.76 | 15 | 0.51 | 16.35 | 16.57 | 19.06 | 19.18 | 21.80 | 21.80 | DIT-6 |
| 26 | 4 | 12 | 0.07 | 0.07 | 0.95 | 0.07 | 0.07 | 5.0 | 5.0 | 8.9 | 0.59 | 11.77 | 0.75 | 12 | 10.92 | 16.69 | 18.00 | 19.72 | 19.72 | 20.99 | 21.60 | CIT-2 |
| 27 | 7 | 27 | 0.00 | 0.31 | 0.00 | 0.00 | 0.27 | 5.0 | 5.8 | 8.7 | 2.33 | 10.33 | 2.97 | 12 | 8.41 | 16.39 | 18.66 | 20.36 | 20.47 | 21.82 | 22.80 | JB T-8 |
| 28 | 27 | 17 | 0.06 | 0.06 | 0.52 | 0.03 | 0.03 | 5.0 | 5.0 | 8.9 | 0.28 | 3.10 | 0.51 | 10 | 2.00 | 18.66 | 19.00 | 20.60 | 20.61 | 22.80 | 23.10 | YIT-7 |
| 29 | 27 | 193 | 0.25 | 0.25 | 0.95 | 0.24 | 0.24 | 5.0 | 5.0 | 8.9 | 2.11 | 2.20 | 3.86 | 10 | 1.01 | 18.66 | 20.60 | 20.47 | 22.26 | 22.80 | 23.30 | RD |
| 30 | 12 | 135 | 0.37 | 0.37 | 0.90 | 0.33 | 0.33 | 5.0 | 5.0 | 8.9 | 2.95 | 3.85 | 2.41 | 15 | 0.36 | 17.26 | 17.74 | 21.11 | 21.39 | 20.27 | 20.30 | EX CI |
| 31 | 25 | 158 | 0.31 | 0.31 | 0.90 | 0.28 | 0.28 | 5.0 | 5.0 | 8.9 | 2.47 | 4.27 | 2.02 | 15 | 0.44 | 16.57 | 17.26 | 19.24 | 19.47 | 21.80 | 20.27 | EX CI |

Ashes Drive Office Number of lines: 31 Run Date: 8/2/17

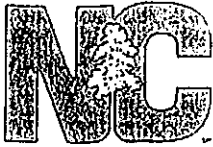
NOTES: Intensity = $171.29 / (\text{inlet time} + 27.30) \wedge 0.86$; Return period = Yrs. 50 ; c = cir e = ellip b = box

Attachment A
 Impervious Area Master Table
 SW8 990306 - Westfall Office Park
 3/2/17

| | | Pond 1 | Pond 2 | Pond 3 | Pond 4 |
|--|--------------------------------|-----------|---------|---------|---------|
| Maximum Allocated Impervious Total: | | 205,644 | 589,464 | 285,841 | 710,028 |
| Future Allocation Available: | | 103,495 | 168,075 | 237,038 | 367,942 |
| Offsite Permits' Allocated Impervious Total: | | 102,149 | 421,389 | 48,803 | 342,086 |
| SW8 000210 | Pharma Research | | 197,737 | | |
| SW8 010703 | Rx Express Marketing | | 18,457 | | |
| SW8 040807 | Atlantic Animal Hospital | | 20,400 | | |
| SW8 050321 | FNB Properties | 44,056 | 105,785 | | |
| SW8 060944 | Gateway Bank | | | 48,803 | |
| SW8 070409 | The Pines | | | | 281,074 |
| SW8 090337 ² | Westfall Medical Offices | - | | | 0 |
| SW8 090421 | Wilmington Board of Realtors | 37R & 38R | | | 61,012 |
| SW8 131009 | Goodwill | | 58,093 | | |
| SW8 140107 | Springhill Suites ¹ | | 79,010 | | |
| SW8 150804 | Mayfaire Flats I | E2D1-R | | | 124,385 |
| SW8 161108 | FLATS on Main | E2D2-R | | | 154,203 |

¹Includes 8,000sf of offsite BUA from the road extension.

²This permit was rescinded on January 8, 2016 and was replaced by SW8 150804.



Energy, Mineral &
Land Resources
ENVIRONMENTAL QUALITY

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

TRACY DAVIS
Director

98941
(Due to 15104)

RECEIVED

MAR 14 2017

N & T

March 3, 2017

Mr. Raiford G. Trask, Jr.
1202 Eastwood Road
Wilmington, NC 28403

**Subject: Approved Plan Revision
Westfall Office Park
Stormwater Permit No. SW8 990306
New Hanover County**

Dear Mr. Trask:

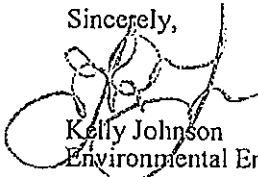
On February 22, 2017, the Wilmington Regional Office received a complete request to revise the approved plans for Stormwater Management Permit Number SW8 990306. The revisions include moving the lot lines as shown in the attached plans, creating an additional lot, and shifting the drainage area of Pond 4. It has been determined that a formal permit modification is not required for the proposed changes. We are forwarding you an approved copy of the revised plans for your files. Please add the following plan sheets to the permit file:

- 1.) New Hanover County Map Book 62 / Page 31: This recombination plat shows the current subdivision layout and lot lines.
- 2.) Pond 4 Drainage Area Map: The drainage area map's lot line has shifted slightly without any appreciable impact on the pond's design.

Please understand that the approval of this revision to the approved plans and to the permit for the subject State Stormwater project is done on a case-by-case basis. Any other changes to this project must be approved through this Office prior to construction. The issuance of this 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.

If you have any questions concerning this matter, please do not hesitate to call me at (910) 796-7215.

Sincerely,



Kelly Johnson
Environmental Engineer

GDS\kjp: \\Stormwater\Permits & Projects\1999\990306 HD\2017 03 permit_pr 990306

cc: Mike Brown, VP of Brokerage Development Services, Cape Fear Commercial
(1051 Military Cutoff Road, Suite 200, Wilm. 28405)
Jason Clark, PE, Norris & Tunstall
Inspector, New Hanover County Building Inspections
Wilmington Regional Office

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF ENERGY, MINERAL AND LAND RESOURCES

STATE STORMWATER MANAGEMENT PERMIT

HIGH DENSITY DEVELOPMENT

In accordance with the provisions of Article 21 of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations

PERMISSION IS HEREBY GRANTED TO

Mr. Raiford G. Trask, Jr., Owner

Westfall Office Park

Military Cutoff Road at Sir Tyler Drive, Wilmington, New Hanover County

FOR THE

construction, operation and maintenance of 4 wet detention ponds in compliance with the provisions of 15A NCAC 2H .1000 (hereafter referred to as the "stormwater rules") and the approved stormwater management plans and specifications and other supporting data as attached and on file with and approved by the Division of Energy, Mineral and Land Resources and considered a part of this permit.

This permit shall be effective from the date of issuance until April 10, 2023 and shall be subject to the following specified conditions and limitations:

I. DESIGN STANDARDS

1. This permit is effective only with respect to the nature and volume of stormwater described in the application and other supporting data.
2. This stormwater system has been approved for the management of stormwater runoff as described in Section I.6 of this permit. The stormwater controls have been designed to handle the runoff from a specific amount of built-upon area as summarized in Attachment A.
3. Approved plans and specifications for this project are incorporated by reference and are enforceable parts of the permit.
4. The amount of built-upon area draining to each pond will be limited as indicated in Section I.6 of this permit, and per the approved plans.
5. No lot lines have been shown on the plans for the future development. The maximum lot built-upon area for each future subdivided lot is limited to 85% of the individual lot area.

6. The following design criteria have been permitted for the four (4) proposed wet detention ponds and must be maintained at design condition:

| | <u>POND 1</u> | <u>POND 2</u> | <u>POND 3</u> | <u>POND 4</u> |
|---|---------------|-----------------------------|---------------|---------------|
| a. Drainage Area, acres: | 5.18 | 17.21 | 8.62 | 25.15 |
| Onsite, ft ² : | 225,640 | 749,668 | 375,487 | 1,095,534 |
| Offsite, ft ² : | 0 | 0 | 0 | 0 |
| b. Impervious Area, ft ² : | 205,644 | 589,464 | 285,841 | 710,028 |
| Lots at 85% | 176,244 | 558,352 | 285,841 | 666,468 |
| Road | 29,400 | 31,112 | -0- | 43,560 |
| c. TSS Removal | 90% | 90% | 90% | 90% |
| d. Design Depth, feet: | 7.5 | 7.5 | 7.5 | 7.5 |
| e. Permanent Pool SA, ft ² : | 8,337 | 22,052 | 12,511 | 36,000 |
| f. Permanent Pool Ele., fmsl: | 13.5 | 14.3 | 15.0 | 14.0 |
| g. Temporary Pool Ele. fmsl: | 15.5 | 16.5 | 17.0 | 15.35 |
| h. Provided Storage Volume, ft ³ : | 19,631 | 54,250 | 28,806 | 68,580 |
| i. Controlling Orifice, diameter: | 2"φ | 3"φ | 2"φ | 3"φ |
| j. Permanent Pool Volume, ft ³ : | 30,373 | 83,070 | 47,104 | 96,637 |
| k. Max. Fountain HP: | 1/8 | 1/3 | 1/6 | 1/3 |
| l. Receiving Stream (all ponds): | | UT Howe Creek | | |
| m. River Basin / Index Number: | | CPF24 18-87-23 | | |
| n. Stream Classification: | | "SA ORW" (chlorides 31 ppm) | | |

II. SCHEDULE OF COMPLIANCE

1. The stormwater management system shall be constructed in its entirety, vegetated and operational for its intended use prior to the construction of any built-upon surface.
2. During construction, erosion shall be kept to a minimum and any eroded areas of the system will be repaired immediately.
3. The facilities shall be constructed in accordance with the conditions of this permit, the approved plans and specifications, and other supporting data.
4. The permittee shall at all times provide the operation and maintenance necessary to assure the permitted stormwater 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. Semiannual scheduled inspections (every 6 months).
 - b. Sediment removal.
 - c. Mowing and revegetation of side slopes.
 - d. Immediate repair of eroded areas.
 - e. Maintenance of side slopes in accordance with approved plans and specifications.
 - f. Debris removal and unclogging of outlet structure, orifice device and catch basins and piping.
 - g. Access to the outlet structure must be available at all times.
5. Records of maintenance activities must be kept and made available upon request to authorized personnel of DEMLR. The records will indicate the date, activity, name of person performing the work and what actions were taken.

6. If the permanent pool volume is greater than 30,000 cubic feet, a decorative spray fountain will be allowed in the stormwater treatment system, subject to the following criteria:
 - a. The fountain must draw its water from less than 2' below the permanent pool surface.
 - b. Separated units, where the nozzle, pump and intake are connected by tubing, may be used only if they draw water from the surface in the deepest part of the pond.
 - c. The falling water from the fountain must be centered in the pond, away from the shoreline.
 - d. The maximum horsepower for a fountain in Ponds 1, 2, 3 and 4 is 1/8, 1/3, 1/6, and 1/3, respectively as listed in Section I.6 (k) of this permit.
7. Upon completion of construction, prior to issuance of a Certificate of Occupancy, and prior to operation of this permitted facility, a certification must be received from an appropriate designer for the system installed certifying that the permitted facility has been installed in accordance with this permit, the approved plans and specifications, and other supporting documentation. Any deviations from the approved plans and specifications must be noted on the Certification.
8. The Permittee shall maintain a copy of the approved plans and specifications on file at all times.
9. The permittee is responsible for verifying that the proposed built-upon area does not exceed the maximum allowed under this permit.
10. The runoff from all built-upon area within any of the drainage areas on the project must be directed into the appropriate permitted stormwater control system.
11. If the stormwater system was used as an Erosion Control device, it must be restored to design condition prior to operation as a stormwater treatment device, and prior to occupancy of the facility.
12. All future development projects within the drainage area of any permitted pond must submit proposed plans to the Division for approval prior to construction. If the project is owned by the permittee, a separate permit will not be required. If the project has been sold, the new owner must submit an offsite permit application. In either case, development plans must be submitted for approval.
13. Prior to the sale of any portion of the property, the following statements and restrictions must be recorded with the Register of Deeds:
 - a. The built-upon area is limited to a maximum of 85% of the lot area. Built-upon area includes, but is not limited to, impervious and partially impervious surfaces such as structures, asphalt, concrete, brick, slate, coquina, gravel and permeable pavement, but does not include raised, open wood decking, or the water surface of swimming pools. The allocated amount of built-upon area for the lot includes that portion of the right-of-way between the front lot line and the edge of pavement.
 - b. All runoff from the built-upon area on the lot must be directed into the forebay of the appropriate detention pond, as indicated on the approved plans.
 - c. The owner of any subdivided lot within the scope of stormwater permit SW8 990306 must submit an offsite permit application to the Division prior to any construction on the lot.

14. A copy of the recorded deed restrictions must be submitted within 30 days of recording.
15. An access/maintenance easement to the stormwater facilities shall be granted in favor of the permittee if access to the stormwater facilities will be restricted by the sale of any portion of the property.
16. The following actions will require a modification to the permit:
 - a. Any revision to the approved plans, regardless of size.
 - b. Redesign or addition to the approved amount of built-upon area.
 - c. Further subdivision or sale of the project area, in whole or in part.
 - d. Filling in, altering, or piping of any vegetative conveyance shown on the approved plan.
17. The Director may determine that other revisions to the project should require a modification to the permit.
18. The Director 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 Director for modifying the site to meet minimum requirements. The permittee shall provide copies of revised plans and certification in writing to the Director that the changes have been made.
19. The area of the project to the north of Pond 4 which is identified on the approved drainage area map as Tracts F and G, is not included in the drainage area of any pond. Prior to development this area must submit for either a permit modification or an individual permit. If this area is sold, the permittee must provide the Division with the name, address and phone number of the new owner within 30 days of the sale, in writing.

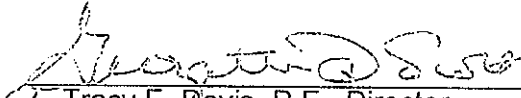
III. GENERAL CONDITIONS

1. This permit is not transferable to any person or entity except after notice to and approval by the Director. The permittee shall submit a completed and signed Name/Ownership Change Form, accompanied by the supporting documentation as listed on the form, to the Division of Energy, Mineral and Land Resources at least 60 days prior to any one or more of the following events:
 - a. An ownership change including the sale or conveyance of the project area in whole or in part, except in the case of an individual lot sale that is made subject to the recorded deed restrictions;
 - b. The sale or conveyance of the common areas to a Homeowner's or Property Owner's Association, subject to the requirements of Session Law 2011-256;
 - c. Bankruptcy;
 - d. Foreclosure;
 - e. Dissolution of the partnership or corporate entity;
 - f. A name change of the current permittee;
 - g. A name change of the project;
 - h. A mailing address change of the permittee;
2. Any individual or entity found to be in noncompliance with the provisions of a stormwater management permit or the stormwater rules, is subject to enforcement action as set forth in North Carolina General Statute 143 Article 21.

3. 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) which have jurisdiction.
4. In the event that the facilities fail to perform satisfactorily, the Permittee shall take immediate corrective action, including those as may be required by this Division, such as the construction of additional or replacement stormwater management systems.
5. The permittee grants DEQ Staff permission to enter the property for the purpose of inspecting all components of the permitted stormwater management facility.
6. The permit may be modified, revoked and reissued or terminated for cause. The filing of a request for a permit modification, revocation and reissuance or termination does not stay any permit condition.
7. Built-upon area is defined as impervious and partially impervious surface such as structures, asphalt, concrete, gravel, brick, stone, slate, coquina and permeable pavement, but does not include raised, uncovered, open slatted decking, or the water surface of swimming pools.

Permit revised and reissued this the 3rd day of March 2017

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION



for Tracy E. Davis, P.E., Director
Division of Energy, Mineral and Land Resources
By Authority of the Environmental Management Commission

Permit Number SW8 990306

Master Table
(See Excel File)

Westfall Office Park
Stormwater Permit No. SW8 990306
New Hanover County

Designer's Certification

I, _____, as a duly registered
_____ in the State of North Carolina, having been
authorized to observe (periodically/weekly/full time) the construction of the project,

_____ (P
roject)

for _____ (Project Owner) hereby state that, to the
best of my abilities, due care and diligence was used in the observation of the project
construction such that the construction was observed to be built within substantial
compliance and intent of the approved plans and specifications.

The checklist of items on page 2 of this form is included in the Certification.

Noted deviations from approved plans and specification:

SEAL

Signature _____

Registration Number _____

Date _____

Certification Requirements:

- _____ 1. The drainage area to the system contains approximately the permitted acreage.
- _____ 2. The drainage area to the system contains no more than the permitted amount of built-upon area.
- _____ 3. All the built-upon area associated with the project is graded such that the runoff drains to the system.
- _____ 4. The outlet/bypass structure elevations are per the approved plan.
- _____ 5. The outlet structure is located per the approved plans.
- _____ 6. Trash rack is provided on the outlet/bypass structure.
- _____ 7. All slopes are grassed with permanent vegetation.
- _____ 8. Vegetated slopes are no steeper than 3:1.
- _____ 9. The inlets are located per the approved plans and do not cause short-circuiting of the system.
- _____ 10. The permitted amounts of surface area and/or volume have been provided.
- _____ 11. Required drawdown devices are correctly sized per the approved plans.
- _____ 12. All required design depths are provided.
- _____ 13. All required parts of the system are provided, such as a vegetated shelf, and a forebay.
- _____ 14. The overall dimensions of the system, as shown on the approved plans, are provided.

cc: NCDEQ-DEMLR Regional Office
New Hanover County Building Inspections