

SANCAR TURKISH CULTURAL AND COMMUNITY CENTER



Contract Purchaser

Aziz and Gwen Sancar Foundation
311 West University Drive - Chapel Hill, NC 27516
Phone: 919 933 9154 | Email: gwendolyn_sancar@med.unc.edu

SPECIAL USE PERMIT APPLICATION

May 26, 2016

Architect

Innovative Design
Mike Nicklas, FAIA
850 West Morgan Street - Raleigh, NC, 27603
Phone: 919 832 6303 | Email: nicklas@innovativedesign.net

Civil Engineer

B+F CONSULTING
2805 Tobermory Lane - Raleigh, NC 28606
NC licence: c-2149
Phone: 919 618 0180 | Email: rbriggs@nc.rr.com

**SPECIAL USE PERMIT
APPLICATION**



TOWN OF CHAPEL HILL
Planning Department
405 Martin Luther King Jr. Blvd
Chapel Hill, NC 27514
phone (919) 968-2728 fax (919) 969-2014
www.townofchapelhill.org

Parcel Identifier Number (PIN): 9799047995 & 9799046951 Date: 5/26/2016

Section A: Project Information

Project Name: SANCAR TURKISH CULTURAL & COMMUNITY CENTER
Property Address: 1609(1605) E. FRANKLIN STREET Zip Code: 27514
Use Groups (A, B, and/or C): NC-C Existing Zoning District: _____
Project Description: COMMUNITY CENTER AND GUEST HOUSE

Section B: Applicant, Owner and/or Contract Purchaser Information

Applicant Information (to whom correspondence will be mailed)

Name: AZIZ & GWEN SANCAR FOUNDATION (% GWEN SANCAR)
Address: 311 WEST UNIVERSITY DRIVE
City: CHAPEL HILL State: NC Zip Code: 27516
Phone: 919 933 9154 Email: GWENDOLYN_SANCAR@MED.UNC.EDU

The undersigned applicant hereby certifies that, to the best of his knowledge and belief, all information supplied with this application is true and accurate.

Signature: *Gwen Sancar* Date: 5/26/2016

Owner/Contract Purchaser Information:

Owner Contract Purchaser

Name: AZIZ & GWEN SANCAR FOUNDATION (% GWEN SANCAR)
Address: 311 WEST UNIVERSITY DRIVE
City: CHAPEL HILL State: NC Zip Code: 27516
Phone: 929 933 9154 Email: GWENDOLYN_SANCAR@MED.UNC.EDU

The undersigned applicant hereby certifies that, to the best of his knowledge and belief, all information supplied with this application is true and accurate.

Signature: *Gwen Sancar* Date: 5/26/2016



PROJECT FACT SHEET
TOWN OF CHAPEL HILL
Planning Department

Section A: Project Information

Application type: SPECIAL USE PERMIT APPLICATION Date: 5/26/2016

Project Name: SANCAR TURKISH CULTURAL AND COMMUNITY CENTER

Use Type: (check/list all that apply)

Office/Institutional Residential Mixed-Use Other: COMMUNITY CENTER & GUEST HOUSE

Overlay District: (check all those that apply)

Historic District Neighborhood Conservation District Airport Hazard Zone

Section B: Land Area

Net Land Area (NLA): Area within zoning lot boundaries		NLA=	<u>75,271</u>	sq. ft.
Choose one, or both, of the following (a or b,) not to exceed 10% of NLA	a) Credited Street Area (total adjacent frontage) x ½ width of public right-of-way <u>E. FRANKLIN (224.24 x 50) VEWMA (78.76 x 30)</u>	CSA=	<u>7527</u> <u>(10%)</u>	sq. ft.
	b) Credited Permanent Open Space (total adjacent frontage) x ½ public or dedicated open space	COS=	<u>—</u>	sq. ft.
TOTAL: NLA + CSA and/or COS = Gross Land Area (not to exceed NLA + 10%)		GLA=	<u>82,798</u>	sq. ft.

Section C: Special Protection Areas, Land Disturbance, and Impervious Area

Special Protection Areas: (check all those that apply)

Jordan Buffer Resource Conservation District 100 Year Floodplain Watershed Protection District

Land Disturbance	Total (sq ft)
Area of Land Disturbance (Includes: Footprint of proposed activity plus work area envelope, staging area for materials, access/equipment paths, all grading, including off-site clearing)	<u>75,977 S.F.</u>
Area of Land Disturbance within RCD	<u>N/A</u>
Area of Land Disturbance within Jordan Buffer	<u>N/A</u>

Impervious Areas	Existing (sq ft)	Demolition (sq ft)	Proposed (sq ft)	Total (sq ft)
Impervious Surface Area (ISA)	<u>9679</u>	<u>9679</u>	<u>37252</u>	<u>37252</u>
Impervious Surface Ratio: Percent Impervious Surface Area of Gross Land Area (ISA/GLA) %	<u>11.72</u>	<u>11.79%</u>	<u>45.09%</u>	<u>45.09%</u>
If located in Watershed Protection District, % of impervious surface on 7/1/1993	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>



PROJECT FACT SHEET
TOWN OF CHAPEL HILL
Planning Department

Section D: Dimensions

Dimensional Unit (sq ft)	Existing (sq ft)	Demolition (sq ft)	Proposed (sq ft)	Total (sq ft)
Number of Buildings	(1) 3,916 SF	(1) 3,916 SF	(2) 12,551 SF	12,551 SF
Number of Floors	ONE	ONE	CENTER - ONE GUEST HOUSE - TWO	CENTER - ONE GUEST HOUSE - TWO
Recreational Space (NOT REG. BUT GARDEN PROVIDED)	-	-	GARDEN 2,966 SF	GARDEN 2,966 SF

Residential Space - ONE - GUEST HOUSE				
Dimensional Unit (sq ft)	Existing (sq ft)	Demolition (sq ft)	Proposed (sq ft)	Total (sq ft)
Floor Area (all floors - heated and unheated)			3,916 SF	3,916 SF
Total Square Footage of All Units			3,916 SF	3,916 SF
Total Square Footage of Affordable Units			-	-
Total Residential Density			-	-
Number of Dwelling Units			ONE	ONE
Number of Affordable Dwelling Units			-	-
Number of Single Bedroom Units			-	-
Number of Two Bedroom Units			-	-
Number of Three Bedroom Units			-	-

Non-Residential Space (Gross Floor Area in Square Feet)					
Use Type	Existing	Proposed	Uses	Existing	Proposed
Commercial					
Restaurant			# of Seats		
Government					
Institutional					
Medical					
Office					
Hotel			# of Rooms		
Industrial					
Place of Worship			# of Seats		
Other COMMUNITY CENTER		9,642 SF			

Dimensional Requirements		Required by Ordinance	Existing	Proposed
Setbacks (minimum)	Street	20 FT	34 FT. (MIN)	20 FT
	Interior (neighboring property lines)	10 FT	12 FT (MIN)	10 FT
	Solar (northern property line)	11 FT	N/A	14 FT
Height (maximum)	Primary	34 FT	TO BE REMOVED	16 FT
	Secondary	60 FT	TO BE REMOVED	27 FT
Streets	Frontages	40 FT	224' FRANKLIN 79' VELMA	224' FRANKLIN 79' VELMA
	Widths	40 FT	68' FRANKLIN 33' VELMA	68' FRANKLIN 33' VELMA



PROJECT FACT SHEET
TOWN OF CHAPEL HILL
Planning Department

Section F: Adjoining or Connecting Streets and Sidewalks

(Note: For approval of proposed street names, contact the Engineering Department)

Street Name	Right-of-way Width	Pavement Width	Number of Lanes	Existing Sidewalk*	Existing curb/gutter
E. FRANKLIN ST.	100 FT	68 FT (VARIES)	5	<input checked="" type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes
VELMA	60 FT (VARIES)	33 FT (VARIES)	2	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> Yes

List Proposed Points of Access (Ex: Number, Street Name):

* SIDEWALKS DO EXIST ON E. FRANKLIN BUT DESIGN PROVIDES FOR MODIFYING & WIDENING
*If existing sidewalks do not exist and the applicant is adding sidewalks, please provide the following information:

Sidewalk Information			
Street Names	Dimensions	Surface	Handicapped Ramps
E. FRANKLIN ST.	5 FT	CONCRETE	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A

Section G: Parking Information

Parking Spaces	CENTRAL Minimum GUEST	CENTRAL Maximum GUEST	CENTRAL Proposed GUEST
Regular Spaces	32	32	36
Handicap Spaces	2	2	2
Total Spaces	34	34	38
Loading Spaces	0	0	0
Bicycle Spaces	4	4	8
Surface Type	ASPHALT	ASPHALT	ASPHALT

Section H: Landscape Buffers

Location (North, South, Street, Etc.)	Minimum Width	Proposed Width	Alternate Buffer	Modify Buffer
E. FRANKLIN ST	20 LF	20 LF	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
VELMA	20 LF	20 LF	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
EAST & WEST	10 LF	10 LF	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
			<input type="checkbox"/> Yes	<input type="checkbox"/> Yes



PROJECT FACT SHEET
 TOWN OF CHAPEL HILL
 Planning Department

Section I: Land Use Intensity

Existing Zoning District:
 Proposed Zoning Change (if any):

Note: Refer to Table 3.8-1 (Dimensional Matrix) in the Land Use Management Ordinance for help completing this table.

Zoning – Area – Ratio			Impervious Surface Thresholds			Minimum and Maximum Limitations	
Zoning District(s)	Floor Area Ratio (FAR)	Recreation Space Ratio (RSR)	Low Density Residential (0.24)	High Density Residential (0.50)	Non-Residential (0.70)	Maximum Floor Area (MFA) = FAR x GLA	Minimum Recreation Space (MSR) = RSR x GLA
NC-C		N/A			57,958 ^{SF}	21,858 ^{SF}	0 ^{SF}
TOTAL					57,958 ^{SF}	21,858 ^{SF}	0 ^{SF}
RCD Streamside		0.01					0 ^{SF}
RCD Managed		0.019					0 ^{SF}
RCD Upland							0 ^{SF}

Section J: Utility Service

Check all that apply

Water	<input checked="" type="checkbox"/> OWASA	<input type="checkbox"/> Individual Well	<input type="checkbox"/> Community Well	<input type="checkbox"/> Other
Sewer	<input checked="" type="checkbox"/> OWASA	<input type="checkbox"/> Individual Septic Tank	<input type="checkbox"/> Community Package Plant	<input type="checkbox"/> Other
Electrical	<input checked="" type="checkbox"/> Underground	<input type="checkbox"/> Above Ground		
Telephone	<input checked="" type="checkbox"/> Underground	<input type="checkbox"/> Above Ground		
Solid Waste	<input checked="" type="checkbox"/> Town	<input type="checkbox"/> Private		



**SPECIAL USE PERMIT APPLICATION
SUBMITTAL REQUIREMENTS
TOWN OF CHAPEL HILL
Planning Department**

The following must accompany your application. Failure to do so will result in your application being considered incomplete. For assistance with this application, please contact the Chapel Hill Planning Department (Planning) at (919)968-2728 or at planning@townofchapelhill.org.

X	Application fee (including Engineering Review fee) (refer to fee schedule)	Amount Paid \$	11,550
X	Pre-application meeting – with appropriate staff		
X	Digital Files - provide digital files of all plans and documents		
X	Recorded Plat or Deed of Property		
X	Project Fact Sheet		
X	Traffic Impact Statement – completed by Town’s consultant (or exemption)		
N/A	Description of Public Art Proposal		
X	Statement of Justification		
X	Response to Community Design Commission and Town Council Concept Plan comments		
N/A	Affordable Housing Proposal, if applicable		
N/A	Provide existing Special Use Permit, if Modification		
X	Mailing list of owners of property within 1,000 feet perimeter of subject property (see GIS notification tool)		
X	Mailing fee for above mailing list (mailing fee is double due to 2 mailings)	Amount Paid \$	193
X	Written Narrative describing the proposal		
N/A	Resource Conservation District, Floodplain, & Jordan Buffers Determination - necessary for all submittals		
N/A	Jurisdictional Wetland Determination – if applicable		
N/A	Resource Conservation District Encroachment Exemption or Variance (determined by Planning)		
N/A	Jordan Buffer Authorization Certificate or Mitigation Plan Approval (determined by Planning)		
X	Reduced Site Plan Set (reduced to 8.5"x11")		

Stormwater Impact Statement (1 copy to be submitted)

- a) Written narrative describing existing & proposed conditions, anticipated stormwater impacts and management structures and strategies to mitigate impacts
- b) Description of land uses and area (in square footage)
- c) Existing and proposed Impervious surface area in square feet for all subareas and project area
- d) Ground cover and uses information
- e) Soil information (classification, infiltration rates, depth to groundwater and bedrock)
- f) Time of concentration calculations and assumptions
- g) Topography (2-foot contours)
- h) Pertinent on-site and off-site drainage conditions
- i) Upstream and/or downstream volumes
- j) Discharges and velocities
- k) Backwater elevations and effects on existing drainage conveyance facilities
- l) Location of jurisdictional wetlands and regulatory FEMA Special Flood Hazard Areas



**SPECIAL USE PERMIT APPLICATION
SUBMITTAL REQUIREMENTS
TOWN OF CHAPEL HILL
Planning Department**

- m) Water quality volume calculations
- n) Drainage areas and sub-areas delineated
- o) Peak discharge calculations and rates (1, 2, and 25-year storms)
- p) Hydrographs for pre- & post-development without mitigation, post-development with mitigation
- q) Volume calculations and documentation of retention for 2-year storm
- r) 85% TSS removal for post-development stormwater run-off
- s) Nutrient loading calculations
- t) BMP sizing calculations
- u) Pipe sizing calculations and schedule (include HGL & EGL calculations and profiles)

Plan Sets (10 copies to be submitted no larger than 24"x36")

Plans should be legible and clearly drawn. All plan sets sheets should include the following:

- Project Name
- Legend
- Labels
- North Arrow (North oriented toward top of page)
- Property Boundaries with bearing and distances
- Scale (Engineering), denoted graphically and numerically
- Setbacks
- Streams, RCD Boundary, Jordan Riparian Buffer Boundary, Floodplain, and Wetlands Boundary, where applicable
- Revision dates and professional seals and signatures, as applicable

Cover Sheet

- a) Include Project Name, Project fact information, PIN, Design team

Area Map

- a) Project name, applicant, contact information, location, PIN, & legend
- b) Dedicated open space, parks, greenways
- c) Overlay Districts, if applicable
- d) Property lines, zoning district boundaries, land uses, project names of site and surrounding properties, significant buildings, corporate limit lines
- e) Existing roads (public & private), rights-of-way, sidewalks, driveways, vehicular parking areas, bicycle parking, handicapped parking, street names.
- f) 1,000' notification boundary

Existing Conditions Plan

- a) Slopes, soils, environmental constraints, existing vegetation, and any existing land features
- b) Location of all existing structures and uses
- c) Existing property line and right-of-way lines



**SPECIAL USE PERMIT APPLICATION
SUBMITTAL REQUIREMENTS
TOWN OF CHAPEL HILL
Planning Department**

- d) Existing utilities & easements including location & sizes of water, sewer, electrical, & drainage lines
- e) Nearest fire hydrants
- f) Nearest bus shelters and transit facilities
- g) Existing topography at minimum 2-foot intervals and finished grade
- h) Natural drainage features & water bodies, floodways, floodplain, RCD, Jordan Buffers & Watershed boundaries

Detailed Site Plan

- a) Existing and proposed building locations
- b) Description & analysis of adjacent land uses, roads, topography, soils, drainage patterns, environmental constraints, features, existing vegetation, vistas (on & off-site)
- c) Location, arrangement, & dimension of vehicular parking, width of aisles and bays, angle of parking, number of spaces, handicapped parking, bicycle parking . Typical pavement sections & surface type
- d) Location of existing and proposed fire hydrants
- e) Location and dimension of all vehicle entrances, exits, and drives
- f) Dimensioned street cross-sections and rights-of-way widths
- g) Pavement and curb & gutter construction details
- h) Dimensioned sidewalk and tree lawn cross-sections
- i) Proposed transit improvements including bus pull-off and/or bus shelter
- j) Required landscape buffers (or proposed alternate/modified buffers)
- k) Required recreation area/space (including written statement of recreation plans)
- l) Refuse collection facilities (existing and proposed) or shared dumpster agreement
- m) Construction parking, staging, storage area, and construction trailer location
- n) Sight distance triangles at intersections
- o) Proposed location of street lights and underground utility lines and/or conduit lines to be installed
- p) Easements
- q) Clearing and construction limits
- r) Traffic Calming Plan – detailed construction designs of devices proposed & associated sign & marking plan

Stormwater Management Plan

- a) Topography (2-foot contours)
- b) Existing drainage conditions
- c) RCD and Jordan Riparian Buffer delineation and boundary (perennial & intermittent streams, note ephemeral streams on site)
- d) Proposed drainage and stormwater conditions
- e) Drainage conveyance system (piping)
- f) Roof drains
- g) Easements
- h) BMP plans, dimensions, details, and cross-sections
- i) Planting and stabilization plans and specifications



Landscape Protection Plan

- a) Rare, specimen, and significant tree survey within 50 feet of construction area
- b) Rare and specimen tree critical root zones
- c) Rare and specimen trees proposed to be removed
- d) Certified arborist tree evaluation, if applicable
- e) Significant tree stand survey
- f) Clearing limit line
- g) Proposed tree protection /silt fence location
- h) Pre-construction/demolition conference note
- j) Landscape protection supervisor note
- k) Existing and proposed tree canopy calculations, if applicable

Planting Plan

- a) Dimensioned and labeled perimeter landscape bufferyard
- b) Off-site buffer
- c) Landscape buffer and parking lot planting plan (including planting strip between parking and building, entryway planting, and 35% shading requirement)

Steep Slope Plan

- a) Classify and quantify slopes 0-10%, 10-15%, 15-25% and 25% and greater
- b) Show and quantify areas of disturbance in each slope category
- c) Provide/show specialized site design and construction techniques

Grading and Erosion Control Plan

- a) Topography (2-foot contours)
- b) Limits of Disturbance
- c) Pertinent off-site drainage features
- d) Existing and proposed impervious surface tallies

Streetscape Plan, if applicable

- a) Public right-of-way existing conditions plan
- b) Streetscape demolition plan
- c) Streetscape proposed improvement plan
- d) Streetscape proposed utility plan and details
- e) Streetscape proposed pavement/sidewalk details
- f) Streetscape proposed furnishing details
- g) Streetscape proposed lighting details



Solid Waste Plan

- a) Preliminary Solid Waste Management Plan
- b) Existing and proposed dumpster pads
- c) Proposed dumpster pad layout design
- d) Proposed heavy duty pavement locations and pavement construction detail

Construction Management Plan

- a) Construction trailer location
- b) Location of construction personnel parking and construction equipment parking
- c) Location and size of staging and materials storage area
- d) Description of emergency vehicle access to and around project site during construction
- e) Delivery truck routes shown or noted on plan sheets

Energy Management Plan

- a) Description of how project will be 20% more energy efficient than ASHRAE Standards
- b) Description of utilization of sustainable forms of energy (Solar, Wind, Hydroelectric, and Biofuels)
- c) Participation in NC GreenPower program
- d) Description of how project will ensure indoor air quality, adequate access to natural lighting, and allow for proposed utilization of sustainable energy
- e) Description of how project will maintain commitment to energy efficiency and reduced carbon footprint over time
- f) Description of how the project's Transportation Management Plan will support efforts to reduce energy consumption as it affects the community

Exterior Elevations

- a) An outline of each elevation of the building, including the finished grade line along the foundation (height of building measured from mean natural grade).

1. Application Fee

The following are the receipt for both the Application Fee (\$11,550). Gwen Sancar delivered the check to the Town on 5/6/16.

```
MISCELLANEOUS PAYMENT   RECPT#: 547718
TOWN OF CHAPEL HILL
405 MARTIN LUTHER KING JR BLVD
CHAPEL HILL NC 27514

DATE: 05/06/16          TIME: 10:01
CLERK: swarther         DEPT:
CUSTOMER#: 477
PLANNING DEPARTMENT REVENUES
PARCEL:

CHG:  ZCOP   ZONING COMPLIAN   11550.30
-----
REVENUE:
1  10045   45106                11550.30
   ZONING COMPLIANCE PERMIT
   REF1: 16-025   REF2:
CASH:
01000   10003                11550.30
   CENTRAL DEPOSITORY C
-----

AMOUNT PAID:           11550.30

PAID BY:               AZIZ AND GWEN SANCAR
CHECKNT METH:          1308
REFERENCE:

AMT TENDERED:         11550.30
AMT APPLIED:          11550.30
CHANGE:                .00
```

2. Pre-Application Meeting

The following are the minutes of the Pre-Application Meeting that took place on February 18, 2016. In attendance were the following:

Gwen Sancar
The Aziz and Gwen Sancar Foundation
Nihat Cubukcu , Board Member
The Aziz and Gwen Sancar Foundation
Robin Lackey Jacobs, Attorney

Gene Poveromo, Development Manager, Town of CH

Judy Johnson, Principal Planner, Town of CH
Kay Pearlstein, Senior Planner, Town of CH
Lou Gerics, Architect, Innovative Design

Mike Nicklas, Architect, Innovative Design

c: 919 619 1135 o: 919 966 2077
gwendolyn_sancar@med.unc.edu

c: 919 332 9029 o: 919 256 8256
nihat.cubukcu@weatherperfect.com

c: 919 360 3520 o: 919 929 0323
Robinlackeyjacobs.eh@gmail.com

o: 919 969 5069
gpoveromo@townofchapelhill.org

o: 919 969 5078

o: 919 969 5063

o: 919 832 6303

gerics@innovativedesign.net

o: 919 832 6303

nicklas@innovativedesign.net

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

- Building footprint would be approximately 10,000 sq ft and under 45 parking spaces likely required.
- Possible to have 6 guest apartments located on back side of property, adjacent to residential area and with separate drive from Velma Road to accommodate guest parking
 - o This option was liked by staff in that it would allow the portion of the site to the north, where the guest housing is located, to be separated and sold separately (in the future) from the community center fronting on E Franklin Street.
 - o It appeared that this would likely require rezoning to R-3 for just that part of the re-combined site but may not need to happen at this time – if ever sold off it would then be required.
 - o If ever sold it may also be beneficial to be able to convert the six bedrooms into four so this should be planned for at this point. (5 living units max)
 - o Best to have the six units as one facility but it could be divided by breezeway
- Town needed site plan options by Feb 23 if it is to meet the next scheduled Committee meeting scheduled for Mar 22. It was stated that as long as the plans were well underway and that the Concept Plan Application was submitted on the 23rd, we would be allowed until the 26th to complete the balance of the submittal.

3. Digital Files

Digital files are included with the accompanying material.

4. Record Plat or Deed of Property

1/8
MM

20070220000065090 DEED
Bk:RB4221 Pg:497
02/20/2007 04:00:10PM 1/4

1

FILED Joyce H. Pearson
Register of Deeds Orange COUNTY, NC
BY: Deputy *Monica K. Miller*

Orange County NC 02/20/2007
State of North Carolina
Real Estate Excise Tax
Excise Tax: \$2440.00

NORTH CAROLINA GENERAL WARRANTY DEED

Excise Tax *\$2440⁰⁰*

Tax I.D. No. *9799-04-7995*
9799-04-6951 ✓

Instrument Prepared by: Robert O. Belo, Esquire, P.O. Box 51579, Durham, NC 27717
Return to: Grantee

THIS DEED is made this _____ day of February, 2007, by and between:

GRANTOR: MADISON PARTNERS, LLC
GRANTEE: HPW PROPERTIES, LLC, whose address is:

1001 WADE AVE
RALEIGH NC 27605

(The designation of Grantor and Grantee as used herein shall include said parties, their heirs, successors and assigns, and shall include the singular, plural, masculine, feminine or neuter as required by the context.)

WITNESSETH: THE GRANTOR, for a valuable consideration paid by the Grantee, the sufficiency and receipt of which is hereby acknowledged, has and by these presents does grant, bargain, sell and convey unto the Grantee, in fee simple, all that certain real property, lying and being in Orange County, North Carolina, and being more particularly described as follows (and hereinafter being referred to as the "Property"):

See Exhibit A attached hereto and incorporated herein by reference.

TO HAVE AND TO HOLD the Property and all privileges and appurtenances thereto belonging to the Grantee in fee simple.

AND THE GRANTOR covenants with the Grantee that Grantor is seized of the Property in fee simple, has the right to convey the same in fee simple, that the title is marketable and free and clear of all encumbrances, and that Grantor will warrant and defend the title against the lawful claims of all persons whomsoever, except for the following exceptions:

See Exhibit B attached hereto and incorporated herein by reference.

IN WITNESS WHEREOF, the Grantor has caused this instrument to be signed and sealed, the day and year first above written.

SIGNATURE AND NOTARY PAGE FOLLOW

KCBCM:

20070220000065090 DEED
Bk: RB4221 Pg: 498
02/20/2007 04:00:10PM 2/4

MADISON PARTNERS, LLC

By: *Gerald D. Bell*
Name: GERALD D. BELL
Title: MEMBER/MANAGER

STATE OF North Carolina
COUNTY OF Durham

I certify that the following person(s) personally appeared before me this day, each acknowledging to me that he or she voluntarily signed the foregoing document for the purpose stated therein and in the capacity indicated:

Gerald D. Bell
[insert name(s) of person(s) in blank].

Date: 2-19-07

Barbara J. Hoover
Notary Public

Print Name: Barbara J. Hoover

[Official Seal]

My commission expires:

BARBARA J HOOVER
Notary Public, North Carolina
Durham County
My Commission Expires
July 15, 2011

20070220000065090 DEED
Bk: RB4221 Pg: 499
02/20/2007 04:00:10PM 3/4

EXHIBIT A
LEGAL DESCRIPTION

BEGINNING AT IRON ROD FOUND BEING THE POINT AND PLACE OF BEGINNING, SAID POINT BEING THE SOUTHWESTERN CORNER OF THE SUBJECT PROPERTY AND LIES ON THE NORTHERN RIGHT-OF-WAY OF EAST FRANKLIN STREET, SAID POINT IS ALSO THE SOUTHEASTERN CORNER OF THE PROPERTY OF TENDU INVESTMENTS, LLC;

THENCE WITH THE LINE OF TENDU INVESTMENTS, LLC NORTH 51° 57' 12" WEST 373.93 FEET TO AN IRON ROD FOUND AT THE NORTHWESTERN CORNER OF TENDU INVESTMENTS, LLC;

THENCE LEAVING THE LINE OF TENDU INVESTMENTS, LLC, THE FOLLOWING COURSE A DISTANCE:

NORTH 17° 48' 33" EAST, 78.76 FEET TO AN IRON ROD FOUND ON THE SOUTHERN RIGHT-OF-WAY OF VELMA ROAD;

THENCE WITH THE LINE OF JOEL L. FLEISHMAN THE FOLLOWING COURSE AND DISTANCE:

NORTH 88° 34' 26" EAST, 234.13 FEET TO AN IRON ROD FOUND, SAID CORNER ALSO BEING A SOUTHEAST CORNER OF THE PROPERTY OF JOEL L. FLEISHMAN AND THE WESTERN CORNER OF THE PROPERTY OF ANDIAMO, LLC;

THENCE ALONG THE LINE OF ANDIAMO, LLC THE FOLLOWING COURSE AND DISTANCE:

SOUTH 52° 20' 20" EAST, 222.14 FEET TO AN IRON ROD FOUND, SAID CORNER BEING THE SOUTHEASTERN CORNER OF ANDIAMO, LLC, AND A POINT ON THE NORTHERN RIGHT-OF-WAY OF EAST FRANKLIN STREET.

THENCE WITH THE RIGHT-OF-WAY OF EAST FRANKLIN STREET THE FOLLOWING COURSE AND DISTANCES:

SOUTH 38° 30' 16" WEST, 99.42 FEET TO AN IRON ROD FOUND; SOUTH 38° 27' 38" WEST 124.82 FEET TO THE POINT AND PLACE OF BEGINNING CONTAINING 1.727 ACRES AND COMPRISING TWO PROPERTIES KNOWN AS PARCEL NUMBERS 9799046951 AND 9799047995, AND THE PROPERTIES ARE TO RE-

MAIN SEPARATE AT THIS TIME 

20070220000065090 DEED
Bk:RB4221 Pg:500
02/20/2007 04:00:10PM 4/4

**EXHIBIT B
EXCEPTIONS**

- 1. City and County ad valorem taxes for the year 2007.**
- 2. All matters shown on the boundary survey for Coldwell Banker Commercial Trademark Properties, Inc. by Stewart Engineers dated January 26, 2007.**

KCBCM:

5. Project Fact Sheet

PROJECT

Name of Project: Sancar Turkish Cultural and Community Center

Project Applicant: Aziz and Gwen Sancar Foundation (Contract Purchaser)
Current Property Owner: HPW Properties, LLC

Project: Architect: Innovative Design
Civil Engineer: B&F Consulting
Landscape Architect: Landis
PME Engineer: Elm Engineering

DESCRIPTION OF PREMISE

Location: 1609 (1605) East Franklin Street
Parcel Identification Numbers: 9799047995 and 9799046951
Existing Zoning: NC-C
Proposed Zoning: NC-C
Existing Use: Residential
Proposed Use: Commercial

DESCRIPTION OF DEVELOPMENT

Community Center size: 9,642 square feet
Guest House size: 2,909 square feet

Total Building size: 12,551 square feet

Site size: 1.73 acres (75,271 square feet)

Parking Required: Community Center Parking: 2032sf dining hall/15sf per person/4 per = 33.9
Guest House Parking: 2.5(max)

Parking Provided: Community Center Parking: 38
Guest House Parking: 4

Bicycle Parking Required: Community Center Spaces: 3.8 spaces
Guest House Spaces: 1

Bicycle Parking Provided: Community Center Spaces: 8
Guest House Spaces: 6

Existing Impervious: 9,679 square feet
Proposed Impervious: 37,252 square feet
Floor Area Allowed (GLA*FAR) 21,858 square feet

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

KEY PROJECT CONTACTS

Contract Purchaser

Aziz and Gwen Sancar Foundation
311 West University Drive
Chapel Hill, NC 27516
Phone: 919 933 9154
Email: gwendolyn_sancar@med.unc.edu

Architect

Innovative Design
Mike Nicklas, FAIA
850 West Morgan Street
Raleigh, NC, 27603
Phone: 919 832 6303
Email: nicklas@innovativedesign.net

Civil Engineer

B+F Consulting
2805 Tobermory Lane
Raleigh, NC 28606
Phone: 919 618 0180
Email: rbriggs@nc.rr.com; afarrelly@nc.rr.com

Landscape Architect and Soil Scientist

Landis, PLLC
3908 Bentley Brook Drive
Raleigh, NC 27612
Phone: 919 787 1617
blkays@aol.com

Plumbing, Mechanical, Electrical, Fire Protection Engineer

Elm Engineering
900 Center Park Drive Suite E, Charlotte, NC 28217-9401
Phone: 704 335 0396 (Charlotte Office)
Email: kimr@elmengr.com

6. Traffic Impact Statement

 EXEMPTION FORM ENGINEERING DEPARTMENT

Request for exemption received from: Innovative Design 850 West Morgan Street, Raleigh, North Carolina 27603, USA. Tel:919.832.6303

Date: April 20, 2016

Type of exemption requested: **TRAFFIC IMPACT ANALYSIS (TIA)**

Type of justification submitted: a) Written Request with Trip Analysis
b) Site Plan

Key reasons why we support this exemption:

- The proposed Cultural and Community Center is expected to generate 285 vehicle trips per day.
- A traffic impact analysis was prepared for the same site with higher density and found that the impact on the street network is minimal.
- The proposed site plan for the Cultural Center decreases number of driveways from two to one.
- Meets the Town TIA Guidelines for an Exemption.

Based upon the attached request for exemption and supporting information, we recommend that the Town Manager approve an exemption for:

1609 East Franklin Street (Sancar Turkish Cultural and Community Center)

Signed:  4/19/16
Traffic Engineer Date

Approved:  4/20/16
Public Works Director Date

Attachment(s): a) Written request from the Applicant/Developer
b) Site Plan
c) Fee

B&F CONSULTING, INC.

CIVIL ENGINEERING AND LAND PLANNING SERVICES

April 15 2016

Mr. Kumar Neppalli
Town of Chapel Hill
306 N. Columbia Street
Chapel Hill, North Carolina 27516

RE: Sancar Turkish Cultural & Community Center

Dear Mr. Neppalli:

This letter serves as a request to exempt the project from a full Traffic Impact Analysis (TIA) as we proceed through the SUP approval process. According to Chapel Hill's guidelines, the TIA may be waived if the difference in pre- and post-development daily trips generated is less than 500, and the applicant submits written request for waiver along with appropriate documentation. With this letter and attachment, we request waiver from the TIA.

Attached is a tabulation of areas within the Center obtained from Innovative Design, the architects for the project along with our choice of most reasonable category that these areas correspond to from the 9th edition of the *Trip Generation Manual* published by the Institute of Transportation Engineers. Our estimate of post-development daily trips of 288 is well under the threshold of 500 which would require the TIA.

Sincerely,



Russell Briggs

Russell Briggs, P.E.
B&F Consulting, Inc.

2805 TOBERMORY LANE • RALEIGH, NORTH CAROLINA • 27606

RUSSELL BRIGGS, P.E.: PHONE: 919.618.0180 • FAX: 919.851.6263 • EMAIL: [RBRIGGS@NC.RR.COM](mailto:rbriggs@nc.rr.com)
AMBER FARRILLY, P.E.: PHONE: 919.389.8102 • FAX: 919.467.8827 • EMAIL: [AFARRILLY@NC.RR.COM](mailto:afarrilly@nc.rr.com)

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

B&F Consulting, Inc.

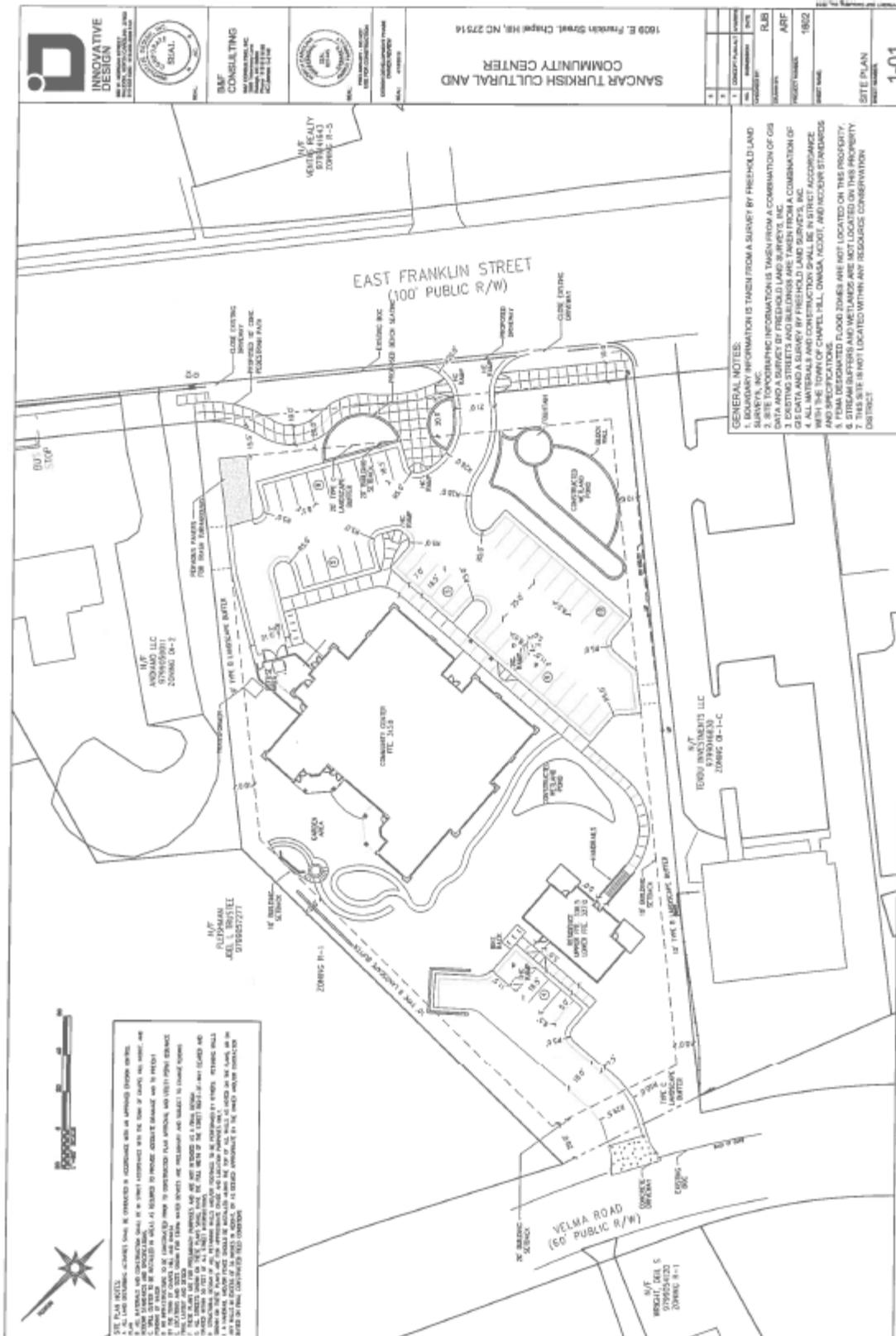
April 15, 2016

Sancar Turkish Cultural and Community Center
Daily Trip Estimates

15-Apr-16
 B&F Consulting

Community Center By space	Area (s.f.)	Code Space Classification	Closest Space Classification Inst. of Transportation Eng.	Daily Trips per 1,000 s.f.	Daily Trips
5 Office Spaces	1032	Business	General Office	11.42	12
Sancar Library or Visitors	776	Reading Room Library	Library	56.24	44
Cooking Class	341	Educational Classroom	Junior/Community College	27.49	9
4 Meeting Rooms	1221	Educational Classroom	Junior/Community College	27.49	34
Dining/Wedding	2027	Assembly w/ Tables & Chairs	Community Center	33.82	69
Circulation, Kitchen, Maint. Etc	3434	Accessory storage, mech, eq	Community Center	33.82	116
			Subtotal		284
Guest House	2909		Apartments (highest)	0.62 per unit (six bedrooms)	4
TOTAL FOR PROJECT					288
Note: 6 bicycle racks are provided at Guest House and 8 bicycle racks are located at the Community Center					

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016



Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

MISCELLANEOUS PAYMENT RECPT#: 546493
TOWN OF CHAPEL HILL
405 MARTIN LUTHER KING JR BLVD
CHAPEL HILL, NC 27514

DATE: 04/19/16 TIME: 10:15
CLERK: bmountain DEPT:
CUSTOMER#: 1811
ENGINEERING DEPT
PARCEL:

CHG: TIAX TRAFFIC IMPACT 350.00

REVENUE:
1 10046 46403 350.00
TRAFFIC IMPACT EKEMPT PERMIT
REF1: 1605/1609 REF2: E.FRANKLIN

CASH:
01000 10003 350.00
CENTRAL DEPOSITORY C

AMOUNT PAID: 350.00

PAID BY: AZIZ AND GWEN SANCAR
CHECKNT METH:
1303
REFERENCE:

AMT TENDERED: 350.00
AMT APPLIED: 350.00
CHANGE: .00

7. Description of Public Art Proposal - N/A

8. Statement of Justification

The Special Use Permit is sought in order to build the Sancar Turkish Cultural and Community Center. The project consists of a Community Center and a separate Guest House for visiting scholars. The goals of the Center are to:

Provide a location in Chapel Hill that will serve as a gathering place for Turks and Turkish Americans to celebrate their heritage and culture – one of the main points of focus being that of honoring the recent Nobel Award winner, Aziz Sancar.

Promote an increased understanding and appreciation of Turkey among non-Turkish members in the community. The Center will host speakers, programs and exhibitions to acquaint community members with Turkish history, culture, and contributions to the arts and sciences. The Center will also provide Turkish language classes and information for those considering visiting Turkey.

Promote scholarly exchange between Turkey and colleges and universities in the Chapel Hill area by providing affordable short- and medium-term housing for 6 - 8 Turkish graduate students or visiting scholars, and by assisting the residents in adapting to American culture.

Provide office space for Aziz and Gwen Sancar Foundation, the Honorary Council for Turkey in North Carolina, as well as other local non-profit organizations devoted to promoting education in Turkey.

While in pursuit of these objectives the Center will is being developed as an exceptional example of sustainable design.

Finding Number One: That the use or development is located, designed, and proposed to be operated so as to maintain or promote the public health, safety, and general welfare

Architecture and Aesthetics: The objectives of the overall design centered around developing an aesthetically pleasing design that works in harmony with nature as well as the existing neighborhood, achieves appropriate human scale, integrates the facilities into the site, and introduces design elements that allow visitors to gain an enhanced appreciation of Turkey's long and rich architectural history while providing those within the local Turkish community with a nice reminder of their own culture.

Sustainable Design: The facilities that are being designed reflect a goal of the Sancar Foundation to produce one of our State's best examples of sustainable architecture. While we will most likely not be pursuing LEED, the project is being designed to a Platinum level.

Energy-Efficiency

With both the Community Center and the Guest House designed as a net-zero energy consuming, the facilities will incorporate a long list of energy saving strategies including:

- Optimum orientation
- Strategical located and selected trees
- Daylighting and passive solar
- Geothermal heating and cooling
- Energy Star roofing

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

- LED lighting and dimming
- Efficient appliances and equipment
- Low plug loads
- Paddle fans
- High levels of insulation and radiant barriers
- Solar water heating
- Roof-integrated photovoltaics

Community Center energy consumption, at this point in the design, reflects a “pre-solar” energy consumption level of 20,700 Btus/square foot/year. Typical existing facilities (per the US Energy Information Agency for this region) consume 120,000 Btus/square foot/year. The current design of the Guest House (pre-solar) is 15,200 Btus/square foot/year versus similar lodging facilities consuming 88,000 Btus/square foot/year.

Because of the high level of energy efficiency achieved at both buildings (considerably under ASHRAE standards), with the planned installation of solar water heating and a 50KW photovoltaic system at the Community Center and 11 KW photovoltaic system at the Guest House, we anticipate that both buildings will be net-zero in energy consumption.

Water –Efficiency

With the incorporation of a rainwater harvesting system that incorporates a 2,000 gallon tank and water-efficient fixtures as well as limiting irrigation to rainwater, we feel that we are on track to reduce our municipal water consumption by 70% versus typical facilities.

Healthy Building Materials – Healthy Indoor Environments

A high degree of emphasis is being placed upon only incorporation environmentally sound, health building materials – both inside and outside.

Daylighting has been incorporated in all the key spaces that will be occupied during daytime hours.

Sustainable Site Design

With the goal of minimizing run-off and nitrogen impacts, the site has been designed to incorporate bio-swales and constructed wetlands.

Currently there is runoff from Velma Road that flows onto our project site. Combined with the non-absorbed rainwater from our site, this storm water is often dumping out onto East Franklin Street during rain events.

Our intent is to correct these problems. The rainwater from the parking and driveway areas, as well as what is not captured by the rainwater harvesting system, will be directed to either the constructed wetland to the west of the Community Center or to the lower wetland in the front of the Community Center that has been developed as an attractive sculpturally designed garden space with cascading water falling through a series of levels. A solar powered pump will be used to recirculate the water (enhancing treatment) during the daytime.

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

Pedestrian Access, Bicycles and Mass Transit

The site for the Cultural and Community Center was specifically selected because of the convenient access to public transportation. Scholars staying at the Guest House as well as visitors to the Center will have very easy access to the public bus system that is located only a short distance from the site. To further encourage non-vehicular traffic, bicycle racks (in excess of that typically required) will be provided.

At the Guest House, six bicycle racks are provided (versus the one required). At the Center, eight spaces are provided (versus the four required).

Public Sidewalks: To further encourage pedestrian access to the Community Center, the current sidewalks along E. Franklin Street will be widened and more nicely integrated into a streetscape design that incorporates a small plaza area, planters and the decorative wetland pond that features a photovoltaic driven, cascading water feature flowing down through an iris garden.

Community Center for the Community: While a main focus of the Center will be on addressing the Turkish community in the Chapel Hill area, because of the types of facilities within the Center (dining halls, meeting rooms, outdoor gardens), we anticipate that many others from the broader Chapel Hill community will also be taking advantage of these facilities for events.

Shared Parking with Neighbors: Currently, to the immediate west of this site is located the Ballet School. To the immediate east is the office of Psychology Associates. In the spirit of cooperation, and given the fact that there will be many times when the parking needs at the Center are minimal, the Sancar Foundation as agreed to an arrangement where the parking at the Center could be utilized by the neighboring establishments. To facilitate this arrangement, we have created walkway paths from our Community Center parking lot to the driveway areas of each neighbor. Likewise, it has been agreed to by both the Ballet School and Psychology Associates that if there is a special event at the Center that may require additional parking, this could also be arranged.

Finding Number Two: That the use or development complies with all required regulations and standards of this Chapter, including all applicable provisions of Articles 3 and 5, the applicable specific standards contained in the Supplemental Use Regulations (Article 6), and with all other applicable regulations.

Consistent with Zoning: Due to the fact that the Cultural and Community Center and the accompanying Guest House are consistent with the current NC-C zoning, there is no proposed new rezoning.

Neighbor Input: The Sancar Foundation fully anticipates that the Cultural and Community Center will become a vibrant part of the Chapel Hill community for decades to come. With that intention, it has been a strong desire of the Sancar Foundation to foster very good relationships with their eventual neighbors and to try to accommodate all reasonable input from the neighbors. To help facilitate this dialogue and keep the immediate neighbors well informed as to the design and process, the Sancar Foundation, along with the architect, have to date, already conducted two meetings to solicit input and keep the neighbors informed about the progress.

Harmony with Nature: By implementing a site plan where the buildings are oriented in manner that maximizes unobstructed southern exposure, we have been able to capitalize on daylighting, passive solar, energy-inefficient east-west glazing minimization, solar water heating, and photovoltaics. This has resulted in designs for the two buildings that are net-zero in energy consumption.

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

Because the site drops significantly from the north end on Velma Road to the southern end on East Franklin Street, and because of the programmatic requirement to separate the Guest House from the Community Center as well as need to incorporate a garden (for weddings) immediately off the dining hall, the two facilities were separated with the residential Guest House more appropriately coming off Velma and the Community Center fronting on East Franklin Street. During the design process numerous design options were investigated where both facilities could, from a vehicular standpoint, be accessed from East Franklin Street. However, as previously presented, the site limitations (e.g., fire and dumpster access, handicap accessibility, grade restrictions, building orientation, wetlands and garden) prohibited a single entry off of East Franklin.

Guest House off Velma: Some of the most significant advantages of locating the Guest House in the northern part of the site and providing vehicular access off of Velma include:

- The Guest House's residential design fits well into the character of the residential community on Velma.
- The amount of traffic accessing the Guest House is minimal in that most of the scholars that will be staying in the Guest House will only be staying for limited periods of time (e.g. semester, lecture) and most will not have cars – relying more on bicycles and mass transit. In taking mass transit, they would most conveniently walk up the path that connects the Guest House to the Community Center.
- One of the expressed concerns of the neighbors living off of Velma was that they feared that if there was a large event at the center and the parking was insufficient, that folks may be tempted to park on Velma and walk down to the Center. To limit this possibility, we have developed the only path from the Guest House to the Center leaving from the lower bedroom floor of the Guest House. Because of the steep slopes and vegetation being planted it is unlikely that others would easily get around the Guest House and connect up to this pathway. Also arranged (as previously mentioned) is the shared parking agreement with neighbors to the east and west of the Center.
- To help make the Guest House fit into the residential feel of the Velma community we have also enhanced the landscaping between Velma and the Guest House, reduced the parking paving to that minimally needed, and eliminated a separate sidewalk from Velma down to the house.

Linking Community Center to East Franklin Street: One of the comments that the design team received in our Concept Plan presentation to the Town was that it was the desire of the Town to create a streetscape design that would more effectively link and direct pedestrian traffic from the sidewalk to the Center. To accomplish this objective we have:

- Introduced a small plaza that incorporates planters and a new wider, and more interesting, sidewalk path down East Franklin Street
- Modified the previous wetland design strategy to create a design that is more sculptural in nature with multiple cascading levels. A photovoltaic pump that would circulate water from the lowest level of the retention area to a higher level, allowing the water to then fall back through a series of scuppers to a highly visible iris pond area. Covering the lowest retention area would be a structural 1"x1" safety grid that would have several planters inset into the grid.
- More fully developed trees will be planted in the parking areas as well as the space between the sidewalk and the parking so that pedestrians could more easily view the building.

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

Vegetation Strategy: Barrett L. Kays, Ph.D., FASLA has prepared the landscape plans for the property. The overall concept has included using plant species for Zone 7 and a few species for Zone 8 since Chapel Hill is rapidly becoming on the edge of 7 and 8. Dr. Kays researched plants commonly used in parks and commercial site in Turkey and then selected species that are adapted to Chapel Hill area and which are commercially available in the United States and are non-invasive.

Along Franklin Street he proposed that we retain several large pine trees and to frame the front yard with a series of new canopy trees under planted with colorful ground cover plants. Around the front of the building he has used narrow junipers that he found to be common features in his trips to Istanbul. The upper narrow fountain in the front yard uses Siberian iris to filter the stormwater. The system uses a recirculating solar pump so that the stormwater is treated numerous times through the vegetative filter.

The stormwater basin behind the main building uses Siberian iris and is buffered with plants adapted for Aquic soil moisture. The hillside will feature various ground cover plants common to country estates in Turkey.

The outdoor event garden uses a sand-based structural soil to provide good drainage during wet periods. The stage has a back drop planting scheme appropriate for the venue.

The gardens around the residential building in the rear of the site uses fruit trees that are common in Turkish country gardens and also adapted to this area. Also ground covers that are common to Turkey are used in areas that do not need to be mowed.

Overall the landscape will include palette of species, colors, textures that resemble the Mediterranean landscapes in more humid parts of Turkey but are non-invasive and appropriate for this region of North Carolina.

Landscaping that exceeds Requirements: The landscaping design reflects one that is intended to exceed the Town's requirements in term of buffer requirements, tree canopy minimums, and impervious ground cover requirements.

Single Entry to Parking: As a result of our April 5th and 6th Review Meetings with the Town we have been able to come to an agreement on the best strategy for access off of East Franklin Street. Previously considered were two entry points but it was determined that fire, dumpster and emergency access could be adequately serviced by a single entry point. This also had the added benefit of better linking the facility to the Franklin streetscape.

Setbacks: By positioning the two buildings to face south we also achieved the added benefit of not having extensive wall areas running along parallel and close to the property lines. This has created a much nicer situation for the two most immediate neighbors.

Addressing the Sloping Site: In order to best address the 34 feet drop across the site (and to minimize the need for extremely high retaining walls), we developed the site in a manner that allows the Guest House to be accessed from Velma Road and the Center to be accessed from East Franklin Street. To further blend the Guest House into the site we had the main north side entry positioned at an elevation of 336.5' (four feet below Velma) and the lower level come out on grade at 327.0' on the south side. The floor level of the Center is another 14 feet below the lower level of the Guest House – at 313.0'. By setting the Guest House into the hill side we have created the appearance of a one story residence from Velma.

Exterior lighting: The parking lot and walkway lighting strategies employed have been designed to minimize dark sky light pollution.

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Statement of Compliance with Design Guidelines and Comprehensive Plan:

In submitting the Concept Plan Application and the Special Use Permit Application our belief is that we have complied with both Chapel Hill's Design Guidelines and your Comprehensive Plan.



Mike Nicklas, FAIA
Innovative Design

Finding Number Three: That the use or development is located, designed, and proposed to be operated so as to maintain or enhance the value of contiguous property, or that the use or development is a public necessity

Appropriately addressing Residential Side on Velma and Commercial Side on East Franklin: As previously mentioned, we feel that our design strategy of separating the two functionally different facilities on the site we have created a project that respects the residential nature of Velma and the more commercial scale of East Franklin.

Aesthetics and Quality: The design was developed in a manner that subtly introduces Turkish design elements into a more contemporary design concept that fully embraces sustainability.

Both the Center and the Guest House have been designed to last for decades and have incorporated high quality materials that have been selected for their durability.

Gardens and Vegetation: Through the implementation of the garden areas, bio-swales, extensive vegetation, and constructed wetlands, we feel that, not only the buildings, but the entire site will be attractive.

Shared parking: Through our proposed shared parking agreements with our neighbors to east and west we can not only help each other but, equally important, help traffic conditions on East Franklin Street.

Minimizing overflow parking for Community Center on Velma: With the input gained from neighbors on Velma, we have intentionally developed the walk path from the Guest House to the Community Center in a fashion that would not encourage any Center event parking to occur on Velma.

Finding Four: That the development conforms with the general plans for the physical development of the Town as embodied in this Chapter and in the Comprehensive Plan

Place for Everyone

The Sancar Cultural and Community Center is being developed in a manner and with a philosophy that the Center will become a wonderful part of the Chapel Hill fabric – a place for not just Turks but where others can benefit from the meeting and dining facilities, the outdoor gardens, and, most importantly, through an enhance understanding of the Turkish people and their rich culture. The existence of this Center will further enhance the reputation of Chapel Hill as a community that embraces diversity.

Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

Community Prosperity and Engagement

By implementing what we feel will be one of our State's best examples of sustainable architecture we feel that we will be making a considerable contribution in advancing the concepts of sustainability in our own Town. Nothing is more effective when attempting to implement change than demonstrating that it can be done in a practical and aesthetically pleasing manner.

By creating net-zero energy consuming buildings we will also be keeping the energy dollars that would have left Chapel Hill right here in our community, further strengthening our community.

Getting Around

By focusing on mass transit, pedestrian and bicycle access we are creating a more livable, more environmentally sound, healthier community.

Good Places, New Spaces

Our biggest goal is to implement a Center that helps create stronger ties between the people of Turkey and the people of the United States – to foster a better understanding of the Turkish culture and the Turkish people. Nothing is more important in the World today than creating bridges between different cultures. Our hope is that our Center will be one of those bridges.

Nurturing Our Community

What better way to nurture our community than to create a sustainably designed facility that helps our natural environment and brings our community closer together by fostering understanding.

9. Response from Commission Design Commission & Town Council Concept Plan Comments

The following are the minutes of the April 5th Town of Chapel Hill Sancar Review Meeting.

Suggestions:

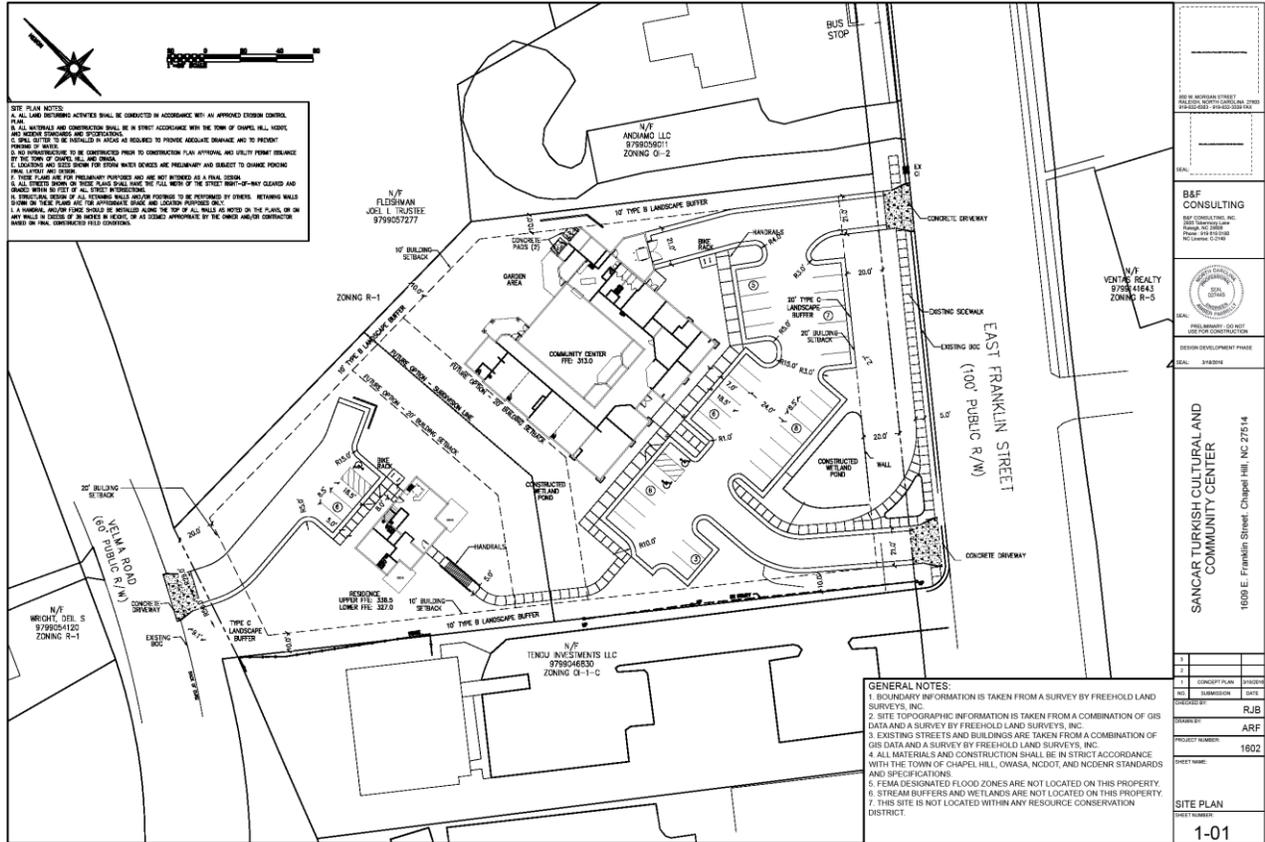
- 1) We will need a backflow preventer at the Guest House and grease interceptor in Community Center.
- 2) Despite the Hotel having two entrances and the fact that both Fire and Dumpster access would be improved with two access points, Mike Taylor had an issue with the two entrances off of Franklin. He would like us to have a single entry.
- 3) It was mentioned that a separate cardboard dumpster would be required unless Public Works was OK with the owner taking care of any cardboard. Mike N indicated that his office had gotten this assurance.
- 4) As part of the SUP, the tree survey and canopy survey would need to occur.
- 5) Mike (TOCH) talked about the TIA exemption needed (or study) and that Kumar would need to be consulted.
- 6) Curtis Brooks (TOCH) confirmed that we could put small walls in the landscape buffer.
- 7) Mike N relayed the input we had previously obtained from Town Council members as well as neighbors to make the drive to the Guest House less commercial looking and maximize vegetation. To do this we eliminated the walkway down from Velma - resulting in less pavement and more vegetation. (This also has the effect of discouraging spillover parking on Velma for large events at the Community Center, which was also a concern of the neighbors.)
- 8) Chris Jensen (TOCH) noted that the town has an Environmental Educator that could help with signage if desired for the wetland/reusable energy items. He also noted that they would want a fence/wall around the front wetland basin, and possibly around the middle one. The wetland at the front of the site would, if deep/steep, require a fence/wall for safety.
- 9) Deangelo (NCDOT) said the site would need driveway permits, encroachment permits for the sidewalk/utilities and if something was desired in the plaza (other than flat stones or a low wall up to 30" or a bench) that it would need to go through their Public Art Policy which was a lengthy process.
- 10) It was agreed that we would meet again the next day at 3:30 to discuss the Fire/Dumpster/One vs Two entry issue.

The following issues all pertained to the idea that the lots may, in the future would be subdivided – hence they didn't have to be addressed by the owner at this time.

- 1) If the property is some point in the future subdivided to separate the Guest House, we should be careful now to look at ant utility easements or the wetland locations (keeping the wetland on one side of the theoretical future subdivision line would be helpful.
- 2) Including the potential subdivision lines on the current documents is just confusing the issues that have to be evaluated today.
- 3) Chris Jensen (TOCH) said that if/when subdivided that they would need to do a stormwater maintenance/restrictions agreement.
- 4) Nick Parker (OWASA) said that if the future lots are split, we'll want to shift the sewer line to the lot line as close as possible to enable the creation of a flag lot - try to keep hardscape off of the sewer line for now so easier in the future.
- 5) Bill (TOCH) initially wanted a natural surface path along Velma Road to connect to the library but determined that they could do that in their right of way in the future and we would not have to deal with this now, since it wasn't be subdivided now.

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The following site plan was developed for the April 5th meeting.



Sancar Turkish Cultural and Community Center: Special Use Permit Application, May 26, 2016

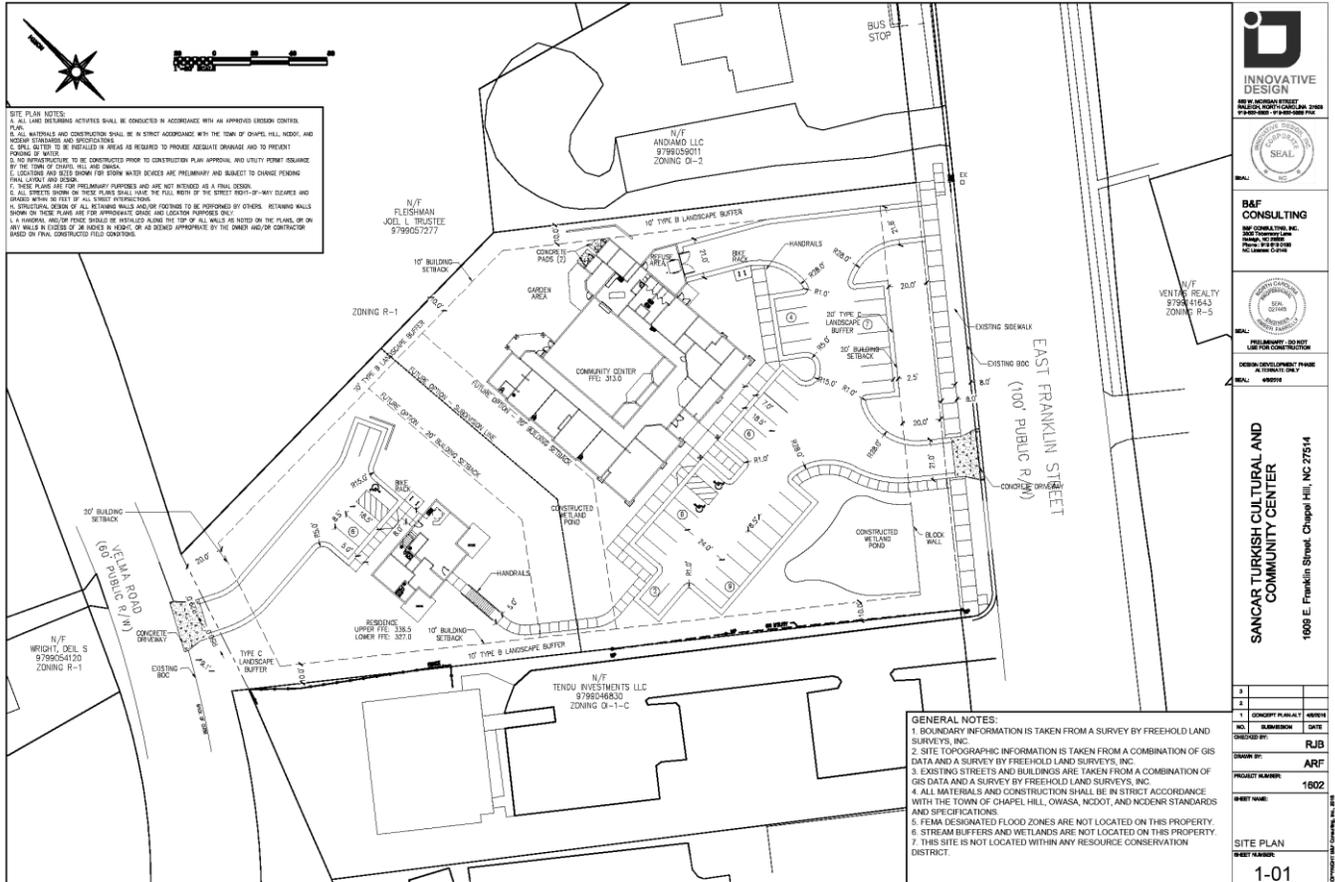
The following are the minutes of the April 6th Town of Chapel Hill Sancar Review Meeting.

In attendance were: Judy Johnson, Planning
Chris Kearns, Fire
Mike Taylor, Public Works
Kumar Neppalli, Public Works
David Bonk, Planning
Ryan Mickles, Planning
Russ Briggs, B&F Consulting
Mike Nicklas, Innovative Design
Gwen Sancar

- 1) Mike again reviewed the positive feedback that the design team had received prior as to the inclusion of two entrance points but indicated that if it was OK with Fire and Public Works (on dumpster access), one single entrance would be acceptable. B&F and ID presented a new plan that reflected the input that came the day before from Mike Taylor, indicating a single entry point.
- 2) After reviewing the revised plan, everyone agreed that it met all requirements that pertain to their own areas. It was agreed upon by Chris K that the hammerhead on the east side of the parking lot could be eliminated since a fire truck could easily back up. We still need to provide for dumpster access and turn around.
- 3) Mike N relayed that the Community Center would be equipped with sprinklers.
- 4) It was clarified that the Guest house would need to be constructed as Commercial vs. Residential (verify based upon square footage and Town requirements). It will not be equipped with sprinklers.
- 5) The discussion came up as to the number of parking spaces that were both required (as well as good to have). Mike N stated that ID has calculated 34 on the Center based upon the dining hall.
- 6) It was mentioned that the Town encourages connectivity and may want Sancar to provide a path from Velma down through the Sancar site to Franklin so that pedestrian wouldn't have to walk through the park. Mike reminded everyone that:
 - a. The neighbors were afraid that spill over parking would occur on Velma if any easy access was provided so ID modified their previous designs so that the only path from the Guest House to the Center was through the Guest House. Neighbors were strongly against any path. This argument was also supported by Council members in our initial presentation. Mike also suggested that it couldn't be made handicap accessible without numerous switchbacks coming down the 30 foot drop.
 - b. Mike mentioned that because the site is quite steep at that part of the site, it would be unlikely that an unplanned trail (by non-Sancar residents) would be created and this would help in discouraging any spill-over parking on Velma.
- 7) Because the Guest House would be built to Commercial standards, the 20' fire access would be required as the driveway (but 8 feet could be pervious pavers).
- 8) Kumar suggested that we should immediately be submitting for an exemption on the TIA study based upon the occupancy numbers anticipated and the trips generated to the site. The Hotel had just completed a Jan 2015 study that could serve as proof of numbers anticipated. But we would need to justify based upon what would likely best be labeled as Multipurpose, Cultural Center (he was sure – we need to check). We will need to justify parking numbers.
- 9) Kumar would send out forms and a similar application so we could provide by next week. He was going to send it to Mike N and Russ.
- 10) Suggestion was to provide walking paths to both Ballet's and Terry's if agreements were made to share parking. Also need to show how, in the future, the Sancar parking could link into Terry's. Cross access easements for the abutting properties was mentioned in the meeting as a standard staff comment.
- 11) Per David Bonk, sidewalk in front needed to be 8' back from street and 10' wide but could wind around and change elevation up to max of 5% slope.

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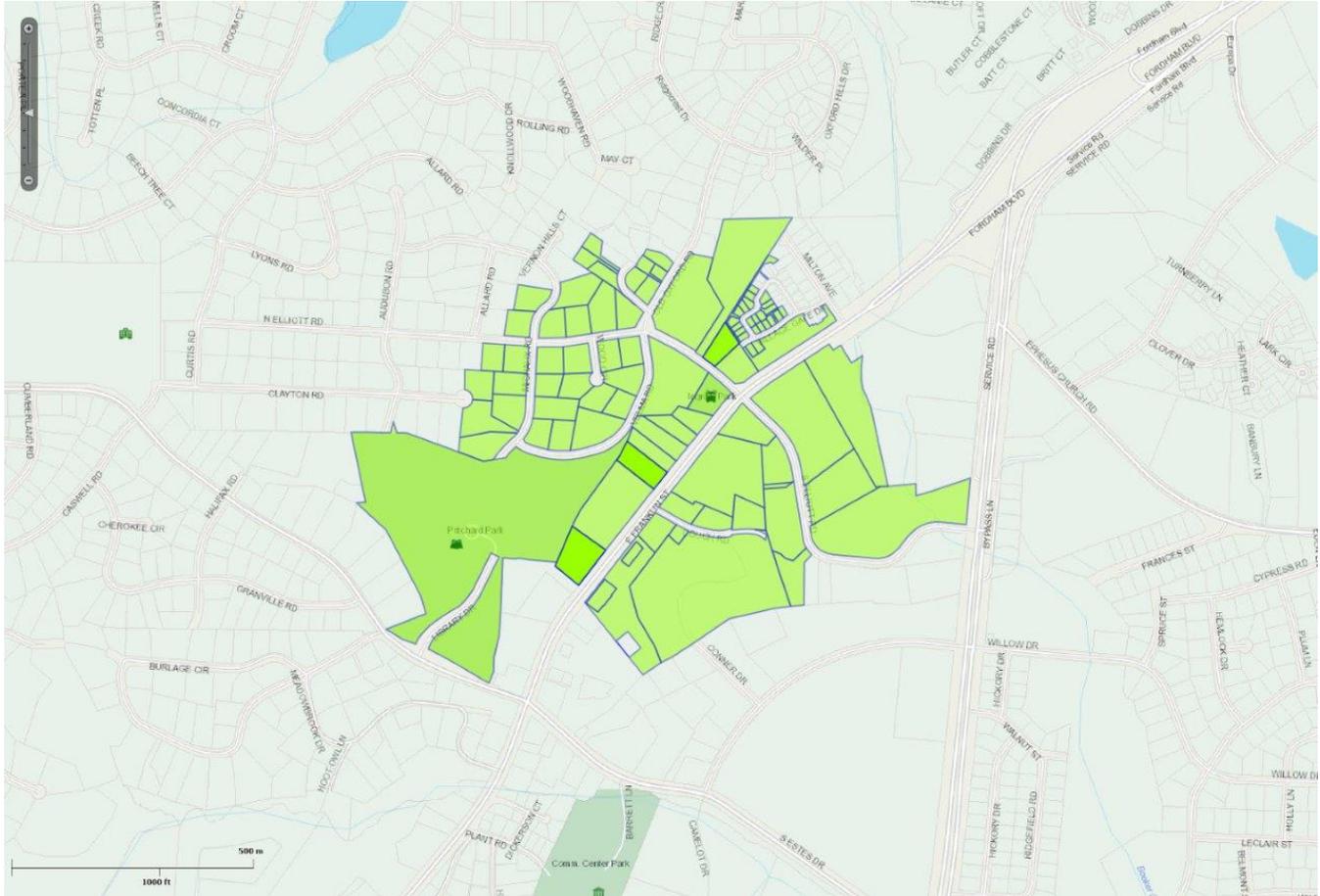
The following reflects the plan modifications that were developed between the April 5th and April 6th meetings – in response from the April 5th meeting.



10. Affordable Housing Proposal - N/A

11. Existing SUP, if Modification - N/A

12. Mailing List of Owners Within 1000 Feet



9799140340	SPIKE LLC	1434 ARBORETUM DR	CHAPEL HILL	NC	27514
9799153795	WALSH STEPHEN J	202 OLD FRANKLIN GROVE DR	Chapel Hill	NC	27514
9799242361	TRIANGLE V II	4309 EMPEROR BLVD	DURHAM	NC	27703
9799151409	MIMI LLC	104A N ELLIOTT RD	CHAPEL HILL	NC	27514
9799151409	ARIANA SM PROPERTIES LLC	118 CASTLE GARDEN ST	CARY	NC	27513
9799151409	ARIANA S M PROPERTIES LLC	118 CASTLE GARDEN ST	CARY	NC	27513
9799045771	BARBARA T HERSHEY LIMITED PTNS	3206 OLD CHAPEL HILL RD	DURHAM	NC	27707
9799045771	PIERONI STEPHEN	214 WINDHOVER DRIVE	CHAPEL HILL	NC	27514
9799045771	HUANG ENG SHANG	1519 JONES FERRY RD	CHAPEL HILL	NC	27516
9799045771	A PENNY SAVED INC	1525 E FRANKLIN ST	CHAPEL HILL	NC	27514
9799045771	PIERONI STEPHEN M ETAL	214 WINDHOVER DR	CHAPEL HILL	NC	275145152
9799045771	SAGE PORTER INVESTMENT LLC	1525 E. FRANKLIN ST #5A	Chapel Hill	NC	27514
9799045771	WCE II LLC	1525 E FRANKLIN ST	Chapel Hill	NC	27514

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9799041064	CREDLE CARROLL III	1515 E FRANKLIN ST UNIT 11	CHAPEL HILL	NC	275142814
9799041064	MARTIN DANIELLE N	1515 E FRANKLIN ST #12	Chapel Hill	NC	27514
9799041064	KING LARRY D	212 COLUMBIA PL W	Chapel Hill	NC	27516
9799041064	VEOLOGICA LLC	PO BOX 2861 1515 E FRANKLIN ST UNIT	Chapel Hill	NC	27515
9799041064	FERGUSON TIMOTHY	15	CHAPEL HILL	NC	27514
9799041064	TEETER C JANE	1512 N GLENEAGLE DR	GARNER	NC	27529
9799041064	CASTELLINO ALTA E	1515 E FRANKLIN ST #34	Chapel Hill	NC	27514
9799041064	PAVELSKY TAMLIN	1515 E FRANKLIN ST	Chapel Hill	NC	27514
9799041064	STONE LYNDA	1515 E FRANKLIN ST #41	CHAPEL HILL	NC	27514
9799041064	STONE LYNDA	1515 E FRANKLIN ST #41	CHAPEL HILL	NC	27514
9799041064	SANDLER EUGENE S	1515 E FRANKLIN #43 WINCHESTER	CHAPEL HILL	NC	275142822
9799041064	SANDLER EUGENE S	1515 E FRANKLIN #43 WINCHESTER	CHAPEL HILL	NC	275142822
9799041064	KURT MARK ROBERT	1515 E FRANKLIN ST #25 205 OLD FRANKLIN GROVE	CHAPEL HILL	NC	27514
9799041064	REAL LIFE PARTNERS LLC	DR	CHAPEL HILL	NC	275142814
9799041064	BARKER DOROTHY M	1515 E FRANKLIN ST #27	Chapel Hill	NC	27514
9799041064	CRAMER LAWRENCE W JR	1515 E FRANKLIN ST APT 31	CHAPEL HILL	NC	27514
9799041064	KAGE GORDON D II	3258 GRADY CT	WOODBIDGE	VA	22192
9799041064	COLUMB DORIS W	1515 FRANKLIN ST #33	CHAPEL HILL	NC	27514
9799041064	ARMIJO ENRIQUE	1119 HILL ST	GREENSBORO	NC	27408
9799041064	HAHN ELIZABETH P	1515 E FRANKLIN ST #18	CHAPEL HILL	NC	27514
9799041064	MADDEN LEE	PO BOX 620434	MIDDLETON	WI	53562
9799041064	SULLIVAN A NOEL JR	4341 CHICKERING LN	NASHVILLE	TN	372154913
9799041064	VENTRE ROBERT M	1515 E FRANKLIN ST	CHAPEL HILL	NC	27514
9799041064	DUDDY PATRICK	2 PORCHLIGHT CT	Durham	NC	27707
9799061087	WEBB FRANCIS T	119 EASTWOOD LAKE RD 205 OLD FRANKLIN GROVE	Chapel Hill	NC	27514
9799153846	HOLCOMB CAROL J	DR 101 OLD FRANKLIN GROVE	CHAPEL HILL	NC	27514
9799153603	ALISON B RAVIN REVOCABLE TRUST	DR	CHAPEL HILL	NC	27514
9799154794	SHREVE BRANDON BROWN BROTHERS HARRIMAN TRUST	68 KING ST	CHARLESTON	SC	29401
9799153698	COMPANY TRUSTEE	919 N MARKET ST	WILMINGTON	DE	19801
9799152669	TAFT JONATHAN G	PO BOX 566	GREENVILLE	NC	27835
9799154761	KOVENS SCOTT J	P O BOX 16815	CHAPEL HILL	NC	27516
9799154506	SANTORO LEONARD	301 VILLAGE GATE DR	CHAPEL HILL	NC	27514
9799250069	LITTLE & CLONIGER PARTNERSHIP	11503 MCLEAN	CHAPEL HILL	NC	27517
9789957421	COLCLOUGH WILLIAM JOSEPH	1507 MICHAUX RD	CHAPEL HILL	NC	275147637
9789959244	IALU LLC	1504 MICHAUX RD	CHAPEL HILL	NC	27514
9799054120	WRIGHT DEIL S	204 VELMA RD	CHAPEL HILL	NC	275147641
9789959098	HAHN KLAUS MICHAEL FIRST CITIZENS BANK DAC 50 CHAPEL HILL	1502 MICHAUX RD	CHAPEL HILL	NC	275147635
9799142995	436	PO BOX 27131	RALEIGH	NC	27611
9799059011	ANDIAMO LLC	1419 GRAY BLUFF TRL	CHAPEL HILL	NC	275179126
9799042945	MCDONALD EUGENE J TRUSTEE	1506 VELMA DR	CHAPEL HILL	NC	27514
9799046830	TENDU INVESTMENTS LLC	1603 E FRANKLIN ST	CHAPEL HILL	NC	27514

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9799144784	STATE EMPLOYEES CREDIT UNION	CHAPEL HILL II BRANCH	RALEIGH	NC	27611
9799048307	WINDACO PROPERTIES LLC	1289 FORDHAM BLVD	Chapel Hill	NC	27514
9799066065	LEWIS NANCY E ETAL	1308 KENTUCKY ST	HIGH POINT	NC	27360
9799058788	CHURCH OF RECONCILIATION FRANKLIN GROVE HOMEOWNERS ASSOCIATION INC	110 ELLIOTT RD	CHAPEL HILL	NC	27514
9799153935	CROOK ROBERT M	203 STABLE ROAD	CARRBORO	NC	27510
9799055922	BU RUOFEI	10 SOUTHWOODS DR	CHAPEL HILL	NC	27517
9799065050	SPIKE LLC	104 EASTWOOD LAKE RD	CHAPEL HILL	NC	27514
9799142352	SUN LIFE ASSURANCE COMPANY OF CANADA	1434 ARBORETUM DR 1511 SUNDAY DRIVE STE 200	CHAPEL HILL	NC	27517
9799044076	LAMUS FELIPE	202 N ELLIOTT RD	RALEIGH	NC	27607
9799053715	WILSON JAMES R	208 OLD FRANKLIN GROVE DR	CHAPEL HILL	NC	27514
9799154875	FERNANDES PRABHAVATHI	114 MILTON AVE	Chapel Hill	NC	27514
9799153813	THOMPSON JUDY S TRUSTEE	201 OLD FRANKLIN GROVE DR	CHAPEL HILL	NC	27514
9799152870	LARSSON JANE	2440 W 24TH ST	CHAPEL HILL	NC	27514
9799155870	GRAHAM BARBARA Y	1702 MICHAUX RD	MINNEAPOLIS	MN	554052321
9799051845	FIDDLEMAN ERIC D	1703 MICHAUX RD	Chapel Hill	NC	27514
9789958821	LAMBERT MICHAEL C	1603 OLD OXFORD RD	CHAPEL HILL	NC	275147638
9799056805	LORENZ RENE	206 OLD FRANKLIN GROVE DR	CHAPEL HILL	NC	27514
9799154891	SCHWARTZ ADAM DAVID FRANKLIN GROVE HOMEOWNERS ASSOCIATION INC	206 N ELLIOTT RD	CHAPEL HILL	NC	275147622
9789959685	HALL DOUGLAS K	203 STABLE ROAD	CARRBORO	NC	27510
9799155707	RIPP ELIZABETH M	204 VILLAGE GATE DR 103 OLD FRANKLIN GROVE DR	CHAPEL HILL	NC	27514
9799155747	THOMPSON JOHN P	107 OLD FRANKLIN GROVE DR	CHAPEL HILL	NC	27514
9799152686	FLEISHMAN JOEL L TRUSTEE	BOX 90522	CHAPEL HILL	NC	27514
9799152743	FLEISHMAN JOEL L TRUSTEE	BOX 90522	DURHAM	NC	277080522
9799055404	KHAKSARI AKRAM	303 VILLAGE GATE DR	DURHAM	NC	277080522
9799053463	FARMER THOMAS H R	211 N ELLIOTT RD	Chapel Hill	NC	27514
9799153564	KELLY LESLIE M	303 N ELLIOTT RD	CHAPEL HILL	NC	27514
9799051430	UNITED CAROLINA BANK	PROPERTY TAX DEPT	CHAPEL HILL	NC	27514
9789955472	URQUHART JAMES ANDREW	304 CLAYTON RD	SALEM	NC	271021290
9799152308	TIEDEMANN MATTHEW P	207 WOOD CIR	CHAPEL HILL	NC	275147610
9799052184	SIMMONS RAYMOND C	1503 MICHAUX RD	CHAPEL HILL	NC	27514
9789957007	LABRANCHE MARC H	1500 MICHAUX RD	CHAPEL HILL	NC	275147637
9789948982	HUNTER KYLE	1405 MICHAUX RD	CHAPEL HILL	NC	27514
9789945852	VILLAGE PLAZA APARTMENTS LLC	1450 ENVIRON WAY	CHAPEL HILL	NC	27514
9799148556	FWDA LLC	2922 HATHAWAY RD	CHAPEL HILL	NC	27517
9799043366	SPIKE LLC	1434 ARBORETUM DR	RICHMOND	VA	23225
9799145239	FIRST CITIZENS BANK & TRUST CO	PO BOX 27131	CHAPEL HILL	NC	27514
9799144583	RAMSES PROPERTIES LLC	2 COUCH RD	RALEIGH	NC	27611
9799047291	KCP RE LLC	2601 S BAYSHORE DR 9TH FL	CHAPEL HILL	NC	27514
9799136901			COCONUT GROVE	FL	33133

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9799032779	SUN LIFE ASSURANCE COMPANY OF CANADA	1511 SUNDAY DRIVE STE 200	RALEIGH	NC	27607
9799056948	NAVARATNAM SRIVALLIPURANANDAN	303 TRAMORE DR	CHAPEL HILL	NC	27516
9799162023	INTER CHURCH COUNCIL HOUSING CORP	PO BOX 3692	CHAPEL HILL	NC	27515
9799062146	MCKEEVER MATTHEW O	121 TURVEY CT 209 OLD FRANKLIN GROVE DR	Chapel Hill	NC	27514
9799153975	ROSKIN MELANIE C	101 A & B EASTWOOD LAKE RD	CHAPEL HILL	NC	27514
9799054771	DOYTCHEV GUEORGUI FRANKLIN GROVE HOMEOWNERS ASSOCIATION INC	PO BOX 16815	CHAPEL HILL	NC	275147500
9799156602	NUNEZ WOLFF MIGUEL	204 N ELLIOTT RD	CHAPEL HILL	NC	275147622
9799154727	PANDYA ARTI	204 OLD FRANKLIN GROVE DR	CHAPEL HILL	NC	27514
9799153753	SIMPSON MARK	200 OLD FRANKLIN GROVE DR	Chapel Hill	NC	27514
9799053926	DOTTI FRANCA	119 EASTWOOD LAKE DR	CHAPEL HILL	NC	275147500
9799153951	ANNE R CADY TRUSTEE	1504 LINCOLN WAY #300	MCLEAN	VA	22102
9799154869	GOLDWASSER LAURIE C	1107 ULLSWATER LANE	WILMINGTON	NC	28405
9789957644	HARSHBARGER RODGERS W	300 N ELLIOTT RD	Chapel Hill	NC	27514
9799154629	MCLEOD MALCOLM N	210 VILLAGE GATE DR	CHAPEL HILL	NC	27514
9799040920	RUGEN ROBERT C	1502 VELMA RD	CHAPEL HILL	NC	27514
9799046232	HOWELL PROPERTIES OF CHAPEL HILL LLC	129 TIMBERHILL PL	Chapel Hill	NC	27514
9799034650	SUN LIFE ASSURANCE COMPANY	1511 SUNDAY DR STE 200	RALEIGH	NC	27607
9789954062	WILSON JASON	305 CLAYTON RD	CHAPEL HILL	NC	275147612
9789959450	ANDERSEN HAROLD	1496 LAUREL HOLLOW RD	SYOSSET	NY	117919634
9799054277	FLEISHMAN JOEL L TRUSTEE	BOX 90522	DURHAM	NC	277080522
9789957204	NIKBAKHT KAVE N	PO BOX 3155	HICKORY	NC	28603
9799051222	BEARDSLEY KYLE	209 WOOD CIR	CHAPEL HILL	NC	27514
9799141643	CCP CHAPEL HILL 0806 LP	353 N CLARK	CHICAGO	IL	60654
9799140074	SH POOL A SUNSTONE LLC	14785 PRESTON RD STE 660	DALLAS	TX	75244
9799147917	COLUMBIA II VILLAGE PLAZA LLC	C/O PROPERTY TAX DEPT	SAN ANTONIO	TX	782790830
9799057277	FLEISHMAN JOEL L TRUSTEE	PO BOX 90522	DURHAM	NC	27708

13. Mailing Fee

The following is the receipt for the two Mailings (\$193). Gwen Sancar delivered the check to the Town on 5/6/16.



14. Written Narrative Describing The Proposal

Stormwater Impact and Management Statement Narrative (Sheets 4-01 to 4-04)

Please refer to the accompanying Stormwater Impact Statement document under separate cover. The peak flows and 2-year 24-hour volume of runoff are increased due to the increased impervious area. Two stormwater control measures (SCMs) are proposed: a constructed wetland near the main building and a recirculating saturated sand filter near East Franklin Street.

Detailed Site Plan Narrative (Sheet 3-01)

Please refer to the attached plans. The required parking does not exceed 5% slope, with the ADA-required accessible spaces not exceeding 2% slope. Fire apparatus and trash truck movements have been coordinated with staff and are accommodated with the site plan.

Landscape Protection Plan Narrative (Sheet 5-03)

The tree protection plan shows seven rare, specimen, and substantial trees to be saved on the site. Based upon the reduction in the canopy coverage on the site, the landscape plan is required to include 66 new canopy trees of sufficient caliper. The landscape planting plan shows a total of 119 new canopy trees to be planted on the site.

Planting Plan Narrative (Sheet 5-02)

Barrett L. Kays, Ph.D., FASLA has prepared the landscape plans for the property. The overall concept has included using plant species for Zone 7 and a few species for Zone 8 since Chapel Hill is rapidly becoming on the edge of 7 and 8. Dr. Kays researched plants commonly used in parks and commercial site in Turkey and then selected species that are adapted to Chapel Hill area and which are commercially available in the United States and are non-invasive.

Along Franklin Street he proposed that we retain several large pine trees and to frame the front yard with a series of new canopy trees under planted with colorful ground cover plants. Around the front of the building he has used narrow junipers that he found to be common features in his trips to Istanbul. The upper narrow fountain in the front yard uses Siberian iris to filter the stormwater. The system uses a recirculating solar pump so that the stormwater is treated numerous times through the vegetative filter.

The stormwater basin behind the main building uses Siberian iris and is buffered with plants adapted for Aquic soil moisture. The hillside will feature various ground cover plants common to country estates in Turkey.

The outdoor event garden uses a sand-based structural soil to provide good drainage during wet periods. The stage has a back drop planting scheme appropriate for the venue.

The gardens around the residential building in the rear of the site uses fruit trees that are common in Turkish country gardens and also adapted to this area. Also ground covers that are common to Turkey are used in areas that do not need to be mowed.

Overall the landscape will include palate of species, colors, textures that resemble the Mediterranean landscapes in more humid parts of Turkey but are non-invasive and appropriate for this region of North Carolina.

Landscaped Buffers Narrative (Sheet 5-02)

The landscape buffers are shown on Landscape Planting Plan Sheet 5-02. The landscape buffers consist of Type B – 20 foot width along the two street frontage rights-of-way and Type B – 10 foot width along the side property lines. An existing off-site buffer of at least 10 feet is located on two of the adjacent properties. The buffers are planted with a variety of deciduous and evergreen trees and shrubs and equal or exceed the minimum number of trees and shrubs per average linear foot of the buffers.

Rear Property 20 Foot Buffer – length is 87 feet, therefore
4 large trees, 8 small trees, and 31 shrubs are required

Front Property 20 Foot Buffer – length is 224 feet, therefore
11 large trees, 22 small trees, and 80 shrubs are required

Southwest Property 10 Foot Buffer – length is 373 feet, therefore
15 large trees, 26 small trees, and 45 shrubs are required

North & East Property 10 Foot Buffer – length is 454 feet, therefore
18 large trees, 32 small trees, and 54 shrubs are required

Total of 48 large trees, 88 small trees, and 210 shrubs are required in the buffers.

Total of 48 large trees, 255 small trees, and 570 shrubs are provided in the buffers.

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Large Trees:

Large existing pine trees	7
Corylus Americana	2
Ficus carica 'Brown Turkey'	3
Koelreuteria paniculata	5
Prunus avium 'Bing'	4
Prunus x cerasifera 'Cripoizam'	5
Cedrus deodara	3
Ilex x Nellie Stevens	<u>12</u>
<u>Subtotal:</u>	48

Small Trees:

Chamaerops humilis	23
Ilex x Nellie Stevens	25*
Rosmarinus officinalis 'Arp'	200**
Trachycarpus fortune	7
<u>Subtotal:</u>	255

Shurbs:

Achillea millefolium 'Paprika'	100
Achillea millefolium 'Oertel's	40
Rosmarinus officinalis 'Arp'	200
Rosmarinus officinalis 'Foxtail'	200
Thymus serpyllum 'Magic Carpet'	<u>30</u>
<u>Subtotal:</u>	570

Note: * Some of the Nellie Stevens are used as small trees.

Note: ** Some of the Arp Rosmary are used as small trees (6 – 8')

Existing Canopy Trees Plan Narrative (Sheet 5-04)

The existing site contain 3 rare, 50 specimen, and 12 other large trees; totaling 65 canopy trees. The existing canopy tree coverage totals 42,692 SF or 55.4% of the site. After reduction for the 7 trees to be saved, 66 new canopy trees are required to be planted.

Shading Analysis Plan Narrative (Sheet 5-05)

The shading analysis shows that on August 21st at noon 41.7% of the main parking lot will be shaded. This percent shading exceeds the minimum required by the Town of Chapel Hill.

Streetscape Plan Narrative (Sheet 5-06 and 8-03)

Please refer to the attached planting plans. Street trees and landscape buffer plantings that are code requirements are satisfied.

Construction Management Plan Narrative (Sheet 7-02)

A construction lay-down area is identified in the plan set, as is the construction entrance.

Energy Management Plan Narrative

With both the Community Center and the Guest House designed as a net-zero energy consuming, the facilities will incorporate a long list of energy saving strategies including:

- Optimum orientation
- Strategical located and selected trees
- Daylighting and passive solar
- Geothermal heating and cooling
- Energy Star roofing
- LED lighting and dimming
- Efficient appliances and equipment
- Low plug loads
- Paddle fans
- High levels of insulation and radiant barriers
- Solar water heating
- Roof-integrated photovoltaics

Community Center energy consumption, at this point in the design, reflects a “pre-solar” energy consumption level of 20,700 Btus/square foot/year. Typical existing facilities (per the US Energy Information Agency for this region) consume 120,000 Btus/square foot/year. The current design of the Guest House (pre-solar) is 15,200 Btus/square foot/year versus similar lodging facilities consuming 88,000 Btus/square foot/year.

Because of the high level of energy efficiency achieved at both buildings (considerably under ASHRAE standards), with the planned installation of solar water heating and a 50KW photovoltaic system at the Community Center and 11 KW photovoltaic system at the Guest House, we anticipate that both buildings will be net-zero in energy consumption.

Please see more detailed description in Statement of Justification above.

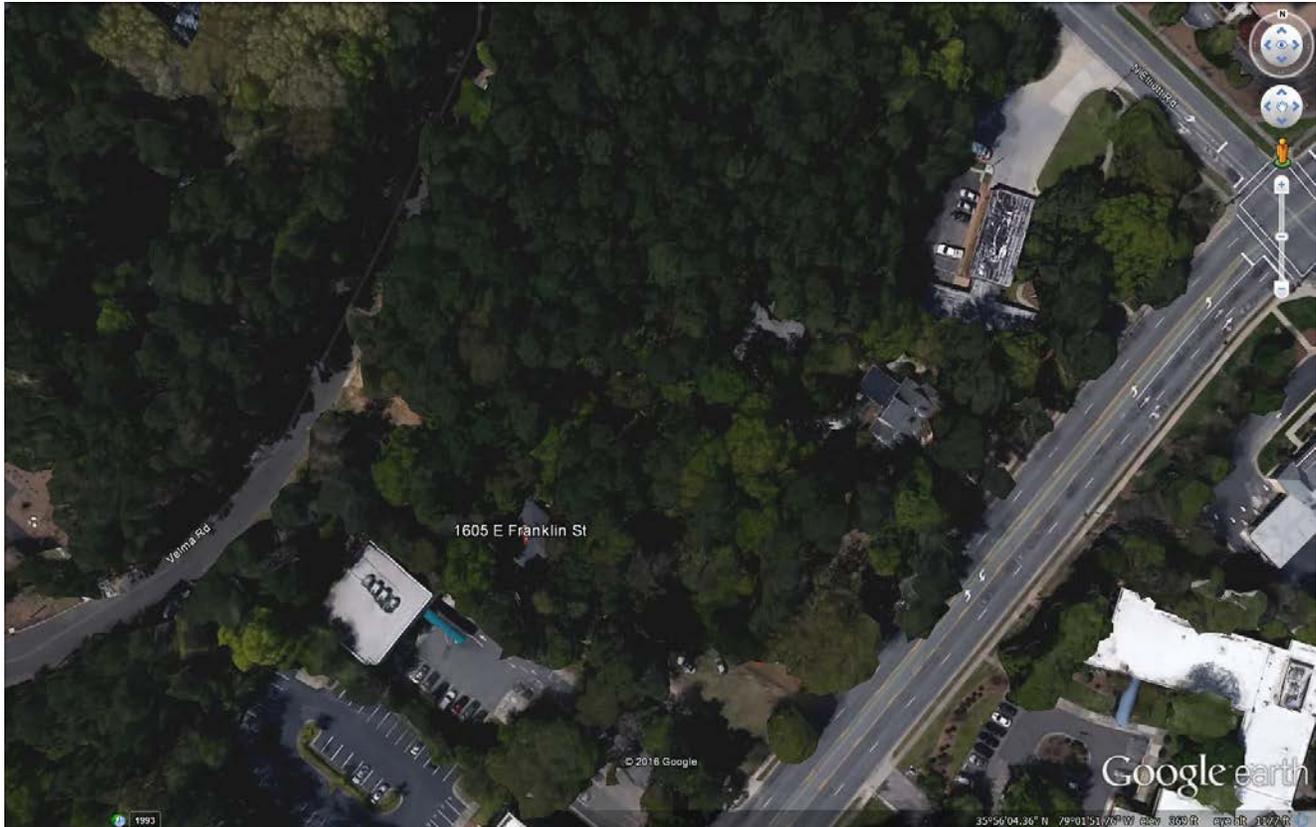
15. Resource Conservation District, Floodplain & Jordan Buffers Determination – N/A

There is no RCD, Floodplain or Jordan Buffer on this property.

16. Jurisdictional Wetland Determination – N/A

- 17. Resource Conservation District Encroachment – N/A**
- 18. Jordan Buffer Authorization Certificate or Mitigation Plan Approval – N/A**
- 19. Reduced Site Plan Set - Attached**

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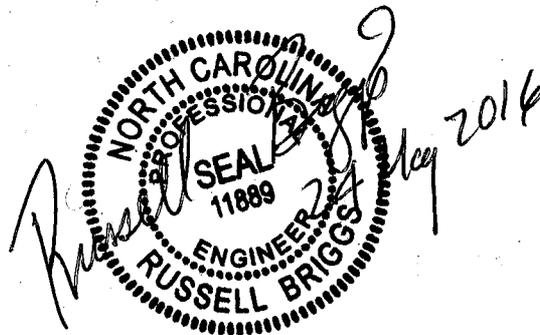
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Stormwater Impact Statement
Sancar Turkish Cultural and Community Center

Prepared by
B&F Consulting
2805 Tobermory Lane
Raleigh, NC 27606
919-618-0180
C-2149

24 May 2016



Stormwater Impact Statement

a) Narrative of existing and proposed conditions.

The existing land use is single-family. The anticipated stormwater impact will be an increase in the peak discharge and associated increase in volume of runoff. Along with these increases, the pollutant load from Total Suspended Solids (TSS) along with Nitrogen (N) and Phosphorous (P) will increase. Two stormwater control measures (SCMs) are proposed for the site which will capture the stormwater runoff and ameliorate the effects of peak, volume and pollutant loading. The first measure is a typical constructed wetland and is shown as Stormwater Control Measure (SCM) "A" on the plans and is located near the Southwest corner of the building. The second measure is a recirculating sand filter and is located at the Southwest corner of the property adjacent to East Franklin Street.

b) Land Uses and areas

On-site pervious	37,998 s.f.
On-site impervious	37,252 s.f.

The impervious areas are for buildings, sidewalks and associated vehicular use area.

c) Existing and proposed impervious surface area

Existing on-site impervious to be removed	(9,679) s.f.	
Proposed on-site impervious:	37,252 s.f.	
Existing off-site impervious to be removed:	(1,521) s.f.	(sidewalk and drives)
Proposed additional off-site impervious	2,768 s.f.	(sidewalk and drives)
Impervious <u>added</u> beyond existing with this project	28,820 s.f.	

d) Ground cover and uses information

The ground cover on-site will be a combination of grass, mulch and natural vegetation.

e) Soil information

The soils on-site are predominately Hydrologic Soil Group "D" (White Store series, WwC). A small amount of Hydrologic Type "B" soil is located along the northern edge of the site (Appling Series, ApB). The Appling Series is rated as having a Seasonal High Water Table (SHWT) at or below 48-inches below the surface. The White Store Series is rated as having a SHWT at or below 8-inches. Barrett L. Kays, Ph.D., NC Licensed Soil Scientist dug a boring hole in the lower portion of the site and near East Franklin Street and did not encounter any SHWT with 24-inches

of the surface. The site is located in a transition zone on the western side of the Triassic Basin and the western geologic boundary is very irregular.

f) Time of concentration calculation and assumption

Pre-development

The Kirpich method was used to develop the time of concentration. The maximum length of flow was measured as 433 feet, with an associated change in elevation of 32 feet (elevation 339 to elevation 307).

$$T_c = \frac{\left(\frac{L^3}{H}\right)^{0.385}}{128} = \frac{\left(\frac{433^3}{32}\right)^{0.385}}{128} = 2.3 \text{ minutes, round to 5 minutes}$$

Where T_c is time of concentration, in minutes

L is the longest flow path, in feet

H is the change in elevation

Post-development

By inspection, the post-development time of concentration is set to 5 minutes, based on the pre-development value.

g) Topography (2-foot contours)

Field topographic mapping was provided for the site, and this is blended with the GIS topographic mapping obtained for off-site areas.

h) Pertinent on-site and off-site drainage conditions

The drainage from the site flows from northwest to southeast toward East Franklin Street. The drainage is sheet flow.

i) Upstream and/or downstream volumes

The volume calculations are shown in Appendix E for the BMP.

j) Discharges and velocities

The discharges from the SCMs are shown in Appendix D and are into the stormwater conveyance system (pipes) for the Town of Chapel Hill.

k) Backwater elevations and effects on existing drainage conveyance facilities

The backwater elevations created by the SCMs are contained on site. Since the post-development peak discharges are mitigated in accordance with the Town's requirements, there are no detrimental effects on existing drainage conveyance facilities downstream.

l) Location of jurisdictional wetlands and regulatory FEMA Special Flood Hazard Areas

The current Flood Insurance Rate Map does not show any FEMA Special Flood Hazard Areas. (Appendix A). From an investigation by Landis, LLC including review of mapping, no jurisdictional wetlands are present on the site.

m) Water quality volume calculations

The water quality volumes, or treatment volumes are 1,365 cubic feet for SCM "A" (constructed wetland adjacent to the building) and 1,494 cubic feet for SCM "B" (recirculating sand filter adjacent to Franklin Street). The calculations are shown in Appendix E.

n) Drainage and sub-areas delineated

The drainage areas are delineated on the plans.

o) Peak discharge calculation and rates (1, 2 10, 25 and 100-year storms)

The peak discharges are shown in Appendix D.
In summary, the peak discharges for the specified storms are tabulated below

Return Period	Pre-development	Post-development	
	(cfs)	(without mitigation) (cfs)	(with mitigation) (cfs)
1	4.9	5.6	4.9
2	5.8	6.5	5.7
25	13.2	13.7	12.4
100	17.1	17.6	14.1

p) Hydrographs for pre- & post development without mitigation, post-development with mitigation

The hydrographs are shown in Appendix D.

- q) Volume calculations and documentation of retention for difference in pre-development and post development for the 2-year, 24-hour storm.

Volumetric calculations are included in Appendix E.

- r) 85% TSS removal for post-development stormwater run-off

The combination of the constructed wetland (SCM "A") and the recirculating sand filter (SCM "B") provide for 85% TSS removal.

- s) Nutrient loading conditions

The nutrient loading conditions and calculations are shown in the Jordan Lake Stormwater Accounting tool in Appendix G. The Post-Development with SCMs Nitrogen Loading is 5.16 pounds/acre-year and Phosphorous is 0.58 pounds/acre-year.

- t) BMP sizing calculations

1. SCM-A Stormwater Wetland Pond

The stormwater control pond is behind the main building has a small drainage area therefore no forebay was included in the stormwater wetland pond. The pond will have a shallow ponding and several evergreen aquatic iris species were selected to provide cover and spring flowering for the pond. No shrubs or trees are believed to be appropriate due to the small pond area and shading from the building and surrounding trees. We prefer to get as much direct sun to the pond surface for better stormwater treatment. The estimated SHWT is > 2-feet below the natural surface.

2. SCM-B Recirculating Sand Filter Pond

This stormwater system combines the advantages of sand filtration, aquatic treatment, aeration, and recirculation to maximize the amount of stormwater treatment. Cell 1 consists of a waterfall for aeration. The water cascades down to Cell 2 which consists of 2-foot depth of sand filtration and is planted with evergreen aquatic iris plants. The plants will root down to the bottom of the sand layer. The water will drain from Cell 2 and cascade for aeration down into Cell 3. This cell is for sufficient storage of water as required by the Town of Chapel Hill. A solar pump will recirculate the water back to Cell 1. The water in Cell 3 will all flow through the treatment cell for 8 to 12 times per day. The design team has design and built several other recirculating sand filter pond systems in North Carolina. The systems are designed to meet TSS, NO₃, and P water quality standards, as well as, heavy metals and petroleum bioaccumulation. Based upon over

40 years of experience Dr. Barrett L. Kays, RLA, LSS and Mr. Russell Briggs, PE believes that this approach provides for the highest quality of stormwater for small sites. Our sustainable philosophy is to achieve the highest level of water quality treatment as reasonably possible.

SCM-B Cell 2 – Treatment Area = 815 ft²

K_{sat} of Media = 10 FT/Day = Flow Rate of 8,150 ft³/Day

Flow Rate for 1.67 Day Period = 13,611 ft³

Pumping Rate = 85 gpm for average of 12 hours/day

Pumping Volume = 8,160 ft³/Day

Water Quality Volume = 1,494 ft³

Dead Storage Volume = 1,404 ft³

Min. Vol. Flow Throughs/Day = 8,150/1,404 = **5.8 volumes/12 hour day**

Maximum Storage Volume = 2,898 ft³

Max. Vol. Flow Throughs/Day = 8,150/2,898 = **2.8 volumes/12 hour day**

Therefore, the stormwater will be treated from 2.81 to 5.80 times during the 12-hour pumping period. **In others words, the sand filtration system will treat stormwater 2.8 to 5.8 more times than a normal sand filter due to the recirculation.**

u) Pipe sizing calculations and schedule

Please see plans and Appendix "E".

Appendix A
Flood Insurance Rate Map

Northing: = 796,905, Easting = 1,989,116

Northing: = 796,905, Easting = 1,992,584



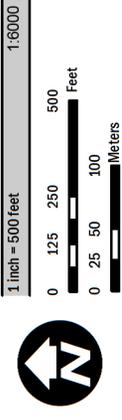
Northing: = 793,437, Easting = 1,989,116

Northing: = 793,437, Easting = 1,992,584

This is an official copy of a portion of the above referenced flood map. This map incorporates changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.fema.gov.

	Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
	With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
	Regulatory Floodway
	0.2% Annual Chance Flood Hazard
	Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
	Areas Determined to be Outside the 0.2% Annual Chance Flood Hazard <i>Zone X</i>
	Jurisdiction Boundary
	FIRM Panel Boundary

North Carolina State Plane Projection Feet (Zone 3200)
Datum: MAD 1983 (Horizontal), NAVD 1988 (Vertical)



FEMA National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

Panel(s): 9789, 9799
CONTAINS:
COMMUNITY
TOWN OF CHAPEL HILL
CID 370180

Notice to User: The Map Number(s) shown below should be used when placing map orders; the Community Number(s) shown above should be used on insurance applications for the subject community.

SELECTED PANELS:
MAP NUMBER 3710978900J
EFFECTIVE DATE 2/2/2007
3710979900K
EFFECTIVE DATE 2/2/2007





FEMA: National Flood Insurance Program



Panel(s):9789,9799

CONTAINS:

COMMUNITY CID 370180
TOWN OF CHAPEL HILL

Notice to User: The Map Number(s) shown below should be used when placing map orders; the Community Number(s) shown above should be used on insurance applications for the subject community.

SELECTED PANELS:

MAP NUMBER EFFECTIVE DATE
3710978900J 2/2/2007
3710979900K 2/2/2007

NOTES TO USERS

This is an official FIRMette of a portion of the effective panels listed in the Title Block shown on Page 1. The information represented on this FIRMette was extracted from the effective digital flood hazard data available at <http://fris.nc.gov/fris>.

Base flood elevation data, floodway, nonencroachment widths, information on certain areas no in the Special Flood Hazard Areas protected by flood control structures, and other pertinent data are available in the Flood Insurance Study (FIS) available at <http://fris.nc.gov/fris>. Users should be aware that flood elevations shown on this FIRMette represent elevations rounded to one tenth of a foot (0.1') and should be utilized in conjunction with data available in the FIS.

NOTES TO USERS

Base map information and geospatial data used to develop this FIRMette were obtained from various organizations, including the participating local community(ies), state and federal agencies, and/or other sources. The primary base for this FIRM is aerial imagery acquired by the State in 2010. Information and geospatial data supplied by the local community(ies) that met FEMA base map specifications were considered the preferred source for development of the base map.

See geospatial metadata for the associated digital FIRMette for additional information about base map preparation. Base map features shown on this FIRMette, such as corporate limits, are based on the most up-to-date data available at the time of publication. Changes in the corporate limits may have occurred since this map was published. Map users should consult the appropriate community official or website to verify current conditions of jurisdictional boundaries and base map features. This map may contain roads that were not considered in the hydraulic analysis of streams where no new hydraulic model was created during the production of this statewide format FIRM.

Flood elevations on this map are referenced to either or both the North American Vertical Datum of 1988 (NAVD 88) or National Geodetic Datum of 1929 (NGVD 29), and are labeled accordingly. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. To obtain current elevation, description, and/or location information for bench marks shown on this map, or for information regarding conversion between NGVD 29 and NAVD 88, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

MORE INFORMATION

Letters of Map Amendment (LOMA)	1-877-336-2627 http://msc.fema.gov/
Letters of Map Revision (LOMR)	919-715-5711 www.ncfloodmaps.com
Flood Insurance Availability	
North Carolina Division of Emergency Management (NCDEM)	919-715-5711 http://www.ncemergencycontrol.org/nfip
National Flood Insurance Program (NFIP)	1-877-638-6620 http://www.fema.gov/business/nfip
Questions about this FIRMette	1-877-336-2627 http://fema.gov

LEGEND

LEGEND

MAP REVISIONS

*This FIRMette includes revisions for the following LOMR

LOMR

Engineering LOMR model, Case 7/31/2009
Number09-04-1756P

DATE

Appendix B
Soils Mapping

Soil Map—Orange County, North Carolina

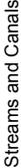
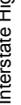
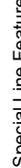


Map Scale: 1:810 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

-  Area of Interest (AOI)
-  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
- Water Features**
 -  Streams and Canals
- Transportation**
 -  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
 -  Aerial Photography
-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Orange County, North Carolina
 Survey Area Data: Version 15, Sep 16, 2015

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

Date(s) aerial images were photographed: Apr 27, 2014—May 6, 2014

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

Orange County, North Carolina (NC135)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ApB	Appling sandy loam, 2 to 6 percent slopes	0.1	8.0%
WmE	Wedowee sandy loam, 15 to 25 percent slopes	0.0	0.3%
WwC	White Store-Urban land complex, 2 to 8 percent slopes	1.6	91.6%
Totals for Area of Interest		1.7	100.0%

Appendix C
Rainfall Data
From
NOAA



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 & aeriels](#)

PF tabular

AMS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹

Duration	Annual exceedance probability (1/years)								
	1/2	1/5	1/10	1/25	1/50	1/100	1/200	1/500	1/1000
5-min	0.442 (0.406-0.483)	0.539 (0.495-0.589)	0.605 (0.554-0.660)	0.669 (0.609-0.729)	0.712 (0.646-0.775)	0.750 (0.677-0.817)	0.782 (0.702-0.854)	0.817 (0.727-0.893)	0.845 (0.745-0.925)
10-min	0.708 (0.649-0.773)	0.864 (0.793-0.944)	0.968 (0.886-1.05)	1.07 (0.971-1.16)	1.13 (1.03-1.24)	1.19 (1.07-1.30)	1.24 (1.11-1.35)	1.29 (1.15-1.41)	1.33 (1.17-1.46)
15-min	0.890 (0.816-0.972)	1.09 (1.00-1.19)	1.22 (1.12-1.33)	1.35 (1.23-1.47)	1.44 (1.30-1.56)	1.51 (1.36-1.64)	1.56 (1.40-1.71)	1.63 (1.45-1.78)	1.67 (1.47-1.83)
30-min	1.23 (1.13-1.34)	1.55 (1.43-1.70)	1.77 (1.62-1.94)	2.00 (1.82-2.18)	2.16 (1.96-2.36)	2.31 (2.08-2.52)	2.44 (2.19-2.66)	2.59 (2.30-2.83)	2.71 (2.38-2.96)
60-min	1.54 (1.42-1.69)	1.99 (1.83-2.17)	2.31 (2.11-2.52)	2.67 (2.43-2.90)	2.93 (2.66-3.19)	3.18 (2.87-3.46)	3.42 (3.07-3.73)	3.71 (3.30-4.06)	3.95 (3.48-4.32)
2-hr	1.85 (1.70-2.03)	2.42 (2.21-2.65)	2.82 (2.57-3.09)	3.30 (2.98-3.61)	3.67 (3.31-4.01)	4.03 (3.60-4.40)	4.39 (3.90-4.79)	4.85 (4.26-5.30)	5.23 (4.56-5.73)
3-hr	1.98 (1.81-2.17)	2.58 (2.37-2.83)	3.04 (2.77-3.32)	3.58 (3.24-3.90)	4.01 (3.62-4.38)	4.44 (3.97-4.84)	4.87 (4.33-5.32)	5.45 (4.78-5.95)	5.94 (5.16-6.50)
6-hr	2.37 (2.19-2.59)	3.10 (2.85-3.39)	3.66 (3.35-3.98)	4.34 (3.94-4.71)	4.89 (4.42-5.31)	5.44 (4.87-5.91)	6.01 (5.33-6.53)	6.79 (5.93-7.37)	7.45 (6.42-8.11)
12-hr	2.81 (2.59-3.06)	3.69 (3.40-4.02)	4.38 (4.01-4.76)	5.24 (4.76-5.68)	5.96 (5.37-6.43)	6.68 (5.97-7.21)	7.45 (6.58-8.03)	8.51 (7.38-9.18)	9.44 (8.05-10.2)
24-hr	3.29 (3.09-3.52)	4.37 (4.09-4.66)	5.11 (4.78-5.46)	6.08 (5.66-6.50)	6.82 (6.34-7.29)	7.57 (7.02-8.11)	8.35 (7.71-8.96)	9.42 (8.65-10.1)	10.3 (9.38-11.1)
2-day	3.84 (3.60-4.11)	5.05 (4.73-5.40)	5.88 (5.50-6.28)	6.94 (6.46-7.42)	7.75 (7.20-8.29)	8.56 (7.93-9.19)	9.40 (8.67-10.1)	10.5 (9.68-11.4)	11.5 (10.5-12.4)
3-day	4.05 (3.80-4.33)	5.31 (4.97-5.67)	6.17 (5.77-6.59)	7.28 (6.78-7.79)	8.13 (7.54-8.70)	8.99 (8.31-9.64)	9.87 (9.09-10.6)	11.1 (10.2-11.9)	12.0 (11.0-13.0)
4-day	4.26 (4.00-4.56)	5.57 (5.21-5.94)	6.46 (6.04-6.90)	7.62 (7.10-8.16)	8.51 (7.89-9.11)	9.41 (8.70-10.1)	10.3 (9.52-11.1)	11.6 (10.6-12.5)	12.6 (11.5-13.7)
7-day	4.87 (4.59-5.19)	6.28 (5.92-6.69)	7.25 (6.82-7.72)	8.50 (7.97-9.07)	9.46 (8.84-10.1)	10.4 (9.72-11.2)	11.5 (10.6-12.3)	12.8 (11.8-13.8)	13.9 (12.8-15.0)
10-day	5.52 (5.21-5.86)	7.03 (6.63-7.47)	8.05 (7.58-8.55)	9.36 (8.79-9.96)	10.4 (9.69-11.0)	11.4 (10.6-12.1)	12.4 (11.5-13.2)	13.8 (12.7-14.8)	14.9 (13.7-16.0)
20-day	7.32 (6.92-7.74)	9.17 (8.66-9.70)	10.4 (9.83-11.0)	12.0 (11.3-12.8)	13.3 (12.4-14.1)	14.5 (13.5-15.4)	15.7 (14.6-16.8)	17.5 (16.1-18.7)	18.8 (17.3-20.1)
30-day	9.07 (8.59-9.58)	11.2 (10.6-11.8)	12.6 (11.9-13.3)	14.3 (13.4-15.1)	15.5 (14.6-16.4)	16.7 (15.7-17.8)	18.0 (16.8-19.1)	19.7 (18.3-20.9)	20.9 (19.4-22.4)
45-day	11.5 (10.9-12.1)	14.0 (13.3-14.7)	15.5 (14.8-16.3)	17.4 (16.5-18.3)	18.8 (17.8-19.8)	20.2 (19.1-21.3)	21.6 (20.3-22.8)	23.4 (21.9-24.7)	24.7 (23.0-26.2)
60-day	13.7 (13.1-14.4)	16.5 (15.7-17.3)	18.1 (17.3-19.0)	20.1 (19.2-21.1)	21.6 (20.5-22.7)	22.9 (21.8-24.1)	24.3 (23.0-25.6)	26.0 (24.5-27.4)	27.3 (25.7-28.9)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of annual maxima series (AMS). 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 annual exceedance probability) 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.

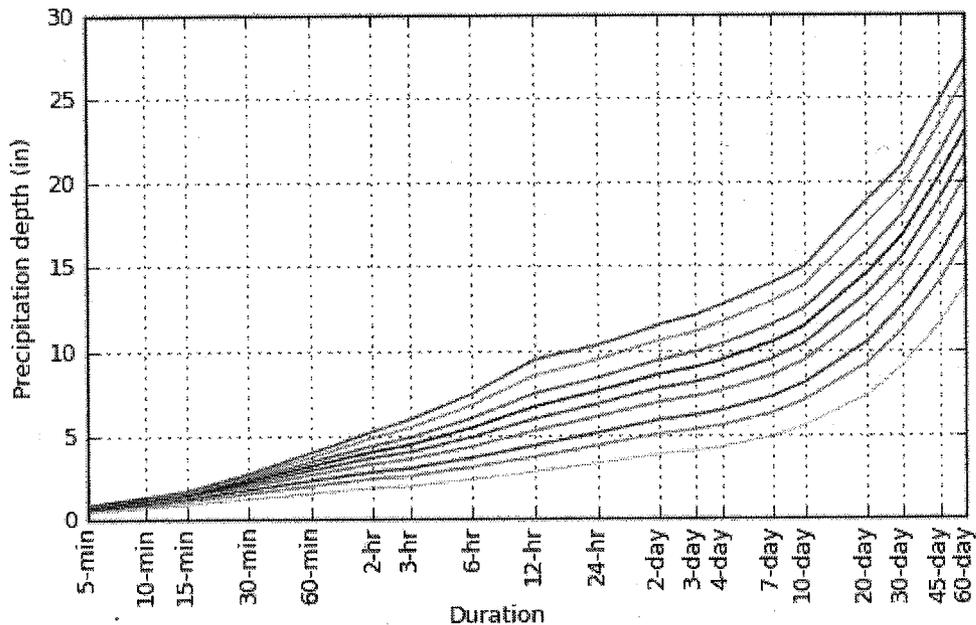
Please refer to NOAA Atlas 14 document for more information.

[Back to Top](#)

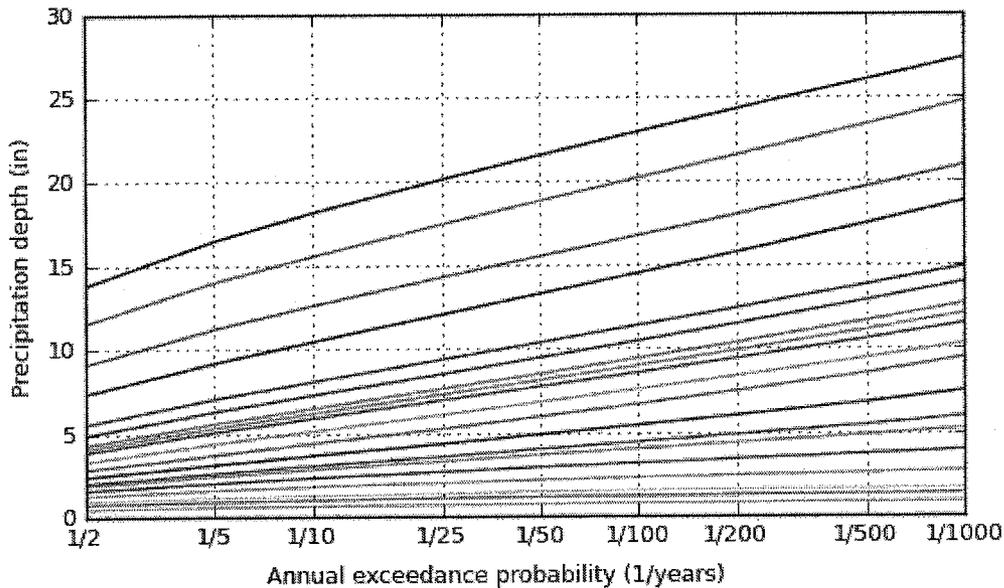
PF graphical

AMS-based depth-duration-frequency (DDF) curves

Latitude: 35.9339°, Longitude: -79.0311°



Annual exceedance probability (1/years)
2
5
10
25
50
100
200
500
1000



Duration
5-min
10-min
15-min
30-min
60-min
2-hr
3-hr
6-hr
12-hr
24-hr

NOAA Atlas 14, Volume 2, Version 3

Created (GMT): Thu May 19 19:15:09 2016

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Maps & aerials

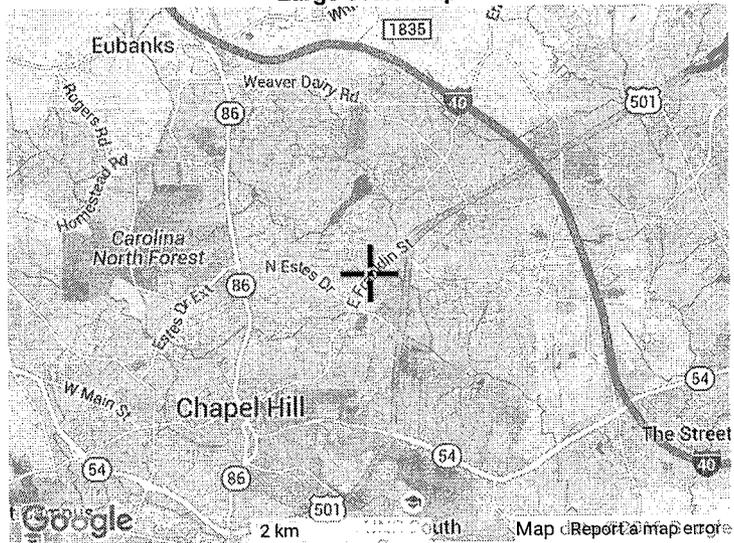
Small scale terrain



Large scale terrain



Large scale map

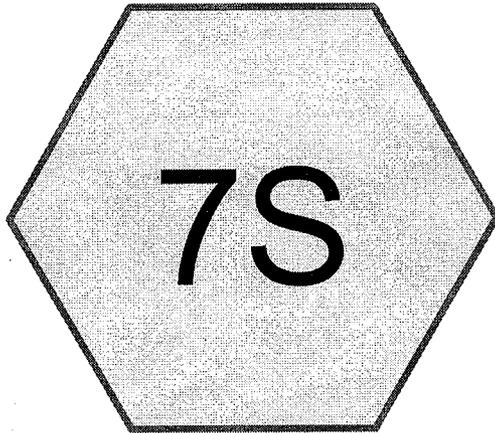


Large scale aerial

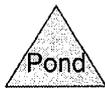


Appendix D
1, 2, 25 and 100-year
Stormwater Peak Flow Estimates

Appendix D (continued)
1, 2, 25 and 100-year
Stormwater Peak Flow Estimates
Existing Conditions



Pre-Dev



Routing Diagram for Sancar Pre-development
Prepared by B & F Consulting
HydroCAD® 10.00-12 s/n 07836 © 2014 HydroCAD Software Solutions LLC

Sancar Pre-development

Prepared by B & F Consulting

HydroCAD® 10.00-12 s/n 07836 © 2014 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.253	84	50-75% Grass cover, Fair, HSG D (7S)
0.222	98	Impervious (7S)
1.252	83	Woods, thin stand, poor cover (7S)
1.728	85	TOTAL AREA

Summary for Subcatchment 7S: Pre-Dev

Runoff = 4.89 cfs @ 11.96 hrs, Volume= 0.149 af, Depth> 1.03"

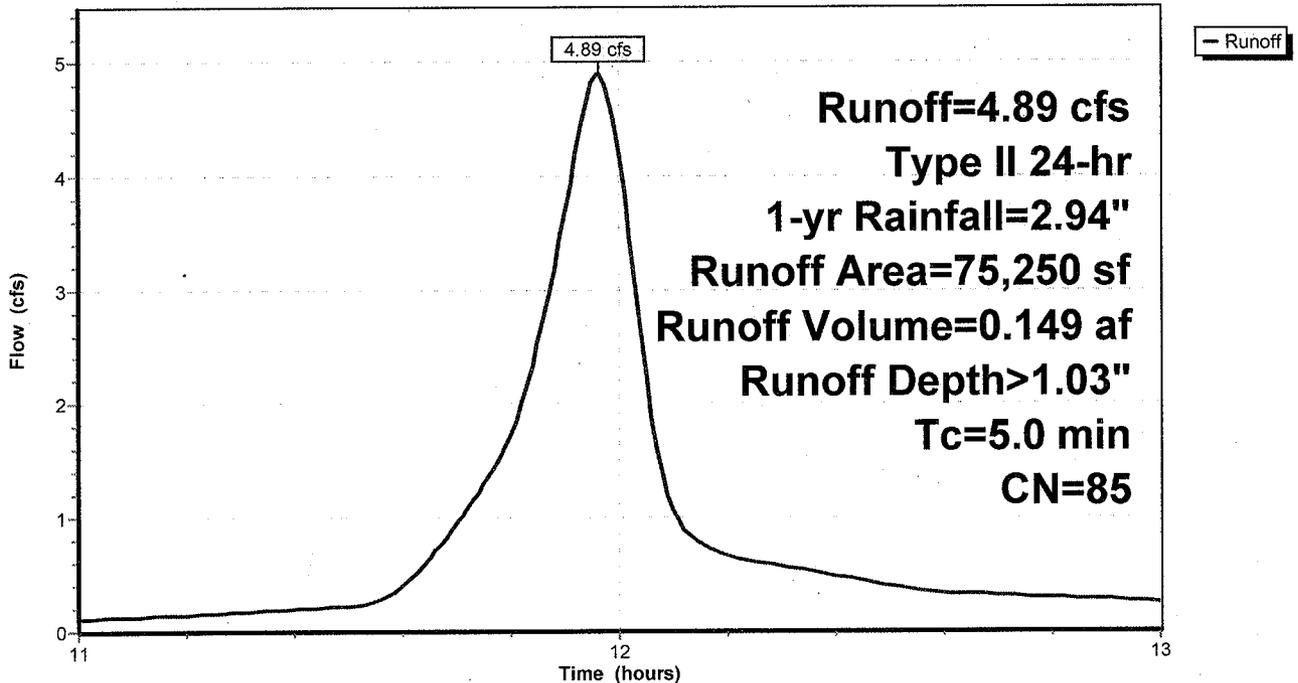
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.94"

	Area (sf)	CN	Description
*	9,679	98	Impervious
*	54,533	83	Woods, thin stand, poor cover
	11,038	84	50-75% Grass cover, Fair, HSG D
	75,250	85	Weighted Average
	65,571		87.14% Pervious Area
	9,679		12.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: Pre-Dev

Hydrograph



Sancar Pre-development

Type II 24-hr 2-yr Rainfall=3.29"

Prepared by B & F Consulting

HydroCAD® 10.00-12 s/n 07836 © 2014 HydroCAD Software Solutions LLC

Summary for Subcatchment 7S: Pre-Dev

Runoff = 5.79 cfs @ 11.96 hrs, Volume= 0.179 af, Depth> 1.24"

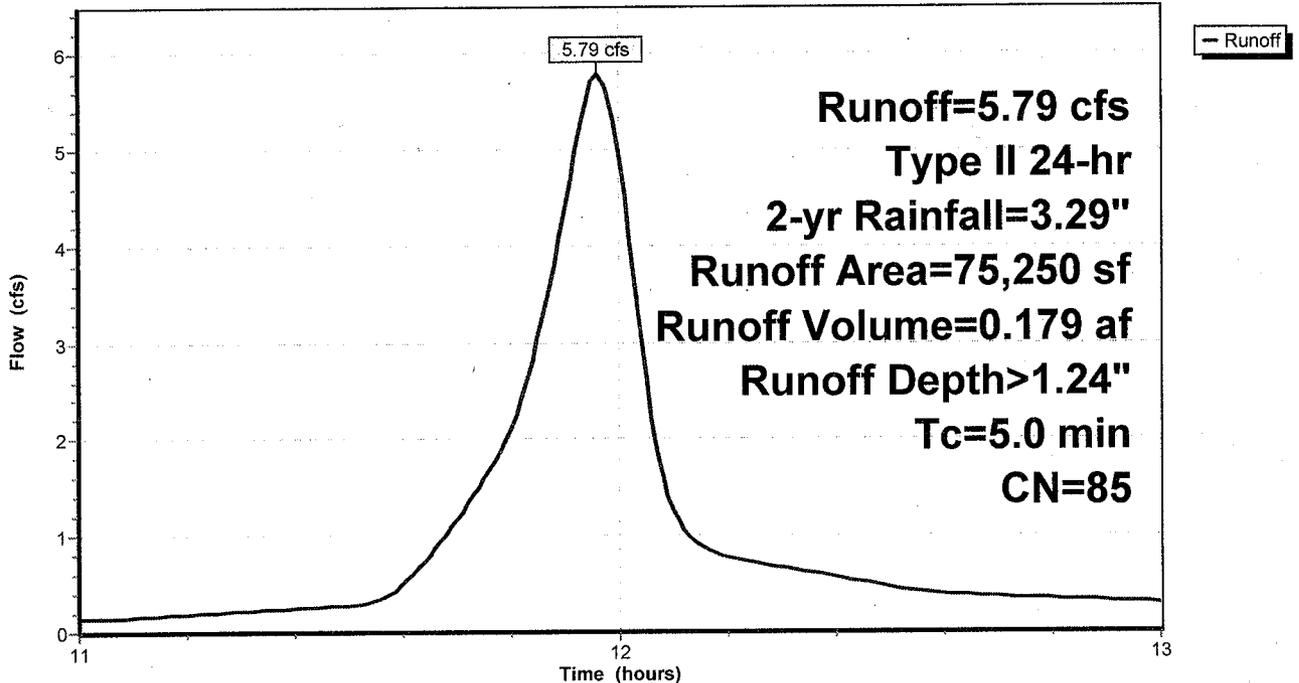
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=3.29"

	Area (sf)	CN	Description
*	9,679	98	Impervious
*	54,533	83	Woods, thin stand, poor cover
	11,038	84	50-75% Grass cover, Fair, HSG D
	75,250	85	Weighted Average
	65,571		87.14% Pervious Area
	9,679		12.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: Pre-Dev

Hydrograph



Sancar Pre-development

Prepared by B & F Consulting

HydroCAD® 10.00-12 s/n 07836 © 2014 HydroCAD Software Solutions LLC

Type II 24-hr 25-yr Rainfall=6.08"

Summary for Subcatchment 7S: Pre-Dev

Runoff = 13.19 cfs @ 11.96 hrs, Volume= 0.444 af, Depth> 3.09"

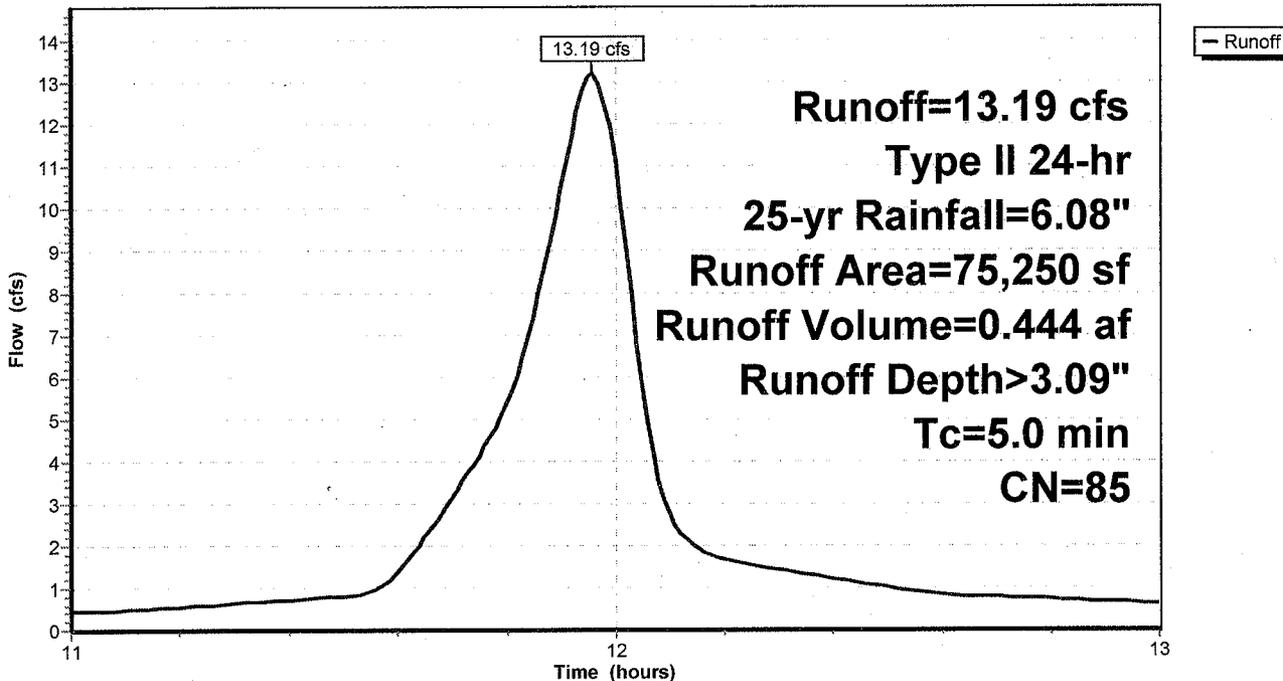
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=6.08"

Area (sf)	CN	Description
* 9,679	98	Impervious
* 54,533	83	Woods, thin stand, poor cover
11,038	84	50-75% Grass cover, Fair, HSG D
75,250	85	Weighted Average
65,571		87.14% Pervious Area
9,679		12.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: Pre-Dev

Hydrograph



Sancar Pre-development

Prepared by B & F Consulting

HydroCAD® 10.00-12 s/n 07836 © 2014 HydroCAD Software Solutions LLC

Type II 24-hr 100-yr Rainfall=7.57"

Summary for Subcatchment 7S: Pre-Dev

Runoff = 17.17 cfs @ 11.96 hrs, Volume= 0.596 af, Depth> 4.14"

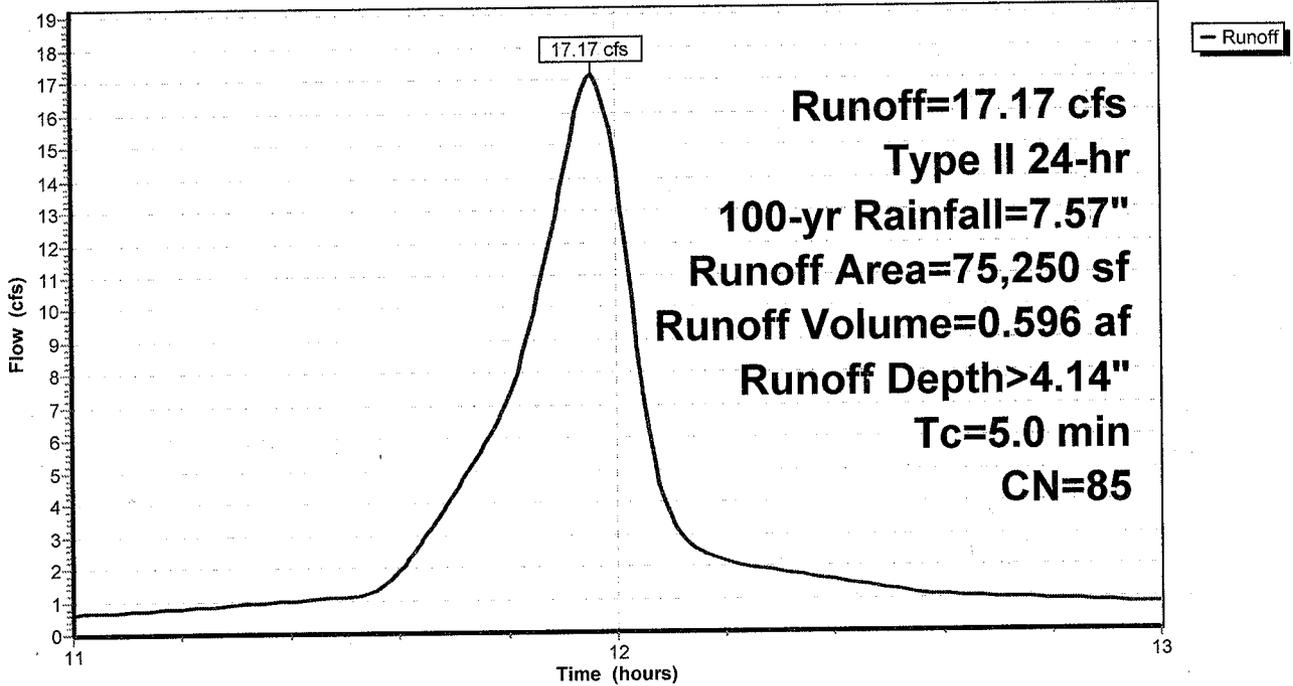
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-yr Rainfall=7.57"

	Area (sf)	CN	Description
*	9,679	98	Impervious
*	54,533	83	Woods, thin stand, poor cover
	11,038	84	50-75% Grass cover, Fair, HSG D
	75,250	85	Weighted Average
	65,571		87.14% Pervious Area
	9,679		12.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: Pre-Dev

Hydrograph



Sancar Pre-development

Type II 24-hr 200-yr Rainfall=8.35"

Prepared by B & F Consulting

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Summary for Subcatchment 7S: Pre-Dev

Runoff = 19.25 cfs @ 11.96 hrs, Volume= 0.677 af, Depth> 4.71"

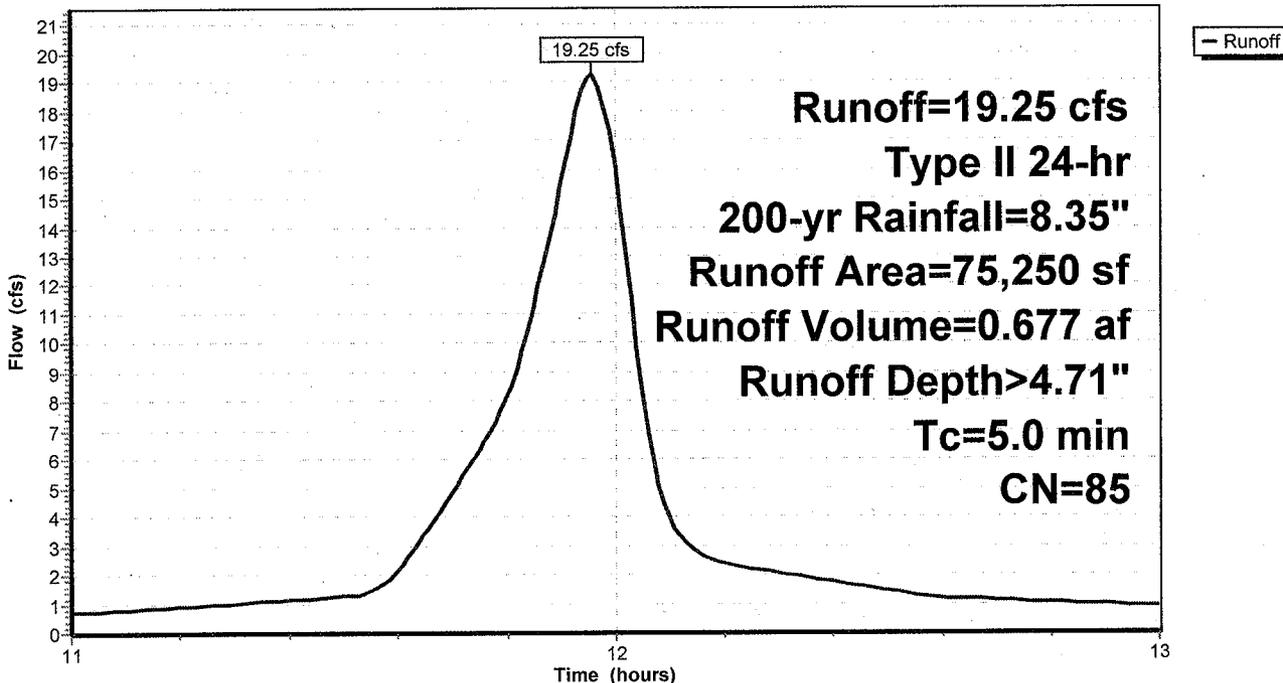
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 200-yr Rainfall=8.35"

	Area (sf)	CN	Description
*	9,679	98	Impervious
*	54,533	83	Woods, thin stand, poor cover
	11,038	84	50-75% Grass cover, Fair, HSG D
	75,250	85	Weighted Average
	65,571		87.14% Pervious Area
	9,679		12.86% Impervious Area

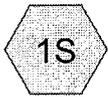
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: Pre-Dev

Hydrograph



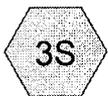
Appendix D (continued)
1, 2, 25 and 100-year
Stormwater Peak Flow Estimates
Proposed Conditions without SCMs



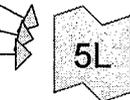
SMC A drainage area



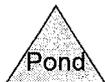
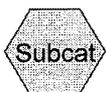
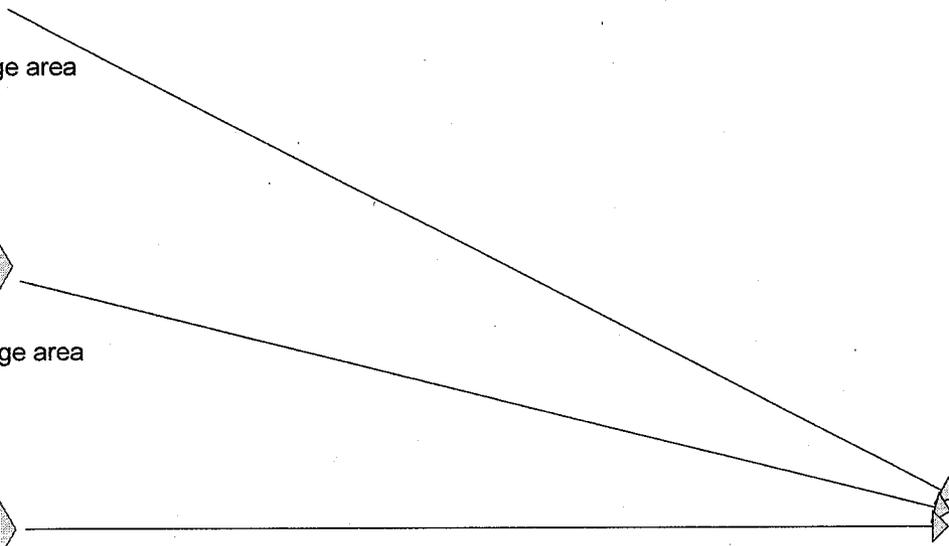
SCM B drainage area



undetained



Total flow



Routing Diagram for Sancar Post-development no mitigation

Prepared by B & F Consulting

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Sancar Post-development no mitigation

Prepared by B & F Consulting

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.062	98	(3S)
0.872	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S)
0.423	98	Impervious to basin (2S)
0.371	98	Roof and pavement (1S)
1.728	89	TOTAL AREA

Sancar Post-development no mitigation

Type II 24-hr 1-yr Rainfall=2.94"

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Summary for Subcatchment 1S: SMC A drainage area

Runoff = 2.65 cfs @ 11.96 hrs, Volume= 0.091 af, Depth> 1.30"

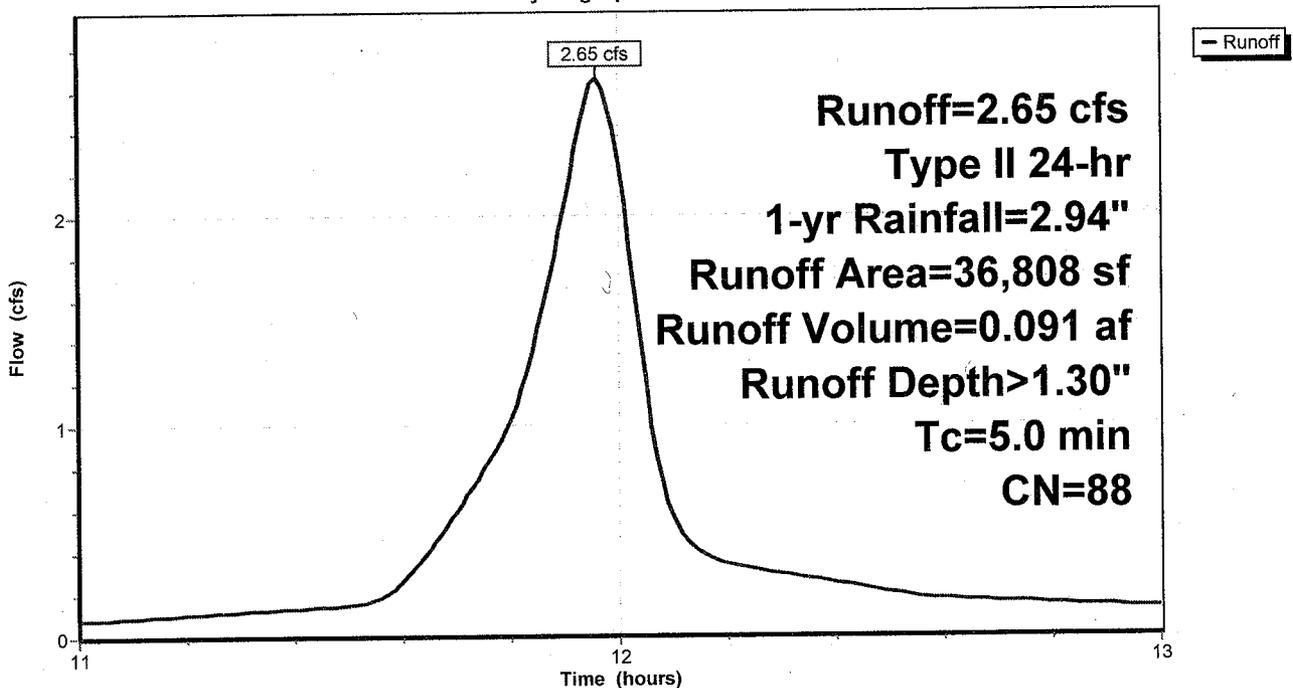
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 1-yr Rainfall=2.94"

Area (sf)	CN	Description
* 16,153	98	Roof and pavement
20,655	80	>75% Grass cover, Good, HSG D
36,808	88	Weighted Average
20,655		56.12% Pervious Area
16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 1-yr Rainfall=2.94"

Prepared by B & F Consulting

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Summary for Subcatchment 2S: SCM B drainage area

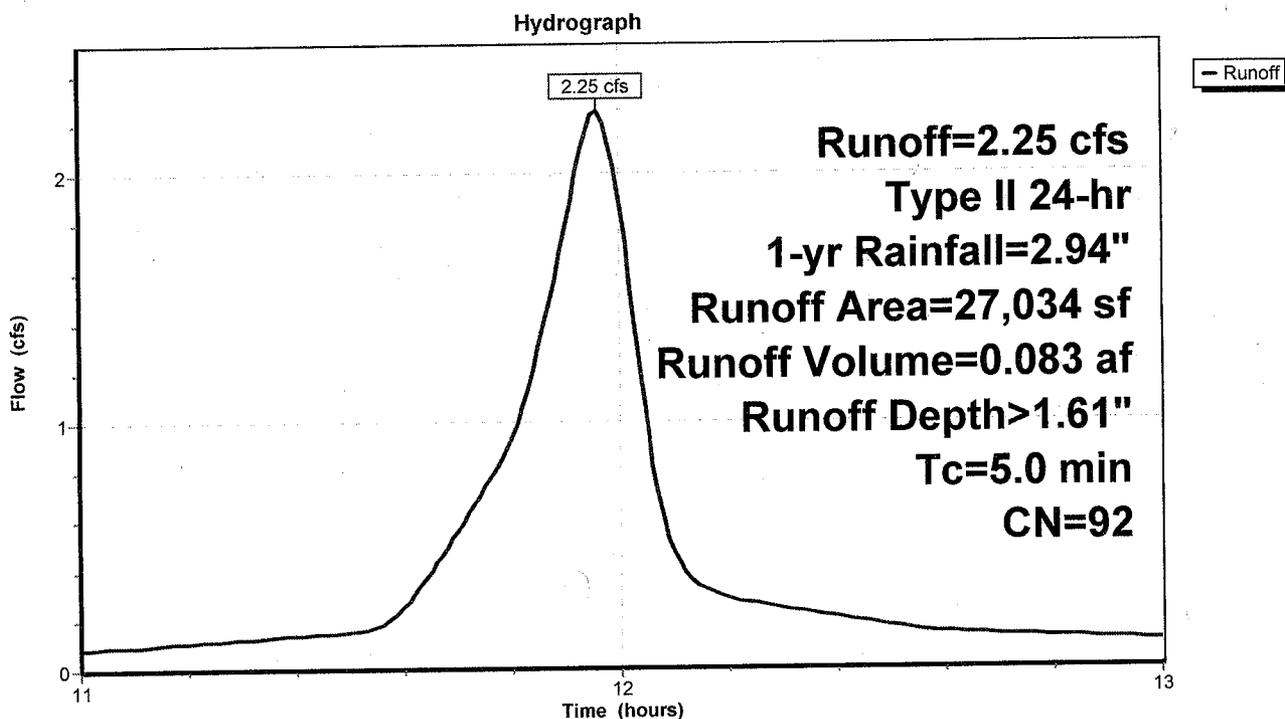
Runoff = 2.25 cfs @ 11.96 hrs, Volume= 0.083 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.94"

	Area (sf)	CN	Description
*	18,412	98	Impervious to basin
	8,622	80	>75% Grass cover, Good, HSG D
	27,034	92	Weighted Average
	8,622		31.89% Pervious Area
	18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area



Sancar Post-development no mitigation

Type II 24-hr 1-yr Rainfall=2.94"

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Summary for Subcatchment 3S: undetained

Runoff = 0.71 cfs @ 11.96 hrs, Volume= 0.023 af, Depth> 1.03"

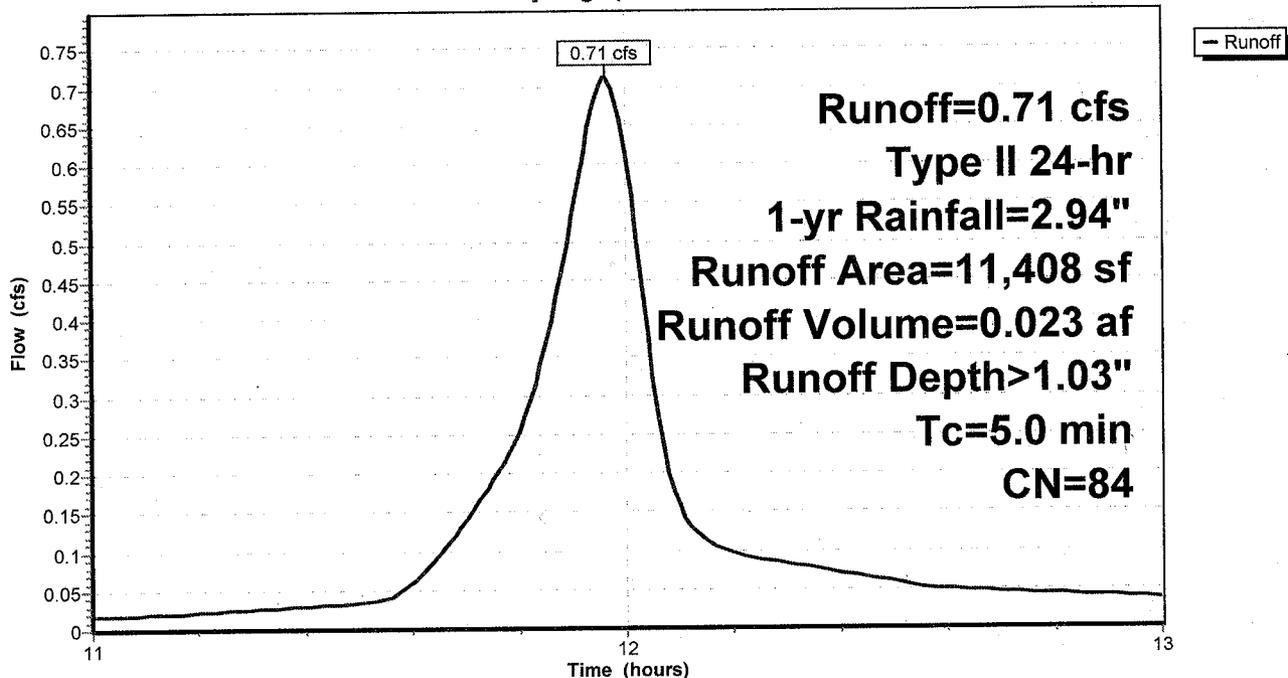
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.94"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 1-yr Rainfall=2.94"

Prepared by B & F Consulting

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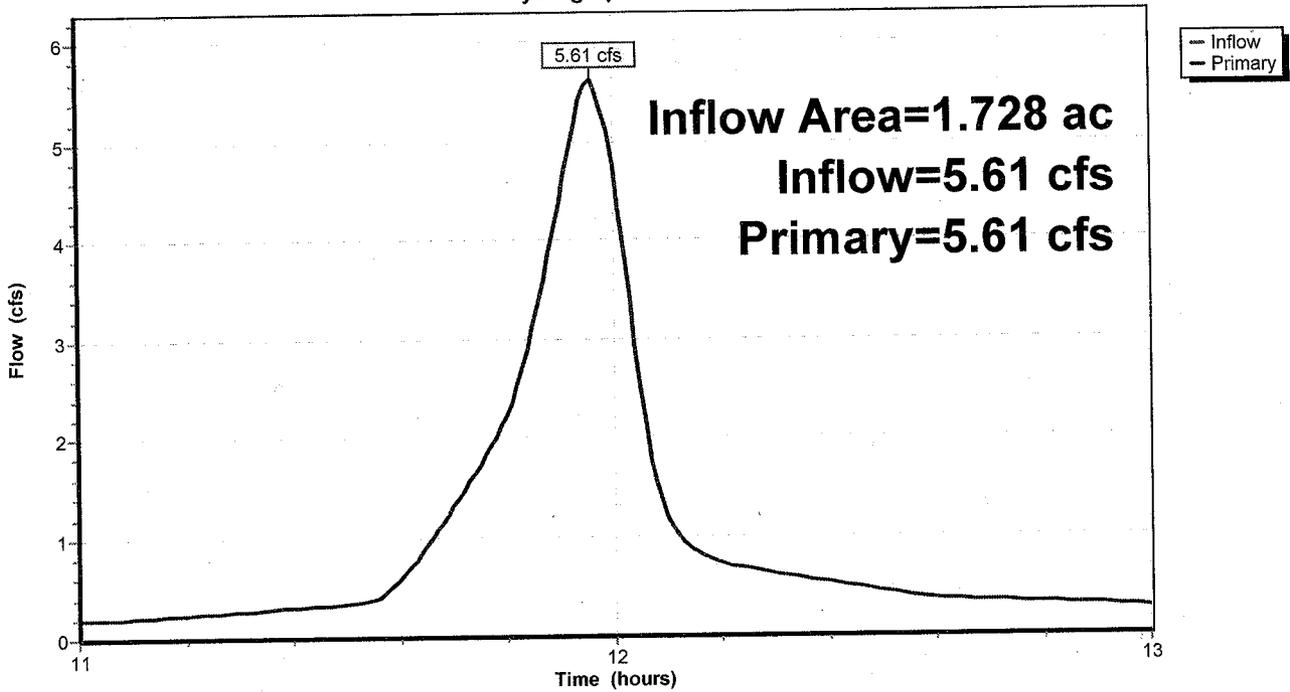
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 1.37" for 1-yr event
Inflow = 5.61 cfs @ 11.96 hrs, Volume= 0.197 af
Primary = 5.61 cfs @ 11.96 hrs, Volume= 0.197 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 2-yr Rainfall=3.29"

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Page 7

Summary for Subcatchment 1S: SMC A drainage area

Runoff = 3.08 cfs @ 11.96 hrs, Volume= 0.107 af, Depth> 1.52"

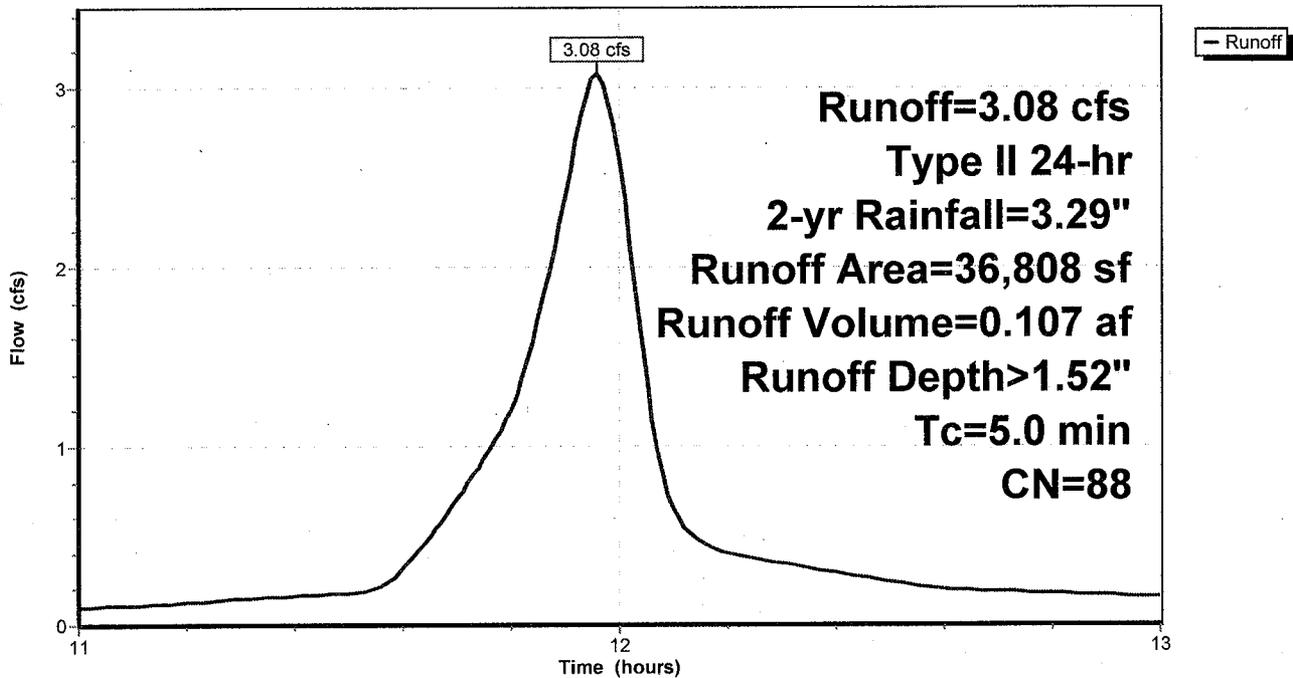
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
* 16,153	98	Roof and pavement
20,655	80	>75% Grass cover, Good, HSG D
36,808	88	Weighted Average
20,655		56.12% Pervious Area
16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 2-yr Rainfall=3.29"

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Summary for Subcatchment 2S: SCM B drainage area

Runoff = 2.57 cfs @ 11.96 hrs, Volume= 0.096 af, Depth> 1.85"

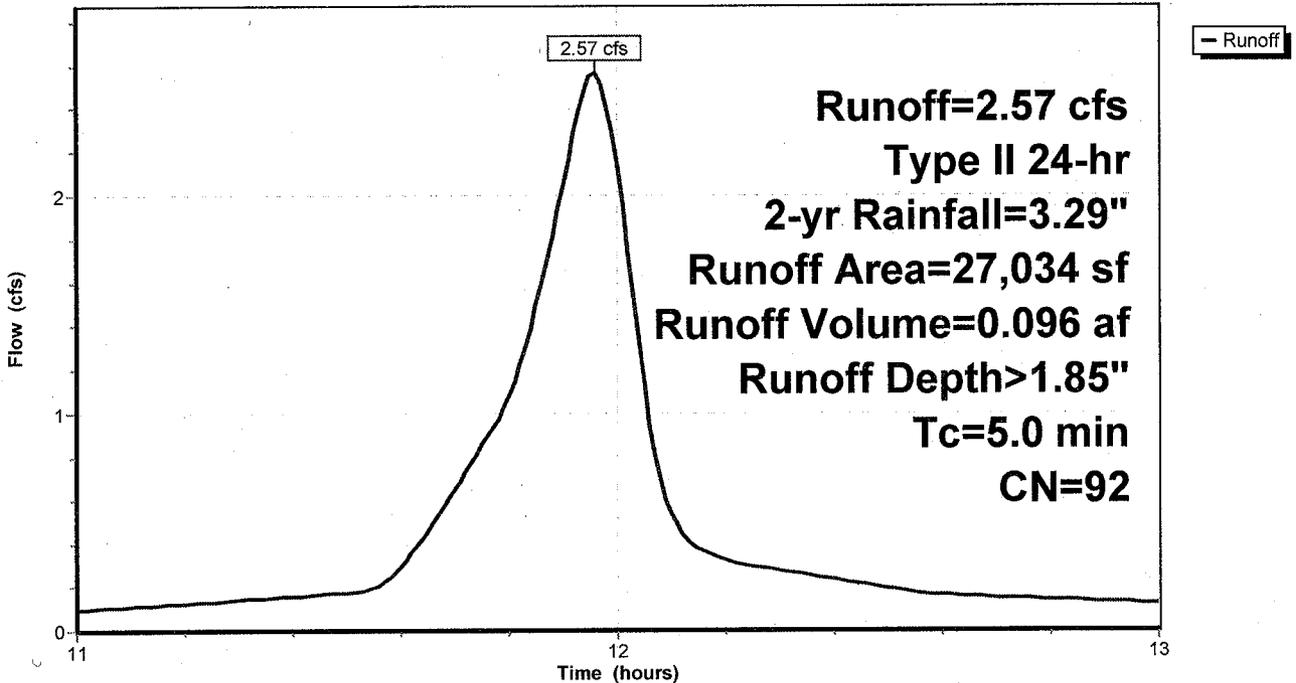
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
* 18,412	98	Impervious to basin
8,622	80	>75% Grass cover, Good, HSG D
27,034	92	Weighted Average
8,622		31.89% Pervious Area
18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 2-yr Rainfall=3.29"

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Summary for Subcatchment 3S: undetained

Runoff = 0.84 cfs @ 11.96 hrs, Volume= 0.027 af, Depth> 1.23"

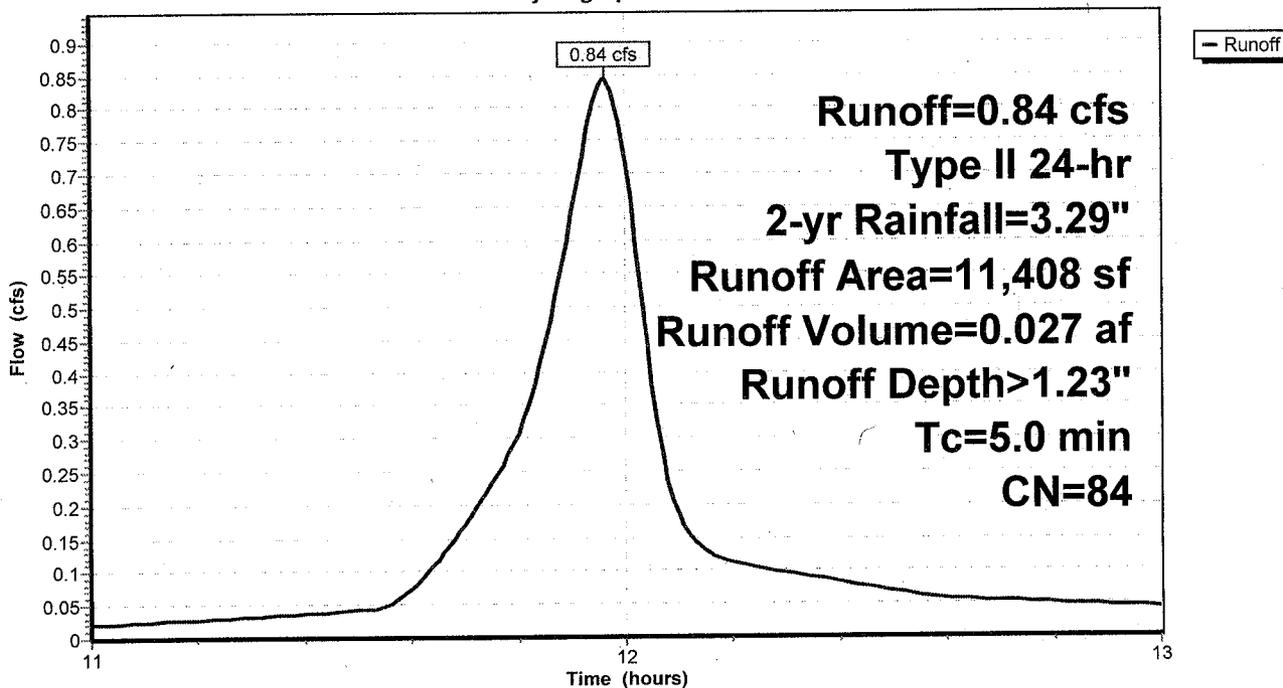
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



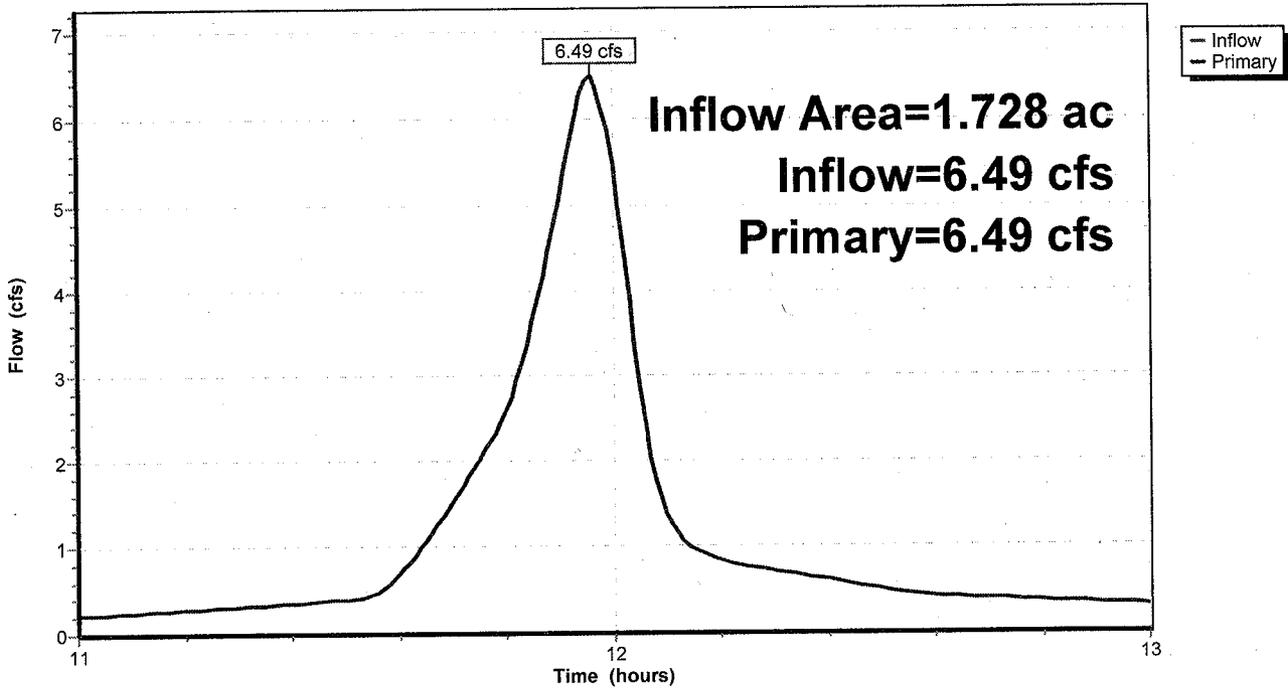
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 1.59" for 2-yr event
Inflow = 6.49 cfs @ 11.96 hrs, Volume= 0.229 af
Primary = 6.49 cfs @ 11.96 hrs, Volume= 0.229 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 25-yr Rainfall=6.08"

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Summary for Subcatchment 1S: SMC A drainage area

Runoff = 6.62 cfs @ 11.96 hrs, Volume= 0.240 af, Depth> 3.40"

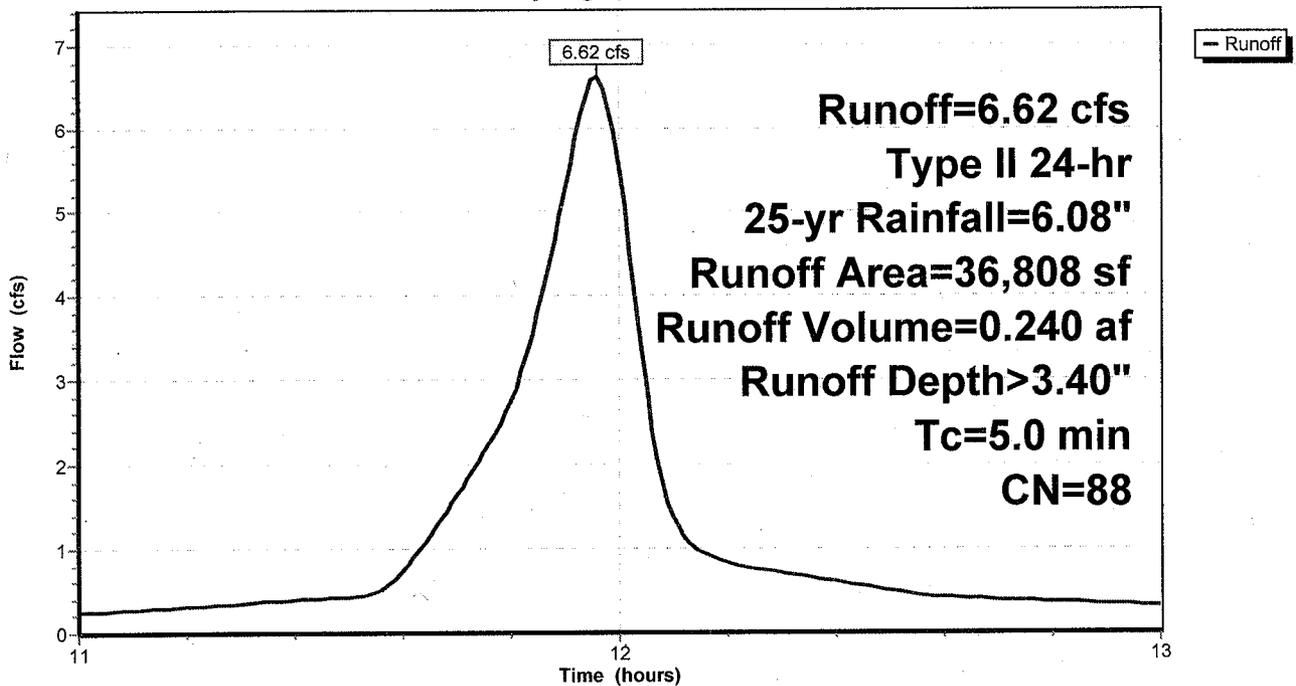
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 25-yr Rainfall=6.08"

Area (sf)	CN	Description
* 16,153	98	Roof and pavement
20,655	80	>75% Grass cover, Good, HSG D
36,808	88	Weighted Average
20,655		56.12% Pervious Area
16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 25-yr Rainfall=6.08"

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Summary for Subcatchment 2S: SCM B drainage area

Runoff = 5.16 cfs @ 11.96 hrs, Volume= 0.199 af, Depth> 3.85"

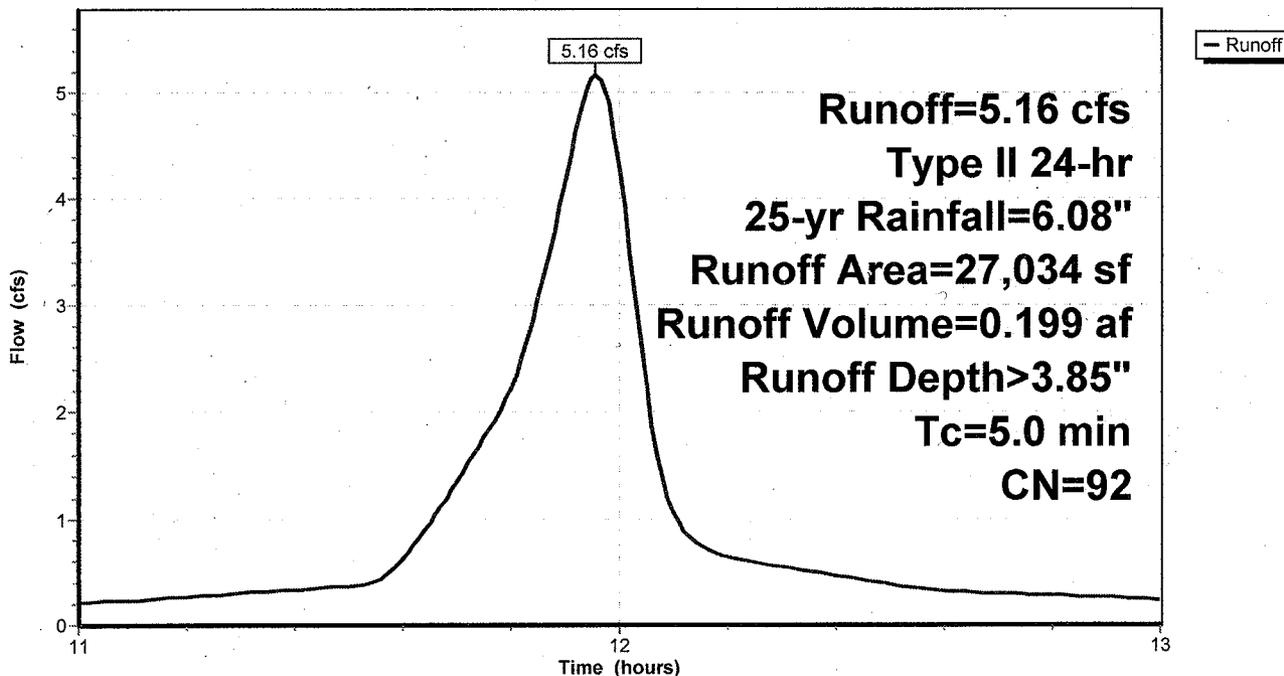
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=6.08"

Area (sf)	CN	Description
* 18,412	98	Impervious to basin
8,622	80	>75% Grass cover, Good, HSG D
27,034	92	Weighted Average
8,622		31.89% Pervious Area
18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 25-yr Rainfall=6.08"

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Summary for Subcatchment 3S: undetained

Runoff = 1.95 cfs @ 11.96 hrs, Volume= 0.066 af, Depth> 3.03"

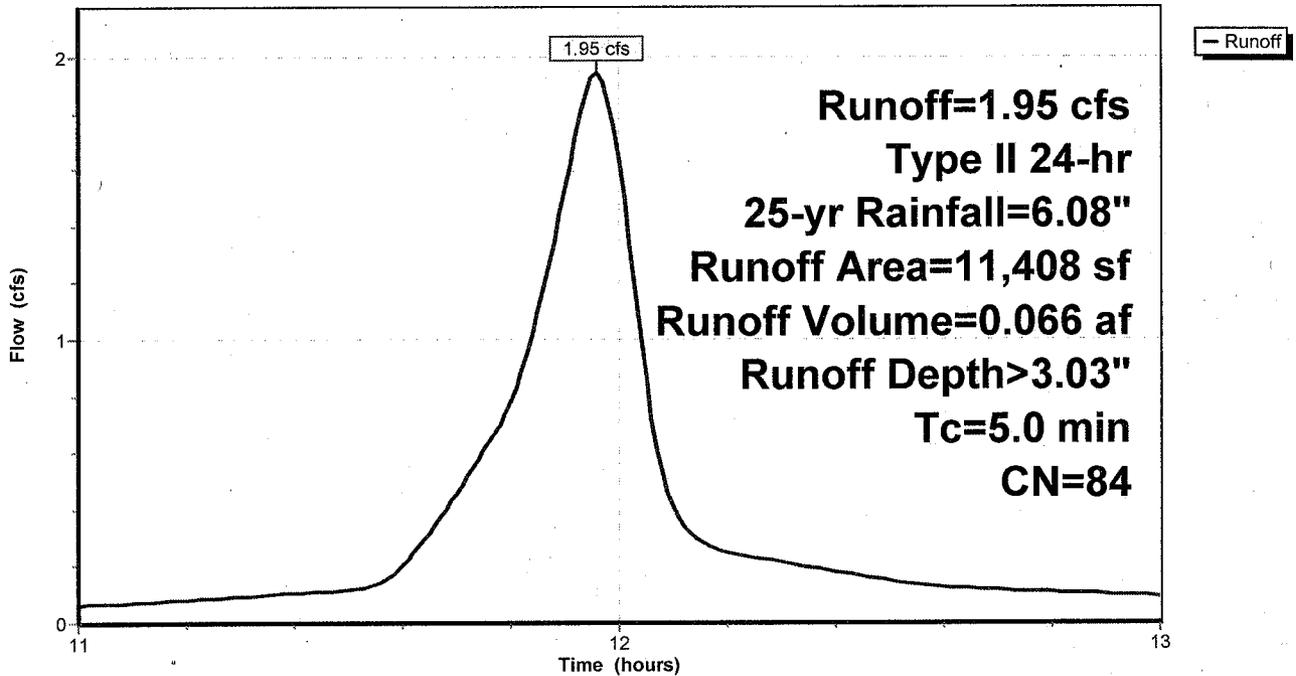
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=6.08"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



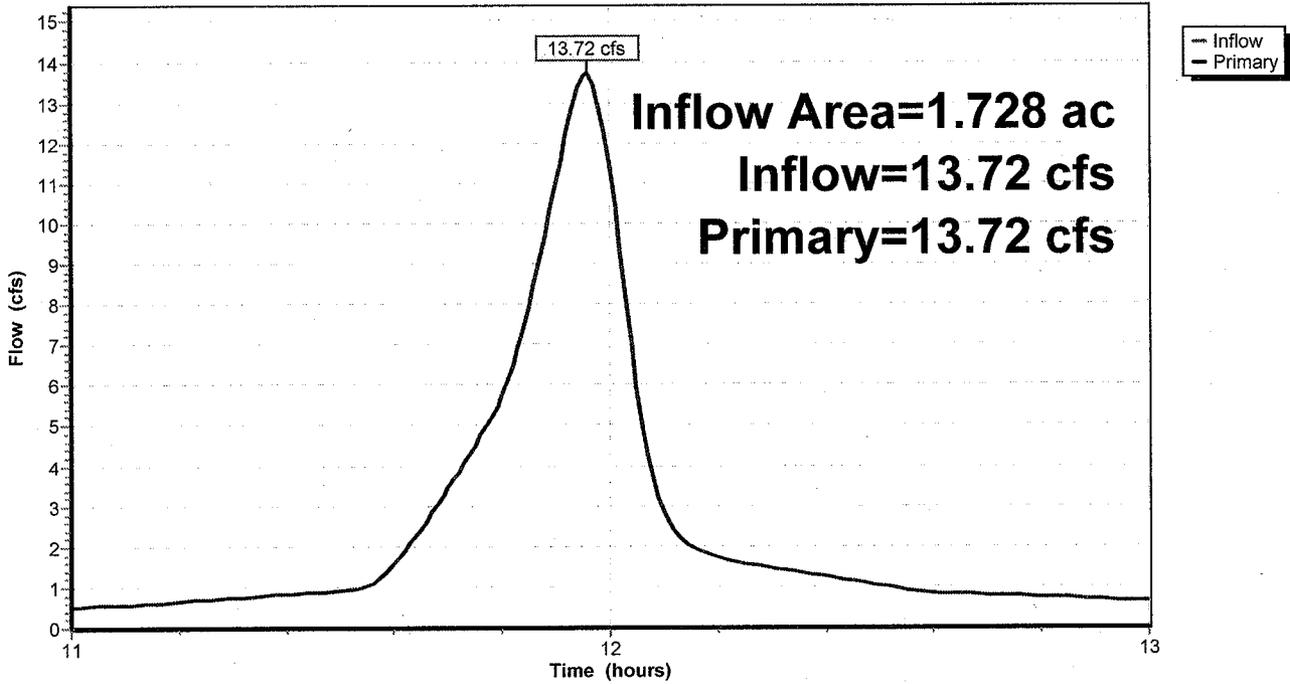
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 3.51" for 25-yr event
Inflow = 13.72 cfs @ 11.96 hrs, Volume= 0.505 af
Primary = 13.72 cfs @ 11.96 hrs, Volume= 0.505 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 1S: SMC A drainage area

Runoff = 8.54 cfs @ 11.96 hrs, Volume= 0.315 af, Depth> 4.47"

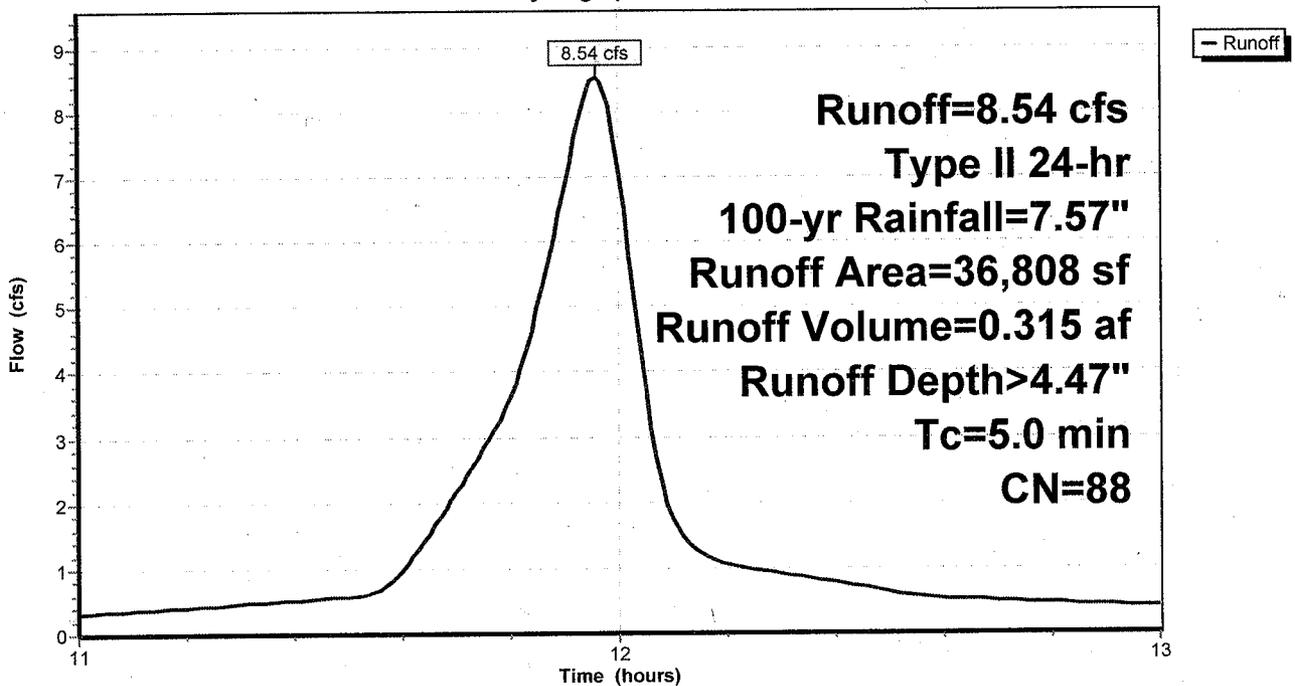
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (sf)	CN	Description
* 16,153	98	Roof and pavement
20,655	80	>75% Grass cover, Good, HSG D
36,808	88	Weighted Average
20,655		56.12% Pervious Area
16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area

Hydrograph



Summary for Subcatchment 2S: SCM B drainage area

Runoff = 6.55 cfs @ 11.96 hrs, Volume= 0.256 af, Depth> 4.95"

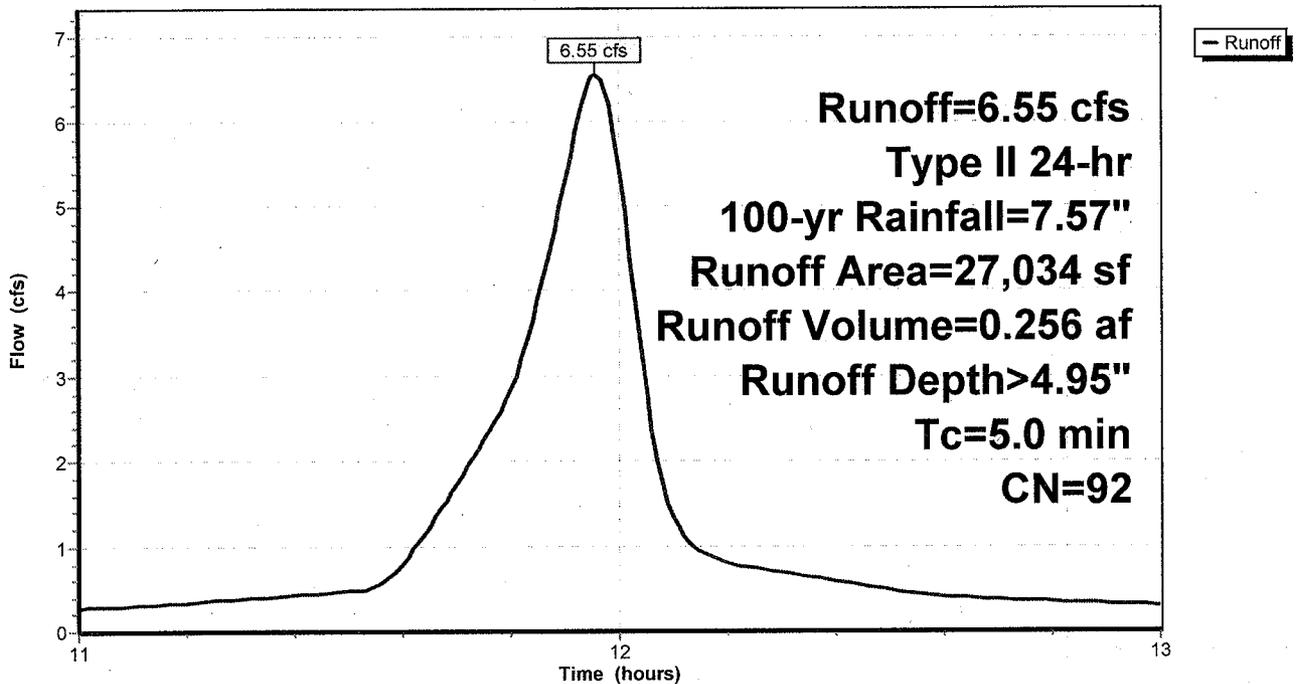
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-yr Rainfall=7.57"

Area (sf)	CN	Description
* 18,412	98	Impervious to basin
8,622	80	>75% Grass cover, Good, HSG D
27,034	92	Weighted Average
8,622		31.89% Pervious Area
18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Subcatchment 3S: undetained

Runoff = 2.55 cfs @ 11.96 hrs, Volume= 0.089 af, Depth> 4.07"

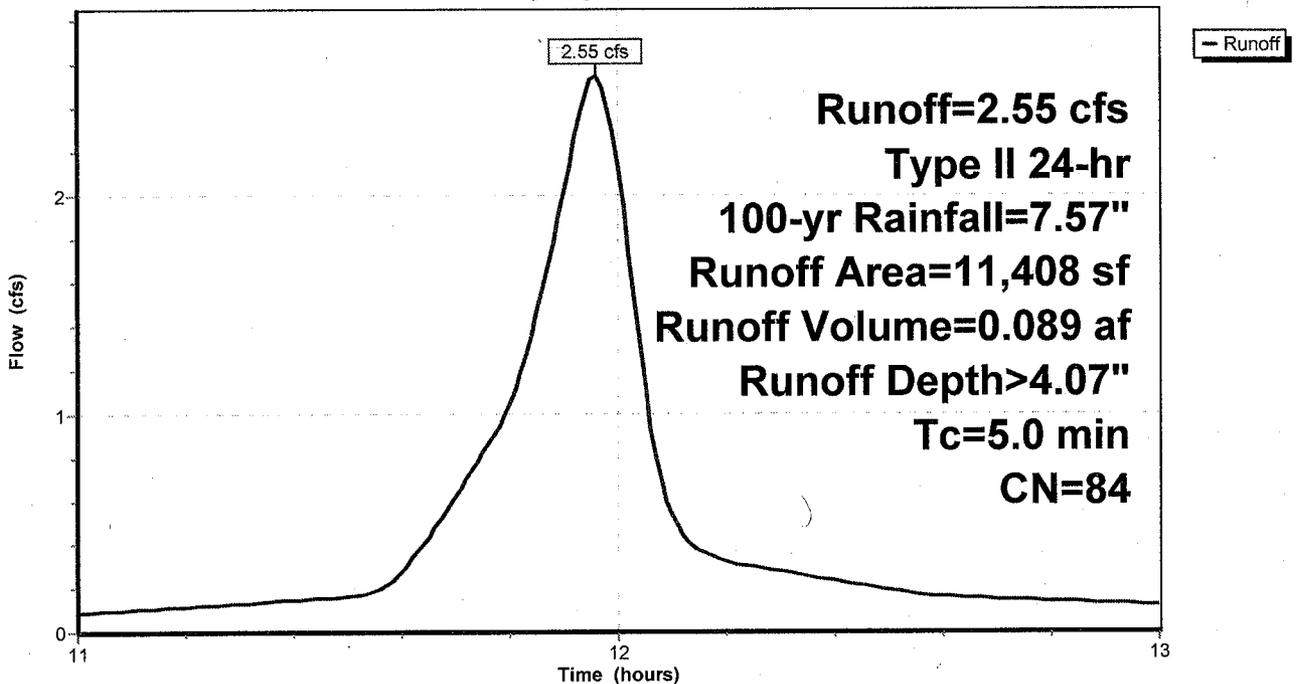
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-yr Rainfall=7.57"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 100-yr Rainfall=7.57"

Prepared by B & F Consulting

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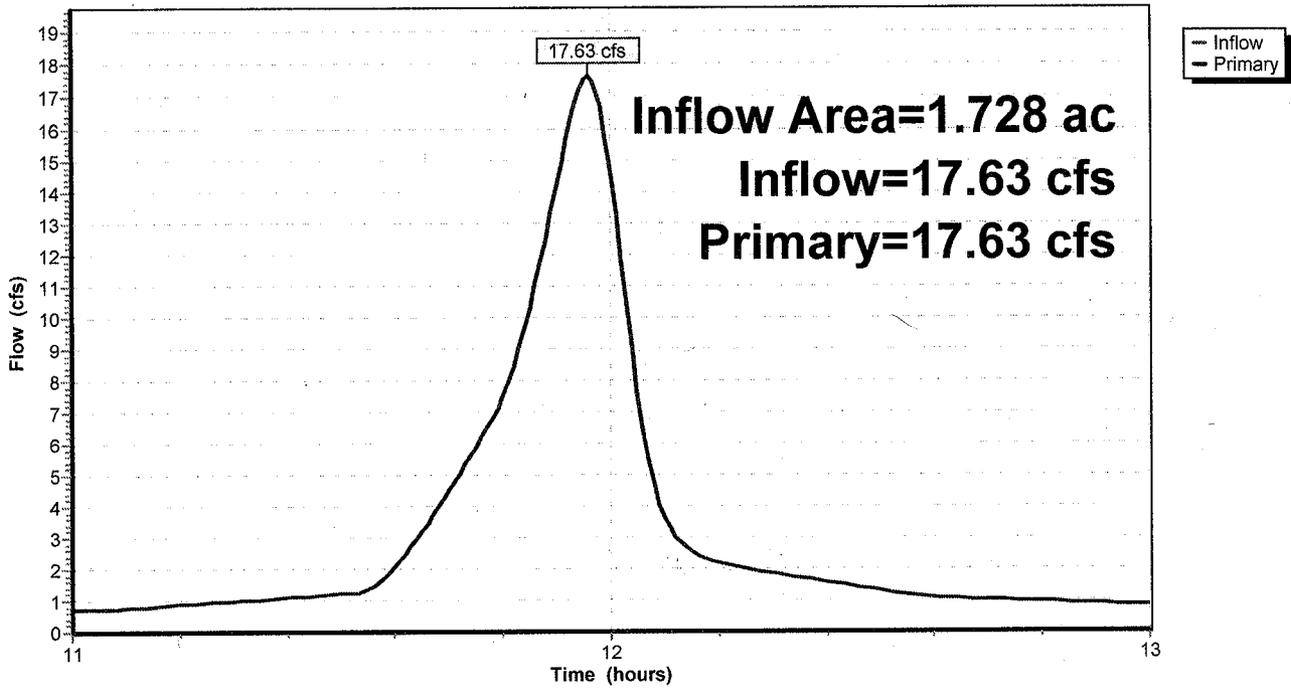
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 4.58" for 100-yr event
Inflow = 17.63 cfs @ 11.96 hrs, Volume= 0.659 af
Primary = 17.63 cfs @ 11.96 hrs, Volume= 0.659 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 200-yr Rainfall=8.35"

Prepared by B & F Consulting

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Summary for Subcatchment 1S: SMC A drainage area

Runoff = 9.54 cfs @ 11.96 hrs, Volume= 0.355 af, Depth> 5.04"

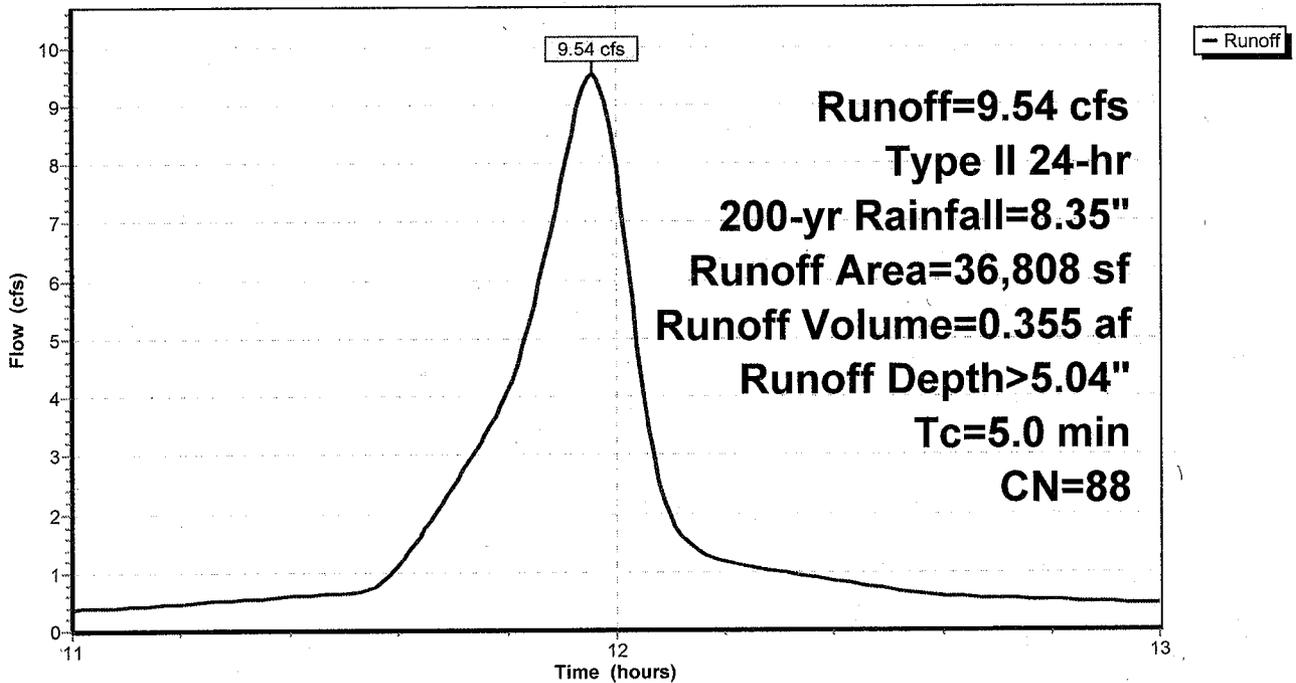
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 200-yr Rainfall=8.35"

Area (sf)	CN	Description
* 16,153	98	Roof and pavement
20,655	80	>75% Grass cover, Good, HSG D
36,808	88	Weighted Average
20,655		56.12% Pervious Area
16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 200-yr Rainfall=8.35"

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Summary for Subcatchment 2S: SCM B drainage area

Runoff = 7.28 cfs @ 11.96 hrs, Volume= 0.286 af, Depth> 5.53"

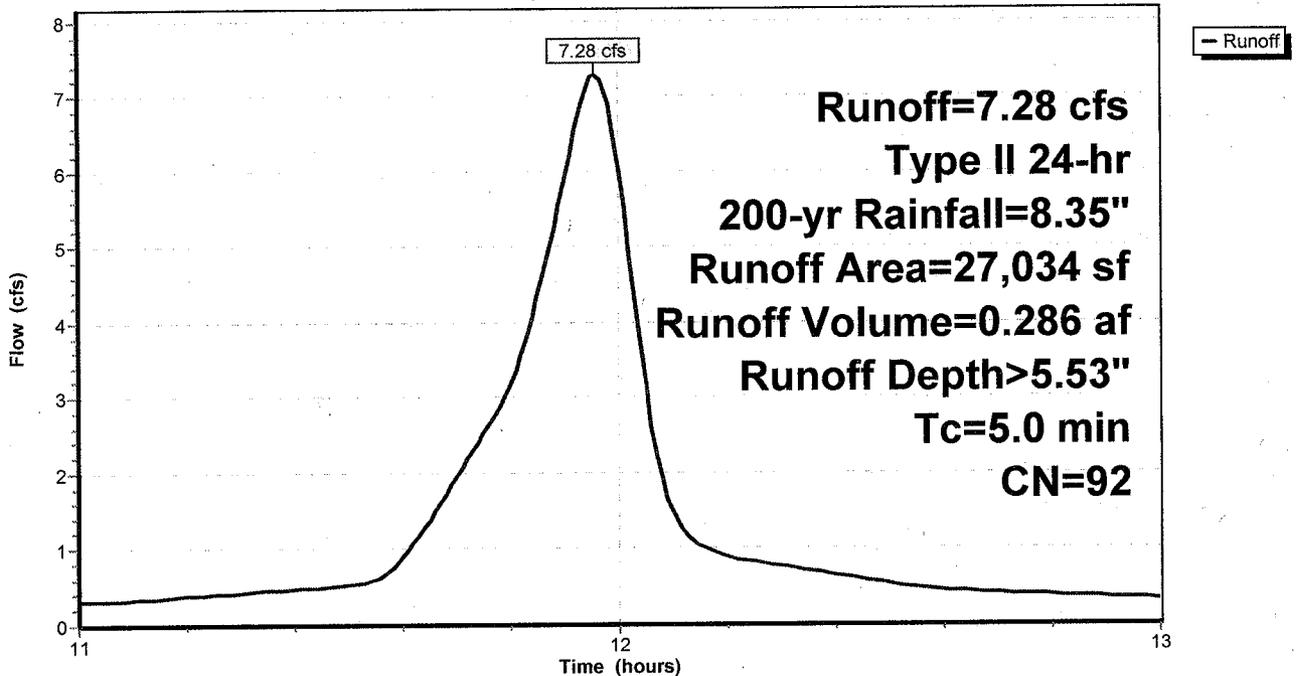
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 200-yr Rainfall=8.35"

Area (sf)	CN	Description
* 18,412	98	Impervious to basin
8,622	80	>75% Grass cover, Good, HSG D
27,034	92	Weighted Average
8,622		31.89% Pervious Area
18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area

Hydrograph



Sancar Post-development no mitigation

Type II 24-hr 200-yr Rainfall=8.35"

Prepared by B & F Consulting

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Summary for Subcatchment 3S: undetained

Runoff = 2.86 cfs @ 11.96 hrs, Volume= 0.101 af, Depth> 4.63"

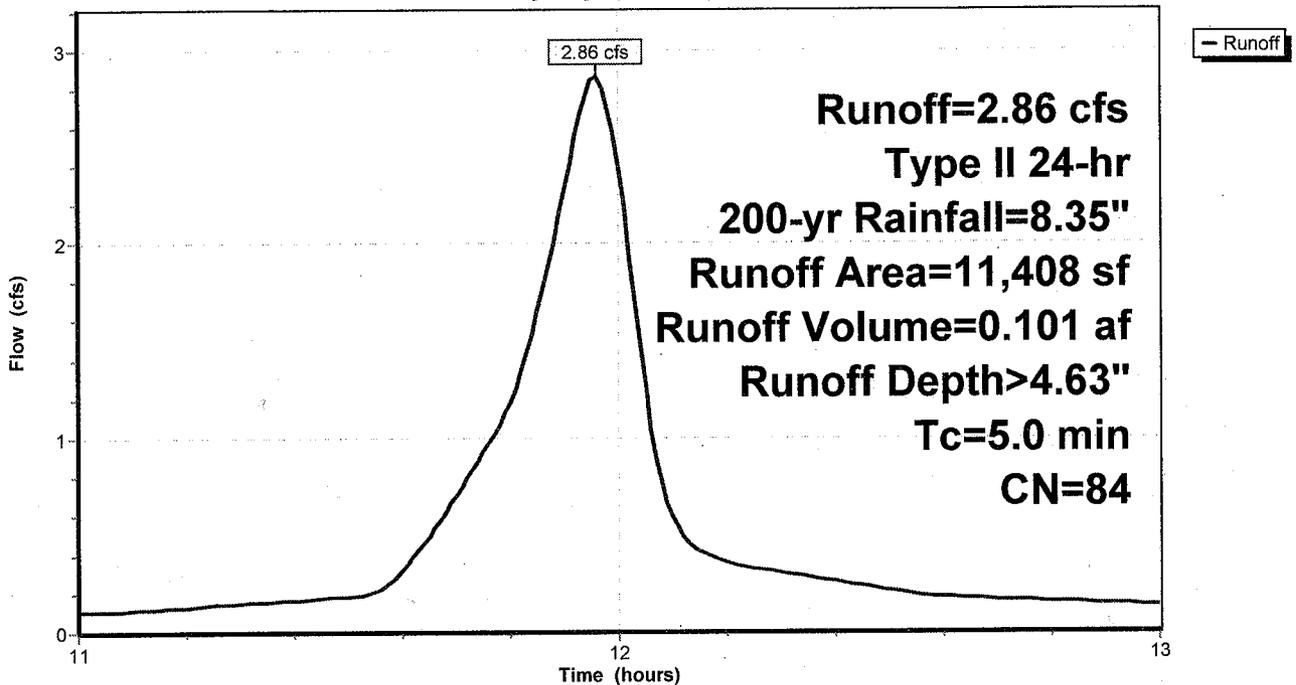
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 200-yr Rainfall=8.35"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



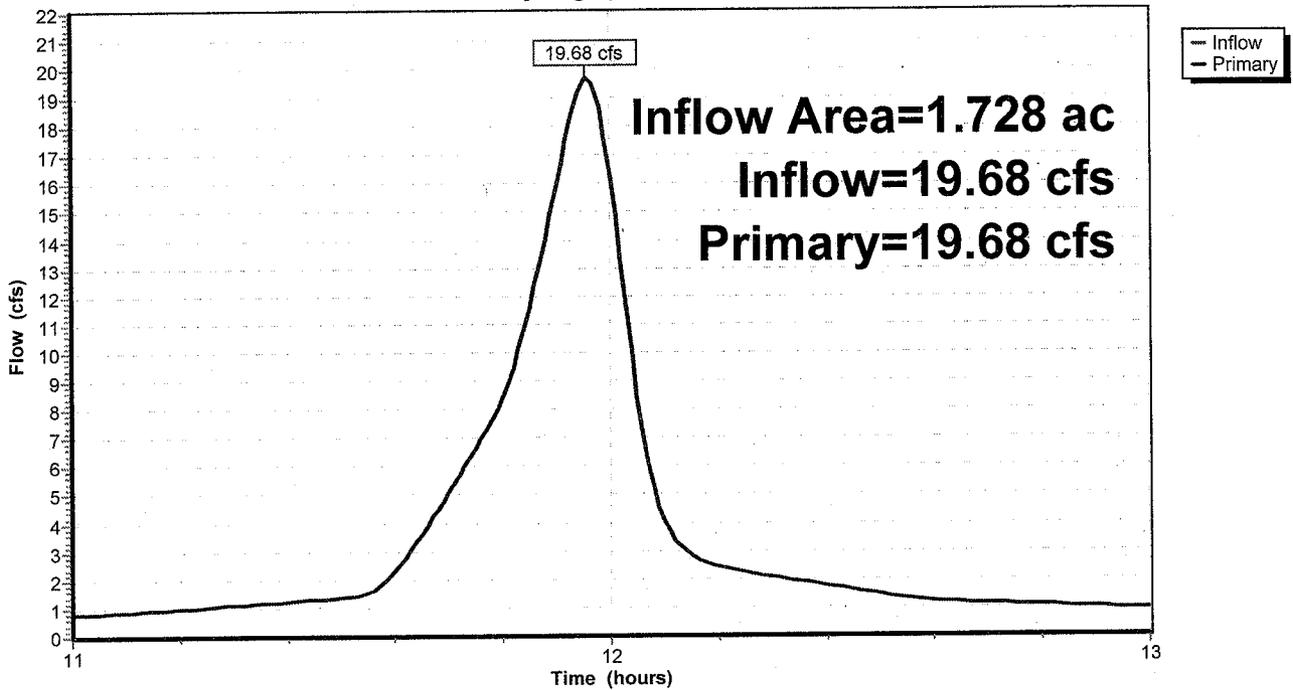
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 5.15" for 200-yr event
Inflow = 19.68 cfs @ 11.96 hrs, Volume= 0.741 af
Primary = 19.68 cfs @ 11.96 hrs, Volume= 0.741 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Appendix D (continued)

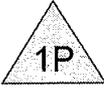
1, 2, 25 and 100-year

Stormwater Peak Flow Estimates

Proposed Conditions with SCMs



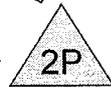
SMC A drainage area



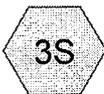
SMB "A"



SCM B drainage area



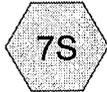
SCM "B"



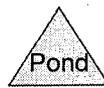
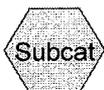
undetained



Total flow



Pre-Dev



Routing Diagram for Sancar Post-development
 Prepared by B & F Consulting
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Sancar Post-development

Prepared by B & F Consulting

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.062	98	(3S)
0.253	84	50-75% Grass cover, Fair, HSG D (7S)
0.872	80	>75% Grass cover, Good, HSG D (1S, 2S, 3S)
0.222	98	Impervious (7S)
0.423	98	Impervious to basin (2S)
0.371	98	Roof and pavement (1S)
1.252	83	Woods, thin stand, poor cover (7S)
3.455	87	TOTAL AREA

Summary for Subcatchment 1S: SMC A drainage area

Runoff = 2.65 cfs @ 11.96 hrs, Volume= 0.091 af, Depth> 1.30"

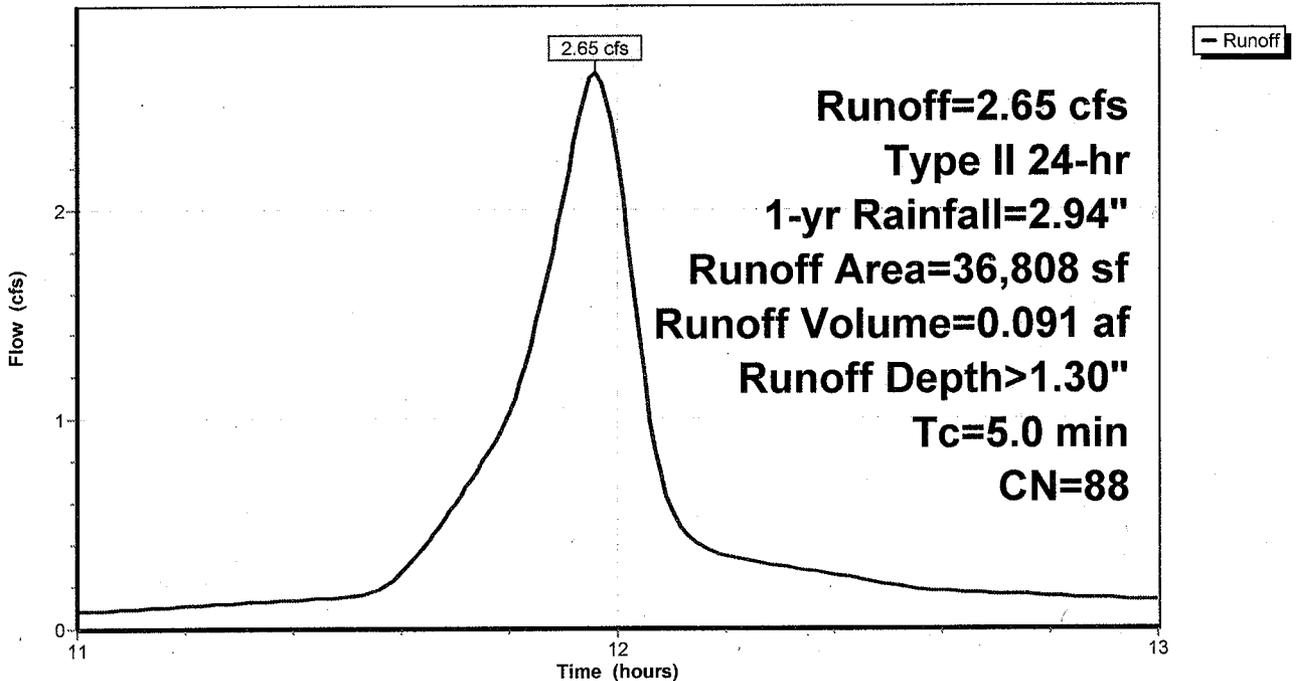
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 1-yr Rainfall=2.94"

Area (sf)	CN	Description
* 16,153	98	Roof and pavement
20,655	80	>75% Grass cover, Good, HSG D
36,808	88	Weighted Average
20,655		56.12% Pervious Area
16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area

Hydrograph



Sancar Post-development

Type II 24-hr 1-yr Rainfall=2.94"

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Summary for Subcatchment 2S: SCM B drainage area

Runoff = 2.25 cfs @ 11.96 hrs, Volume= 0.083 af, Depth> 1.61"

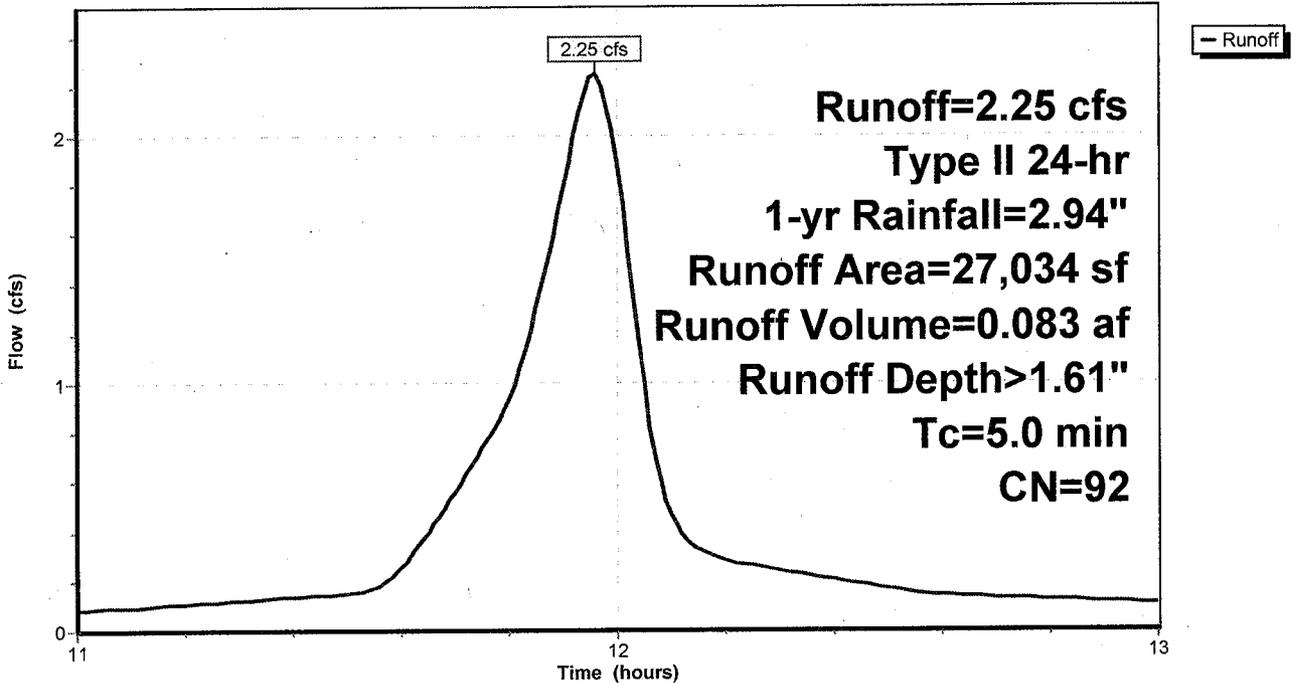
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.94"

Area (sf)	CN	Description
* 18,412	98	Impervious to basin
8,622	80	>75% Grass cover, Good, HSG D
27,034	92	Weighted Average
8,622		31.89% Pervious Area
18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area

Hydrograph



Sancar Post-development

Type II 24-hr 1-yr Rainfall=2.94"

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Summary for Subcatchment 3S: undetained

Runoff = 0.71 cfs @ 11.96 hrs, Volume= 0.023 af, Depth> 1.03"

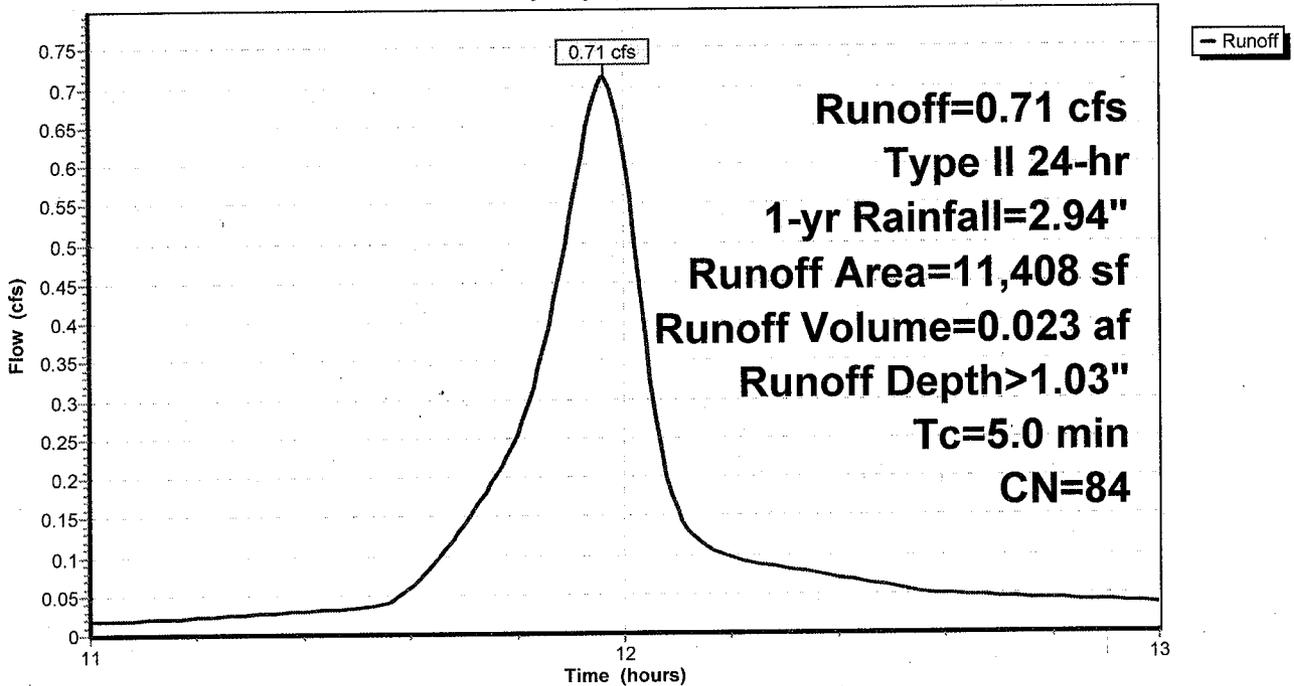
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.94"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



Sancar Post-development

Type II 24-hr 1-yr Rainfall=2.94"

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Summary for Subcatchment 7S: Pre-Dev

Runoff = 4.89 cfs @ 11.96 hrs, Volume= 0.149 af, Depth> 1.03"

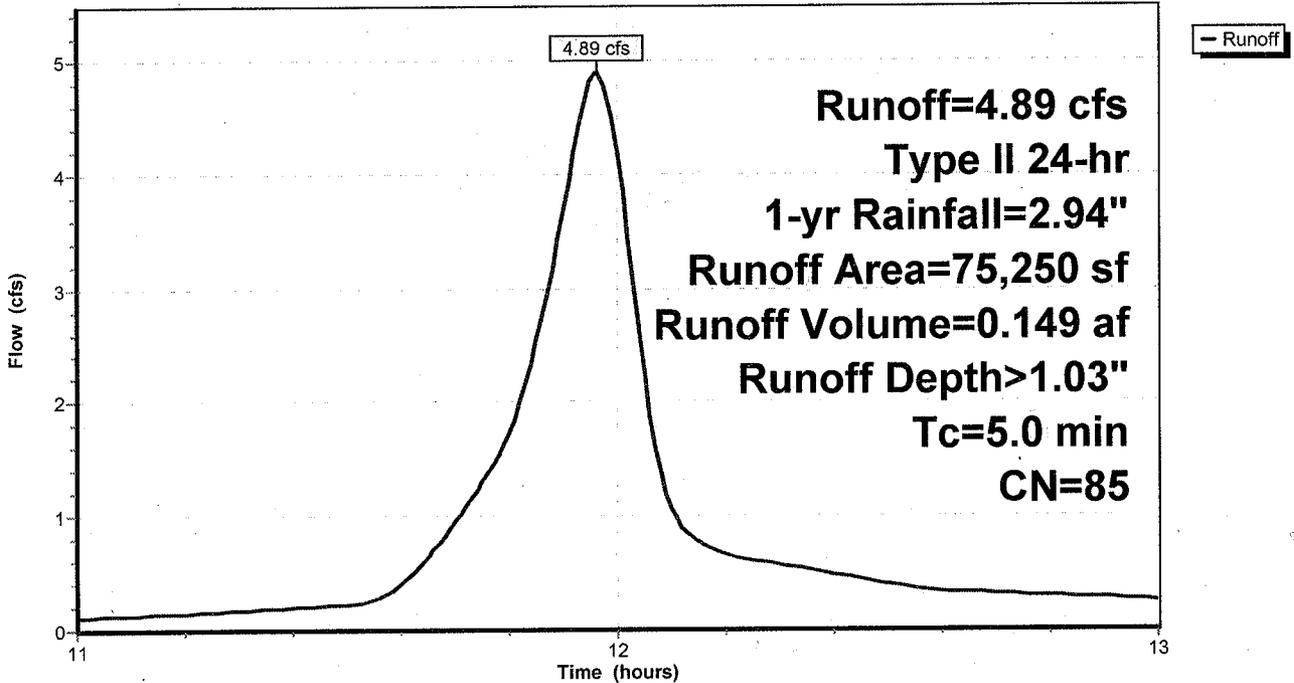
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-yr Rainfall=2.94"

	Area (sf)	CN	Description
*	9,679	98	Impervious
*	54,533	83	Woods, thin stand, poor cover
	11,038	84	50-75% Grass cover, Fair, HSG D
	75,250	85	Weighted Average
	65,571		87.14% Pervious Area
	9,679		12.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

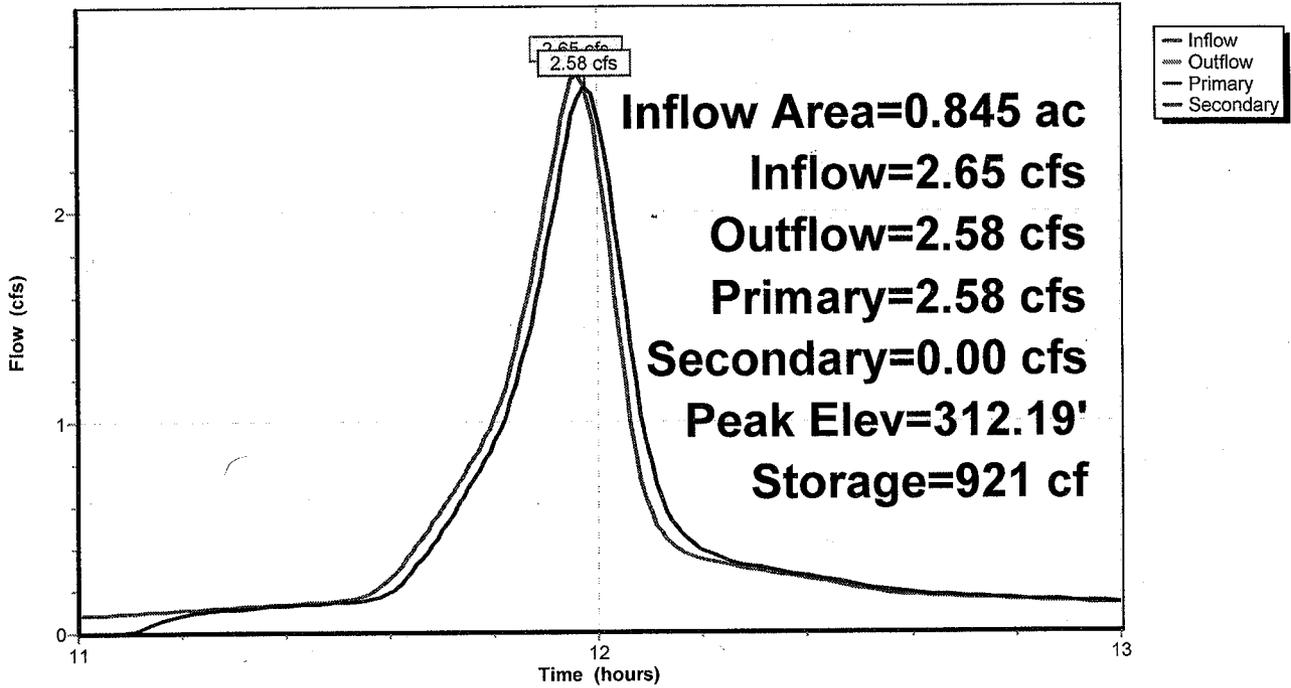
Subcatchment 7S: Pre-Dev

Hydrograph



Pond 1P: SMB "A"

Hydrograph



Summary for Pond 2P: SCM "B"

Inflow Area = 1.466 ac, 54.14% Impervious, Inflow Depth > 1.29" for 1-yr event
 Inflow = 4.80 cfs @ 11.97 hrs, Volume= 0.158 af
 Outflow = 4.26 cfs @ 12.00 hrs, Volume= 0.179 af, Atten= 11%, Lag= 2.1 min
 Primary = 4.26 cfs @ 12.00 hrs, Volume= 0.179 af

Routing by Stor-Ind method, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs / 2
 Starting Elev= 307.00' Surf.Area= 966 sf Storage= 2,512 cf
 Peak Elev= 307.06' @ 12.00 hrs Surf.Area= 966 sf Storage= 2,572 cf (61 cf above start)

Plug-Flow detention time= 47.3 min calculated for 0.121 af (77% of inflow)
 Center-of-Mass det. time= (not calculated: outflow precedes inflow)

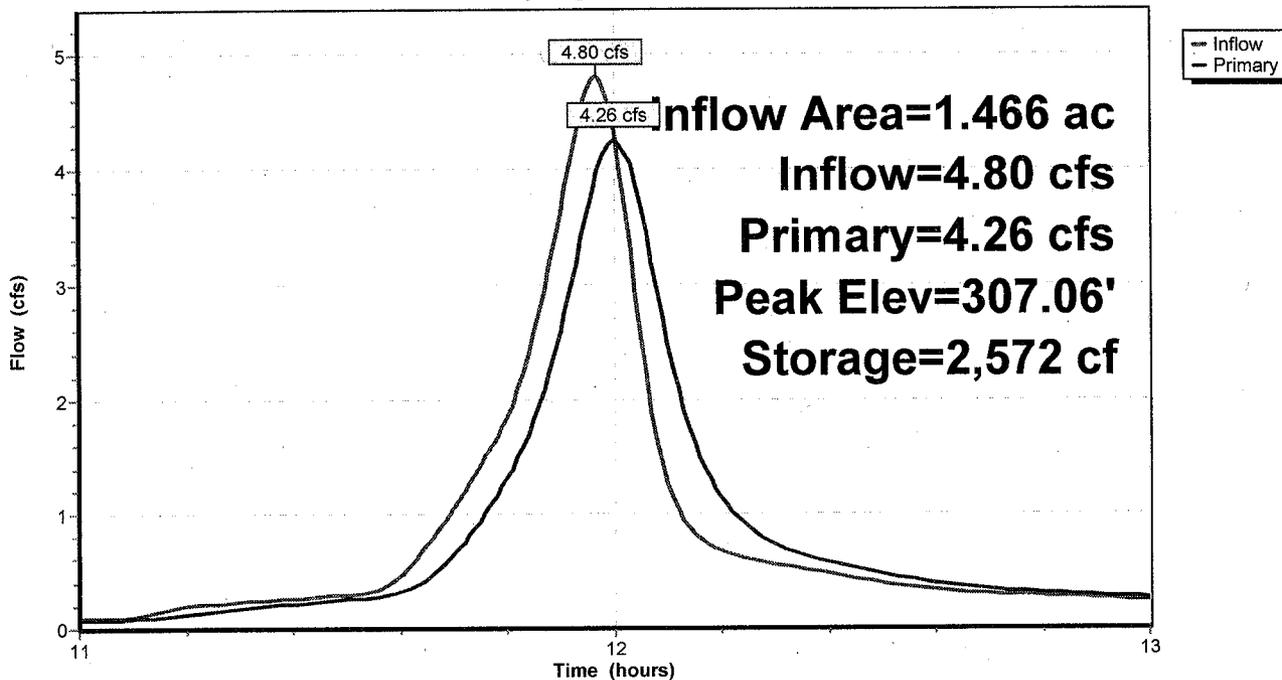
Volume	Invert	Avail.Storage	Storage Description
#1	304.40'	5,410 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
304.40	966	0	0
305.69	966	1,246	1,246
305.70	966	10	1,256
310.00	966	4,154	5,410

Device	Routing	Invert	Outlet Devices
#1	Primary	304.00'	15.0" Round Culvert L= 32.3' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 304.00' / 303.35' S= 0.0201 ' / Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	306.00'	1.4' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Device 1	307.15'	2.0' long Sharp-Crested Rectangular Weir 1 End Contraction(s)
#4	Device 1	307.80'	5.4' long Sharp-Crested Rectangular Weir 1 End Contraction(s)

Primary OutFlow Max=4.25 cfs @ 12.00 hrs HW=307.06' (Free Discharge)
 ↑ 1=Culvert (Passes 4.25 cfs of 9.22 cfs potential flow)
 | 2=Sharp-Crested Rectangular Weir (Weir Controls 4.25 cfs @ 3.37 fps)
 | 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)
 | 4=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 2P: SCM "B"

Hydrograph



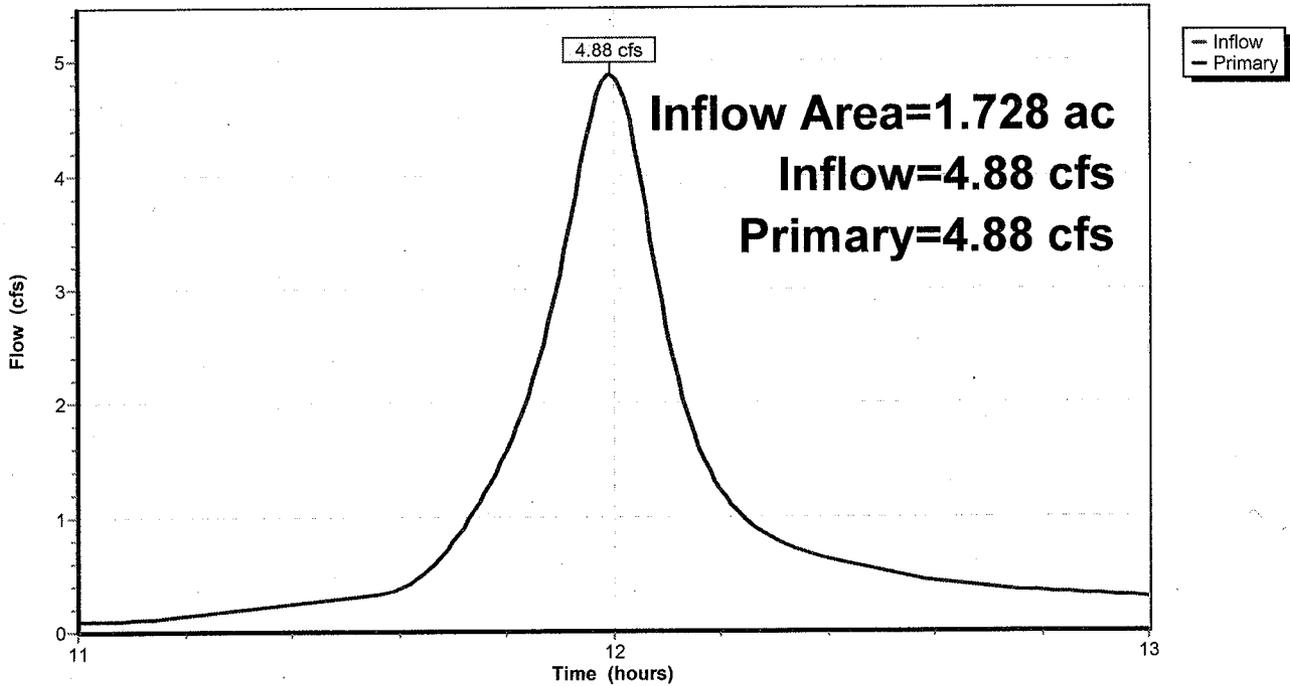
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 1.40" for 1-yr event
Inflow = 4.88 cfs @ 11.99 hrs, Volume= 0.201 af
Primary = 4.88 cfs @ 11.99 hrs, Volume= 0.201 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Sancar Post-development

Type II 24-hr 2-yr Rainfall=3.29"

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Summary for Subcatchment 1S: SMC A drainage area

Runoff = 3.08 cfs @ 11.96 hrs, Volume= 0.107 af, Depth > 1.52"

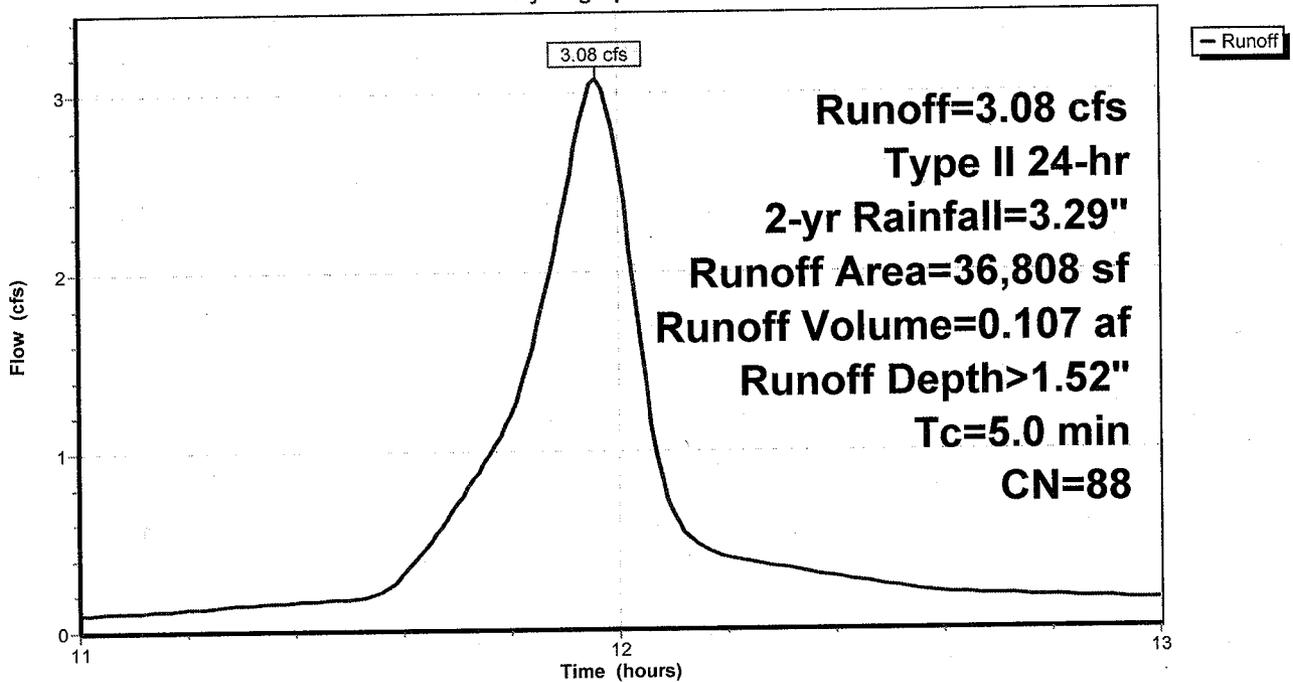
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
* 16,153	98	Roof and pavement
20,655	80	>75% Grass cover, Good, HSG D
36,808	88	Weighted Average
20,655		56.12% Pervious Area
16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area

Hydrograph



Summary for Subcatchment 2S: SCM B drainage area

Runoff = 2.57 cfs @ 11.96 hrs, Volume= 0.096 af, Depth> 1.85"

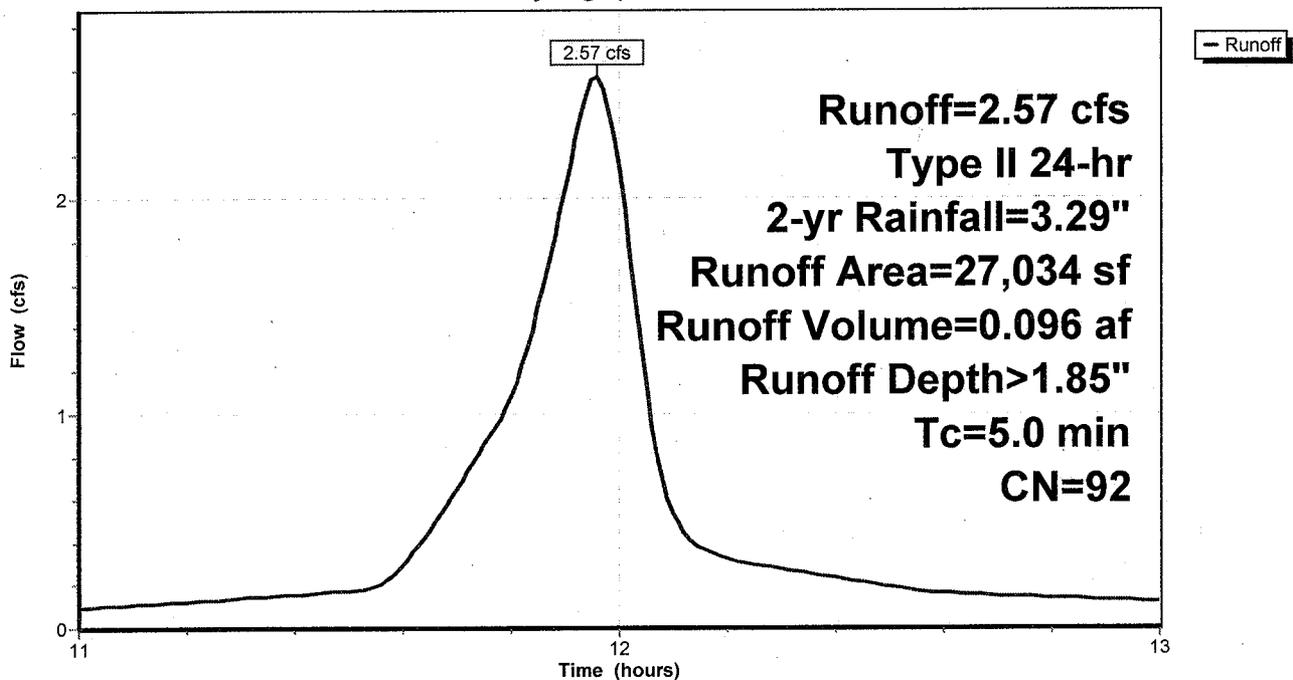
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
* 18,412	98	Impervious to basin
8,622	80	>75% Grass cover, Good, HSG D
27,034	92	Weighted Average
8,622		31.89% Pervious Area
18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area

Hydrograph



Summary for Subcatchment 3S: undetained

Runoff = 0.84 cfs @ 11.96 hrs, Volume= 0.027 af, Depth> 1.23"

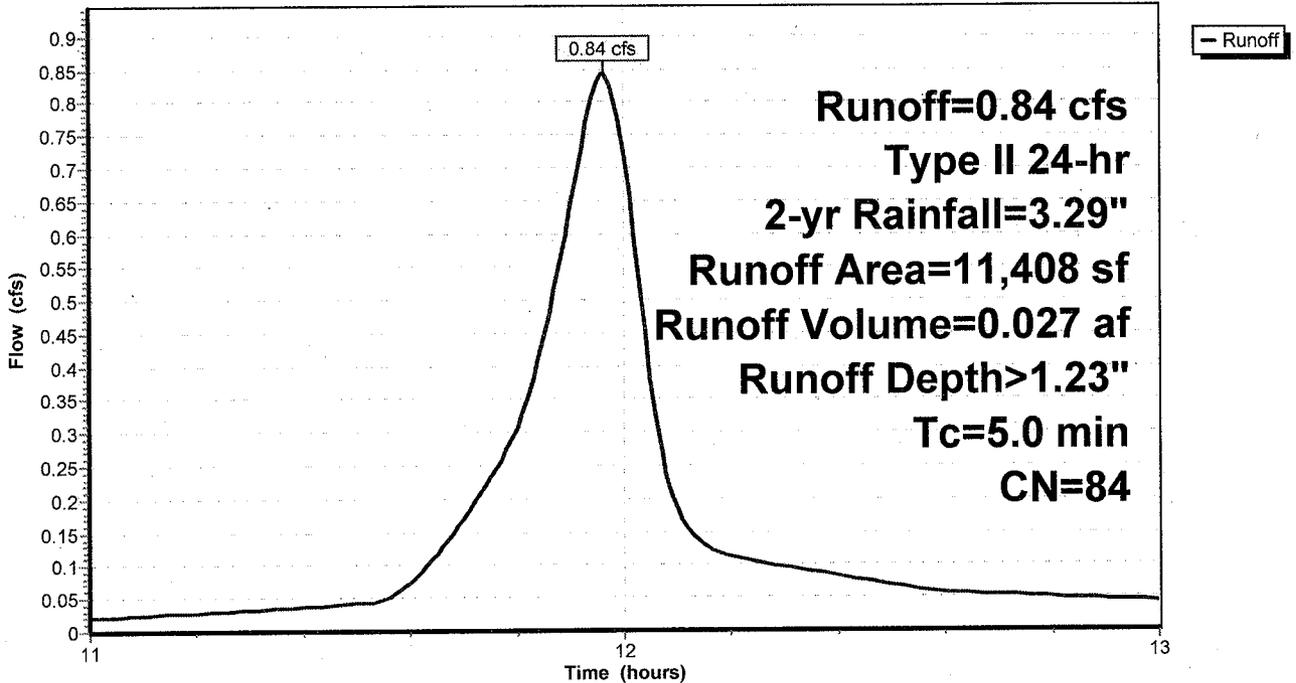
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



Sancar Post-development

Type II 24-hr 2-yr Rainfall=3.29"

Prepared by B & F Consulting

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Summary for Subcatchment 7S: Pre-Dev

Runoff = 5.79 cfs @ 11.96 hrs, Volume= 0.179 af, Depth> 1.24"

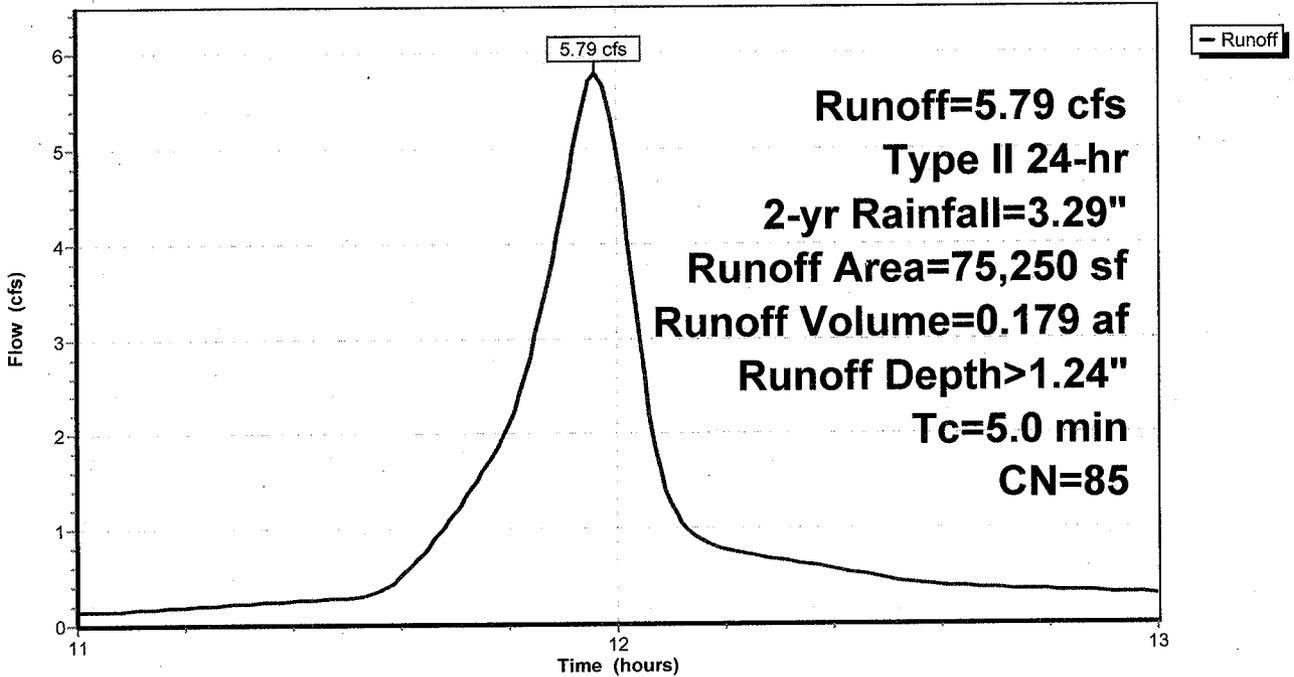
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=3.29"

Area (sf)	CN	Description
* 9,679	98	Impervious
* 54,533	83	Woods, thin stand, poor cover
11,038	84	50-75% Grass cover, Fair, HSG D
75,250	85	Weighted Average
65,571		87.14% Pervious Area
9,679		12.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: Pre-Dev

Hydrograph



Sancar Post-development

Type II 24-hr 2-yr Rainfall=3.29"

Prepared by B & F Consulting

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Summary for Pond 1P: SMB "A"

Inflow Area = 0.845 ac, 43.88% Impervious, Inflow Depth > 1.52" for 2-yr event
 Inflow = 3.08 cfs @ 11.96 hrs, Volume= 0.107 af
 Outflow = 3.01 cfs @ 11.97 hrs, Volume= 0.090 af, Atten= 2%, Lag= 0.8 min
 Primary = 3.01 cfs @ 11.97 hrs, Volume= 0.090 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 312.21' @ 11.97 hrs Surf.Area= 1,202 sf Storage= 946 cf

Plug-Flow detention time= 50.4 min calculated for 0.090 af (84% of inflow)
 Center-of-Mass det. time= 37.7 min (718.6 - 680.9)

Volume	Invert	Avail.Storage	Storage Description
#1	310.78'	1,850 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
310.78	1,134	0	0
311.00	11	126	126
312.00	1,134	573	698
312.40	1,263	479	1,178
312.50	1,546	140	1,318
312.80	2,000	532	1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	309.15'	15.0" Round Culvert L= 80.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 308.00' / 309.15' S= -0.0144 '/' Cc= 0.900 n= 0.005, Flow Area= 1.23 sf
#2	Device 1	312.00'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Secondary	314.00'	5.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=3.00 cfs @ 11.97 hrs HW=312.21' (Free Discharge)

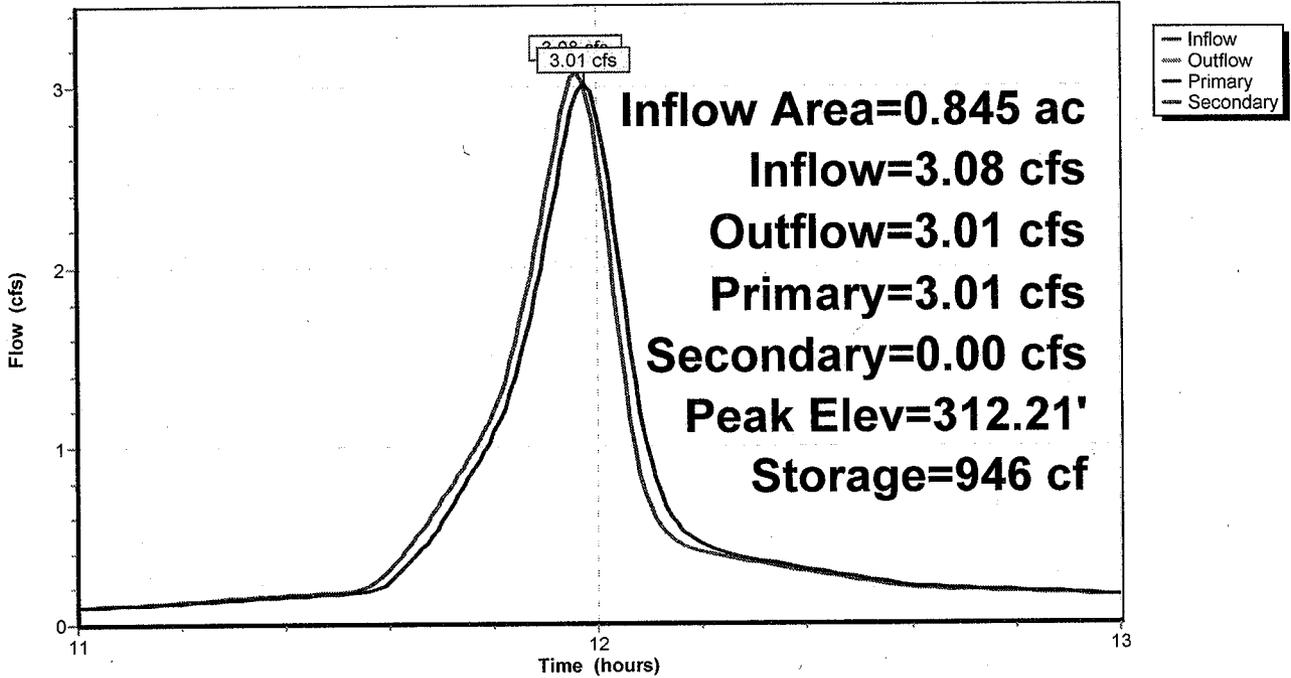
- ↑1=Culvert (Passes 3.00 cfs of 9.22 cfs potential flow)
- ↑2=Orifice/Grate (Weir Controls 3.00 cfs @ 1.50 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=310.78' (Free Discharge)

- ↑3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: SMB "A"

Hydrograph



Sancar Post-development

Type II 24-hr 2-yr Rainfall=3.29"

Prepared by B & F Consulting

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Summary for Pond 2P: SCM "B"

Inflow Area = 1.466 ac, 54.14% Impervious, Inflow Depth > 1.52" for 2-yr event
 Inflow = 5.55 cfs @ 11.97 hrs, Volume= 0.186 af
 Outflow = 4.97 cfs @ 12.00 hrs, Volume= 0.206 af, Atten= 10%, Lag= 2.0 min
 Primary = 4.97 cfs @ 12.00 hrs, Volume= 0.206 af

Routing by Stor-Ind method, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs / 2
 Starting Elev= 307.00' Surf.Area= 966 sf Storage= 2,512 cf
 Peak Elev= 307.19' @ 12.00 hrs Surf.Area= 966 sf Storage= 2,692 cf (181 cf above start)

Plug-Flow detention time= 45.3 min calculated for 0.148 af (80% of inflow)
 Center-of-Mass det. time= (not calculated: outflow precedes inflow)

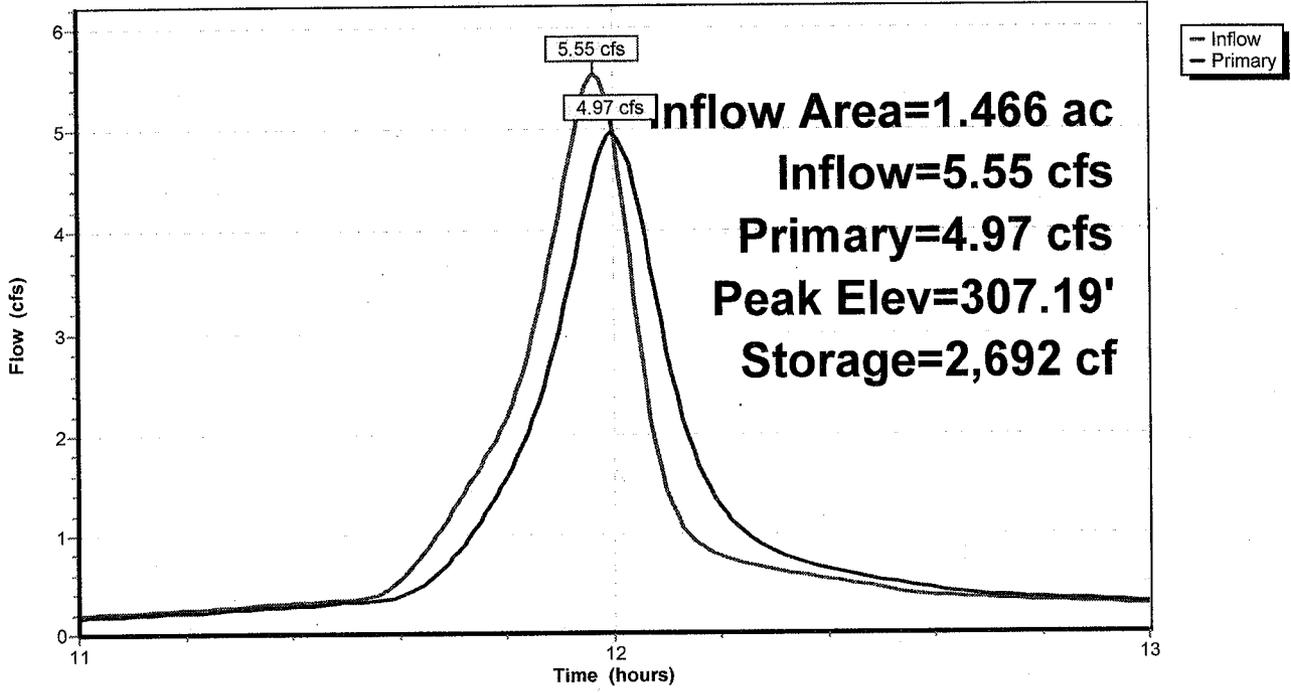
Volume	Invert	Avail.Storage	Storage Description
#1	304.40'	5,410 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
304.40	966	0	0
305.69	966	1,246	1,246
305.70	966	10	1,256
310.00	966	4,154	5,410

Device	Routing	Invert	Outlet Devices
#1	Primary	304.00'	15.0" Round Culvert L= 32.3' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 304.00' / 303.35' S= 0.0201 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	306.00'	1.4' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Device 1	307.15'	2.0' long Sharp-Crested Rectangular Weir 1 End Contraction(s)
#4	Device 1	307.80'	5.4' long Sharp-Crested Rectangular Weir 1 End Contraction(s)

Primary OutFlow Max=4.96 cfs @ 12.00 hrs HW=307.19' (Free Discharge)
 ↑ **1=Culvert** (Passes 4.96 cfs of 9.46 cfs potential flow)
 | **2=Sharp-Crested Rectangular Weir** (Weir Controls 4.92 cfs @ 3.56 fps)
 | **3=Sharp-Crested Rectangular Weir** (Weir Controls 0.05 cfs @ 0.63 fps)
 | **4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 2P: SCM "B"

Hydrograph



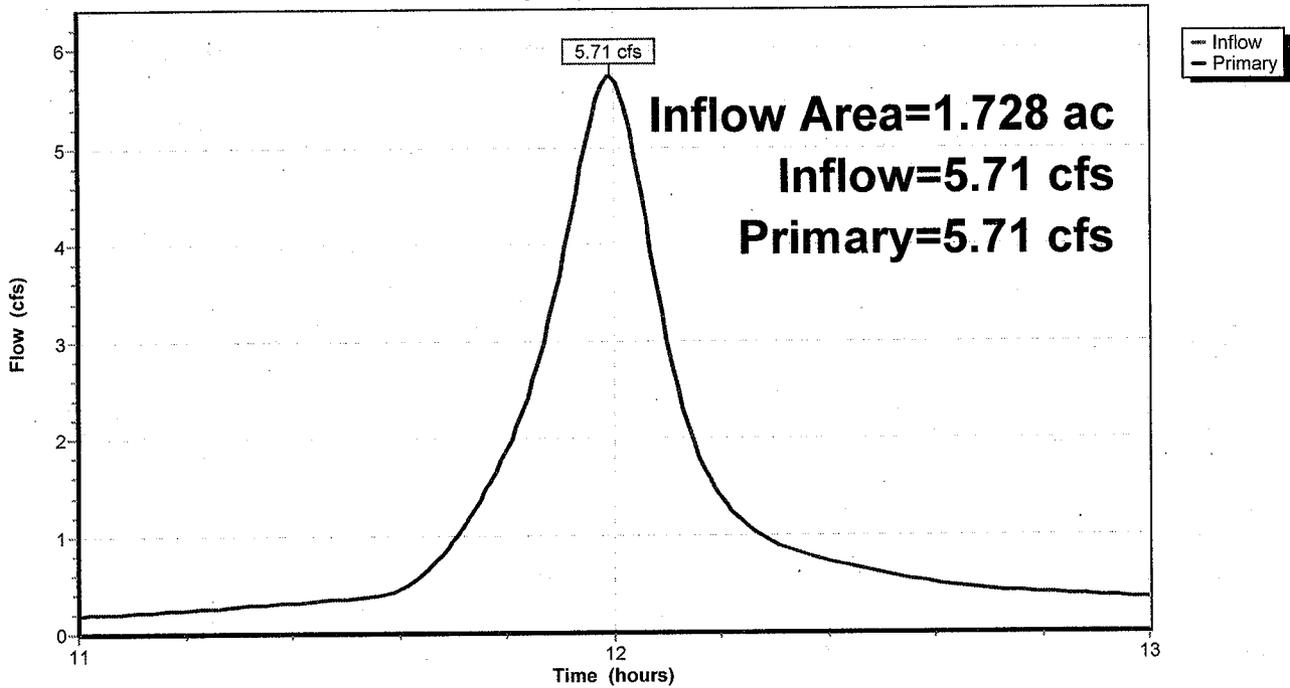
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 1.62" for 2-yr event
Inflow = 5.71 cfs @ 11.99 hrs, Volume= 0.233 af
Primary = 5.71 cfs @ 11.99 hrs, Volume= 0.233 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Sancar Post-development

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Type II 24-hr 25-yr Rainfall=6.08"

Summary for Subcatchment 1S: SMC A drainage area

Runoff = 6.62 cfs @ 11.96 hrs, Volume= 0.240 af, Depth> 3.40"

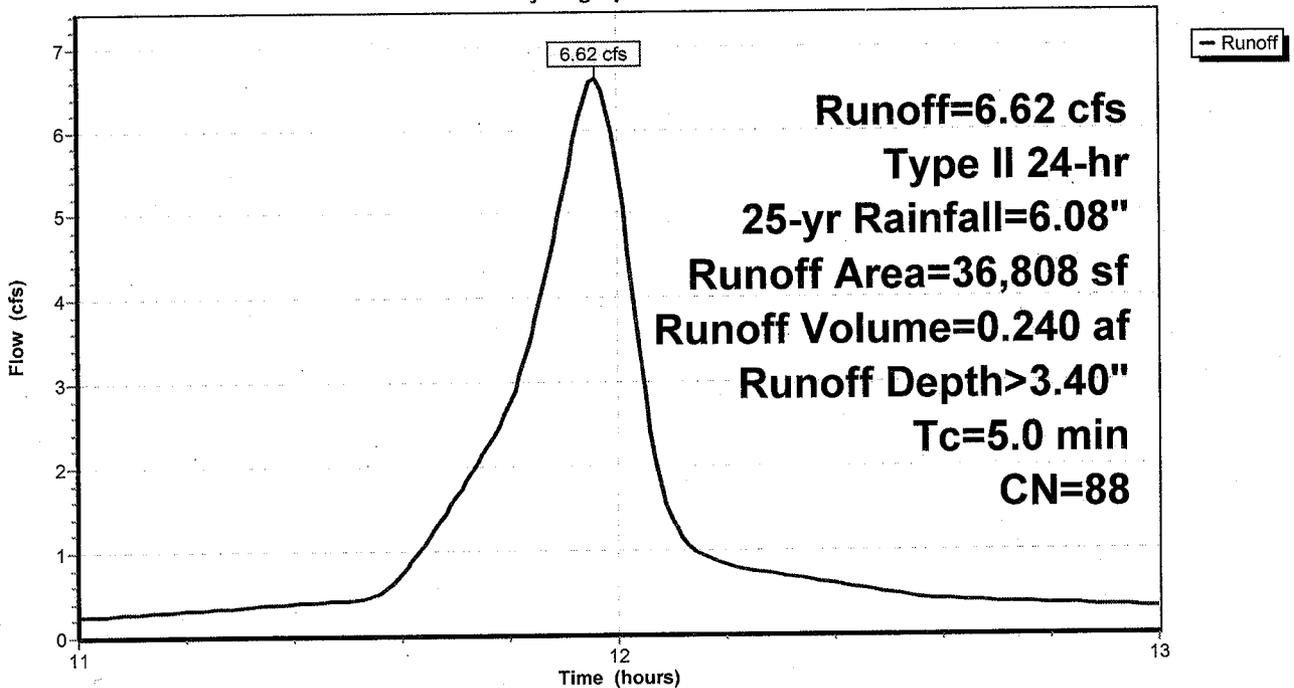
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 25-yr Rainfall=6.08"

	Area (sf)	CN	Description
*	16,153	98	Roof and pavement
	20,655	80	>75% Grass cover, Good, HSG D
	36,808	88	Weighted Average
	20,655		56.12% Pervious Area
	16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area

Hydrograph



Sancar Post-development

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Type II 24-hr 25-yr Rainfall=6.08"

Summary for Subcatchment 2S: SCM B drainage area

Runoff = 5.16 cfs @ 11.96 hrs, Volume= 0.199 af, Depth> 3.85"

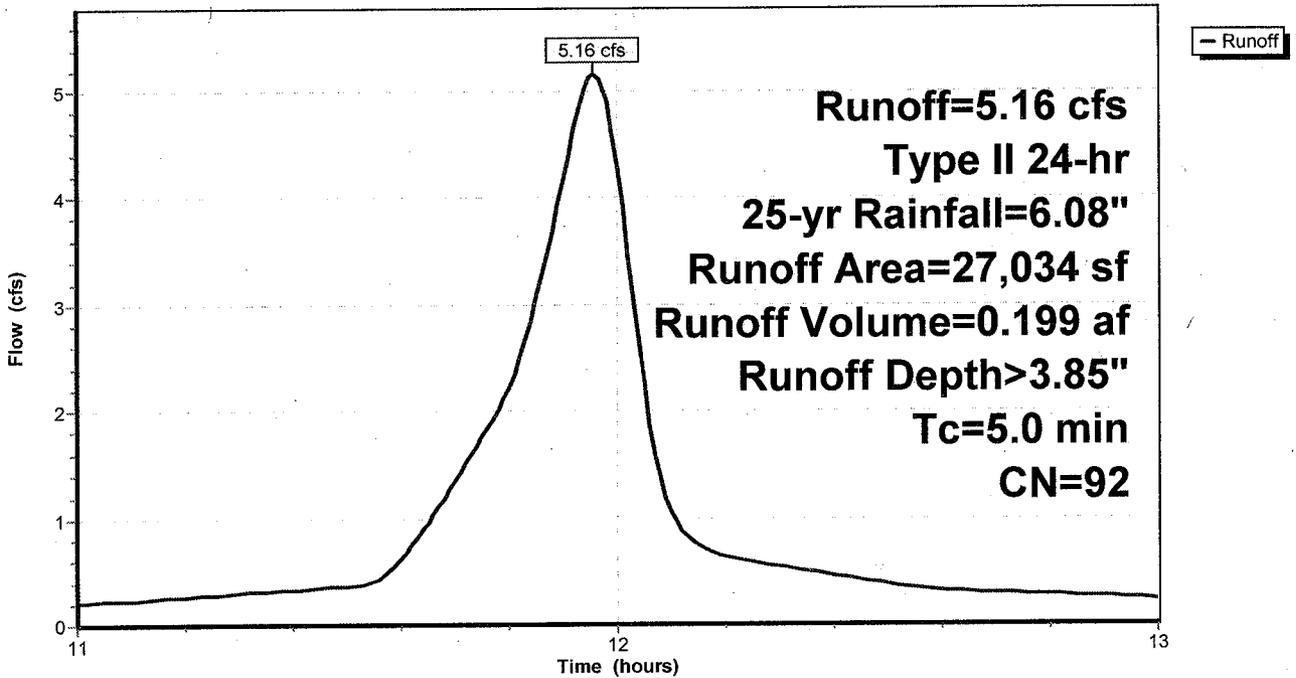
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 25-yr Rainfall=6.08"

Area (sf)	CN	Description
* 18,412	98	Impervious to basin
8,622	80	>75% Grass cover, Good, HSG D
27,034	92	Weighted Average
8,622		31.89% Pervious Area
18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area

Hydrograph



Sancar Post-development

Type II 24-hr 25-yr Rainfall=6.08"

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Summary for Subcatchment 3S: undetained

Runoff = 1.95 cfs @ 11.96 hrs, Volume= 0.066 af, Depth> 3.03"

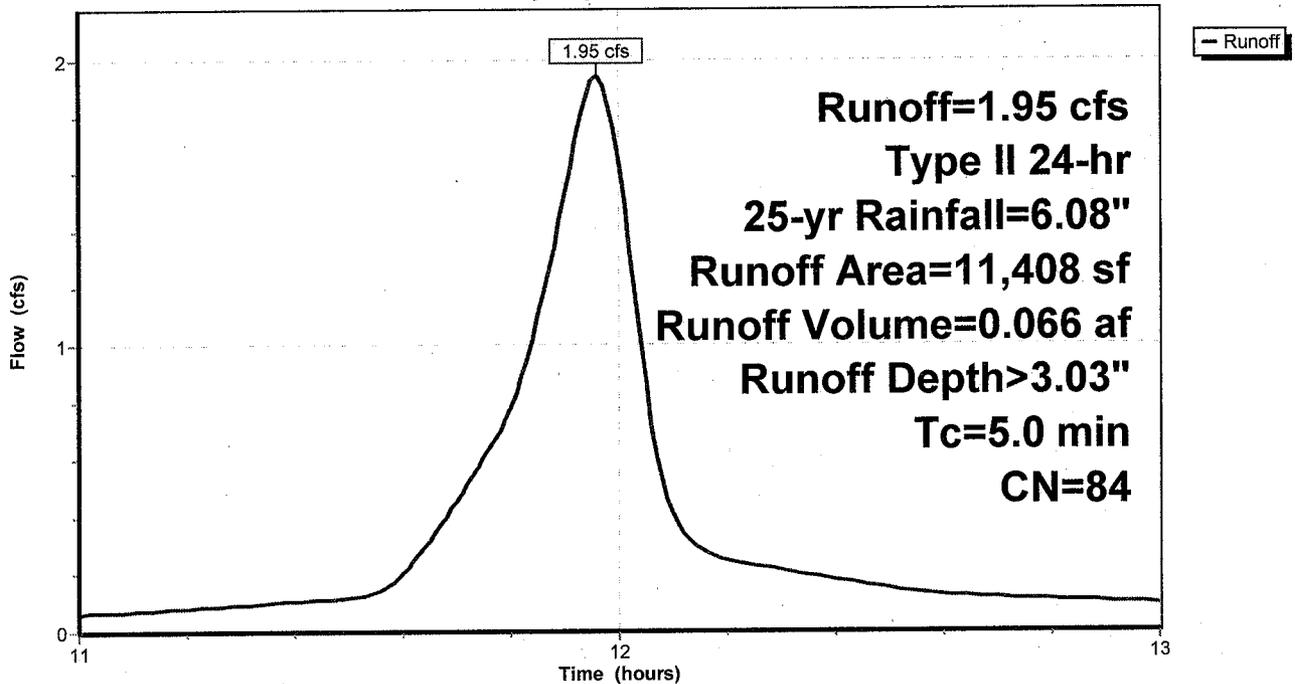
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 25-yr Rainfall=6.08"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



Sancar Post-development

Type II 24-hr 25-yr Rainfall=6.08"

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Summary for Subcatchment 7S: Pre-Dev

Runoff = 13.19 cfs @ 11.96 hrs, Volume= 0.444 af, Depth> 3.09"

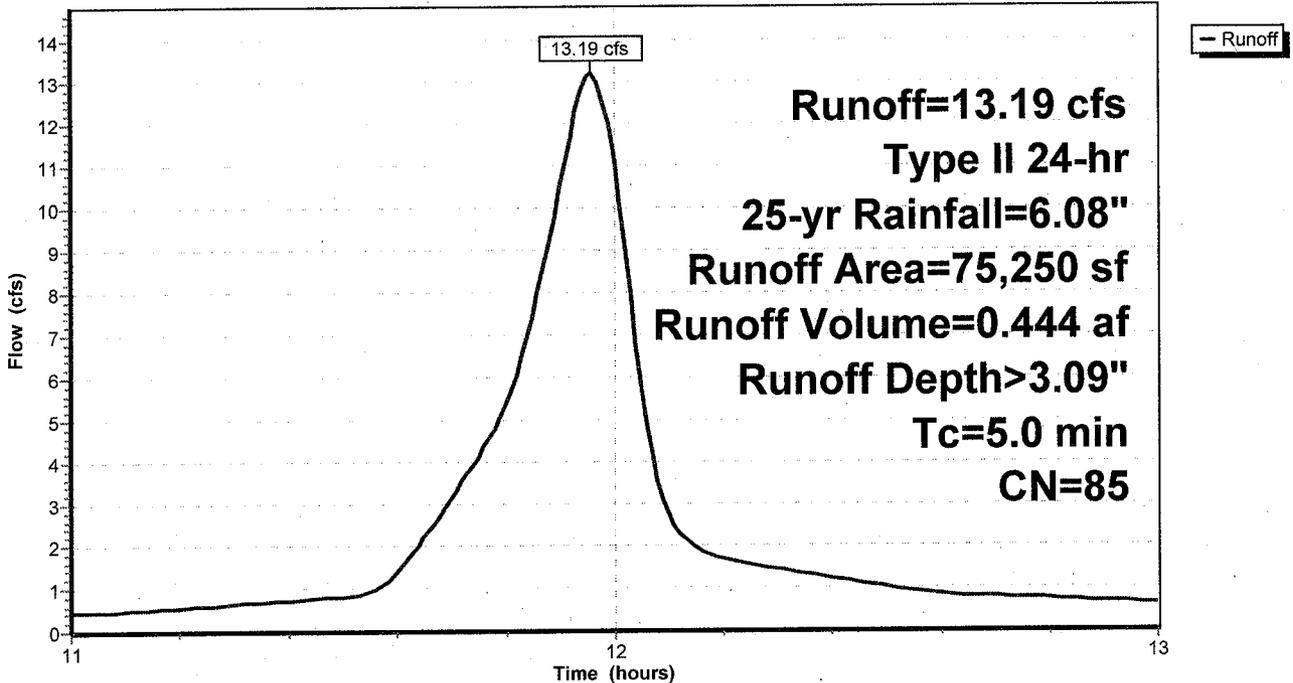
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=6.08"

	Area (sf)	CN	Description
*	9,679	98	Impervious
*	54,533	83	Woods, thin stand, poor cover
	11,038	84	50-75% Grass cover, Fair, HSG D
	75,250	85	Weighted Average
	65,571		87.14% Pervious Area
	9,679		12.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: Pre-Dev

Hydrograph



Sancar Post-development

Type II 24-hr 25-yr Rainfall=6.08"

Prepared by B & F Consulting

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Summary for Pond 1P: SMB "A"

Inflow Area = 0.845 ac, 43.88% Impervious, Inflow Depth > 3.40" for 25-yr event
 Inflow = 6.62 cfs @ 11.96 hrs, Volume= 0.240 af
 Outflow = 6.52 cfs @ 11.97 hrs, Volume= 0.223 af, Atten= 1%, Lag= 0.7 min
 Primary = 6.52 cfs @ 11.97 hrs, Volume= 0.223 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 312.35' @ 11.97 hrs Surf.Area= 1,248 sf Storage= 1,121 cf

Plug-Flow detention time= 33.7 min calculated for 0.222 af (93% of inflow)
 Center-of-Mass det. time= 27.0 min (701.8 - 674.8)

Volume	Invert	Avail.Storage	Storage Description
#1	310.78'	1,850 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
	Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)
	310.78	1,134	0
	311.00	11	126
	312.00	1,134	573
	312.40	1,263	479
	312.50	1,546	140
	312.80	2,000	532
			Cum.Store (cubic-feet)
			0
			126
			698
			1,178
			1,318
			1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	309.15'	15.0" Round Culvert L= 80.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 308.00' / 309.15' S= -0.0144 '/' Cc= 0.900 n= 0.005, Flow Area= 1.23 sf
#2	Device 1	312.00'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Secondary	314.00'	5.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=6.51 cfs @ 11.97 hrs HW=312.35' (Free Discharge)

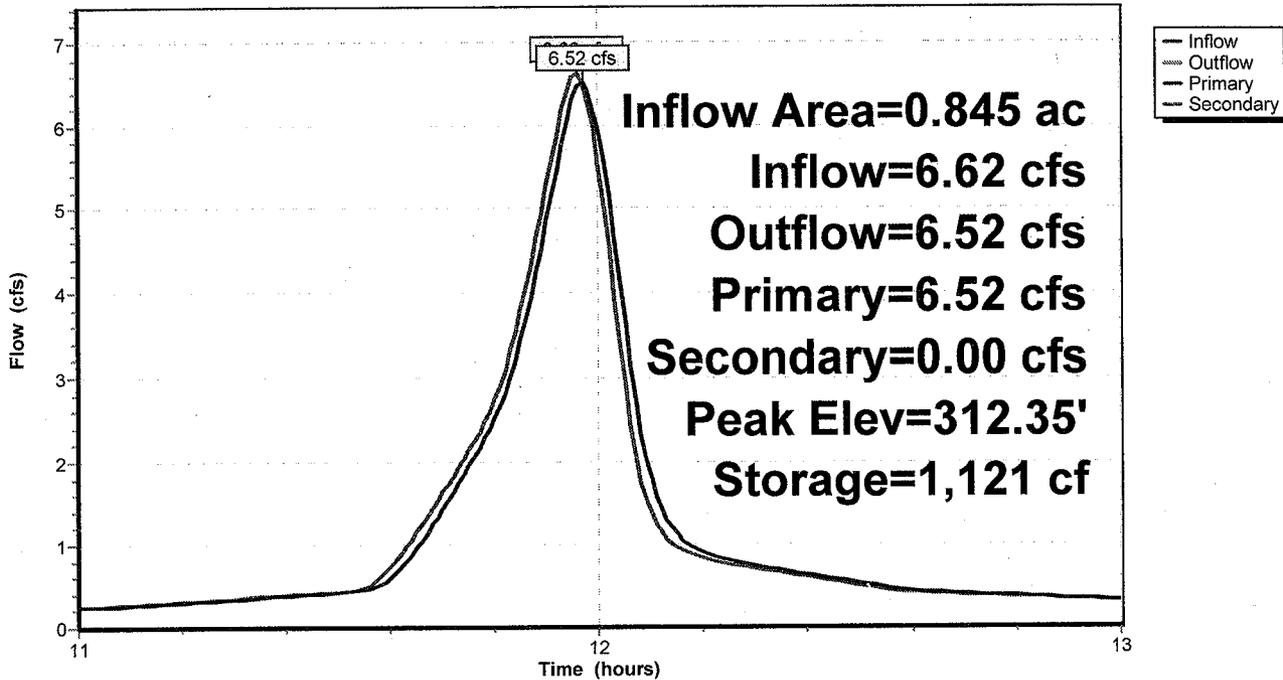
- ↑ 1=Culvert (Passes 6.51 cfs of 9.49 cfs potential flow)
- ↑ 2=Orifice/Grate (Weir Controls 6.51 cfs @ 1.95 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=310.78' (Free Discharge)

- ↑ 3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: SMB "A"

Hydrograph



Sancar Post-development

Type II 24-hr 25-yr Rainfall=6.08"

Prepared by B & F Consulting

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Summary for Pond 2P: SCM "B"

Inflow Area = 1.466 ac, 54.14% Impervious, Inflow Depth > 3.45" for 25-yr event
 Inflow = 11.63 cfs @ 11.96 hrs, Volume= 0.421 af
 Outflow = 10.61 cfs @ 11.99 hrs, Volume= 0.440 af, Atten= 9%, Lag= 1.8 min
 Primary = 10.61 cfs @ 11.99 hrs, Volume= 0.440 af

Routing by Stor-Ind method, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs / 2
 Starting Elev= 307.00' Surf.Area= 966 sf Storage= 2,512 cf
 Peak Elev= 307.85' @ 11.99 hrs Surf.Area= 966 sf Storage= 3,332 cf (820 cf above start)

Plug-Flow detention time= 35.4 min calculated for 0.382 af (91% of inflow)
 Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	304.40'	5,410 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
304.40	966	0	0
305.69	966	1,246	1,246
305.70	966	10	1,256
310.00	966	4,154	5,410

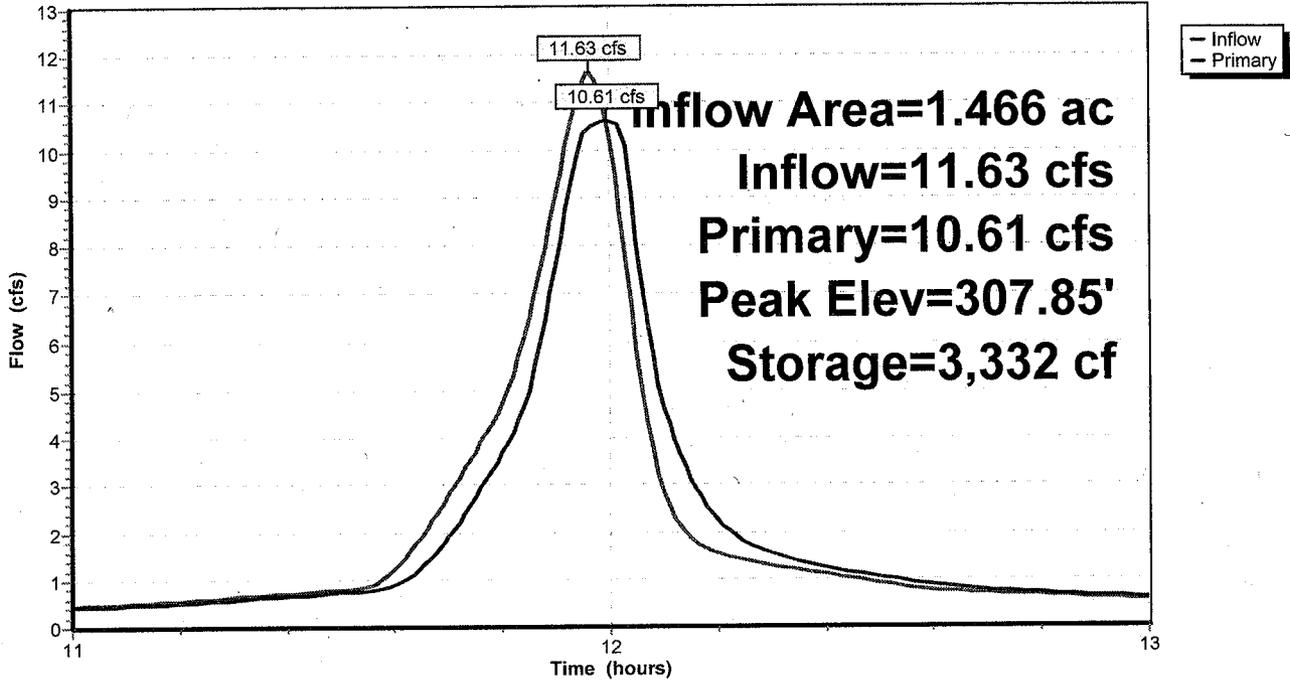
Device	Routing	Invert	Outlet Devices
#1	Primary	304.00'	15.0" Round Culvert L= 32.3' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 304.00' / 303.35' S= 0.0201 1/4' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	306.00'	1.4' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Device 1	307.15'	2.0' long Sharp-Crested Rectangular Weir 1 End Contraction(s)
#4	Device 1	307.80'	5.4' long Sharp-Crested Rectangular Weir 1 End Contraction(s)

Primary OutFlow Max=10.61 cfs @ 11.99 hrs HW=307.85' (Free Discharge)

- ← 1=Culvert (Inlet Controls 10.61 cfs @ 8.64 fps)
- | 2=Sharp-Crested Rectangular Weir (Passes < 8.46 cfs potential flow)
- | 3=Sharp-Crested Rectangular Weir (Passes < 3.67 cfs potential flow)
- | 4=Sharp-Crested Rectangular Weir (Passes < 0.18 cfs potential flow)

Pond 2P: SCM "B"

Hydrograph



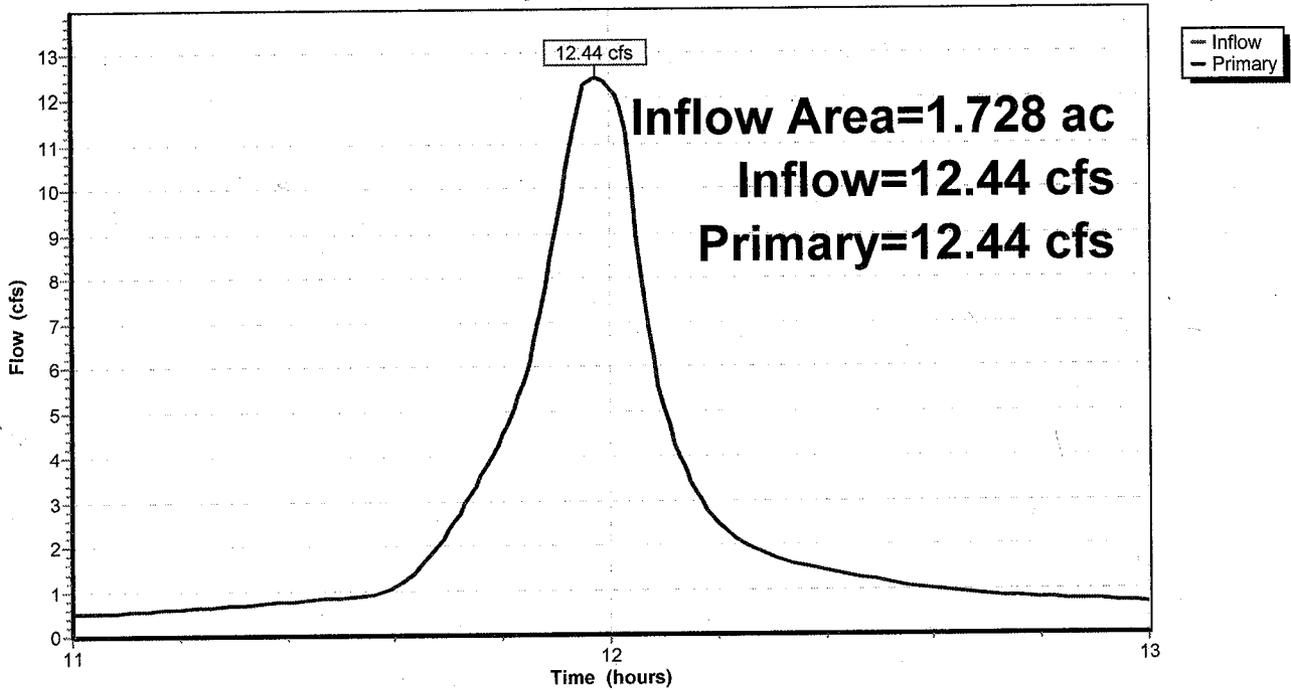
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 3.51" for 25-yr event
Inflow = 12.44 cfs @ 11.97 hrs, Volume= 0.506 af
Primary = 12.44 cfs @ 11.97 hrs, Volume= 0.506 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Sancar Post-development

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Type II 24-hr 100-yr Rainfall=7.57"

Summary for Subcatchment 1S: SMC A drainage area

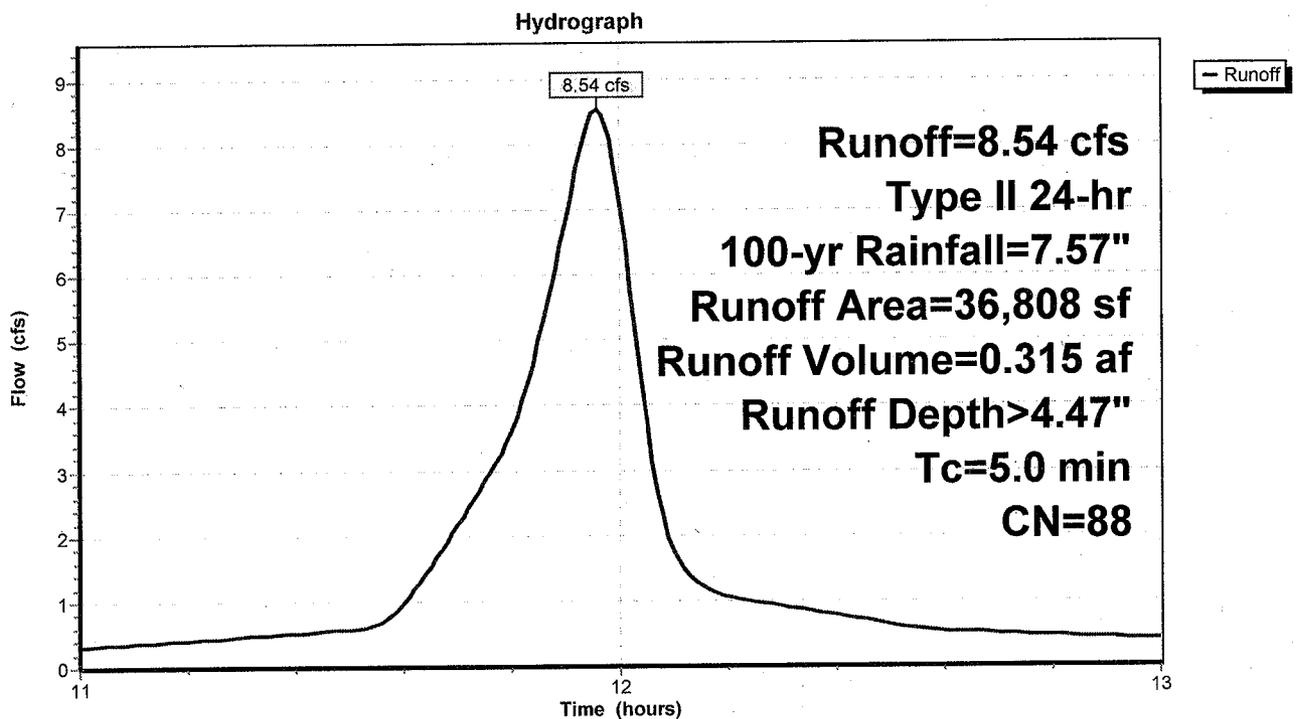
Runoff = 8.54 cfs @ 11.96 hrs, Volume= 0.315 af, Depth> 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-yr Rainfall=7.57"

Area (sf)	CN	Description
* 16,153	98	Roof and pavement
20,655	80	>75% Grass cover, Good, HSG D
36,808	88	Weighted Average
20,655		56.12% Pervious Area
16,153		43.88% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 1S: SMC A drainage area



Summary for Subcatchment 2S: SCM B drainage area

Runoff = 6.55 cfs @ 11.96 hrs, Volume= 0.256 af, Depth> 4.95"

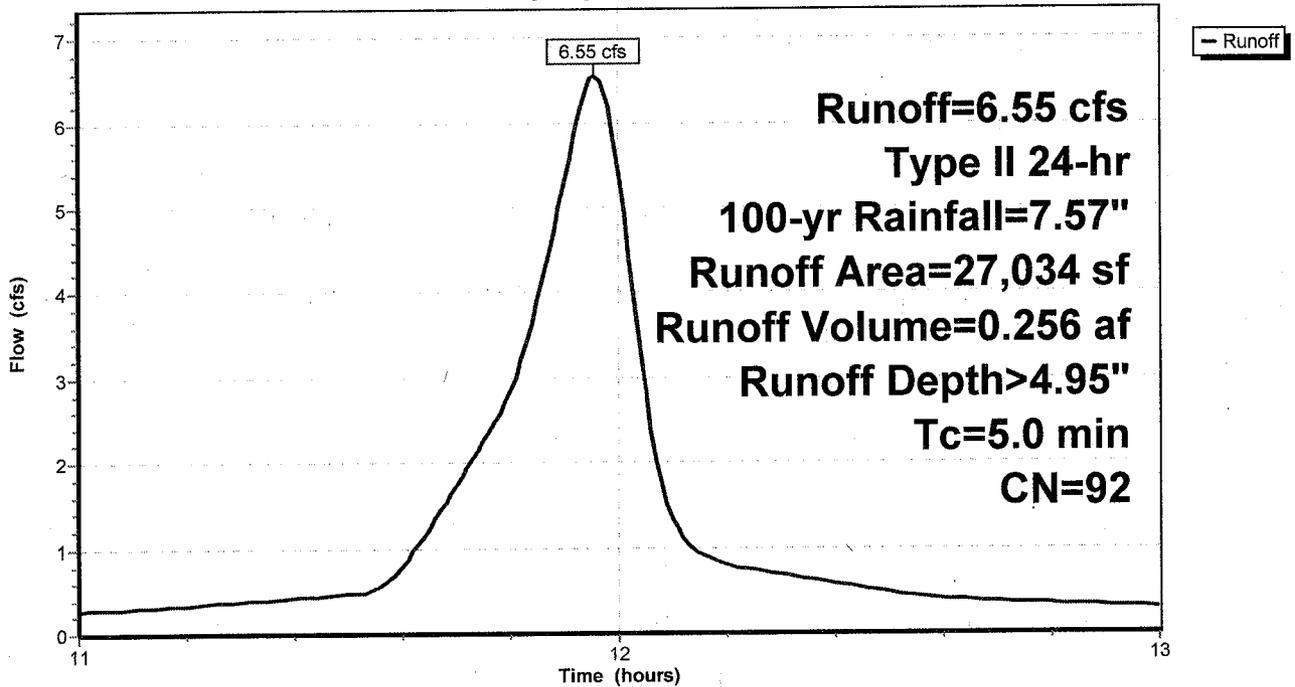
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-yr Rainfall=7.57"

Area (sf)	CN	Description
* 18,412	98	Impervious to basin
8,622	80	>75% Grass cover, Good, HSG D
27,034	92	Weighted Average
8,622		31.89% Pervious Area
18,412		68.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 2S: SCM B drainage area

Hydrograph



Summary for Subcatchment 3S: undetained

Runoff = 2.55 cfs @ 11.96 hrs, Volume= 0.089 af, Depth> 4.07"

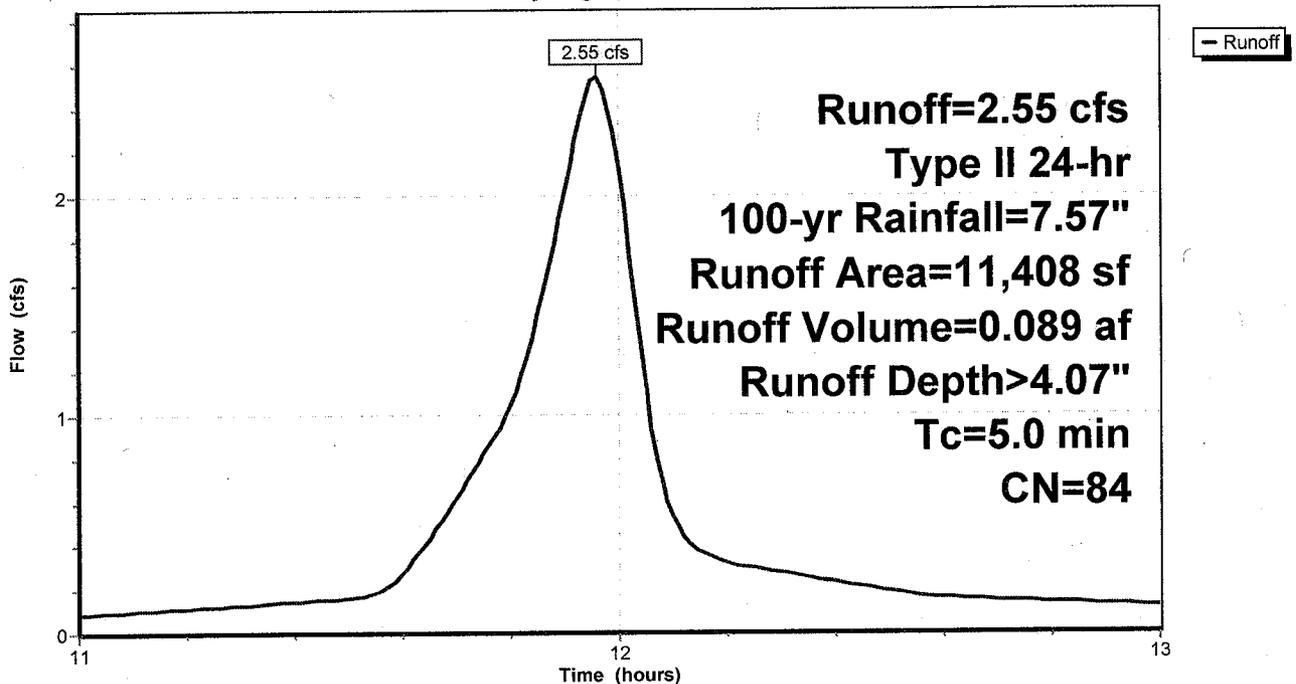
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-yr Rainfall=7.57"

Area (sf)	CN	Description
8,721	80	>75% Grass cover, Good, HSG D
* 2,687	98	
11,408	84	Weighted Average
8,721		76.45% Pervious Area
2,687		23.55% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 3S: undetained

Hydrograph



Summary for Subcatchment 7S: Pre-Dev

Runoff = 17.17 cfs @ 11.96 hrs, Volume= 0.596 af, Depth> 4.14"

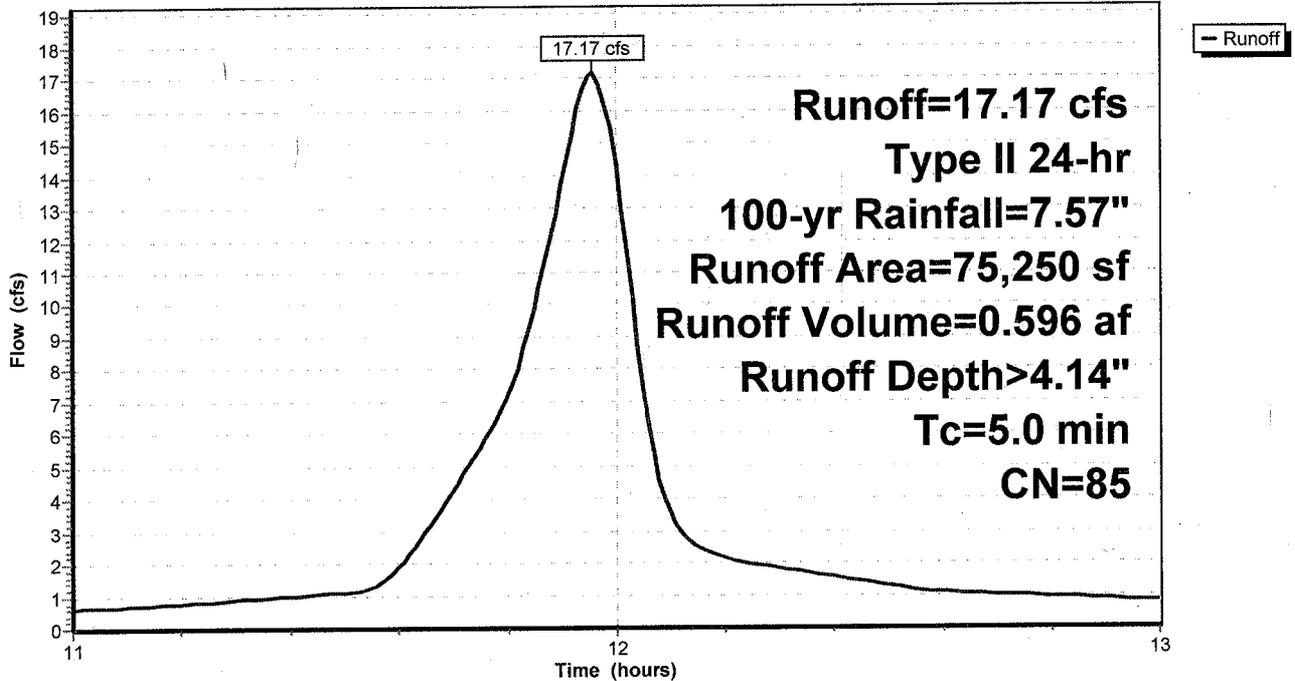
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs
 Type II 24-hr 100-yr Rainfall=7.57"

	Area (sf)	CN	Description
*	9,679	98	Impervious
*	54,533	83	Woods, thin stand, poor cover
	11,038	84	50-75% Grass cover, Fair, HSG D
	75,250	85	Weighted Average
	65,571		87.14% Pervious Area
	9,679		12.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

Subcatchment 7S: Pre-Dev

Hydrograph



Sancar Post-development

Type II 24-hr 100-yr Rainfall=7.57"

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Summary for Pond 1P: SMB "A"

Inflow Area = 0.845 ac, 43.88% Impervious, Inflow Depth > 4.47" for 100-yr event
 Inflow = 8.54 cfs @ 11.96 hrs, Volume= 0.315 af
 Outflow = 8.42 cfs @ 11.97 hrs, Volume= 0.297 af, Atten= 1%, Lag= 0.7 min
 Primary = 8.42 cfs @ 11.97 hrs, Volume= 0.297 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 312.42' @ 11.97 hrs Surf.Area= 1,323 sf Storage= 1,205 cf

Plug-Flow detention time= 28.4 min calculated for 0.297 af (94% of inflow)
 Center-of-Mass det. time= 23.0 min (695.1 - 672.1)

Volume	Invert	Avail.Storage	Storage Description
#1	310.78'	1,850 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
310.78	1,134	0	0
311.00	11	126	126
312.00	1,134	573	698
312.40	1,263	479	1,178
312.50	1,546	140	1,318
312.80	2,000	532	1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	309.15'	15.0" Round Culvert L= 80.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 308.00' / 309.15' S= -0.0144 '/ Cc= 0.900 n= 0.005, Flow Area= 1.23 sf
#2	Device 1	312.00'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Secondary	314.00'	5.0' long x 5.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=8.41 cfs @ 11.97 hrs HW=312.42' (Free Discharge)

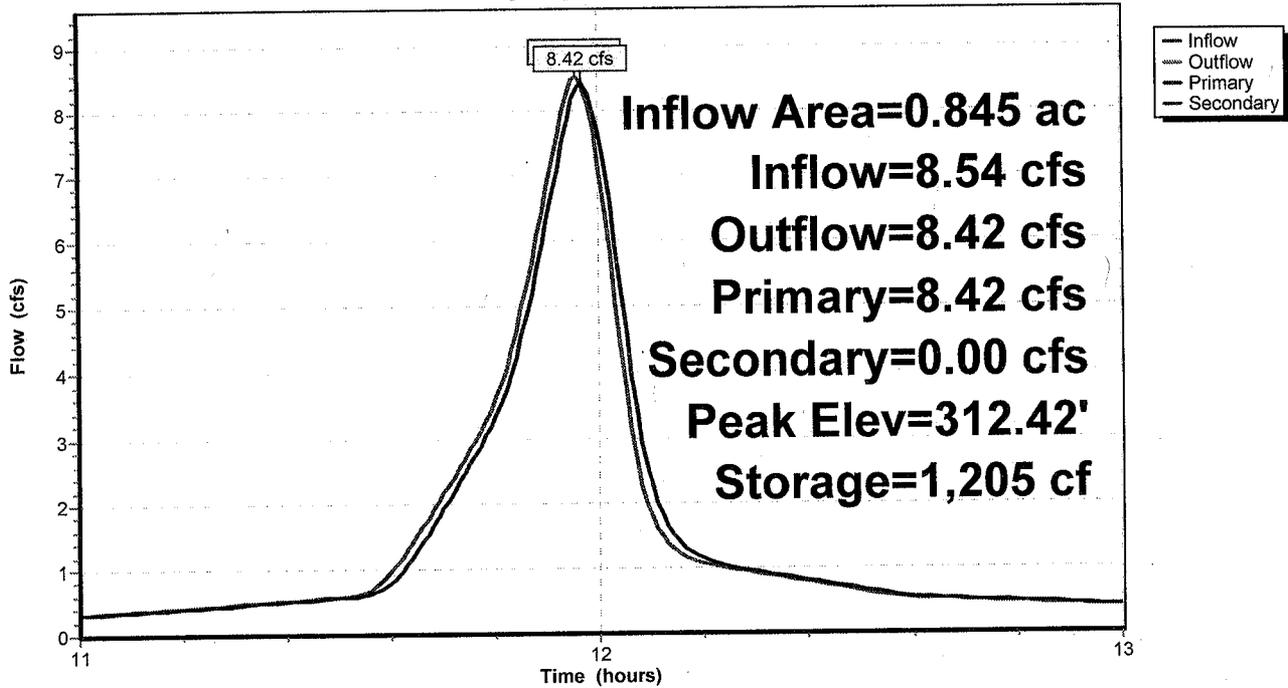
- ↑1=Culvert (Passes 8.41 cfs of 9.61 cfs potential flow)
- ↑2=Orifice/Grate (Weir Controls 8.41 cfs @ 2.12 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=310.78' (Free Discharge)

- ↑3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 1P: SMB "A"

Hydrograph



Sancar Post-development

Type II 24-hr 100-yr Rainfall=7.57"

Prepared by B & F Consulting

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Summary for Pond 2P: SCM "B"

Inflow Area = 1.466 ac, 54.14% Impervious, Inflow Depth > 4.53" for 100-yr event
 Inflow = 14.92 cfs @ 11.96 hrs, Volume= 0.553 af
 Outflow = 11.97 cfs @ 12.01 hrs, Volume= 0.570 af, Atten= 20%, Lag= 2.9 min
 Primary = 11.97 cfs @ 12.01 hrs, Volume= 0.570 af

Routing by Stor-Ind method, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs / 2
 Starting Elev= 307.00' Surf.Area= 966 sf Storage= 2,512 cf
 Peak Elev= 308.73' @ 12.01 hrs Surf.Area= 966 sf Storage= 4,179 cf (1,668 cf above start)

Plug-Flow detention time= 31.6 min calculated for 0.512 af (93% of inflow)
 Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	304.40'	5,410 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
304.40	966	0	0
305.69	966	1,246	1,246
305.70	966	10	1,256
310.00	966	4,154	5,410

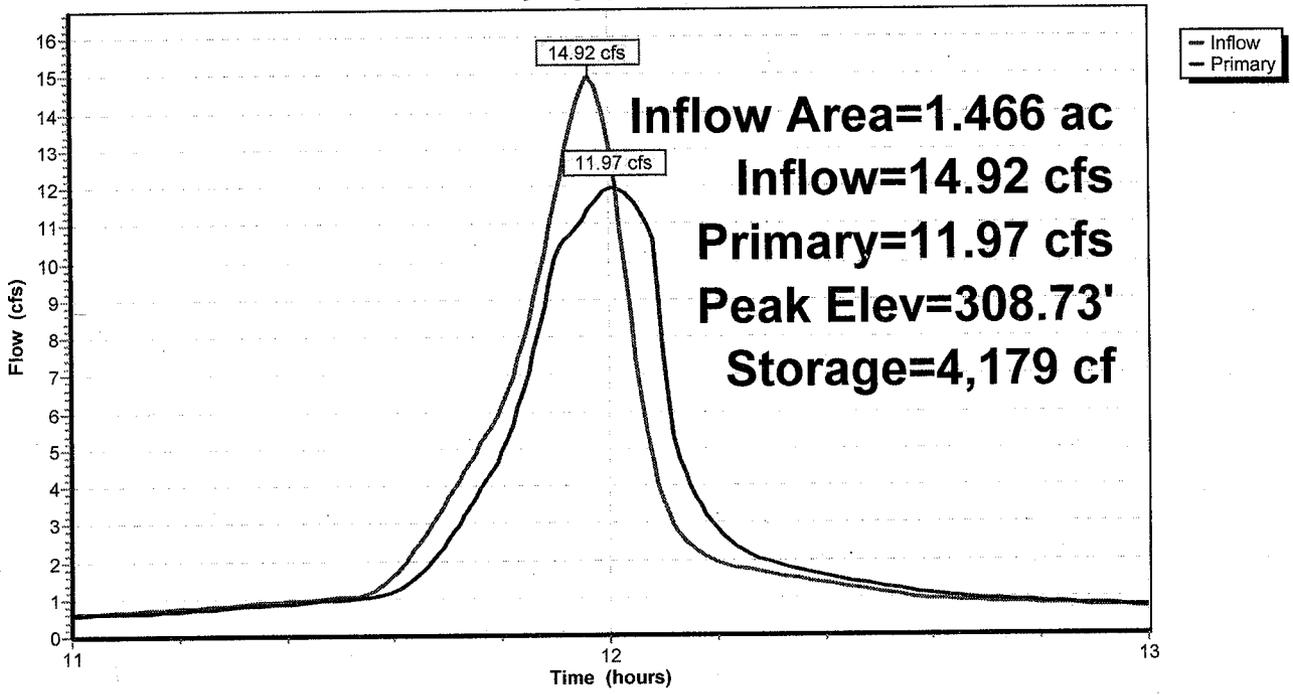
Device	Routing	Invert	Outlet Devices
#1	Primary	304.00'	15.0" Round Culvert L= 32.3' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 304.00' / 303.35' S= 0.0201 ' /' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	306.00'	1.4' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#3	Device 1	307.15'	2.0' long Sharp-Crested Rectangular Weir 1 End Contraction(s)
#4	Device 1	307.80'	5.4' long Sharp-Crested Rectangular Weir 1 End Contraction(s)

Primary OutFlow Max=11.96 cfs @ 12.01 hrs HW=308.72' (Free Discharge)

- ↑ 1=Culvert (Inlet Controls 11.96 cfs @ 9.75 fps)
- ↑ 2=Sharp-Crested Rectangular Weir (Passes < 12.57 cfs potential flow)
- ↑ 3=Sharp-Crested Rectangular Weir (Passes < 11.90 cfs potential flow)
- ↑ 4=Sharp-Crested Rectangular Weir (Passes < 15.42 cfs potential flow)

Pond 2P: SCM "B"

Hydrograph



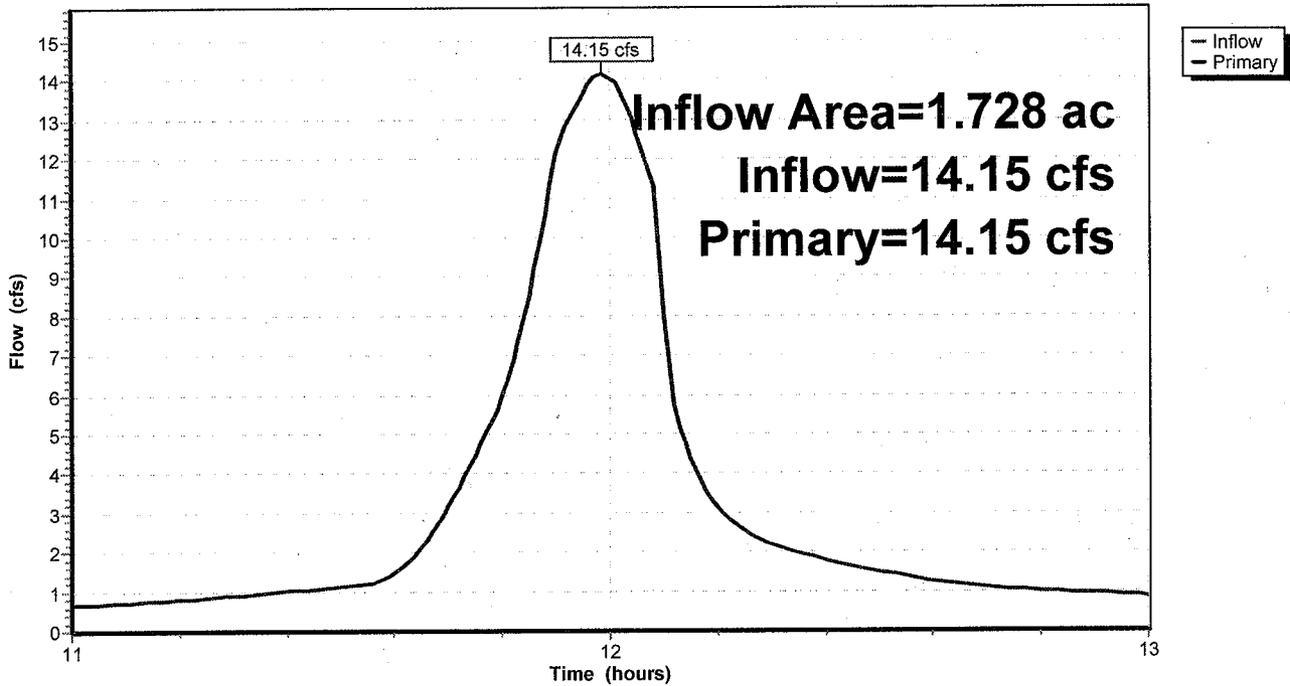
Summary for Link 5L: Total flow

Inflow Area = 1.728 ac, 49.50% Impervious, Inflow Depth > 4.58" for 100-yr event
Inflow = 14.15 cfs @ 11.99 hrs, Volume= 0.659 af
Primary = 14.15 cfs @ 11.99 hrs, Volume= 0.659 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-13.00 hrs, dt= 0.01 hrs

Link 5L: Total flow

Hydrograph



Appendix E

Volumetric calculations for

SCM "A"

SCM "B"

&

2-year 24-hour increase

**Water Quality Volume Calculation
SCM "A"**

Total drainage area	0.84 acres
Impervious drainage area	0.37 acres
Estimated % impervious	44%

Water quality volume

V = 1365 cf

$$V = 3630 \times R_o \times (0.05 + 0.9 \times I_a) \times A$$

where

V = Volume of runoff to be controlled (ft^3)

R_o = Design storm rainfall depth (1")

A = watershed area (ac.)

**Water Quality Volume Calculation
SCM "B"**

Total drainage area	0.62 acres
Impervious drainage area	0.42 acres
Estimated % impervious	68%

Water quality volume

V = 1494 cf

$$V = 3630 \times R_o \times (0.05 + 0.9 \times I_a) \times A$$

where

V = volume of runoff to be controlled (ft^3)

R_o = design storm rainfall depth (1")

I_a = percent impervious

A = watershed area (ac.)

Appendix F
Stormwater System Calculations
Including
Hydraulic Grade Line Analysis

Storm Drainage Summary - Sancar Turkish Center																
Summary of Pipes - 5/20/2016																
TWENTY-FIVE YEAR RETURN PERIOD ANALYSIS FOR HGL																
From	To	Rational C	Intensity (in/hr)	Area (ac)	Q_25 (cfs)	Q_25 (cfs)	Length (ft)	Diameter (inches)	DIA. (inches)	Slope (%)	Invert (From)	Invert (To)	drop	REF BOC	DEPTH	DEPTH LESS PIPE
									calculated							
EX CI	CI#1	0.90	8.09	0.02	0.1	9.5	38	15	RCP 15.2	2.00%	301.90	302.66	0.20	307.10	4.44	3.19
CI#1	CI#2	0.90	8.09	0.03	0.2	9.3	14.7	15	RCP 15.1	2.00%	302.86	303.15	0.20	307.10	3.95	2.70
CI#2	OUT#1		(from routing)		9.1	9.1	32.3	15	RCP 15.0	2.00%	303.35	304.00	0.20	310.00	6.00	4.75
IN#1	CI#3	0.90	8.09	0.21	1.6	8.6	20.5	18	RCP 16.7	1.00%	303.50	303.71	0.20	311.20	7.50	6.00
CI#3	CI#4	0.80	8.09	0.24	1.6	2.0	64.8	12	RCP 11.1	0.50%	303.91	304.23	0.20	308.60	4.37	3.37
CI#4	CISTERN	0.95	8.09	0.06	0.5	0.5	113.8	12	RCP 6.3	0.50%	304.43	305.00	0.20	313.00	8.00	7.00
CI#1	RB#1	0.60	8.09	0.52	2.5	5.0	131.2	15	RCP 10.5	4.00%	303.91	309.15	0.20	311.00	1.85	0.60
IN#2	ROOF	0.95	8.09	0.21	1.64	1.6	16.1	10	HDPE 10.2	0.50%	311.00	311.08	0.20	313.00	1.92	1.09
IN#3	CI#5	0.90	8.09	0.11	0.78	0.8	94.2	12	RCP 4.1	15.00%	311.00	325.13	0.20	335.00	9.87	8.87
From	To	"K"	Flow full Area	Velocity Head (ft)	Downstream WSE	Friction Slope (%)	Upstream WSE	Full Flow?	Thru Basin (ft)	Depth Below Grate						
EX CI	CI#1	10%	1.23	0.93	305.40	2.15%	306.22	yes	0.09	0.46						
CI#1	CI#2	10%	1.23	0.90	306.31	2.08%	306.62	yes	0.09	0.06						
CI#2	OUT#1	10%	1.23	0.86	306.71	1.98%	307.35	yes		2.23						
IN#1	CI#3	10%	1.77	0.37	307.85	0.66%	307.99	yes	0.04	3.60						
CI#3	CI#4	10%	0.79	0.11	308.02	0.33%	308.23	yes	0.01	0.77						
CI#4	CISTERN	10%	0.79	0.01	308.25	0.02%	308.26	yes	0.00	5.16						
CI#1	RB#1	10%	1.23	0.25	307.85	0.59%	310.40	yes	0.03	0.99						
IN#2	ROOF	10%	0.55	0.14	312.31	0.56%	312.40	yes	0.01	1.01						
IN#3	CI#5	10%	0.79	0.02	312.31	0.05%	325.38	no	0.00	n/a						

Appendix G

Jordan Lake Accounting tool

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	
1		Watershed Characteristics Ver2.0																			
2		Clear All Values					Return to Instructions					Proceed to BMP Characteristics					Skip to Development Summary				
3		<i>Instructions</i>																			
4		1. Select your physiographic/geologic region. (see map on 'instructions' page)																			
5		2. Enter the area of the entire development in square feet (ft ²).																			
6		3. Select the location that is most representative of the site's precipitation characteristics. (see map on 'instructions' page)																			
7		4. For each applicable land use, enter the total area of that land use that lies within the development under pre-development conditions.																			
8		5. For each applicable land use, enter the total area of that land use that lies within the development under post-development conditions, before BMP implementation.																			
9		6. Ensure that the sum of pre- and post-development areas entered equal the original development area.																			
10		7. Continue to "BMP Characteristics" tab.																			
11		<i>Additional Guidelines</i>																			
12		- For non-residential watersheds, indicate acreages of each land use type in Column 1 for both pre- and post-development conditions.																			
13		- For residential watersheds, complete the required information in Column 2 for both pre- and post-development conditions.																			
14		- If a given land use is not present in the given watershed, leave the cell blank or enter a zero.																			
15		- Ensure that land use areas entered for both pre- and post-development conditions match the total development area entered in cell O21.																			
16		- Residential areas may be entered by average lot size (column, part A), or may be separated into individual land uses (column 2, part B) -- do NOT list out individual land uses within an area already described by lot size.																			
17		- Unless runoff flowing onto the development from offsite is routed separately around or through the site, the offsite catchment area draining in must be included in the acreage values of the appropriate land use(s) and treated.																			
18																					
19																					
20																					
21		Physiographic/Geologic Region:		Triassic Basin																	
22		Soil Hydrologic Group		D																	
23		Precipitation location:		Carrboro																	
24																					
25																					
26		COLUMN 1 -- NON-RESIDENTIAL LAND USES										COLUMN 2 -- RESIDENTIAL LAND USES									
27																					
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54		*Jurisdictional land uses are not included in nutrient/flow calculations.																			
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LAND USE AREA CHECK	
Total Development Area Entered (ft²):	75,250
Total Pre-Development Calculated Area (ft²):	75,250
Total Post-Development Calculated Area (ft²):	75,250

Parking lot																			0	0
Roof																			0	0
Sidewalk																			0	0
Lawn																			0	0
Managed pervious																			0	0
Forest																			0	0
LAND TAKEN UP BY BMP																			0	0
TOTAL AREA TREATED BY BMP (ft²):	36,808	0	0	27,034	0															
TOTAL AREA TREATED BY SERIES (ft²):	36,808			27,034			0			0			0			0				

Development:	Sancar Center
Prepared By:	R. Briggs
Date:	May 24, 2016

WATERSHED SUMMARY Ver2.0

REGION:	Triassic Basin		
TOTAL DEVELOPMENT AREA (ft ²):	75,250		
	Pre-Development Conditions	Post-Development Conditions	Post-Development w/ BMPs
Percent Impervious (%)	12.9%	49.5%	49.5%
Annual Runoff Volume (c.f.)	48,200	144,092	124,211
Total Nitrogen EMC (mg/L)	1.41	1.36	1.15
Total Nitrogen Loading (lb/ac/yr)	2.45	7.06	5.16
Total Phosphorus EMC (mg/L)	0.18	0.17	0.13
Total Phosphorus Loading (lb/ac/yr)	0.32	0.89	0.58

Percent Difference Between:

	Pre-Dev. & Post-Dev. without BMPs	Pre-Development & Post-Development with BMPs	Post-Dev without BMPs & Post-Dev with BMPs
Percent Impervious (%)	37%	37%	0%
Annual Runoff Volume (c.f.)	199%	158%	-14%
Total Nitrogen EMC (mg/L)	-4%	-18%	-15%
Total Nitrogen Loading (lb/ac/yr)	188%	110%	-27%
Total Phosphorus EMC (mg/L)	-6%	-29%	-24%
Total Phosphorus Loading (lb/ac/yr)	180%	83%	-34%

*Negative percent difference values indicate a decrease in runoff volume, pollutant concentration or pollutant loading. Positive values indicate an increase.

BMP VOLUME REDUCTIONS/EFFLUENT CONCENTRATIONS

	Volume Reduction (%)	TN Effluent Concn. (mg/L)	TP Effluent Concn. (mg/L)
Bioretention with IWS	35%	0.95	0.12
Bioretention without IWS	15%	1.00	0.12
Dry Detention Pond	0%	1.20	0.20
Grassed Swale	0%	1.21	0.26
Green Roof	50%	1.08	0.15
Level Spdr, Filter Strip	20%	1.20	0.15
Permeable Pavement*	0%	1.44	0.39
Sand Filter	5%	0.92	0.14
Water Harvesting	user defined	1.08	0.15
Wet Detention Pond	5%	1.01	0.11
Wetland	15%	1.08	0.12

*if treating commercial parking lot, TP effluent concentration = 0.16 mg/L

- [Return to Instructions](#)
- [Return to Watershed Characteristics](#)
- [Return to BMP Characteristics](#)
- [Print Summary](#)

BMP SUMMARY Ver2.0

	CATCHMENT 1			CATCHMENT 2			CATCHMENT 3			CATCHMENT 4			CATCHMENT 5			CATCHMENT 6		
	BMP 1	BMP 2	BMP 3	BMP 1	BMP 2	BMP 3	BMP 1	BMP 2	BMP 3	BMP 1	BMP 2	BMP 3	BMP 1	BMP 2	BMP 3	BMP 1	BMP 2	BMP 3
Wetland	--	--	--	Wetland	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Area Treated (ac)	0.84	--	--	0.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Inflow Volume (c.f.)	63,288	--	--	69,256	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Percent Volume Reduced (%)	15%	--	--	15%	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Inflow Nitrogen EMC (mg/L)	1.26	--	--	1.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Inflow Nitrogen (lb/ac/yr)	5.89	--	--	9.82	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Inflow Phosphorus EMC (mg/L)	0.171	--	--	0.165	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Inflow Phosphorus (lb/ac/yr)	0.80	--	--	1.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BMP Outflow Nitrogen (lbs/ac/yr)	4.37	--	--	6.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BMP Outflow Phosphorus (lbs/ac/yr)	0.49	--	--	0.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Catchment Outflow Nitrogen EMC (mg/L)	1.10			1.12			--			--			--			--		
Catchment Outflow Total Nitrogen (lb/ac/yr)	4.37			6.61			--			--			--			--		
Percent Reduction in Nitrogen Load (%)	26%			33%			--			--			--			--		
Catchment Outflow Phosphorus EMC (mg/L)	0.123			0.123			--			--			--			--		
Catchment Outflow Total Phosphorus (lb/ac/yr)	0.489			0.725			--			--			--			--		
Percent Reduction in Phosphorus Load (%)	39%			4%			--			--			--			--		