Prepared for:

NEW CENTRE WILMINGTON, LLC

806 GREEN VALLEY ROAD, SUITE 311
GREENSBORO, NC 27408

Stormwater & Erosion Control Calculations

New Centre Apartments Fitness Center

New Hanover County, NC
City of Wilmington

May 25, 2016
Revised July 29, 2016
Revised October 28, 2016

Final Calcs
12/1/16
DP2016044
Rac

Curry
ENGINEERING

Prepared by:

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(919)552-0849

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SUPPORT DOCUMENTS

CALCULATIONS & ANALYSIS

CLAY ST
HENRY ST
DARLINGTON AVE
MAIDES AVE
MOSLEY ST
CAMDEN CIR
ROSEMONT AVE
METTING RD
LANCELOT LN
BARCLAY HILLS DR
F
WILSHIRE BLVD
ASHLEY CIR
Devon Park
Coll Of Wilmington
ESTATE
BIRCHWOOD DR
Fairlawn
JENNINGS DR
DECATUR DR
RANDALL PKWY
MARLBORO ST
CINEMA DR
Fernside
N KERR A
AVE
HOGGARD DR
EMERSON ST
MCCLELLAND DR
DR
S KERR AVE
PATRICK AVE
FRANKLIN AVE
CAPRI DR
GREENWAY AVE
LULLWATER DR
TULANE DR
DAPPLE CT
HUNT CLUB RD
132
NEW CENTRE DR
SIGMON RD
Bus
17
117
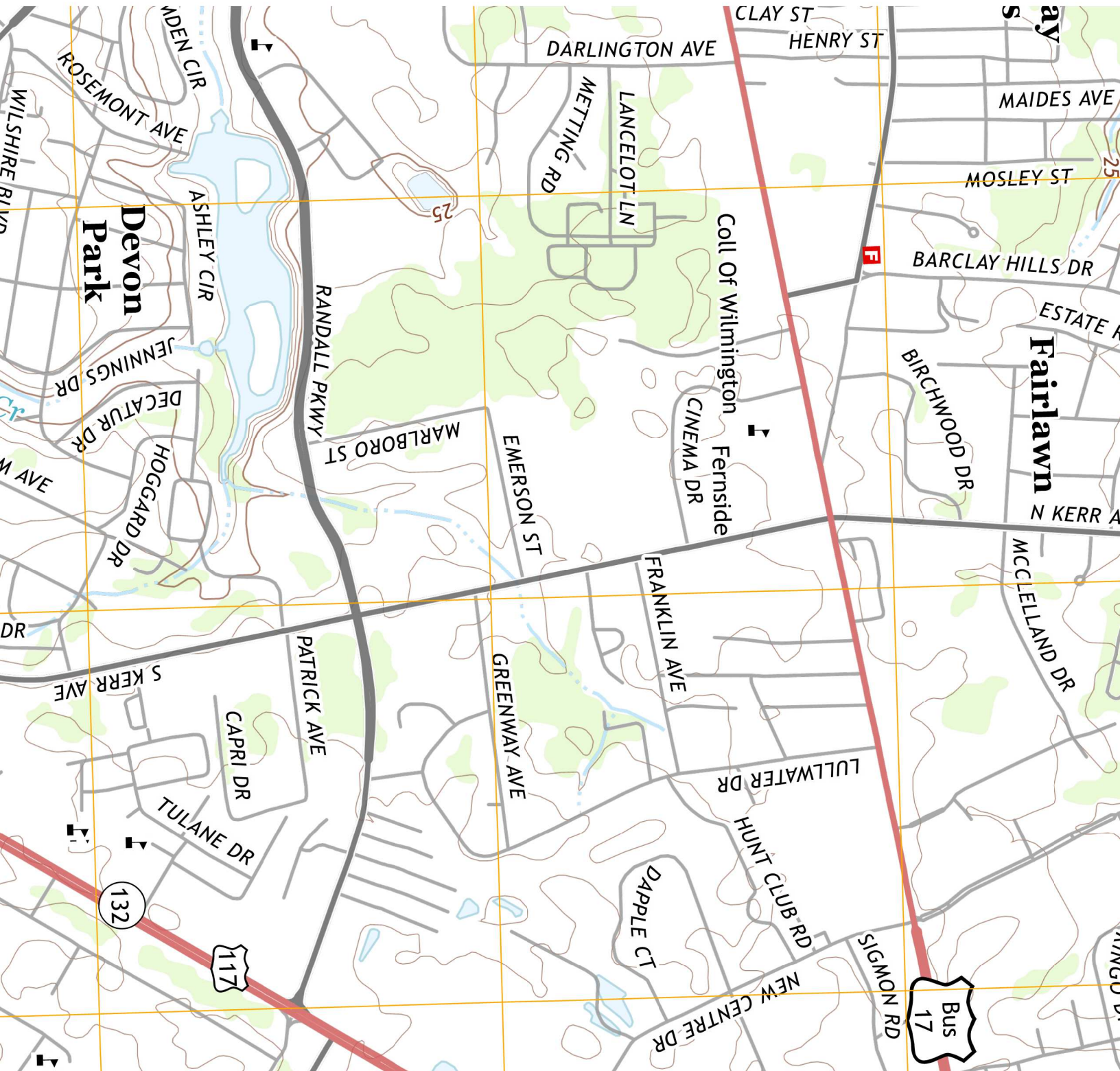
37 91
37 92
FEET
180 000
37 93

77°53'0"W

New Centre Dr

Dapple Ct

Franklin Ave

Vineyard Ln

Durango Pl

Amy Dr

Cedar Branch Ln

Red Bud Cir

Lullwater Dr

Greenway Ave

Ridge Way

beck Ct
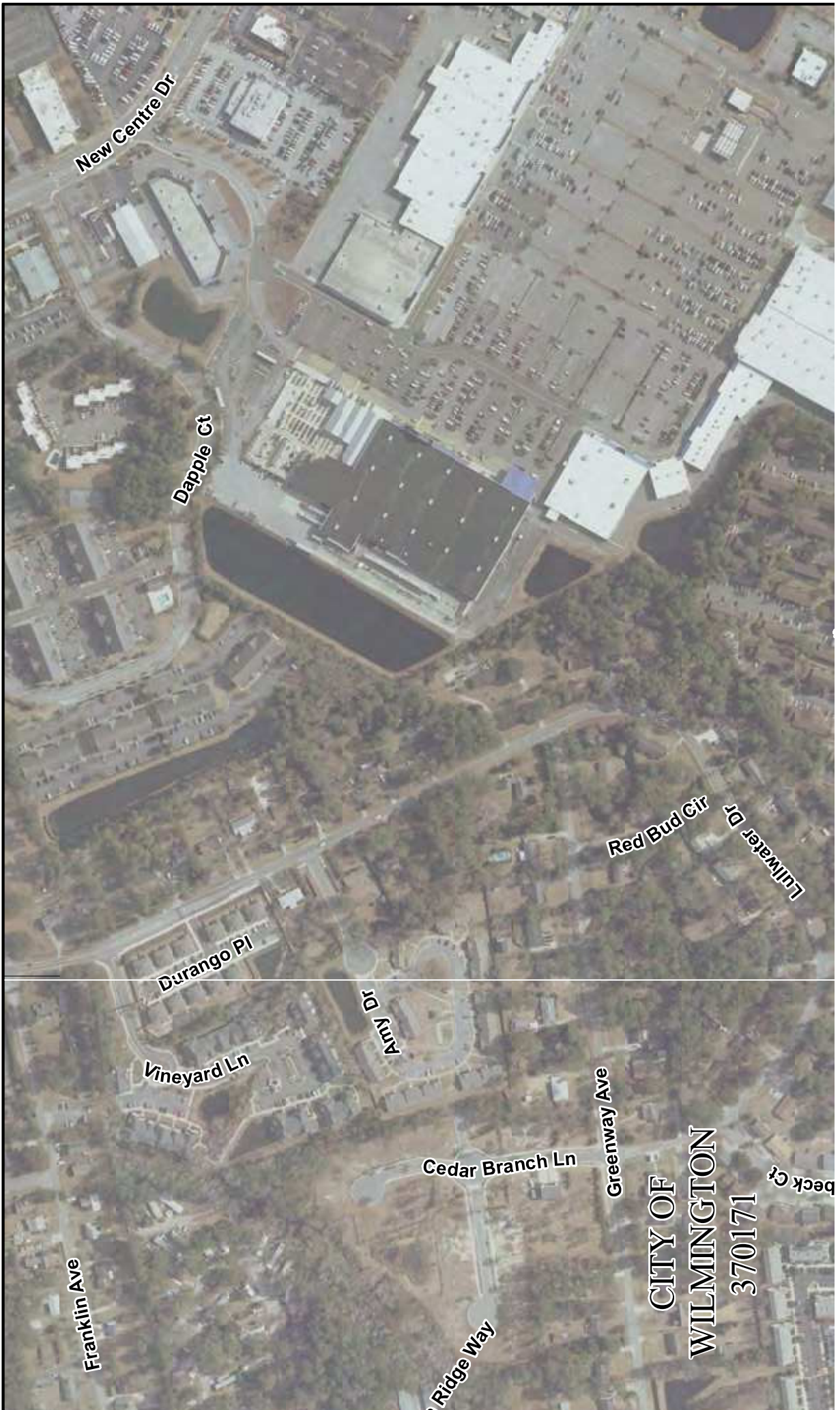
CITY OF
WILMINGTON
370171

Le

234762 234769 234776 234783 234790 234797 234804 234811 234818 234825

3792344 3792337 3792330 3792323 3792316 3792309 3792302

Map Scale: 1:308 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0   4   9   18   27

Feet
0   10   20   40   60
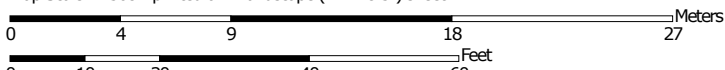
Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
☐ Area of Interest (AOI)

Soils
☐ Soil Map Unit Polygons
↬ Soil Map Unit Lines
■ Soil Map Unit Points

Special Point Features
⊙ Blowout
⊠ Borrow Pit
✼ Clay Spot
◇ Closed Depression
✕ Gravel Pit
∴ Gravelly Spot
⊛ Landfill
⋀ Lava Flow
⚓ Marsh or swamp
⚒ Mine or Quarry
◎ Miscellaneous Water
◯ Perennial Water
⌄ Rock Outcrop
✛ Saline Spot
∴ Sandy Spot
⊟ Severely Eroded Spot
◇ Sinkhole
⫝ Slide or Slip
⊘ Sodic Spot

≣ Spoil Area
⊙ Stony Spot
⊗ Very Stony Spot
⚐ Wet Spot
△ Other
▬ Special Line Features

Water Features
～ Streams and Canals

Transportation
+++ Rails
⌁ Interstate Highways
⌁ US Routes
≈ Major Roads
≈ Local Roads

Background
▦ Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: New Hanover County, North Carolina
Survey Area Data: Version 16, Sep 29, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

New Hanover County, North Carolina (NC129)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Le	Leon sand	0.3	100.0%
Totals for Area of Interest		**0.3**	**100.0%**

Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

5/25/2016
Page 3 of 3

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan

4

3

2

1

Outfall

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr Line No.	Line Length (ft)	Defl angle (deg)	Junc Type	Known Q (cfs)	Drng Area (ac)	Runoff Coeff (C)	Inlet Time (min)	Invert El Dn (ft)	Line Slope (%)	Invert El Up (ft)	Line Size (in)	Line Shape	N Value (n)	J-Loss Coeff (K)	Inlet/ Rim El (ft)	
1	End	12.060	-20.647	DrCrb	0.00	0.56	0.60	5.0	37.49	0.33	37.53	15	Cir	0.012	1.40	39.60	
2	1	22.210	-66.721	DrCrb	0.00	0.22	0.75	5.0	37.53	0.50	37.64	15	Cir	0.012	1.40	39.60	
3	2	63.880	-66.387	DrCrb	0.00	0.03	0.50	5.0	37.64	0.50	37.96	15	Cir	0.012	1.05	40.50	
4	3	33.250	40.554	DrCrb	0.00	0.09	0.70	5.0	37.96	0.51	38.13	15	Cir	0.012	1.00	40.60	

Project File: Pipe Network.stm | Number of lines: 4 | Date: 11/4/2016

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1		DropCurb	39.60	Cir	4.00	4.00	15	Cir	37.53	15	Cir	37.53
2		DropCurb	39.60	Cir	4.00	4.00	15	Cir	37.64	15	Cir	37.64
3		DropCurb	40.50	Cir	4.00	4.00	15	Cir	37.96	15	Cir	37.96
4		DropCurb	40.60	Cir	4.00	4.00	15	Cir	38.13			

Project File: Pipe Network.stm | Number of Structures: 4 | Run Date: 11/4/2016

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	12.060	0.56	0.90	0.60	0.34	0.58	5.0	8.1	8.5	4.93	4.03	4.02	15	0.33	37.49	37.53	38.74	38.78	39.84	39.60	
2	1	22.210	0.22	0.34	0.75	0.17	0.24	5.0	7.9	8.6	2.09	4.92	1.70	15	0.50	37.53	37.64	39.13	39.15	39.60	39.60	
3	2	63.880	0.03	0.12	0.50	0.02	0.08	5.0	6.1	9.3	0.72	4.95	0.59	15	0.50	37.64	37.96	39.21	39.22	39.60	40.50	
4	3	33.250	0.09	0.09	0.70	0.06	0.06	5.0	5.0	9.7	0.61	5.00	0.52	15	0.51	37.96	38.13	39.23	39.23	40.50	40.60	

Project File: Pipe Network.stm

Number of lines: 4

Run Date: 11/4/2016

NOTES:Intensity = 96.48 / (Inlet time + 12.40) ^ 0.80; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraulic Grade Line Computations

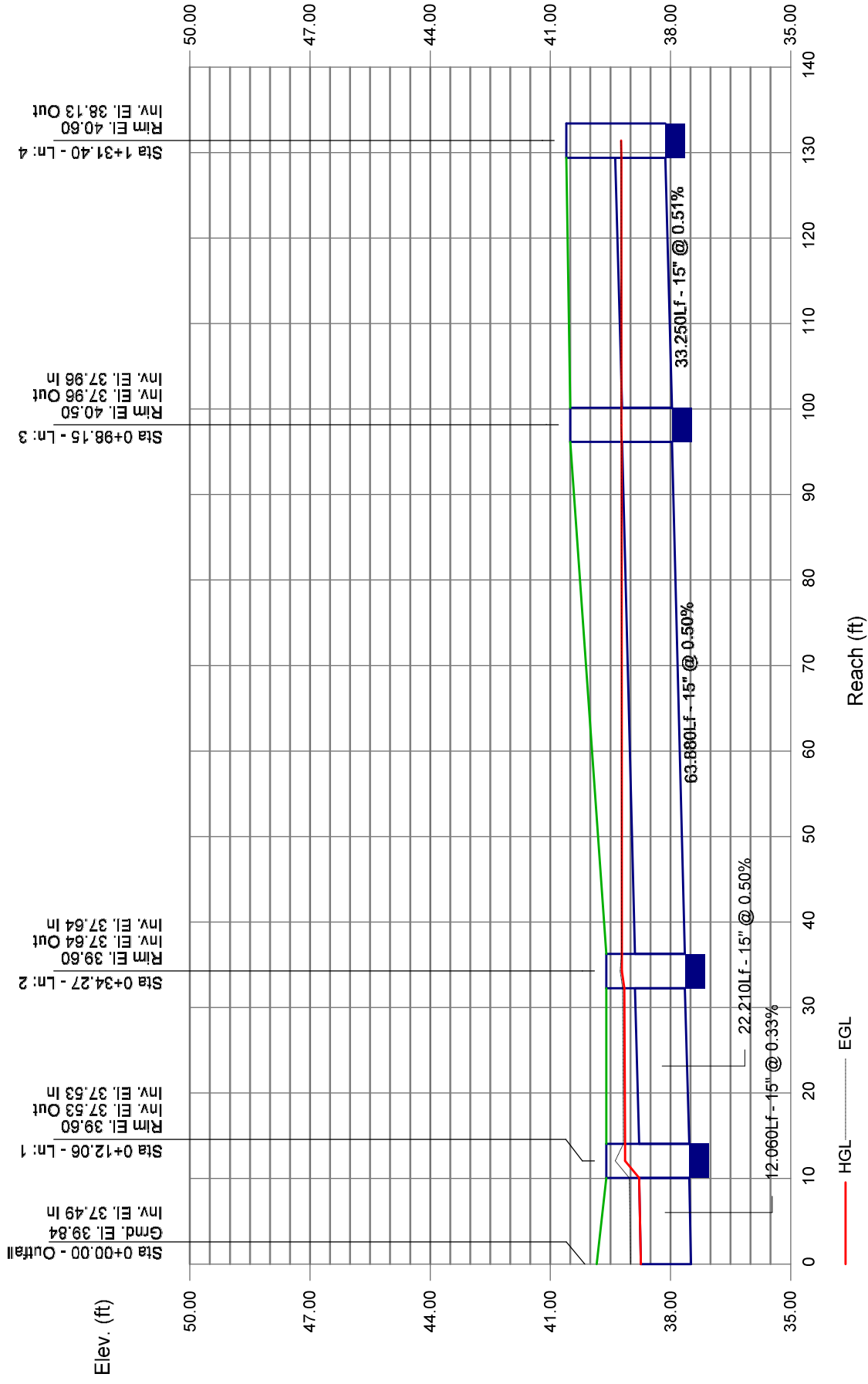| Line	Size (in)	Q (cfs)	Downstream								Len (ft)	Upstream								Check		JL coeff (K)	Minor loss (ft)
			Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)		Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)		
1	15	4.93	37.49	38.74	1.25	1.23	4.02	0.25	38.99	0.497	12.060	37.53	38.78	1.25	1.23	4.02	0.25	39.03	0.493	0.495	0.060	1.40	0.35
2	15	2.09	37.53	39.13	1.25	1.23	1.70	0.05	39.18	0.089	22.210	37.64	39.15	1.25	1.23	1.70	0.04	39.20	0.089	0.089	0.020	1.40	0.06
3	15	0.72	37.64	39.21	1.25	1.23	0.59	0.01	39.22	0.011	63.880	37.96	39.22	1.25	1.23	0.59	0.01	39.23	0.011	0.011	0.007	1.05	0.01
4	15	0.61	37.96	39.23	1.25	1.23	0.50	0.00	39.23	0.008	33.250	38.13	39.23	1.10	1.14	0.54	0.00	39.23	0.007	0.007	0.002	1.00	0.00

Project File: Pipe Network.stm

Number of lines: 4

Run Date: 11/4/2016

; c = cir e = ellip b = box

Storm Sewers v11.00

Storm Sewer Profile

Storm Sewers

Elev. (ft)

Reach (ft)

HGL

EGL

Sta 0+00.00 - Outfall
Grnd. El. 39.84
Inv. El. 37.49 In

Sta 0+12.06 - Ln: 1
Rim El. 39.60
Inv. El. 37.53 Out
Inv. El. 37.53 In

12.06Lf - 15" @ 0.33%

Sta 0+34.27 - Ln: 2
Rim El. 39.60
Inv. El. 37.64 Out
Inv. El. 37.64 In

22.21Lf - 15" @ 0.50%

63.88Lf - 15" @ 0.50%

Sta 0+98.15 - Ln: 3
Rim El. 40.50
Inv. El. 37.96 Out
Inv. El. 37.96 In

33.25Lf - 15" @ 0.51%

Sta 1+31.40 - Ln: 4
Rim El. 40.60
Inv. El. 38.13 Out

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line		Incr	Total		Incr	Total	Inlet	Syst					Size	Slope	Dn	Up	Dn	Up	Dn	Up	
		(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	End	12.060	0.56	0.90	0.60	0.34	0.58	5.0	7.5	10.7	6.18	4.03	5.03	15	0.33	37.49	37.53	38.74	38.83	39.84	39.60	
2	1	22.210	0.22	0.34	0.75	0.17	0.24	5.0	7.4	10.7	2.61	4.92	2.13	15	0.50	37.53	37.64	39.39	39.42	39.60	39.60	
3	2	63.880	0.03	0.12	0.50	0.02	0.08	5.0	5.9	11.4	0.89	4.95	0.73	15	0.50	37.64	37.96	39.51	39.53	39.60	40.50	
4	3	33.250	0.09	0.09	0.70	0.06	0.06	5.0	5.0	11.9	0.75	5.00	0.61	15	0.51	37.96	38.13	39.53	39.54	40.50	40.60	

Project File: Pipe Network.stm   Number of lines: 4   Run Date: 11/4/2016

NOTES:Intensity = 78.44 / (Inlet time + 10.10) ^ 0.70; Return period =Yrs. 50 ; c = cir e = ellip b = box

Storm Sewers v11.00

Hydraulic Grade Line Computations

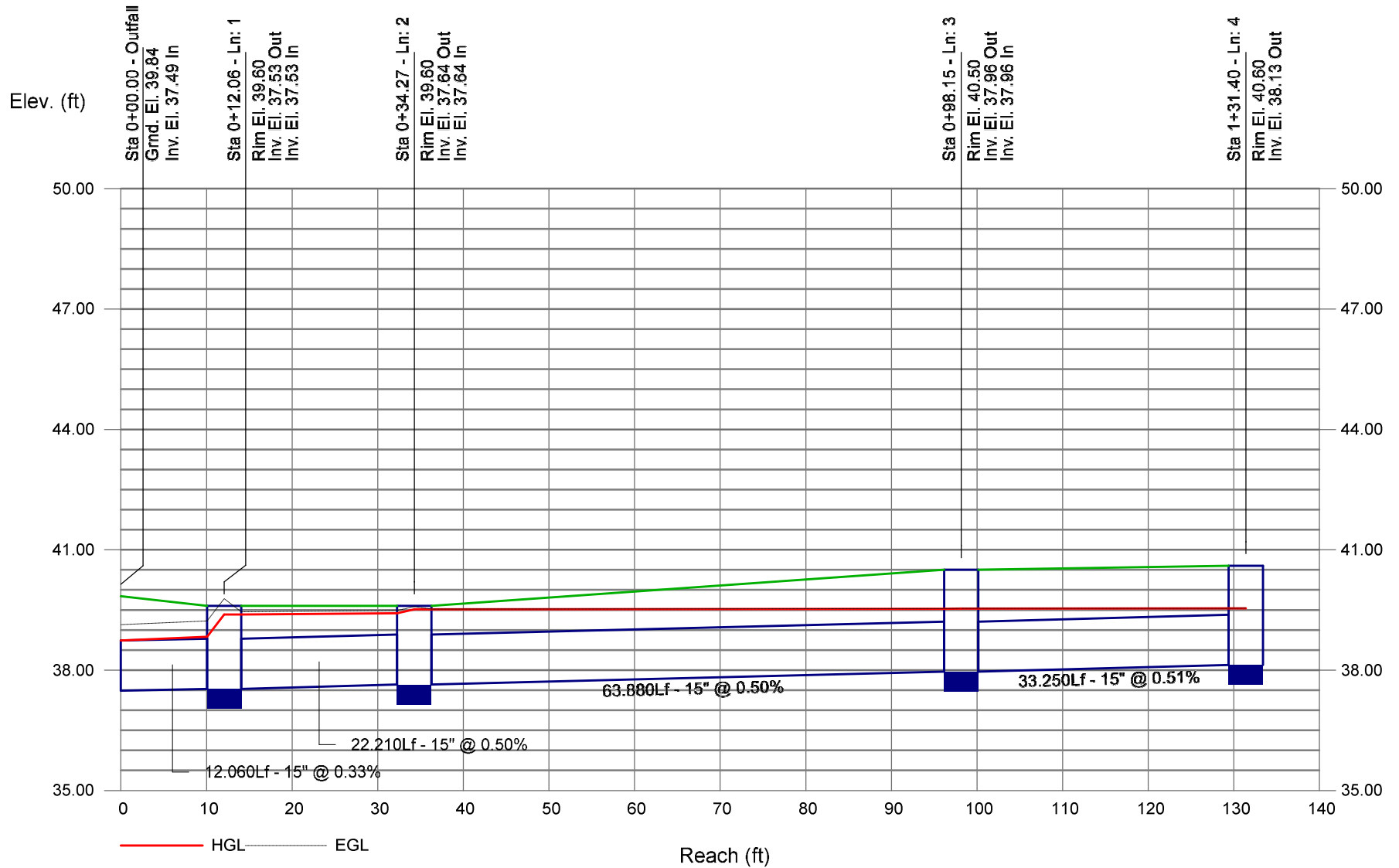| Line | Size | Q | Downstream | | | | | | | | Len | Upstream | | | | | | | | Check | | JL coeff | Minor loss |
| | | | Invert elev | HGL elev | Depth | Area | Vel | Vel head | EGL elev | Sf | | Invert elev | HGL elev | Depth | Area | Vel | Vel head | EGL elev | Sf | Ave Sf | Enrgy loss | | |
	(in)	(cfs)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(ft)	(ft)	(ft)	(ft)	(sqft)	(ft/s)	(ft)	(ft)	(%)	(%)	(ft)	(K)	(ft)
1	15	6.18	37.49	38.74	1.25	1.23	5.03	0.39	39.13	0.780	12.060	37.53	38.83	1.25	1.23	5.03	0.39	39.23	0.780	0.780	0.094	1.40	0.55
2	15	2.61	37.53	39.39	1.25	1.23	2.13	0.07	39.46	0.139	22.210	37.64	39.42	1.25	1.23	2.13	0.07	39.49	0.139	0.139	0.031	1.40	0.10
3	15	0.89	37.64	39.51	1.25	1.23	0.73	0.01	39.52	0.016	63.880	37.96	39.53	1.25	1.23	0.73	0.01	39.53	0.016	0.016	0.010	1.05	0.01
4	15	0.75	37.96	39.53	1.25	1.23	0.61	0.01	39.54	0.011	33.250	38.13	39.54	1.25	1.23	0.61	0.01	39.54	0.011	0.011	0.004	1.00	0.01

Project File: Pipe Network.stm | Number of lines: 4 | Run Date: 11/4/2016

; c = cir e = ellip b = box

Storm Sewer Profile

Elev. (ft)

Sta 0+00.00 - Outfall
Gmd. El. 39.84
Inv. El. 37.49 In

Sta 0+12.06 - Ln: 1
Rim El. 39.60
Inv. El. 37.53 Out
Inv. El. 37.53 In

Sta 0+34.27 - Ln: 2
Rim El. 39.60
Inv. El. 37.64 Out
Inv. El. 37.64 In

Sta 0+98.15 - Ln: 3
Rim El. 40.50
Inv. El. 37.96 Out
Inv. El. 37.96 In

Sta 1+31.40 - Ln: 4
Rim El. 40.60
Inv. El. 38.13 Out

63.880Lf - 15" @ 0.50%

33.250Lf - 15" @ 0.51%

22.210Lf - 15" @ 0.50%

12.060Lf - 15" @ 0.33%

——— HGL ········· EGL

Reach (ft)

Wet Detention Basin Modification Calculations

Project: Hawthorne at New Centre
Location: Wilmington, NC
Date   5/24/2016

Pond Number: 1

Total Project Area: | 774,932 | sf or | 17.79 | ac

Total On-Site Drainage Area: | 774,932 | sf or | 17.79 | ac
Off-site Drainage Area: | 0 | sf or | 0.00 | ac
                                     Total: | 17.79 | ac.

On-Site Impervious Area:

Buildings (Existing):	101,295	sf	Originally Approved Imp. Area:	406,563
Parking & Roads (Existing):	263,236	sf	Original Approved % Imp:	52.46%
Sidewalks (Existing):	42,032	sf		
New Impervious:	**4,990**	sf	Modified Watershed % Imp:	53.75%
Future Impv. (from Mod):	5,000	sf	(including new Imp. Area)	
Off-Site Impervious:	0	sf	Total New Impervious Area:	9,990

Total Impervious Area: | 416,553 | sf or | 9.56 | ac.

Calculate Required Surface Area:

        Avg. Perm. Pool Depth: 7 Feet   (per permit)
              SA/DA Ratio: 2.08

        Minimum Required Surface Area: | 16119 | sf

Calculate Original WQv Storage Volume:

        Use Simple Method with volume for 1.0" storm (per original pond design):

        Rv= 0.05+0.009(I)
        Rv= Runoff Coefficient (ratio of runoff to rainfall in inches)
        Io= Impervious Percentage-Original

              Rv= | 0.53 |

        WQv= 3630 x Rd x Rv x A   Rd= Design Storm= 1.0"
                                                   A= Drainage Area
              WQv= | **34470** | **cf**   WQv= Storage Volume

Calculate Delta WQv Storage Volume (based on new impervious area only):

Use Simple Method with volume for 1.5" storm (for new impervious area):

Rv= 0.05+0.009(I)

Rv= Runoff Coefficient (ratio of runoff to rainfall in inches)

Ip= Impervious Percentage-Additional= 100%   (Assume additional impervious area
                                                    is separate watershed with 100% imp.

Rv= | 0.95 | coverage)

WQv= 3630 x Rd x Rv x A   Rd= Design Storm= 1.5"
                                           A= Drainage Area-New Impervious Area Only
WQv= | **1186** | cf   WQv= Storage Volume

Total WQv= Original WQv Volume + Delta WQv Volume
Total WQv= | **35657** | cf

Elevation	Contour Area	Inc. Volume	Accumulated Volume	Stage
	(sf)	(cf)	(cf)	
35.10	27500	0	0	0
35.50	28301	11160	11160	0.4
36.00	29320	14405	25565	0.9
36.50	30356	14919	40484	1.4
37.00	31410	15442	55926	1.9

Calculated S-S Parameters:

b= | 1.0344 |
Ks= | 28792.7535 |

Orifice El: 35.10
Overflow El: 37.00

Overflow Spillway Stage: | 1.9 | ft
Spillway Crest Length | 5 | ft
Storage Below Overflow: | **55926** | cf   S=Ks*Z^b

WQv Stage: | **1.23** | **or Elevation** | **36.33** |
Surface Area at WQv Stage: | **30003** | **Square Feet**

Calculate WQv Drawdown Time:

Drawdown Orifice Diameter: | 2.50 | Cross Section Area: | 0.03407 | sf
Orifice Coefficient: | 0.60 | Average Head: | 0.5986 | ft
Number of Orifices: | 1 | Discharge: | 0.1269 | cfs

WQv Drawdown Time: | 78.03 | hours or | 3.25 | days

Weighted Curve Number Calculation

Existing Impervious Percentage:	52.4643%
New Impervious Percentage:	53.7535%

Hydraulic Soil Group: Leon, Murville   Use HSG C

Curve Numbers:

Impervious:	98
Grass, Good Condition:	74

Existing Weighted CN:	86.59
New Weighted CN:	86.90

Based on the Weighted Curve number, pond flood routing and overflow hydraulics should remain the same. Note that this analysis does not constitute a flood-routing analysis of the existing pond.

NOAA Atlas 14, Volume 2, Version 3
Location name: Wilmington, North Carolina, US*
Latitude: 34.2387°, Longitude: -77.8797°
Elevation: 41 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

| PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]										
Duration	**Average recurrence interval (years)**									
	1	**2**	**5**	**10**	**25**	**50**	**100**	**200**	**500**	**1000**
5-min	6.28 (5.87-6.76)	7.45 (6.95-8.02)	8.72 (8.14-9.36)	9.72 (9.02-10.4)	11.0 (10.2-11.8)	11.9 (11.0-12.8)	12.9 (11.8-13.8)	13.9 (12.6-14.9)	15.1 (13.6-16.3)	16.1 (14.4-17.4)
10-min	5.01 (4.69-5.39)	5.96 (5.56-6.41)	6.98 (6.51-7.50)	7.78 (7.22-8.35)	8.75 (8.09-9.37)	9.49 (8.74-10.2)	10.2 (9.38-11.0)	11.0 (9.99-11.8)	12.0 (10.8-12.9)	12.7 (11.3-13.7)
15-min	4.18 (3.90-4.50)	5.00 (4.66-5.37)	5.89 (5.49-6.32)	6.56 (6.09-7.04)	7.39 (6.84-7.92)	8.01 (7.38-8.60)	8.64 (7.91-9.26)	9.24 (8.40-9.92)	10.0 (9.03-10.8)	10.6 (9.49-11.5)
30-min	2.86 (2.68-3.08)	3.45 (3.22-3.71)	4.19 (3.90-4.49)	4.75 (4.41-5.10)	5.47 (5.06-5.86)	6.03 (5.55-6.47)	6.61 (6.05-7.09)	7.19 (6.54-7.72)	7.98 (7.19-8.60)	8.61 (7.68-9.28)
60-min	1.78 (1.67-1.92)	2.16 (2.02-2.33)	2.68 (2.50-2.88)	3.09 (2.87-3.32)	3.65 (3.37-3.90)	4.09 (3.76-4.38)	4.55 (4.17-4.88)	5.04 (4.59-5.42)	5.72 (5.16-6.17)	6.29 (5.61-6.78)
2-hr	1.05 (0.972-1.15)	1.28 (1.18-1.40)	1.64 (1.51-1.78)	1.93 (1.77-2.11)	2.36 (2.16-2.57)	2.73 (2.48-2.97)	3.13 (2.83-3.40)	3.57 (3.20-3.87)	4.22 (3.75-4.59)	4.78 (4.21-5.22)
3-hr	0.750 (0.693-0.821)	0.911 (0.840-0.996)	1.17 (1.07-1.27)	1.39 (1.27-1.51)	1.72 (1.57-1.87)	2.01 (1.82-2.19)	2.33 (2.10-2.53)	2.69 (2.40-2.92)	3.24 (2.85-3.51)	3.72 (3.23-4.04)
6-hr	0.467 (0.432-0.512)	0.568 (0.525-0.622)	0.728 (0.671-0.797)	0.868 (0.797-0.948)	1.08 (0.983-1.17)	1.26 (1.15-1.37)	1.47 (1.32-1.60)	1.70 (1.52-1.85)	2.06 (1.81-2.24)	2.37 (2.06-2.58)
12-hr	0.272 (0.249-0.300)	0.330 (0.302-0.363)	0.426 (0.390-0.469)	0.511 (0.465-0.560)	0.639 (0.577-0.699)	0.753 (0.676-0.822)	0.882 (0.787-0.963)	1.03 (0.907-1.12)	1.26 (1.09-1.37)	1.46 (1.25-1.59)
24-hr	0.161 (0.147-0.179)	0.195 (0.178-0.218)	0.253 (0.230-0.281)	0.303 (0.275-0.337)	0.381 (0.342-0.422)	0.451 (0.401-0.499)	0.530 (0.466-0.587)	0.620 (0.538-0.688)	0.759 (0.645-0.848)	0.883 (0.737-0.991)
2-day	0.095 (0.087-0.106)	0.115 (0.106-0.128)	0.148 (0.135-0.164)	0.176 (0.161-0.195)	0.220 (0.198-0.243)	0.258 (0.230-0.286)	0.301 (0.266-0.335)	0.350 (0.304-0.391)	0.425 (0.361-0.477)	0.490 (0.410-0.554)
3-day	0.068 (0.062-0.075)	0.082 (0.075-0.090)	0.104 (0.095-0.115)	0.124 (0.113-0.137)	0.153 (0.138-0.169)	0.179 (0.160-0.198)	0.207 (0.183-0.230)	0.239 (0.209-0.267)	0.288 (0.246-0.323)	0.331 (0.278-0.374)
4-day	0.054 (0.050-0.060)	0.065 (0.060-0.072)	0.082 (0.075-0.091)	0.097 (0.089-0.107)	0.120 (0.108-0.132)	0.139 (0.124-0.153)	0.160 (0.142-0.178)	0.184 (0.161-0.205)	0.219 (0.189-0.246)	0.251 (0.212-0.283)
7-day	0.035 (0.033-0.039)	0.043 (0.040-0.047)	0.054 (0.050-0.059)	0.063 (0.058-0.069)	0.076 (0.070-0.083)	0.088 (0.080-0.096)	0.100 (0.090-0.110)	0.114 (0.101-0.125)	0.134 (0.117-0.148)	0.150 (0.130-0.167)
10-day	0.028 (0.026-0.030)	0.034 (0.031-0.036)	0.042 (0.039-0.045)	0.048 (0.045-0.053)	0.058 (0.053-0.063)	0.066 (0.061-0.072)	0.075 (0.068-0.082)	0.085 (0.076-0.093)	0.099 (0.087-0.109)	0.110 (0.096-0.123)
20-day	0.019 (0.018-0.020)	0.022 (0.021-0.024)	0.027 (0.025-0.029)	0.031 (0.029-0.034)	0.037 (0.034-0.040)	0.042 (0.038-0.045)	0.047 (0.043-0.051)	0.052 (0.047-0.057)	0.060 (0.053-0.065)	0.066 (0.058-0.073)
30-day	0.015 (0.014-0.016)	0.018 (0.017-0.019)	0.022 (0.021-0.023)	0.025 (0.023-0.026)	0.029 (0.027-0.031)	0.032 (0.030-0.034)	0.036 (0.033-0.038)	0.039 (0.036-0.042)	0.044 (0.040-0.048)	0.048 (0.043-0.052)
45-day	0.013 (0.012-0.014)	0.015 (0.014-0.016)	0.018 (0.017-0.019)	0.020 (0.019-0.021)	0.023 (0.022-0.025)	0.026 (0.024-0.027)	0.028 (0.026-0.030)	0.031 (0.029-0.033)	0.035 (0.032-0.037)	0.037 (0.034-0.041)
60-day	0.012 (0.011-0.012)	0.014 (0.013-0.014)	0.016 (0.015-0.017)	0.018 (0.017-0.019)	0.020 (0.019-0.021)	0.022 (0.021-0.023)	0.024 (0.022-0.026)	0.026 (0.024-0.028)	0.028 (0.026-0.031)	0.030 (0.028-0.033)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

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PF graphical

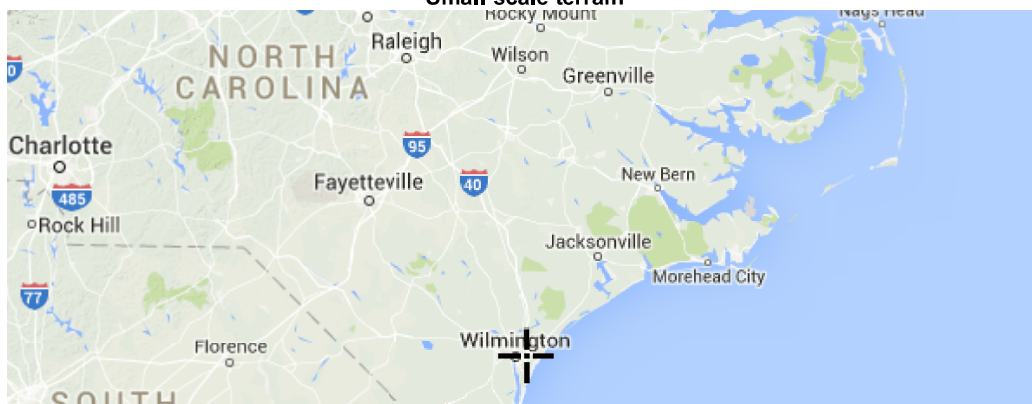## PDS-based intensity-duration-frequency (IDF) curves
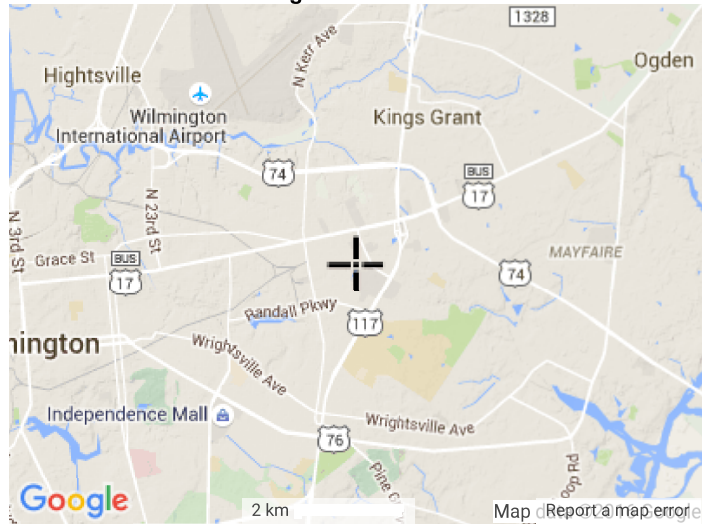### Latitude: 34.2387°, Longitude: -77.8797°

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Created (GMT): Tue May 17 19:58:34 2016
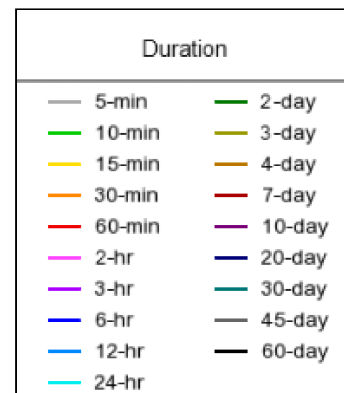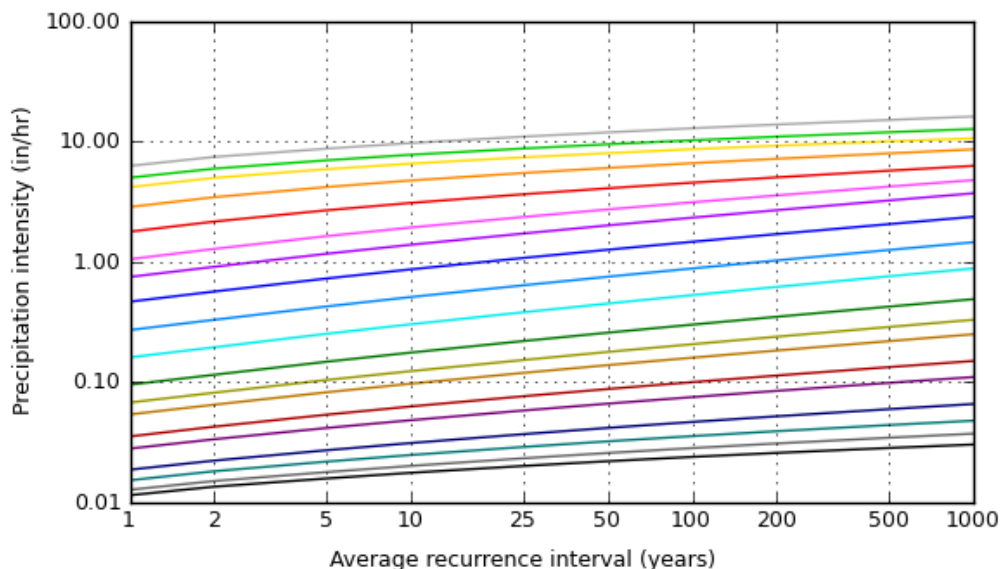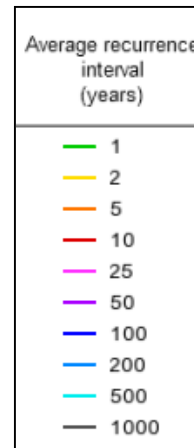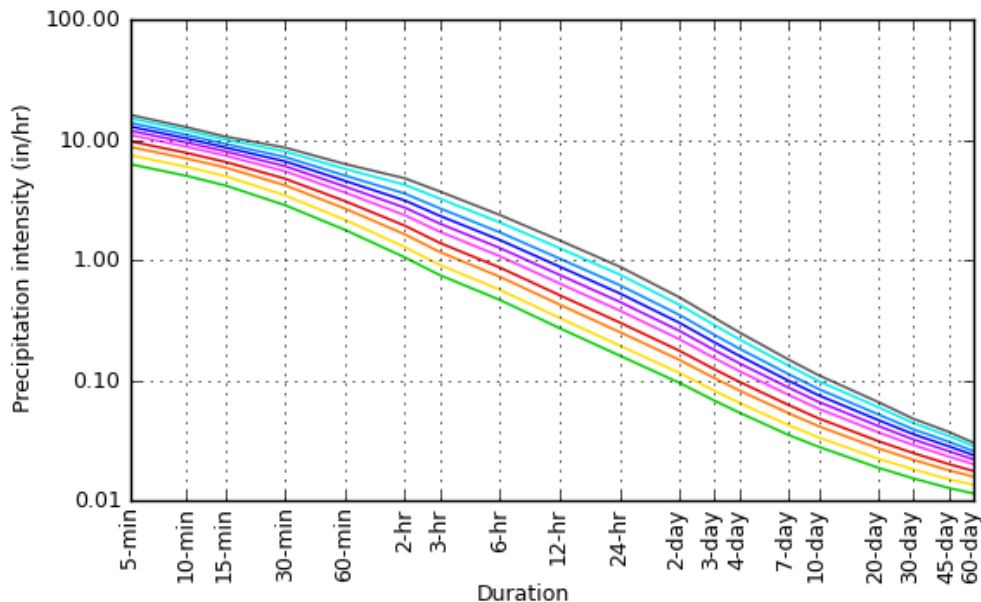
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Maps & aerials
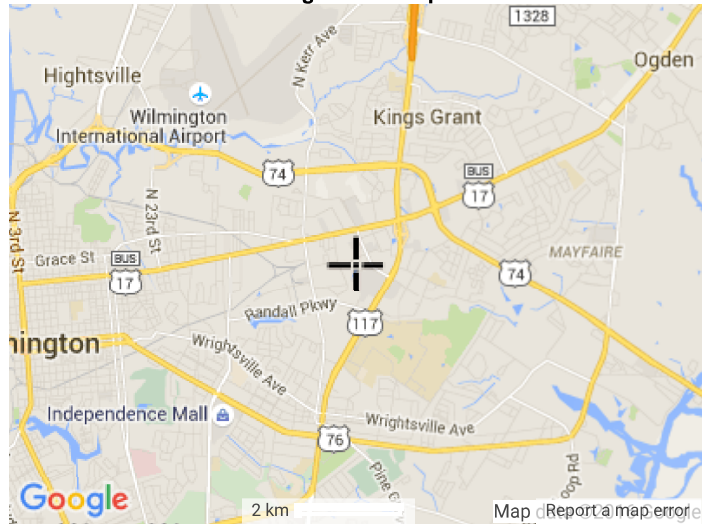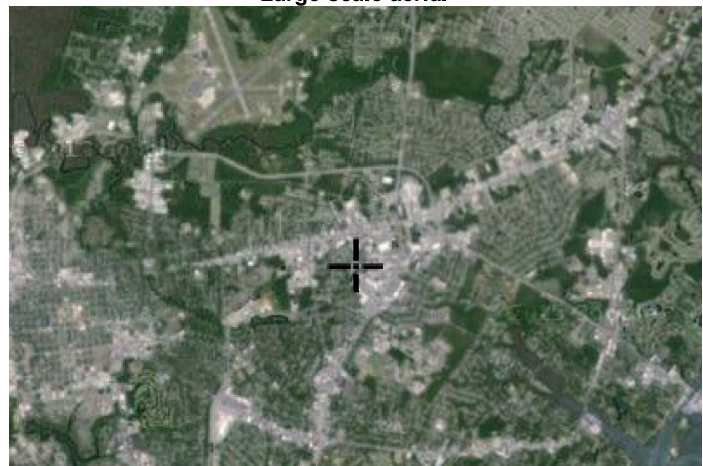
Small scale terrain

Large scale terrain

Large scale map

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