Coulter | Jewell | Thames, PA

111 WEST MAIN STREET
DURHAM, NORTH CAROLINA 27701
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Planning for the Future

May 26, 2017

Town of Chapel Hill
Planning Department
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514-5705

Reference: Response to First Review Comments
Purefoy Road Apartments - 111 Purefoy Rd.

Jay:

Enclosed with this letter please find ten (10) plan sets for Town Hall and one (1) plan set for OWASA of the revised Site Plan for the above referenced project. In addition, we have addressed the review comments as follows:

ACCESS AND CIRCULATION:

1. Prior to a Certificate of Occupancy construct a 5 foot wide concrete sidewalk to Town standards behind the ditch along the length of the Purifoy Road frontage. If necessary the applicant shall dedicate public right-of-way to ensure the right-of-way is located a minimum of 1 foot behind the sidewalk. (*Engineering*)
   Applicant Response: The following note has been added to the cover sheet "Prior to a Certificate of Occupancy construct a 5 foot wide concrete sidewalk to Town standards behind the ditch along the length of the Purifoy Road frontage". Please see note #1 under the heading general conditions of approval on SD-0.0 Cover Sheet. The current proposed right-of-way dedication of 15 feet for this project will accommodate correct placement of the proposed sidewalk 1 foot inside of the proposed right-of-way.

2. Prior to a Certificate of Occupancy construct the drive aisle and parking lot to Town standard for pavement design and dimensions. (*Engineering*)
   Applicant Response: The following note has been added to the cover sheet "Prior to a Certificate of Occupancy construct the drive aisle and parking lot to Town standard for pavement design and dimensions". Please see note #2 under the heading general conditions of approval on SD-0.0 Cover Sheet.

FIRE:

3. FIRE APPARATUS ACCESS ROADS; Any fire apparatus access roads, (any public/private street, parking lot access, fire lanes and access roadways), used for fire department access shall be all weather and designed to carry the imposed load of fire apparatus weighing at least 80,000 lbs. Fire apparatus access roads shall have a minimum width of 20' exclusive of shoulders with an overhead clearance of at least 13'-6" for structures not exceeding 30' in height and shall provide access to within 150' of all exterior portions of the building. Structures exceeding 30' in height shall be provided with an aerial apparatus access road 26' in width in the immediate vicinity of the building or portion thereof and shall provide at least one of the required access roads to be located not less than 15' and not more than 30' from the structure parallel to one entire side of the structure. NC FPC 2012 502.1,503.1.1, 503.2.1, D102.1 (*Fire*)
   Applicant Response: Proposed fire apparatus access road will be constructed of heavy duty all weather asphalt pavement and be designed to support fire apparatus weighting at least 80,000 pounds. Proposed fire apparatus access road is 20 feet wide and less than 150 linear feet in length. All proposed electrical and communication utilities will be underground so overhead clearance will not be an issue. Proposed structures are three stories and less than 30 feet in height thus an aerial apparatus access roadway shall not be required for this project. Please see plan sheets for above supporting information.

4. DEAD END ACCESS ROADS; Dead end fire apparatus access roads exceeding 150' shall have a designated turn around required. The turnaround shall meet one of the design standards of NC FPC 2012, Appendix D table D 103.4 (*Fire*)
   Applicant Response: Proposed fire apparatus access road does not extend beyond 150 linear feet as such a designated turnaround is not required for this project.

5. GRADE AND APPROACH; Fire apparatus access roads shall not exceed 10% in grade unless approved by the fire chief and all approach and departure angles shall be within the limits established based on the Department's apparatus. NC FPC 2012, 503.2.7, 503.2.8 and D103.2 (*Fire*)
   Applicant Response: Proposed fire apparatus access road does not exceed 10% slope. Please see grading and drainage plan SD-3.0.

6. FIRE APPARATUS ACCESS ROADS AUTHORITY; The fire code official shall have the authority to increase the minimum access widths where they are deemed inadequate for fire and rescue operations. NC FPC 503.2.2 (*Fire*)
   Applicant Response: Noted, Thank you.

7. GATES AND BARRICADES; Where required or authorized by the fire code official and permanent or temporary (construction), any gates across fire apparatus access roads shall be a minimum width of 20', be of swinging or sliding type, have an emergency means of operation, shall be openable by either forcible entry or keyed, capable of being operated by one person, and shall be installed and maintained according to UL 325 and ASTM F 2200. NC FPC 2012, 503.5, 503.6, D103.5 (*Fire*)
   Applicant Response: There are no gates or barricades proposed across the fire apparatus access road associated with this project. As such the above comment is not applicable to this project.

8. FIRE LANES; Where required, approved marking signs including the words, NO PARKING-FIRE LANE signs shall be provided for fire apparatus access roads to identify such roads. NC FPC 2012, 503.3, D103.6, D103.6.1, D103.6.2 (*Fire*)
   Applicant Response: Four "NO PARKING FIRE LANE" signs have been added and labeled along the proposed access driveway. A "NO PARKING FIRE LANE" sign detail has been added to sheet SD-8.2. Please see SD-2.0 Site Layout Plan and SD-8.2 Utility Details sheet for revisions.

9. PREMISE IDENTIFICATION; Approved building address numbers, placed in acceptable position to the fire code official, shall be required on all new buildings. NC FPC 2012, 505.1 (*Fire*)
   Applicant Response: The above note has been added to 2/SD-2.0 Site Layout Plan Notes, note #7. Please see SD-2.0 Site Layout Plan for revisions.

10. KEY BOXES; Where required by the fire code official, a secure key box, mounted on the address side of the building, near the main entrance, shall be provided to ensure adequate access to the building based on life safety and/or fire protection needs. NC FPC 2012, 506 (*Fire*)
    Applicant Response: The following note has been added to the site layout plan notes, note #12 "Where required by the fire code official, a secure key box, mounted on the address side of the building, near the main entrance, shall be provided to ensure adequate access to the building based on life safety and/or fire protection needs. NC FPC 2012, 506 (Fire)". Please see SD-2.0 Site Layout Plan for revisions.

11. FIRE HYDRANTS; The addition of any required hydrants to serve the submitted building must flow a minimum of 2500 gpm per Town Engineering Standards unless approved by the fire code official. The farthest hydrant serving a proposed structure must be no more than 500' distant. A maximum distance of 500' spacing between hydrants must be maintained unless otherwise approved by the fire code official. Lesser spacing distances may be required. A minimum working space of 3' must be maintained around all hydrants. Where hydrants are subject to physical impact, physical protection may be required, NC FPC 2012, 507.5.6. The minimum number of required hydrants and their spacing must meet NC FPC 2012, Appendix C, table C 105.1 (*Fire*)
    Applicant Response: Fire hydrant added. Fire flow report included.

12. AUTOMATIC FIRE SPRINKLER SYSTEM REQUIRED: Town Ordinance 7 - 56.An automatic fire sprinkler system meeting the requirements of NFPA Standard #13 is required to be installed in non-residential construction, as follows. (1)In new non-residential structures if: a. The building has more than 6,000 square feet of floor area; b. Twenty (20) per cent or more of the total floor area is more than two hundred (200) feet of travel distance from the nearest access point for a fire truck; or c. The building exceeds two (2) stories or twenty-four (24) feet in height from the average grade of the lot to the windows on the topmost occupied floor. (2) In a structural addition to a non-residential building of more than six thousand (6,000) square feet where the cost of the addition exceeds fifty (50) per cent of the value of the building. Fire sprinklers are required in the addition. (3) In a non-residential building of more than six thousand (6,000) square feet which is either renovated at a cost greater than fifty (50) per cent of value or which is damaged and rebuilt at a cost greater than fifty (50) per cent of value. In addition, all connections shall be located on the street side of each building, and activation of the sprinkler system shall activate both a local building alarm and a supervisory alarm at a twenty-four (24) hour certified and licensed alarm monitoring service. (*Fire*)

Applicant Response: Sprinkler feeds are shown on the plans. Notes have been added.

13. FIRE PROTECTION AND UTILITY PLAN; shall include the fire flow report: for a hydrant within 500' of each building, provide the calculated gallons per minute of with a residual pressure of 20 pounds per square inch. The calculations should be sealed by a professional engineer licensed in the State of NC and accompanied by a water supply flow test conducted within one year of the submittal. Reference Town Design Manual for required gallons per minute. (*Fire*)
    Applicant Response: Fire flow report provided.

14. FIRE DEPARTMENT CONNECTIONS, LOCATIONS; Any required FDC's for any buildings shall meet the design and installation requirements for the current, approved edition of NFPA 13, 13D, 13R, or 14 of the NC FPC 2012 and Town Ordinances; 7-38 for location. FDC's shall be installed on the street/ address side of the building and within 100' of a hydrant or unless otherwise approved by the fire code official and shall not be obstructed or hindered by parking or landscaping. FDC's shall be equipped with NST. (*Fire*)
    Applicant Response: Note added. FDC's are within 100' of proposed hydrant.

15. FIRE DEPARTMENT CONNECTIONS, INSTALLATION; A working space of not less than 36" in width and depth and a working space of 78" in height shall be provided on all sides with the exception of wall mounted FDC's unless otherwise approved by the fire code official. The FDC's where required must be physically protected by an approved barrier from impacts. NC FPC 2012, 912.1, 912.2 912.2.1, 912.3.2, 312 (*Fire*)
    Applicant Response: Noted.

16. FIRE WATCH; During construction and demolition where hot work, materials subject to spontaneous combustion, or other hazardous construction or demolition is occurring, the owner or their designee shall be responsible for maintaining a fire watch. The fire watch shall consist of at least one person with a means of communicating an alarm to 911, shall have a written address posted in a conspicuous location and shall maintain constant patrols. NC FPC 2012 Section 1404 (*Fire*)
    Applicant Response: The above note has been added to the site layout plan notes, note #9. Please see SD-2.0 Site Layout Plan for revisions.

17. CONSTRUCTION/DEMOLITION; All Construction and demolition conducted shall be in compliance of the current edition of Chapter 14 of the NC FPC. (*Fire*)
    Applicant Response: The above note has been added to the site layout plan notes, note #10. Please see SD-2.0 Site Layout Plan for revisions.

18. AERIALS; Where a building exceeds 30' in height or 3 stories above the lowest level of Fire Department Access, overhead power and utility lines shall not be allowed within the aerial apparatus access roadway and the roadway shall have an unobstructed width of 26' exclusive of the shoulders. At least one of the apparatus access roadways shall be located within a minimum of 15' and maximum of 30' from one complete side of the building. NC FPC 2012 D105.1, D105.2, D105.3 (*Fire*)
    Applicant Response: Proposed structure is three stories and less than 30 feet in height thus an aerial apparatus access roadway shall not be required for this project. Please reference building elevations for demonstrated building heights.

19. BUILDING HEIGHT; Buildings exceeding 30 feet or three stories in height must have at least two means of fire apparatus access separated by at least one half the diagonal distance of the building. NC FPC 2012, D104.1, D104.3 (*Fire*)
    Applicant Response: Proposed structure is three stories and less than 30 feet in height, two means of fire apparatus access shall not be required for this project. Please reference building elevations for demonstrated building heights.

20. FIRE APPARATUS ACCESS FOR CHFD: All fire department access determinations shall be based upon CHFD apparatus specifications (data specs provided by Office of the Fire Marshal/Life Safety Division) and field verification. All proposed fire department access designs shall be reviewed and shall also pass field inspection. (*Fire*)
    Applicant Response: Noted, Thank you.

RECREATION:

21. We are in support of the proposal to pay 100% of the required recreation space as a payment in lieu. Payment should be made prior to issuance of the first Zoning Compliance Permit. (*Parks and Recreation*)
    Applicant Response: The following note has been added to the cover sheet "Prior to the issuance of the first Zoning Compliance Permit developer shall pay payment-in-lieu for the required recreation space". Please see note #3 under the heading general conditions of approval on SD-0.0 Cover Sheet.

STORMWATER MANAGEMENT:

22. Provide a copy of site plan permit application form showing the existing and proposed impervious area. (*Stormwater*)
    Applicant Response: An additional site plan permit application form has been included with this resubmittal package for Stormwater Management review.

23. Show on plan sheet SD-3.0, Junction Box at the upstream of underground detention pipe. (*Stormwater*)
    Applicant Response: The storm drain and treatment system has been revised to include two Filterra's for water quality treatment and an underground detention system by Contech.

24. Show on plan sheet SD-3, the cross-section A-A (*Stormwater*)
    Applicant Response: The storm drain and treatment system has been revised to include two Filterra's for water quality treatment and an underground detention system by Contech.

25. Provide in the calculation document the 2-year-24 hour storm event volume difference between the post and pre-development. (*Stormwater*)
    Applicant Response: The difference in pre- and post-development runoff volume for the 2-year storm is 2,526 cf. This is noted in the stormwater impact statement under the heading "Stormwater Volume Calculations (2-yr Storm)".

26. Provide the first inch runoff computation and show that the first inch and 2-year volume will

meet the draw down requirement. (*Stormwater*)
Applicant Response: The Filterra's are sized based on the amount of impervious area that is draining to them using Contech's Filterra design guidance. Drawdown calculations for the 2-yr storm in the underground detention system are provided. These calculations do not account for runoff received and drawn down through the Filterra's. The drawdown time was calculated to be 27 hours. While this is less than the desired 48 hours, an orifice that is less than 1" in diameter is not warranted due to maintenance.

27. Dimension on the plan view of the bioretention basin, the length, width and radius of the top surface basin. The surface are in square feet should also be listed on the plan sheet (*Stormwater*)
Applicant Response: The storm drain and treatment system has been revised to include two Filterra's for water quality treatment and an underground detention system by Contech.

28. The 1, 2 and 25-year post-development peak discharge for basin 1 cannot exceed the pre-development for basin 1.
Applicant Response: Noted. The site has been analyzed as a single basin as all of the runoff drains to the low point on the south side of the site. There is a decrease in peak runoff rate from the site for the 1-yr, 2-yr, and 25-yr storms.

ORANGE COUNTY SOLID WASTE:

28. Solid Waste Management Plan. This document must be completed and returned to me for review and approval. A blank copy of the document will be attached to the e-mail transmitting these review comments to you. (*OC Solid Waste*)
Applicant Response: Please find completed Orange County Solid Waste Management Plan attached to this resubmittal package for review and approval.

29. Plan Sheet SD-2.0 (Site Layout Plan): Although there are only 5 units there are a total of 34 bedrooms. As such, 5 recycling carts will not sufficiently serve this property, especially since it will be on our urban route which allows for the placement of cardboard within the carts. Please add 3 more carts (for a total of 8) and depict this on the plan. (*OC Solid Waste*)
Applicant Response: Proposed bedroom count has been reduced to 28 total bedrooms since the last plan submittal. Please recall e-mail correspondence regarding the minimum number of trash and recycling carts to be provided. Last correspondence (e-mail dated 3/29/2017, attached) indicated 6 trash and 6 recycling roll-out carts would be adequate to serve the 28 total bedrooms proposed for this project.

30. Plan Sheet SD-2.0 (Site Layout Plan): For the designated Trash Corral, please revise the wording to say Trash and Recycling Corral. (*OC Solid Waste*)
Applicant Response: Plan label has been revised to state the following "Trash and Recycling Corral". Please see SD-2.0 Site Layout Plan for revisions.

31. Plan Sheet SD-2.0 (Site Layout Plan): Add a note to the plan that states that residents will be required to bring the recycling carts to the street edge on Purefoy Road (by 7:00 a.m.) on collection day and then return them to the Corral after collection. (*OC Solid Waste*)
Applicant Response: The following note has been added to the site layout plan notes, note #11 "residents will be required to bring the recycling carts to the street edge on Purefoy Road (by 7:00

a.m.) on collection day and then return them to the Corral after collection". Please see SD-2.0 Site Layout Plan for revisions.

PLANNING:

32. Multiple sheets: Clarify proposed land disturbance. Separate between onsite and offsite (including existing ROW and ROW dedication). Call out total on site plan and grading sheet. (*Current Development*)
    Applicant Response: Proposed land disturbance numbers have been broken out as requested above. Please find a summary of these numbers on SD-0.0 Cover Sheet and SD-4.0 Erosion Control Plan. Notes have been added to SD-2.0 and SD-3.0 to reference the land disturbance number summary on the cover sheet. Please note that both pre and post ROW dedication land disturbance numbers tally less than 40,000 SF.

33. Please be advised that existing impervious may not be credited against proposed land disturbance. Existing impervious may only be credited where it is not disturbed as a part of the project -- grading where there is an existing driveway for instance would count as disturbance. (*Current Development*)
    Applicant Response: Understood, the only credit being taken is for the footprint of the existing structure on-site. No other existing impervious areas are being credited towards the overall land disturbance total.

34. Provide a draft Affordable Housing Plan in accordance with section 3.10 of the LUMO. This application results in 5 multi-family dwelling units and therefor the ordinance applies. The conversion from a single family dwelling unit (with or without accessory apartment) is considered a new multi-family dwelling unit. (*Current Development*)
    Applicant Response: Developer met with ToCH staff on 4/17/2017 to discuss the above comment. Per these conversations it is understood ToCH LUMO does not have any stated or applied developer requirements or contributions for affordable housing associated with development properties that are for rental purposes. As such an affordable housing plan has not been provided.

35. Stormwater outlets are not permitted within the setbacks - new and existing structures must outlet within the buildable area of the lot. Confirm with Stormwater regarding the allowance for other stormwater structures in the setback (*Current Development*)
    Applicant Response: Proposed stormwater infrastructure has been removed from the setback areas. Please see SD-3.0 Grading and Drainage Plan.

36. A buffer exhibit will be required for the shared buffer (*Current Development*)
    Applicant Response: Alternate shared buffer is no longer being requested along the Kehillah property line. The required 20 foot type "C" buffer is now being provided on-site. Please see revised Landscape Plan SD-7.0.

37. Multiple sheets: call out location and width of shared buffer with Kehillah property on site plan and landscape plan (*Current Development*)
    Applicant Response: Alternate shared buffer is no longer being requested along the Kehillah property line. The required 20 foot type "C" buffer is now being provided on-site. Please see revised Landscape Plan SD-7.0.

38. Multiple sheets: Remove references to conversations from site data block on cover sheet and elsewhere. Reference LUMO requirement instead. Primary height: LUMO 3.8.2 and Appendix B, Division 5. Buffers: LUMO 5.6 (*Current Development*)
    Applicant Response: References to conversations with Planning Staff have been removed from the site data table on SD-0.0 Cover Sheet and also Site Layout Plan Notes on SD-2.0 Site Layout Plan.

39. Multiple sheets and narrative: The units proposed are deemed multi-family as 3 or more units are proposed on the same site. Replace all references to the term "duplex" with "multi-family." (*Current Development*)
    Applicant Response: All references to the term "duplex" have been replaced with "multi-family". Please see revised plan sheets and project narrative attached to this resubmittal package.

40. Grading sheet: Confirm mean finished grade points for measurement on grading sheet - show spot elevations. Building Elevations: Draw allowable building envelope onto building facades. Call out heights measured from mean finished grade (*Current Development*)
    Applicant Response: Mean finished grade for the front façade of the proposed structure is 436.00. Mean finished grade for the front façade of the existing structure is 434.25. Spot elevations have been added denoting the ground elevation at all four building corners. Architectural elevations have been updated to include revised average finished grade elevations and also the 30 foot allowable building height envelope. Please see SD-3.0 Grading and Drainage Plan and also building elevation sheets.

41. Landscape Plan - clarify off-site buffer - is wall or alternate buffer proposed for portion of the site? Alternate buffers require Community Design Commission review and approval (*Current Development*)
    Applicant Response: Alternate shared buffer is no longer being requested along the Kehillah property line. The required 20 foot type “C” buffer is now being provided on-site. Please see revised Landscape Plan SD-7.0.

42. Existing Conditions Sheet: confirm steep slopes compliance - confirm on plan that no slopes in excess of 25% are present on the site (*Current Development*)
    Applicant Response: The following note has been added to 4/SD-1.0 Description of Existing Site Features “there are no existing steep slopes in excess of 25% on this project site per LUMO Sec. 5.3.2 steep slopes. Please see revisions on SD-1.0 Existing Conditions and Demolition Plan.

43. Final Plan application shall include photometric plan including foot-candle isographs demonstrating compliance with LUMO 5.11 (*Current Development*)
    Applicant Response: Site lighting plan has been updated to include photometric foot-candles as requested above. Please see SD-6.0 and notice proposed lighting levels are 0.3 foot candles or less at the ROW and property lines.

44. Relocate driveway or speed table. If no change is proposed, confirm location is appropriate with Town Traffic Engineer (*Current Development*)
    Applicant Response: Please find e-mail from Kumar Neppalli attached noting the speed table can remain where it is. Please also understand the speed table is not actually raised in this location. It is simply a visual speed deterrent.

45. Final Plan application shall include construction management plan demonstrating compliance with LUMO 5.13 (*Current Development*)
    Applicant Response: Construction Management Plan Notes were included with the first plan submittal. Please see 5/SD-2.0 for Construction Management Plan Notes.

46. 50 foot street setback applies to proposed rights-of-way line not existing. (*Current Development*)
    Applicant Response: The 50 foot street setback is now shown form the proposed right-of-way line along Purefoy Road. All proposed structures are located inside the required setbacks. Please see SD-2.0 Site Layout Plan.

INSPECTIONS:

47. A single electrical service shall be provided to serve each structure. Article 230.2 (A) 2014 edition of North Carolina Electric Code. (*Inspections*)
    Applicant Response: The following note has been added to 2/SD-5.0 Utility Plan Notes, note # 9 under general notes section "A single electrical service shall be provided to serve each structure. Article 230.2 (A) 2014 edition of North Carolina Electric Code". Please see SD-5.0 Utility Plan for revisions.

48. Key boxes for first responders will be required near the front door and sprinkler riser room areas. 2012 NC Fire Code, section 506. (*Inspections*)
    Applicant Response: The following note has been added to the site layout plan notes, note #12 "Where required by the fire code official, a secure key box, mounted on the address side of the building, near the main entrance, shall be provided to ensure adequate access to the building based on life safety and/or fire protection needs. NC FPC 2012, 506 (Fire)". Please see SD-2.0 Site Layout Plan for revisions.

49. Address numbers must be a minimum of 4 inches high and of contrasting color to their background. Reflective numbers are preferred. When the distance from the street or fire department access lane to the front or address side of the building exceeds 25 feet, larger numbers are required. 26 feet to 50 feet shall have 8 inch numbers, 51-75 feet shall have 12 inch numbers and over 75 feet shall have 18 inch numbers. Where access is by private means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. (*Inspections*)
    Applicant Response: The above note has been added to 2/SD-2.0 Site Layout Plan Notes, note #7. Please see SD-2.0 Site Layout Plan for revisions.

50. A fire hydrant will be required to be installed within 100 feet of the fire department connections. (*Inspections*)
    Applicant Response: Hydrant added.

ENGINEERING:

51. Prior to beginning work in the public right-of-way the applicant much contact the Engineering Division to

apply for an Engineering Construction Permit and to schedule a preconstruction conference. (*Engineering*)
Applicant Response: The above note has been added to 2/SD-2.0 Site Layout Plan Notes, note #13. Please see SD-2.0 Site Layout Plan for revisions.

52. A pad for the roll-out carts is shown in the Town's right-of-way. There is no standard practice for the approval of this type of installation, a privately maintained concrete slab abutting the roadway pavement. The staff should discuss an alternate solution for the curb side pick-up. (*Engineering*)
Applicant Response: The precedent for a concrete slab abutting the roadway pavement has already been set with the McCauley Street Apartment project. During the McCauley Street Apartment project review process staff requested a concrete pad for refuse staging and pick-up and subsequently approved of. Applicant is currently proposing a similar configuration for this project again at staff's request.

[NO CATEGORY]:

53. Need justification for 2 bike parking spaces. Application states 5 dwelling units but 34 bedrooms will be built. How many people will be expected to live here and need parking of some sort? The 2 class II bike parking spaces could be sufficient for visitors but it may be necessary to consider providing bike hooks or some other indoor bike parking option for residents. (*Long Range/Transportation*)
Applicant Response: Bike parking calculations have been revised. Please see revised calculations on cover sheet SD-0.0. Minimum class I bicycle parking requirements are being met by providing 7 class I bicycle parking spaces interior to bedrooms via bike hooks. This actually meets the requirements for the overall project. That said the developer has chosen to provide 12 additional covered class II bike parking spaces exterior of the buildings. There are now 19 proposed bike parking spaces and 13 motor vehicle parking spaces provided with this project. That's a total of 32 combined parking spaces leaving room for four visitor spaces.

54. Show significant tree stand on Purefoy Rd Frontage (*Urban Forestry*)
Applicant Response: After reviewing LUMO Sec. 5.7.5 Significant Tree Stands and what a "significant tree stand" means we believe the four individual mature street trees along Purefoy Road should not be considered a "significant tree stand" as this area is not a contiguous mature woods. Rather the area in question is simply four individual mature street trees with a maintained lawn understory and not a contiguous mature woods. For purposes of this comment please understand all four of these trees have been located and shown on our existing conditions plan. Three of the four trees are to remain with as much intact root zone as possible per development of this site. The developer understand the importance of these trees and intends to protect them with tree protection fence best possible while still allowing development of this site.

55. Justify removal of 48" bald Cyprus (labeled as #22, Mimosa) (*Urban Forestry*)
Applicant Response: "Mimosa" has been revised to "Bald Cypress" in the tree table. Revised site layout allows the existing Bald Cypress tree to remain. Tree protection fence is shown around the existing tree to the extents possible while still allowing development of this project.

56. Offsite shared buffer with Kehillah and alternate Buffer is acceptable. (*Urban Forestry*)
Applicant Response: Alternate shared buffer is no longer being requested along the Kehillah property line. The required 20 foot type "C" buffer is now being provided on-site. Please see revised Landscape Plan SD-7.0.

57. Tree Canopy calculations are acceptable. (*Urban Forestry*)
    Applicant Response: Noted, Thank you.

58. Provide on plan sheet SD-3, the bottom and top elevation of the retaining wall between catch basin Cl 1 and bioretention basin. It appears part of the driveway impervious area sloping towards the bioretention basin is bypassing treatment. Please address. (*Stormwater*)
    Applicant Response: Please note the proposed site layout has been reconfigured. Please also understand current paved driveway and parking areas are graded to drain to stormwater treatment devices. See Stormwater Impact Statement regarding delineated drainage areas for this project. Top and bottom of proposed walls are also shown on SD-3.0 Grading and Drainage plan.

59. Provide copy of approved Traffic Impact Analysis Exemption from the Town Traffic Engineer. The application is deemed incomplete without this document. (*Current Development*)
    Applicant Response: Please find approved Traffic Impact Analysis Exemption within resubmittal package.

60. Provide estimate of weekly refuse generation to confirm that 5 92-gallon roll carts will be sufficient to service the proposed development (*Current Development*)
    Applicant Response: Proposed bedroom count has been reduced to 28 total bedrooms since the last plan submittal. Please see attached e-mail correspondence with Jeff Scouten, Orange County Solid Waste noting the minimum number of trash and recycling carts to be provided. Last correspondence (e-mail dated 3/29/2017, attached) indicated 6 trash and 6 recycling roll-out carts would be adequate to serve the 28 total bedrooms proposed for this project.

61. Provide estimate of parking demand based on comparable properties. Provide information related to proposed off site lease of parking spaces (*Current Development*)
    Applicant Response: Based on developers rental portfolio the estimated parking demand for this project is 1 parking space per bedroom. There are 28 total bedrooms proposed with the current plan. Current project proposes the maximum allowed motor vehicle parking spaces which is 13 for this project per the LUMO. Nineteen additional (interior and exterior) bicycle parking spaces are being provided to accommodate the remaining parking demand. This totals 32 parking spaces (combination bicycle and auto) which allows for four visitor spaces. Developer plans to control motor vehicle parking with lease agreements. Parking requirements per the LUMO have been met.

62. Consider providing an offsite continuous sidewalk connection to Mason Farm Road. This could be achieved in one of two ways: 1) work with Kehillah to continue site sidewalk to intersection 2) work with property at 102 Purefoy Rd continue sidewalk on opposite side of Purefoy to intersection and provide crosswalk from site to sidewalk across the street. (*Current Development*)
    Applicant Response: Thank you for this comment. Developer has considered and does not desire to extend sidewalk off site as noted above at this time.

OWASA:

1. We would want only 2 sewer services connected to the manhole. Tie one into the main via service saddle.
   Applicant Response: 2 sewer services are provided with plan revisions.

2. Label size of private water service line to Building 1.
   Applicant Response: Size has been labeled.

If you have any comments or questions, please contact me at jheikes@townofchapelhill.org or 9199695082.

Sincerely,

Jay Heikes
Planner

Cc: File: Development - 111 Purefoy Rd

Contact information
Fire: Chris Kearns ckearns@townofchapelhill.org 919-969-5080
Inspections: Travis Crabtree tcrabree@townofchapelhill.org 919-969-5042
Engineering: Mike Taylor / Chris Jensen cjensen@townofchapelhill.org 919-969-7233
Public Works/Urban Forestry: Curtis Brooks cbrooks@townofchapelhill.org 919-969-5116
Transportation Planning: Kayla Siebel ksiebel@townofchapelhill.org 919-969-5061
Stormwater: Ernest Odei-Larbi eodei-larbi@townofchapelhill.org 919-968-2717
Orange County Solid Waste: Jeff Scouten jscouten@orangecountync.gov 919-968-2788 x107

Please call if you have any questions or require additional information.

Sincerely,
Coulter Jewell Thames, P.A.

Andrew J. Porter, RLA
Landscape Architect

Coulter Jewell Thames, PA

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Planning for the Future

May 10, 2017

Town of Chapel Hill
Planning Department
405 Martin Luther King Jr. Blvd.
Chapel Hill, NC 27514

Reference: **Site Plan Application**
Purefoy Road Apartments
111 Purefoy Road
Chapel Hill, NC 27514
Pin: 9788419609

Jay,

Below please find our request for approval of an alternate 10' type "B" landscape buffer along both the southern and eastern property lines.

Applicant proposes to shift the required 10' type "B" landscape buffer further into the site as means to protect existing bamboo and natural vegetation within the first 10 feet from the property line as shown on the site plans and requested by adjacent neighbors. The required 10' type "B" landscape buffer would then be planted from ten feet inwards to twenty feet from the southern and eastern property lines.

Applicant understands this request will require (CDC) Community Design Commission approval. As such applicant has requested adjacent property owners support for this request as this alternate will provide additional screening to their benefit.

Please feel free to contact me should you have any questions of comments regarding this matter.

Respectfully submitted,
Coulter Jewell Thames, PA

Andrew J. Porter, RLA
Landscape Architect

EXEMPTION FORM
ENGINEERING DEPARTMENT

Request for exemption received from: **Coulter Jewell Thames, PA**, 111 West Main Street, Durham, NC 27701 phone: 919-682-0368

Date: April 24, 2017

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:

a) The proposed development is expected to generate 50 additional vehicle trips per day.
b) 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:

Purefoy Road Apartments

Signed: _____ 4/24/17
Traffic Engineer *Date*

Approved: _____ 4/24/17
Public Works Director *Date*

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

RETURN TO ENGINEERING DEPARTMENT WHEN SIGNED

MISCELLANEOUS PAYMENT RECPT#: 566192
TOWN OF CHAPEL HILL
405 MARTIN LUTHER KING JR BLVD
CHAPEL HILL NC 27514

DATE: 04/19/17 TIME: 15:17
CLERK: swarther DEPT:
CUSTOMER#: 1811
ENGINEERING DEPT
PARCEL:

CHG: TIAX TRAFFIC IMPACT 350.00

REVENUE:
1 10046 46403 350.00
TRAFFIC IMPACT EXEMPT PERMITS
REF1: REF2:
CASH:
01000 10003 350.00
CENTRAL DEP CASH - S

AMOUNT PAID: 350.00

PAID BY: PUREFOY
CHECKNT METH:
5009357747
REFERENCE:

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

Kumar Neppalli

From: Andrew Porter <andrew.porter@cjtpa.com>
Sent: Wednesday, November 30, 2016 9:02 AM
To: Kumar Neppalli
Cc: Ken Gorfkle; Dan Jewell; Preston Royster; Steven Epley
Subject: RE: Purefoy Road Apartments (Project 16-106)

Thanks Kumar.

Andy Porter, RLA
Project Manager

Coulter Jewell Thames, PA
111 West Main Street
Durham, NC 27701
phone: 919-682-0368
fax: 919-688-5646

-----Original Message-----
From: Kumar Neppalli [mailto:kneppalli@townofchapelhill.org]
Sent: Wednesday, November 30, 2016 8:58 AM
To: Andrew Porter <andrew.porter@cjtpa.com>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Dan Jewell <djewell@cjtpa.com>; Preston Royster <proyster@cjtpa.com>; Steven Epley <SEpley@vhb.com>
Subject: RE: Purefoy Road Apartments (Project 16-106)

Sure, my office is located at Public Works, Building 1, 6850 Millhouse Rd.

-----Original Message-----
From: Andrew Porter [mailto:andrew.porter@cjtpa.com]
Sent: Wednesday, November 30, 2016 8:58 AM
To: Kumar Neppalli <kneppalli@townofchapelhill.org>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Dan Jewell <djewell@cjtpa.com>; Preston Royster <proyster@cjtpa.com>; Steven Epley <SEpley@vhb.com>
Subject: RE: Purefoy Road Apartments (Project 16-106)

Thank you for the quick response Kumar. I will request the developer send a check to your attention.

Thanks again,
Andy

Andy Porter, RLA

fax: 919-688-5646

-----Original Message-----
From: Kumar Neppalli [mailto:kneppalli@townofchapelhill.org]
Sent: Wednesday, November 30, 2016 8:22 AM
To: Andrew Porter <andrew.porter@cjtpa.com>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Dan Jewell <djewell@cjtpa.com>; Preston Royster <proyster@cjtpa.com>
Subject: RE: Purefoy Road Apartments (Project 16-106)

Hi Andrew, I need more information such as what ITE Code he used and for how many apartments etc.

-----Original Message-----
From: Andrew Porter [mailto:andrew.porter@cjtpa.com]
Sent: Wednesday, November 30, 2016 8:03 AM
To: Kumar Neppalli <kneppalli@townofchapelhill.org>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Dan Jewell <djewell@cjtpa.com>; Preston Royster <proyster@cjtpa.com>
Subject: RE: Purefoy Road Apartments (Project 16-106)

Good morning Kumar.

Steve Epley from VHB has calculated the following daily and peak hour trips for the proposed Purefoy Road Apartment project.

33 ADT
3 AM Trips (1 enter, 2 exit)
3 PM Trips (2 enter, 1 exit)

Please let me know if you need any additional information to complete this request.

Thanks,
Andy

Andy Porter, RLA
Project Manager

Coulter Jewell Thames, PA
111 West Main Street
Durham, NC 27701
phone: 919-682-0368
fax: 919-688-5646

-----Original Message-----
From: Kumar Neppalli [mailto:kneppalli@townofchapelhill.org]
Sent: Tuesday, November 29, 2016 8:54 AM
To: Andrew Porter <andrew.porter@cjtpa.com>

To: Andrew Porter
<andrew.porter@cjtpa.com<mailto:andrew.porter@cjtpa.com>>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net<mailto:kgorfkle@bellsouth.net>>;
Dan Jewell <djewell@cjtpa.com<mailto:djewell@cjtpa.com>>; Ben Hitchings
<bhitchings@townofchapelhill.org<mailto:bhitchings@townofchapelhill.org>>;
Gene Poveromo
<gpoveromo@townofchapelhill.org<mailto:gpoveromo@townofchapelhill.org>>
Subject: RE: Purefoy Road Apartments (Project 16-106)

Hi Andy,

Please see attached draft Round 1 comments on your application referenced above. Gene and Ben have not yet had a chance to review fully, but I do not expect them to change substantively. Please be advised that a Traffic Impact Analysis Exemption is required for this application. We are unable to consider this a complete application without that approval. If you have already obtained one, please send it my way. If not, please work with Kumar to obtain one.
kneppalli@townofchapelhill.org<mailto:kneppalli@townofchapelhill.org>
919-969-5093

Have a Happy Thanksgiving,

Jay

[TownSeal]

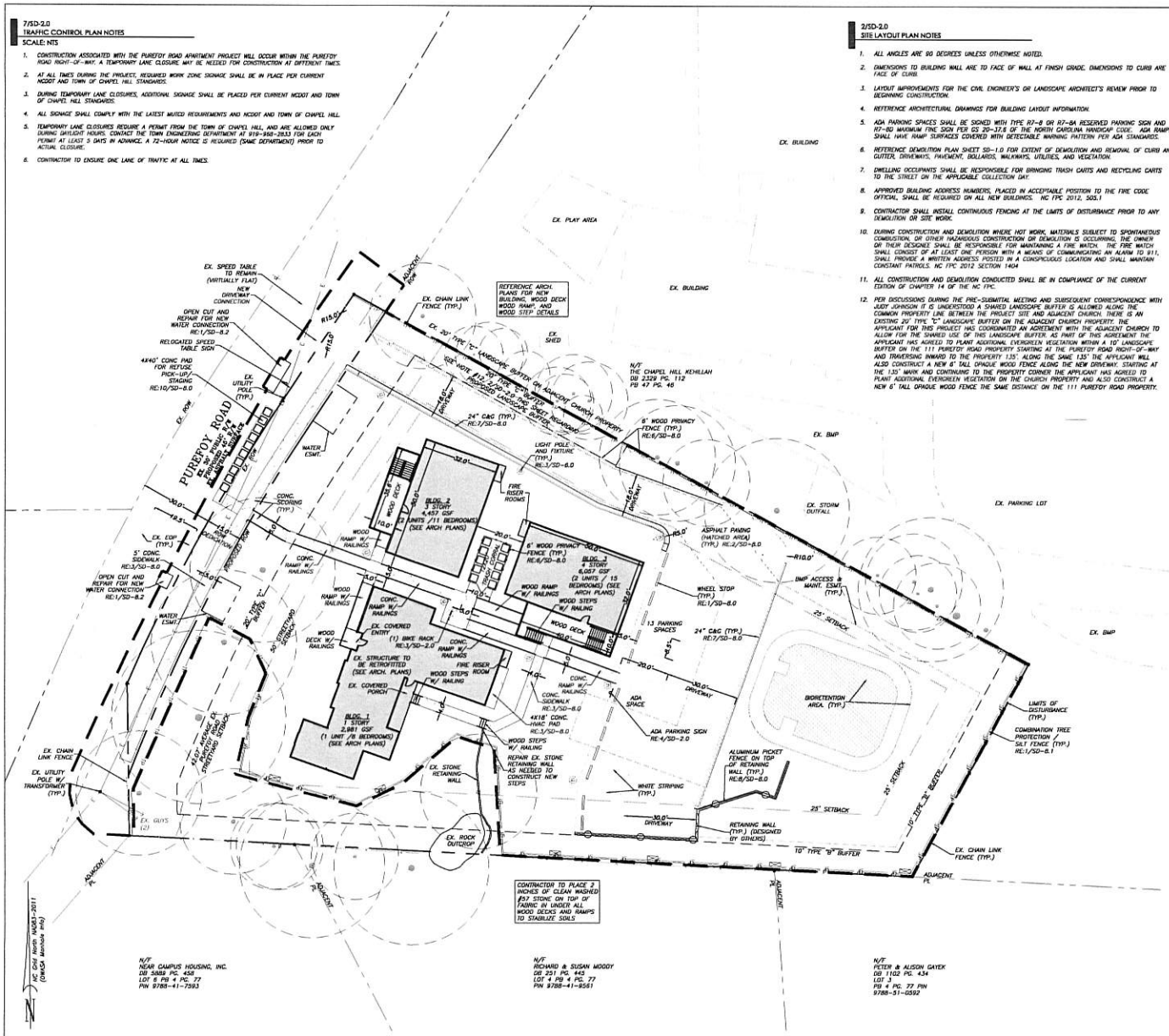
Jay Heikes, Planner
Development Services Division | Planning and Sustainability
405 Martin Luther King Jr Blvd. | Chapel Hill NC 27514

Town of Chapel Hill |
www.townofchapelhill.org<http://www.townofchapelhill.org/>
t: 919-969-5082 |
jheikes@townofchapelhill.org<mailto:jheikes@townofchapelhill.org>

PIN: 9788419609
PID: 8801003

7/SD-2.0
TRAFFIC CONTROL PLAN NOTES
SCALE: NTS

1. CONSTRUCTION ASSOCIATED WITH THE PUREFOY ROAD APARTMENT PROJECT WILL OCCUR WITHIN THE PUREFOY ROAD RIGHT-OF-WAY. A TEMPORARY LANE CLOSURE MAY BE NEEDED FOR CONSTRUCTION AT DIFFERENT TIMES.
2. AT ALL TIMES DURING THE PROJECT, REQUIRED WORK ZONE SIGNAGE SHALL BE IN PLACE PER CURRENT NCDOT AND TOWN OF CHAPEL HILL STANDARDS.
3. DURING TEMPORARY LANE CLOSURES, ADDITIONAL SIGNAGE SHALL BE PLACED PER CURRENT NCDOT AND TOWN OF CHAPEL HILL STANDARDS.
4. ALL SIGNAGE SHALL COMPLY WITH THE LATEST MUTCD REQUIREMENTS AND NCDOT AND TOWN OF CHAPEL HILL.
5. TEMPORARY LANE CLOSURES REQUIRE A PERMIT FROM THE TOWN OF CHAPEL HILL, AND ARE ALLOWED ONLY DURING DAYLIGHT HOURS. CONTACT THE TOWN ENGINEERING DEPARTMENT AT 919-968-2933 FOR EACH PERMIT AT LEAST 3 DAYS IN ADVANCE. A 72-HOUR NOTICE IS REQUIRED (SAME DEPARTMENT) PRIOR TO ACTUAL CLOSURE.
6. CONTRACTOR TO ENSURE ONE LANE OF TRAFFIC AT ALL TIMES.

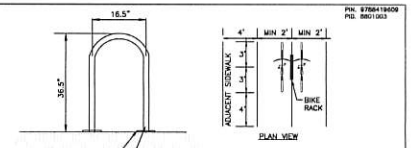


1/SD-2.0
SITE LAYOUT PLAN
SCALE: 1" = 20'

20 0 20 40 60
Scale 1" = 20'

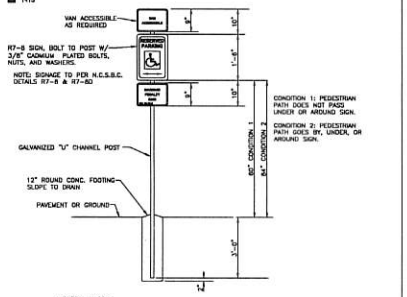
2/SD-2.0
SITE LAYOUT PLAN NOTES

1. ALL ANGLES ARE 90 DEGREES UNLESS OTHERWISE NOTED.
2. DIMENSIONS TO BUILDING WALL ARE TO FACE OF WALL AT FINISH GRADE. DIMENSIONS TO CURB ARE TO FACE OF CURB.
3. LAYOUT IMPROVEMENTS FOR THE CIVIL ENGINEER'S OR LANDSCAPE ARCHITECT'S REVIEW PRIOR TO BEGINNING CONSTRUCTION.
4. REFERENCE ARCHITECTURAL DRAWINGS FOR BUILDING LAYOUT INFORMATION.
5. ADA PARKING SPACES SHALL BE SIGNED WITH TYPE R7-8 OR R7-8A RESERVED PARKING SIGN AND R7-8G MAXIMUM FINE SIGN PER GS 20-37.6 OF THE NORTH CAROLINA HANDICAP CODE. ADA RAMPS SHALL HAVE RAMP SURFACES COVERED WITH DETECTABLE WARNING PATTERN PER ADA STANDARDS.
6. REFERENCE DEMOLITION PLAN SHEET SD-1.0 FOR EXTENT OF DEMOLITION AND REMOVAL OF CURB AND GUTTER, DRIVEWAYS, PAVEMENT, BOLLARDS, WALKWAYS, UTILITIES, AND VEGETATION.
7. DWELLING OCCUPANTS SHALL BE RESPONSIBLE FOR BRINGING TRASH CARTS AND RECYCLING CARTS TO THE STREET ON THE APPLICABLE COLLECTION DAY.
8. APPROVED BUILDING ADDRESS NUMBERS, PLACED IN ACCEPTABLE POSITION TO THE FIRE CODE OFFICIAL, SHALL BE REQUIRED ON ALL NEW BUILDINGS. NC FPC 2012, 505.1
9. CONTRACTOR SHALL INSTALL CONTINUOUS FENCING AT THE LIMITS OF DISTURBANCE PRIOR TO ANY DEMOLITION OR SITE WORK.
10. DURING CONSTRUCTION AND DEMOLITION WHERE HOT WORK, MATERIALS SUBJECT TO SPONTANEOUS COMBUSTION, OR OTHER HAZARDOUS CONSTRUCTION OR DEMOLITION IS OCCURRING, THE OWNER OR THEIR DESIGNEE SHALL BE RESPONSIBLE FOR MAINTAINING A FIRE WATCH. THE FIRE WATCH SHALL CONSIST OF AT LEAST ONE PERSON WITH A MEANS OF COMMUNICATING AN ALARM TO 911, SHALL PROVIDE A WRITTEN ADDRESS POSTED IN A CONSPICUOUS LOCATION AND SHALL MAINTAIN CONSTANT PATROLS. NC FPC 2012 SECTION 1404
11. ALL CONSTRUCTION AND DEMOLITION CONDUCTED SHALL BE IN COMPLIANCE OF THE CURRENT EDITION OF CHAPTER 14 OF THE NC FPC.
12. PER DISCUSSIONS DURING THE PRE-SUBMITTAL MEETING AND SUBSEQUENT CORRESPONDENCE WITH JUDY JOHNSON IT IS UNDERSTOOD A SHARED LANDSCAPE BUFFER IS ALLOWED ALONG THE COMMON PROPERTY LINE BETWEEN THE PROJECT SITE AND ADJACENT CHURCH. THERE IS AN EXISTING 20' TYPE 'C' LANDSCAPE BUFFER ON THE ADJACENT CHURCH PROPERTY. THE APPLICANT FOR THIS PROJECT HAS COORDINATED AN AGREEMENT WITH THE ADJACENT CHURCH TO ALLOW FOR THE SHARED USE OF THIS LANDSCAPE BUFFER. AS PART OF THIS AGREEMENT THE APPLICANT HAS AGREED TO PLANT ADDITIONAL EVERGREEN VEGETATION WITHIN A 10' LANDSCAPE BUFFER ON THE 111 PUREFOY ROAD PROPERTY STARTING AT THE PUREFOY ROAD RIGHT-OF-WAY AND TRAVERSING INWARD TO THE PROPERTY 135' ALONG THE SAME 135' THE APPLICANT WILL ALSO CONSTRUCT A NEW 6' TALL OPAQUE WOOD FENCE ALONG THE NEW DRIVEWAY. STARTING AT THE 135' MARK AND CONTINUING TO THE PROPERTY CORNER THE APPLICANT HAS AGREED TO PLANT ADDITIONAL EVERGREEN VEGETATION ON THE CHURCH PROPERTY AND ALSO CONSTRUCT A NEW 6' TALL OPAQUE WOOD FENCE THE SAME DISTANCE ON THE 111 PUREFOY ROAD PROPERTY.



NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. BIKE RACK SPACING SHALL MEET REQUIREMENTS OF THE TOWN OF CHAPEL HILL DESIGN MANUAL SECTION 4.11
3. DO NOT SCALE DRAWINGS.

3/SD-2.0
BIKE RACK DETAIL
NTS



GENERAL NOTES:
1. REGARDLESS OF AGE, ALL ACCESSIBLE SPACES SHALL BE IDENTIFIED BY ABOVE-GROUND SIGNS ONLY.
2. NEW SPACES SHALL NOT USE GROUND-PAINTED SYMBOLS.
3. ACCESSIBLE SPACES ARE REQUIRED TO BE STRIPED OFF ONLY; BLUE COLORING IS NOT NECESSARY NOR REQUIRED.
4. STRIPING IS WHITE ON DARK PAVEMENT; BLACK ON LIGHT PAVEMENT. (N.C.D.O.T.)

4/SD-2.0
ADA SIGNAGE
NTS

1. COMPLIANCE WITH THE TOWN NOISE ORDINANCE IS REQUIRED DURING CONSTRUCTION OF THIS PROJECT.
2. AN ENGINEERING CONSTRUCTION PERMIT IS REQUIRED PRIOR TO THE START OF ANY WORK IN THE PUBLIC RIGHT-OF-WAY. CONTACT LARRY TUCKER (TOWN ENGINEERING AND DESIGN SERVICES DIVISION, (919-968-5084) TO APPLY FOR THE PERMIT.
3. THERE WILL BE NO CONSTRUCTION TRAILER ON SITE. CONSTRUCTION OFFICE WILL BE LOCATED IN EX. DUPLEX ON SAME PROPERTY.
4. CONSTRUCTION PERSONNEL AND CONSTRUCTION EQUIPMENT PARKING WILL BE WITHIN THE PROPERTY LIMITS. PERSONNEL PARKING SHALL BE LOCATED WEST OF PROPOSED BLDG. #2 WITHIN EXISTING GRAVEL DRIVEWAY. ADDITIONAL OFF-SITE PARKING ARRANGEMENTS SHALL BE COORDINATED WITH THE TOWN IF DETERMINED TO BE NEEDED DURING CONSTRUCTION.
5. STAGING FOR CONSTRUCTION MATERIALS SHALL BE LOCATED WEST OF PROPOSED BLDG. #2 WITHIN THE EXISTING GRAVEL DRIVEWAY AREA.
6. EMERGENCY VEHICLE ACCESS WILL BE FROM ADJACENT ROW (PUREFOY ROAD). CONTRACTOR SHALL ENSURE ACCEPTABLE EMERGENCY VEHICLE ACCESS AT ALL TIMES DURING CONSTRUCTION.
7. DELIVERY TRUCKS SHALL DELIVER FROM ADJACENT ROW (PUREFOY ROAD).
8. CONTRACTOR TO PROVIDE CONSTRUCTION SIGNAGE AS NECESSARY ALONG PUREFOY ROAD PER LATEST NCDOT STANDARDS.
9. CONTRACTOR SHALL COORDINATE ANY REQUIRED LANE CLOSURES WITH THE TOWN OF CHAPEL HILL PRIOR TO PERFORMING WORK. CONTRACTOR TO MAINTAIN TWO WAY TRAFFIC AT ALL TIMES.
10. DURING DEMOLITION AND/OR CONSTRUCTION, ALL ASPECTS OF CHAPTER 14 OF THE NC FIRE PREVENTION SHALL BE FOLLOWED. THE OWNER/DEVELOPER SHALL DESIGNATE ONE PERSON TO BE THE FIRE PREVENTION PROGRAM SUPERINTENDENT WHO SHALL BE RESPONSIBLE FOR ENFORCING CHAPTER 14 OF THE NCFPC AND THE ON-SITE FIRE PREVENTION PROGRAM AND ENSURE THAT IT IS CARRIED OUT THROUGH COMPLETION OF THE PROJECT.
11. FIRE WATCH; DURING CONSTRUCTION AND DEMOLITION WHERE HOT WORK, MATERIALS SUBJECT TO SPONTANEOUS COMBUSTION, OR OTHER HAZARDOUS CONSTRUCTION OR DEMOLITION IS OCCURRING, THE OWNER OR THEIR DESIGNEE SHALL BE RESPONSIBLE FOR MAINTAINING A FIRE WATCH. THE FIRE WATCH SHALL CONSIST OF AT LEAST ONE PERSON WITH A MEANS OF COMMUNICATING AN ALARM TO 911, SHALL PROVIDE A WRITTEN ADDRESS POSTED IN A CONSPICUOUS LOCATION AND SHALL MAINTAIN CONSTANT PATROLS. NC FPC 2012 SECTION 1404.

5/SD-2.0
CONSTRUCTION MANAGEMENT PLAN NOTES

1. ALL EXISTING STRUCTURES 500 SQUARE FEET AND LARGER IN SIZE SHALL BE ASSESSED PRIOR TO DEMOLITION TO ENSURE COMPLIANCE WITH THE COUNTY'S REGULATED RECYCLABLE MATERIALS ORDINANCE (RRMO) AND TO ASSESS THE POTENTIAL FOR DE-CONSTRUCTION AND/OR THE RE-USE OF SALVAGEABLE MATERIALS.
2. BY ORANGE COUNTY ORDINANCE, CLEAN WOOD WASTE, SCRAP METAL, AND CORRUGATED CARDBOARD PRESENT IN CONSTRUCTION OR DEMOLITION WASTE MUST BE RECYCLED.
3. BY ORANGE COUNTY ORDINANCE, ALL HAULERS OF MIXED CONSTRUCTION AND DEMOLITION WASTE THAT INCLUDES ANY REGULATED RECYCLABLE MATERIALS SHALL BE LICENSED BY ORANGE COUNTY.
4. PRIOR TO ANY DEMOLITION OR CONSTRUCTION ACTIVITY ON THE SITE THE APPLICANT SHALL HOLD A PRE-DEMOLITION / PRE-CONSTRUCTION CONFERENCE WITH THE SOLID WASTE STAFF. THIS MAY BE THE SAME PRE-CONSTRUCTION MEETING HELD WITH OTHER DEVELOPMENT / ENFORCEMENT OFFICIALS.
5. THE PRESENCE OF ASBESTOS CONTAINING MATERIALS ("ACM") AND/OR OTHER HAZARDOUS MATERIALS IN CONSTRUCTION AND DEMOLITION WASTE SHALL BE HANDLED IN ACCORDANCE WITH ANY AND ALL LOCAL, STATE, AND FEDERAL REGULATIONS AND GUIDELINES.

6/SD-2.0
CONSTRUCTION WASTE NOTES

Coulter Jewell Thames, PA.
ENGINEERING · LAND SURVEYING · LANDSCAPE ARCHITECTURE
111 West Main Street
Durham, N.C. 27701
p 919.682.0368
f 919.688.5646
www.cjtpa.com
NC BOARD OF EXAMINERS FOR ENGINEERS AND SURVEYORS
LIC # C-1208
NC BOARD OF LANDSCAPE ARCHITECTS LIC # C-104

10-10-2014

Project
PUREFOY ROAD APARTMENTS
111 PUREFOY ROAD
CHAPEL HILL NC, 27514
ORANGE COUNTY NC

PIN: 9788419609
PID: 8801003

Job Number 1842
Drawn VTC, EB
Checked PBR, AJP
Date 10/10/2014
Revisions

SITE PLANS NOT ISSUED FOR CONSTRUCTION

Sheet Title
SITE LAYOUT PLAN

Sheet Number
SD-2.0

PUREFOY ROAD APARTMENTS

111 PUREFOY ROAD, CHAPEL HILL, NC 27514

1ST SITE PLAN SUBMITTAL: OCTOBER 10, 2016

APPLICANT / OWNER

KEN GORFKLE
1436 POINSETT DRIVE
CHAPEL HILL, NC 27717
PHONE: 919-942-1467

CONSULTANTS:

LANDSCAPE ARCHITECT:
COULTER JEWELL THAMES PA
111 WEST MAIN STREET
DURHAM, NC 27701
PHONE: 919-682-0368
CONTACT: ANDREW PORTER

CIVIL ENGINEER:
COULTER JEWELL THAMES PA
111 WEST MAIN STREET
DURHAM, NC 27701
PHONE: 919-682-0368
CONTACT: PRESTON ROYSTER

ARCHITECT:
TISE-KIESTER ARCHITECTS
119 E. FRANKLIN STREET, SUITE 300
CHAPEL HILL, NC 27514
PHONE: 919-9670158
CONTACT: PHIL KIESTER

PIN: 9788419609
PID: 8801003

PROJECT DATA

PARCEL A:
SITE ADDRESS: 111 PUREFOY ROAD, CHAPEL HILL, NC 27514

OWNER: KEN GORFKLE
OWNER ADDRESS: 1436 POINSETT DRIVE, CHAPEL HILL, NC 27717

PIN: 9788419609
PARCEL ID: 8801003
ACREAGE: 56,805.72 SF / 1.30 AC
PLAT BOOK: PB3/PG40 ORANGE CO. REG.

EXISTING LAND USE: MULTI-FAMILY RESIDENTIAL
PROPOSED LAND USE: MULTI-FAMILY RESIDENTIAL
EXISTING ZONING: R-4, MEDIUM DENSITY RESIDENTIAL, 10 UNITS / ACRE
COMP. PLAN LAND USE: MEDIUM RESIDENTIAL, 4-8 UNITS PER/AC
OVERLAYS: MASON FARMS/WHITEHEAD CIRCLE NEIGHBORHOOD CONSERVATION DISTRICT PLAN
ADOPTED PLANS: N/A
TOTAL PROJECT AREA: NET LAND AREA = 56,805.72 SF / 1.30 AC
GROSS LAND AREA = 59,610.72 SF / 1.37 AC
AREA OF DISTURBANCE: TOTAL DISTURBED AREA = 53,281 SF / 1.22 AC
ON-SITE DISTURBED AREA = 45,004 SF / 1.03 AC
RIVER BASIN: CAPE FEAR RIVER BASIN
WATERSHED OVERLAY: JORDAN LAKE WATERSHED PROTECTION DISTRICT

DESIGN STANDARDS
MIN LOT SIZE: 1 ACRE GROSS LAND AREA (NEIGHBORHOOD CONSERVATION DISTRICT)
MAXIMUM DENSITY: 10 DWELLING UNITS
MIN. LOT FRONTAGE: 40'
MIN. LOT WIDTH: 50'
MAX. BUILDING HEIGHT
PRIMARY: 30' (PER CORRESPONDENCE W/ JUDY JOHNSON)
SECONDARY: 30' (NEIGHBORHOOD CONSERVATION DISTRICT)

BUILDING SETBACKS
STREET: 50' MIN. (NEIGHBORHOOD CONSERVATION DISTRICT)
42.07' AVERAGE EX. PUREFOY ROAD STREETYARD SETBACK
INTERIOR: 25' MIN. (NEIGHBORHOOD CONSERVATION DISTRICT)
SOLAR: 9' MIN.

EXISTING BLDG. AREA: EX. BLDG #1 - 2,470 SF
PROPOSED BLDG. AREA: BLDG #1 - 2,981 GSF (1 UNIT/ 8 BEDROOMS)
BLDG #2 - 4,457 GSF (2 UNITS/ 11 BEDROOMS)
BLDG #3 - 6,057 GSF (2 UNITS/ 15 BEDROOMS)
TOTAL - 13,495 GSF (5 UNITS/ 34 BEDROOMS)

PARKING
MIN. NUMBER OF SPACES: 2 PER DWELLING UNIT
MAX. NUMBER OF SPACES: 2.50 PER DWELLING UNIT
REQUIRED: 2 X 5 DU = 10 SPACES MIN. / 2.5 X 5 DU = 13 SPACES MAX.
PROVIDED: 13 PARKING SPACES INCLUDING 1 HANDICAP VAN ACCESSIBLE SPACE

MIN. BICYCLE PARKING
REQUIRED: 1 PER 4 DWELLING UNITS
PROVIDED: 2 BICYCLE PARKING SPACE (CLASS II RACK)

LANDSCAPE BUFFERS
NORTH: R4-R4 ZONING (CHURCH) - 20' TYPE "C" LANDSCAPE BUFFER
SEE NOTE #12, 2/SD-2.0 REGARDING SHARED LANDSCAPE BUFFER
WEST: PUREFOY ROAD (COLLECTOR STREET) - 20' TYPE "C" LANDSCAPE BUFFER
SOUTH: R4-R4/R-LD1 ZONING - 10' TYPE "B" LANDSCAPE BUFFER
EAST: R4-R-LD1 ZONING - 10' TYPE "B" LANDSCAPE BUFFER

TREE PROTECTION
RE:SD-7.0 LANDSCAPE PLAN

IMPERVIOUS SURFACE
EXISTING: 5,746 SF / 0.13 AC (10.1% OF SITE)
PROPOSED: 18,942 SF / 0.43 AC (33.3% OF SITE)

RECREATION AREA AND RECREATION SPACE
MIN. RECREATION AREA: NONE REQUIRED PER PRE SUBMITTAL MEETING
MIN. RECREATION SPACE: (R-4 ZONING) 0.039 X 59,610.72 SF (GROSS) = 2,325 SF REQUIRED
PROVIDED: 0 SF, APPLICANT REQUESTING PAYMENT-IN-LIEU

PROJECT NOTES

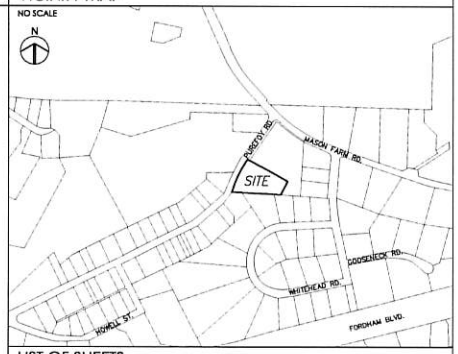
- BOUNDARY AND TOPOGRAPHIC SURVEY PROVIDED BY HOLLAND LAND SURVEYING, MAY 2016.

RESOURCE ORDINANCE COMPLIANCE

FLOODPLAIN PROTECTION: NO FLOODPLAIN AS PER REVISED PRELIMINARY FEMA MAP NUMBER 3710978800K (REVISION DATE: AUGUST 30, 2013).
STEEP SLOPE PROTECTION: SEE STEEP SLOPES ON SD-1.0 EXISTING CONDITIONS PLAN.
WETLANDS PROTECTION: THERE ARE NO WETLANDS ON THIS SITE.
STREAM BUFFERS: THERE ARE NO STREAM BUFFERS ON THIS SITE.

VICINITY MAP

NO SCALE



LIST OF SHEETS

SD-0.0	COVER SHEET
SD-0.1	AREA MAP
SD-1.0	EXISTING CONDITIONS/DEMOLITION PLAN
SD-2.0	SITE LAYOUT PLAN
SD-3.0	GRADING AND STORMWATER DRAINAGE PLAN
SD-3.1	STORMWATER DETAILS
SD-4.0	EROSION CONTROL PLAN
SD-5.0	UTILITY PLAN
SD-6.0	SITE LIGHTING PLAN
SD-7.0	LANDSCAPE PLAN
SD-8.0	SITE DETAILS
SD-8.1	EROSION CONTROL DETAILS
SD-8.2	UTILITY DETAILS
A4.11	BUILDING 1 ELEVATIONS
A4.12	BUILDING 1 ELEVATIONS
A4.2	BUILDING 2 ELEVATIONS
A4.3	BUILDING 3 ELEVATIONS

APPROVAL STAMPS

Coulter Jewell Thames PA
ENGINEERING · LAND SURVEYING · LANDSCAPE ARCHITECTURE
111 West Main Street
Durham, N.C. 27701
p 919.682.0368
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NC BOARD OF EXAMINERS FOR ENGINEERS AND SURVEYORS LIC # C-1208
NC BOARD OF LANDSCAPE ARCHITECTS LIC # C-104

10-10-2016

Project
PUREFOY ROAD APARTMENTS
111 PUREFOY ROAD
CHAPEL HILL NC, 27514
ORANGE COUNTY NC

PIN. 9788419609
PID. 8801003

Job Number 1642
Drawn MTE, ED
Checked PSR, AJP
Date 10/10/2016
Revisions

SITE PLANS NOT ISSUED FOR CONSTRUCTION

Sheet Title
COVER SHEET

Sheet Number
SD-0.0

Orange County
Solid Waste Management Plan

All development applications must provide a detailed solid waste management plan, including a recycling plan and a plan for management of construction debris. The following form must be completed to fulfill this requirement. This form must be completed and approved to satisfy the requirement of a plan for management of construction debris. Please complete all information in its entirety. Assistance in completing this form is available from the Orange County Solid Waste Staff at (919) 968-2788 x107 or x109.

COMPLETE ALL INFORMATION BELOW

(Incomplete contact information will delay plan review and approval.)

Project Name: Purefoy Road Apartments

Property ID #: 8801003 Permit: _____

Project Location: 111 Purefoy Road
Chapel Hill, NC 27717

Project Owner: Ken Garfkle

Contact Person: Ken Garfkle

Address: 1436 Poinsette Drive
Chapel Hill, NC 27717

Telephone: (919) 942 - 1467

Fax/Mobile: (N/A) ____ - _____ / (N/A) ____ - _____

Design Firm: Coulter Jewell Thames, PA

Contact Person: Andrew J. Porter, RLA

Address: 111 West main Street
Durham, NC 27701

Telephone: (919) 682 - 0368

Fax/Mobile: (919) 688 - 5646 / (N/A) ____ - _____

Date: 4/12/2017

Provide a brief description of the work to be performed under this application:

(For example: construct a new commercial building [include use/sq. ft.], apartment complex [# units], place of worship, horizontal improvements for subdivision, etc.)

conversion of existing single family home to multi-family residential (8 total bedrooms). New construction of 4 multi-family residential dwelling units consisting of two stacked duplex buildings connected at the center. (20 total bedrooms).

1. Site Preparation Wastes (landclearing, demolition, deconstruction)

During site preparation for a project the amount of waste destined for a construction waste landfill or an inert debris landfill should be minimized or diverted for reuse or recycling. Many materials can be reused, recycled, or salvaged, provided that materials are kept separate. This approach may also reduce overall project waste disposal costs. **Regulated Recyclable Materials (clean wood waste, scrap metal and corrugated cardboard) generated in Orange County must be recycled**. During demolition activities, metal and wood are often not "reasonably possible to separate" or doing so may present health and safety concerns (asbestos, lead paint, etc.). In these cases only, are regulated materials not required to be separated for recycling. Consider whether the following materials will be generated on this project, *in any quantity*, and indicate the management method(s).

☒	**1. Trees and Plant Materials:**
	No tree/plant wastes will be produced (proceed to # 2)
X	Tree waste will be salvaged as timber, mulch, or boiler fuel
X	Valuable plants will be removed for replanting
X	Landclearing and inert debris landfill (LCID)
X	Construction and demolition debris landfill (C&D)
	Other (specify):

☒	**2. Dirt, Rock, Clean Fill, Inert materials to be removed from site:**
	No inert materials will be removed from the site (proceed to # 3)
X	Site Needs Fill
	Will be hauled to site needing fill
X	Construction and demolition debris landfill (C&D)
X	Landclearing and inert debris landfill (LCID)
	Other (specify):

☒	**3. Asphalt Paving:**
X	No asphalt wastes will be produced (proceed to # 4)

	Recycled at asphalt-paving producer
	Used on or off site. Describe use:
	Disposed in an approved landfill
	Other (specify):

☒	**4. Concrete, Brick, Block, other Aggregate materials:**
	No aggregate materials will be removed from the site (proceed to # 5)

	Recycled as scrap at an aggregate producer
	Used on or off site: Describe use:
X	Construction and demolition debris landfill (C&D)
X	Landclearing and inert debris landfill (LCID)
	Other (specify):

☒	**5. Metal Scrap** (metal wastes are required by ordinance to be recycled)
	No metal waste will be produced (proceed to # 6)
	Segregated for on-site recycling collection
X	Recycle at Orange County Landfill (**no tip fee charged if kept separate**)
X	Segregated for hauling to scrap dealer by general contractor
	Segregated for hauling to scrap dealer by sub-contractor
	Certified Commingled Recycling Facility
	Other (specify):

☒	**6. Clean Wood Wastes** (clean wood wastes are required to be recycled)
	No clean wood wastes will be produced (proceed to # 7)
	Segregated for on-site recycling collection
X	Recycle at Orange County Landfill (**reduced tip fee charged if kept separate**)
X	Saved and used on future jobs
	Separated for private salvage or charity
	Certified Commingled Recycling Facility
	Other (specify):

☒	**7. Demolition/Salvage of Buildings or Structures on the Site:**
	No structure(s) will be removed (proceed to Construction Waste section)
X	Structure(s) must be removed. Please describe (include square footage for each structure): Removal of dilapidated 8 x 10', 80 SF light metal storage shed.

If any structure described above is greater than 500 ft^2, it must be assessed for deconstruction possibilities. Please call Solid Waste Staff at (919) 968-2788 x107 or x109 to arrange an assessment.

Could the structure(s) be moved from the site? YES (NO) Don't Know

Has the sale or donation of the structures been considered? YES (NO)
Please explain: dilapidated structure

How will the structure be removed otherwise?
disassembled and recycled

What is the timetable on removal of the structure(s)?
early construction after SCE measures are installed.

Are there salvageable materials (hardwood floors, fixtures, molding, that can be removed for reuse prior to demolition? YES (NO) Don't Know
If Yes, Please list (use a separate sheet if necessary):

Have, or will, these materials been offered for sale or donation? YES (NO)

2. Construction Wastes

During the construction phase there are multiple options for recycling building materials. **Regulated Recyclable Materials (clean wood waste, scrap metal and corrugated cardboard) generated in Orange County must be recycled.** Although other materials are not required to be recycled, you are highly encouraged to do so. One of the best methods of recycling is to separate the materials on the jobsite. You may also combine materials for delivery to a certified recycling facility. Specifying waste reduction/recycling practices on a project will assure better performance.

☒	**1. Clean Wood Wastes** (clean wood wastes are required by ordinance to be recycled)
	No clean wood wastes will be produced (proceed to # 2)
	Segregated for on-site recycling collection
X	Recycle at Orange County Landfill (**reduced tip fee charged if kept separate**)
X	Saved and used on future jobs
	Separated for private salvage or charity
	Certified Commingled Recycling Facility
	Other (specify):

☒	**2. Metal Scrap** (metal wastes are required by ordinance to be recycled)
	No metal waste will be produced (proceed to # 3)
	Segregated for on-site recycling collection
X	Recycle at Orange County Landfill (**no tip fee charged if kept separate**)
X	Segregated for hauling to scrap dealer by general contractor
	Segregated for hauling to scrap dealer by sub-contractor
	Certified Commingled Recycling Facility
	Other (specify):

☒	**3. Concrete, Brick, Block, other Aggregate materials:**
	No aggregate materials will be removed from the site (proceed to # 4)

	Recycled as scrap at an aggregate producer
	Used on or off site: Describe use:
X	Construction and demolition debris landfill (C&D)
X	Landclearing and inert debris landfill (LCID)
	Other (specify):

☒	**4. Corrugated Cardboard** (cardboard wastes are required to be recycled)
	No cardboard waste will be produced (proceed to # 5)
	Segregated for on-site recycling collection
X	Recycle at Orange County Landfill (**no tip fee charged if kept separate**)
	Segregated for hauling to paper dealer by general contractor
	Segregated for hauling to paper dealer by sub-contractor
	Certified Commingled Recycling Facility
	Other (specify):

☒	**5. Drywall**
	No drywall waste will be produced (proceed to # 6)

	Segregated for on-site recycling collection
	Used on site as agricultural supplement
X	Disposed in an approved landfill
	Certified Commingled Recycling Facility
	Other (specify):

☒	**6. Other Materials**
	No other wastes will be produced (proceed to # 7)

Please specify other wastes that will be produced and how they will be managed:

Plastics (including vinyl and shrink-wrap): Recycle at Orange County Landfill.
Carpet and padding: Dispose of at Orange County Landfill.
Shingles: Dispose of at Orange County Landfill.
Fixtures (sinks, tubs, lighting, etc): Recycle / dispose of at Orange County Landfill.
Other (specify):
Other (specify):
Other (specify):

7. Bulk Containers (Dumpsters)

County ordinance requires that any bulk waste container be labeled to define what materials are intended or prohibited from being deposited in them and be serially numbered. Hauling Licenses are required for vehicles greater than 9000 GVW in Orange County. Ensure that your waste haulers is licensed. You may contact Orange County Solid Waste for a list of licensees at (919) 968-2788 x107 or x109.

X	There will be one or more bulk containers at the site for construction wastes.
	Contractors will be required to remove own wastes without the use of bulk containers.
	Corral or similar system will be used.

3. Recycling After Occupancy

Depending on the eventual use of the structure, different waste materials will be produced and available for recycling. Recyclable materials must be separated into categories based on collection methods.

PLANNING REQUIREMENTS:

- **Indicate location of all bulk waste containers for refuse and recycling. Plan must show location of all containers, even if using existing refuse/recycling enclosures. Standard details/notes for any of the following are available from Orange County Solid Waste Management (919-968-2788 x107 or x109).**
- **All refuse/recycling containers are required to be on concrete pads.**
- **Provide a detailed and scaled plan of all bulk waste containers areas that show: each container labeled, required screening, lighting, overhead clearances, bollards, and concrete pad.**
- **Indicate whether refuse/recycling area will be gated. If so doors/gates will need retainers to be latched open for refuse/recycling collection.**
- **Ensure adequate collection vehicle access routes to all containers for deposit and collection. Turning radius templates are available from Orange County Solid Waste Management.**
- **Sharing of exterior recycling locations is acceptable if a joint access/shared-use agreement is filed and the deeds of all properties amended.**

☒	**Check materials that will be generated once the structure is ready for occupancy:**
X	Standard: glass bottles, metal cans, newspaper, glossy magazines, #1 plastics, #2 plastics
X	Corrugated Cardboard (not including waxed or single layer cardboard)
X	Mixed Paper: junk mail, cereal boxes
X	Office Paper: white or colored copy paper, confidential papers
	Restaurant: food wastes, cooking oil, disposable dining ware
	Other Plastics: #5, #7
	Business specific wastes (please describe):

Cardboard Recycling Requirement

Orange County Ordinance requires recyclable corrugated cardboard to be kept separate from all other refuse. All developments must provide for cardboard recycling. If the facility's garbage will be collected from a bulk container (dumpster), a second waste container is likely to be required for cardboard. Public recycling drop-off sites can accommodate a very limited amount of commercial use (no > 50 boxes per week).

X	Site Plan includes space for cardboard recycling container on Sheet # SD-2.0
X	Corrugated Cardboard will be handled in an alternate manner. Description Required: will be placed in mixed-recyclable 95 gallon roll-cart to be collected by Orange County Recycling.

☒	**Collection Type:** This project will be served by the following collection methods. **Check all that apply.**
	Exterior individual or cooperative-use bulk waste container site. May be suitable for apartment complexes, restaurants, places of worship, educational facility, office building, retail/office/restaurant combinations
	Garbage dumpster
	Garbage compactor
	Cardboard dumpster
	Cardboard compactor
X	Recycling carts for glass, cans, plastic bottles, newspaper, magazines, office paper (co-mingled)
	Cooking grease rendering container (required for any commercial kitchen facility)
	Food waste collection container (If qualify based on volume; contact OCSW staff for details of program)

X	**Standard "curbside" recycling collection.** May be suitable for single-family developments and subdivisions, including some duplex, triples, and townhome developments.

From:	Jeff Scouten
To:	Andrew Porter
Cc:	Ken Gorfkle; Daniel Jewell; Preston Royster
Subject:	RE: Purefoy Road Apartments
Date:	Wednesday, March 29, 2017 12:52:22 PM

I think 6 of each will still work.
If more are needed they can be added later.
Thanks.

Jeff Scouten
Environmental Enforcement Supervisor
Orange County Solid Waste Management
P.O. Box 17177
1207 Eubanks Road
Chapel Hill, NC 27516-7177
919-968-2788 x 107 (Office)

Pursuant to North Carolina General Statute 132, correspondence sent and received from this account is a public record and may be disclosed to third parties.

From: Andrew Porter [mailto:andrew.porter@cjtpa.com]
Sent: Wednesday, March 29, 2017 12:45 PM
To: Jeff Scouten
Cc: Ken Gorfkle; Daniel Jewell; Preston Royster
Subject: RE: Purefoy Road Apartments

Hi Jeff,

Wanted to touch base with you one more time regarding the Purefoy Road Apartment project. With continued revisions to the plans the developer has chosen to add 4 more bedrooms back since our last e-mail correspondence. We are now proposing 28 total bedrooms. Our last correspondence indicated you would like 6 carts for mixed recycling and 6 for garbage. With this new understanding of 28 total bedrooms proposed are you still ok with the 6 carts for mixed recycling and 6 for garbage?

Please let me know if you have any questions.

Thanks for your continued help.
Andy

Andy Porter, RLA
Project Manager

Coulter Jewell Thames, PA
111 West Main Street
Durham, NC 27701
phone: 919-682-0368
fax: 919-688-5646

From: Jeff Scouten [mailto:jscouten@orangecountync.gov]
Sent: Friday, January 6, 2017 1:13 PM
To: Andrew Porter <andrew.porter@cjtpa.com>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Daniel Jewell <djewell@cjtpa.com>
Subject: RE: Purefoy Road Apartments

Go with 6 for mixed recycling and 6 for garbage.

Jeff Scouten
Environmental Enforcement Supervisor
Orange County Solid Waste Management
P.O. Box 17177
1207 Eubanks Road
Chapel Hill, NC 27516-7177
919-968-2788 x 107 (Office)

Pursuant to North Carolina General Statute 132, correspondence sent and received from this account is a public record and may be disclosed to third parties.

From: Andrew Porter [mailto:andrew.porter@cjtpa.com]
Sent: Friday, January 06, 2017 11:23 AM
To: Jeff Scouten
Cc: Ken Gorfkle; Daniel Jewell
Subject: Purefoy Road Apartments

Good morning Jeff.

I wanted to touch base with you regarding the Purefoy Road Apartment project. The developer has decided to reduce the overall number of bedrooms to 24 total from the prior 34. Your below comment requests 8 trash and 8 recycling carts to serve the 34 total bedrooms. With this new understanding can you tell me how many carts you would like us to provide for the lower bedroom count?

29. *Plan Sheet SD-2.0 (Site Layout Plan): Although there are only 5 units there are a total of 34 bedrooms. As such, 5 recycling carts will not sufficiently serve this property, especially since it will be on our urban route which allows for the placement of cardboard within the carts. Please add 3 more carts (for a total of 8) and depict this on the plan. (OC Solid Waste)*

Please let me know if you have any questions.

Thanks,
Andy

Andy Porter, RLA

Project Manager

Coulter Jewell Thames, PA
111 West Main Street
Durham, NC 27701
phone: 919-682-0368
fax: 919-688-5646

Andrew Porter

From: Kumar Neppalli
Sent: Wednesday, November 30, 2016 8:50 AM
To: Andrew Porter
Cc: Ken Gorfkle; Dan Jewell; Preston Royster; Steven Epley
Subject: RE: Purefoy Road Apartments (Project 16-106)

I can process the exemption. Please send a fee of $350 payable to Town.

I am OK to leave the speed table where it is.

-----Original Message-----
From: Andrew Porter [mailto:andrew.porter@cjtpa.com]
Sent: Wednesday, November 30, 2016 8:48 AM
To: Kumar Neppalli <kneppalli@townofchapelhill.org>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Dan Jewell <djewell@cjtpa.com>; Preston Royster <proyster@cjtpa.com>; Steven Epley <SEpley@vhb.com>
Subject: RE: Purefoy Road Apartments (Project 16-106)

Kumar,

The ITE code that Steve used was - Land Use 220 - Apartment.

The project currently includes 5 multi-family dwelling units which will contain a total of 34 total bedrooms amongst the 5 units.

Please let me know if you need any other information.

Thanks,
Andy

Andy Porter, RLA
Project Manager

Coulter Jewell Thames, PA
111 West Main Street
Durham, NC 27701
phone: 919-682-0368
fax: 919-688-5646

-----Original Message-----
From: Kumar Neppalli [mailto:kneppalli@townofchapelhill.org]
Sent: Wednesday, November 30, 2016 8:22 AM
To: Andrew Porter <andrew.porter@cjtpa.com>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Dan Jewell <djewell@cjtpa.com>; Preston Royster <proyster@cjtpa.com>

Subject: RE: Purefoy Road Apartments (Project 16-106)

Hi Andrew, I need more information such as what ITE Code he used and for how many apartments etc.

-----Original Message-----
From: Andrew Porter [mailto:andrew.porter@cjtpa.com]
Sent: Wednesday, November 30, 2016 8:03 AM
To: Kumar Neppalli <kneppalli@townofchapelhill.org>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Dan Jewell <djewell@cjtpa.com>; Preston Royster <proyster@cjtpa.com>
Subject: RE: Purefoy Road Apartments (Project 16-106)

Good morning Kumar.

Steve Epley from VHB has calculated the following daily and peak hour trips for the proposed Purefoy Road Apartment project.

33 ADT
3 AM Trips (1 enter, 2 exit)
3 PM Trips (2 enter, 1 exit)

Please let me know if you need any additional information to complete this request.

Thanks,
Andy

Andy Porter, RLA
Project Manager

Coulter Jewell Thames, PA
111 West Main Street
Durham, NC 27701
phone: 919-682-0368
fax: 919-688-5646

-----Original Message-----
From: Kumar Neppalli [mailto:kneppalli@townofchapelhill.org]
Sent: Tuesday, November 29, 2016 8:54 AM
To: Andrew Porter <andrew.porter@cjtpa.com>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net>; Daniel Jewell <djewell@cjtpa.com>; Preston Royster <proyster@cjtpa.com>
Subject: Re: Purefoy Road Apartments (Project 16-106)

Can you let me know the daily and peak hour trips for these proposed apartments?

_____
From: Andrew Porter <andrew.porter@cjtpa.com>
Sent: Monday, November 28, 2016 7:08 PM
To: Kumar Neppalli
Cc: Ken Gorfkle; Daniel Jewell; Preston Royster

Subject: Purefoy Road Apartments (Project 16-106)

Kumar,

Please see e-mail below from Jay Heikes with ToCH Planning. It has been brought to our attention that we need to seek a Traffic Impact Analysis Exemption for the Purefoy Road Apartment project. Can you please take a look at our current site layout plan and cover sheet attached and let me know if you are able to grant a TIA exemption for this project?

The project site is located at 111 Purefoy road (pin: 9788419609). The current project scope is proposing five multi-family dwelling units to include 34 total bedrooms for the project.

Based on the information above are you able to grant a TIA exemption for this project? If you should need additional information to make this determination please let me know.

My next question for you is in regards to the existing striped speed table which exists in front of the proposed driveway. Are you ok with us leaving this speed table in its current location? Planning has requested we seek confirmation from Transportation. The important point to understand regarding this speed table is that the asphalt is not actually raised in this location. The speed table is simply two stripes across the existing road surface acting as a speed deterrent in this location. After driving thru this area we are of the mind that the speed table should be ok in its current location.

Please let me know your thoughts on the above.

Thanks,
Andy

Andy Porter, RLA
Project Manager

Coulter Jewell Thames, PA
111 West Main Street
Durham, NC 27701
phone: 919-682-0368
fax: 919-688-5646

From: Jay Heikes
[mailto:jheikes@townofchapelhill.org<mailto:jheikes@townofchapelhill.org>]
Sent: Wednesday, November 23, 2016 4:11 PM
To: Andrew Porter
<andrew.porter@cjtpa.com<mailto:andrew.porter@cjtpa.com>>
Cc: Ken Gorfkle <kgorfkle@bellsouth.net<mailto:kgorfkle@bellsouth.net>>;
Dan Jewell <djewell@cjtpa.com<mailto:djewell@cjtpa.com>>; Ben Hitchings
<bhitchings@townofchapelhill.org<mailto:bhitchings@townofchapelhill.org>>;
Gene Poveromo
<gpoveromo@townofchapelhill.org<mailto:gpoveromo@townofchapelhill.org>>
Subject: RE: Purefoy Road Apartments (Project 16-106)

Hi Andy,

Please see attached draft Round 1 comments on your application referenced above. Gene and Ben have not yet had a chance to review fully, but I do not expect them to change substantively. Please be advised that a Traffic Impact Analysis Exemption is required for this application. We are unable to consider this a complete application without that approval. If you have already obtained one, please send it my way. If not, please work with Kumar to obtain one.
kneppalli@townofchapelhill.org<mailto:kneppalli@townofchapelhill.org>
919-969-5093

Have a Happy Thanksgiving,

Jay

[TownSeal]

Jay Heikes, Planner
Development Services Division | Planning and Sustainability
405 Martin Luther King Jr Blvd. | Chapel Hill NC 27514

Town of Chapel Hill |
www.townofchapelhill.org<http://www.townofchapelhill.org/>
t: 919-969-5082 |
jheikes@townofchapelhill.org<mailto:jheikes@townofchapelhill.org>

Coulter | Jewell | Thames, PA

Purefoy Road Apartments

STORMWATER IMPACT STATEMENT

PIN:
9788-41-9609

NORTH CAROLINA PROFESSIONAL SEAL 35003 ENGINEER PRESTON B. ROYSTER
5/25/17

Calculations By: Preston B. Royster, PE

Coulter Jewell Thames, P.A.
111 West Main Street
Durham, NC 27701
Ph: 919-682-0368
Fax: 919-688-5646
NC Board of Engineers & Surveyors License #C-1209

Project # 1642

May 24, 2017

Project Description and Summary

The Purefoy Road Apartments Project is located at 111 Purefoy Road, Chapel Hill, NC 27514. The project involves one building addition to an existing residence, construction of two new duplexes, concrete sidewalks, and paved driveways and parking spaces. Calculations for peak discharge, runoff volume, and water quality treatment for all of the proposed improvements are provided.

The Purefoy Road Apartments site is currently zoned R-4 Medium Density Residential. Soils on the site include Appling-Urban Land Complex (hydrologic soil group B), and Wedowee (hydrologic soil group B). The proposed site is located in the Cape Fear River Basin within the Jordan Lake watershed protection district.

Per the Town of Chapel Hill stormwater ordinance, the stormwater runoff rate leaving the site under post-development conditions may not exceed the stormwater runoff rate under pre-development conditions for the 1-year, 2-year, and 25-year storms. The additional runoff volume from the pre-development to post-development conditions for the 2-year storm must also be captured on-site.

Methodology

- The Orange County Soil Survey is used to identify the soil types located on the site.
- HydroCAD software is used to calculate pre- and post-development peak flow rates and volumes for each sub-basin. HydroCAD uses the SCS TR-20 method to develop hydrographs.
- HydroCAD software is used to calculate the composite curve number for each sub-basin. HydroCAD uses the NRCS TR-55 method for calculation composite curve numbers.

Discussion of Results

Q1/Q2/Q25:

For the peak discharge calculations, the 1.3 acre site was analyzed as a single basin. An analysis point was set at the lowest point on the southern property line. Under pre-development conditions, the time of concentration for the site was calculated to be 5.0 minutes. Under post-development conditions, the minimum time of concentration, 5.0 minutes, was used. As a result of the proposed improvements, there is an increase in runoff from the 1-year, 2-year, and 25-year storms. An underground detention system is proposed to provide attenuation.

With the addition of the underground detention system, the peak flow is reduced by 21.9% for the 1-yr storm, 26.8% for the 2-yr storm, and 18.9% for the 25-yr storm. In addition, the underground detention system is designed to safely pass the 100-yr storm.

2-yr Runoff Volume:

Per the Town of Chapel Hill Design Manual, "the post-development stormwater runoff rate leaving the site shall not exceed the pre-development (existing conditions) stormwater runoff rate leaving the site for the local 1-year, 2-year, and 25-year storm events." In addition, "the post-development stormwater runoff volume leaving the site shall not exceed the pre-development (existing conditions) stormwater runoff volume leaving the site for the local 2-year frequency, 24-hour duration storm event." The stormwater runoff volume for the site under pre-development conditions was calculated to be 2,526 cf and the post-development volume was calculated to be 5,053 cf. Because there is an increase of 2,526 cf,, stormwater control measures are proposed to provide detention. The proposed underground detention system provides 2,614 cf of storage during the 2-yr storm. A 1" drawdown orifice is proposed at the bottom of the underground detention system. The drawdown time for the system is 27 hours. While this is less than the desired 2 days, a smaller orifice to increase the drawdown time is not practical due to the potential for clogging.

85% TSS Removal:

The Town of Chapel Hill Design Manual states that BMP's shall be designed to remove 85% average total suspended solids from the post-development stormwater runoff.

The proposed project results in an increase in impervious surface of approximately 14,436 sf. As a result, a BMP must be installed to treat for 85% TSS removal for the additional impervious surface added.

In order to meet this requirement, two Filterra's are proposed. The total impervious area that drains to both Filterra's is 14,490 sf. Since the amount of impervious surface draining to the Filterra's is greater than the proposed increase in impervious surface, the requirement for treating the runoff from all added impervious surface for 85% TSS removal is met.

Calculations for the Filterra's are included.

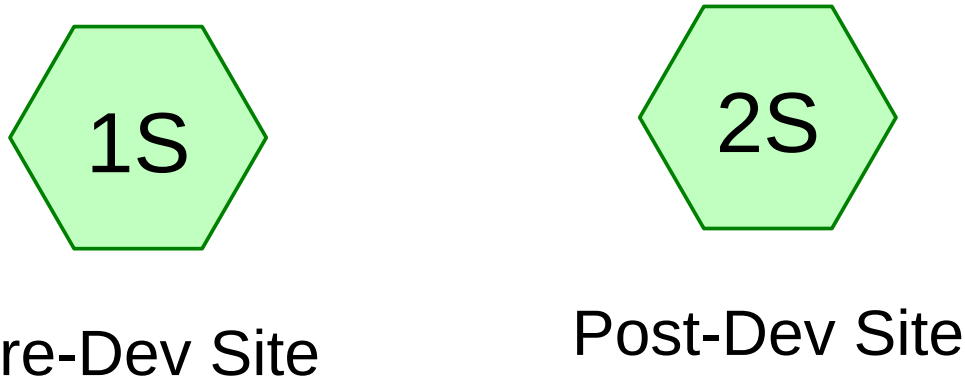
<u>Conclusion:</u>

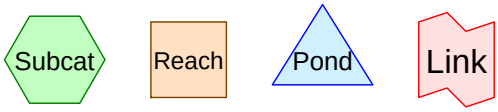
Because the increase in impervious surfaces as a result of this project resulted in an increase in peak flow for the 1-year, 2-year, and 25-year storms, and in runoff volume for the 2-year storm, detention and treatment are proposed in the form of an underground detention system and two Filterra's.

STORMWATER PEAK RUNOFF CALCULATIONS

Run-off Summary

Drainage Basin	Pre-Dev						Post-Dev						Percentage Increase			Remark
	Tc	Area	CN	Q1	Q2	Q25	Tc	Area	CN	Q1	Q2	Q25	Q1	Q2	Q25	
	min	*ac*		*cfs*	*cfs*	*cfs*	*min*	*ac*		*cfs*	*cfs*	*cfs*	*%*	*%*	*%*	
Site	5.0	1.30	62	0.73	1.27	4.88	5.0	1.30	73	1.96	2.74	7.23	168.5	115.7	48.2	DETENTION REQUIRED
To Detention							5.0	0.47	91	0.04	0.06	2.16				
Bypass Detention							5.0	0.83	63	0.53	0.89	3.25				
Combined Hydrograph								1.30		0.57	0.93	3.96	-21.9	-26.8	-18.9	





Drainage Diagram for STORM STUDY - 1642
Prepared by {enter your company name here}, Printed 5/24/2017
HydroCAD® 9.00 s/n 02109 © 2009 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Pre-Dev Site

[49] Hint: Tc<2dt may require smaller dt

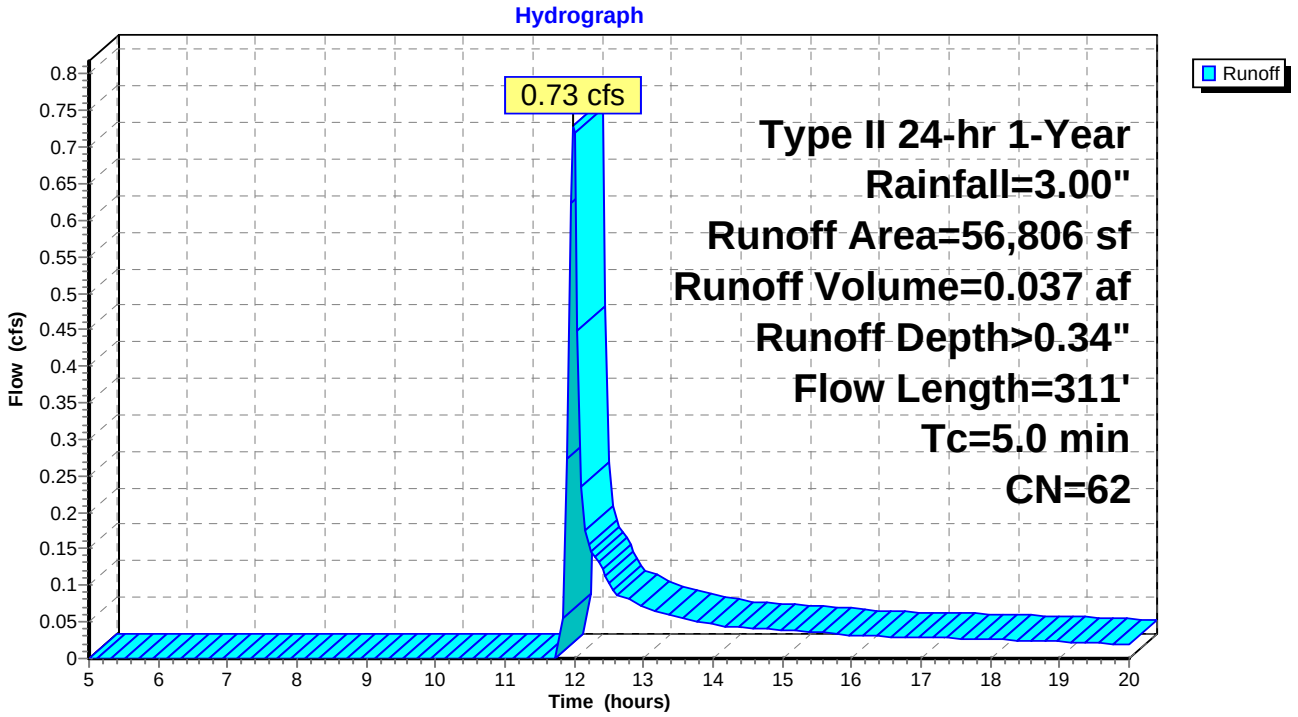
Runoff = 0.73 cfs @ 11.99 hrs, Volume= 0.037 af, Depth> 0.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
5,744	98	Paved parking, HSG B
23,611	55	Woods, Good, HSG B
27,451	61	>75% Grass cover, Good, HSG B
56,806	62	Weighted Average
51,062		89.89% Pervious Area
5,744		10.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	11	0.0900	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.8	79	0.0630	1.68	0.19	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 7.0 & 15.0 '/' Top.W=2.20' n= 0.030
0.9	106	0.0940	2.06	0.52	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 25.0 '/' Top.W=5.00' n= 0.030
1.3	115	0.0480	1.47	0.29	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 20.0 '/' Top.W=4.00' n= 0.030
1.1					**Direct Entry, Adjust to Minimum Tc**
5.0	311	Total			

Subcatchment 1S: Pre-Dev Site



Summary for Subcatchment 2S: Post-Dev Site

[49] Hint: Tc<2dt may require smaller dt

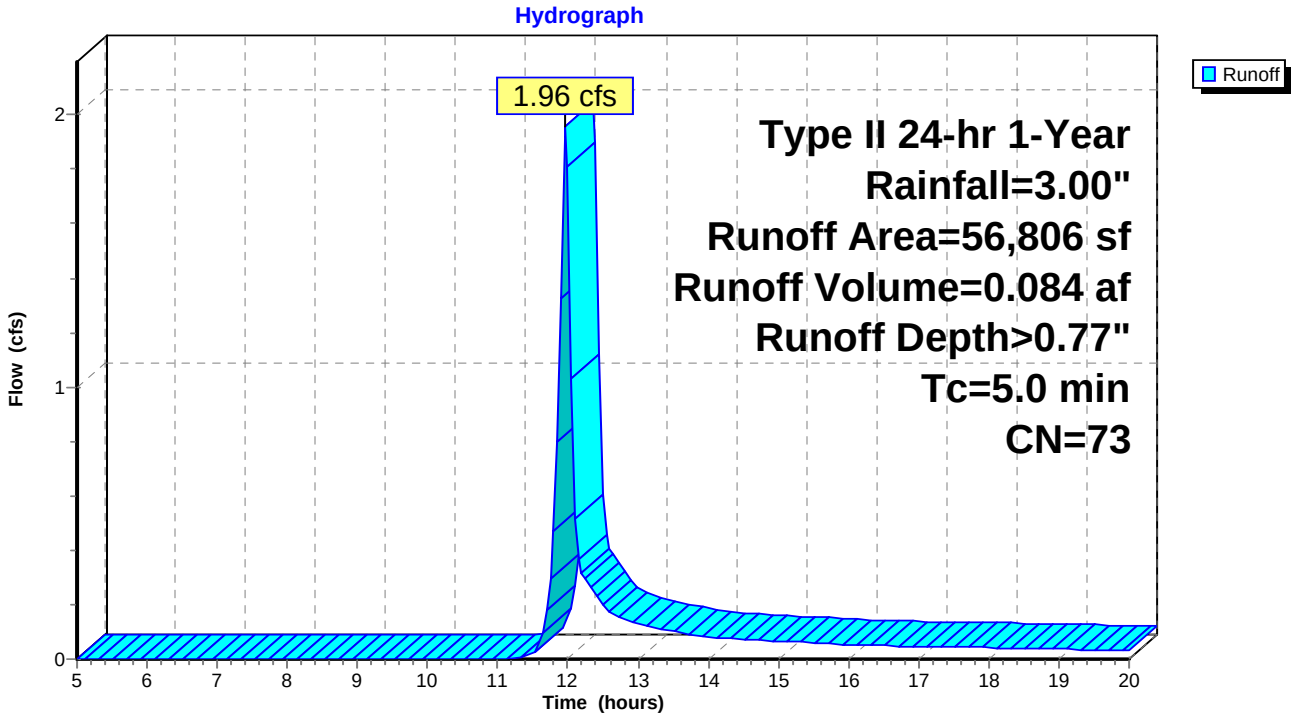
Runoff = 1.96 cfs @ 11.97 hrs, Volume= 0.084 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
20,180	98	Paved parking, HSG B
8,702	55	Woods, Good, HSG B
27,924	61	>75% Grass cover, Good, HSG B
56,806	73	Weighted Average
36,626		64.48% Pervious Area
20,180		35.52% Impervious Area

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

Subcatchment 2S: Post-Dev Site



Summary for Subcatchment 1S: Pre-Dev Site

[49] Hint: Tc<2dt may require smaller dt

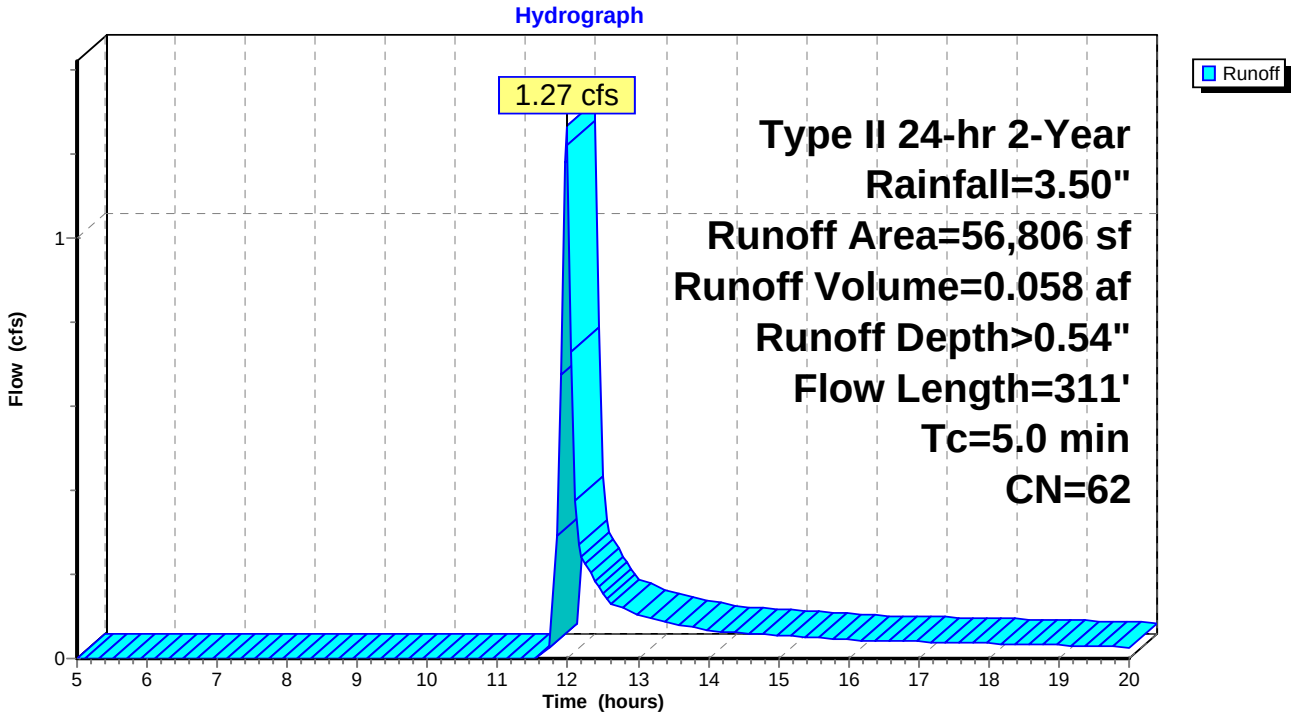
Runoff = 1.27 cfs @ 11.98 hrs, Volume= 0.058 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
5,744	98	Paved parking, HSG B
23,611	55	Woods, Good, HSG B
27,451	61	>75% Grass cover, Good, HSG B
56,806	62	Weighted Average
51,062		89.89% Pervious Area
5,744		10.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	11	0.0900	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.8	79	0.0630	1.68	0.19	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 7.0 & 15.0 '/' Top.W=2.20' n= 0.030
0.9	106	0.0940	2.06	0.52	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 25.0 '/' Top.W=5.00' n= 0.030
1.3	115	0.0480	1.47	0.29	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 20.0 '/' Top.W=4.00' n= 0.030
1.1					**Direct Entry, Adjust to Minimum Tc**
5.0	311	Total			

Subcatchment 1S: Pre-Dev Site



Summary for Subcatchment 2S: Post-Dev Site

[49] Hint: Tc<2dt may require smaller dt

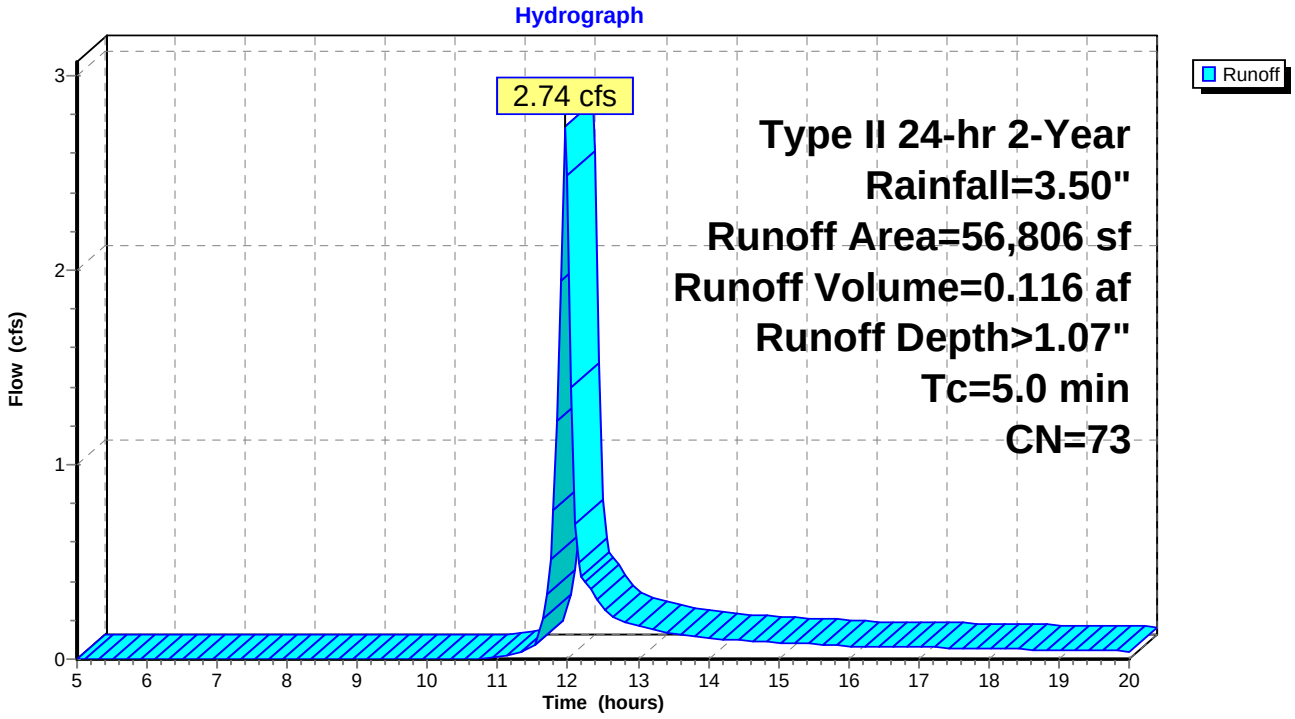
Runoff = 2.74 cfs @ 11.96 hrs, Volume= 0.116 af, Depth> 1.07"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
20,180	98	Paved parking, HSG B
8,702	55	Woods, Good, HSG B
27,924	61	>75% Grass cover, Good, HSG B
56,806	73	Weighted Average
36,626		64.48% Pervious Area
20,180		35.52% Impervious Area

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

Subcatchment 2S: Post-Dev Site



Summary for Subcatchment 1S: Pre-Dev Site

[49] Hint: Tc<2dt may require smaller dt

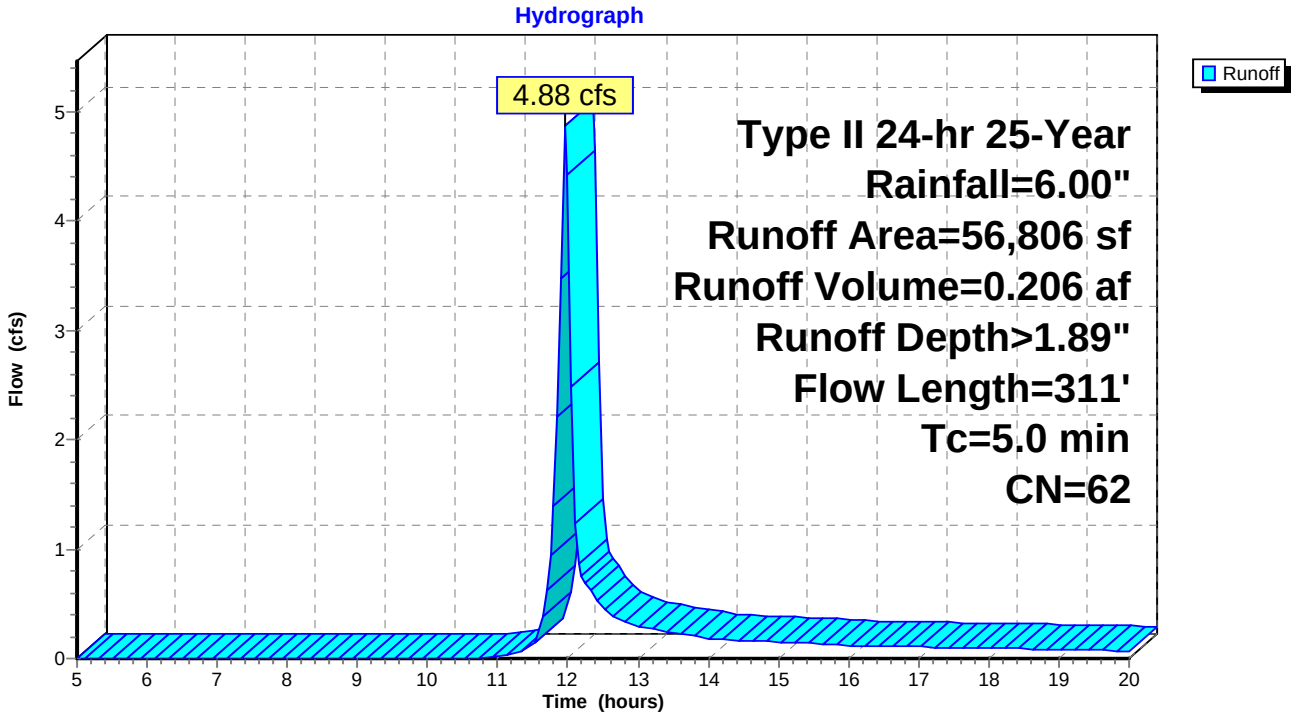
Runoff = 4.88 cfs @ 11.96 hrs, Volume= 0.206 af, Depth> 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
5,744	98	Paved parking, HSG B
23,611	55	Woods, Good, HSG B
27,451	61	>75% Grass cover, Good, HSG B
56,806	62	Weighted Average
51,062		89.89% Pervious Area
5,744		10.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	11	0.0900	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.8	79	0.0630	1.68	0.19	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 7.0 & 15.0 '/' Top.W=2.20' n= 0.030
0.9	106	0.0940	2.06	0.52	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 25.0 '/' Top.W=5.00' n= 0.030
1.3	115	0.0480	1.47	0.29	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 20.0 '/' Top.W=4.00' n= 0.030
1.1					**Direct Entry, Adjust to Minimum Tc**
5.0	311	Total			

Subcatchment 1S: Pre-Dev Site



Summary for Subcatchment 2S: Post-Dev Site

[49] Hint: Tc<2dt may require smaller dt

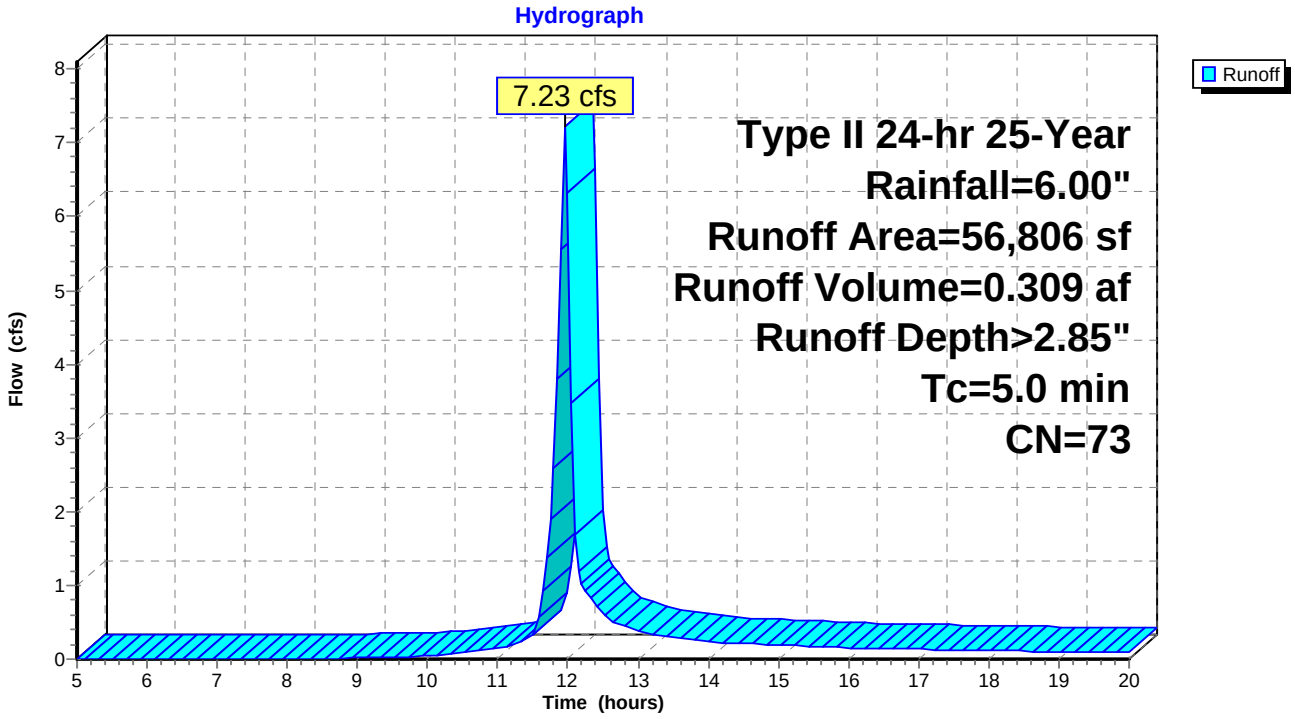
Runoff = 7.23 cfs @ 11.96 hrs, Volume= 0.309 af, Depth> 2.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=6.00"

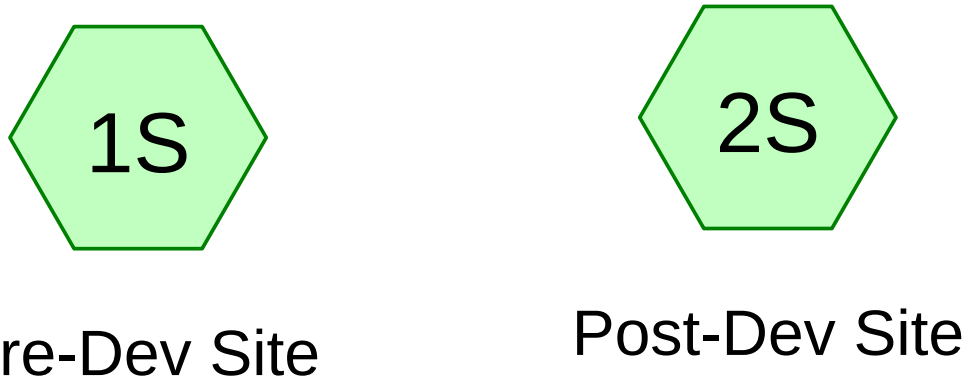
Area (sf)	CN	Description
20,180	98	Paved parking, HSG B
8,702	55	Woods, Good, HSG B
27,924	61	>75% Grass cover, Good, HSG B
56,806	73	Weighted Average
36,626		64.48% Pervious Area
20,180		35.52% Impervious Area

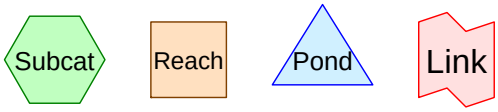
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry, Minimum Tc**

Subcatchment 2S: Post-Dev Site



STORMWATER VOLUME CALCULATIONS (2-YR STORM)





Drainage Diagram for STORM STUDY - 1642
Prepared by {enter your company name here}, Printed 5/24/2017
HydroCAD® 9.00 s/n 02109 © 2009 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Pre-Dev Site

[49] Hint: Tc<2dt may require smaller dt

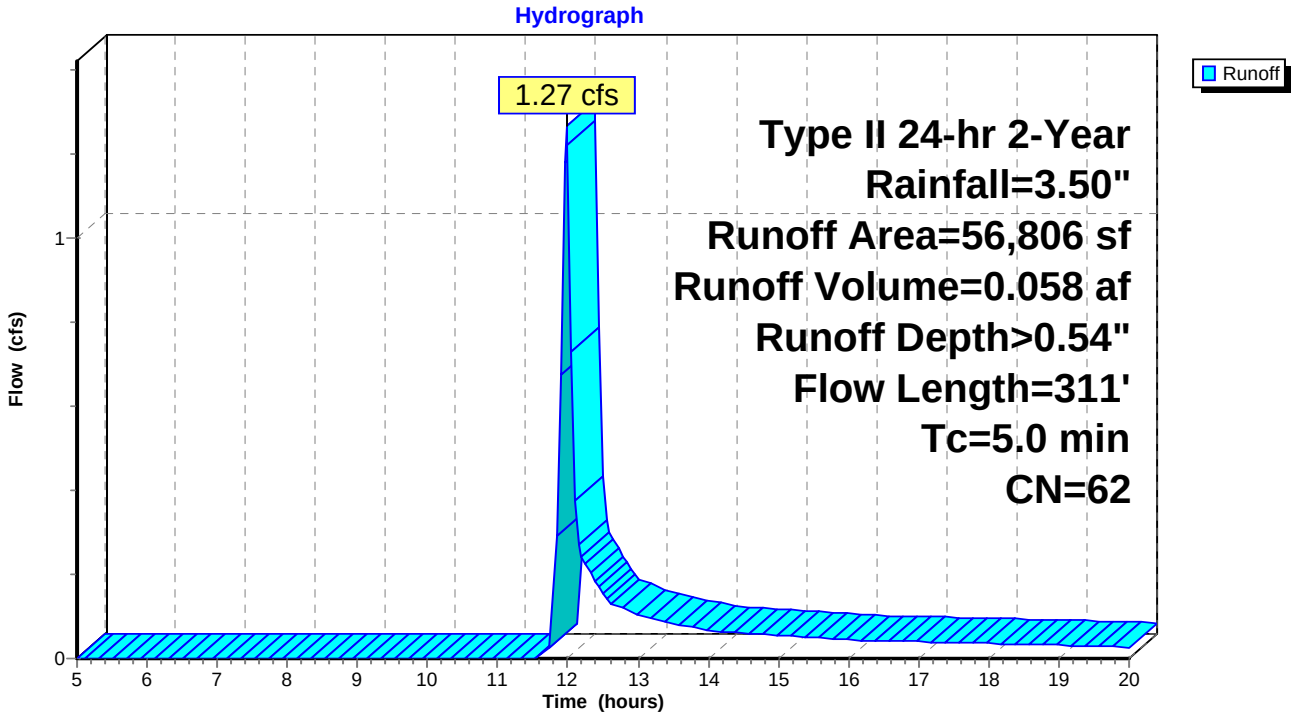
Runoff = 1.27 cfs @ 11.98 hrs, Volume= 0.058 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
5,744	98	Paved parking, HSG B
23,611	55	Woods, Good, HSG B
27,451	61	>75% Grass cover, Good, HSG B
56,806	62	Weighted Average
51,062		89.89% Pervious Area
5,744		10.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	11	0.0900	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.50"
0.8	79	0.0630	1.68	0.19	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 7.0 & 15.0 '/' Top.W=2.20' n= 0.030
0.9	106	0.0940	2.06	0.52	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 25.0 '/' Top.W=5.00' n= 0.030
1.3	115	0.0480	1.47	0.29	**Trap/Vee/Rect Channel Flow,** Bot.W=0.00' D=0.10' Z= 20.0 '/' Top.W=4.00' n= 0.030
1.1					**Direct Entry, Adjust to Minimum Tc**
5.0	311	Total			

Subcatchment 1S: Pre-Dev Site



Summary for Subcatchment 2S: Post-Dev Site

[49] Hint: Tc<2dt may require smaller dt

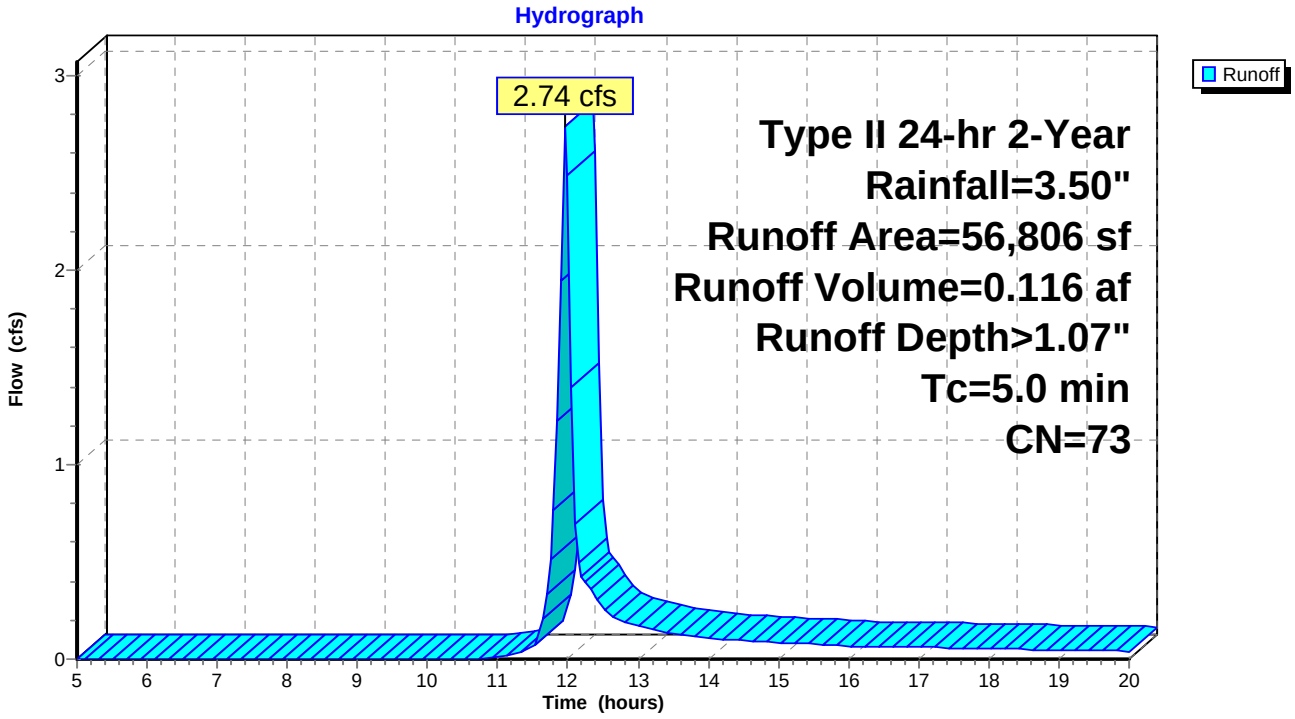
Runoff = 2.74 cfs @ 11.96 hrs, Volume= 0.116 af, Depth> 1.07"

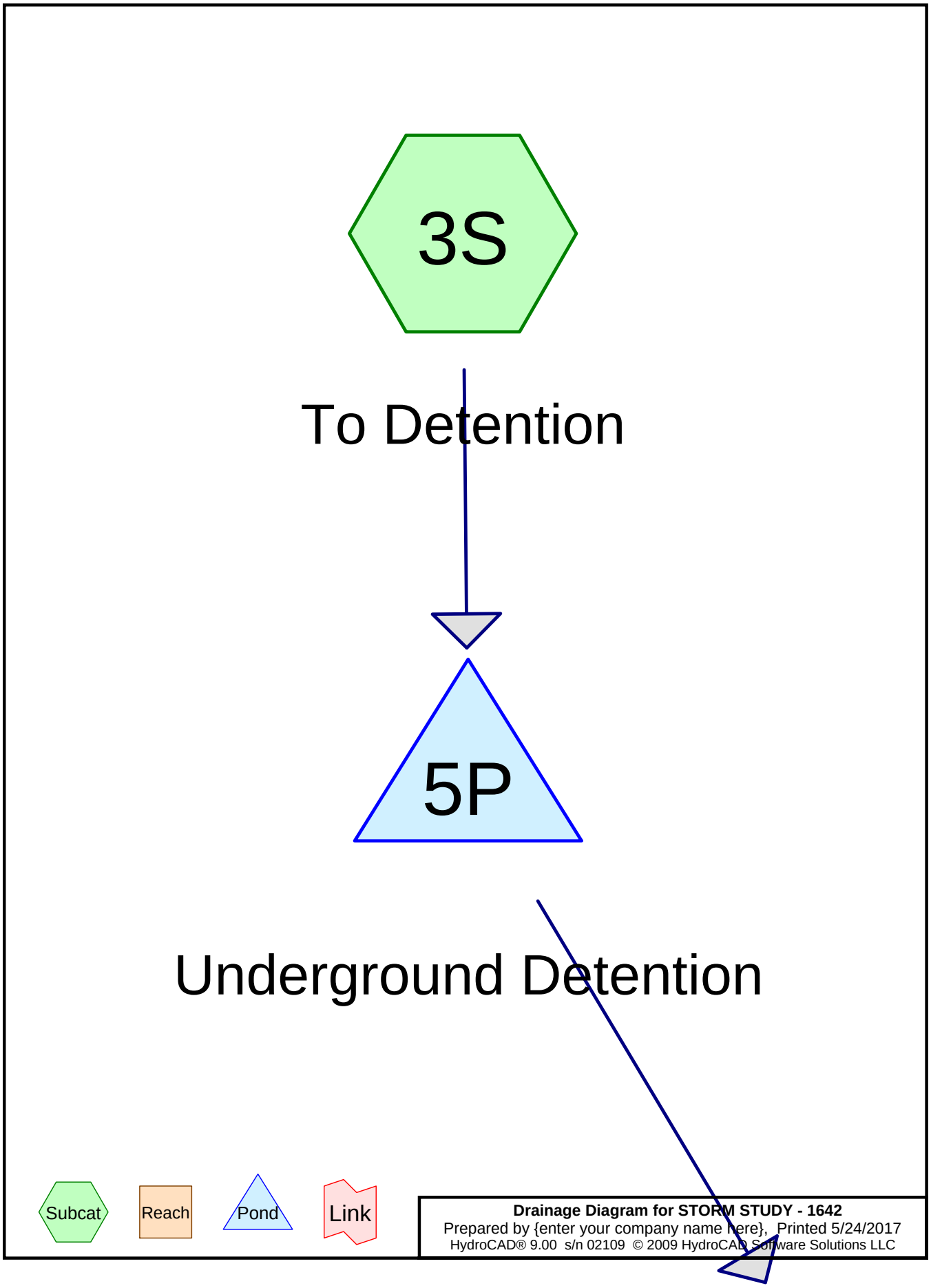
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
20,180	98	Paved parking, HSG B
8,702	55	Woods, Good, HSG B
27,924	61	>75% Grass cover, Good, HSG B
56,806	73	Weighted Average
36,626		64.48% Pervious Area
20,180		35.52% Impervious Area

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

Subcatchment 2S: Post-Dev Site





Drainage Diagram for STORM STUDY - 1642
Prepared by {enter your company name here}, Printed 5/24/2017
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Summary for Subcatchment 3S: To Detention

[49] Hint: Tc<2dt may require smaller dt

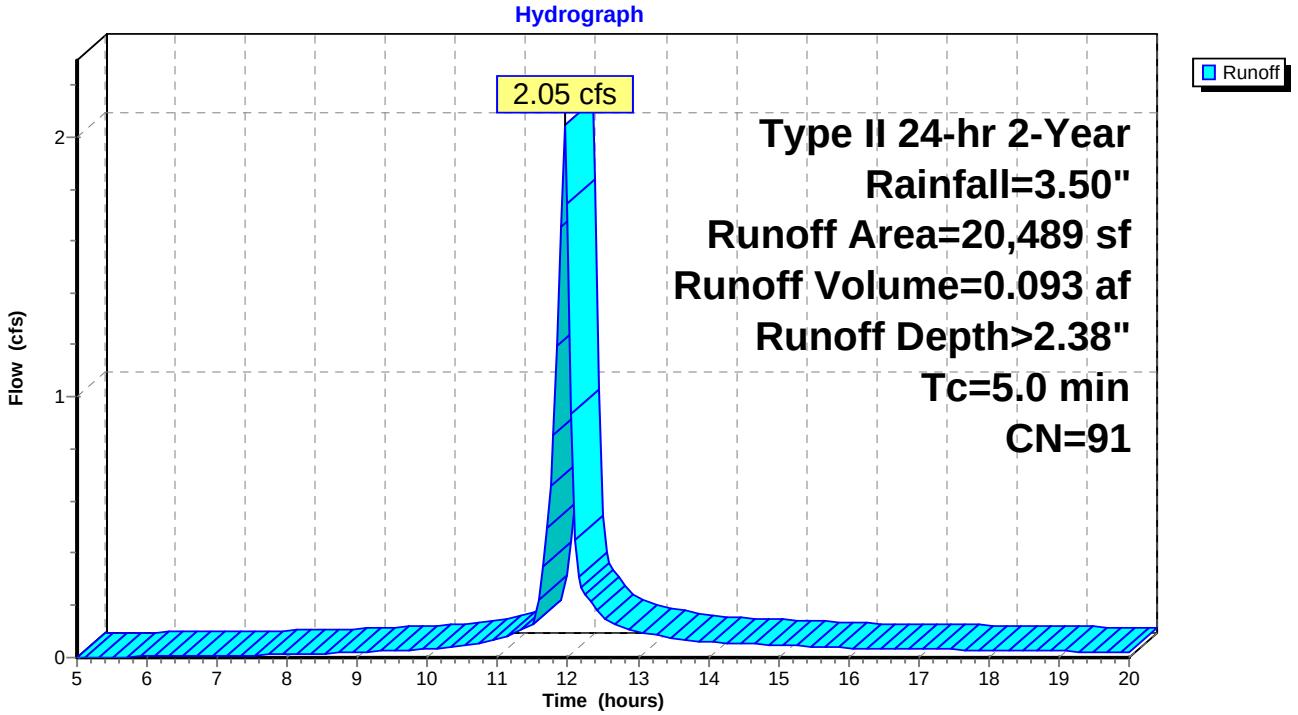
Runoff = 2.05 cfs @ 11.95 hrs, Volume= 0.093 af, Depth> 2.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
16,800	98	Paved parking, HSG B
3,689	61	>75% Grass cover, Good, HSG B
20,489	91	Weighted Average
3,689		18.00% Pervious Area
16,800		82.00% Impervious Area

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

Subcatchment 3S: To Detention



Summary for Pond 5P: Underground Detention

Inflow Area = 0.470 ac, 82.00% Impervious, Inflow Depth > 2.38" for 2-Year event
Inflow = 2.05 cfs @ 11.95 hrs, Volume= 0.093 af
Outflow = 0.06 cfs @ 13.87 hrs, Volume= 0.041 af, Atten= 97%, Lag= 114.8 min
Primary = 0.06 cfs @ 13.87 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 423.67' @ 13.87 hrs Surf.Area= 0.022 ac Storage= 0.060 af

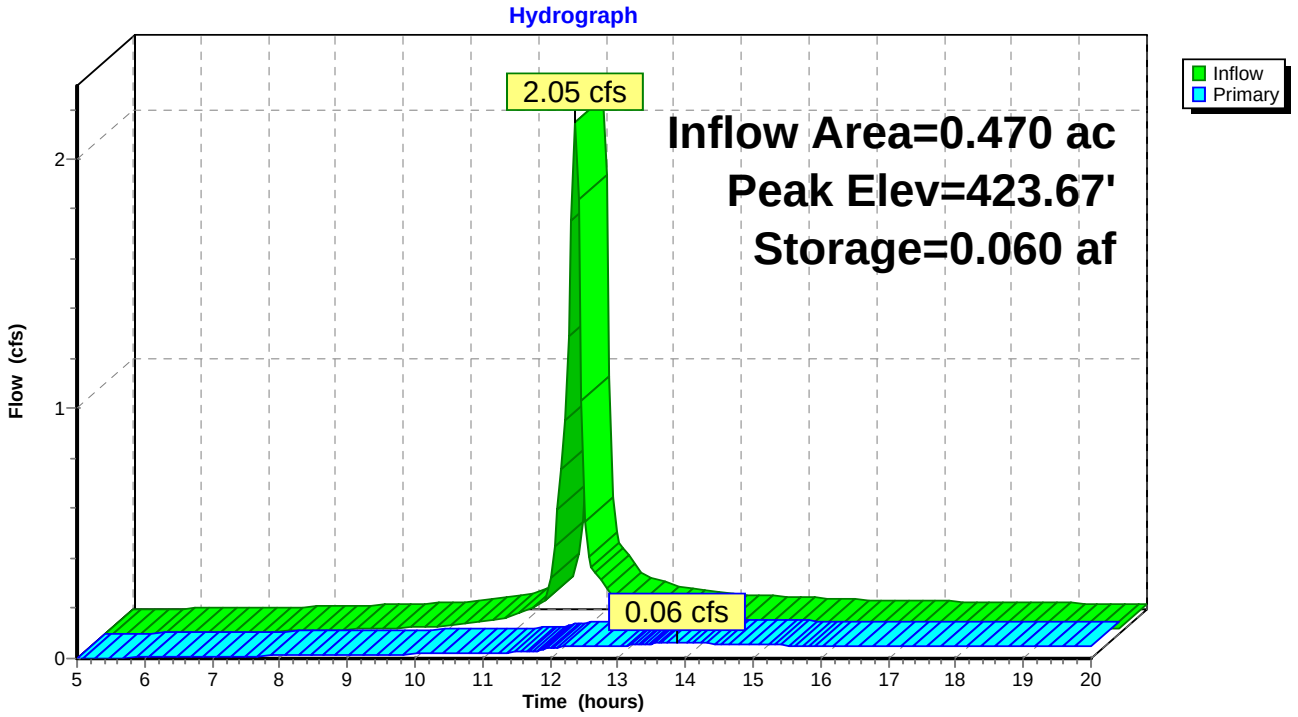
Plug-Flow detention time= 208.6 min calculated for 0.041 af (44% of inflow)
Center-of-Mass det. time= 123.6 min (883.3 - 759.7)

Volume	Invert	Avail.Storage	Storage Description
#1	420.40'	0.090 af	**60.0" D x 50.0'L Pipe Storage S= 0.0050 '/'** x 4

Device	Routing	Invert	Outlet Devices
#1	Primary	420.20'	**18.0" Round Culvert** L= 14.0' RCP, square edge headwall, Ke= 0.500 Outlet Invert= 420.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections
#2	Device 1	420.20'	**1.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	423.60'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	425.00'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.06 cfs @ 13.87 hrs HW=423.67' (Free Discharge)
└─**1=Culvert** (Passes 0.06 cfs of 14.02 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 8.91 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.88 fps)
  └─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Underground Detention



Hydrograph for Pond 5P: Underground Detention

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
5.00	0.00	0.000	420.40	0.00
5.10	0.00	0.000	420.41	0.00
5.20	0.00	0.000	420.41	0.00
5.30	0.00	0.000	420.41	0.00
5.40	0.00	0.000	420.41	0.00
5.50	0.00	0.000	420.41	0.00
5.60	0.00	0.000	420.41	0.00
5.70	0.00	0.000	420.41	0.00
5.80	0.00	0.000	420.41	0.00
5.90	0.00	0.000	420.42	0.00
6.00	0.00	0.000	420.42	0.00
6.10	0.00	0.000	420.42	0.00
6.20	0.00	0.000	420.42	0.00
6.30	0.01	0.000	420.42	0.01
6.40	0.01	0.000	420.42	0.01
6.50	0.01	0.000	420.43	0.01
6.60	0.01	0.000	420.43	0.01
6.70	0.01	0.000	420.43	0.01
6.80	0.01	0.000	420.43	0.01
6.90	0.01	0.000	420.43	0.01
7.00	0.01	0.000	420.43	0.01
7.10	0.01	0.000	420.44	0.01
7.20	0.01	0.000	420.44	0.01
7.30	0.01	0.000	420.44	0.01
7.40	0.01	0.000	420.44	0.01
7.50	0.01	0.000	420.44	0.01
7.60	0.01	0.000	420.44	0.01
7.70	0.01	0.000	420.45	0.01
7.80	0.01	0.000	420.45	0.01
7.90	0.01	0.000	420.45	0.01
8.00	0.01	0.000	420.45	0.01
8.10	0.01	0.000	420.45	0.01
8.20	0.01	0.000	420.46	0.01
8.30	0.01	0.000	420.47	0.01
8.40	0.02	0.000	420.48	0.01
8.50	0.02	0.000	420.50	0.01
8.60	0.02	0.000	420.51	0.01
8.70	0.02	0.000	420.52	0.01
8.80	0.02	0.000	420.54	0.01
8.90	0.02	0.000	420.56	0.01
9.00	0.02	0.000	420.57	0.02
9.10	0.02	0.000	420.58	0.02
9.20	0.02	0.000	420.60	0.02
9.30	0.02	0.000	420.61	0.02
9.40	0.02	0.001	420.62	0.02
9.50	0.02	0.001	420.63	0.02
9.60	0.03	0.001	420.64	0.02
9.70	0.03	0.001	420.66	0.02
9.80	0.03	0.001	420.67	0.02
9.90	0.03	0.001	420.68	0.02
10.00	0.03	0.001	420.70	0.02
10.10	0.04	0.001	420.71	0.02
10.20	0.04	0.001	420.73	0.02

Hydrograph for Pond 5P: Underground Detention (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
10.30	0.04	0.002	420.75	0.02
10.40	0.04	0.002	420.77	0.02
10.50	0.05	0.002	420.79	0.02
10.60	0.05	0.002	420.81	0.02
10.70	0.05	0.002	420.84	0.02
10.80	0.06	0.003	420.87	0.02
10.90	0.07	0.003	420.90	0.02
11.00	0.07	0.003	420.93	0.02
11.10	0.08	0.004	420.96	0.02
11.20	0.09	0.004	421.00	0.02
11.30	0.10	0.005	421.04	0.02
11.40	0.11	0.006	421.09	0.02
11.50	0.13	0.006	421.14	0.02
11.60	0.22	0.008	421.22	0.03
11.70	0.50	0.010	421.38	0.03
11.80	0.86	0.016	421.67	0.03
11.90	**1.66**	0.025	422.15	0.04
12.00	**1.74**	0.041	422.83	0.04
12.10	0.45	0.049	423.18	0.05
12.20	0.27	0.051	423.28	0.05
12.30	0.23	0.053	423.36	0.05
12.40	0.19	0.054	423.41	0.05
12.50	0.16	0.055	423.46	0.05
12.60	0.13	0.056	423.50	0.05
12.70	0.12	0.057	423.53	0.05
12.80	0.11	0.057	423.55	0.05
12.90	0.11	0.058	423.58	0.05
13.00	0.10	0.058	423.60	0.05
13.10	0.09	0.058	423.61	0.05
13.20	0.09	0.059	423.63	0.05
13.30	0.08	0.059	423.64	0.06
13.40	0.08	0.059	423.65	0.06
13.50	0.08	0.059	423.66	0.06
13.60	0.07	0.060	423.66	0.06
13.70	0.07	0.060	423.66	0.06
13.80	0.07	**0.060**	**423.67**	**0.06**
13.90	0.06	**0.060**	**423.67**	**0.06**
14.00	0.06	0.060	423.67	0.06
14.10	0.06	0.060	423.66	0.06
14.20	0.06	0.060	423.66	0.06
14.30	0.05	0.059	423.66	0.06
14.40	0.05	0.059	423.66	0.06
14.50	0.05	0.059	423.66	0.06
14.60	0.05	0.059	423.65	0.06
14.70	0.05	0.059	423.65	0.06
14.80	0.05	0.059	423.65	0.06
14.90	0.05	0.059	423.65	0.06
15.00	0.05	0.059	423.64	0.06
15.10	0.05	0.059	423.64	0.05
15.20	0.05	0.059	423.64	0.05
15.30	0.04	0.059	423.63	0.05
15.40	0.04	0.059	423.63	0.05
15.50	0.04	0.059	423.62	0.05

Peak Elevation at 13.80 hrs

Hydrograph for Pond 5P: Underground Detention (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
15.60	0.04	0.059	423.62	0.05
15.70	0.04	0.059	423.62	0.05
15.80	0.04	0.058	423.61	0.05
15.90	0.04	0.058	423.61	0.05
16.00	0.04	0.058	423.60	0.05
16.10	0.04	0.058	423.60	0.05
16.20	0.04	0.058	423.59	0.05
16.30	0.03	0.058	423.59	0.05
16.40	0.03	0.058	423.59	0.05
16.50	0.03	0.058	423.58	0.05
16.60	0.03	0.058	423.57	0.05
16.70	0.03	0.057	423.57	0.05
16.80	0.03	0.057	423.56	0.05
16.90	0.03	0.057	423.56	0.05
17.00	0.03	0.057	423.55	0.05
17.10	0.03	0.057	423.55	0.05
17.20	0.03	0.057	423.54	0.05
17.30	0.03	0.057	423.54	0.05
17.40	0.03	0.057	423.53	0.05
17.50	0.03	0.056	423.52	0.05
17.60	0.03	0.056	423.52	0.05
17.70	0.03	0.056	423.51	0.05
17.80	0.03	0.056	423.50	0.05
17.90	0.03	0.056	423.50	0.05
18.00	0.03	0.056	423.49	0.05
18.10	0.03	0.056	423.48	0.05
18.20	0.03	0.055	423.48	0.05
18.30	0.03	0.055	423.47	0.05
18.40	0.03	0.055	423.46	0.05
18.50	0.03	0.055	423.45	0.05
18.60	0.03	0.055	423.45	0.05
18.70	0.03	0.055	423.44	0.05
18.80	0.03	0.054	423.43	0.05
18.90	0.02	0.054	423.42	0.05
19.00	0.02	0.054	423.41	0.05
19.10	0.02	0.054	423.41	0.05
19.20	0.02	0.054	423.40	0.05
19.30	0.02	0.053	423.39	0.05
19.40	0.02	0.053	423.38	0.05
19.50	0.02	0.053	423.37	0.05
19.60	0.02	0.053	423.36	0.05
19.70	0.02	0.053	423.35	0.05
19.80	0.02	0.052	423.35	0.05
19.90	0.02	0.052	423.34	0.05
20.00	0.02	0.052	423.33	0.05
20.10	0.02	0.052	423.32	0.05
20.20	0.02	0.052	423.31	0.05
20.30	0.02	0.051	423.30	0.05
20.40	0.02	0.051	423.29	0.05
20.50	0.02	0.051	423.28	0.05
20.60	0.02	0.051	423.27	0.05
20.70	0.02	0.051	423.26	0.05
20.80	0.02	0.050	423.25	0.05

Hydrograph for Pond 5P: Underground Detention (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
20.90	0.02	0.050	423.24	0.05
21.00	0.02	0.050	423.23	0.05
21.10	0.02	0.050	423.22	0.05
21.20	0.02	0.049	423.22	0.05
21.30	0.02	0.049	423.21	0.05
21.40	0.02	0.049	423.20	0.05
21.50	0.02	0.049	423.19	0.05
21.60	0.02	0.049	423.18	0.05
21.70	0.02	0.048	423.17	0.04
21.80	0.02	0.048	423.16	0.04
21.90	0.02	0.048	423.15	0.04
22.00	0.02	0.048	423.14	0.04
22.10	0.02	0.048	423.13	0.04
22.20	0.02	0.047	423.12	0.04
22.30	0.02	0.047	423.11	0.04
22.40	0.02	0.047	423.10	0.04
22.50	0.02	0.047	423.09	0.04
22.60	0.02	0.046	423.08	0.04
22.70	0.02	0.046	423.08	0.04
22.80	0.02	0.046	423.07	0.04
22.90	0.02	0.046	423.06	0.04
23.00	0.02	0.046	423.05	0.04
23.10	0.02	0.045	423.04	0.04
23.20	0.02	0.045	423.03	0.04
23.30	0.02	0.045	423.02	0.04
23.40	0.02	0.045	423.01	0.04
23.50	0.02	0.045	423.00	0.04
23.60	0.02	0.044	422.99	0.04
23.70	0.02	0.044	422.98	0.04
23.80	0.02	0.044	422.97	0.04
23.90	0.02	0.044	422.96	0.04
24.00	0.02	0.043	422.95	0.04
24.10	0.00	0.043	422.94	0.04
24.20	0.00	0.043	422.93	0.04
24.30	0.00	0.042	422.91	0.04
24.40	0.00	0.042	422.90	0.04
24.50	0.00	0.042	422.88	0.04
24.60	0.00	0.041	422.87	0.04
24.70	0.00	0.041	422.85	0.04
24.80	0.00	0.041	422.84	0.04
24.90	0.00	0.040	422.82	0.04
25.00	0.00	0.040	422.81	0.04
25.10	0.00	0.040	422.79	0.04
25.20	0.00	0.039	422.77	0.04
25.30	0.00	0.039	422.76	0.04
25.40	0.00	0.039	422.74	0.04
25.50	0.00	0.038	422.73	0.04
25.60	0.00	0.038	422.71	0.04
25.70	0.00	0.038	422.70	0.04
25.80	0.00	0.037	422.68	0.04
25.90	0.00	0.037	422.67	0.04
26.00	0.00	0.037	422.65	0.04
26.10	0.00	0.036	422.64	0.04

Hydrograph for Pond 5P: Underground Detention (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
26.20	0.00	0.036	422.63	0.04
26.30	0.00	0.036	422.61	0.04
26.40	0.00	0.035	422.60	0.04
26.50	0.00	0.035	422.58	0.04
26.60	0.00	0.035	422.57	0.04
26.70	0.00	0.034	422.55	0.04
26.80	0.00	0.034	422.54	0.04
26.90	0.00	0.034	422.52	0.04
27.00	0.00	0.033	422.51	0.04
27.10	0.00	0.033	422.49	0.04
27.20	0.00	0.033	422.48	0.04
27.30	0.00	0.032	422.46	0.04
27.40	0.00	0.032	422.45	0.04
27.50	0.00	0.032	422.44	0.04
27.60	0.00	0.031	422.42	0.04
27.70	0.00	0.031	422.41	0.04
27.80	0.00	0.031	422.39	0.04
27.90	0.00	0.030	422.38	0.04
28.00	0.00	0.030	422.36	0.04
28.10	0.00	0.030	422.35	0.04
28.20	0.00	0.029	422.34	0.04
28.30	0.00	0.029	422.32	0.04
28.40	0.00	0.029	422.31	0.04
28.50	0.00	0.029	422.29	0.04
28.60	0.00	0.028	422.28	0.04
28.70	0.00	0.028	422.26	0.04
28.80	0.00	0.028	422.25	0.04
28.90	0.00	0.027	422.24	0.04
29.00	0.00	0.027	422.22	0.04
29.10	0.00	0.027	422.21	0.04
29.20	0.00	0.026	422.19	0.04
29.30	0.00	0.026	422.18	0.04
29.40	0.00	0.026	422.17	0.04
29.50	0.00	0.025	422.15	0.04
29.60	0.00	0.025	422.14	0.04
29.70	0.00	0.025	422.12	0.04
29.80	0.00	0.025	422.11	0.04
29.90	0.00	0.024	422.10	0.04
30.00	0.00	0.024	422.08	0.04
30.10	0.00	0.024	422.07	0.04
30.20	0.00	0.023	422.05	0.04
30.30	0.00	0.023	422.04	0.04
30.40	0.00	0.023	422.03	0.04
30.50	0.00	0.023	422.01	0.03
30.60	0.00	0.022	422.00	0.03
30.70	0.00	0.022	421.99	0.03
30.80	0.00	0.022	421.97	0.03
30.90	0.00	0.021	421.96	0.03
31.00	0.00	0.021	421.94	0.03
31.10	0.00	0.021	421.93	0.03
31.20	0.00	0.021	421.92	0.03
31.30	0.00	0.020	421.90	0.03
31.40	0.00	0.020	421.89	0.03

Hydrograph for Pond 5P: Underground Detention (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
31.50	0.00	0.020	421.88	0.03
31.60	0.00	0.019	421.86	0.03
31.70	0.00	0.019	421.85	0.03
31.80	0.00	0.019	421.84	0.03
31.90	0.00	0.019	421.82	0.03
32.00	0.00	0.018	421.81	0.03
32.10	0.00	0.018	421.79	0.03
32.20	0.00	0.018	421.78	0.03
32.30	0.00	0.017	421.77	0.03
32.40	0.00	0.017	421.75	0.03
32.50	0.00	0.017	421.74	0.03
32.60	0.00	0.017	421.73	0.03
32.70	0.00	0.016	421.71	0.03
32.80	0.00	0.016	421.70	0.03
32.90	0.00	0.016	421.69	0.03
33.00	0.00	0.016	421.67	0.03
33.10	0.00	0.015	421.66	0.03
33.20	0.00	0.015	421.65	0.03
33.30	0.00	0.015	421.63	0.03
33.40	0.00	0.015	421.62	0.03
33.50	0.00	0.014	421.61	0.03
33.60	0.00	0.014	421.59	0.03
33.70	0.00	0.014	421.58	0.03
33.80	0.00	0.014	421.57	0.03
33.90	0.00	0.013	421.55	0.03
34.00	0.00	0.013	421.54	0.03
34.10	0.00	0.013	421.53	0.03
34.20	0.00	0.013	421.51	0.03
34.30	0.00	0.012	421.50	0.03
34.40	0.00	0.012	421.49	0.03
34.50	0.00	0.012	421.47	0.03
34.60	0.00	0.012	421.46	0.03
34.70	0.00	0.011	421.45	0.03
34.80	0.00	0.011	421.43	0.03
34.90	0.00	0.011	421.42	0.03
35.00	0.00	0.011	421.41	0.03
35.10	0.00	0.010	421.39	0.03
35.20	0.00	0.010	421.38	0.03
35.30	0.00	0.010	421.36	0.03
35.40	0.00	0.010	421.35	0.03
35.50	0.00	0.010	421.34	0.03
35.60	0.00	0.009	421.32	0.03
35.70	0.00	0.009	421.31	0.03
35.80	0.00	0.009	421.30	0.03
35.90	0.00	0.009	421.28	0.03
36.00	0.00	0.008	421.27	0.03
36.10	0.00	0.008	421.26	0.03
36.20	0.00	0.008	421.24	0.03
36.30	0.00	0.008	421.23	0.03
36.40	0.00	0.008	421.22	0.03
36.50	0.00	0.007	421.20	0.03
36.60	0.00	0.007	421.19	0.03
36.70	0.00	0.007	421.18	0.03

Hydrograph for Pond 5P: Underground Detention (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
36.80	0.00	0.007	421.16	0.03
36.90	0.00	0.007	421.15	0.03
37.00	0.00	0.006	421.14	0.02
37.10	0.00	0.006	421.12	0.02
37.20	0.00	0.006	421.11	0.02
37.30	0.00	0.006	421.09	0.02
37.40	0.00	0.006	421.08	0.02
37.50	0.00	0.005	421.07	0.02
37.60	0.00	0.005	421.05	0.02
37.70	0.00	0.005	421.04	0.02
37.80	0.00	0.005	421.02	0.02
37.90	0.00	0.005	421.01	0.02
38.00	0.00	0.004	421.00	0.02
38.10	0.00	0.004	420.98	0.02
38.20	0.00	0.004	420.97	0.02
38.30	0.00	0.004	420.95	0.02
38.40	0.00	0.004	420.94	0.02
38.50	0.00	0.003	420.93	0.02
38.60	0.00	0.003	420.91	0.02
38.70	0.00	0.003	420.90	0.02
38.80	0.00	0.003	420.88	0.02
38.90	0.00	0.003	420.87	0.02
39.00	0.00	0.003	420.85	0.02
39.10	0.00	0.002	420.84	0.02
39.20	0.00	0.002	420.82	0.02
39.30	0.00	0.002	420.81	0.02
39.40	0.00	0.002	420.79	0.02
39.50	0.00	0.002	420.77	0.02
39.60	0.00	0.002	420.76	0.02
39.70	0.00	0.001	420.74	0.02
39.80	0.00	0.001	420.72	0.02
39.90	0.00	0.001	420.71	0.02
40.00	0.00	0.001	420.69	0.02
40.10	0.00	0.001	420.67	0.02
40.20	0.00	0.001	420.65	0.02
40.30	0.00	0.001	420.63	0.02
40.40	0.00	0.000	420.60	0.02
40.50	0.00	0.000	420.57	0.02
40.60	0.00	0.000	420.54	0.01
40.70	0.00	0.000	420.48	0.01
40.80	0.00	0.000	420.40	0.00
40.90	0.00	0.000	420.40	0.00
41.00	0.00	0.000	420.40	0.00
41.10	0.00	0.000	420.40	0.00
41.20	0.00	0.000	420.40	0.00
41.30	0.00	0.000	420.40	0.00
41.40	0.00	0.000	420.40	0.00
41.50	0.00	0.000	420.40	0.00
41.60	0.00	0.000	420.40	0.00
41.70	0.00	0.000	420.40	0.00
41.80	0.00	0.000	420.40	0.00
41.90	0.00	0.000	420.40	0.00
42.00	0.00	0.000	420.40	0.00

System empty at 40.80 hrs
Drawdown Time = 27 hrs

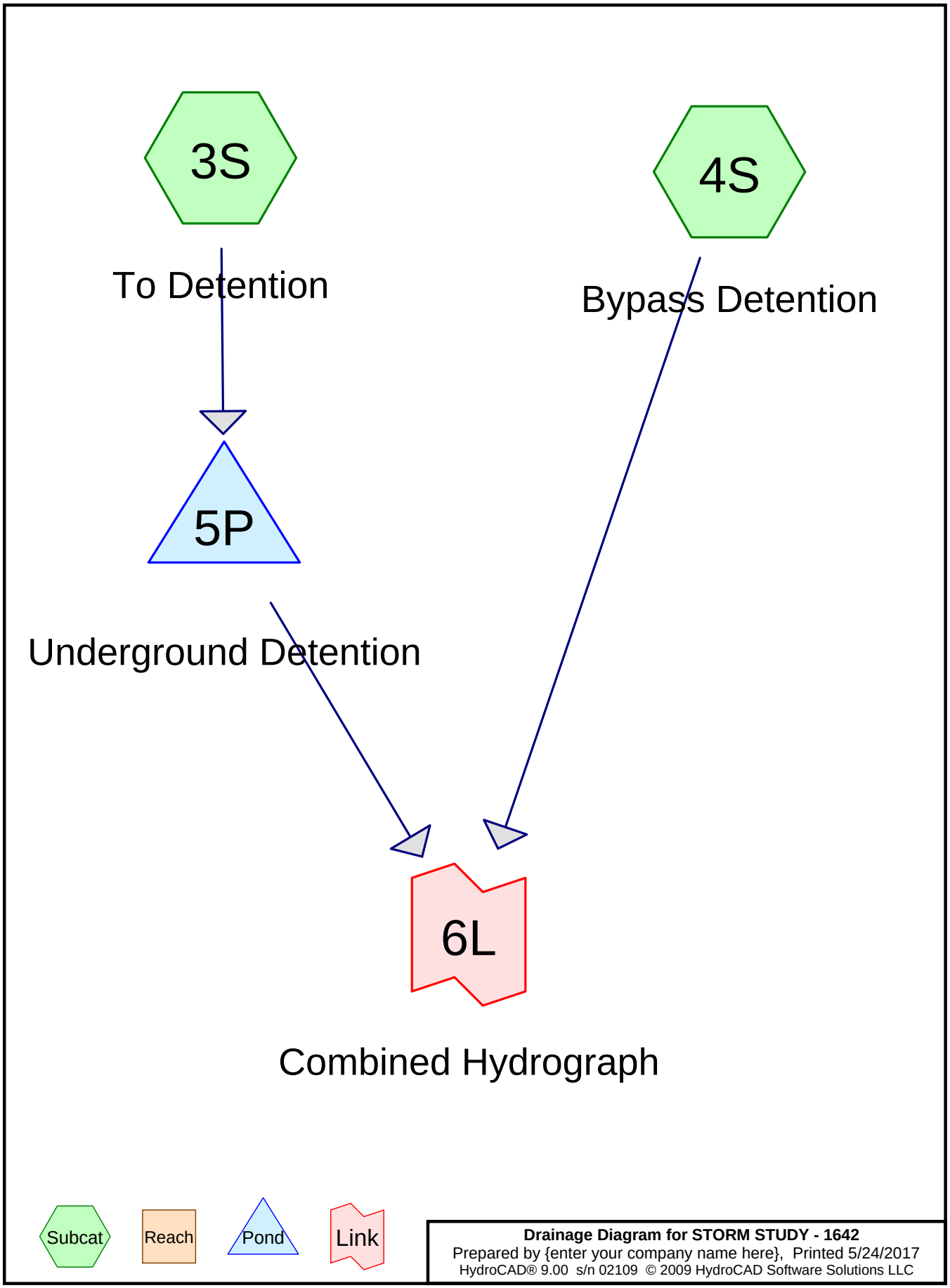
Hydrograph for Pond 5P: Underground Detention (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
42.10	0.00	0.000	420.40	0.00
42.20	0.00	0.000	420.40	0.00
42.30	0.00	0.000	420.40	0.00
42.40	0.00	0.000	420.40	0.00
42.50	0.00	0.000	420.40	0.00
42.60	0.00	0.000	420.40	0.00
42.70	0.00	0.000	420.40	0.00
42.80	0.00	0.000	420.40	0.00
42.90	0.00	0.000	420.40	0.00
43.00	0.00	0.000	420.40	0.00
43.10	0.00	0.000	420.40	0.00
43.20	0.00	0.000	420.40	0.00
43.30	0.00	0.000	420.40	0.00
43.40	0.00	0.000	420.40	0.00
43.50	0.00	0.000	420.40	0.00
43.60	0.00	0.000	420.40	0.00
43.70	0.00	0.000	420.40	0.00
43.80	0.00	0.000	420.40	0.00
43.90	0.00	0.000	420.40	0.00
44.00	0.00	0.000	420.40	0.00
44.10	0.00	0.000	420.40	0.00
44.20	0.00	0.000	420.40	0.00
44.30	0.00	0.000	420.40	0.00
44.40	0.00	0.000	420.40	0.00
44.50	0.00	0.000	420.40	0.00
44.60	0.00	0.000	420.40	0.00
44.70	0.00	0.000	420.40	0.00
44.80	0.00	0.000	420.40	0.00
44.90	0.00	0.000	420.40	0.00
45.00	0.00	0.000	420.40	0.00
45.10	0.00	0.000	420.40	0.00
45.20	0.00	0.000	420.40	0.00
45.30	0.00	0.000	420.40	0.00
45.40	0.00	0.000	420.40	0.00
45.50	0.00	0.000	420.40	0.00
45.60	0.00	0.000	420.40	0.00
45.70	0.00	0.000	420.40	0.00
45.80	0.00	0.000	420.40	0.00
45.90	0.00	0.000	420.40	0.00
46.00	0.00	0.000	420.40	0.00
46.10	0.00	0.000	420.40	0.00
46.20	0.00	0.000	420.40	0.00
46.30	0.00	0.000	420.40	0.00
46.40	0.00	0.000	420.40	0.00
46.50	0.00	0.000	420.40	0.00
46.60	0.00	0.000	420.40	0.00
46.70	0.00	0.000	420.40	0.00
46.80	0.00	0.000	420.40	0.00
46.90	0.00	0.000	420.40	0.00
47.00	0.00	0.000	420.40	0.00
47.10	0.00	0.000	420.40	0.00
47.20	0.00	0.000	420.40	0.00
47.30	0.00	0.000	420.40	0.00

Hydrograph for Pond 5P: Underground Detention (continued)

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
47.40	0.00	0.000	420.40	0.00
47.50	0.00	0.000	420.40	0.00
47.60	0.00	0.000	420.40	0.00
47.70	0.00	0.000	420.40	0.00
47.80	0.00	0.000	420.40	0.00
47.90	0.00	0.000	420.40	0.00
48.00	0.00	0.000	420.40	0.00
48.10	0.00	0.000	420.40	0.00
48.20	0.00	0.000	420.40	0.00
48.30	0.00	0.000	420.40	0.00
48.40	0.00	0.000	420.40	0.00
48.50	0.00	0.000	420.40	0.00
48.60	0.00	0.000	420.40	0.00
48.70	0.00	0.000	420.40	0.00
48.80	0.00	0.000	420.40	0.00
48.90	0.00	0.000	420.40	0.00
49.00	0.00	0.000	420.40	0.00
49.10	0.00	0.000	420.40	0.00
49.20	0.00	0.000	420.40	0.00
49.30	0.00	0.000	420.40	0.00
49.40	0.00	0.000	420.40	0.00
49.50	0.00	0.000	420.40	0.00
49.60	0.00	0.000	420.40	0.00
49.70	0.00	0.000	420.40	0.00
49.80	0.00	0.000	420.40	0.00
49.90	0.00	0.000	420.40	0.00
50.00	0.00	0.000	420.40	0.00

UNDERGROUND DETENTION CALCULATIONS



Drainage Diagram for STORM STUDY - 1642
Prepared by {enter your company name here}, Printed 5/24/2017
HydroCAD® 9.00 s/n 02109 © 2009 HydroCAD Software Solutions LLC

Summary for Subcatchment 3S: To Detention

[49] Hint: Tc<2dt may require smaller dt

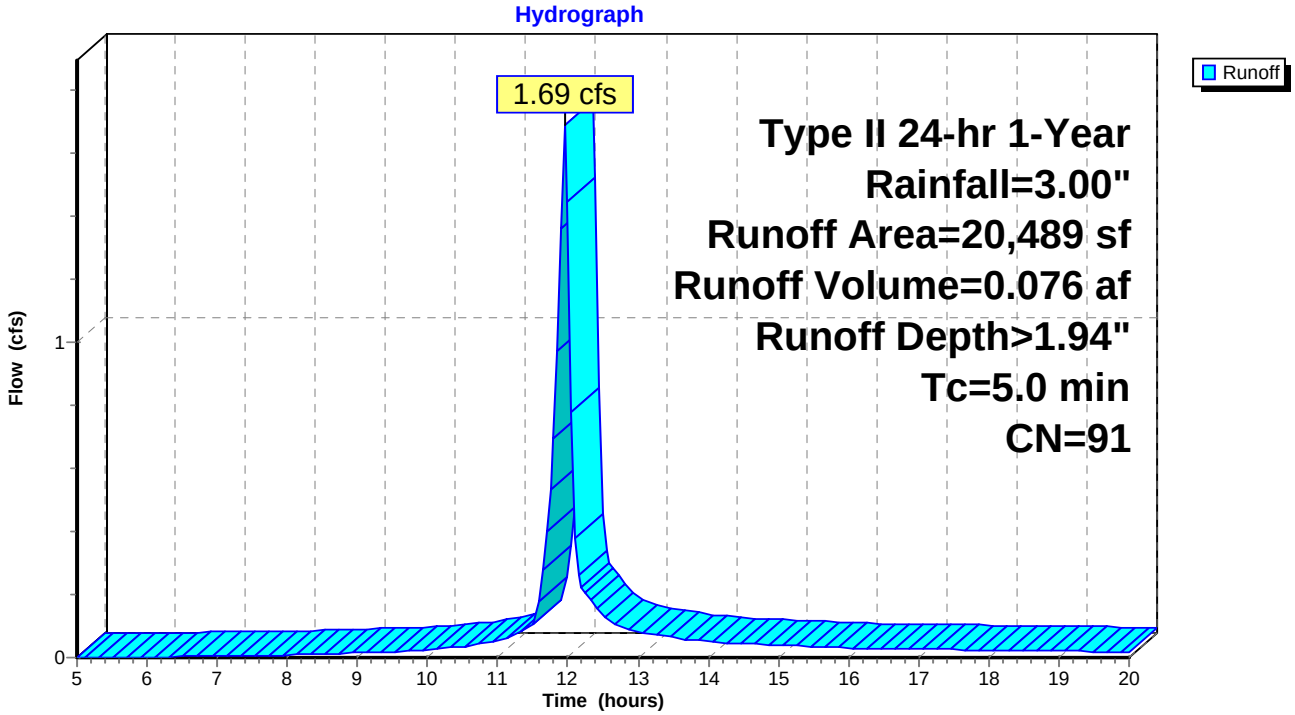
Runoff = 1.69 cfs @ 11.95 hrs, Volume= 0.076 af, Depth> 1.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
16,800	98	Paved parking, HSG B
3,689	61	>75% Grass cover, Good, HSG B
20,489	91	Weighted Average
3,689		18.00% Pervious Area
16,800		82.00% Impervious Area

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

Subcatchment 3S: To Detention



Summary for Subcatchment 4S: Bypass Detention

[49] Hint: Tc<2dt may require smaller dt

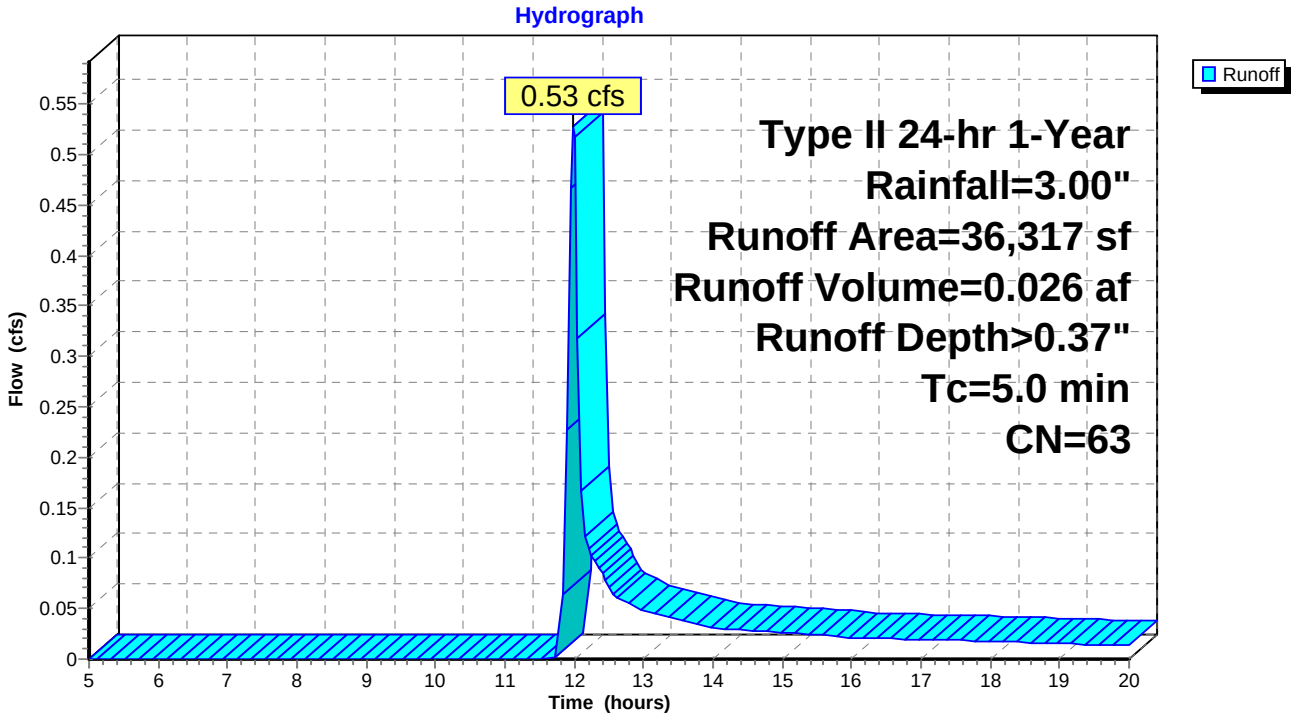
Runoff = 0.53 cfs @ 11.99 hrs, Volume= 0.026 af, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=3.00"

Area (sf)	CN	Description
3,380	98	Paved parking, HSG B
8,702	55	Woods, Good, HSG B
24,235	61	>75% Grass cover, Good, HSG B
36,317	63	Weighted Average
32,937		90.69% Pervious Area
3,380		9.31% Impervious Area

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

Subcatchment 4S: Bypass Detention



Summary for Pond 5P: Underground Detention

Inflow Area = 0.470 ac, 82.00% Impervious, Inflow Depth > 1.94" for 1-Year event
Inflow = 1.69 cfs @ 11.95 hrs, Volume= 0.076 af
Outflow = 0.04 cfs @ 14.42 hrs, Volume= 0.035 af, Atten= 97%, Lag= 148.2 min
Primary = 0.04 cfs @ 14.42 hrs, Volume= 0.035 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 423.14' @ 14.42 hrs Surf.Area= 0.023 ac Storage= 0.048 af

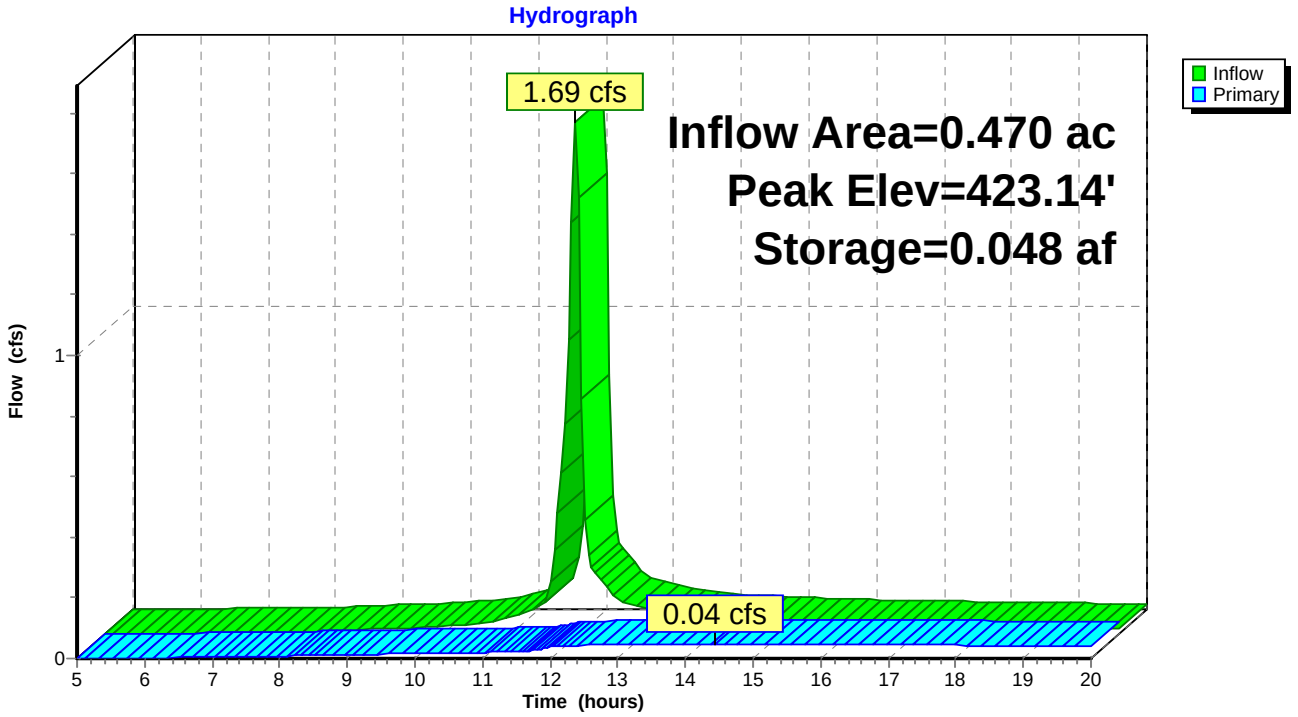
Plug-Flow detention time= 210.1 min calculated for 0.035 af (47% of inflow)
Center-of-Mass det. time= 129.5 min (894.0 - 764.5)

Volume	Invert	Avail.Storage	Storage Description
#1	420.40'	0.090 af	**60.0" D x 50.0'L Pipe Storage S= 0.0050 '/'** x 4

Device	Routing	Invert	Outlet Devices
#1	Primary	420.20'	**18.0" Round Culvert** L= 14.0' RCP, square edge headwall, Ke= 0.500 Outlet Invert= 420.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections
#2	Device 1	420.20'	**1.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	423.60'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	425.00'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.04 cfs @ 14.42 hrs HW=423.14' (Free Discharge)
└─**1=Culvert** (Passes 0.04 cfs of 12.60 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 8.20 fps)
  ├─**3=Orifice/Grate** (Controls 0.00 cfs)
  └─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Underground Detention

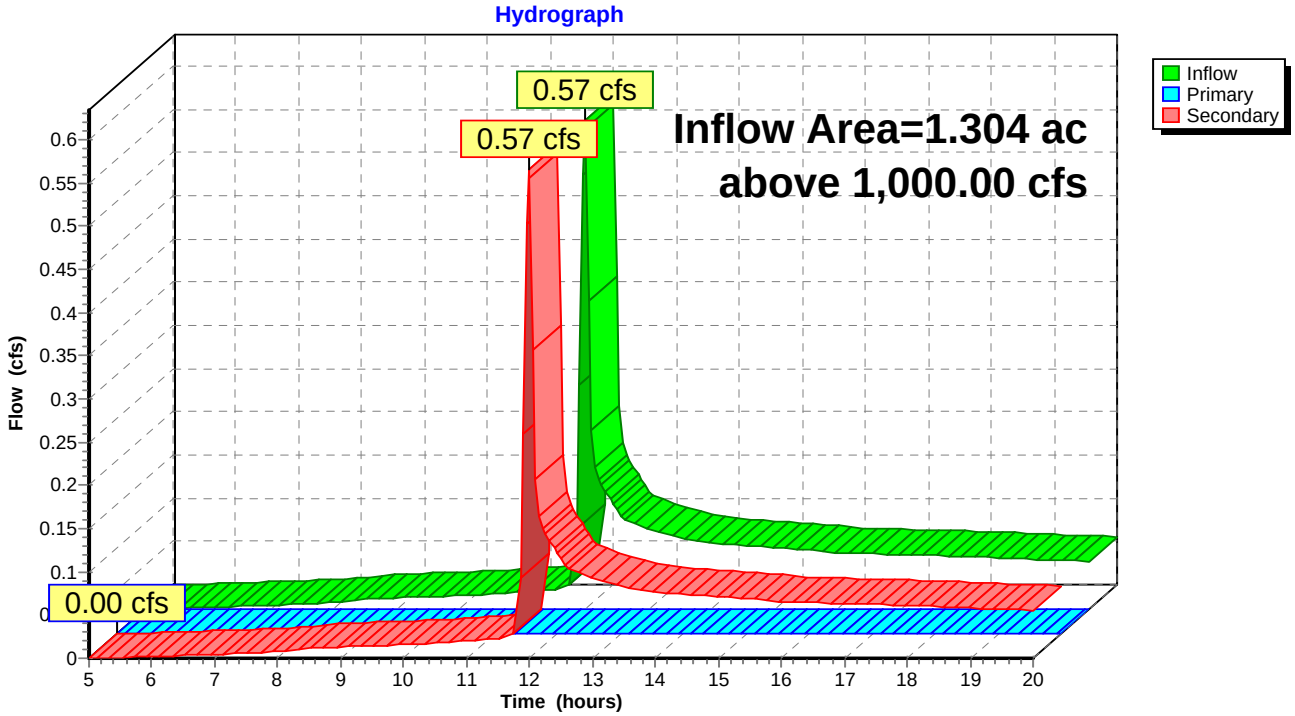


Summary for Link 6L: Combined Hydrograph

Inflow Area =	1.304 ac, 35.52% Impervious, Inflow Depth > 0.57" for 1-Year event				
Inflow =	0.57 cfs @	11.99 hrs,	Volume=	0.061 af	
Primary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af,	Atten= 100%, Lag= 0.0 min
Secondary =	0.57 cfs @	11.99 hrs,	Volume=	0.061 af	

Primary outflow = Inflow above 1,000.00 cfs, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Combined Hydrograph



Summary for Subcatchment 3S: To Detention

[49] Hint: Tc<2dt may require smaller dt

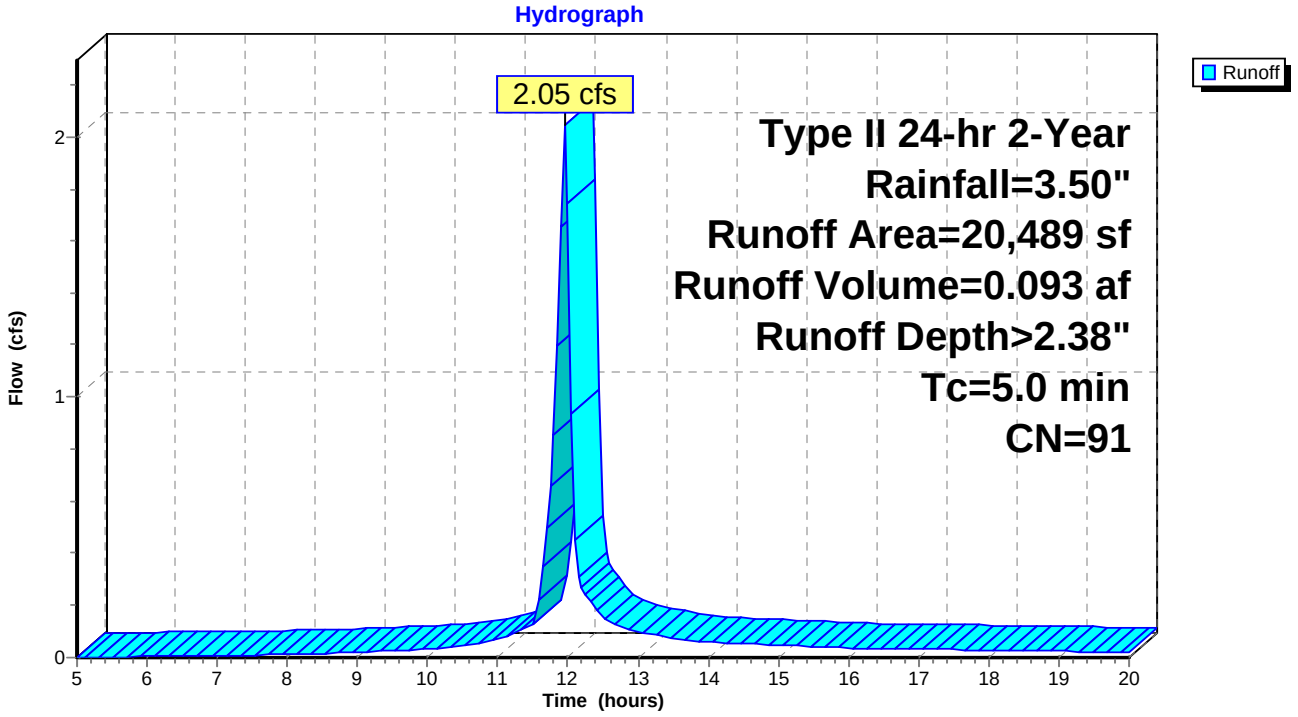
Runoff = 2.05 cfs @ 11.95 hrs, Volume= 0.093 af, Depth> 2.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
16,800	98	Paved parking, HSG B
3,689	61	>75% Grass cover, Good, HSG B
20,489	91	Weighted Average
3,689		18.00% Pervious Area
16,800		82.00% Impervious Area

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

Subcatchment 3S: To Detention



Summary for Subcatchment 4S: Bypass Detention

[49] Hint: Tc<2dt may require smaller dt

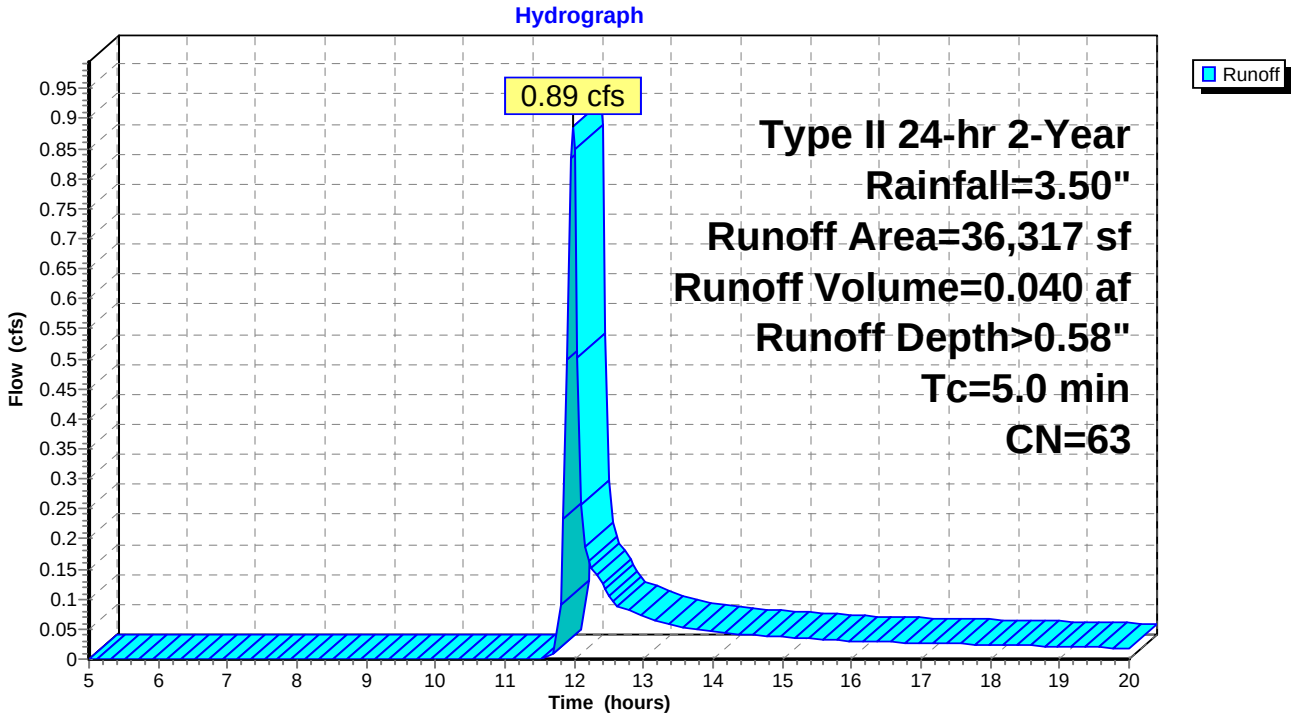
Runoff = 0.89 cfs @ 11.98 hrs, Volume= 0.040 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=3.50"

Area (sf)	CN	Description
3,380	98	Paved parking, HSG B
8,702	55	Woods, Good, HSG B
24,235	61	>75% Grass cover, Good, HSG B
36,317	63	Weighted Average
32,937		90.69% Pervious Area
3,380		9.31% Impervious Area

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

Subcatchment 4S: Bypass Detention



Summary for Pond 5P: Underground Detention

Inflow Area = 0.470 ac, 82.00% Impervious, Inflow Depth > 2.38" for 2-Year event
Inflow = 2.05 cfs @ 11.95 hrs, Volume= 0.093 af
Outflow = 0.06 cfs @ 13.87 hrs, Volume= 0.041 af, Atten= 97%, Lag= 114.8 min
Primary = 0.06 cfs @ 13.87 hrs, Volume= 0.041 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 423.67' @ 13.87 hrs Surf.Area= 0.022 ac Storage= 0.060 af

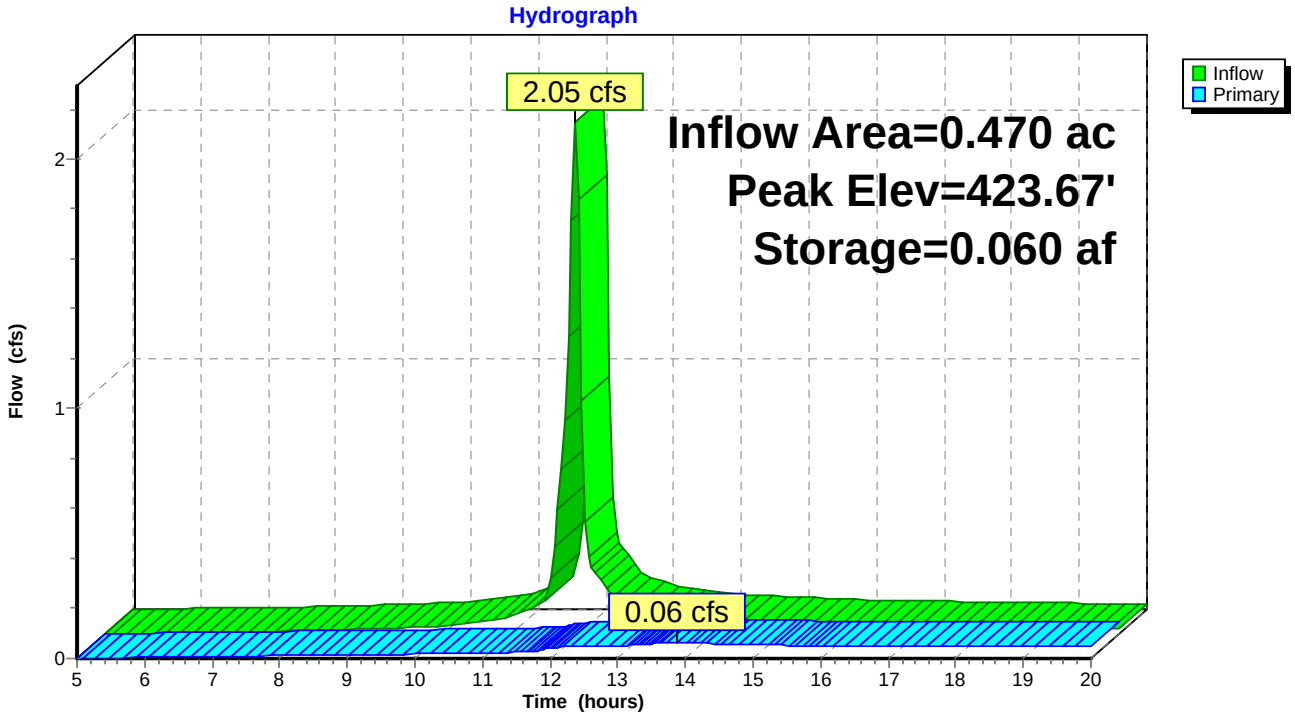
Plug-Flow detention time= 208.6 min calculated for 0.041 af (44% of inflow)
Center-of-Mass det. time= 123.6 min (883.3 - 759.7)

Volume	Invert	Avail.Storage	Storage Description
#1	420.40'	0.090 af	**60.0" D x 50.0'L Pipe Storage S= 0.0050 '/'** x 4

Device	Routing	Invert	Outlet Devices
#1	Primary	420.20'	**18.0" Round Culvert** L= 14.0' RCP, square edge headwall, Ke= 0.500 Outlet Invert= 420.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections
#2	Device 1	420.20'	**1.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	423.60'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	425.00'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.06 cfs @ 13.87 hrs HW=423.67' (Free Discharge)
└─**1=Culvert** (Passes 0.06 cfs of 14.02 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.05 cfs @ 8.91 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.01 cfs @ 0.88 fps)
  └─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: Underground Detention

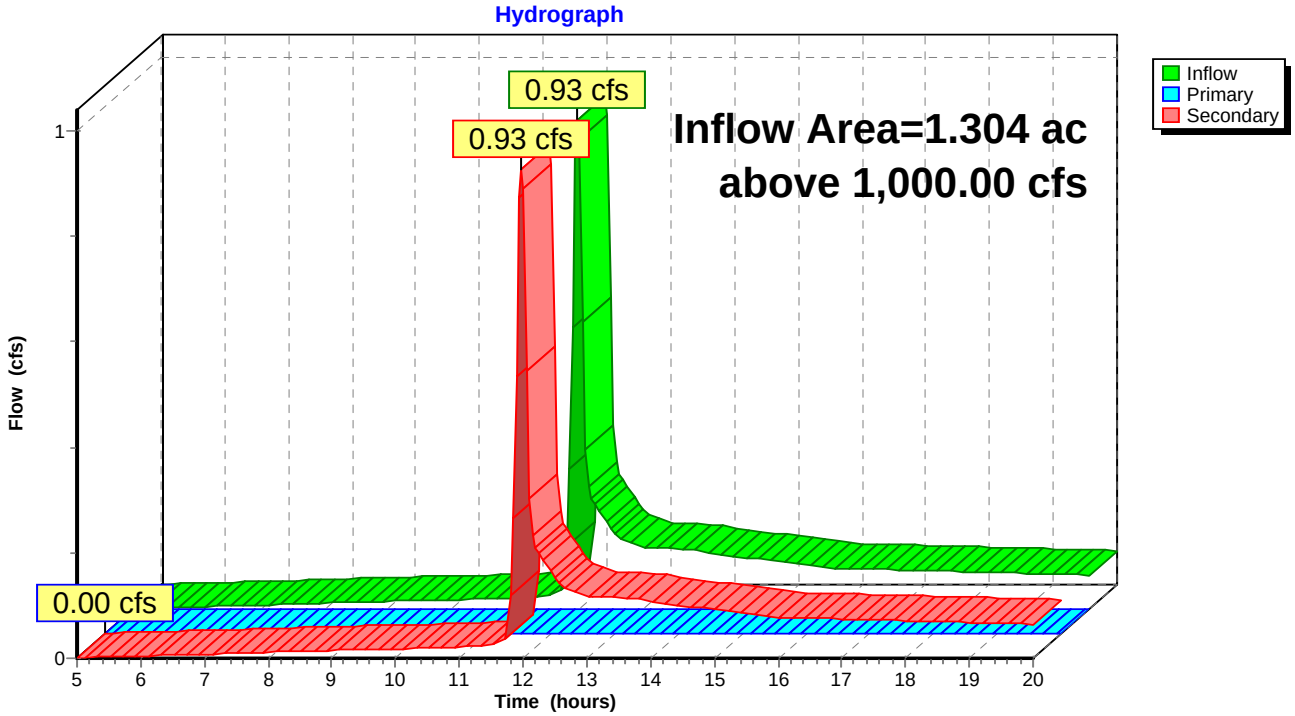


Summary for Link 6L: Combined Hydrograph

Inflow Area =	1.304 ac, 35.52% Impervious, Inflow Depth > 0.75" for 2-Year event				
Inflow =	0.93 cfs @	11.98 hrs,	Volume=	0.082 af	
Primary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af,	Atten= 100%, Lag= 0.0 min
Secondary =	0.93 cfs @	11.98 hrs,	Volume=	0.082 af	

Primary outflow = Inflow above 1,000.00 cfs, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Combined Hydrograph



Summary for Subcatchment 3S: To Detention

[49] Hint: Tc<2dt may require smaller dt

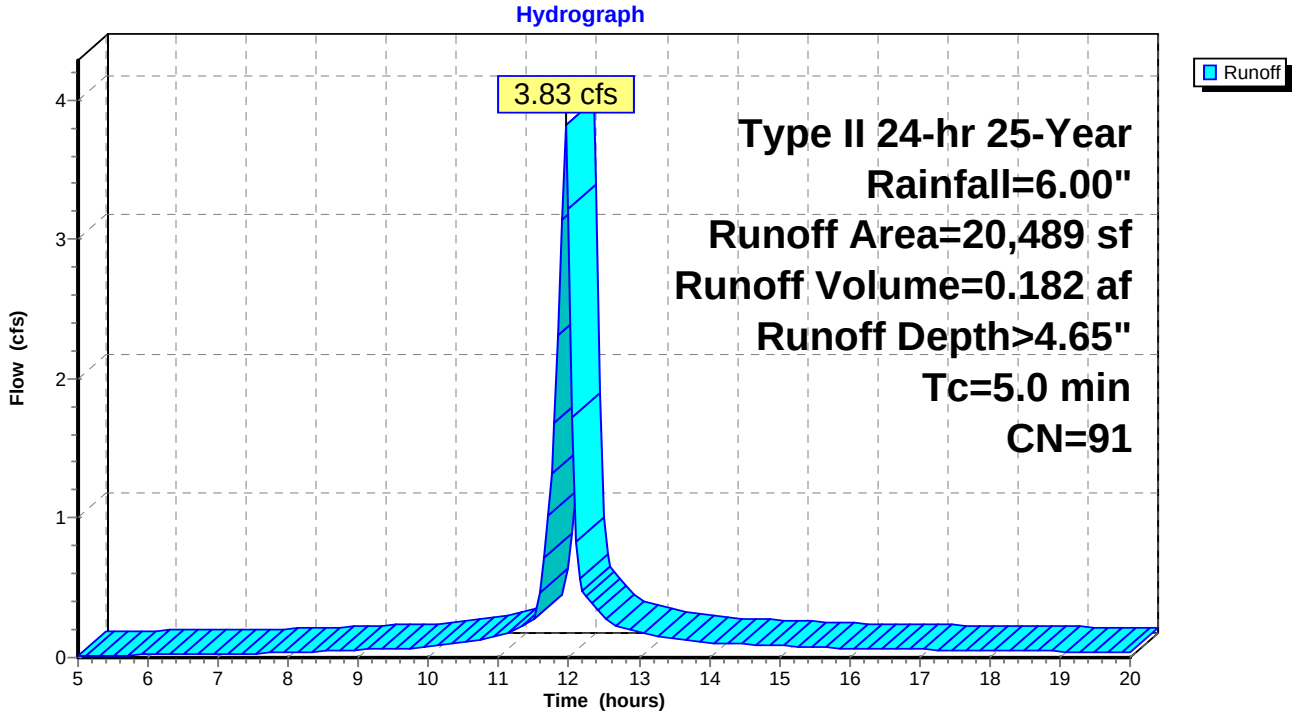
Runoff = 3.83 cfs @ 11.95 hrs, Volume= 0.182 af, Depth> 4.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
16,800	98	Paved parking, HSG B
3,689	61	>75% Grass cover, Good, HSG B
20,489	91	Weighted Average
3,689		18.00% Pervious Area
16,800		82.00% Impervious Area

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

Subcatchment 3S: To Detention



Summary for Subcatchment 4S: Bypass Detention

[49] Hint: Tc<2dt may require smaller dt

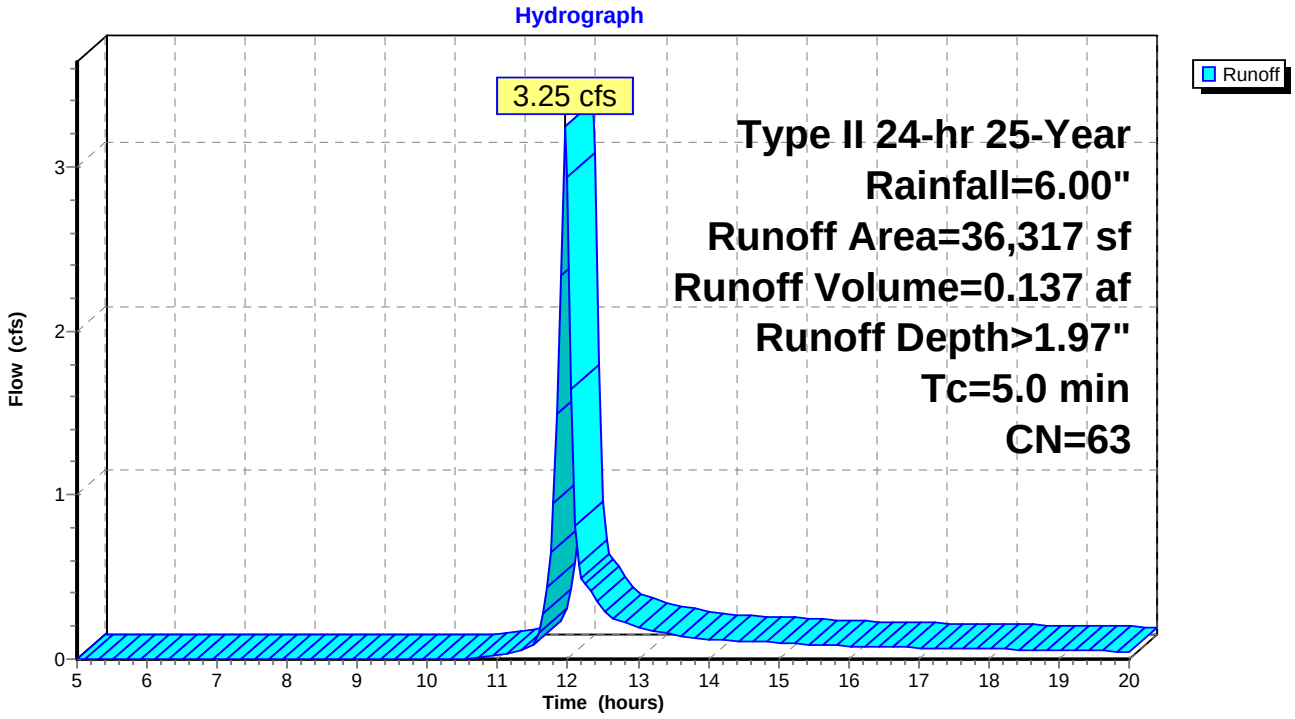
Runoff = 3.25 cfs @ 11.96 hrs, Volume= 0.137 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=6.00"

Area (sf)	CN	Description
3,380	98	Paved parking, HSG B
8,702	55	Woods, Good, HSG B
24,235	61	>75% Grass cover, Good, HSG B
36,317	63	Weighted Average
32,937		90.69% Pervious Area
3,380		9.31% Impervious Area

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

Subcatchment 4S: Bypass Detention



Summary for Pond 5P: Underground Detention

[82] Warning: Early inflow requires earlier time span

Inflow Area =	0.470 ac, 82.00% Impervious, Inflow Depth > 4.65" for 25-Year event				
Inflow =	3.83 cfs @	11.95 hrs, Volume=	0.182 af		
Outflow =	2.16 cfs @	12.05 hrs, Volume=	0.124 af, Atten= 44%, Lag= 6.0 min		
Primary =	2.16 cfs @	12.05 hrs, Volume=	0.124 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 425.16' @ 12.06 hrs Surf.Area= 0.012 ac Storage= 0.087 af

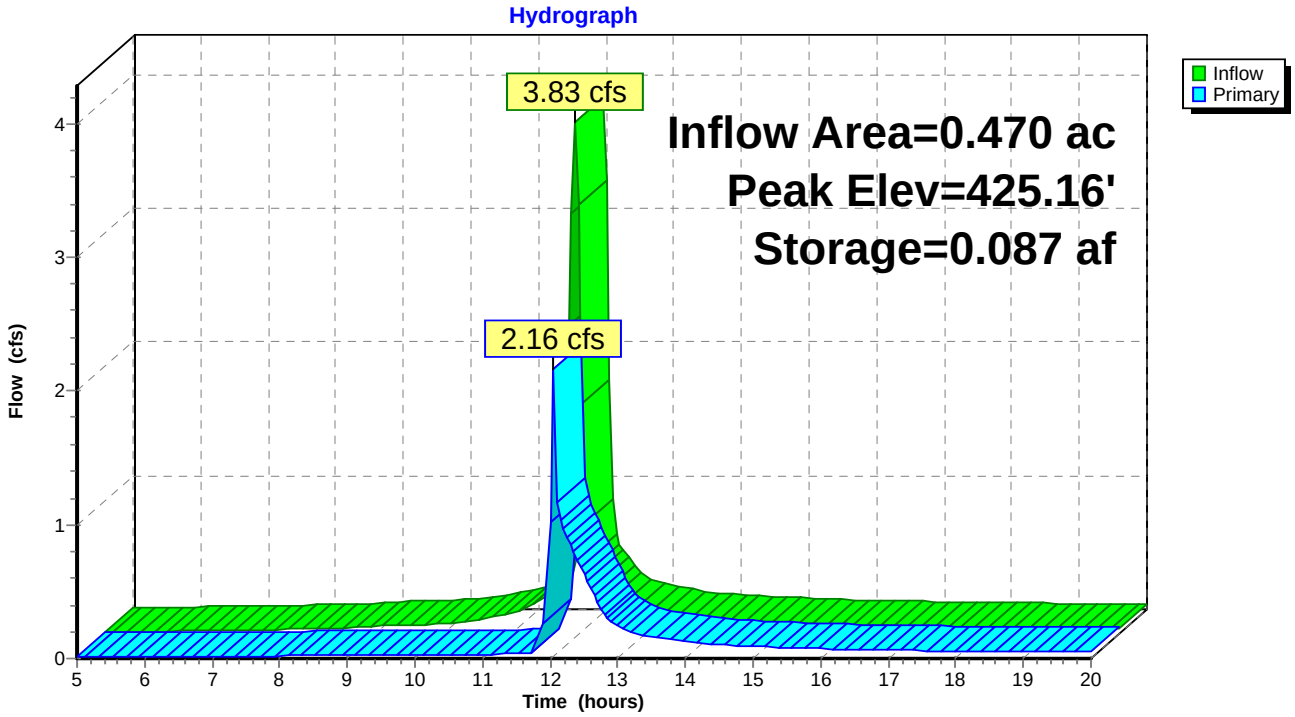
Plug-Flow detention time= 118.4 min calculated for 0.124 af (68% of inflow)
Center-of-Mass det. time= 51.2 min (797.4 - 746.2)

Volume	Invert	Avail.Storage	Storage Description
#1	420.40'	0.090 af	**60.0" D x 50.0'L Pipe Storage S= 0.0050 '/'** x 4

Device	Routing	Invert	Outlet Devices
#1	Primary	420.20'	**18.0" Round Culvert** L= 14.0' RCP, square edge headwall, Ke= 0.500 Outlet Invert= 420.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections
#2	Device 1	420.20'	**1.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	423.60'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	425.00'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.10 cfs @ 12.05 hrs HW=425.15' (Free Discharge)
└─**1=Culvert** (Passes 2.10 cfs of 17.44 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.06 cfs @ 10.67 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.08 cfs @ 5.49 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 0.97 cfs @ 1.08 fps)

Pond 5P: Underground Detention

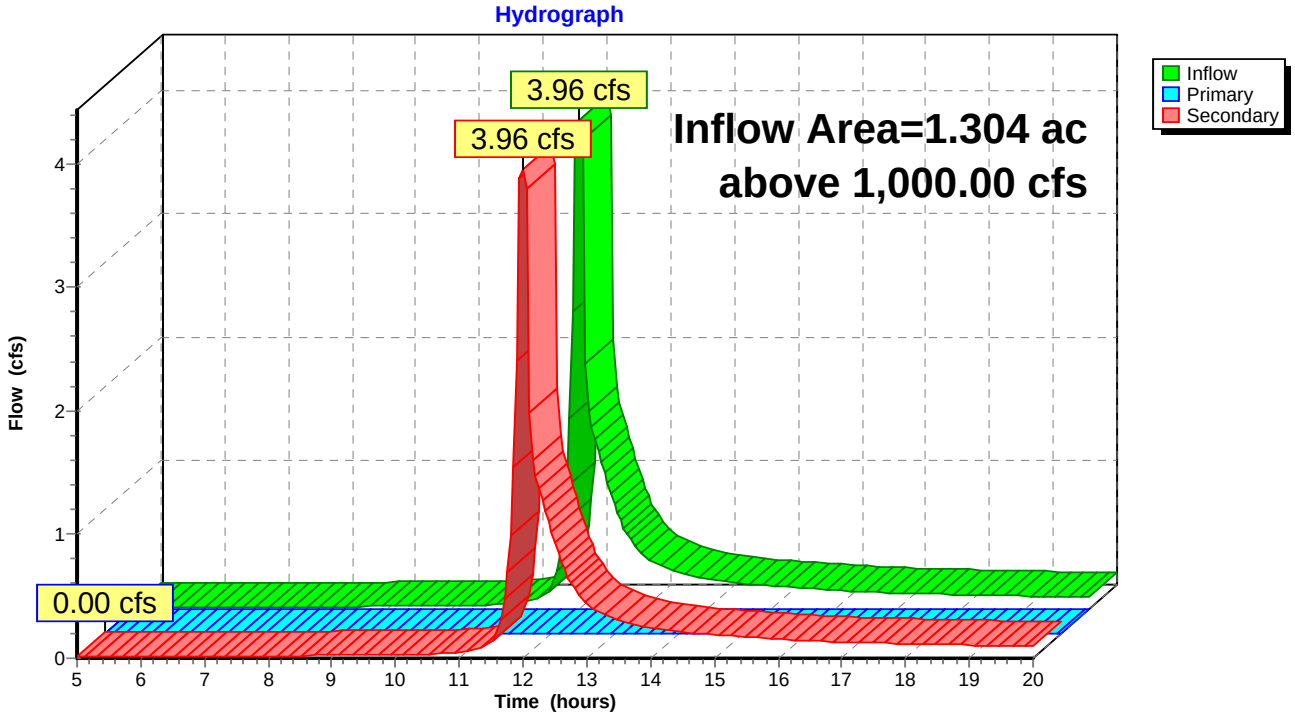


Summary for Link 6L: Combined Hydrograph

Inflow Area =	1.304 ac, 35.52% Impervious, Inflow Depth > 2.41" for 25-Year event				
Inflow =	3.96 cfs @	11.99 hrs,	Volume=	0.261 af	
Primary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af,	Atten= 100%, Lag= 0.0 min
Secondary =	3.96 cfs @	11.99 hrs,	Volume=	0.261 af	

Primary outflow = Inflow above 1,000.00 cfs, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Combined Hydrograph



Summary for Subcatchment 3S: To Detention

[49] Hint: Tc<2dt may require smaller dt

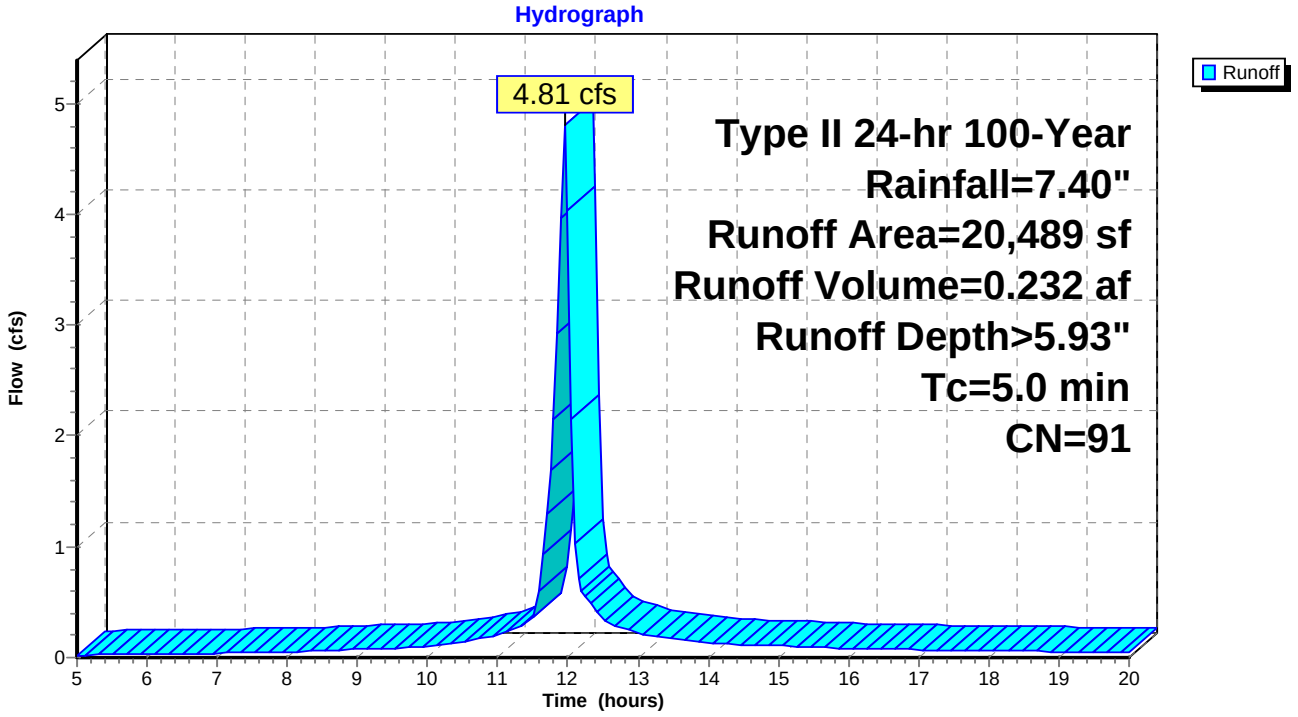
Runoff = 4.81 cfs @ 11.95 hrs, Volume= 0.232 af, Depth> 5.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.40"

Area (sf)	CN	Description
16,800	98	Paved parking, HSG B
3,689	61	>75% Grass cover, Good, HSG B
20,489	91	Weighted Average
3,689		18.00% Pervious Area
16,800		82.00% Impervious Area

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

Subcatchment 3S: To Detention



Summary for Subcatchment 4S: Bypass Detention

[49] Hint: Tc<2dt may require smaller dt

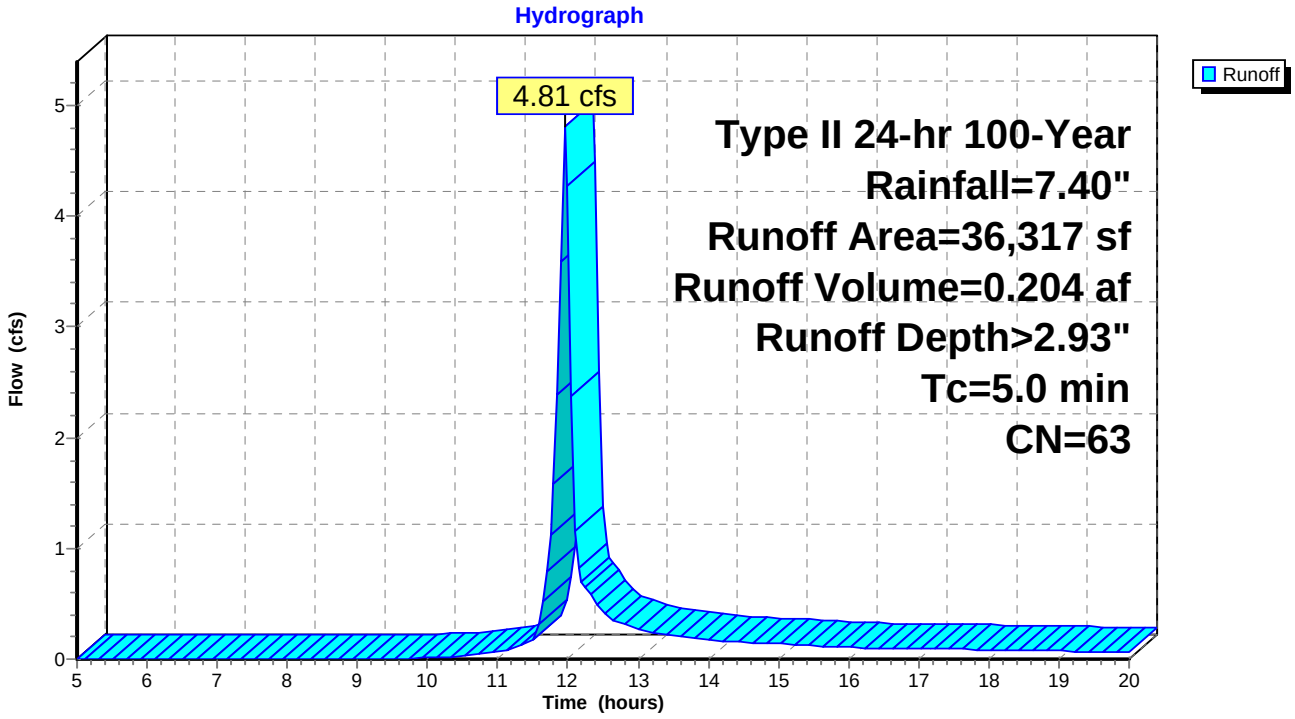
Runoff = 4.81 cfs @ 11.96 hrs, Volume= 0.204 af, Depth> 2.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=7.40"

Area (sf)	CN	Description
3,380	98	Paved parking, HSG B
8,702	55	Woods, Good, HSG B
24,235	61	>75% Grass cover, Good, HSG B
36,317	63	Weighted Average
32,937		90.69% Pervious Area
3,380		9.31% Impervious Area

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

Subcatchment 4S: Bypass Detention



Summary for Pond 5P: Underground Detention

[82] Warning: Early inflow requires earlier time span
[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area =	0.470 ac, 82.00% Impervious, Inflow Depth > 5.93" for 100-Year event				
Inflow =	4.81 cfs @	11.95 hrs, Volume=	0.232 af		
Outflow =	5.24 cfs @	12.00 hrs, Volume=	0.173 af, Atten= 0%, Lag= 2.7 min		
Primary =	5.24 cfs @	12.00 hrs, Volume=	0.173 af		

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 425.38' @ 12.00 hrs Surf.Area= 0.008 ac Storage= 0.089 af

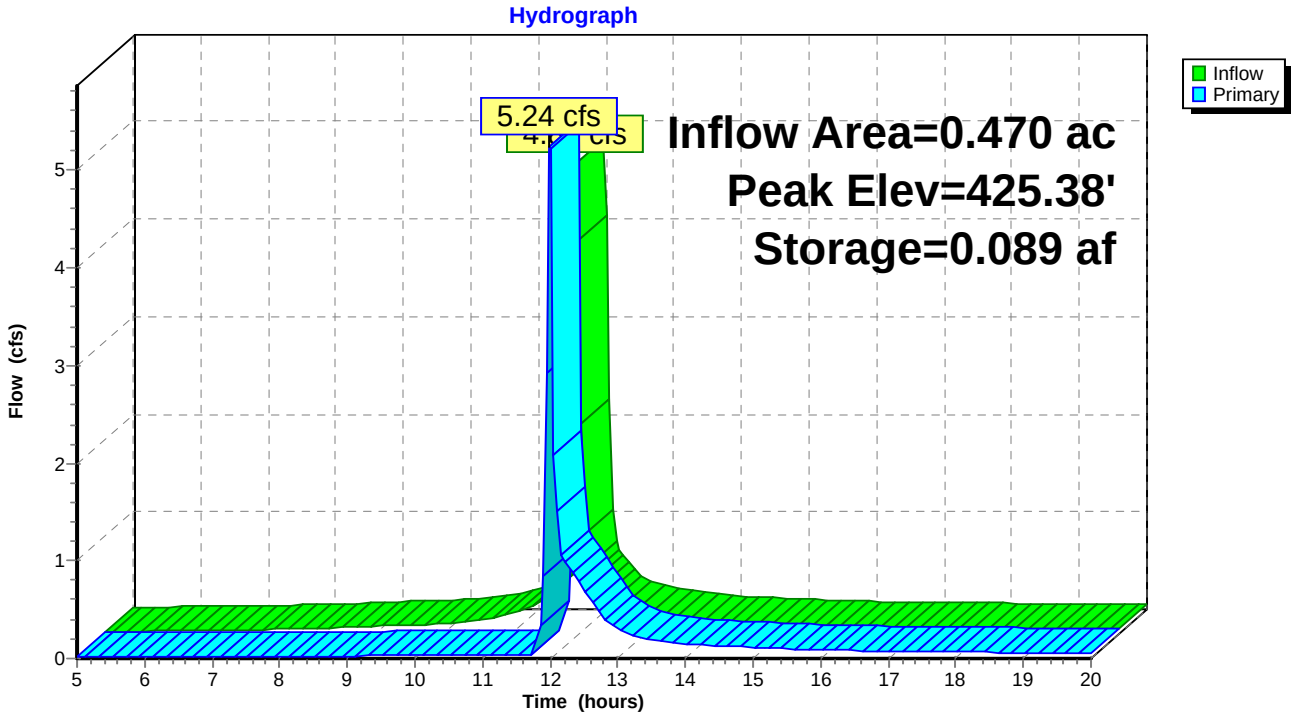
Plug-Flow detention time= 105.5 min calculated for 0.173 af (75% of inflow)
Center-of-Mass det. time= 44.3 min (786.5 - 742.1)

Volume	Invert	Avail.Storage	Storage Description
#1	420.40'	0.090 af	**60.0" D x 50.0'L Pipe Storage S= 0.0050 '/'** x 4

Device	Routing	Invert	Outlet Devices
#1	Primary	420.20'	**18.0" Round Culvert** L= 14.0' RCP, square edge headwall, Ke= 0.500 Outlet Invert= 420.00' S= 0.0143 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections
#2	Device 1	420.20'	**1.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	423.60'	**6.0" Vert. Orifice/Grate** C= 0.600
#4	Device 1	425.00'	**6.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=5.01 cfs @ 12.00 hrs HW=425.36' (Free Discharge)
└─**1=Culvert** (Passes 5.01 cfs of 17.87 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.06 cfs @ 10.90 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 1.16 cfs @ 5.92 fps)
  └─**4=Broad-Crested Rectangular Weir** (Weir Controls 3.79 cfs @ 1.74 fps)

Pond 5P: Underground Detention

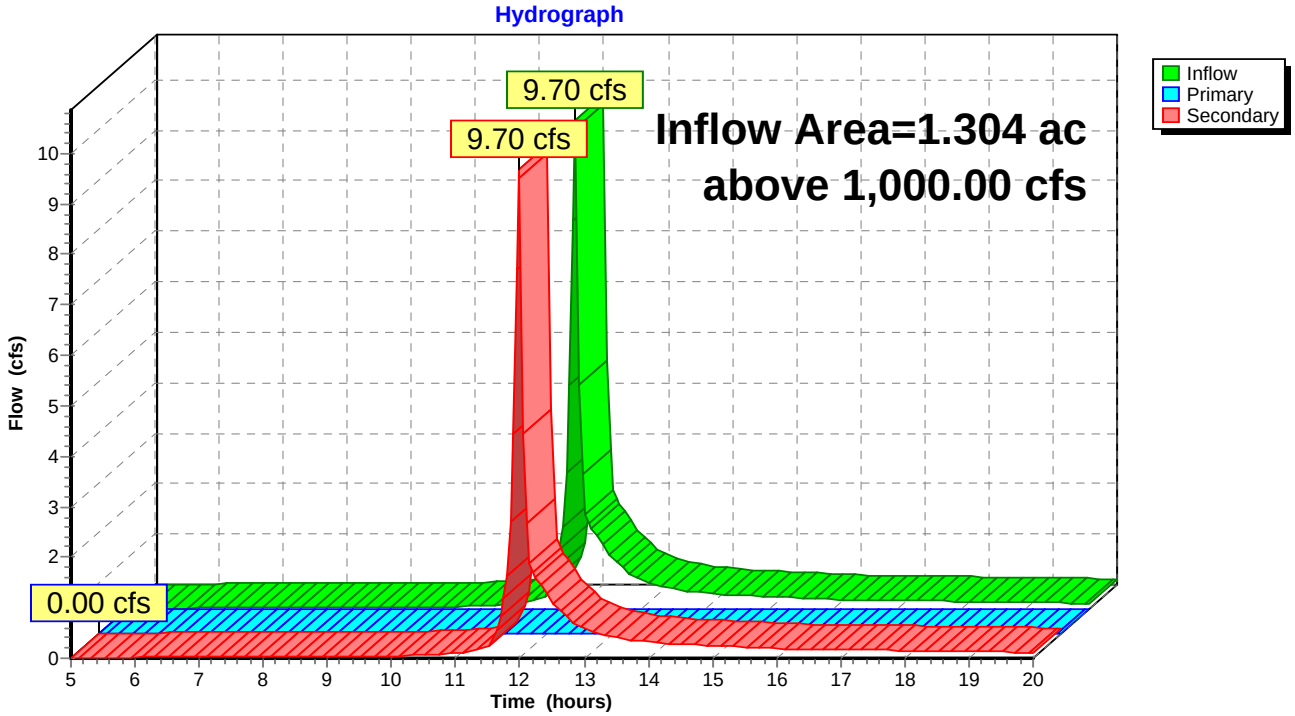


Summary for Link 6L: Combined Hydrograph

Inflow Area =	1.304 ac, 35.52% Impervious, Inflow Depth > 3.47" for 100-Year event				
Inflow =	9.70 cfs @	11.99 hrs,	Volume=	0.377 af	
Primary =	0.00 cfs @	5.00 hrs,	Volume=	0.000 af,	Atten= 100%, Lag= 0.0 min
Secondary =	9.70 cfs @	11.99 hrs,	Volume=	0.377 af	

Primary outflow = Inflow above 1,000.00 cfs, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Link 6L: Combined Hydrograph



DRAINAGE AREA MAPS

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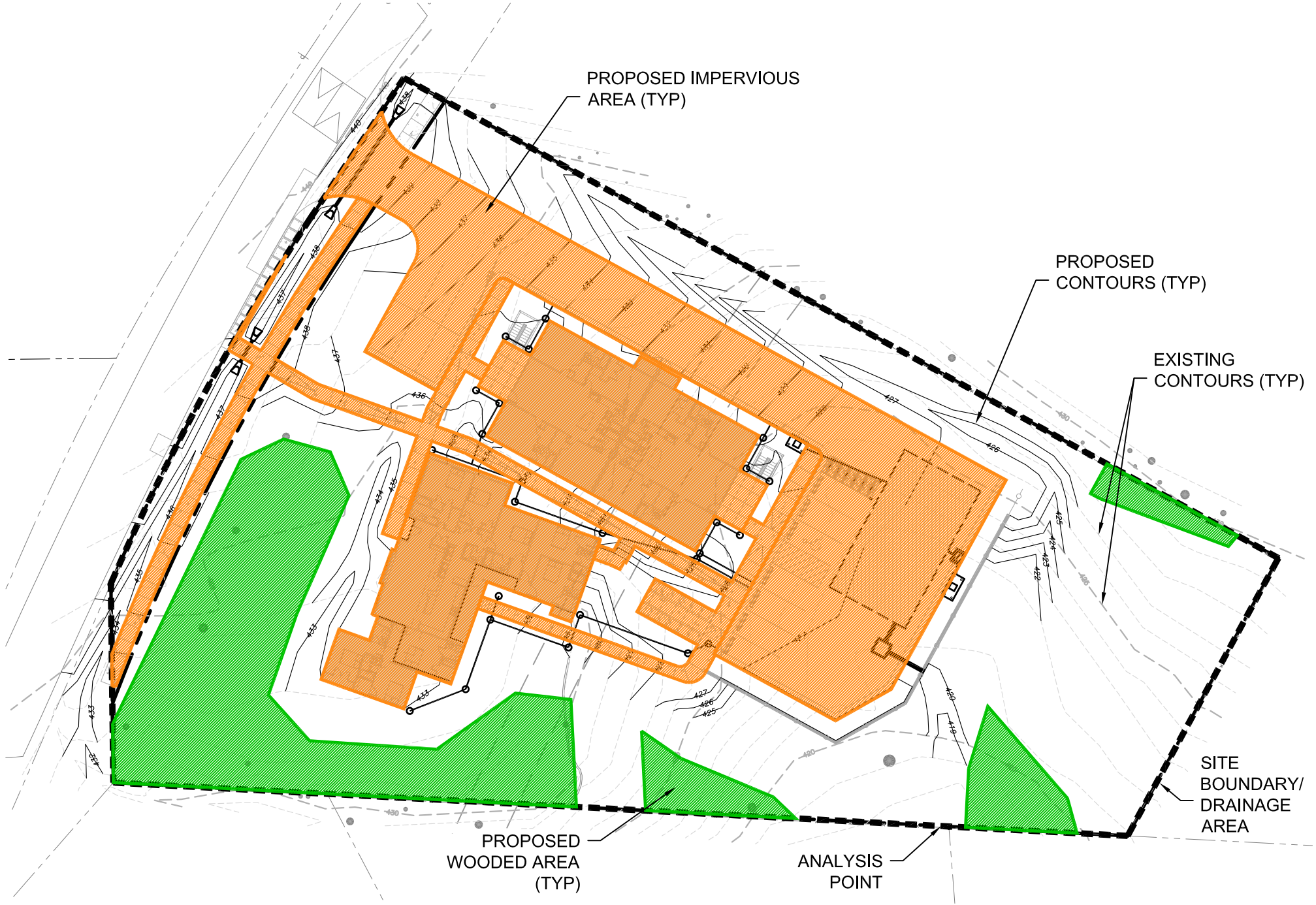
(919) 682-0368

PUREFOY ROAD APARTMENTS

PRE-DEVELOPMENT DRAINAGE AREA MAP

DATE: 05/24/2017
SCALE: 1"= 40'
DRAWN BY: TRM



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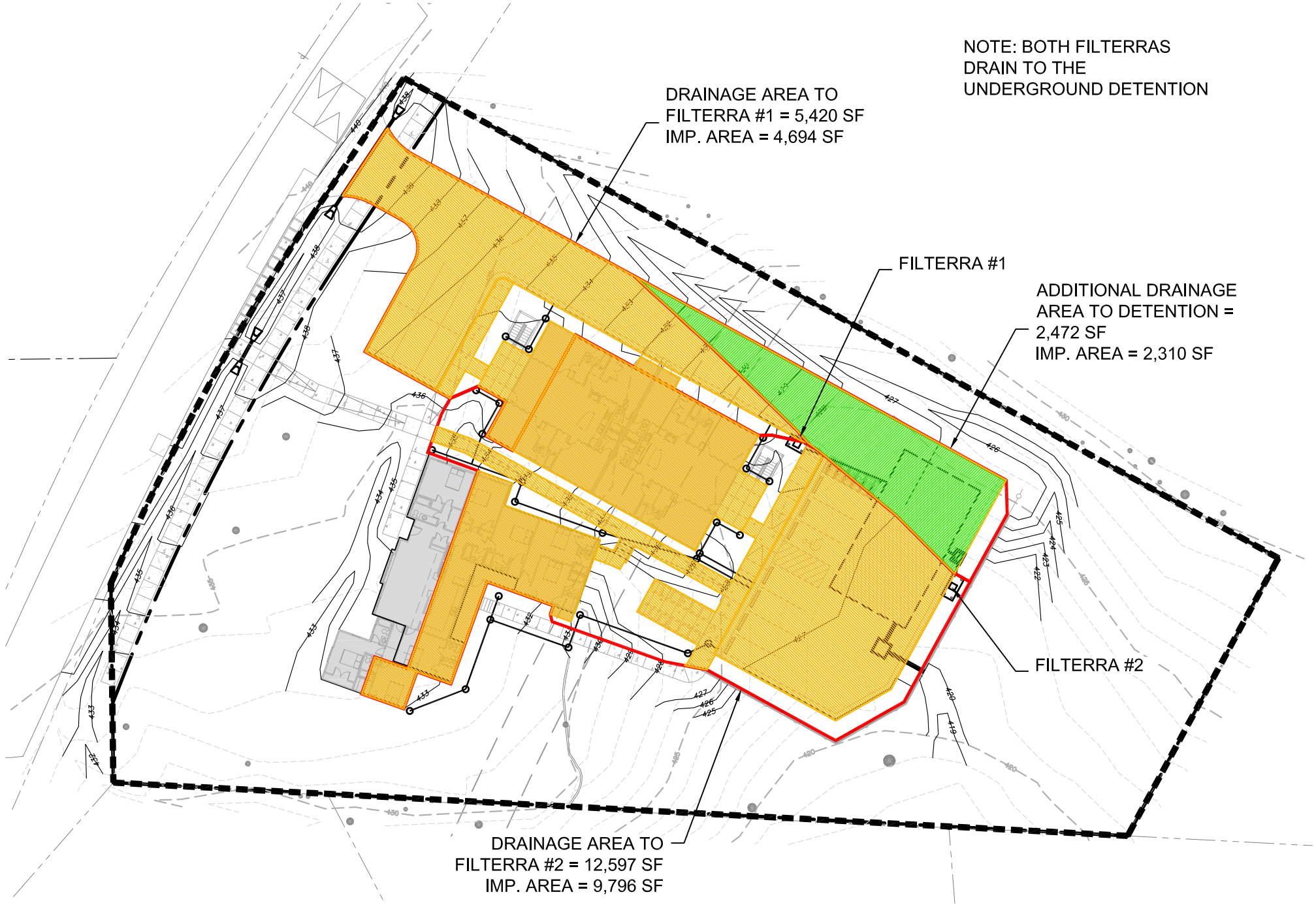
PUREFOY ROAD APARTMENTS

POST-DEVELOPMENT DRAINAGE AREA MAP

DATE: 05/24/2017
SCALE: 1"= 40'
DRAWN BY: TRM



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PUREFOY ROAD APARTMENTS

POST-DEVELOPMENT DRAINAGE AREA MAP TO SCM

DATE: 05/24/2017
SCALE: 1"= 40'
DRAWN BY: TRM

FILTERRA CALCULATIONS

Filterra Sizing Based on the NCDENR Stormwater BMP Manual Alternative Design Criteria

Sizing Basis:

The sizing for the Filterra system under the NCDENR regulations is based on designing the system to provide treatment of first 1.0" rainfall (1.5" rainfall in coastal counties). Contech has modeled a 1.0" Type II - 24 hr storm (1.5" Type III - 24 hr storm in coastal counties) to represent the water quality design storm. The Filterra system is then designed to ensure treatment of the entire hydrograph volume. Additionally to meet the Alternative Design Criteria under 15A NCAC 02H.1008, in-field testing has been shown to provide a peak flow reduction of the 1-year 24 hr storm to pre-development rates. To validate the system sizing, the following parameters were assumed:

Design Parameters:

Design Storm =	1.0" Rainfall	(Non-coastal counties)
Filterra Media Flow Rate =	140"/hr	
Site Drainage Area =	0.373 ac	
Percent Impervious =	100%	(CN = 98)
Time of Concentration =	6 min	
Allowable Ponding in Filterra =	Approx 9"	(+/- 1")
Filterra Model Size Analyzed =	13x7	(Treats 0.29 cfs at 140"/hr)

Design Summary:

Utilizing the HydroCAD Software, a hydrograph can be derived to represent the design storm (Figure 1). Based on Figure 1, the required treatment flow rate for this drainage area is 0.47 cfs.

This storm can then be routed through an appropriately sized Filterra unit, in this case a 13x7. Because the Filterra system can provide up to 9" of ponding, some flow attentuation is possible and the Filterra system is able to accommodate a portion of the water quality volume in the head space and release it at the system's design flow rate. The hydrograph in Figure 2 illustrates this concept. In this example, the 69 cf stored represents the upper portion of the hydrograph between 0.29 cfs and 0.47 cfs.

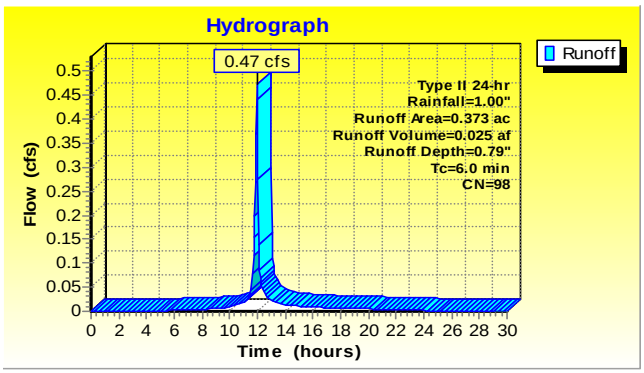


Figure 1. Inflow rate during the 1.0" Rainfall WQ Storm event.

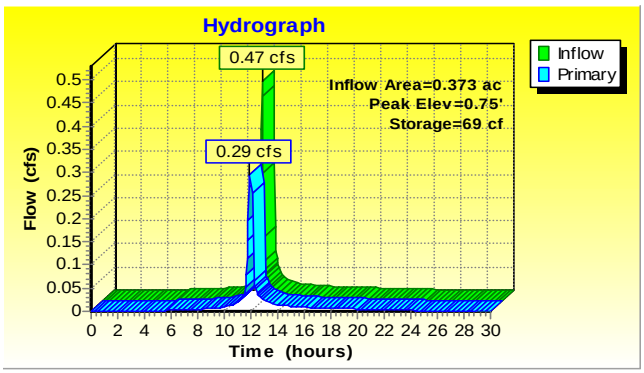


Figure 2. Inflow rate during the WQ Storm Event compared with the Filterra outlflow rate, accounting for 9" ponding within the unit.

This approach is scalable and can be completed for all Filterra sizes and the varying rainfall depth used in the coastal counties (1.5"). Table 1 identifies the maximum impervious drainage area to each Filterra unit based on this methodology. Addtionally, for drainage areas that are larger, or not fully impervious, Contech can prepare a custom sizing on a project specific basis to provide the most economical system design.

Table 1. Filterra Sizing based on the NCDENR BMP Manual.

System Size (ft)	Treatment Flow Rate at 140"/hr (cfs)	Maximum Impervious Drainage Area When Fully Ponded: 1.0" Rainfall Depth (ac)	Maximum Impervious Drainage Area When Fully Ponded: 1.5" Rainfall Depth (Coastal Counties) (ac)	Outlet Pipe Size
4x4	0.05	0.065	0.060	4" PVC
4x6 / 6x4	0.08	0.098	0.090	4" PVC
4x8 / 8x4	0.10	0.131	0.121	4" PVC
6x6	0.12	0.147	0.135	4" PVC
6x8 / 8x6 / 4x12 / 12x4	0.16	0.196	0.181	4" PVC
6x10 / 10x6	0.19	0.245	0.226	6" PVC
6x12 / 12x6	0.23	0.294	0.271	6" PVC
7x13 / 13x7	0.29	0.373	0.343	6" PVC

Filterra #1
Imp Area = 0.108 ac

Filterra #2
Imp Area = 0.225 ac

Notes:

1. Boxes are standard depth from rim to outlet: 3.5' for Standard Offline, 4.0' for Internal Bypass Curb. Contact Contech for information on Internal Bypass - Pipe systems.
2. A standard PVC pipe coupling is cast into the wall for easy connection to discharge piping
3. Dimensions shown are internal.
4. Contact Contech for site specific sizing.

SOILS, FLOOD, and USGS MAPS

COULTER JEWELL THAMES, PA
111 WEST MAIN STREET
DURHAM, NC 27701
(919) 682-0368

ORANGE COUNTY SOIL SURVEY

Purefoy Road Apartments

October 7, 2016
SCALE: 1"=2000'

Hydrologic Soil Group—Orange County, North Carolina

Map Scale: 1:716 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 30 60 120 180

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Orange County, North Carolina (NC135)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ApB	Appling sandy loam, 2 to 6 percent slopes	B	0.4	30.5%
ApC	Appling sandy loam, 6 to 10 percent slopes	B	0.9	69.5%
Totals for Area of Interest			**1.2**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

GRID NORTH

MAP SCALE 1" = 500' (1 : 6,000)

250 0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 9788J

FIRM
FLOOD INSURANCE RATE MAP
NORTH CAROLINA

PANEL 9788

(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	CID No.	PANEL	SUFFIX
CARRBORO, TOWN OF	370275	9788	J
CHAPEL HILL, TOWN OF	370180	9788	J
ORANGE COUNTY	370342	9788	J

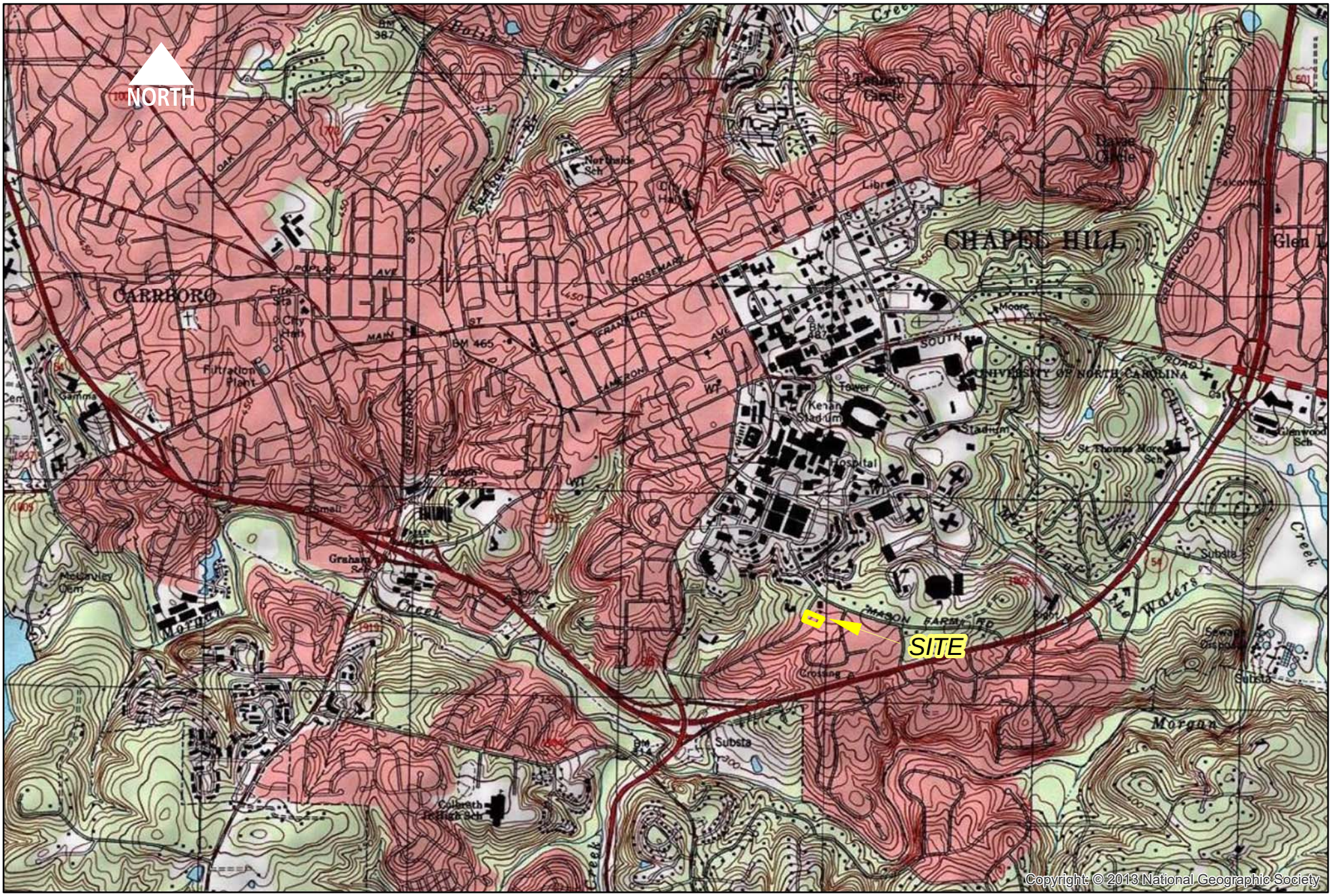
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

EFFECTIVE DATE
FEBRUARY 2, 2007

MAP NUMBER
3710978800J

State of North Carolina
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect 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.msc.fema.gov



USGS QUAD MAP - CHAPEL HILL

PUREFOY RD APARTMENTS

OCTOBER 7, 2016
SCALE: 1" = 2000'

Culvert Analysis

Coulter | Jewell | Thames, PA

Project Name: Purefoy Road Apts
Project Number: 1642

By: TRM
Date: 10.10.2016

Revised:
Date:

Culvert Calculations

Culvert #1

DRAINAGE AREA = 2,692 SF
0.06 AC.

IMPERVIOUS =		SF	C =	0.95
GRASS =	2,692	SF	C =	0.35
WOODED =	-	SF	C =	0.2

COMPOSITE C-VALUE = 0.35

Discharge - Q = CiA

i10 = 7.22 in/hr

Q10 = 0.16 cfs

Culvert #2

DRAINAGE AREA = 960 SF
0.02 AC.

IMPERVIOUS =	153	SF	C =	0.95
GRASS =	807	SF	C =	0.35
WOODED =	-	SF	C =	0.2

COMPOSITE C-VALUE = 0.45

Discharge - Q = CiA

i10 = 7.22 in/hr

Q10 = 0.07 cfs

Outlet Protection Calculations

OUTLET: Culvert #1

Inputs:

Pipe Diameter = 15 in
Slope = 1.00%
Q(10) = 0.16 cfs
v(10) = 2.22 fps
Zone: 1

Apron Materials:

Minimum- Stone Filling (Fine) - Cl. 'A'
Proposed- Stone Filling (Fine) - Cl. 'A'

Apron Dimensions:

Length
Multiplier 3
To Protect Culvert (L1) = 3.75 ft
Multiplier 4
To Protect Scour (L2) = 5 ft
Width
W = 3.75 ft
Thickness
Th = 12 in

Outlet Protection Calculations

OUTLET: Culvert #2

Inputs:

Pipe Diameter = 15 in
Slope = 1.00%
Q(10) = 0.07 cfs
v(10) = 1.74 fps
Zone: 1

Apron Materials:

Minimum- Stone Filling (Fine) - Cl. 'A'
Proposed- Stone Filling (Fine) - Cl. 'A'

Apron Dimensions:

Length
Multiplier 3
To Protect Culvert (L1) = 3.75 ft
Multiplier 4
To Protect Scour (L2) = 5 ft
Width
W = 3.75 ft
Thickness
Th = 12 in

Culvert #1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.25	ft
Discharge	0.16	ft^3/s

Results

Normal Depth	0.14	ft
Flow Area	0.07	ft^2
Wetted Perimeter	0.84	ft
Hydraulic Radius	0.09	ft
Top Width	0.78	ft
Critical Depth	0.15	ft
Percent Full	10.9	%
Critical Slope	0.00582	ft/ft
Velocity	2.22	ft/s
Velocity Head	0.08	ft
Specific Energy	0.21	ft
Froude Number	1.29	
Maximum Discharge	6.95	ft^3/s
Discharge Full	6.46	ft^3/s
Slope Full	0.00001	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	10.85	%
Downstream Velocity	Infinity	ft/s

Culvert #1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.14	ft
Critical Depth	0.15	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00582	ft/ft

Culvert #2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.25	ft
Discharge	0.07	ft^3/s

Results

Normal Depth	0.09	ft
Flow Area	0.04	ft^2
Wetted Perimeter	0.68	ft
Hydraulic Radius	0.06	ft
Top Width	0.65	ft
Critical Depth	0.10	ft
Percent Full	7.3	%
Critical Slope	0.00657	ft/ft
Velocity	1.74	ft/s
Velocity Head	0.05	ft
Specific Energy	0.14	ft
Froude Number	1.23	
Maximum Discharge	6.95	ft^3/s
Discharge Full	6.46	ft^3/s
Slope Full	0.00000	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	7.32	%
Downstream Velocity	Infinity	ft/s

Culvert #2

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.09	ft
Critical Depth	0.10	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00657	ft/ft

Coulter Jewell Thames, PA

Purefoy Road Apartments

FIRE FLOW ANALYSIS

Site Plan Submittal

PIN #
9788-41-9609

NORTH CAROLINA PROFESSIONAL SEAL 35003 ENGINEER PRESTON B. ROYSTER
5/25/17

Calculations By: Preston B. Royster, PE

Coulter Jewell Thames, P.A.
111 West Main Street
Durham, NC 27701
Ph: 919-682-0368
Fax: 919-688-5646
NC Board of Engineers & Surveyors License No. C-1209

May 25, 2017

Project Description and Summary:

The Purefoy Road Apartments Project is located at 111 Purefoy Road, Chapel Hill, NC 27514. The project involves one building addition to an existing residence, construction of two new duplexes, concrete sidewalks, and paved driveways and parking spaces.

As part of this project, a new fire hydrant is proposed that will be tapped off the existing 8" main along the frontage of the site. The only proposed water line extensions onto the site are for domestic flow and NFPA 13 sprinkler systems.

The existing site is fed by the OWASA water system. There is an existing 8" line in Purefoy Rd along the site's frontage. The proposed hydrant will be tapped directly off of the existing main.

Based on a preliminary analysis of the existing system, the Town's minimum fire flow of 2,500 gpm at 20 psi is not obtainable at this location due to limitations of the existing water system. With that said, a flow of 2,350 gpm can be obtained with a residual pressure of 21.04 psi. According to Table B105.1 in Appendix B of the NC Fire Code, the required fire flow for Type V-B construction and a 9,576 sf building (the new, larger building) is 2,750 gpm. Since an automatic sprinkler system will be installed, the required fire flow can be reduced by up to 50%. The provided fire flow of 2,350 gpm is a reduction of approximately 15%. Given this, the provided fire flow of 2,350 gpm should be acceptable.

The water system was modeled using WaterCAD v8i. The proposed hydrant is represented by node "FH-1" in the model. With a fire flow demand of 2,350 gpm, we were able to obtain a pressure of 21.04 psi. This meets the minimum required flow based on Table B150.1 in the NC Fire Code and is close to the Town of Chapel Hill's required flow of 2,500 gpm.

Copies of the final calculations from the WaterCAD model and the fire flow test results are attached. In summary, this study indicates that this development can be constructed as proposed and provide adequate fire flow according to the methodologies described above.

FIRE FLOW CALCULATIONS

Orange Water And Sewer Authority

OWASA

Fire Flow Test Report

Location Purefoy Road

Test Made By: Crew 4 **Time:** 08:20 AM **Date:** 06/21/16

Requested By: Andy Porter **Phone:** (919) 682-0368

Date Requested: 6/14/2016 **FAX:**

Flow Hydrant No. 1915 **Gauge Hydrant No.** 800

Hydrant Make Flow: American Darling **Nozzle Size:** 2½"

Hydrant Make Gauge: CLOW **Nozzle Size:** 2½"

Expected Static Pressure (PSI): _____ **(Approx.)**

Static Pressure (PSI): 86 **Pitot Reading:** 80 / 65

Residual Pressure (PSI) 72 **Flow (GPM):** 1500 / 1350

Sketch:

Coulter Jewell Thames P.A.

WATER PRESSURE ROUTING

PROJECT : Purefoy Road Apartments

DATE: 05/01/17

FIRE FLOW TEST RESULTS

Flow Hydrants:	1915	
Pressure Hydrant:	800	
Date of Flow:	6/21/2016	
STATIC =	86	PSI
=	**198.6**	**FT**
RESID. =	72	PSI
=	**166.3**	**FT**
FLOW =	**1500**	**GPM**
Q@20 =	**3465.3**	**GPM**
R@20 =	20.0	PSI
=	**46.2**	**FT**

FlexTable: Pump Table

ID	Label	Elevation (ft)	Pump Definition	Status (Initial)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
34	PMP-1	434.00	Pump Definition - 1	On	434.00	558.39	2,350	124.39

Pump Definition Detailed Report: Pump Definition - 1

Element Details

ID	35	Notes	
Label	Pump Definition - 1		

Pump Definition Type

Pump Definition Type	Standard (3 Point)	Design Head	166.30 ft
Shutoff Flow	0 gpm	Maximum Operating Flow	3,465 gpm
Shutoff Head	198.60 ft	Maximum Operating Head	46.20 ft
Design Flow	1,500 gpm		

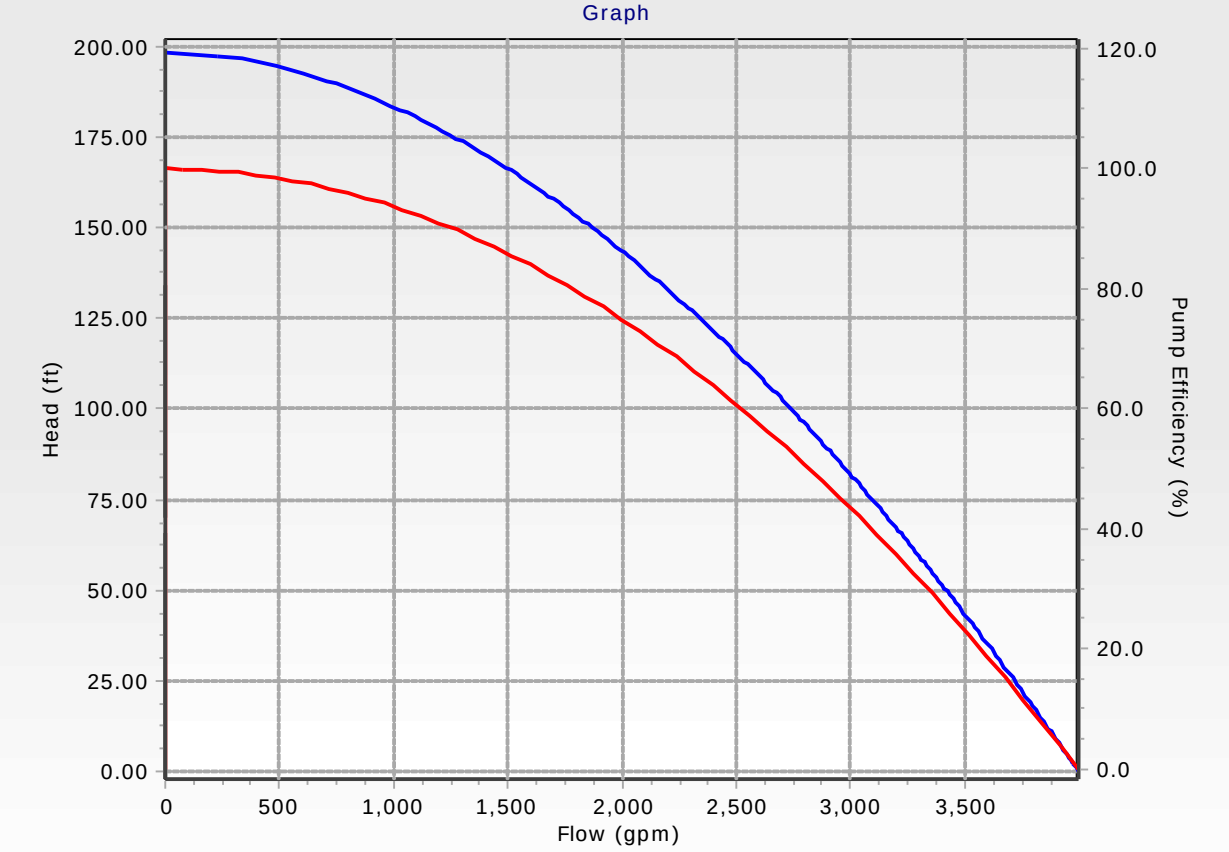
Pump Efficiency Type

Pump Efficiency Type	Best Efficiency Point	Motor Efficiency	100.0 %
BEP Efficiency	100.0 %	Is Variable Speed Drive?	False
BEP Flow	0 gpm		

Transient (Physical)

Inertia (Pump and Motor)	0.000 lb·ft²	Specific Speed	SI=25, US=1280
Speed (Full)	0 rpm	Reverse Spin Allowed?	True

Pump Definition Detailed Report: Pump Definition - 1



FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)
36	P-1	34	R-1	PMP-1	48.0	Ductile Iron	150.0	False	0.000	2,350	0.42	0.000	True	1
37	P-2	33	PMP-1	J-1	48.0	Ductile Iron	150.0	False	0.000	2,350	0.42	0.000	True	1
38	P-3	86	J-1	J-2	8.0	Ductile Iron	110.0	False	0.000	2,350	15.00	0.146	True	285
39	P-4	24	J-2	FH-1	6.0	Ductile Iron	120.0	False	0.000	2,350	26.67	1.210	True	24

FlexTable: Junction Table

ID	Label	Elevation (ft)	Zone	Demand Collection	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
30	J-1	434.00	<None>	<Collection: 0 items>	0	558.39	53.82
31	J-2	440.00	<None>	<Collection: 0 items>	0	516.67	33.17
32	FH-1	439.00	<None>	<Collection: 1 items>	2,350	487.64	21.04